SCHOOL ADMINISTRATIVE UNIT THIRTY-NINE
Amherst, Mont Vernon, and Souhegan Cooperative School Districts

STEVEN CHAMBERLIN
Interim Superintendent of Schools

CHRISTINE M. LANDWEHRLE
Assistant Superintendent

MARGARET A. BEAUCHAMP
Director of Student Services

AMY FACEY
Business Administrator

Mont Vernon School Board Meeting

Tuesday, March 7th – 6:00 PM
Mont Vernon Village School- Library
1 Kittredge Road
Mont Vernon, NH 03057

Please click the link to join the webinar
https://sau39.zoom.us/j/82472187155?pwd=bVh1ZTlHRWcwUE0wWWMrcS84bUozdz09
Passcode: 945073

All times listed below are approximate

Agenda Item	Time	Desired Action	Backup Materials
Call to Order	*6:00 PM*	*Ms. Sarah Lawrence, Mont Vernon School Board Chair, to call the meeting to order*	None
Public Input I of II	*6:00 PM*		Public Comment Procedure
Student/ Teacher Presentation	*6:15 PM*	*The board to receive an Overview of Programs from MVVS's Reading and Math Specialists*	None
Consent Agenda -Approval	*6:35 PM*	*1. AMS Feb. Principal's Report* *2. Sept. 2022 Treasurer's Report* *3. Oct. 2022 Treasurer's Report* *4. Unanticipated Revenue $675* *5. Feb. 2023 Facilities Update* *6. Budget Transfer 2023-003* *7. Budget Transfer 2023-004* *8. Kindergarten Math Curriculum* *9. Grade 1 Math Curriculum* *10. Grade 2 Math Curriculum* *11. Grade 3 Math Curriculum* *12. Grade 4 Math Curriculum* *13. Grade 5 Math Curriculum* *14. Feb 8th 2023 Draft Minutes*	AMS Feb. Principal's Report Sept. 2022 Treasurer's Report Oct. 2022 Treasurer's Report Unanticipated Revenue Memo Feb. Facilities Update Budget Transfer Memo Budget Transfer Memo K- Math Curriculum Grade 1 Math Curriculum Grade 2 Math Curriculum Grade 3 Math Curriculum Grade 4 Math Curriculum Grade 5 Math Curriculum Feb 8th 2023 Draft Minutes

Math Curriculum Update	*6:45 PM*	*Assistant Superintendent, Ms. Christine Landwehrle, to present an overview of Bridges- Math Curriculum*	Bridges Math
NWEA Insights Report	*6:55 PM*	*Board to review the NWEA Insights Report*	Insights Report
Food Service Program Projections	*7:05 PM*	*SAU #39 Business Administrator, Ms. Amy Facey, to update the board on Food Service projections*	Nutrition Memo
Instructional Time/ School Calendar	*7:10 PM*	*Board to receive an update on the Instructional Time/ School Calendar*	Instructional Time Memo
Staffing 2023- 2024	*7:25 PM*	*The Board to discuss staffing for the FY 23-24 school year*	Staffing Memo
Public Input II of II	*7:40 PM*		
Non-Public	*7:55 PM*	*RSA 91: A 3 II (b & c)*	
Meeting Adjourned	*8:00 PM*		

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Public Comment Procedure

We will take public comment tonight from our virtual audience.

If you wish to speak during the public comment session(s), we will allow in-person guests to speak for 3 minutes first. Once we go through all in-person guests, we will open it up for virtual speakers on Zoom.

In order to speak, please do the following:

1. Raise your virtual hand.
2. Enter your full name in your avatar/profile.
3. When speaking, turn your camera on and say your full name and town of residence.
4. When these are complete, you will have three minutes to speak.

1 School Street P.O. Box 849 Amherst, NH 03031-0849 Phone: 603-673-2690 Fax: 603-672-1786

Consent Agenda Item #1

Amherst Middle School

Principal's Report

February 2023

AMS Music Performances

In December, our band students had the opportunity to perform their first concert of the year. It was wonderful to see so many involved students and a large amount of growth from prior years. Additionally, our chorus students had their first performance on January 12th. It was especially great to hear grade levels perform combined pieces together on stage. We had a very high family turnout at both events and it was great once more to see the cafeteria filled with so many members of our school community. We look forward to seeing and hearing all of our groups again in the spring.

Music programs by the numbers:

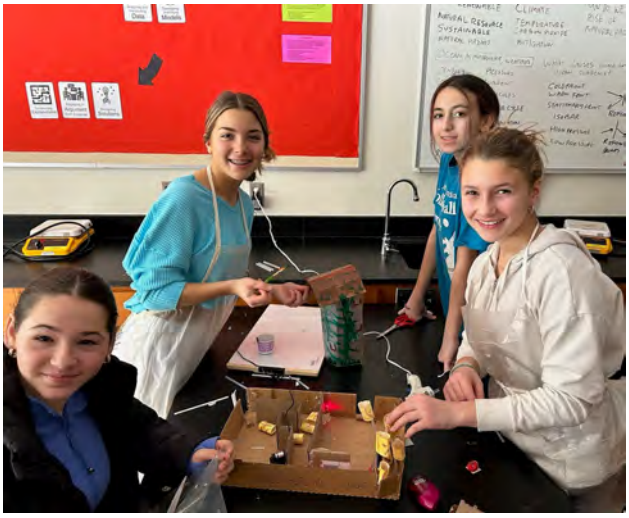
- *294 student musicians (46% of student body voluntarily enrolled in performing groups)*
- *5 different performing groups (band/chorus at each grade level, plus jazz band)*
- *32 music selections*
- *4 public concerts*

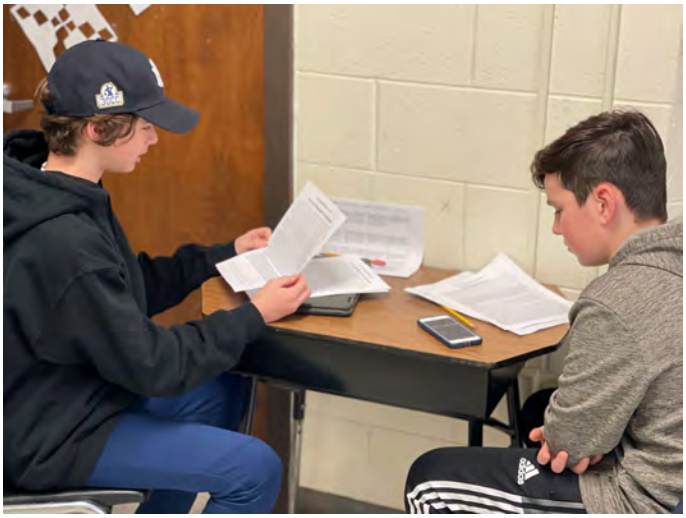
Winter Sports

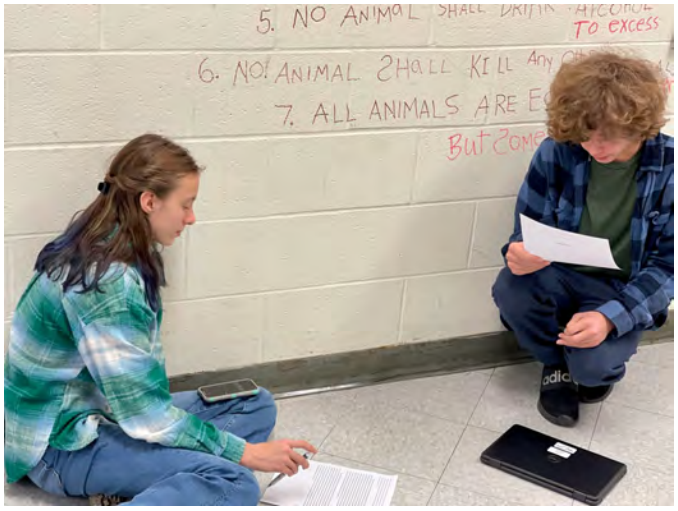
Amherst Middle School offers the following winter sports: coed wrestling, coed spirit, and boys' and girls' basketball (D2 & D6). We have had really successful seasons with nearly 100 participants involved. Our coed wrestling team recently claimed the title Tri-County League champions and our basketball teams are currently participating in playoffs. Our spirit (cheerleading) squad attends home basketball games–their school pride can't be matched!

Classroom Updates

Our students and staff have been engaged in hands-on and experiential learning over the past two months in a variety of grade levels and subject areas. From scientific investigations in our labs, to cooperative Quinzee (snow hut) building outside, to social studies presentations about important human rights topics, and business model presentations in Venture Adventure, our students have many opportunities to show us what they have learned.







Transition Planning (5th and 7th Grade)

School counselors from Amherst Middle School (Maggie Kim and Chris Beede) have been working with teams at Clark-Wilkins and Mont Vernon Village School to finalize dates for upcoming transition events for rising 5th and 7th graders. These events have certainly been impacted over the past couple of years due to the pandemic and we are looking forward to reinvigorating our transition process in order to support students and their families as they join Amherst Middle School.

AMS Spelling Bee

A huge congratulations to all of our finalists and runners-up representing the four grade levels. Getting to the finals is an accomplishment and we are proud of their hard work, dedication, and preparation for the big day! A special shout out goes to Aum P. (first place), Joel C. (2nd place) and Nick T. (third place) for their outstanding performance this morning. Many thanks for our ELA teachers, Ms. Jayma Robinson, and Dr. Steve Lebel for their assistance in organizing this event.

6th Grade Ecology School Info Night

On January 18th, our 6th grade STEM teachers hosted an information night for AMS and MVVS parents about our upcoming trip to *The Ecology School* in May. It was very well attended and we are excited to resume our typical spring trips to The Ecology School!

NWEA Testing

Students in grades 5, 6, 7, and 8 at Amherst Middle School took the NWEA assessment during the weeks of January 30th and February 6th. We look forward to examining and analyzing this data, and comparing it to the fall data during our Friday MTSS Data Dives in order to plan instruction and support individual students with their learning.

AMS Teacher PD: Brain Breaks and Dynamic Learning Structures

On February 7th, AMS professional and support staff took part in a 2.5 hour workshop with Sarah Fillion from Positive School Solutions on the topic of Brain Breaks and Dynamic Learning Structures. Integrating these techniques can boost students cognitive, social-emotional, and physical skills, and improve academic outcomes. We can't wait to see students engage in these activities in our classroom environments!

National Junior Honor Society

With nearly 50 members, the AMS Chapter of NJHS, the society just voted on which members to elect to its executive council. The chapter is being led by newly elected President, Sophie J.. In addition to the hours members contribute outside of the building, committees are forming around several different service projects with plans to beautify the school grounds, freshen up some murals inside the building, mentor younger and incoming students, raise money and collect donations for various charitable organizations, and raise school spirit. We will be hosting an induction ceremony in the coming weeks.

Bathroom Supervision & Beautification

We are happy to report that we have had no significant plumbing or vandalism issues since early December. This is largely due to tightened procedures and supervision (many thanks to AMS and SAU staff!). In addition, we are grateful to our maintenance staff for installing hand dryers in place of paper towels. We launched a Bathroom Beautification Project and are working with students to plan decorative projects for the bathrooms this winter/spring. We had over 30 entries and can't wait to get started!

Teacher Supervision and Evaluation

On Tuesday, October 11th, we started visiting classrooms for documented observations (formal and informal) as part of the teacher evaluation process. We have put significant time into completing formal observations over the past few months. *These observations include a pre-meeting, observation block, and post meeting, with written documentation for all three parts.* We will continue to update the board each month about our progress toward completion of this process for the 2022-2023 school year.

As of 02.06.2023:

Type	**Completed**	**Remaining**	**Total**
Informal	31	145	**176**
Formal	34	4	**38**

Staffing Update

Amherst Middle School is still actively hiring for 1 open position. At the time of this report, we are actively hiring for a Lunch/Recess Monitor. We are excited to announce that we recently hired a full-time experienced school nurse, Kristen Blodgett, to support Sue Sarraf in the health office for the remainder of the school year.

We also had a mid-year opening for a health teacher and have been able to fill that using a certified long term sub and a daily sub. We wish Ms. Lougee, our previous health teacher, the best in her next adventure!

Upcoming Events

February 10 (Fri): Festive Friday - Football Jerseys/Gear

February 13 (Mon): 8th Grade Parent Info Night at SHS

February 14, 15: SHS Counselors Meet with 8th Grade Students

February 17 (Fri): Festive Friday - Silly Sock Day

February 21 (Tue): Staff v Student Basketball Game, 4pm

February 22 (Wed): Winter Sports Awards Night

February 24 (Fri): Festive Friday - Tropical Beach Attire

February 27-March 3: NO SCHOOL, February Break

March 7 (Tues): Early Release Day, 12:30 Dismissal

March 14 (Tues): NJHS Induction Ceremony

March 15 (Wed): Grade 5 Pennichuck Presentation

March 27 (Mon): Spring Sports Begin

Enrollment

	August 2022	Sept. 2022	Oct. 2022	Nov. 2022	Dec. 2022	Jan. 2023	Feb. 2023
TOTAL	**634**	**638**	**640**	**639**	**639**	**640**	**641**
5th	136	138	138	138	138	138	138
6th	152	150	151	151	151	151	151
	August 2022	**Sept. 2022**	**Oct.2022**	**Nov.2022**	**Dec. 2022**	**Jan. 2023**	**Feb. 2023**
7th	167 (29MV)	169 (32MV)	170 (33MV)	170 (33MV)	169 (33MV)	169 (33MV)	170 (33MV)
8th	179 (34MV)	181 (33MV)	181 (33MV)	180 (33MV)	181 (33MV)	182 (34MV)	182 (34MV)

Respectfully submitted to the Amherst School Board on February 8, 2023

Kristen Gauthier, Principal, Amherst Middle School

Consent Agenda Item #2

Mont Vernon School District
Treasurers Cash Journal - September 2022

Treasurers' Cash Journal

DATE	DESCRIPTION	M&T Acct #502003822 AMOUNT		DESCRIPTION	M&T Acct #502003822 AMOUNT		BALANCE M&T Acct #502003822 AMOUNT
9/1/2022	**Beginning Balance**						$493,785.97
9/1/2022	State of NH	$223,696.00		EFT IRS	$22,095.09		$695,386.88
				Payroll CK#'s 5057456-5057458	$945.92		$694,440.96
				Payroll DED CK#'s 5057459-5057461	$1,141.43		$693,299.53
9/2/2022				Retirement	$800.00		$692,499.53
9/8/2022				Expense CK#'s 5057462-5057484	$264,268.75		$428,230.78
9/13/2022				Direct Deposit	$61,461.47		$366,769.31
				EFT IRS	$19,191.26		$347,578.05
				Retirement	$800.00		$346,778.05
				Payroll CK#'s 5057485-5057487	$1,800.13		$344,977.92
				Payroll DED CK#'s 5057488-5057489	$526.43		$344,451.49
9/15/2022	State of NH	$28,320.72					$372,772.21
9/20/2022	State of NH	$4,074.22					$376,846.43
9/22/2022				Expense CK#'s 5057490-5057527	$61,395.87		$315,450.56
9/27/2022				Direct Deposit	$65,558.76		$249,891.80
9/29/2022				EFT IRS	$22,138.85		$227,752.95
				Retirement	$800.00		$226,952.95
				Payroll CK#'s 5057528-5057530	$1,997.09		$224,955.86
				Payroll DED CK#'s 5057531-5057532	$526.43		$224,429.43
9/30/2022				Payroll DED CK#'s 5057533-5057536	$101,105.16		$123,324.27
9/26/2022	Deposit CK# 402053	$1,097.20					$124,421.47
	CK# 25772	$384,289.00					$508,710.47
	CK# 241962	$1,186.78					$509,897.25
	CK# 104	$4,807.86					$514,705.11
	CK# 25721	$384,289.00					$898,994.11
9/30/2022	Food Service	$513.00					$899,507.11
	Interest	$2.86					$899,509.97
	TOTALS	$1,032,276.64			$626,552.64		

9/30/2022		$1,059,875.39	
Outstanding A/P	CK #		
	5057315	$332.17	Kristin Yonge
	5057382	$39.31	Jan Mattie
	5057429	$939.00	Center for Responsive Schools, Inc.
	5057442	$562.41	Thomas Lacklider
	5057490-5057527	$ 56,413.24	Expense CK's cleared less cleared 5057495, 5057520 and 5057522
AP Total		$58,286.13	
	CK#		
Outstanding P/R			
	5057528	$184.70	Mary Wilson
	5057529	$789.43	Angelique Adams
	5057533-5057536	$101,105.16	Payroll DED Ck's
P/R Total		$102,079.29	
Total Outstanding		$160,365.42	
Book Balance		$899,509.97	
Adj Book Balance		$1,059,875.39	
		$ -	

Accounts Payable Voucher - September 2022		
	22-Sep	$325,664.62
Payroll Voucher		
	22-Sep	$110,442.59
Payroll - Direct Deposit & Taxes		
	22-Sep	$190,445.43
TOTAL		$626,552.64

Consent Agenda Item #3

Mont Vernon School District
Treasurers Cash Journal - October 2022

Treasurers' Cash Journal

DATE	DESCRIPTION	M&T Acct #502003822 AMOUNT		DESCRIPTION	M&T Acct #502003822 AMOUNT		BALANCE M&T Acct #502003822 AMOUNT
10/1/2022	**Beginning Balance**						$899,509.97
10/5/2022	9/30 Interest Payment	$30.30					$899,540.27
10/6/2022	State of NH	$5,387.29		Expense CK#'s 5057537-5057583	$91,581.90		$813,345.66
10/11/2022				Direct Deposit	$61,666.26		$751,679.40
				EFT IRS	$19,822.10		$731,857.30
10/13/2022				Retirement	$800.00		$731,057.30
				Payroll CK#'s 5057584-5057592	$2,741.09		$728,316.21
				Payroll DED CK#'s 5057593-5057594	$540.18		$727,776.03
10/20/2022				Expense CK#'s 5057595-5057627	$373,114.43		$354,661.60
10/21/2022	State of NH	$42,807.17					$397,468.77
10/25/2022				Direct Deposit	$59,117.79		$338,350.98
10/27/2022				EFT IRS	$19,077.53		$319,273.45
				Retirement	$800.00		$318,473.45
				Payroll CK#'s 5057628-5057629	$1,786.76		$316,686.69
10/25/2022	State of NH	$8,401.15		Payroll DED CK#'s 5057630-5057631	$526.43		$324,561.41
10/31/2022				Payroll DED CK#'s 5057632-5057635	$82,677.73		$241,883.68
10/31/2022	Food Service	$9,441.68					$251,325.36
	Interest	$232.63					$251,557.99
	TOTALS	$66,300.22			$714,252.20		

Accounts Payable Voucher - October 2022		
	22-Oct	$464,696.33
Payroll Voucher		
	22-Oct	$89,872.19
Payroll - Direct Deposit & Taxes		
	22-Oct	$159,683.68
TOTAL		$714,252.20

10/31/2022		$692,086.60	
Outstanding A/P	CK #		
	5057315	$332.17	Kristin Yonge
	5057382	$39.31	Jan Mattie
	5057442	$562.41	Thomas Lacklider
	5057512	$319.87	Thomas Lacklider
	5057543	$469.45	Consolidated Communication
	5057546	$104.30	Kim Deppen
	5057550	$115.00	Patricia Garrity
	5057575	$32.00	Sunnycrest Farm, Inc
	5057595-5057597	$340,780.52	Expense CK's
	5057600	$2,312.24	Caring Hands Transportation
	5057601	$640.00	Jerid, Day
	5057603-5057604	$506.42	Expense CK's
	5057607	$1,025.20	Heinemann
	5057609	$734.56	In Bloom Autism Service
	5057611	$132.11	Lyn Jennings
	5057613-5057614	$5,412.77	Expense Ck's
	5057616	$160.00	NHSCA
	5057618	$169.44	Paul Brookes Publishing Co
	5057621-5057622	$3,101.56	Expense CK's
	5057627	$31.00	Wilson Language Training
	5057628	$870.55	Angelique Adams
AP Total		$357,850.88	
Outstanding P/R	CK#		
	5057632-5057635	$82,677.73	
P/R Total		$82,677.73	
Total Outstanding		$440,528.61	
Book Balance		$251,557.99	
Adj Book Balance		$692,086.60	
		$0.00	

Consent Agenda Item #4

MEMO

School Administrative Unit 39
1 School Street
P.O. Box 849
Amherst, NH 03031
Phone: 603-673-2690
Fax: 603-672-1786

Date: **02/20/2023**

To: **Steve Chamberlin, Superintendent of Schools**

From: **Katie Hannan, Budget Director**

Re: **Donation**

A donation of $675 has been received by the Mont Vernon School District this month.

Requested Board Actions

1. Motion: To accept and expend the amount of $675 from the MVVPTA for Environmental Camp. These funds shall be accepted into Student Activity Fund.

Jennifer Whitney <jwhitney@sau39.org>

MVVS - PTA Ecology School Scholarship

3 messages

Jennifer Whitney <jwhitney@sau39.org> Mon, Feb 13, 2023 at 12:41 PM
To: Kara <Kkucenski1@gmail.com>
Cc: Thomas Lecklider <tlecklider@sau39.org>

Hi Kara,

We have families requesting financial assistance for this year's program at *The Ecology School*. The requests total $675. It's my understanding the PTA has approved $450 in scholarship funds, so we'd like to request those funds and would split them equally between the families. Please let me know if you need further information.

Thank you for your assistance and the PTA's unwavering support of MVVS and our students!

Kindly,

Jennifer

Kara Kucenski <kkucenski1@gmail.com> Mon, Feb 13, 2023 at 12:47 PM
To: Jennifer Whitney <jwhitney@sau39.org>

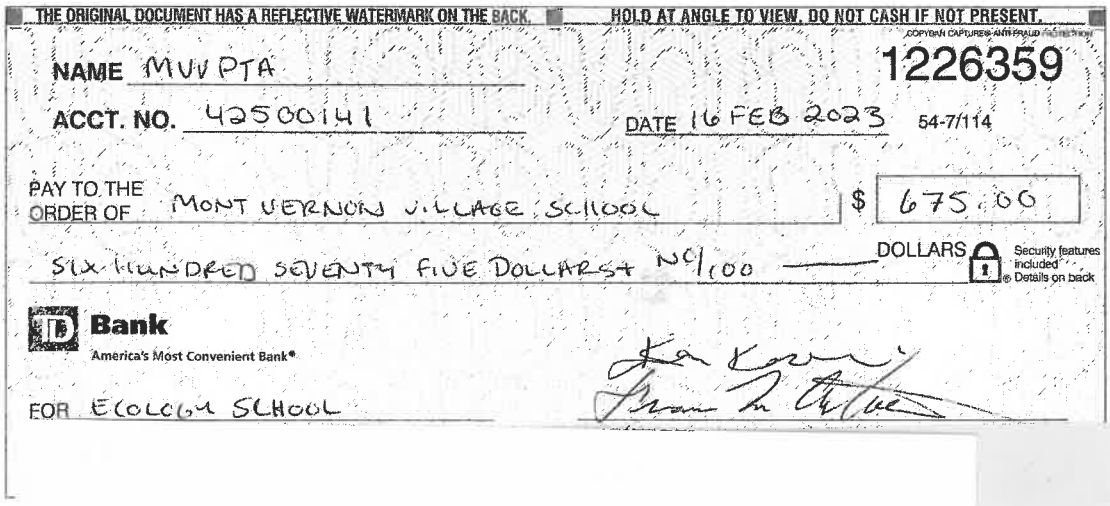
Hi Jennifer,
That is correct. I will get a check from Fran at our meeting on Thursday.

Thanks,
Kara
[Quoted text hidden]

Jennifer Whitney <jwhitney@sau39.org> Mon, Feb 13, 2023 at 12:54 PM
To: Kara Kucenski <kkucenski1@gmail.com>
Cc: Thomas Lecklider <tlecklider@sau39.org>

Thank you, Kara!

Jennifer
[Quoted text hidden]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NAME MVV PTA 1226359

ACCT. NO. 425001411 DATE 16 FEB 2023 54-7/114

PAY TO THE ORDER OF MONT VERNON VILLAGE SCHOOL $ 675.00

SIX HUNDRED SEVENTY FIVE DOLLARS+ NO/100 DOLLARS

Bank America's Most Convenient Bank®

FOR ECOLOGY SCHOOL

Consent Agenda Item #5

MONT VERNON SCHOOL DISTRICT
SCHOOL BOARD BUDGET TRANSFER REQUEST

REQUEST FOR BUDGET TRANSFER NO.: 2023-003 **DATE:** 2/20/2023

TRANSFER FROM:

Account Number	Description	Current Approp.	Transfer Amount	Projected Yr. End Exp.
10.1100.211.10.000000	Health Insurance	$181,345	$14,500	$166,845
10.1100.212.10.000000	Dental Insurance	$15,195	$425	$14,770
TOTAL TRANSFERRED FROM:			**$14,925**	

TRANSFER TO:

Account Number	Description	Current Approp.	Transfer Amount	Projected Yr. End Exp.
10.1210.211.10.000000	Health Insurance	$88,057	$14,500	$102,557
10.1210.212.10.000000	Dental Insurance	$3,201	$425	$3,626
TOTAL TRANSFERRED TO:			**$14,925**	

JUSTIFICATION: **Reclass budget for Health & Dental Insurance to align with actual employee benefit elections.**

Katie Hannan, Budget Director 2/20/2023
REQUESTOR: DIRECTOR/DATE

APPROVED BY MONT VERNON SCHOOL BOARD ON: _____

Amy Facey, Business Administrator

Consent Agenda Item #6

MONT VERNON SCHOOL DISTRICT
SCHOOL BOARD BUDGET TRANSFER REQUEST

REQUEST FOR BUDGET TRANSFER NO.: 2023-004 **DATE:** 2/20/2023

TRANSFER FROM:

Account Number	Description	Current Approp.	Transfer Amount	Projected Yr. End Exp.
10.1100.260.10.000000	Workers Comp	$3,613	$417	$3,196

TOTAL TRANSFERRED FROM: **$417**

TRANSFER TO:

Account Number	Description	Current Approp.	Transfer Amount	Projected Yr. End Exp.
10.1210.260.10.000000	WORKERS COMPENSATION	$573	$170	$743
10.2120.260.10.000000	WORKERS COMPENSATION	$150	$31	$181
10.2130.260.10.000000	WORKERS COMPENSATION	$150	$17	$167
10.2142.260.10.000000	WORKERS' COMPENSATION	$0	$76	$76
10.2220.260.10.000000	WORKERS COMPENSATION	$131	$51	$182
10.2410.260.10.000000	WORKERS COMPENSATION	$373	$52	$425
10.2840.260.10.000000	WORKERS COMPENSATION	$67	$20	$87

TOTAL TRANSFERRED TO: **$417**

JUSTIFICATION: **Reclass budget for Workers Comp to align with actual employee expense allocation.**

Katie Hannan, Budget Director 2/20/2023
REQUESTOR: DIRECTOR/DATE

APPROVED BY MONT VERNON SCHOOL BOARD ON: _____

Amy Facey, Business Administrator

Consent Agenda Item #7

SAU #39 **2/24/2023**

Mont Vernon Village School

February Facilities Update

Vendor Maintenance Completed

- Cleanup/restoration of water damage areas
- Temporary facilities cleaning services
- Waste management services weekly schedule
- Monthly pest services monitoring program

MVVS Facilities Staff Projects Completed

- Ordered/received salt spreader and 5 gallon gas can
- Cleanup/restoration of water damage areas
- Setup for events throughout the building
- Installed intercom speaker in server room
- Adjusted closer on main hallway doors
- Emergency light inspection
- Care and upkeep of grounds
- Daily water meter readings
- Daily cleaning and disinfecting
- Weekly generator test
- Weekly fuel readings (building fuel and generator)
- Monthly fire extinguisher inspection
- Monthly underground storage tank inspection

Upcoming Work

- Installation of rain/water diverter for kitchen exterior entrance
- Air quality testing (March)
- EPA AHERA 3-Year Reinspection

Installed intercom speaker in server room

SAU 39 Kindergarten Mathematics Curriculum

Kindergarten Scope & Sequence - SAU39

Bridges in Mathematics Second Edition

	August / September - Done by Oct. 7th	October/November - Done by Nov. 22nd	November/December - Done by Jan. 6th	January/February - Done by Feb. 10th	February/March - Done by March 24th	March/April - Done by April 21st	May/June	Optional/Integrate in Science
	Unit 1 Numbers to Five & Ten	**Unit 2** Numbers to Ten	**Unit 3** Bikes & Bugs: Double, Add & Subtract	**Unit 4** Paths to Adding, Subtracting & Measuring	**Unit 5** Two-Dimensional Geometry	**Unit 6** Three-Dimensional Shapes & Numbers Beyond Ten	**Unit 7** Weight & Place Value	**Unit 8** Computing & Measuring with Frogs & Bugs
Module 1	**Sorting Shoes** *K.CC.1, K.CC.4a–c, K.CC.5, K.CC.6, K.CC.7, K.MD.2, K.MD.3, K.G.1, K.G.2, K.G.4, K.G.6* CC	**Dots to Ten** *K.CC.4a–b, K.CC.5, K.CC.6, K.OA.1, K.OA.3, K.OA.4* CC	**Bicycle Doubles** *K.CC.1, K.CC.4a–b, K.CC.5, K.OA.1, K.OA.3, K.G.5* OA	**Paths: The Number Line** *K.CC.1, K.CC.2, K.CC.3, K.CC.5, K.CC.7, K.MD.1* CC	**Exploring Shapes** *K.CC.1, K.CC.3, K.CC.6, K.CC.7, K.OA.3, K.MD.3, K.G.1, K.G.2, K.G.3, K.G.4, K.G.5* G	**What Do You Know About Three-Dimensional Shapes?** *K.CC.1, K.CC.2, K.CC.4a–b. K.CC.5, K.CC.6, K.CC.7, K.OA.1, K.OA.2, K.NBT.1, K.MD.3, K.G.1, K.G.2, K.G.3, K.G.4, K.G.5* G	**How Heavy? Weight & Number** *K.CC.1, K.CC.3, K.CC.5, K.OA.1, K.OA.2, K.OA.3, K.NBT.1, K.MD.1, K.MD.2, K.MD.3* MD	**Catching, Counting & Comparing** *K.CC.1, K.CC.2, K.CC.3, K.CC.5, K.CC.6, K.OA.1, K.OA.2, K.OA.3, K.OA.4, K.OA.5, K.NBT.1* OA
Module 2	**Friendly Fives** *K.CC.3, K.CC.4a–b, K.CC.5, K.OA.3, K.MD.3* CC	**Introducing the Number Rack** *K.CC.3, K.CC.4a–b, K.CC.5, K.OA.1, K.OA.3* CC	**Adding & Subtracting Ones** *K.CC.2, K.CC.3, K.CC.4b, K.CC.5, K.OA.1, K.OA.2, K.OA.3, K.OA.4* OA	**Counting, Adding & Subtracting with Forest Animals** *K.CC.2, K.CC.3, K.CC.4a–b, K.CC.5, K.OA.1, K.OA.2, K.OA.5* OA	**Circles, Squares, Triangles & Rectangles** *K.CC.1, K.CC.6, K.MD.3, K.G.1, K.G.2, K.G.3, K.G.4, K.G.5* G	**More Three-Dimensional Shapes** *K.CC.1, K.CC.2, K.CC.3, K.CC.4a–b, K.CC.5, K.CC.6, K.OA.3, K.OA.5, K.MD.3, K.G.1, K.G.2, K.G.3, K.G.4, K.G.5* G	**Tens & Ones to Twenty** *K.CC.1, K.CC.3, K.CC.5, K.CC.6, K.CC.7, K.OA1, K.OA2, K.OA5, K.NBT.1* NBT	**Frogs: Estimating & Measuring** *K.CC.1, K.CC.3, K.CC.5, K.CC.6, K.OA.1, K.OA.2, K.OA.3, K.OA.4, K.NBT.1, K.MD.1, K.MD.2, K.MD.3* MD
Module 3	**Friendly Tens** *K.CC.3, K.CC.4a–c, K.CC.5, K.CC.6, K.OA.3, K.MD.3* CC	**Five & Some More** *K.CC.1, K.CC.4a–c, K.CC.5, K.CC.6, K.OA.1, K.OA.2, K.OA.3, K.MD.3* CC	**Add, Subtract & Double It!** *K.CC.2, K.CC.3, K.CC.4b, K.CC.5, K.CC.6, K.OA.1, K.OA.2, K.OA.3, K.OA.4, K.MD.1, K.MD.2* OA	**Comparing & Measuring Length** *K.CC.1, K.CC.2, K.CC.3, K.CC.4, K.CC.6, K.OA.5, K.MD.1, K.MD.2* MD	**Constructing & Drawing Shapes** *K.CC.3, K.CC.6, K.OA.4, K.MD.3, K.G.1, K.G.2, K.G.3, K.G.4, K.G.5, K.G.6* G	**Exploring the Teen Numbers** *K.CC.1, K.CC.2, K.CC.3, K.CC.4c, K.CC.5, K.CC.6, K.CC.7, K.OA.1, K.OA.2, K.OA.3, K.OA.4, K.OA.5, K.NBT.1* NBT	**Addition & Subtraction Story Problems** *K.CC.3, K.CC.5, K.CC.6, K.OA.1, K.OA.2, K.OA.3, K.OA.4, K.OA.5, K.MD.1* OA	**Tens & Ones** *K.CC.2, K.CC.3, K.CC.4c, K.CC.6, K.OA.2, K.OA.3, K.OA.4, K.OA.5, K.NBT.1* NBT
Module 4	**Using Structures & Patterns** *K.CC.3, K.CC.5, K.MP.6, K.MP.7* OA	**Composing & Decomposing Shapes** *K.CC.3, K.CC.5, K.G.1, K.G.2, K.G.4, K.G.6* MD	**Put Them in Order** *K.CC.2, K.CC.3, K.CC.4b–c, K.CC.6, K.CC.7, K.OA.3, K.OA.4* CC	**Fives & Ones with Money** *K.CC.1, K.CC.2, K.CC.6, K.OA.1, K.OA.2, K.OA.5, K.MD.3* MD	**Sorting, Comparing, Composing & Decomposing Shapes** *K.CC.3, K.CC.6, K.MD.3, K.G.1, K.G.2, K.G.3, K.G.4, K.G.5, K.G.6* G	**Combinations to Ten** *K.CC.3, K.CC.4a-b, K.CC.5, K.OA.1, K.OA.2, K.OA.3, K.OA.5* OA	**Counting by Tens & Ones** *K.CC.1, K.CC.3, K.CC.5, K.CC.6, K.CC.7, K.OA.1, K.OA.2, K.OA.5, K.NBT.1* NBT	**Addition & Subtraction Equations** *K.CC.3, K.CC.5, K.OA.1, K.OA.2, K.OA.3, K.OA.4, K.OA.5, K.NBT.1* OA

Primary Focus: CC - Counting & Cardinality **OA** - Operations & Algebraic Thinking **NBT** - Number & Operations in Base Ten **MD** - Measurement & Data **G** - Geometry

Approved by the Amherst School Board on February 16, 2023
Pending Approval of the Mont Vernon School District

Unit Overview

Unit Title: Unit 1: Numbers to Five & Ten

Unit Summary

Kindergartners begin their formal study of mathematics by focusing on the counting sequence to 20 and quantities to 10. They also spend a good deal of time in this first unit establishing the classroom routines that will provide structure for math class all year long.

Approximate Time Needed

5 Weeks - August and September

Unit Foundation

Assessed Competencies

Counting and Cardinality
Operations and Algebraic Thinking

Assessed Standards *(includes standards on both required and optional assessments)*

K.CC.1 Count to 5 and 10 by 1s
K.CC.1 Count to 100 by 10s
K.CC.3 Write numbers from 0 to 10
K.CC.4a Count objects one by one, saying the numbers in the standard order and pairing each object with only one number name
K.CC.4b Identify the number of objects as the last number said when counting a group of objects
K.CC Recognize the number of objects in a collection of 6 or fewer, arranged in any configuration
K.CC.5 Count up to 10 objects arranged in a line, rectangular array, or circle to answer “how many?” questions. Count up to 5 objects in a scattered configuration to answer “how many?” questions
K.CC.6 Identify whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group for groups of up to 10 objects
K.OA.3 Decompose numbers less than or equal to 10 into pairs in more than one way
Supports **K.OA** Copy and extend simple repetitive patterns with up to 3 elements (ABAB, AABAAB, ABCABC, ABBCABBC, and so on)

Curriculum Framing Questions

Enduring Understandings

Student will understand how to:

- Count to 20
- Recognize and build sets to 10 using fingers, five-frames and ten-frames, and objects
- Count, order, and compare numbers to 10
- Write numerals to 10

Mathematical Concepts
This unit addresses three major concepts that make it possible for students to answer the question, **"How many?"** In many cases, students must count to determine how many objects are in a collection. To do so, they must be able to apply the number word sequence, one-to-one correspondence, and cardinality. First, students must master the number word sequence, that is, they must be able to say the number words in the correct order. In this unit, students focus on the sequence of numbers from 0 to 20. Many kindergartners find it particularly challenging to say the numbers from 11 to 19 correctly, because of the inconsistencies in how they are named. Students must also understand one-to-one correspondence, the idea that when counting to find the total number of objects in a collection, they must count each object once and only once. One-to-one correspondence connects the number word sequence to quantity: each object corresponds to exactly one number in the counting sequence. Many incoming kindergartners skip over some objects, while counting others twice. They might also skip number words they don't know, or count quickly to a familiar number (or the highest number they know), regardless of how many items are actually in the collection. Finally, students must have a firm grasp of cardinality, that is, that the last number they say when counting a group of objects indicates the total number in the collection. It is very helpful to arrange the objects in an orderly way before counting them. In fact, if a collection of objects is fairly small, or if the objects are arranged in a structured way, students might be able to recognize the quantity without counting, a process referred to as subitizing. Students will explore the quantities 5 and 10 in depth in this unit, using models to see each quantity as a combination of other quantities. For example, students will see 5 as a combination of 1 and 4, as well as 2 and 3.

Unit Overview

Unit Title: Unit 2 Numbers to Ten

Unit Summary

Students continue to develop the major concepts addressed in Unit 1 related to counting and recognizing quantities: number sequence, one-to-one correspondence, cardinality, and subitizing. Unit 2 emphasizes combinations of numbers that make 5, and also introduces the process of comparing quantities within 10.

Approximate Time Needed

6 weeks - October and November

Unit Foundation

Assessed Competencies

Counting and Cardinality
Geometry
Operations and Algebraic Thinking

Assessed Standards *(includes standards on both required and optional assessments)*

K.CC.3 Write numbers from 0 to 10
***Supports* K.CC** Read numbers from 0 to 10
K.CC.4a Count objects one by one, saying the numbers in the standard order and pairing each object with only one number name
K.CC.4b Identify the number of objects as the last number said when counting a group of objects
K.CC.4b Count collections of objects in different ways to demonstrate that the arrangement of objects and the order in which they are counted do not change the total number of objects
K.CC.5 Count up to 10 objects arranged in a line, rectangular array, or circle to answer “how many?” questions
K.CC.6 Identify whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group for groups of up to 10 objects
K.G.1 Identify shapes in the environment and describe their positions relative to one another
K.G.2 Identify shapes, regardless of orientation or size
K.G.6 Compose simple shapes to form larger shapes
K.OA.3 Decompose numbers less than or equal to 10 into pairs in more than one way

Curriculum Framing Questions

Enduring Understandings

Students will understand how to:

- Quickly recognize how many objects are in a collection (up to 5) without counting

- Compare sets using the words more and less
- Develop number sense with combinations that make 5, and then 10
- Count objects and match the quantity to the written numeral
- Build with two-dimensional shapes

Mathematical Concepts

The models and activities in this unit help students focus on combinations of 5, that is, pairs of numbers that make 5, for example, 0 + 5 = 5 and 1 + 4 = 5. Students also explore combinations of 10 later in the unit. Although we express these combinations in the forms of equations, the emphasis is not on the operation of addition or fact mastery, though these experiences set a solid foundation for both adding and subtracting. Rather, the emphasis at this time is on understanding that a single quantity, in this case 5, can be decomposed into smaller component quantities, such as 1 and 4. Toward this end, the activities promote flexible ways of representing and recognizing quantities, not memorizing combinations.

In addition to counting, subitizing, and decomposing quantities, students will compare quantities in Unit 2. Where they were primarily concerned with answering the question “How many?” in Unit 1, they now grapple with the question **“Which is more, and which is less?”**

Students also practice pairing quantities (represented on ten-frames and with tallies) with numerals. Connecting a quantity to the symbol that represents it (the numeral) is quite abstract, and some students, particularly those who have had limited exposure to written numerals, will need quite a bit of practice to become proficient. In later units and in Number Corner, students will have plenty of practice writing numerals as well.

Unit Overview

Unit Title: Unit 3 Bikes & Bugs: Double, Add & Subtract

Unit Summary

Students begin this unit with an exploration of bicycles and wheels in which they begin counting by 2s. This leads them to an exploration of doubling and even numbers. They also use the five- and ten-frames to add 1 to numbers from 1 to 10, compare and order numbers, and write equations to show combinations of numbers that have a sum of 5.

Approximate Time Needed

6 Weeks - November and December

Unit Foundation

Assessed Competencies

Counting and Cardinality
Operations and Algebraic Thinking

Assessed Standards *(includes standards on both required and optional assessments)*

Supports **K.CC** Count backward from any number in the range of 10 to 1
Supports **K.CC** Read numbers from 0 to 10
K.CC.2 Count forward from a given number, rather than starting at 1
K.CC.3 Write numbers from 0 to 10
K.CC.4a Count objects one by one, saying the numbers in the standard order and pairing each object with only one number name
K.CC.4b Identify the number of objects as the last number said when counting a group of objects
K.CC.4b Count collections of objects in different ways to demonstrate that the arrangement of objects and the order in which they are counted do not change the total number of objects
K.CC.5 Count up to 10 objects in a scattered configuration to answer “how many?” questions
K.CC.6 Identify whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group for groups of up to ten objects
K.OA.1 Represent addition and subtraction with objects, fingers, mental images, etc.
K.OA.3 Decompose numbers less than or equal to ten into pairs in more than one way
K.OA.4 For any number from 1 to 5, find the number that makes five when added to that number

Curriculum Framing Questions

Enduring Understandings

Students will understand how to:

- Count by 2s to 20
- Explore even numbers as double

- Add 1 and subtract 1 to numbers from 1 to 10
- Compare and order numbers from 1 to 10
- Write equations to show sums up to 5

Mathematical Concepts

In the first section, students consider the number of wheels on different numbers of bicycles. In doing so, they begin counting by 2s and use the ten-frame to connect that counting sequence to quantity. They also use the ten-frame to visualize the structure of doubles or even numbers. Next, the unit introduces students to the idea of adding and subtracting 1 to a given quantity. While both of these sections lay the foundation for addition and subtraction, the emphasis is on the structure of numbers, rather than fluency with addition or subtraction facts.

Later in the unit, the class uses representations on the five- and ten-frames as a springboard for writing equations. In the example here, students use standard finger patterns to show that there are two red dots, three blue dots, and five dots in all. Then the teacher models how to show that equality in the form of a written equation.

Students also solve story problems involving bicycles and tricycles, and the teacher models how to write equations to represent the problem situations and their solutions. It is important for students to understand that an equation indicates equality between two quantities. It is not a precursor to the answer or an indication that students should perform an operation. For this reason, you will write equations with the total on the left and on the right. You'll also explain to students that the equal sign means is the same as or has the same value as. For example, you'll read the equation 5 = 2 + 3 as, "Five is the same as two plus three," or "Five has the same value as two plus three."

As students gain a deeper understanding of equality in the years to come, they will begin to use the more mathematically accurate terminology of equality: "Five is equal to two plus three." For now, however, the goal is for students to understand that the equal sign describes a relationship between two quantities that have the same value.

The unit concludes with sessions that invite students to compare and order quantities, while also practicing counting skills they have been developing since the start of school: counting forward and backward, reading numerals, and matching numerals and quantities.

Unit Overview

Unit Title: Unit 4 Paths to Adding, Subtracting & Measuring

Unit Summary

Students begin this unit by building a number line to model the number sequence from 0 to 10. They continue to practice counting forward and backward between 0 and 50, starting with any number in the range. They also solve addition and subtraction problems, compute with pennies and nickels, and begin measuring length using non-standard units. The number line and measurement activities provide many opportunities for students to consider the relationships between numbers and quantities, including making comparisons about which are greater and which are less.

Approximate Time Needed

6 weeks - January / February

Unit Foundation

Assessed Competencies

Counting and Cardinality
Operations and Algebraic Thinking
Measurement and Data

Assessed Standards *(includes standards on both required and optional assessments)*

K.CC.1 Count to 10 by 1s
Supports K.CC Count backward from any number in the range of 10 to 1
K.CC.2 Count forward from a given number, rather than starting at 1
K.CC.3 Write numbers from 0 to 15
Supports K.CC Read numbers from 0 to 10; to 20
Supports K.CC Order numerals from 0 to 10
K.CC.5 Count up to 20 objects arranged in a line, rectangular array, or circle to answer “how many?” questions
K.OA.2 Adds with sums to 10
K.MD.3 Classify objects into categories and count the number of objects in different categories
Supports K.MD Identify pennies and nickels by name and worth

Curriculum Framing Questions

Enduring Understandings

Students will understand how to:

- Count forward and backward between 0 and 50
- Order and compare numbers from 1 to 10
- Solve addition and subtraction problems within 10

- Compare objects to see which is longer, shorter, or the same length
- Add with pennies and nickels

Mathematical Concepts

Kindergartners have done a great deal of counting in Units 1–3. As discussed in those units, students must learn the number sequence, apply it as they count objects, and understand that the last number in the sequence indicates how many are in the set (cardinality). When counting sets of objects or dots in a ten-frame, students are engaged in what we refer to as discrete counting, that is, the counting of discrete or separate objects. This unit introduces interval counting through use of the number line and length measurement. When they are engaged in interval counting, students count the number of equal intervals between two points. This kind of counting is fundamental to length measurement and to counting forward and backward as a way to add and subtract.

The concept of equality, which was formally introduced in Unit 3, is developed further in this unit when students measure length and work with money. They use Unifix cubes to represent the lengths of different objects and then compare those lengths. In some cases, one length is greater and one is less; in other cases, the lengths are equal. Students are also introduced to the nickel in this unit and begin to understand that a single nickel has the same value as (is equal to) five pennies. In order to establish equality (or nonequality), students must first make comparisons. Many of the models and activities in this unit invite students to consider the relationships among quantities, lengths, numbers, and coins. They use positional (between, to the left) and comparison (greater than, less than) words to describe the relationships among nonequal quantities, lengths, numbers, and coins. Through making a variety of comparisons, they develop a deeper understanding of what it means for two things to be equal: two objects are equal in length if they can be represented with the same number of Unifix cubes, and two collections of coins are equal if they have the same value or are worth the same amount.

Unit Overview

Unit Title: Unit 5 Two-Dimensional Geometry

Unit Summary

Students begin this unit by comparing a sphere and a circle, two shapes with which they are likely to be quite familiar. Students' comparisons bring to light the difference between three-dimensional shapes and two-dimensional shapes. After this initial investigation, students spend the rest of the unit examining, identifying, comparing, and sorting two-dimensional shapes. The Work Places in this unit invite students to construct and deconstruct a variety of shapes.

Approximate Time Needed

6 weeks - February / March

Unit Foundation

Assessed Competencies

Counting and Cardinality
Operations and Algebraic Thinking
Geometry
Measurement and Data

Assessed Standards *(includes standards on both required and optional assessments)*

K.CC.2 Count forward from a given number, rather than starting at 1
***Supports* K.CC** Read numbers from 0 to 20
K.CC.5 Count up to 20 objects arranged in a line, rectangular array, or circle to answer "how many?" questions
K.CC.6 Identify whether the number of objects in one group is greater than, less than, or equal to the number in another group
***Supports* K.CC** Locate numbers from 0–20 on a number line
K.OA.4 For any number from 1 to 9, find the number that makes 10 when added to that number
K.MD.3 Classify objects into categories
K.MD.3 Count the numbers of objects in a given category and sort the categories by count.
K.G.1 Identify shapes using geometric shape names
K.G.2 Identify shapes, regardless of orientation or size
K.G.4 Use informal language to describe the parts and attributes of two-dimensional shapes
K.G.5 Model two-dimensional shapes in the world by drawing them
K.G.6 Compose simple shapes to form larger shapes

Curriculum Framing Questions

Enduring Understandings

Students will understand how tol:

- Explore the difference between two-dimensional (flat) and three dimensional (solid) shapes
- Identify, describe, sort, compare, and draw 2-D shapes based on their defining attributes
- Use simple shapes to form larger shapes
- Count and compare the number of objects in different categories in a picture graph

Mathematical Concepts

Young children are naturally intrigued by shapes, and many of your students probably enjoyed drawing and finding shapes in the world around them long before they came to school. Although this unit focuses on two-dimensional shapes, students begin by comparing a circle and a sphere, and in so doing begin to understand the difference between two-dimensional (flat) and three dimensional (solid) shapes. This unit formalizes students' knowledge of shapes by inviting them to sort and classify shapes based on specific attributes like number of sides or number of corners. The sorting activities result in groups of shapes with common attributes, which provides a natural connection to data. Students compare the number of shapes in each set and make formal comparisons of those sets by writing inequality statements about them.

Unit Overview
Unit Title: Unit 6 Three-Dimensional Shapes & Numbers Beyond Ten
Unit Summary
This unit emphasizes the two critical areas for kindergarten mathematics identified by the Common Core State Standards: number and geometry. The first two modules focus on geometry, while the last two modules focus on number and operations. To start the unit, students describe the attributes, similarities, and differences among two-dimensional and three-dimensional shapes. These early sessions also include activities in which students count and make combinations to 5. Later in the unit, students count forward and backward, read and write numerals to 20, and explore combinations to numbers from 5 to 10, with special emphasis on the 5+ and 10+ combinations. Each student receives a Student Book at the start of this unit, which they will use for independent work for the rest of the school year.
Approximate Time Needed
5 Week - March and April
Unit Foundation
Assessed Competencies
Counting and Cardinality Operations and Algebraic Thinking Numbers and Operations Base Ten Geometry Measurement and Data
Assessed Standards *(includes standards on both required and optional assessments)*
Supports K.CC Read numbers from 0 to 20 **K.CC.3** Write numbers from 0 to 20 **K.CC.4a** Count objects one by one, saying the numbers in the standard order and pairing each object with only one number name **K.CC.4b** Identify the number of objects as the last number said when counting a group of objects **K.CC.5** Count up to 20 objects arranged in a line, rectangular array, or circle to answer “how many?” questions **K.CC.6** Identify whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group for groups of up to 10 objects **K.OA.1** Represent addition with equations **K.OA.2** Add with sums to 10 **K.OA.3** Decompose numbers less than or equal to 10 into pairs in more than one way **K.OA.3** Record decompositions of numbers less than or equal to 10 with equations **K.OA.5** Fluently add with sums to 5 **K.NBT.1** Decompose numbers from 11 to 19 into a group of 10 and some 1s

K.MD.3 Classify objects into categories
Supports K.MD Identify the name and worth of a penny and dime
K.G.1 Identify shapes using geometric shape names
K.G.2 Identify shapes, regardless of orientation or size
K.G.3 Identify shapes as two-dimensional or three-dimensional
K.G.4 Analyze and compare three-dimensional shapes, and use informal language to describe the parts and attributes of shapes and the similarities and differences between shapes
K.G.5 Model three-dimensional shapes in the world by building them

Curriculum Framing Questions

Enduring Understandings

Students will understand:

- How to identify, name, and describe objects in the environment using the names of shapes
- How to explore the difference between two-dimensional (flat) and three-dimensional (solid) shapes
- How to build three-dimensional shapes
- Numbers from 11 to 20 as “10 and some more”
- How to solve number combinations within 10

Math Concepts

In this unit, students continue to develop their ability to count by 1s with one-to-one correspondence and cardinality. A mastery of the forward and backward counting sequences, one-to-one correspondence, and cardinality helps students correctly determine sums and differences as they begin to solve addition and subtraction tasks.

In this unit, students are introduced to the concept that numbers greater than 10 are composed of 10 and some more 1s. Students also practice counting by 10s and think of multiples of 10 as being a certain number of groups of ten. Rather than simply recite the count-by-10 sequence, students use visual models, including trains of 10 cubes and ten-frames, to connect the numbers in the sequence to the quantities they represent. They use these same models to show how each teen number is a group of ten and some more 1s.

Unit Overview
Unit Title: Unit 7 Weight & Place Value
Unit Summary
Students explore weight and capacity, solve addition and subtraction story problems, and begin to develop an understanding of place value. In the first module, students measure weight and capacity and make comparisons about those measurements. In the last three modules, the focus shifts to counting and operations. Students begin to develop robust strategies for solving addition and subtraction problems and explore the concept that numbers are composed of 10s and 1s.
Approximate Time Needed
5 Weeks - May and June
Unit Foundation
Assessed Competencies
Counting and Cardinality Operations and Algebraic Thinking Numbers and Operations Base Ten Measurement and Data
Assessed Standards *(includes standards on both required and optional assessments)*
K.CC.3 Write numbers from 0 to 20 **K.CC.3** Write numerals from 0–20 to represent a number of objects **K.CC.5** Count up to 20 objects arranged in a line, rectangular array, or circle to answer “how many?” questions ***Supports* K.CC** Recognize the number of objects in a collection of 6 or fewer, arranged in any configuration ***Supports* K.CC** Locate numbers from 0–20 on a number line **K.CC.7** Compare two numbers from 1 to 10 presented as written numerals **K.OA.1** Represent addition with objects, fingers, drawings, or equations **K.OA.2** Solve addition story problems **K.OA.5** Fluently add with sums to 5 **K.NBT.1** Compose numbers from 11 to 19 by adding the required number of 1s to a 10 **K.NBT.1** Use a drawing to represent the ten and ones in any number from 11 to 19 **K.MD.1** Describe the weight of an object **K.MD.2** Directly compare the weights of two objects **K.MD.3** Classify objects into categories and count the number of objects in different categories
Curriculum Framing Questions
Enduring Understandings

Students will understand how to:

- Explore weight and capacity concepts
- Count groups of objects by 10s and 1s to build an understanding of place value
- Compare numbers to determine which number is more than, less than, or equal to another number
- Solve addition and subtraction equations and story problems within 10

Mathematical Concepts

Young students are learning to describe objects in terms of several measurable attributes, including weight and capacity. Students begin by describing a single object, as in, “This bag of potatoes is heavy. It’s hard for me to hold it for very long.” Then, they begin to compare different objects in terms of the same attribute: “This block is lighter than the bag of potatoes. It’s easy for me to pick up and hold for a while.” Finally, they make measurements and use those measurements to make comparisons among two or more objects. These experiences are, in large part, language-based. You’ll be helping students to describe objects in increasingly precise and comparative ways, and the act of measuring lends an additional level of precision to students’ observations and descriptions. The measuring sessions in this unit give students plenty of hands-on experiences, which are essential for young students to develop an understanding of weight and capacity.

One of the major goals of this unit is to help students understand that numbers are composed of groups of 10s and 1s. The Common Core State Standards require that all kindergartners be able to count by 10s and recognize that the numbers from 11 to 19 are composed of a 10 and some more 1s. You’ll continue using ten-frames to help students see the group of 10 and additional 1s in such numbers. The ten-frame also makes the group of 10 easy to recognize, while showing that the 10 is composed of 10 ones.

Students will count by tens on the decade (10, 20, 30, 40, and so on). Students recite this sequence while counting bundles of 10 sticks so that the number names remain connected to the quantities. The bundles reinforce the fact that these numbers are composed of a certain number of 10s.

In this unit, students will actively decompose and compose numbers. When students decompose a number, they begin with the numeral form of a number and represent it as a collection of 10s and 1s using double ten-frames, Unifix cubes, stick bundles, or equations.

When students compose a number, they begin with materials organized into 10s and 1s and put them together to form numbers.

Unit Overview

Unit Title: Unit 8 Computing & Measuring with Frogs & Bugs (optional unit)

Unit Summary

This final unit of the kindergarten year prepares students for the work ahead in Grade 1. In the context of explorations about frogs, students build a deeper understanding of subtraction and strengthen the connections between quantity, related number combinations, and written notation to 20. The activities in this unit should help students learn to add and subtract to 5 with fluency, add to 10, and strengthen their understanding of place value by the end of the year.

Approximate Time Needed

Optional Unit - Can integrate with Science

Unit Foundation

Assessed Competencies

Counting and Cardinality
Operations and Algebraic Thinking
Numbers and Operations Base Ten
Measurement and Data

Assessed Standards *(all assessments in this unit are optional)*

K.CC.1 Count by ones and tens to 100
K.CC.3 Write numerals from 0–10 to represent a number of objects
***Supports* K.CC** Read numbers from 0 to 10
K.CC.6 Identify whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group
K.OA.1 Represent addition with objects and equations
K.OA.1 Represent subtraction with equations
K.OA.2 Subtract with minuends to 10
K.OA.2 Solve subtraction story problems
K.NBT.1 Decompose numbers from 11 to 19 into a group of 10 and some 1s
K.NBT.1 Compose numbers from 11 to 19 by adding the required number of 1s to a 10
K.NBT.1 Use an equation to represent any number from 11 to 19 as the sum of 10 and some more ones
K.MD.1 Describe the length of an object
K.MD.2 Directly compare the lengths of two objects
1.MD.2 Measure the length of an object by laying multiple copies of a shorter unit end to end (iterating)

Curriculum Framing Questions

Enduring Understandings

Students will understand how to:

- Count by 10s and 1s
- Read, write, order, and compare numerals to 20
- Estimate, measure, and compare length
- Solve addition and subtraction story problems within 10

Mathematical Concepts

Throughout this unit, subtraction is presented in two different ways: as an act of taking some away from a total and as an act of comparing or determining the difference between two quantities.

It is important for students, many of whom might already think of subtracting strictly in terms of taking away, to see subtraction presented in both ways. This unit includes a variety of story problems to reinforce these two meanings of subtraction.

In the second section of the unit, students use craft sticks and Unifix cubes to measure length. The emphasis of these measuring activities is on estimating, measuring, and then comparing lengths. Students also expand on their place value work by using trains of 10 Unifix cubes and some more to measure.

Unit 8 concludes the year by reinforcing strong connections between the three facets of number: the verbal sequences associated with numbers, the quantities numbers represent, and the written notation that we use to record numbers.

Kindergarten Scope & Sequence

Number Corner Second Edition

	August / September	October	November	December	January	February	March	April	May / June
Calendar Grid	**Circle, Rectangle, Triangle, Square** *K.G.1, K.G.2, K.G.3, K.G.4* G	**Dancing Leaves** *K.CC.4a–c, K.CC.5, K.G.1* G	**Flat & Solid Shapes** *K.G.1, K.G.2, K.G.3, K.G.4, K.G.5* G	**Where's the Bear?** *K.G.1* G	**Teddy Bear's Buttons: Combinations to Five** *K.CC.4c, K.OA.1, K.OA.2, K.OA.3* OA	**One Dot/Many Dots** *K.CC.2, K.CC.4c, K.CC.5, K.CC.6* CC	**How Many More to Make Ten?** *K.CC.5, K.OA.1, K.OA.2, K.OA.4* OA	**Measuring Tools** *K.MD.1, K.MD.2, K.MD.3* MD	**Number Puzzles** *K.OA.1, K.OA.2,* OA
Calendar Collector	**Collecting Cubes** *K.CC.1, K.CC.4a–b, K.CC.5, K.NBT.1* NBT	**Collecting Cubes in Two Colors** *K.CC.1, K.CC.4a–b, K.CC.5, K.CC.6, K.OA.3, K.NBT.1, K.MD.3* NBT	**Collecting Sticks** *K.CC.4a–b, K.CC.5, K.NBT.1, K.MD.2* MD	**Collecting Pattern Block Shapes** *K.CC.1, K.CC.4a–c, K.CC.5, K.CC.6, K.NBT.1, K.MD.3, K.G.1* G	**Collecting Cubes in Three Colors** *K.CC.4a–b, K.CC.5 K.CC.6, K.MD.3, K.NBT.1* NBT	**Ones & Fives with Pennies & Nickels** *K.CC.2, K.OA.1, K.OA.2, K.OA.3, K.OA.5* MD	**How Many Lambs? How Many Lions?** *K.CC.6, K.OA.1, K.OA.2, K.OA.3, K.OA.5, K.MD.3* OA	**Frogs & Toads to Five** *K.CC.6, K.OA.1, K.OA.2, K.OA.3, K.OA.5, K.MD.3* OA	**Cats & Dogs to Ten** *K.CC.6, K.OA.1, K.OA.2, K.OA.3, K.MD.3* OA
Days in School	**Dots, Links & Numbers** *K.CC.1, K.CC.4a–c* CC	**How Many More?** *K.CC.1, K.CC.4a–c, K.CC.5, K.OA.4* CC	**Drawing to Make Ten** *K.CC.1, K.CC.4a–b, K.OA.4* CC	**Counting the Days Until Winter Break** *K.CC.1, K.CC.4a–b, K.CC.5, K.OA.1, K.NBT.1* CC	**How Many to Ten?** *K.CC.4a–b, K.OA.1, K.OA.4* OA	**One Hundred Days & Counting** *K.CC.1, K.CC.4a–b, K.OA.4* NBT	**Counting by Ones & Tens on the Line** *K.CC.1, K.CC.2, K.CC.4a–b, K.OA.4* NBT	**Counting to One Hundred by Ones & Tens** *K.CC.1, K.CC.4a–b, K.OA.4* NBT	**Hopping by Tens on the Number Line** *K.CC.1, K.CC4a–b, K.OA.4* NBT
Computational Fluency	**Quantities to Five** *K.CC.3, K.CC.4a–c, K.CC.5, K.OA.4* CC	**Fun with Finger Patterns** *K.CC.4a–c, K.CC.5, K.OA.3* CC	**Combinations of Five** *K.CC.4a–b, K.CC.5, K.OA.3* OA	**Numbers from Six to Ten** *K.CC.4a–c, K.OA.1, K.OA.3* OA	**Combinations for Numbers from Two to Ten** *K.CC.4b, K.OA.1, K.OA.3* OA	**Representing Addition & Subtraction on the Farm** *K.CC.5, K.OA.1, K.OA.2, K.OA.4* OA	**Solving Addition & Subtraction Story Problems at the Zoo** *K.CC.5, K.OA.1, K.OA.2, K.OA.3* OA	**Sums & Minuends to Ten with Frogs & Toads** *K.OA.1, K.OA.2* OA	**Fives Up** *K.CC.2, K.OA.1, K.OA.3, K.OA.4, K.OA.5* OA
Number Line	**Up to Ten & Back Again** *K.CC.1, K.CC.2, K.CC.3, K.CC.4a–b* CC	**The Tricky Teens** *K.CC.1, K.CC.2, K.CC.3, K.CC.4a–c,* CC	**Numbers Before & After** *K.CC.1, K.CC.2, K.CC.3, K.CC.4c, K.G.1* CC	**The Twenties** *K.CC.1, K.CC.2, K.CC.3, K.CC.4c, K.CC.7, K.G.1* CC	**Hopping on the Number Line** *K.CC.1, K.CC.2, K.CC.3, K.CC.4c, K.CC.6, K.CC.7* CC	**Ten & More** *K.CC.1, K.CC.2, K.CC.3, K.CC.4c, K.NBT.1* NBT	**Reviewing Teens & Twenties** *K.CC.1, K.CC.2, K.CC.3, K.CC.6, K.CC.7, K.OA.4* CC	**The Thirties & Forties** *K.CC.1, K.CC.2, K.CC.4c, K.CC.7, K.OA.4* CC	**Fun with Fifty** *K.CC.1, K.CC.2, K.CC.7* CC

Primary Focus: CC - Counting & Cardinality **OA** - Operations & Algebraic Thinking **NBT** - Number & Operations in Base Ten **MD** - Measurement & Data **G** - Geometry

Number Corner is an additional component of our mathematics curriculum. It is a skill-building program that revolves around the classroom calendar, providing daily practice as well as continual experiences with broader mathematical concepts in 20 minutes of engaging instruction.

SAU 39 Grade 1 Mathematics Curriculum

Grade 1 Scope & Sequence - SAU 39

Bridges in Mathematics Second Edition

	August / September - Done by Oct. 7th	October/November - Done by Nov. 22nd	November/December - Done by Jan. 6th	January/February - Done by Feb. 10th	February/March - Done by March 24th	March/April - Done by April 21st	May/June	Optional/Integrate in Science
	Unit 1 Numbers All Around Us	**Unit 2** Developing Strategies with Dice & Dominoes	**Unit 3** Adding, Subtracting, Counting & Comparing	**Unit 4** Leapfrogs on the Number Line	**Unit 5** Geometry	**Unit 6** Figure the Facts with Penguins	**Unit 7** One Hundred & Beyond	**Unit 8** Changes, Changes
Module 1	**Counting & Data with Popsicles** *1.NBT.1, 1.MD.4, 1.OA.5, 1.OA.6, 1.MD.2, 1.G.2* NBT	**Counting, Comparing & Adding with Dominoes** *1.OA.3, 1.OA.5, 1.OA.6, 1.OA.7, 1.NBT.1, 1.NBT.3* OA	**Single-Digit Sums** *1.OA.1, 1.OA.2, 1.OA.3, 1.OA.4, 1.OA.5, 1.OA.6, 1.OA.7, 1.OA.8, 1.NBT.4, 1.MD.4* OA	**Adding & Subtracting on the Life-Sized Number Line** *1.OA.1, 1.OA.5, 1.OA.6, 1.OA.8, 1.NBT.1, 1.NBT.4* OA	**Introducing Two-Dimensional Shapes** *1.OA.3, 1.OA.6, 1.MD.4, 1.G.1, 1.G.2* G	**Story Problems for Basic Addition & Subtraction** *1.OA.1, 1.OA.4, 1.OA.5, 1.OA.6, 1.OA.7, 1.OA.8, 1.NBT.1, 1.NBT.2b* OA	**Grouping Sticks & Bundles Beyond One Hundred** *1.OA.6, 1.NBT.1, 1.NBT.2, 1.NBT.2a-c, 1.NBT.3, 1.NBT.4, 1.NBT.6* NBT	**Time & Duration** *1.OA.8, 1.NBT.1, 1.NBT.3, 1.NBT.4, 1.MD.3, 1.MD.4, 1.G.3* MD
Module 2	**Meet the Number Rack** *1.OA.1, 1.OA.3, 1.OA.5, 1.OA.6, 1.OA.8, 1.NBT.1, 1.NBT.2b, 1.MD.4* OA	**Fact Families & Story Problems** *1.OA.1, 1.OA.3, 1.OA.4, 1.OA.5, 1.OA.6, 1.OA.7, 1.OA.8, 1.NBT.1, 1.NBT.3* OA	**Combinations with the Number Rack** *1.OA.1, 1.OA.2, 1.OA.3, 1.OA.6, 1.OA.7, 1.OA.8, 1.NBT.3, 1.NBT.4, 1.MD.3, 1.MD.4* OA	**Jumping by Fives & Tens** *1.NBT.1, 1.NBT.2c, 1.NBT.4, 1.NBT.5, 1.NBT.6* NBT	**Introducing Three-Dimensional Shapes** *1.OA.6, 1.OA.7, 1.MD.4, 1.G.1, 1.G.2* G	**Combinations & Story Problems** *1.OA.1, 1.OA.2, 1.OA.3, 1.OA.4, 1.OA.6, 1.OA.8, 1.NBT.2b* OA	**Hansel & Gretel's Path on the Number Line** *1.NBT.1, 1.NBT.2, 1.NBT.4, 1.NBT.5, 1.NBT.6* NBT	**Patterns, Structure & Change** *1.OA.1, 1.OA.2, 1.OA.5, 1.OA.6, 1.NBT.4, 1.NBT.5, 1.NBT.6, 1.G.3* OA
Module 3	**Part-Part-Whole to Ten** *1.OA.1, 1.OA.5, 1.OA.6, 1.OA.8, 1.NBT.1, 1.MD.1, 1.MD.2, 1.MD.4* OA	**Introducing Fact Strategies** *1.OA.1, 1.OA.3, 1.OA.4, 1.OA.5, 1.OA.6, 1.OA.8, 1.MD.4, 1.G.2* OA	**Tens & Teens** *1.OA.6, 1.OA.8, 1.NBT.1, 1.NBT.2a–b, 1.NBT.3, 1.NBT.4* NBT	**Jumping by Fives & Tens on the Open Number Line** *1.OA.1, 1.OA.4, 1.OA.5, 1.OA.6, 1.OA.8, 1.NBT.1, 1.NBT.2c, 1.NBT.3, 1.NBT.4, 1.NBT.5, 1.NBT.6* NBT	**Putting Shapes Together & Taking Them Apart** *1.OA.6, 1.NBT.1, 1.NBT.4, 1.NBT.6, 1.G.1, 1.G.2, 1.G.3* G	**Solving for the Unknown in Penguin Stories** *1.OA.1, 1.OA.4, 1.OA.6, 1.OA.7, 1.OA.8* OA	**Adding & Subtracting Two-Digit Numbers with Hansel & Gretel** *1.OA.1, 1.OA.2, 1.OA.3, 1.OA.6, 1.OA.8, 1.NBT.1, 1.NBT.4, 1.NBT.5, 1.NBT.6, 1.MD.2, 1.G.3* NBT	**Measurement & Data with Paper Gliders** *1.NBT.1, 1.NBT.2, 1.NBT.3, 1.NBT.4, 1.NBT.5, 1.MD.1, 1.MD.2, 1.MD.4, 1.G.3* MD
Module 4	**Adding & Subtracting to Ten with the Number Rack** *1.OA.4, 1.OA.5, 1.OA.6, 1.OA.8, 1.NBT.1, 1.MD.1, 1.MD.2, 1.MD.4* OA	**Counting by Fives & Tens** *1.OA.1, 1.OA.3, 1.OA.5, 1.OA.6, 1.OA.8, 1.NBT.1, 1.NBT.3, 1.NBT.4, 1.G.2, 1.G.2, 1.G.3* NBT	**Exploring Equations** *1.OA.1, 1.OA.3, 1.OA.6, 1.OA.7, 1.OA.8* OA	**Measuring, Comparing & Subtracting with Penguins** *1.OA.1, 1.OA.4, 1.OA.6, 1.OA.8, 1.NBT.1, 1.NBT.2c, 1.NBT.3, 1.NBT.4, 1.NBT.6, 1.MD.1, 1.MD.2, 1.MD.4* MD	**Sorting & Graphing Shapes** *1.OA.1, 1.OA.2, 1.OA.4, 1.NBT.4, 1.MD.4, 1.G.1, 1.G.2, 1.G.3* G	**Measuring & Comparing Emperor & Little Blue Penguins** *1.OA.1, 1.OA.2, 1.OA.6, 1.NBT.1, 1.NBT.3, 1.NBT.4, 1.MD.1, 1.MD.2* MD	**Place Value with Money** *1.NBT.1, 1.NBT.2, 1.NBT.3, 1.NBT.4, 1.NBT.5, 1.MD.3, 1.MD.4* NBT	**Measuring Our Growth** *1.OA.3, 1.NBT.1, 1.NBT.2, 1.NBT.3, 1.NBT.4, 1.NBT.5, 1.MD.1, 1.MD.2, 1.MD.3, 1.MD.4* MD

Primary Focus: OA - Operations & Algebraic Thinking **NBT** - Number & Operations in Base Ten **MD** - Measurement & Data **G** - Geometry

Approved by the Amherst School Board on February 16, 2023
Pending Approval of the Mont Vernon School District

Unit Overview
Unit Title: Unit 1: Numbers All Around Us
Unit Summary
As an entry point to the study of mathematics in first grade, Unit 1 works to establish classroom standards around exploring and communicating about numbers. Its mathematical focus is the development of number sense and number combinations (with emphasis on combinations to 10). The unit introduces important mathematical models, including the number rack and five- and ten-frames, and students are expected to become proficient using strategies that emerge from these models.
Approximate Time Needed
5 Weeks - August and September
Unit Foundation
Assessed Competencies
Geometry Measurement and Data Number and Operations in Base Ten Operations and Algebraic Thinking
Assessed Standards *(includes standards on both required and optional assessments)*
***Supports* K.CC** Recognize the number of objects in a collection of 6 or fewer, arranged in any configuration **1.OA.5** Solve addition problems by counting on **1.OA.6** Add within 20 ***Supports* 1.OA** Create, describe, and extend shape patterns **1.NBT.1** Count to 120, starting with any number less than 120, including 0 or 1 **1.NBT.1** Read numerals to 120 **1.NBT.1** Write numerals to 120 **1.NBT.1** Represent a number of objects with a written numeral up to 120 **1.NBT.2b** Demonstrate an understanding that numbers from 11 to 19 are composed of a ten and some more ones ***Supports* 1.NBT** Count by 10s to 100 **Supports 1.NBT** Group and count objects by 10s **1.MD.2** Measure the length of an object by laying multiple copies of a shorter unit end to end (iterating) **1.MD.2** Express the length of an object as a whole number of units **1.MD.2** Demonstrate an understanding that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps **1.MD.4** Organize, represent, and interpret data with up to 3 categories

1.MD.4 Answer questions about the total number of data points in a set of data with up to 3 categories
1.MD.4 Answer questions about how many data points are in each category in a set of data with up to 3 categories
***Supports* 1.MD** Determine the value of a collection of coins totaling less than $1.00
***Supports* 1.G** Identify, name, describe, and compare two-dimensional shapes including triangles, squares, rhombuses, hexagons, and trapezoids
***Supports* 1.G** Identify, name, describe, and compare three-dimensional shapes including cubes, rectangular prisms, triangular prisms, and pyramids
1.G.2 Create a composite shape by composing two-dimensional or three dimensional shapes

Curriculum Framing Questions

Enduring Understandings

Students will understand how to:

- Quickly recognize how many objects are in a collection (up to 10), without counting from 1
- Identify 1 more and 1 less than a given number
- Explore number combinations that add up to 5 and 10
- Count by 1s, 2s, 5s, and 10s
- Make and read simple graphs using pictures and tally marks

Mathematical Concepts

The instruction in Unit 1 is designed to help students develop a sense of numbers and their relationships to one another. Children need a strong number foundation to develop the intuitions and skills required for operational fluency.

Unit 1 focuses on engaging students in number-oriented activities and exercises that become gradually more sophisticated as the unit progresses. Beginning first with the simple organization and counting of Popsicle sticks, students quickly progress to counting both forward and backward, as well as grouping and counting in 2s, 5s, and 10s. The ability to subitize is central to a well-rounded sense of numbers. To subitize is to give up the need and tendency to count every object in a set in order to name the quantity of the set. Stated another way, the ability to subitize allows a child to "see" numbers inside of larger numbers. For example, students who have developed this ability are able to think of 7 as 5 and 2 more. Subitizing allows students to use creative and informal strategies for addition and subtraction. Several sessions in Unit 1 include opportunities to practice subitizing.

Another mathematical concept emphasized in the unit is part-part-whole reasoning. A precursor to algebraic reasoning, knowledge of part-part-whole relations is useful in problem contexts that involve either combining or separating numbers. Part-part-whole reasoning allows a student to shift focus from the part as a unit to the whole as a unit, and back again. In other words, the student with part-part-whole understanding can see the part distinct from the whole, and at the same time not lose sight of the whole as it relates to its component parts.

Finally, this unit introduces length measurement. Students work with nonstandard units to measure various distances and lengths. These activities are useful for the continued development of number

sense. They also introduce the measurement concepts that will be developed throughout the Bridges program.

Unit Overview
Unit Title: Unit 2 Developing Strategies with Dice & Dominoes
Unit Summary
This unit features dominoes, dot cards, and the number rack to help children develop confidence with efficient, effective, and sensible strategies for adding and subtracting single-digit numbers. The work takes advantage of students' ability to subitize (recognize the quantity represented in a set without having to count each individual object in the set) on common dot arrangements such as those found on dominoes or dice. Students explore such strategies as counting on, combining small groups of numbers within larger numbers, building from known facts, using doubles facts to solve other addition problems, counting by 5s and 10s, and using the commutative property. In the second module, students are encouraged to view the equal sign as a way to indicate that two expressions are of equal value, not as a symbol that precedes "the answer." This relational view of equality is perhaps the most important algebraic concept to be learned in the early grades, making it possible for young children to solve for unknown values in an equation.
Approximate Time Needed
6 weeks - October and November
Unit Foundation
Assessed Competencies
Measurement and Data Number and Operations in Base Ten Operations and Algebraic Thinking
Assessed Standards *(includes standards on both required and optional assessments)*
Supports K.CC Recognize the number of objects in a collection of 6 or fewer, arranged in any configuration **K.CC.6** Identify whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group for groups of up to 10 objects **1.OA.1** Solve subtraction story problems with minuends to 20 involving situations of taking from, taking apart, and comparing, with unknowns in all positions ***Supports* 1.OA** Represent subtraction on a number line **1.OA.3** Apply the commutative property of addition to add **1.OA.4** Solve subtraction problems by finding an unknown addend (e.g., Solve 10 – 8 by finding the number that makes 10 when added to 8) **1.OA.5** Solve addition problems by counting on **1.OA.5** Solve subtraction problems by counting back **1.OA.6** Add with sums to 20 **1.OA.6** Add fluently with sums to 10 **1.OA.6** Use strategies to add with sums to 20

1.OA.6 Use strategies to subtract with minuends to 20 (e.g., counting back, adding up to 10, derived facts)
1.OA.7 Demonstrate an understanding that the equal sign indicates equivalence (e.g., rather than the completion of a procedure)
1.NBT.3 Use >, =, and < symbols to record comparisons of two 2-digit numbers
1.MD.4 Organize, represent, and interpret data with up to 3 categories

Curriculum Framing Questions

Enduring Understandings

Students will understand how to:

- Instantly recognize dots on dominoes or dice
- Practice addition and subtraction strategies, like counting on, doubles, and make 10 within 12
- Use dominoes and picture cards to write a fact family of equations
- Solve and write story problems
- Count by 5s and 10s

Mathematical Concepts

Unit 2 features dominoes, dot cards, and the number rack to help students develop strategies for adding and subtracting single-digit numbers in ways that are connected to their natural reasoning. Understanding the relationship between addition and subtraction is foundational to these skills.

Addition is often thought of as either increasing a given amount (adding some number to an existing quantity), or as the joining of two distinct sets. In contrast, subtraction is often thought of as “taking away” or, perhaps more subtly, the “difference” between two sets. Many children enter first grade able to solve single-digit arithmetic problems by counting. This strategy is inefficient with large numbers and often leads to mistakes, especially when used without a physical model. The sessions in this unit help children move away from this type of “calculating by counting” and toward the idea of “calculating by structuring.”

For young children, the ability to subitize is fundamental to this notion of the structure of numbers. To subitize is to abandon the need to count every object in a set in order to arrive at the number name for the set of objects. Another way to think of the concept of subitizing is to say that it allows a way to see smaller numbers within larger numbers. For example, the number 8 might be thought of as 5 and 3 more. The student doesn’t need to count each bead; she knows there is a group of 5, and 3 more, within 8.

The process of moving young learners from counting to structuring through mathematical models prevails throughout the unit. This approach supports conceptual development in other areas as well. For example, consider the use of a domino set to reinforce number facts and, in particular, the commutative property. Students could be asked to turn over a domino and find the total number of dots on it. Working with dominoes reinforces the notion that 4 dots plus 3 dots is the same as 3 dots plus 4 dots: a domino has the same number of dots regardless of which way it faces.

Finally, this unit develops the algebraic concept of a relational view of equality: the understanding

that the equal sign is a marker that signifies that two quantities have the same value as each other, rather than simply standing for “the answer.” Once students understand this, they can begin to reason algebraically as they find unknown values that make a given equality statement true. The following statement is an example.

Unit Overview
Unit Title: Unit 3 Adding, Subtracting, Counting & Comparing
Unit Summary
Unit 3 encourages student mastery of key number facts and fact strategies for single-digit addition and subtraction. The first two modules use the number rack to help students see number combinations, find the sum of two numbers, and compare two numbers to find the difference between them. The third module focuses on developing place-value understanding and solving addition combinations to 20, and the final module makes use of Unifix cubes to help students develop understanding of the difference model of subtraction.
Approximate Time Needed
6 Weeks - November and December
Unit Foundation
Assessed Competencies
Measurement and Data Number and Operations in Base Ten Operations and Algebraic Thinking
Assessed Standards *(includes standards on both required and optional assessments)*
1.OA.1 Solve addition and subtraction story problems with sums and minuends to 20 involving situations of adding to, putting together, taking away, and comparing, with unknowns in all positions **1.OA.3** Apply the commutative property of addition to add **1.OA.4** Solve subtraction problems by finding an unknown addend **1.OA.5** Solve addition and subtraction problems by counting on and counting backward **1.OA.6** Add and subtract fluently within 10 **1.OA.6** Use strategies to add with sums to 20 **1.OA.8** Solve for the unknown in an addition equation involving 3 whole numbers **1.NBT.1** Represent a number of objects with a written numeral up to 120 ***Supports* 1.NBT** Group and count objects by 10s **1.NBT.2** Demonstrate an understanding that the digits in a 2-digit number represent amounts of tens and ones **1.NBT.2a** Demonstrate an understanding that 10 can be thought of as a bundle or group of 10 ones, called a ten **1.NBT.2b** Demonstrate an understanding that numbers from 11 to 19 are composed of a 10 and some more ones M **1.NBT.3** Use >, =, and < symbols to record comparisons of two 2-digit numbers **1.NBT.4** Add a 1-digit number and a 2-digit number **1.NBT.4** Use concrete models or drawings to add with sums to 100 **1.MD.4** Organize, represent, and interpret data with up to 3 categories

1.MD.4 Answer questions about how many more or fewer data points are each category in a set of data with up to 3 categories

Curriculum Framing Questions

Enduring Understandings

Students will understand how to:

- Practice efficient math strategies to add and subtract within 10 and 20
- Build an understanding of place value with tens and ones
- Solve addition and subtraction story problems with pictures, numbers, and words

Mathematical Concepts

Unit 3 pushes students toward mastery of key number facts and fact strategies for single-digit addition and subtraction. By the end of the unit, students are expected to be confident in number facts up to 10 and comfortable with number families to 20.

The unit takes a unique, indirect route to help students learn these number facts. The repetition and memorization-based strategies for fact mastery prevalent in math education for much of the past century are gradually being replaced as we learn more about how students make mathematical meaning, and about the power of mathematical representations and models. The strategies highlighted in this unit reflect this contemporary thinking in the mathematics education community.

Unit 3 is based on the idea that understanding mathematical relationships is preferable to memorizing them. If young children understand relationships between numbers, if they can “see” subsets of numbers within a larger number, if they are comfortable making combinations of 5 and 10, then they are much more likely to have accurate recall of all single digit number facts.

Relationships between numbers, combinations of numbers, number patterns, and a small collection of models that elicit such understanding are the focus of the unit. The ability to subitize is central to a well-rounded sense of numbers and operational fluency in general. To subitize is to give up the need to count every object in a set in order to name the quantity of the set. Stated another way, a student able to subitize can “see” numbers inside of larger numbers. For example, she is able to think of 7 as 5 and 2 more.

Sessions throughout the unit allow students to practice subitizing and find creative and informal strategies for addition and subtraction. Unit 3 also emphasizes the concept of part-part-whole reasoning. A precursor to algebraic reasoning, knowledge of part-whole relations is useful in problem contexts that involve either combining or separating numbers. Part-part-whole reasoning allows a student to shift her focus from the part as a unit to the whole as a unit and back again. In other words, the student with part-part-whole understanding can see the part distinct from the whole without losing sight of the whole as it relates to its component parts. This is a vital skill.

Students who see addition and subtraction facts as part-part-whole problems (rather than memorized facts) are much more likely to develop rich problem-solving strategies, deep number sense, and fluency with the number facts. This nuanced sense of numbers and number relationships helps them easily derive the number facts via strategies highlighted throughout the unit.

Unit Overview
Unit Title: Unit 4 Leapfrogs on the Number Line
Unit Summary
Unit 4 revolves around the number line, an essential mathematical model. Throughout, closed and open number lines are used both as models of our number system, as well as models for beginning operations with addition and subtraction. Students locate numbers on a number line, use their reasoning skills and number sense to determine unknown values that correspond to empty boxes, and explore addition and subtraction. As the unit unfolds, the range of numbers represented grows from 0–20 to 0–120. Students become comfortable skip-jumping along open number lines in multiples of 5 and 10, forward and backward, from numbers that are both on and off the decade. In the concluding module, students measure penguins and then compare and order those measurements, write inequality statements, and find differences between the two numbers.
Approximate Time Needed
6 weeks - January / February
Unit Foundation
Assessed Competencies
Number and Operations in Base Ten Operations and Algebraic Thinking
Assessed Standards *(includes standards on both required and optional assessments)*
1.OA.1 Solve addition and subtraction story problems with sums and minuends to 20 involving situations of adding to, putting together, taking from, taking apart, and comparing with unknowns in all positions ***Supports* 1.OA** Represent addition and subtraction on a number line **1.OA.5** Solve addition and subtraction problems by counting on and counting backward **1.OA.6** Add and subtract fluently within 10 **1.OA.6** Use the relationship between addition and subtraction to add and subtract within 20 **1.OA.8** Solve for the unknown in an addition or subtraction equation involving 3 whole numbers ***Supports* 1.OA** Recognize and extend number patterns **1.NBT.1** Count to 120, starting with any number less than 120, including 0 or 1 **1.NBT.1** Read and write numerals to 120 ***Supports* 1.NBT** Count by 10s to 100 **1.NBT.2c** Demonstrate an understanding that multiples of 10 from 10 to 90 refer to some number of tens and 0 ones (e.g., the number 60 refers to 6 tens and no ones) **1.NBT.4** Add a 1-digit number and a 2-digit number **1.NBT.4** Add a multiple of 10 (up to 80) and another 2-digit number **1.NBT.4** Use strategies based on place value, properties of operations, or the relationship between addition and subtraction to add with sums to 100

1.NBT.5 Mentally find the number that is 10 more or 10 less than a given 2-digit number, without counting
1.NBT.6 Use concrete models or drawings to subtract a 2-digit multiple of 10 from an equal or greater 2-digit multiple of 10
1.NBT.6 Use strategies based on place value, properties of operations, or the relationship between addition and subtraction to subtract a 2-digit multiple of 10 from an equal or greater 2-digit multiple of 10

Curriculum Framing Questions

Enduring Understandings

Students will understand how to:

- Locate, identify and order numbers to 120 on a number line
- Count forward and backward by 1s, 5s and 10s
- Add, subtract, and solve word problems using a number line
- Measure, order, and compare height in inches

Mathematical Concepts

The primary concern of Unit 4 is to help students develop a solid footing in counting, addition, and subtraction within the range of 0–120—conceptually and procedurally. In particular, Unit 4 focuses on the number line as a model both to represent numbers and to add and subtract them using multiples of 1, 5, and 10.

The two major obstacles that young students face when learning to count to 100 and beyond are passing a decade number (10, 20, 30, and so on), and counting backward. It's important to recognize these challenges and to equip students with many opportunities to choral count forward and backward by 1s, 5s, and 10s as well as opportunities to visualize our number system. The number line offers these opportunities. It can be useful to consider the number line in light of two fundamental questions: What is addition? What is subtraction? The answers have implications for how we teach children to add and subtract.

Generally speaking, addition appears to students as a process of increasing or putting together. Subtraction, on the other hand, is thought of as taking away or finding the difference. The contexts we use to promote addition and subtraction calculations become significant as they suggest the use of a particular model and subsequent strategy.

Most young children begin the process of calculation by counting. For example, imagine the following prompt: "There are 8 children on the bus. Five get off. How many are left?" Students are likely to first solve this problem by counting on their fingers. Starting with 8 fingers, they begin to count backward from 8 and often arrive at a confusing point: 8-7-6-5-4. Is the answer 4, or 3? Should I count 8 or not? In short, counting backward is an awkward process for young children. We can help them learn to calculate by structuring. For children to be able to calculate by structuring, they must be able to see the essential building blocks of our number system. They must have a firm grasp of the base ten system, through which very predictable patterns emerge. For example, 14 + 10 is 24…44 – 10 is 34. Unlike discrete grouping models, the number line is instrumental in helping students visualize number relationships and also use those visualizations in the act of counting and

calculating.

Unit Overview
Unit Title: Unit 5 Geometry
Unit Summary
Over the course of this unit, students use a variety of tools and models to explore two- and three-dimensional shapes and fractions (halves, thirds, and fourths). Throughout, the emphasis is squarely on shapes—identifying, describing, constructing, drawing, comparing, composing, and sorting them. Students learn about fractions in the context of two-dimensional shapes as they cut paper sandwiches in halves and fourths, fold and cut paper circle pizzas to share, and play a fraction bingo game in which they must complete the pictures and labels on their own boards.
Approximate Time Needed
5 weeks - February / March
Unit Foundation
Assessed Competencies
Geometry Measurement and Data
Assessed Standards *(includes standards on both required and optional assessments)*
1.MD.4 Organize, represent, and interpret data with up to 3 categories **1.MD.4** Answer questions about the total number of data points in a set of data, about how many data points are in each category, and how many more or fewer data points are in each category **Supports 1.G** Identify, name, describe, and compare two-dimensional shapes, including circles, triangles, rectangles, squares, rhombuses, hexagons, and trapezoids ***Supports* 1.G** Identify, name, describe, and compare three-dimensional shapes, including cubes, rectangular prisms, triangular prisms, pyramids, cylinders, cones, and spheres **1.G.1** Demonstrate an understanding of the difference between the defining and non-defining attributes of a two dimensional shape **1.G.1** Draw a two-dimensional shape with specific defining attributes **1.G.1** Build a three-dimensional shape with specific defining attributes **1.G.2** Create a composite shape by composing two-dimensional shapes **1.G.2** Create a composite shape by composing three-dimensional shapes **1.G.3** Use the terms halves and half of to talk about the 2 equal parts into which a circle [rectangle] has been partitioned **1.G.3** Use the terms fourths, quarters, fourth of, and quarter of to talk about the 4 equal parts into which a circle [rectangle] has been partitioned **1.G.3** Demonstrate an understanding that as a shape is partitioned into a greater number of equal parts the size of the parts gets smaller

Curriculum Framing Questions

Enduring Understandings

Students will understand how to:

- Identify, name, describe, and compare 2- and 3-D shapes based on their defining features
- Draw 2-D shapes and build 3-D shapes
- Use two or more geometric shapes to create a new composite shape or figure
- Split whole shapes into 2, 3, or 4 equal parts called halves, thirds, or fourths/quarters

Mathematical Concepts

In 1957, two Dutch educators, Pierre van Hiele and Dina van Hiele-Geldof, puzzled by the difficulty their students had with geometry, published what has become a very influential theory in the design of geometry curriculum. According to the van Hiele theory, students pass through certain levels as they become more sophisticated in their geometric thinking, and these levels must unfold in order, propelled by students' own explorations and discoveries.

Progress through the levels of geometric understanding is more dependent on educational experiences than on age or maturity. It's interesting to note that while traditional high school geometry textbooks are generally pitched at about level 3, many high school students enter functioning at level 0 or, at best, level 1. To arrive at level 3, students must move through all the prior levels. To move through a level means that a student has experienced geometric thinking appropriate for that level and has created in his or her own mind the types of objects or relationships that are the focus of thought at the next level.

The van Hieles believe that instruction must begin at a student's current level and provide many years of visual and exploratory work before moving into formal deductions. Experience with shapes, terms, and geometry-related concepts is the greatest single factor influencing advancement through the levels. So, the question for us as teachers of primary students is two-fold: at what level are our students currently working, and what can we do to support their development?

Most K–2 students think and work largely at level 0. In fact, the move into and through level 1 might be considered the main focus of geometry instruction through elementary school. Activities that permit children to explore, talk about, and interact with content at the next level, while increasing their experiences at the current level, have the best chance of advancing their thinking. Listed here are some of the features of effective instruction at both level 0 and level 1.

Features of Level 0 Activities

- Involve lots of sorting, identifying, and describing of various shapes.
- Use lots of physical models that can be manipulated by the students.
- Include many different and varied examples of shapes so that irrelevant features, such as size, color, and orientation, do not become important.
- Provide opportunities to build, make, draw, put together, and take apart shapes.

Features of Level 1 Activities

- Begin to focus more on properties of figures than on simple identification. Define, measure, observe, and change properties with the use of models.

- Use problem-solving contexts in which properties of shapes are important components.
- Continue to use models, as with level 0, but include models that permit the exploration of various properties of figures.
- Classify figures based on properties of shapes as well as by names of shapes. For example, investigate properties of triangles, such as side length and angle measure, that make some alike and others different.

Unit Overview
Unit Title: Unit 6 Figure the Facts with Penguins
Unit Summary
Unit 6 is tightly focused on addition and subtraction to 20. During this unit, first graders continue to develop fluency with addition and subtraction facts to 10 and strategies for working with facts to 20. Students make extensive use of the number rack to model and solve number combinations and story problems of all types. In the process, they learn how to write and solve equations that involve unknowns in all positions and determine whether addition and subtraction equations are true or false. Throughout the unit, the interesting and sometimes amazing habits of penguins offer engaging story problem contexts for young learners.
Approximate Time Needed
5 Week - March and April
Unit Foundation
Assessed Competencies
Number and Operations in Base Ten Operations and Algebraic Thinking
Assessed Standards (includes standards on both required and optional assessments)
1.OA.1 Solve addition and subtraction story problems with sums and minuends to 20 involving situations of adding to, putting together, taking from, taking apart, and comparing with unknowns in all positions **1.OA.4** Solve subtraction problems by finding an unknown addend **1.OA.6** Add and subtract with sums and minuends to 20 **1.OA.6** Add and subtract fluently with sums to 10 **1.OA.6** Use strategies to add and subtract within 20 **1.OA.7** Demonstrate an understanding that the equal sign indicates equivalence **1.OA.7** Determine whether addition and subtraction equations are true **1.OA.8** Solve for the unknown in an addition or subtraction equation involving 3 whole numbers **1.NBT.2b** Demonstrate an understanding that numbers from 11 to 19 are composed of a 10 and some more ones
Curriculum Framing Questions
Enduring Understandings
Students will understand: ● Practice efficient math strategies to add and subtract within the range of 0–20 ● Tell, write, and solve a variety of addition and subtraction story problems

- Write equations to match the problems
- Use place value strategies to add and subtract up to 100
- Measure, order, and compare height in inches

Math Concepts

Unit 6 is devoted to the understanding of addition and subtraction. The unit focuses not only on strategies that are useful in solving addition and subtraction problems, but also on helping students develop broader conceptual understanding of the operations of addition and subtraction themselves, and their relationship to one another.

Throughout, students use the number rack to model number combination problems that come in many different forms. These explorations help them develop comfort with certain number facts as well as key strategies for addition and subtraction. The Common Core Standards call for first grade children to add and subtract to 20, but not necessarily with fluency. In fact, mastery of subtraction facts to 20 is not required at any grade level. Mastery of facts within 10, however, is expected in first grade. The reasoning is that while students may not have all the number facts to 20 memorized, they can work well within that range, applying useful strategies that go beyond by 1s counting. The strategies emphasized in Unit 6 that address these goals are outlined below.

It's easier for young children to combine quantities (add) than separate quantities (subtract). But that doesn't mean that we should place more attention on subtraction in Unit 6 rather than addition. In fact, we do the opposite. While several locations in the unit (e.g., Module 2, Session 5) emphasize subtraction, and while we carefully develop specific subtraction strategies (such as developing the notion of "difference" between two quantities) the unit more frequently emphasizes addition. Although this might seem counterintuitive, there is a very good reason for this structure. One instructional goal is to have students see the relationship between the addition and subtraction operations, particularly within a specific number context.

Through repeated exposure to various iterations of the fundamental relationship of 7 + 9 = 16, students develop a solid understanding of this number relationship and the various ways to represent it through both subtraction and addition. The best way to foster this understanding is to start with additive contexts. As students grapple with this number family in all its additive iterations, they make the natural associations to subtraction. This approach solidifies an understanding of what it actually means to add or to subtract—to combine or to separate.

Unit Overview
Unit Title: Unit 7 One Hundred & Beyond
Unit Summary
The focus of Unit 7 is place value. During this unit, first graders continue to develop deep understandings of numbers to 120 as they estimate, count, compare, add, and subtract two-digit quantities using familiar models: sticks & bundles; dimes, nickels, and pennies; and the number line.
Approximate Time Needed
5 Weeks - May and June
Unit Foundation
Assessed Competencies
Number and Operations in Base Ten
Assessed Standards (includes standards on both required and optional assessments)
1.NBT.1 Count to 120, starting with any number less than 120, including 0 or 1 **1.NBT.1** Read and write numerals to 120 ***Supports* 1.NBT** Count by 5s to 100 **1.NBT.3** Use >, =, and < symbols to record comparisons of two 2-digit numbers **1.NBT.4** Add a 1-digit number and a 2-digit number **1.NBT.4** Add a multiple of 10 (up to 80) and another 2-digit number **1.NBT.4** Use concrete models or drawings and strategies based on place value, properties of operations, or the relationship between addition and subtraction to add with sums to 100 **1.NBT.4** Relate strategies for adding with sums to 100 to written methods; use written numbers and symbols to represent strategies for adding with sums to 100 **1.NBT.4** Add with sums to 100 using strategies that involve adding tens to tens and ones to ones **1.NBT.4** Add with sums to 100 using strategies that involve composing a ten (regrouping) **1.NBT.5** Mentally find the number that is 10 more or 10 less than a given 2-digit number, without counting **1.NBT.6** Subtract a 2-digit multiple of 10 from an equal or greater 2-digit multiple of 10 **1.NBT.6** Use concrete models or drawings to subtract a 2-digit multiple of 10 from an equal or greater 2-digit multiple of 10 **1.NBT.6** Relate strategies for subtracting a 2-digit multiple of 10 from an equal or greater 2-digit multiple of 10 to written methods; use written numbers and symbols to represent strategies
Curriculum Framing Questions
Enduring Understandings
Students will:

- Understand place value within the range of 0–120
- Represent numbers using groups of 1s, 10s, and 100
- Use models, sketches, and numbers to add and subtract up to 120
- Count forward and backward by 1s, 2s, 5s, and 10s on a number line

Mathematical Concepts

One of the noteworthy changes in Grade 1 standards is an increased emphasis on addition and subtraction of two-digit numbers. Previously this topic was addressed in later grades, but now first grade teachers are accountable for helping their students acquire strategies to handle these multi-digit problems. Reflecting these changes, Unit 7 emphasizes models that reinforce students' understandings of place value within the range of 0–120 and that foster confidence with addition and subtraction strategies within this range.

Sessions in Unit 7 employ a variety of models (coins, sticks & bundles, the number line) for students' beginning forays into multi-digit operations. As we note below, coins and bundles of sticks are helpful for illustrating discrete quantities that can then be joined or separated. These discrete counting models are closely tied not only to important place value concepts but also to widely taught addition and subtraction algorithms for double-digit computation. The number line, a continuous model used to introduce the idea of skip-counting by 2s, 5s and 10s, is also used throughout the unit and supplements these discrete models. (Skip-counting by these intervals is emphasized repeatedly in Grade 2, reflecting Common Core Standards.) Research has indicated that students with a solid understanding of 1, 2, 5, and 10 readily develop both formal and informal strategies for two-digit operations, particularly when those intervals are illustrated and manipulated on the open number line. If a child is comfortable counting by 1s, 2s, or 5s, there's no number she cannot conceptualize easily. For example, take the number 87. The student with understanding of 1s, 2s, and 5s will see 87 as "85 and 2 more" and think of the number 33 as "2 less than 35."

Central to these mental manipulations is a strong sense of place value—how our number system works, how predictable patterns can help us navigate number contexts, and how strategies that work with small numbers are scalable to larger numbers. Developing these important concepts is the core work of this unit.

Unit Overview
Unit Title: Unit 8 Changes, Changes (optional unit)
Unit Summary
During Unit 8, students consider the concept of change from several different angles. The activities in Module 1 help first graders make the link between time and change as they investigate some of the changes they can make to materials such as paper, craft sticks, and ice cubes in a second, a minute, and an hour. In Module 2, they explore predictable changes in numbers, using a very simple function machine made of a half-gallon milk carton and specially designed sets of change cards. In Module 3, students consider changes in location as they learn to fold and launch paper gliders through the air. After making and testing an initial set of gliders, students modify their original gliders or fold new ones in the attempt to better their flight distances. In Module 4, they explore some of the ways they've grown and changed since they were born. All in all, Unit 8 offers a satisfying end to the school year, blending math and science in ways sure to engage young learners.
Approximate Time Needed
Optional Unit - Can integrate with Science
Unit Foundation
Assessed Competencies
Measurement and Data Number and Operations in Base Ten Operations and Algebraic Thinking
Assessed Standards *(all assessments in this unit are optional)*
1.OA.5 Solve addition problems by counting on **1.OA.5** Solve subtraction problems by counting back **1.OA.6** Add and subtract within 20 **1.OA.6** Use the relationship between addition and subtraction to add and subtract within 20 **1.OA.8** Solve for the unknown in an addition equation involving 3 whole numbers (2 addends and a sum) ***Supports*** **1.OA** Recognize, describe, extend, and create number patterns **1.NBT.1** Read and write numerals to 120 **1.NBT.1** Represent a number of objects with a written numeral up to 120 ***Supports*** **1.NBT** Count by 5s to 100 **1.NBT.3** Compare pairs of 2-digit numbers **1.NBT.4** Add a multiple of 10 (up to 80) and another 2-digit number **1.NBT.4** Use concrete models or drawings and strategies based on place value, properties of operations, or the relationship between addition and subtraction to add with sums to 100 **1.NBT.5** Mentally find the number that is 10 more or 10 less than a given 2-digit number, without counting

1.NBT.6 Subtract a 2-digit multiple of 10 from an equal or greater 2-digit multiple of 10
1.MD.2 Measure the length of an object by laying multiple copies of a shorter unit end to end (iterating)
1.MD.2 Express the length of an object as a whole number of units
1.MD.2 Demonstrate an understanding that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps
1.MD.3 Tell time to the hour on an analog clock
1.MD.4 Interpret data with up to 3 categories, and answer questions about the data point

Curriculum Framing Questions

Enduring Understandings

Students will understand how to:

- Explore change with math and science concepts
- Develop a sense of time by experiencing activities that last a second, minute, hour, and day
- Solve problems using addition and subtraction up to 100
- Measure, order, compare, and find differences in length
- Collect and analyze data by making simple charts and graphs using pictures, numbers, and tally marks

Mathematical Concepts

As might be expected in a unit that integrates math and science, many of the activities throughout Unit 8 involve measurement, data analysis, and computing the amount of change, or the difference, between quantities. For example, after folding and learning to fly paper gliders during the first session in Module 3, students watch as three of their classmates launch their gliders individually. Pressed by the teacher to say which of the three gliders flew the farthest, students experience a real need to develop a system that allows for fair testing and standard measurement of flight distances. With guidance from the teacher, they build runways of Unifix cubes grouped into sets of 10, making it possible to efficiently measure the flight distances of gliders that are now launched from a common starting point.

After each student has an opportunity to conduct three test flights, all are asked to reflect on their results, each individual looking for his or her longest and shortest flight and developing strategies to find the difference between the distances. Students then work together to compile all their flight data, making a tally chart and analyzing the data to look for the most common range of flight distances.

The teacher then invites students to modify their gliders or build new ones, with the goal of improving their flight distances. Because it takes a balance of four forces—drag, gravity, thrust, and lift—to get a paper plane to fly well, first graders' modifications will be largely based on trial and error rather than scientific manipulation of the forces at work. This doesn't mean their attempts are a waste of time.

For young children, manipulating the physical properties of an object and repeatedly testing for and observing the results constitute a valid investigation. After students have had time to make new

gliders, the class conducts a second set of flight trials, compiles and analyzes class results, and looks for evidence of improved flight distances. Throughout the six sessions that comprise the third module, students have many opportunities to measure distance with nonstandard units, develop further understanding of place value as they count cubes arranged much like a number line, find the difference between pairs of flight distances, and compile and interpret data in a real-world context rich with meaning for them. The activities in Module 4 provide a very different, but equally meaningful context for measurement, computation, and data analysis. Students investigate how much they've grown in height since they were first born, and compare their own height, foot and arm length, and head circumference to that of a visiting baby.

Grade 1 Scope & Sequence

Number Corner Second Edition

	August / September	October	November	December	January	February	March	April	May / June
Calendar Grid	**Place Value Models** *1.NBT.1, 1.NBT.2a–b* NBT	**Fall Number Stories & Equations** *1.OA.1, 1.OA.3, 1.OA.6* OA	**Chomp! Gulp! Nibble! Fractions** *1.NBT.1, 1.G.3* G	**Three-Dimensional Shapes All Around Us** *1.NBT.1, 1.G.1, 1.G.2* G	**Equations with Unknowns** *1.OA.1, 1.OA.6, 1.OA.7, 1.OA.8, 1.NBT.1* OA	**Geoboard Shapes** *1.NBT.1, 1.G.1* G	**What Time Is It?** *1.NBT.1, 1.MD.3, 1.G.3* MD	**Folding Fractions** *1.NBT.1, 1.G.1, 1.G.3* G	**Hopping on the 120 Number Grid** *1.NBT.1, 1.NBT.4, 1.NBT.5, 1.NBT.6* NBT
Calendar Collector	**Fives & Ones with Nickels & Pennies** *1.MD.4* NBT	**Pattern Block Shapes** *1.NBT.1, 1.NBT.3, 1.MD.4, 1.G.2* G	**An Hour a Day** *1.MD.3, 1.G.3* MD	**Time to the Hour** *1.MD.3* MD	**Tens & Ones with Dimes & Pennies** *1.MD.4* NBT	**Collecting Cubes** *1.OA.3, 1.NBT.2, 1.NBT.3, 1.NBT.4, 1.MD.4* NBT	**Tens, Fives & Ones with Coins** *1.NBT.1, 1.MD.4* NBT	**Counting & Adding with Popsicle Sticks** *1.NBT.2a, 1.MD.1, 1.MD.2, 1.MD.4* MD	**Fractions with Quarters** *1.G.3* MD
Days in School	**Finding Five** *1.OA.6, 1.OA.7, 1.NBT.2a–b* NBT	**Making Ten** *1.OA.7, 1.NBT.1, 1.NBT.2, 1.NBT.4* NBT	**Finding Fifty** *1.OA.7, 1.NBT.1, 1.NBT.2, 1.NBT.4* NBT	**Moving Beyond Fifty** *1.OA.6, 1.OA.7, 1.NBT.1, 1.NBT.2a, 1.NBT.4* NBT	**Close to One Hundred** *1.OA.7, 1.NBT.1, 1.NBT.2a, 1.NBT.4* NBT	**One Hundred Days of School & More** *1.OA.7, 1.NBT.1, 1.NBT.2a, 1.NBT.2c, 1.NBT.4* NBT	**Looking Beyond One Hundred** *1.NBT.1, 1.NBT.2, 1.NBT.4, 1.NBT.5* NBT	**Expanded Notation** *1.NBT.1, 1.NBT.2, 1.NBT.4* NBT	**Closing in on Two Hundred** *1.NBT.1, 1.NBT.2, 1.NBT.4* NBT
Computational Fluency	**Adding Ten & More** *1.OA.6, 1.NBT.2a–b, 1.NBT.4* OA	**Make Ten Facts** *1.OA.3, 1.OA.4, 1.OA.6, 1.OA.8* OA	**Doubles & Halves to Ten** *1.OA.4, 1.OA.6* OA	**Doubles & Halves Within Twenty** *1.OA.6* OA	**Doubles Plus or Minus One Facts** *1.OA.5, 1.OA.6* OA	**Multiple Addends** *1.OA.2, 1.OA.3, 1.OA.6* OA	**Think Ten** *1.OA.3, 1.OA.4, 1.OA.6, 1.OA.7, 1.NBT.3* OA	**Numbers to 120** *1.NBT.1, 1.NBT.2, 1.NBT.2c, 1.NBT.3, 1.NBT.4, 1.NBT.5, 1.NBT.6* NBT	**Adding & Subtracting on the 120 Grid** *1.NBT.1, 1.NBT.4, 1.NBT.5, 1.NBT.6* NBT
Number Line	**The First Two Decades** *1.OA.6, 1.NBT.1, 1.NBT.2* NBT	**The Twenties & Thirties** *1.NBT.1, 1.NBT.2, 1.NBT.2a, 1.NBT.2c, 1.NBT.3* NBT	**The Forties & Fifties** *1.NBT.1, 1.NBT.2, 1.NBT.2a, 1.NBT.2c, 1.NBT.3* NBT	**The Fifties & Sixties** *1.OA.5, 1.NBT.1, 1.NBT.2, 1.NBT.2a, 1.NBT.2c, 1.NBT.3* NBT	**The Seventies & Eighties** *1.OA.5, 1.NBT.1, 1.NBT.2, 1.NBT.2a, 1.NBT.2c, 1.NBT.3* NBT	**The Tenth Decade** *1.OA.5, 1.NBT.1, 1.NBT.2, 1.NBT.3* NBT	**Numbers to 120** *1.NBT.1, 1.NBT.2, 1.NBT.2c, 1.NBT.3* NBT	**Adding & Subtracting Decade Numbers** *1.NBT.1, 1.NBT.2, 1.NBT.4, 1.NBT.5, 1.NBT.6* OA	**Numbers Off the Decade by Tens** *1.NBT.1, 1.NBT.2, 1.NBT.4, 1.NBT.5* NBT

Primary Focus: OA - Operations & Algebraic Thinking **NBT** - Number & Operations in Base Ten **MD** - Measurement & Data **G** - Geometry

Number Corner is an additional component of our mathematics curriculum. It is a skill-building program that revolves around the classroom calendar, providing daily practice as well as continual experiences with broader mathematical concepts in 20 minutes of engaging instruction.

SAU 39 Grade 2 Mathematics Curriculum

Grade 2 Scope & Sequence - SAU 39

Bridges in Mathematics Second Edition

	August / September - Done by Oct. 7th	October/November - Done by Nov. 22nd	November/December - Done by Jan. 6th	January/February - Done by Feb. 10th	February/March - Done by March 24th	March/April - Done by April 21st	May/June	Optional/Integrate in Science
	Unit 1 Figure the Facts	**Unit 2** Place Value & Measurement with Jack's Beanstalks	**Unit 3** Addition & Subtraction Within 100	**Unit 4** Measurement	**Unit 5** Place Value to One Thousand	**Unit 6** Geometry	**Unit 7** Measurement, Fractions & Multi-Digit Computation with Hungry Ants	**Unit 8** Measurement, Data & Multi-Digit Computation with Marble Rolls
Module 1	**Sorting & Graphing** *2.OA.1, 2.OA.2, 2.OA.3, 2.MD.1, 2.MD.8, 2.MD.10, 2.G.1, 2.G.2, 2.G.3* MD	**Counting & Modeling Two- & Three-Digit Numbers** *2.OA.1, 2.OA.2, 2 NBT.1, 2.NBT.1a, 2.NBT.2, 2.NBT.3, 2.NBT.4, 2.NBT.5, 2.NBT.7, 2.MD.4, 2.MD.6* NBT	**Tens & Ones** *2.OA.1, 2.OA.2, 2 NBT.1, 2.NBT.2,2.NBT.3,2.NBT.4, 2.NBT.5,2.NBT.6,2.NBT.9, 2.MD.1, 2.MD.56, 2.MD.6, 2.MD.8* NBT	**Inches & Feet** *2.OA.1, 2.NBT.2, 2.NBT.3, 2.NBT.5, 2.MD.1, 2.MD.2, 2.MD.3, 2.MD.6, 2.MD.10* MD	**Counting to One Thousand** *2.OA.1, 2.OA.2, 2 NBT.1, 2.NBT.2,2.NBT.3,2.NBT.4, 2.NBT.5,2.NBT.7,2.NBT.8, 2.MD.8* NBT	**Attributes of Two-Dimensional Shapes** *2.OA 2, 2.NBT.1, 2.NBT.3, 2.NBT.5, 2.MD.8 , 2.G.1, 2.G.2* G	**Army Ants: Length in Metric Units** *2.OA.1, 2.NBT.1, 2.NBT.1a-b, 2.NBT.3, 2.NBT.4, 2.NBT.5, 2.NBT.7, 2.NBT.8, 2.NBT.9, 2.MD.1, 2.MD.2, 2.MD.3, 2.MD.4, 2.MD.6, 2.MD.8, 2.G.3* MD	**Revisiting Place Value & Three-Digit Computation** *2.OA.1, 2.OA.3, 2 NBT.1, 2.NBT.1a, 2.NBT.1b, 2.NBT.2, 2.NBT.3, 2.NBT.4, 2.NBT.5, 2.NBT.6, 2.NBT.7, 2.NBT.8, 2.NBT.9, 2.MD.5, 2.MD.8* NBT
Module 2	**Number Facts with the Number Rack** *2.OA.1, 2.OA.2, 2.OA.4, 2.NBT.2, 2.NBT.5, 2.MD.8* OA	**Measuring Jack's Giant Beans with Tens** *2.OA 2, 2.OA.4, 2 NBT.1, 2.NBT.2, 2.NBT.3, 2.NBT.4, 2.NBT.5, 2.MD.4, 2.MD.6* NBT	**Adding & Subtracting on the Number Line** *2.OA.1, 2.OA.2, 2 NBT.2, 2.NBT.5, 2.MD.1, 2.MD.3, 2.MD.4, 2.MD.5, 2.MD.6, 2.MD.8* NBT	**Inches, Feet & Yards** *2.OA.1, 2.OA.2, 2 NBT.4, 2.NBT.5, 2.NBT.6, 2.MD.1, 2.MD.2, 2.MD.3, 2.MD.4, 2.MD.5, 2.MD.6, 2.MD.8* MD	**Place Value with Money** *2.OA.3, 2.NBT.1, 2.NBT.1a-b, 2.NBT.2, 2.NBT.3, 2.NBT.4, 2.NBT.7, 2.NBT.8, 2.MD.7, 2.MD.8, 2.MD.10* MD	**Exploring Area & Arrays** *2.OA.4, 2.G.1, 2.G 2, 2.G.3* G	**Ant Treats: Division & Fractions** *2.OA.1, 2.NBT.5, 2.NBT.6, 2.NBT.7, 2.MD.1, 2.MD.3, 2.MD.10, 2.G.3* G	**Building Marble Rolls & Collecting Data** *2.OA.1, 2.NBT.3, 2.NBT.5, 2.NBT.7, 2.MD.1, 2.MD.2, 2.MD.3, 2.MD.4, 2.MD.5, 2.MD.6, 2.MD.7, 2.MD.8, 2.MD.9* MD
Module 3	**Introducing Addition & Subtraction Strategies** *2.OA.1, 2.OA.2, 2.OA.3, 2.NBT.5, 2.MD.6 , 2 MD.10* OA	**Adding on the Open Number Line** *2.OA.1, 2.OA.2, 2 NBT.1, 2.NBT.2,2.NBT.3,2.NBT.5, 2.NBT.6,2.NBT.7, 2.MD.4, 2.MD.5, 2.MD.6, 2.MD.7* NBT	**Present & Parcel Story Problems with Two-Digit Numbers** *2.OA.1, 2.OA.2, 2 NBT.1, 2.NBT.2,2.NBT.3,2.NBT.4, 2.NBT.5,2.NBT.6,2.NBT.9, 2.MD.5, 2.MD.6, 2.MD.8* NBT	**Proportions & Fractions with a Giant** *2.OA.1, 2.OA.2, 2 NBT.5, 2.NBT.6, 2.MD.1, 2.MD.2, 2.MD.3, 2.MD.4, 2.MD.5, 2.MD.8* MD	**Multiples of Ten, One Hundred & One Thousand** *2.NBT.1, 2.NBT.1a-b, 2.NBT.2,2.NBT.3,2.NBT.4, 2.NBT.7, 2.NBT.8,2.MD.4, 2.MD.5, 2.MD.6, 2.MD.7, 2.MD.8* NBT	**Composing & Decomposing Patchwork Shapes** *2.OA.1, 2.OA.2, 2.OA.4, 2.NBT.5, 2.NBT.6, 2.NBT.7, 2.G.1, 2.G.2, 2.G.3* G	**Adding & Subtracting Three-Digit Numbers** *2.OA.1, 2.NBT.2, 2.NBT.3, 2.NBT.4,2.NBT.6,2.NBT.7, 2.NBT.9, 2.MD.1, 2.MD.3, 2.MD.3, 2.MD.8, 2.MD.10, 2.G.3* NBT	**Collecting & Analyzing More Marble Roll Data** *2.OA.1, 2.NBT.3, 2.NBT.4, 2.NBT.5,2.NBT.6,2.NBT.7, 2.MD.1, 2.MD.3, 2.MD.4, 2.MD.5, 2.MD.6, 2.MD.8, 2.MD.9, 2.G.3* MD
Module 4	**Fluency with Addition Facts to Twenty** *2.OA.1, 2.OA.2, 2.OA.3, 2.MD.6* OA	**Thinking in Twos** *2.OA.3, 2.OA.4, 2 NBT.5, 2.NBT.8* OA	**Data & the Many Colors Project** *2.OA.3, 2.NBT.6, 2.NBT.9, 2.MD.10* MD	**Thinking in Threes** *2.OA.1, 2.OA.3, 2.OA.4, 2.NBT.2, 2.NBT.3, 2.NBT.5* OA	**Sequences & Patterns** *2.OA.3, 2.NBT.1, 2.NBT.2, 2.NBT.3, 2.NBT.5, 2.NBT.7, 2.NBT.8* OA	**Patchwork Fractions** *2.OA.1, 2.OA.2, 2 NBT.5, 2.NBT.7, 2.MD.10, 2.G.1, 2.G.2, 2.G.3,* G	**Writing & Solving Story Problems** *2.OA.1, 2.OA.2, 2 NBT.5, 2.NBT.6, 2.NBT.7, 2.NBT.9, 2.MD.1, 2.MD.3, 2.MD.4, 2.MD.8, 2.MD.10* NBT	**Student-Conducted Surveys** *2.OA.1, 2.NBT.2, 2.NBT.3, 2.NBT.4, 2 NBT 5, 2.NBT.7, 2.MD.1, 2.MD.3, 2.MD.9, 2.MD.10* MD

Primary Focus: OA - Operations & Algebraic Thinking **NBT** - Number & Operations in Base Ten **MD** - Measurement & Data **G** - Geometry

201306

Approved by the Amherst School Board on February 16, 2023
Pending Approval of the Mont Vernon School District

Unit Overview

Unit Title: Unit 1 Figure the Facts

Unit Summary

As an entree into the study of mathematics in second grade, Unit 1 works toward the establishment of classroom norms around mathematical inquiry and discourse. The mathematical focus rests primarily on the development of number sense, operations, and fact fluency to 20. Important mathematical models including the number rack, bead strings, and the number line are introduced during the unit, and students are expected to become proficient at using strategies that emerge from these models.

Approximate Time Needed

5 Weeks - August and September

Unit Foundation

Assessed Competencies

Geometry
Measurement and Data
Number and Operations in Base Ten
Operations and Algebraic Thinking

Assessed Standards *(includes standards on both required and optional assessments)*

Supports **1.OA** Create number and shape patterns
1.OA.4 Demonstrate understanding of subtraction as an unknown addend problem
1.OA.6 Use strategies to add with sums to 20
1.NBT.3 Compare pairs of 2-digit numbers
1.MD.2 Measure the length of an object by laying multiple copies of a shorter unit end to end
2.OA.1 Solve one-step addition story problems with sums to 100 involving situations of adding to and putting together, with unknowns in all positions; solve one-step subtraction story problems with minuends to 100 involving situations taking from, taking apart, and comparing, with unknowns in all positions
2.OA.2 Fluently add and subtract with sums to 20 using mental strategies
2.OA.3 Determine whether a group of objects (up to 20) has an odd or even number of members, e.g., by pairing objects or counting them by 2s
2.NBT.2 Skip-count by 5s up to 1,000
2.G.1 Recognize and construct shapes having specified attributes
2.G.2 Partition a rectangle into rows and columns of same-size squares, and count them to find the total

Curriculum Framing Questions

Enduring Understandings

Students will understand how to:

- Practice efficient math strategies to add and subtract within 20
- Explore even and odd numbers
- Solve addition and subtraction story problems
- Count by 2s, 5s, and 10s to solve problems

Mathematical Concepts

The instruction in Unit 1 is designed to help students develop confidence and fluency with number relationships, operations, and facts in the range of 0 to 20. Some educators refer to this set of skills and concepts as operational sense. Operational sense depends heavily on a solid number foundation of the type developed throughout Bridges Kindergarten and Grade 1. In second grade, it is our goal to help students develop a highly integrated understanding of the operations, as well as the ways in which those operations take on meanings in real-world contexts. The goal of this unit is to help students develop solid understandings of addition and subtraction and some of the ways in which these two operations complement each other. These understandings in turn lead to the development of confidence and fluency with the number facts as they appear in real-world contexts.

It is important to note that our approach to the basic facts draws heavily on the perspective that fact retrieval is far more likely to be successful when based on models, the use of strategies, and intuition, as opposed to rote memorization and recall. Throughout Unit 1, students learn to think about numbers in terms of parts and missing parts. Such part-part-whole reasoning is not only fundamental to a rich understanding of numbers, but also fundamentally related to addition and subtraction as operations. Take, for example, the addition fact 8 + 5 = 13. Research has indicated that this combination is one that causes difficulty for many students. The instruction in Unit 1 allows students to approach this troublesome combination from a range of perspectives, each of which is helpful in retrieving the correct answer. For example, after repeated use of the number rack, some students will see the number 8 as a combination of 5 and 3 more. Combining the two 5s, this number fact becomes 5 + 5 + 3 = 13. Other students might use a compensation strategy to make this an easier problem to solve: take 2 from the 5, and add it to the 8. That leaves us with 10, and 3 more. It is this flexibility, built upon solid number sense and part-part-whole thinking, that allows students to reason their way toward mastery of the number facts.

Unit Overview
Unit Title: Unit 2 Place Value & Measurement with Jack's Beanstalks
Unit Summary
Unit 2 moves students through counting and grouping discrete objects by place value, to measuring length with trains of Unifix cubes, to creating their own measuring tapes marked in intervals of 5 and 10 cubes, and finally to adding double-digit numbers on an open number line. Jack and the Beanstalk, with a few twists and turns, serves as a springboard for this mathematical journey.
Approximate Time Needed
6 weeks - October and November
Unit Foundation
Assessed Competencies
Measurement and Data Number and Operations in Base Ten Operations and Algebraic Thinking
Assessed Standards *(includes standards on both required and optional assessments)*
2.OA.2 Fluently subtract with minuends to 12 using models and mental strategies **2.OA.4** Find the total number of objects in an array with up to 5 rows and 5 columns, using addition **2.NBT.1** Demonstrate an understanding that the digits in a 3-digit number represent amounts of hundreds, tens, and ones **2.NBT.1a** Demonstrate an understanding that 100 can be thought of a bundle or group of 10 tens, called a hundred **2.NBT.2** Skip-count by 5s and 10s within 1,000 **2.NBT.3** Read and write numbers to 1000 represented with numerals, number names, and expanded form **2.NBT.5** Use strategies based on place value, properties of operations, or the relationship between addition and subtraction to add fluently with sums to 100 **1.MD.2** Measure the length of an object in non-standard units **2.MD.4** Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit **2.MD.6** Represent whole numbers as lengths, and whole-number sums, on a number line
Curriculum Framing Questions
Enduring Understandings
Students will understand how to: ● Identify the place and value of a 3-digit number

- Read, write, model, and compare 2- and 3-digit numbers
- Measure and compare the lengths of objects
- Model problem-solving strategies on a number line
- Practice math strategies to add and subtract fluently

Mathematical Concepts

Throughout Unit 2, students explore base ten concepts and models within 1,000. Early in Module 1, students review the first three place value units: ones, tens, and hundreds. They work flexibly within these place value ranges, learning, for example, to express the number 127 as 12 groups of ten plus 7 ones, or 1 group of one hundred, 2 groups of ten, and 7 ones. Likewise, students are challenged to build numbers based on their component parts as they solve number riddles such as, “I have 2 hundreds, 4 tens and 3 ones. What number am I?” In Module 2, working and thinking in discrete groups of hundreds, tens and ones give way to using these groups as intervals of measurement, as students build long trains of Unifix cubes to measure length.

In Module 3, students create measuring tapes marked in intervals of 5s and 10s and then move into making jumps of 10s and 1s along an open number line to model and solve double-digit addition problems. The unit is designed to promote measurement concepts even as students are learning about our base ten number system. Students come to understand measurement—both what it means to measure, and how one might do so—as they use nonstandard, iterated units to determine the lengths of various objects. As they count, total, and compare these units, they are encouraged to think about, and apply, base ten concepts. Students develop a more sophisticated conceptual understanding of the structure of our number system, the power of mathematical models as representational and computational tools, and the nature of measurement.

Unit Overview
Unit Title: Unit 3 Addition & Subtraction Within One Hundred
Unit Summary
This unit focuses on strategies for multi-digit addition and subtraction within the range of 0 to 100. The first module emphasizes the number line model and encourages students to develop the strategy of using "skip-jumps" based on multiples of 5 and 10. The second module continues to use the number line as a computational tool through which students add and subtract 2-digit numbers. The third module focuses on addition and subtraction, but uses the base ten structure (collecting ones and tens). Finally, the fourth module requires students to determine the frequency with which various colored objects appear in a bag and to graph the data.
Approximate Time Needed
6 Weeks - November and December
Unit Foundation
Assessed Competencies
Measurement and Data Number and Operations in Base Ten Operations and Algebraic Thinking
Assessed Standards *(includes standards on both required and optional assessments)*
2.OA.1 Use addition and subtraction within 100 to solve one- and two-step story problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem **2.OA.2** Fluently add and subtract with sums to 20 using mental strategies **2.NBT.1** Demonstrate and understanding that the digits in a 3-digit number represent amounts of hundreds, tens, and ones **2.NBT.2** Count within 1000; skip-count by 5s, 10s, and 100s **2.NBT.3** Read and write numbers to 1,000 represented with base ten numerals and expanded form **2.NBT.5** Fluently add and subtract within 100 using strategies based on place value, properties of operations, or the relationship between addition and subtraction **2.NBT.6** Add up to four two-digit numbers using strategies based on place value and properties of operations **2.MD.5** Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units **2.MD.6** Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the numbers 0, 1, 2…, and represent whole-number sums and differences within 100 on a number line diagram

Curriculum Framing Questions

Enduring Understandings

Students will understand how to:

- Make graphs and answer questions about the graphs
- Solve addition and subtraction story problems
- Add and subtract 2-digit numbers using efficient strategies
- Represent addition and subtraction on a number line

Mathematical Concepts

One of the goals for second grade is that students develop a solid sense of our number system, as well as informal understandings of mathematical models that can be used to represent numbers, number relationships, and actions on numbers (e.g., addition and subtraction). Unit 3 has been written to address these goals, fostering the development of a foundation for later work in third grade. Several significant mathematical concepts are central to the unit. First, the concept of "counting" should not be taken for granted. While some students count intuitively and naturally to 100 well before second grade, others must not only practice counting before it is internalized, they must also be led to understand the connection between counting and calculating. For example, counting by 10s is helpful for developing counting sequence fluency; it is also helpful for understanding that 2 groups of 10 is 20 (i.e., 10 + 10 = 20). Such number patterns and sequences naturally lead to the development of an understanding of place value, a second critical mathematical concept embedded in the unit. Place value understanding includes the awareness that the placement of a digit within a given number determines the value, or the unit, that the digit represents. Both skip-counting and splitting strategies (explained below) depend heavily on the notion of place value. Within the unit, students use base ten concepts to orient their actions on the number line. They also work with objects and contexts that highlight the notion of "collecting" groups of 10 or 1.

Unit Overview
Unit Title: Unit 4 Measurement
Unit Summary
In Unit 4, students explore measurement from multiple entry points. Initial activities in the unit foster an understanding of the importance of standard units of measurement. Students explore measurement in the context of a giant's world, complete with inchworms, footworms, and yardworms and have multiple opportunities to make conversions between inches, feet, and yards. A second objective of the unit is to provide informal experiences with ratios and proportional reasoning. While proportional reasoning is considered by many to be a skill reserved for work with older students, the unit again makes use of context (the giant's world) to introduce proportional reasoning in a manner that is intuitive to second grade students (e.g., "The giant's door is as tall as 5 bricks."). These activities continue to reinforce measurement concepts and skills, but also lay the important groundwork for the multiplicative comparison and proportional reasoning skills expected in later grades. The unit concludes with a module in which students identify, describe, and extend counting-by-3s patterns. These activities illustrate the relationship between repeated addition and multiplication, as well as patterns that appear when counting by 3s.
Approximate Time Needed
6 weeks - January / February
Unit Foundation
Assessed Competencies
Measurement and Data Number and Operations in Base Ten Operations and Algebraic Thinking
Assessed Standards *(includes standards on both required and optional assessments)*
2.OA.1 Solve one-step addition story problems with sums to 100 involving situations of adding to and putting together, with unknowns in all positions **2.OA.1** Solve one- and two-step subtraction story problems with minuends to 100 involving situations taking from, taking apart, and comparing, with unknowns in all positions **2.OA.2** Fluently add and subtract with sums and minuends to 20 using mental strategies **2.OA.2** Recall from memory all sums of two 1-digit numbers **2.NBT.4** Compare pairs of 2- and 3-digit numbers **2.NBT.6** Add three 2-digit numbers **2.MD.1** Select and use the appropriate tool for measuring the length of an object **2.MD.1** Measure the length of objects in inches using a ruler a yardstick or a measuring tape **2.MD.2** Describe how the size of the unit used to measure an object's length relates to the measurement of the object's length **2.MD.3** Estimate length in inches feet, or yards

***Supports* 2.MD** Measure length to the nearest whole unit in customary units
2.MD.4 Determine exactly how much longer one object is than another and express the difference between two lengths in terms of a standard unit of length
2.MD.5 Solve addition and subtraction story problems with sums and minuends to 100 involving lengths given in the same units
2.MD.6 Represent whole-number differences from minuends up to 100 on a number line

Curriculum Framing Questions

Enduring Understandings

Students will understand how to:

- Estimate, measure, and compare the lengths of objects in inches, feet, and yards
- Select and use the appropriate tool for measuring the length of an object
- Measure the length of an object twice, using two different units—such as inches the first time, then feet

Mathematical Concepts

The performance of U.S. students on international exams highlights gaps in our students' understanding of both what it means to measure, as well as the actual skill of measuring itself. For example, a two-part problem emphasizes the limited nature of our approach to the teaching and learning of measurement. In the first part of the problem, students are asked to measure the length of an object relative to a ruler. The beginning of the object is lined up with the 0 on the ruler. As we might hope and expect, most 4th grade U.S. students correctly answer this problem. When the diagram is altered, and the object is placed somewhere other than at 0,, the number of correct scores plummets. Only about a quarter of U.S. 4th grade students typically answer the question correctly, while their peers in many other countries continue to show proficiency that matches the results of the first problem shown above. These results suggest that although our students may have procedural understanding of some of the mechanics of measurement, they are unable to link meaning to those mechanics.

Unit 4 has been designed with this concern in mind: to foster both procedural and conceptual understanding of measurement. With this context as the backdrop, several key measurement concepts are presented in Unit 4. The first of these involves work with both standard and non-standard units of measurement. The basic premise behind using multiple units to measure a given object is to reinforce the idea of measurement itself. Students might measure the length of a desktop in inches or feet, Unifix cubes, or paperclips. The fundamental idea is that the desktop spans a certain distance and we can measure that distance using various measurement units: "We lined up Unifix cubes end-to-end across the desktop. It took 20 of them to go from one side of the desk to the other side." Students can then compare two objects with respect to the given unit of measurement: "Your desktop was 20 Unifix cubes in length; my desktop required 25 Unifix cubes. Therefore, my desk is longer than yours."

Multiple activities with non-standard units of measurement help to develop this kind of understanding. At some point, however, it is also necessary to help students understand that for purposes related both to convenience and necessity, standards of measurement evolved over time so that communities had benchmarks for measurement. Hence, students spend considerable time

measuring length with standard units: in inches, feet, and yards.

One of the fundamental concepts explored in this unit is that the smaller the unit of measurement being used, the greater the number of units needed to determine the object's length (or weight, volume, etc.). Similarly, the larger the unit of measurement used, the fewer the number of units necessary to measure the object. We do not want students measuring the length of the gymnasium floor in inches, nor do we want them to measure the length of a pencil in feet. Rather, they should have the presence of mind to select a unit of measurement that is appropriate for the object being measured. That said, they must also understand that it is entirely possible to measure the gymnasium floor in both inches and feet; one unit is simply more desirable, due to its ease of implementation, than the other.

Assuming that students do have conceptual understanding of measurement as in the previous example (e.g., measuring the gym floor), they can then naturally engage in conversations about unit conversions. If the desktop was 2 feet wide, how many inches wide must it be? Throughout the unit, students are presented with problems in which they must make unit conversions. Many of these problems are nested in the context of the giant's world. In the giant's garden are earthworms of various lengths: inchworms, footworms, and yardworms. Students learn that 12 inch worms may take a ride on the back of 1 footworm. Likewise, 3 foot worms can ride on the back of a yardworm. Students become adept at moving between these units.

The final concepts explored in this unit involve ratios and proportional reasoning. The sessions in Unit 4 depend heavily on contexts that elicit the natural inclination to think about relationships between two quantities. Without meaningful context, proportional reasoning is likely to be beyond young students. However, as in the case of this unit, imaginable situations that contain proportions serve as a starting point for students to recognize ratios from a mathematical point of view. For example, students view pictures that illustrate that the length of 3 hammers is the same as the length of 1 shovel. By using pictures, students take a step toward proportional reasoning.

Unit Overview
Unit Title: Unit 5 Place Value to One Thousand
Unit Summary
Unit 5 is designed to help students solidify their understanding of place value to 1,000. Using a variety of manipulatives, students create and count bundles (or groups) in 10s and 100s. They practice adding and subtracting in multiples of 10 and 100, both on and off the decade. The sessions that focus explicitly on money contexts provide opportunities for students to count by 5 and 10 and consider 25 cents or a quarter as a unit. The final module in the unit is algebraic in nature, encouraging students to observe and describe sequences as they search for patterns and generalizations that will enable them to build and represent succeeding arrangements in those sequences.
Approximate Time Needed
5 weeks - February / March
Unit Foundation
Assessed Competencies
Geometry Measurement and Data Number and Operations in Base Ten Number and Operations Fractions Operations and Algebraic Thinking
Assessed Standards *(includes standards on both required and optional assessments)*
2.NBT.1 Count within 1,000, starting and ending with any given pair of numbers **2.NBT.1a** Demonstrate an understanding that 100 can be thought of as a bundle or group of 10 tens, called a hundred **2.NBT.1b** Demonstrate an understanding that multiples of 100 from 100 to 900 refer to some number of hundreds and 0 tens and 0 ones **2.NBT.2** Count within 1,000, starting and ending with any given pair of numbers **2.NBT.2** Skip-count by 5s, 10s and 100s up to 1,000 **2.NBT.3** Read & write numbers to 1,000 using base-ten numerals, words, and expanded form **2.NBT.4** Compare pairs of 3-digit numbers, based on an understanding of what the digits in their hundreds, tens, and ones places represent and use >, =, and < symbols to record comparisons of two 3-digit numbers **2.NBT.5** Fluently add and subtract with sums and minuends to 100 **2.NBT.7** Add and subtract with sums and minuends to 1,000 **2.NBT.8** Mentally add 10 or 100 to a given number 100–900, and mentally subtract 10 or 100 from a given number 100–900 **2.NBT.9** Explain why strategies for adding and subtracting 2- and 3-digit numbers work, using place

value and the properties of operations
2.MD.6 Represent whole numbers, sums, and differences as lengths on a number line
2.MD.8 Solve money story problems involving pennies, nickels, dimes, quarters, and dollar bills
2.MD.8 Use $ and ¢ symbols when solving money story problems
2.MD.10 Make a bar graph to represent a data set with up to 4 categories

Curriculum Framing Questions

Enduring Understandings

Students will understand how to:

- Represent numbers using groups of 1s, 10s, and 100s to demonstrate an understanding of place value to 1,000
- Use models, sketches, and numbers to add and subtract within 1,000
- Mentally add and subtract multiples of 10 and 100 to and from any number within 1,000
- Solve money story problems involving pennies, nickels, dimes, and quarters using correct notation

Mathematical Concepts

One of the most significant transitions in young students' mathematical thinking is the ability to move from one-to-one counting to the organization of numbers of objects into groups of 5 and 10. This process, often referred to as "unitizing," is essential to the development of place value understanding. Historical evidence suggests that over 30,000 years ago, human beings were using marks notched into bones and stones to count objects. With the expansion of human communities and activity, the "one object, one notch" system of record keeping became inefficient to record larger quantities of objects. Occurring simultaneously on different continents, various human cultures began to develop systems of counting that became the precursor to our base ten place value system. Archeological evidence suggests that almost all the early number systems developed across the globe used 1s, 5s, 10s, and 20s. Given that most counting took place on fingers and hands, it is no coincidence that 5 and 10 became important benchmarks in almost all ancient number systems. Indeed, place value concepts are great examples of human involvement in the constructions of mathematics. Nevertheless, one must not forget that counting large quantities using place value concepts can be difficult for primary students.

Unitizing

To understand the essential components of place value, students often must forsake their formative and well-rehearsed understandings of numbers and, indeed, counting itself. Children spend the first several years of their lives coming to understand that for each unique object, there corresponds a unique word: the word "one" means 1 object, the word "five" means that 5 objects are present. The fundamental shift in thinking occurs when children are asked to unitize–to come to understand that the number 1 might represent more than one individual object. The number 1 now might actually refer to a group of 10 objects. To understand how complex this might be for a young child, consider the following statement: "Ten ones make 1 ten." What? You can imagine the confusion this inspires. How can the number "one" be simultaneously 1 object and 10 objects? This is not an intuitively obvious premise to young children, and yet it is one we assume they embrace early and readily.

To foster an understanding of unitizing, young learners must engage in contexts in which they bundle, link, package or otherwise organize individual objects into groups. Subsequently, they must also keep track of leftover items, perhaps even becoming aware of the number of additional items necessary to complete an additional cluster. In this unit, students have numerous opportunities to engage in this sort of activity. Using sticks, cubes, clips, and coins, students explore groupings of numbers within the range of 0 to 1,000. Emphasized throughout the unit is the role that 10 plays in our number system. For example, in one series of activities, students build strings of 10 clips, combine them to make a string of 100, and finally join those strings of 100 to make a train of 1,000 clips. The intent of the sequence is to give them very tangible evidence and experience with the concept that 10 tens make 100, and 10 hundreds make 1,000. This idea must be reinforced often if students are to come to embrace the foundational precepts of our number system.

Unit Overview

Unit Title: Unit 6 Geometry

Unit Summary

Over the course of this unit, students investigate two-dimensional shapes, fractions (halves and fourths), congruence, symmetry, and transformations (slides, flips, and turns) using a variety of tools and models. There is a strong emphasis on identifying, describing, constructing, drawing, comparing, contrasting, and sorting various types of triangles and quadrilaterals, as well as other shapes, throughout the unit. The first grade focus on composing and decomposing shapes resurfaces at a more sophisticated level in Modules 2–4 as students are introduced to concepts of tiling a plane (tessellating) and finding the areas of shapes by counting the number of units it takes to cover them without leaving any gaps or holes.

Approximate Time Needed

5 Week - March and April

Unit Foundation

Assessed Competencies

Geometry
Measurement and Data
Number and Operations in Base Ten
Number and Operations Fractions
Operations and Algebraic Thinking

Assessed Standards *(includes standards on both required and optional assessments)*

2.OA.4 Find the total number of objects in an array with up to 5 rows and 5 columns, using addition
2.OA.4 Write an equation to represent the total number of objects in an array with up to 5 rows and 5 columns as the sum of equal addends
2.G.1 Recognize and draw shapes having specified attributes
2.G.1 Identify triangles, quadrilaterals, pentagons, hexagons, and cubes
2.G.2 Partition a rectangle into rows and columns of same-size squares and count to find the total number of them
2.G.3 Partition circles and rectangles into 2 and 4 equal parts
2.G.3 Use the terms halves and half, fourths, quarters, fourth of, and quarter of to talk about the 2 or 4 equal parts into which circles and rectangles have been partitioned
2.G.3 Describe whole circles and rectangles as 2 of two equal parts or 4 of four equal parts
2.G.3 Demonstrate an understanding that equal parts of identical wholes do not have to be the same shape

Curriculum Framing Questions

Enduring Understandings
Students will understand how to: ● Identify, describe, draw, and create 2-D shapes based on their defining features ● Explore the area of shapes, especially rectangles ● Split whole shapes into 2, 3, or 4 equal parts called halves, thirds, or fourths/quarters ● Recognize that equal parts of identical wholes do not need to be the same shape
Math Concepts
In 1957, two Dutch educators, Pierre van Hiele and Dina van Hiele-Geldof, puzzled by the difficulty their students had with geometry, published what has become a very influential theory in the design of geometry curriculum. According to the van Hiele theory, students pass through certain levels as they become more sophisticated in their geometric thinking, and these levels must unfold in order, propelled by students' own explorations and discoveries. Progress through the levels of geometric understanding is more dependent on educational experiences than on age or maturity. It's interesting to note that while traditional high school geometry textbooks are generally pitched at about level 3, many high school students enter functioning at level 0 or, at best, level 1. To arrive at level 3, students must move through all the prior levels. To move through a level means that a student has experienced geometric thinking appropriate for that level and has created in his or her own mind the types of objects or relationships that are the focus of thought at the next level. The van Hieles believe that instruction must begin at a student's current level and provide many years of visual and exploratory work before moving into formal deductions. Experience with shapes, terms, and geometry-related concepts is the greatest single factor influencing advancement through the levels. So, the question for us as teachers of primary students is two-fold: at what level are our students currently working, and what can we do to support their development? Most K–2 students think and work largely at level 0. In fact, the move into and through level 1 might be considered the main focus of geometry instruction through elementary school. Activities that encourage children to explore, talk about, and interact with content at the next level, while increasing their experiences at the current level, have the best chance of advancing their thinking. Listed here are some of the features of effective instruction at both level 0 and level 1. **Features of Level 0 Activities** ● Involve lots of sorting, identifying, and describing of various shapes. ● Use lots of physical models that can be manipulated by the students. ● Include many different and varied examples of shapes so that irrelevant features, such as size, color, and orientation, do not become important. ● Provide opportunities to build, make, draw, put together, and take apart shapes. **Features of Level 1 Activities** ● Begin to focus more on properties of figures than on simple identification. Define, measure, observe, and change properties with the use of models. ● Use problem-solving contexts in which properties of shapes are important components. ● Continue to use models, as with level 0, but include models that permit the exploration of various properties of figures.

- Classify figures based on properties of shapes as well as by names of shapes. For example, investigate properties of triangles, such as side length and angle measure, that make some alike and others different.

Unit Overview
Unit Title: Unit 7 Measurement, Fractions & Multi-Digit Computation with Hungry Ants
Unit Summary
This unit addresses metric measurement, fractions, and multi-digit addition and subtraction, set in the context of army ants, picnic ants, and imaginary ants who enjoy toys as much as second graders do. In Module 1, students discover that the average length of a worker army ant is 1 centimeter, make army ant rulers similar to the inchworm rulers they made in Unit 4 and use their new rulers to measure in metric units. In Module 2, an amusing children's book about ants serves as a springboard for investigating division and fractions. Modules 3 and 4 feature a new set of story problems that revolve around a toy store for ants.
Approximate Time Needed
5 Weeks - May and June
Unit Foundation
Assessed Competencies
Geometry Measurement and Data Number and Operations in Base Ten Operations and Algebraic Thinking
Assessed Standards *(includes standards on both required and optional assessments)*
2.OA.1 Solve one- and two-step addition and subtraction story problems with sums and minuends to 100 involving situations of adding to, putting together, taking from, taking apart, and comparing, with unknowns in all positions ***Supports* 2.OA** Model division situations in which sets are separated into equal parts **2.NBT.2** Skip-count by 10s and 100s up to 1000 **2.NBT.3** Read and write numbers to 1000 represented with numerals **2.NBT.4** Compare pairs of 3-digit numbers, based on an understanding of what the digits in their hundreds, tens, and ones places represent and use >, =, and < symbols to record the comparisons **2.NBT.7** Add and subtract with sums and minuends to 1000 **2.NBT.7** Use concrete models or drawings to add and subtract with sums and minuends to 1000 **2.NBT.7** Use strategies based on place value, properties of operations, or the relationship between addition and subtraction to add and subtract with sums and minuends to 1000 **2.NBT.7** Use written numbers and symbols to represent strategies for adding and subtracting with sums and minuends to 1000 **2.NBT.7** Add with sums to 1000 using strategies that involve adding hundreds to hundreds, tens to tens, and ones to ones **2.NBT.7** Add with sums to 1000 using strategies that involve composing a hundred or a ten **2.NBT.7** Subtract with minuends to 1000 using strategies that involve subtracting hundreds from

hundreds, tens from tens, and ones from ones
2.NBT.7 Subtract with minuends to 1000 using strategies that involve decomposing a hundred or a ten
2.NBT.9 Explain why strategies for adding and subtracting 2- and 3-digit numbers work, using place value and the properties of operations
2.MD.1 Select and use the appropriate tool for measuring the length of an object
2.MD.1 Measure the length of an object in centimeters and meters using rulers, meter sticks, and measuring tapes
2.MD.3 Estimate length in centimeters and meters
***Supports* 2.MD** Measure length to the nearest whole unit in metric units
2.MD.4 Determine exactly how much longer one object is than another, and express the difference between the two lengths in terms of a standard unit of length
2.OA.1 Solve addition and subtraction story problems with sums and minuends to 100 involving lengths given in the same units
2.MD.8 Solve money story problems involving dollars, quarters, dimes, nickels, and pennies, and use $ and ¢ symbols when doing so
2.G.3 Partition a circle (rectangle) into 2, 3, or 4 equal parts
2.G.3 Use the terms halves, half, thirds, third of, fourths, quarters, a fourth of to talk about the equal parts into which a circle (rectangle) has been partitioned
2.G.3 Describe a whole circle [rectangle] as 2 [3, 4] of two [three, four] equal parts

Curriculum Framing Questions

Enduring Understandings

Students will understand how to:

- Estimate, measure, and compare the lengths of objects in centimeters and meters
- Split whole shapes into 2, 3, 4, or 8 equal parts called halves, thirds, fourths/quarters or eighths
- Solve, pose, and write addition, subtraction, and money story problems involving 2- and 3-digit numbers

Mathematical Concepts

Insects in general, and ants in particular are fascinating to most young students, and deservedly so. These remarkable creatures live in large colonies all over the world. In fact, there are more than 12,000 different species, each with its own distinctive—and in some cases, almost unbelievable—adaptations and behaviors. Unit 7 draws on some of these to develop concepts of metric measurement, fractions, and multi-digit addition and subtraction. Module 1 features army ants and takes advantage of the fact that the approximate length of a worker army ant is 1 centimeter. After a brief introduction to these creatures, students each make an army ant ruler that is 10 centimeters—or 1 decimeter—long.

The fact that students now associate centimeters with the army ant and inches with the inchworm helps them distinguish between the two units of measure and remember that a centimeter is smaller than an inch. After they make their rulers, students estimate and measure objects around the classroom in centimeters. Then they set 10 of their army ant rulers end-to-end to see that 1

meter is the same as 100 army ants in a line. They go out to the playground to measure a length of 14 meters, the width that some army ant "raids" take when they fan out over the forest floor to hunt for food. Toward the end of the first module, students each cut a piece of adding machine tape to a length between 60 and 180 centimeters and create an ant path by coloring the tape to resemble the terrain army ants traverse. These paper ant paths become part of a new Work Place in which students measure and compare length in metric units. Hands-on experiences like these, carrying such vivid associations as army ants and raids along the forest floor, are nearly guaranteed to help young students remember centimeters and meters long after the unit is over. In Module 2, ants much less ferocious than their army cousins show up to join the picnic in One Hundred Hungry Ants. In this amusing story, 100 ants are traveling in typical marching formation. The littlest ant, worried that they might miss the picnic, suggests they split into 2 lines, then 4, 5, and finally 10 lines. Students work together to figure out the results of each division problem and then work independently to solve related problems after 20 ant cousins show up from out of town. Although problems such as 120 ÷ 4 are not typically posed to second graders, young students have the tools and interest needed to solve them when posed in a story context.

After investigating these large division situations, students are asked to consider similar situations at the other end of the spectrum. What happens when you share a single granola bar among 2, 3, or 4 hungry ants? What happens when you share 2 granola bars among 2, 3, or 4 hungry ants?

Among other things, you wind up with fractions of granola bars. The association between division and fractions is quite deliberate; the literal meaning of 1/2 is 1 ÷ 2. This connection is often not made until later grades, and sometimes not at all, to the detriment of students who go through elementary school with very limited notions of fractions, only to trip over a/b later on. While it's possible to imagine half a pizza or understand 1/4 as one out of four equal pieces, a/b makes no sense at all unless you understand that you're looking at a division problem.

Students delve further into fractions during Module 2, creating their own fraction kits with construction paper strips to play a new game, and conducting probability experiments with a half-and-half spinner and then a spinner divided into fourths.

The lovable side of ants is featured in Modules 3 and 4, as students solve and pose addition, subtraction, and money story problems about an imaginary toy store for ants. During these sessions, students revisit, refine, and develop new strategies for adding and subtracting 2- and 3-digit numbers. The Ants' Toy Store buys and sells toys in cases of 100, boxes of 10, and packages of 1. These models parallel the base ten hundreds, tens, and ones pieces, and facilitate strategies that involve adding and subtracting.

Unit Overview

Unit Title: Unit 8 Measurement, Data & Multi-Digit Computation with Marble Rolls (optional unit)

Unit Summary

This unit provides a review of place value and three-digit computation in Module 1. Modules 2, 3, and 4 focus on data collection and analysis. In Module 2, students are introduced to a project in which they make cardboard ramps of different kinds to investigate some of the factors that cause marbles to roll farther and faster. After their initial explorations, students conduct formal experiments to test several different variables. In the process, they generate data by measuring marble roll distances multiple times, pool their data, and enter it on line plots to better see, understand, and analyze how manipulating the different variables affects the outcomes. The unit concludes with student-conducted surveys, in which students generate questions on topics of their choosing, gather, organize, and analyze the data, and share their findings with others.

Approximate Time Needed

Optional Unit - Can integrate with Science

Unit Foundation

Assessed Competencies

Measurement and Data
Number and Operations in Base Ten

Assessed Standards *(all assessments in this unit are optional)*

2.NBT.1 Demonstrate an understanding that the digits in a 3-digit number represent amounts of hundreds, tens, and ones
2.NBT.3 Read and write numbers to 1000 represented with numerals, words, and expanded form
2.NBT.4 Compare pairs of 3-digit numbers, based on an understanding of what the digits in their hundreds, tens, and ones places represent and use >, =, and < symbols to record the comparisons
2.NBT.7 Add with sums to 1000
2.NBT.7 Subtract with minuends to 1000
2.NBT.7 Use concrete models or drawings to subtract with minuends to 1000
2.NBT.7 Use strategies based on place value, properties of operations, or the relationship between addition and subtraction to subtract with minuends to 1000
2.NBT.7 Relate strategies for subtracting with minuends to 1000 to written methods
2.NBT.7 Use written numbers and symbols to represent strategies for subtracting with minuends to 1000
2.MD.9 Make a line plot to show measurement data, with a horizontal scale marked in whole-number units

Curriculum Framing Questions

Enduring Understandings

Students will understand how to:

- Measure length to the nearest inch
- Collect, organize, and display data on a line plot and on a bar graph
- Analyze data to solve problems, draw conclusions, and make predictions
- Add, subtract, order, and compare 3-digit numbers

Mathematical Concepts

The first module in this unit provides a review of place value through and beyond 1,000, as well as 3-digit addition and subtraction. Students have an opportunity to deepen their understandings, correct misconceptions, solidify strategies for dealing with 3-digit addition and subtraction problems, and develop increasingly efficient, number-based ways of approaching these situations. The concepts, models, and strategies employed in Module 1 have been thoroughly discussed in the introduction to Unit 7, so they will not be addressed here.

Linear Measurement The marble roll project is, in a sense, the culmination of a year filled with linear measure. For, just as area is perhaps the most predominant theme in Grade 3, length and distance are powerful drivers in Grade 2. Given that their first task is to use simple materials to get a marble to roll without a push or pull other than the force of gravity, students almost immediately start experimenting to try to get the marble to roll farther. Many students will use a measuring tape to quantify the ever increasing distances they can get the marble to roll during their initial explorations. Linear measurement becomes central when students start conducting formal experiments to test the effects of different variables on the marble's speed and distance. Like scientists everywhere, students run multiple trials, measuring and recording the distance the marble rolls from each ramp height three times.

One of the things students practice in the process is measuring to the nearest whole inch, setting the stage for rounding and working with fractions on a number line in Grade 3. When the marble rolls too far away from the measuring tape to make an accurate measurement, students lay their pencil between the marble and the tape. If the pencil tip falls within the first half of the interval, the distance recorded is the lower number of inches. If it falls at the half-inch mark or in the latter half of the interval, the distance recorded is the higher number of inches.

Data Display and Analysis: Line Plots Even three trials per variation—9 total—aren't enough to draw definite conclusions about the effect of a variable, so students pool their data and display the results on a line plot for each experiment. Before they do this, however, each student pair lists the values they got for each set of trials in order and circles the middle value. This tends to eliminate the outliers in both directions, similar to averaging the data.

Each pair writes their middle values on sticky notes in three different colors and posts the notes on a class line plot displayed on the whiteboard.

Students then transfer the information to their own line plots, reflect on the results, and discuss them with their classmates.

Grade 2 Scope & Sequence

Number Corner Second Edition

	August / September	October	November	December	January	February	March	April	May / June
Calendar Grid	**How Many to Twenty?** *2.OA.1, 2.OA.2, 2.OA.3* OA	**Multiples of Three & Four** *2.OA.3, 2.OA.4* OA	**Telling Time to the Quarter Hour** *2.NBT.2, 2.MD.7, 2.G.3* MD	**Shapes & Attributes** *2.G.1, 2.G.3* G	**Survey Data & Graphs** *2.OA.1, 2.MD.10* MD	**Flag Fractions** *2.OA.1, 2.NBT.5, 2.NBT.7, 2.G.3* G	**Mystery Shapes** *2.G.1* G	**Garden Fractions** *2.G.3* G	**Where's Joey on the Thousand Grid?** *2.NBT.1,2.NBT.2, 2.NBT.3,2.NBT.7, 2.NBT.8* NBT
Calendar Collector	**Sixty Minutes a Day** *2.NBT.2, 2.NBT.7, 2.MD.7* MD	**Five Minutes a Day** *2.NBT.2, 2.MD.7* MD	**Measuring Length with Different Units** *2.MD.2* MD	**Student Surveys** *2.MD.10* MD	**Exactly Half?** *2.OA.3, 2.MD.10, 2.G.3* G	**Capture the Clock** *2.MD.7, 2.G.3* MD	**Two Quarters a Day** *2.MD.8, 2.G.3* G	**Measuring & Plotting Plant Growth** *2.MD.1, 2.MD.4, 2.MD.9* MD	**Measuring & Plotting Student Heights** *2.MD.1, 2.MD.4, 2.MD.9* MD
Daily Rectangle	**Odd & Even** *2.OA 2, 2.OA.3, 2.OA.4* OA	**The Day's Arrays** *2.OA.3, 2.OA.4* OA	**Rows & Columns** *2.OA.4, 2.NBT.4* OA	**Rows & Columns Revisited** *2.OA.4, 2.NBT.6* OA	**Arrays on the Hundreds Grid** *2.OA.4, 2.NBT.5, 2.NBT.6, 2.NBT.9* NBT	**The Base Ten Bank: Addition** *2.NBT.7, 2.NBT.9* NBT	**The Base Ten Bank: Subtraction** *2.NBT.7, 2.NBT.9* NBT	**Writing Area Equations** *2.OA.4, 2.G 2* G	**Arrays to Thirty-One** *2.OA.4, 2.G 2* G
Computational Fluency	**Zeros, Count On & Count Back** *2.OA 2, 2.MD.6* OA	**Make & Break Tens** *2.OA 2* OA	**Doubles & Halves** *2.OA 2, 2.OA.3* OA	**Tens & Nines** *2.OA 2* OA	**Addition & Subtraction Strategies** *2.OA 2, 2.NBT.6, 2.MD.6* OA	**Addition Quick Facts** *2.OA 2* OA	**Continuing with Addition Quick Facts** *2.OA 2* OA	**More Addition Quick Facts** *2.OA.* OA	**Quick Facts Finale** *2.OA 2* OA
Number Line	**The Century Counts** *2.NBT.2, 2.NBT.3, 2.NBT.5, 2.NBT.6, 2.NBT.8, 2.MD.6* NBT	**Guess My Number** *2.NBT.2, 2.NBT.3, 2.NBT.4, 2.NBT.7, 2.NBT.8, 2.MD.6* NBT	**The Fifth Century** *2.NBT.1, 2.NBT.1a-b, 2.NBT.2, 2.NBT.3, 2.NBT.7, 2.NBT.8, 2.MD.6* NBT	**Counting Off-Decade & Off-Century** *2.NBT.1, 2.NBT.2, 2.NBT.3, 2.NBT.4, 2.NBT.7, 2.NBT.8, 2.MD.6* NBT	**Changing Endpoints** *2.NBT.2, 2.NBT.3, 2.NBT.7, 2.NBT.8, 2.NBT.9, 2.MD.6* NBT	**The Tenth Century** *2.NBT.2, 2.NBT.3, 2.NBT.8, 2.MD.6* NBT	**Put It on the Line** *2.OA.1, 2.NBT.3, 2.NBT.5, 2.NBT.6, 2.NBT.7, 2.NBT.9, 2.MD.8* NBT	**Efficient Jumps of Tens & Hundreds** *2.NBT.2, 2.NBT.3, 2.NBT.5, 2.NBT.7, 2.NBT.8, 2.MD.6* NBT	**Adding & Subtracting Tens & Hundreds** *2.NBT.2, 2.NBT.3, 2.NBT.7, 2.NBT.8, 2.MD.6* NBT

Primary Focus: OA - Operations & Algebraic Thinking **NBT** - Number & Operations in Base Ten **MD** - Measurement & Data **G** - Geometry

Number Corner is an additional component of our mathematics curriculum. It is a skill-building program that revolves around the classroom calendar, providing daily practice as well as continual experiences with broader mathematical concepts in 20 minutes of engaging instruction.

SAU 39 Grade 3 Mathematics Curriculum

Grade 3 Scope & Sequence - 39

Bridges in Mathematics Second Edition

	August / September - Done by Oct. 7th	October/November - Done by Nov. 22nd	November/December - Done by Jan. 6th	January/February - Done by Feb. 10th	February/March - Done by March 24th	March/April - Done by April 21st	May/June	Optional/Integrate in Science
	Unit 1 Addition & Subtraction Patterns	**Unit 2** Introduction to Multiplication	**Unit 3** Multi-Digit Addition & Subtraction	**Unit 4** Measurement & Fractions	**Unit 5** Multiplication, Division & Area	**Unit 6** Geometry	**Unit 7** Extending Multiplication & Fractions	**Unit 8** Bridge Design & Data Collection & Analysis
Module 1	**Community Building & Addition Facts to Twenty** *2.OA.2, 3.OA.9* OA	**Multiplication in Context** *3.OA.1, 3.OA.3, 3.OA.5, 3.OA.9* OA	**Rounding & Multi-Digit Addition** *3.NBT.1, 3.NBT.2, 3.OA.8* NBT	**Measuring Time & Mass** *3.MD.1, 3.MD.2* MD	**Linking Multiplication & Division** *3.OA.1, 3.OA.2, 3.OA.3, 3.OA.6, 3.OA.9* OA	**Investigating Polygons** *3.G.1* G	**Multiplication Beyond the Basics** *3.OA.8, 3.NBT.3* NBT	**Introducing Bridges** *3.MD.2, 3.MD.3, 3.MD.4, 3.MD.6, 3.MD.7* MD
Module 2	**Subtraction Facts to Twenty** *2.OA.2, 3.OA.9* OA	**Multiplying with Arrays & Number Lines** *3.OA.9* OA	**Multi-Digit Subtraction** *3.NBT.1, 3.NBT.2* NBT	**Measuring Volume & Solving Measurement Story Problems** *3.OA.8, 3.NBT.2, 3.MD.1, 3.MD.2* MD	**Multiplication & Division Families** *3.OA.1, 3.OA.2, 3.OA.3, 3.OA.4, 3.OA.6, 3.OA.7* OA	**Quadrilaterals** *3.G.1* G	**One- by Two-Digit Multiplication** *3.OA.5, 3.NBT.3* OA	**Investigating Structures in Bridges** *3.NF.1, 3.MD.1, 3.MD.2, 3.MD.4, 3.MD.8 3.G.1, 3.G.2* MD G
Module 3	**Double-Digit Addition** *2.MD.1, 2.MD.3, 2.MD.5, 3.NBT.2* NBT	**Ratio Tables & the Multiplication Table** *3.OA.1, 3.OA.3, 3.OA.4, 3.OA.5, 3.OA.6, 3.OA.7, 3.OA.9, 3.MD.3* OA	**Estimating to Add & Subtract** *3.NBT.1, 3.NBT.2* NBT	**Fractions as Fair Shares** *3.NF.1, 3.NF.2a–b, 3.NF.3a–d* NF	**Division Practice** *3.OA.3, 3.OA.2, 3.OA.5, 3.OA.7, 3.OA.8* OA	**Perimeter & Area** *3.OA.3, 3.NF.1, 3.NF.3b, 3.NF.3d, 3.MD.5a–b, 3.MD.7a–b, 3.MD.8, 3.G.1* MD	**Fractions as Parts of a Whole & Parts of a Set** *3.NF.1, 3.NF.2, 3.NF.3a–b, 3.G.2* NF	**Planning, Building & Analyzing Bridges** *3.MD.1, 3.MD.2, 3.MD.4, 3.MD.8, 3.G.1, 3.G.2* MD G
Module 4	**Story Problems & Strategies** *2.NBT.5, 3.NBT.2* NBT	**Story Problems with Graphs & Multiple Operations** *3.OA.8, 3.MD.3* MD	**Exploring the Algorithms for Addition & Subtraction** *3.NBT.1, 3.NBT.2, 3.OA.8* NBT	**Fractions on a Line Plot** *3.NF.1, 3.NF.3a–d, 3.G.2* MD	**Introducing Area** *3.MD.5a–b, 3.MD.6, 3.MD.7a–b* MD	**Shapes & Fractions** *3.G.2* G	**Fractions at Work** *3.NF.1, 3.NF.2, 3.NF.3a–b, 3.G.2, 3.MD.3* NF	**Demonstrating Our Learning About Bridges** *3.NF.1, 3.MD.1, 3.MD.2, 3.MD.4, 3.MD.6, 3.MD.7, 3.MD.8, 3.G.1, 3.G.2* MD G

Primary Focus: OA - Operations & Algebraic Thinking **NBT** - Number & Operations in Base Ten **MD** - Measurement & Data **G** - Geometry **NF** - Fractions

Approved by the Amherst School Board on February 16, 2023
Pending Approval of the Mont Vernon School District

Unit Overview
Unit Title: Unit 1 Addition & Subtraction Patterns
Unit Summary
This unit focuses on patterns in addition and subtraction facts, the pattern of adding 10s, measuring, and problem solving. The first module sets the tone for the year with community building and then reviews the addition strategies for facts to 20, which students learned in second grade. The second module revisits subtraction strategies for facts to 20. Students are introduced to multi-digit addition on the open number line in Module 3, and Module 4 presents students with a collection of story problems that prompt them to practice their skills with multi-digit addition and subtraction.
Approximate Time Needed
5 Weeks - August and September
Unit Foundation
Assessed Competencies
Number and Operations in Base Ten Operations and Algebraic Thinking
Assessed Standards *(includes standards on both required and optional assessments)*
2.OA.1 Solve one-step addition story problems with sums to 100 involving situations of putting together, with unknowns in all positions **2.OA.1** Solve one-step subtraction story problems with minuends to 100 involving situations of taking from and comparing, with unknowns in all positions **2.OA.2** Fluently add with sums to 20 using mental strategies **2.OA.2** Fluently subtract with minuends to 20 using mental strategies **2.OA.2** Recall from memory all sums of two 1-digit numbers **2.NBT.2** Skip-count by 10s within 1,000 **2.MD.5** Solve addition story problems with sums to 100 involving lengths given in the same units **3.OA.9** Identify patterns among basic addition facts **3.OA.9** Identify patterns among basic subtraction facts ***Supports* 3.OA** Write equations with a letter standing for the unknown quantity to represent one-step story problems ***Supports* 3.OA** Determine whether two expressions are equal **3.NBT.2** Use strategies based on place value, properties of operations, or the relationship between addition and subtraction to add fluently with sums to 1,000
Curriculum Framing Questions
Enduring Understandings
Students will understand how to:

- Use efficient math strategies to build fluency with basic addition and subtraction facts
- Determine whether two expressions are equal
- Write equations to represent one-step story problems
- Use strategies based on place value, properties of operations, or the relationship between addition and subtraction to fluently add and subtract within 100

Mathematical Concepts

The mathematical focus of Unit 1 is a review and extension of skills and concepts introduced in second grade: number relationships, operations, facts to 20, adding 10 to any 2- or 3-digit number, and adding 2-digit numbers. In third grade, the goal is to help students use these relationships and their understanding of the operations to further develop their multi-digit addition and subtraction strategies. With a repertoire of strategies to draw on, students are then ready to study and use the standard algorithms with understanding. While Unit 1 revolves largely around facts to 20, and the pattern of adding 10s and getting to 10s, students will work on multi-digit addition and subtraction in Units 3 and 4.

The approach to basic facts in Modules 1 and 2 acknowledges that fact retrieval is far more likely to be successful when based on models, use of strategies, and intuition, as opposed to rote memorization and recall. Using the number rack as a primary mathematical model, students learn to think about numbers in terms of parts and missing parts. This part-part whole understanding is not only fundamental to a rich understanding of numbers but also fundamentally related to addition and subtraction as operations. For example, the number fact 8 + 5 = 13 is challenging for many primary students. The models and strategies promoted in this unit allow them to approach that number fact from a range of perspectives, each one helpful in retrieving the correct answer. After repeated use of the number rack, a student may “see” the number 8 as a combination of 5 and 3 more. Combining the two 5s, this number fact becomes 5 + 5 (10) + 3 = 13.

Another student might compensate to make this an easier problem to solve: take 2 from the 5, and add it to the 8. That leaves them with 10, and 3 more. This flexibility, built upon solid number sense and reasoning, anchors students’ mastery of the number facts. It leads to understanding how to reason about problems like 8 + ____ = 13 and later, 8 + 5 = ____ + 6.

Module 3 uses a measurement context to review the open number line. Students work on estimating lengths in metric units as they go on a scavenger hunt to find objects with certain measurements. They use the found objects to create a measurement chart. That measurement chart becomes the open number line. Students build on the work done in Bridges Grade 2, where they used the open number line to add and subtract 2-digit numbers. As you model student solutions to addition problems involving lengths on the open number line, students will see a key pattern, the addition of 10 to any number.

Unit Overview
Unit Title: Unit 2 Introduction to Multiplication
Unit Summary
This unit introduces multiplication by immersing students in a wide variety of multiplicative situations. When solving problems that are embedded in different contexts and that invite them to think of the operation in different ways, students make use of a variety of models for multiplication, including equal groups, arrays, the number line, and ratio tables. They also apply the associative and distributive properties to develop efficient, reliable, and generalizable strategies for multiplying. They track these strategies on a multiplication table featuring products from 0 to 100 and apply what they have learned by solving problems that involve scaled graphs and story problems with multiple steps and operations.
Approximate Time Needed
6 weeks - October and November
Unit Foundation
Assessed Competencies
Measurement and Data Operations and Algebraic Thinking
Assessed Standards *(includes standards on both required and optional assessments)*
3.OA.1 Interpret products of whole numbers **3.OA.2** Interpret quotients of whole numbers **3.OA.3** Solve multiplication story problems with products to 100 involving situations of equal groups, arrays, and measurement quantities **3.OA.4** Solve for the unknown in a multiplication equation involving 3 whole numbers (a multiplicand, multiplier, and product) **3.OA.5** Apply properties of operations as strategies to multiply **3.OA.7** Fluently multiply with products to 100 using strategies **3.OA.9** Identify patterns among basic multiplication facts **3.MD.7b** Represent the product of two numbers as the area of a rectangle with side lengths equal to those two numbers, and find the area of the rectangle by multiplying the side lengths **3.MD.7c** Use the area model for multiplication to
Curriculum Framing Questions
Enduring Understandings
Students will understand how to: ● Solve story problems involving multiplication

- Represent problems involving multiplication using skip counting, number lines, arrays, and ratio tables
- Develop efficient strategies for multiplication facts through 10 × 10

Mathematical Concepts

Unit 2 focuses on helping students develop a conceptual understanding of multiplication. Investigations begin with contexts and problems that invite them to multiply, to think about equal groups and multiplicative comparisons. Story problems are not reserved as a culminating activity after students have explored multiplication. Instead, through the process of solving problems in context, students begin to make the transition from additive to multiplicative reasoning. The contexts and problems invite, and sometimes require, students to take this step in their mathematical thinking. Beginning to think multiplicatively is no small task. It requires students to think about groups not just as collections of individual items or numbers, but as units. We refer to this process as unitizing. For example, if a student is considering 4 groups of 3, she can determine the total by counting one by one, shown in the first row of the following table. She can also add repeatedly, skip-count, and multiply. Using any strategy besides counting by 1s requires that she be able to unitize, to treat each group of 3 as a unit.

Some problems in this unit feature contexts involving a constant ratio. For example, students consider how many total tires are on 3 cars if each car has 4 tires. In this situation, the ratio of 1 car: 4 tires remains constant, and students arrive at an equivalent ratio of 3 cars: 12 tires. Using multiplication to find these equivalent ratios helps students begin to develop proportional reasoning, which is very complex and takes years to mature. Students' work with proportionality in Bridges will build strong foundations for much future work with fractions, decimals, percents, ratios, proportions, algebra, and physics.

In addition to developing a conceptual understanding of multiplication in this unit, students will begin to develop computational strategies that not only support their fluency with basic multiplication facts now and can also be generalized to computation with larger numbers and in algebra. Later in this introduction, we'll explain these strategies in detail and describe how they support the development of students' algebraic reasoning.

Unit Overview
Unit Title: Unit 3 Multi-Digit Addition & Subtraction
Unit Summary
Unit 3 reviews and extends students' thinking about place value, multi-digit addition and subtraction, and problem solving. In the first module, students are introduced to the idea of rounding 2- and 3-digit numbers to the nearest ten and the nearest hundred. This skill is extended into the realm of computation, as students use rounding as a way to estimate and check the results of adding and subtracting multi-digit numbers. Along with reviewing and deepening their understandings of strategies learned in second grade, students are introduced to the standard algorithms for adding and subtracting multi-digit numbers toward the end of the unit.
Approximate Time Needed
6 Weeks - November and December
Unit Foundation
Assessed Competencies
Number and Operations in Base Ten Operations and Algebraic Thinking
Assessed Standards *(includes standards on both required and optional assessments)*
3.NBT.1 Round whole numbers to the nearest ten **3.NBT.1** Round whole numbers to the nearest hundred **3.NBT.2** Use strategies based on place value, properties of operations, or the relationship between addition and subtraction to add fluently with sums to 1,000 **3.NBT.2** Use strategies based on place value, properties of operations, or the relationship between addition and subtraction to subtract fluently with minuends to 1,000 **3.OA.8** Solve two-step story problems using the four operations.
Curriculum Framing Questions
Enduring Understandings
Students will understand how to: ● Continue to practice addition and subtraction ● Round multi-digit numbers and estimate their sums and differences ● Add and subtract 2- and 3-digit numbers using algorithms and other methods
Mathematical Concepts
The mathematical focus of Unit 3 is additive thinking. In third grade, the goal is to help students use numeric relationships and their understanding of the operations to further develop their multi-digit

addition and subtraction strategies. With a repertoire of strategies to draw on, students are then ready to study and use the standard algorithms with understanding, as they are given an opportunity to do toward the end of the unit. The specific concepts addressed in this unit include the following:

- Two- and three-digit numbers can be rounded to the nearest ten or the nearest hundred.
- Rounding and computational estimation go hand in hand. Rounding numbers is useful in estimating the results of 2- and 3-digit addition and subtraction, as well as checking answers for reasonableness.
- Some situations call for exact answers, while others call for estimates, and it's important to be able to distinguish the two.
- There are a variety of strategies for adding and subtracting 2- and 3-digit numbers with accuracy, efficiency, and flexibility.
- While the standard algorithms for multi-digit addition and subtraction work in a consistent and reliable manner for all combinations, decisions about which method or strategy to use should be based on the numbers themselves. For example, it is sensible to use the standard algorithm to solve 369 + 268, but a combination like 299 + 538 can be solved more efficiently by taking 1 from 538 and "giving" it to 299, resulting in 300 + 537, easily solved in one's head. Likewise, it is sensible to use the standard subtraction algorithm to solve 842 – 564. However, a combination like 734 – 298 can be solved more efficiently using a constant difference strategy in which 2 is added to the minuend and the subtrahend to produce 736 – 300, easily solved mentally.

Unit Overview
Unit Title: Unit 4 Measurement & Fractions
Unit Summary
This unit begins with measurement concepts and skills. Students tell time to the minute and solve elapsed time problems. Then the class discusses the need for measuring by reading a book about the biggest, tallest, and fastest animals in the world. At the end of the first module, students estimate, measure, and compare the masses of different objects. In the second module, students work with volume and solve measurement-related story problems. The third module introduces them to fractions, using several different models to build, compare, and investigate the relationships among unit and common fractions. A short project at the end of the unit brings it all together, as students measure lengths to fractions of an inch and display measurement data on line plots.
Approximate Time Needed
6 weeks - January / February
Unit Foundation
Assessed Competencies
Geometry Measurement and Data Number and Operations in Base Ten Number and Operations Fractions Operations and Algebraic Thinking
Assessed Standards *(includes standards on both required and optional assessments)*
3.OA.8 Solve two-step story problems using addition, subtraction, and multiplication **3.NBT.2** Fluently add and subtract with sums to 1,000 **3.NF.1** Demonstrate an understanding of a unit fraction 1/b as 1 of b equal parts into which a whole has been partitioned (e.g., 1/4 is 1 of 4 equal parts of a whole) **3.NF.1** Demonstrate an understanding of a fraction a/b as a equal parts, each of which is 1/b of a whole (e.g., 3/4 is 3 of 4 equal parts of a whole or 3 parts that are each 1/4 of a whole) **3.NF.2a** Locate 1/b on the number line after partitioning the interval from 0 to 1 into b equal parts **3.NF.2b** Show a fraction a/b on a number line by marking off, starting at 0, a lengths of 1/b each and labeling the resulting interval a/b **3.NF.3a** Identify equivalent fractions by comparing their size **3.NF.3b** Recognize simple equivalent fractions **3.NF.3b** Generate simple equivalent fractions and explain why two fractions must be equivalent **3.NF.3d** Compare two fractions with the same numerator or the same denominator; use the symbols >, =, and < to record comparisons of two fractions; demonstrate that fractions can be compared only when they refer to the same whole **3.MD.1** Tell and write time to the nearest minute; measure time intervals in minutes

3.MD.1 Solve story problems involving addition or subtraction of time intervals in minutes
3.MD.2 Measure liquid volume in liters; measure mass in grams and kilograms
3.MD.2 Solve story problems involving addition of mass measurements given in grams
3.MD.2 Solve story problems involving subtraction of mass measurements given in grams
3. MD.2 Solve story problems involving addition or subtraction of lengths given in centimeters
3.G.2 Partition shapes into parts with equal areas; express the area of each equal part of a whole as a unit fraction of the whole

Curriculum Framing Questions

Enduring Understandings

Students will understand how to:

- Tell time and calculate elapsed time
- Measure mass and volume to solve problems
- Model and compare fractions in different ways

Mathematical Concepts

The mathematical focus of Unit 4 is the development of measurement and fraction concepts. These are related because measurement is continuous, unlike counting, which is discrete. In measuring time, mass, volume, and length, students have to shift from counting one by one to dealing with spans. These spans become smaller as our units of measure decrease. But they never disappear entirely, which is why measurement remains slightly imprecise, even under the best of circumstances. Fractions are also continuous—there are no things to count one by one with a fraction. In fact, in between any two fractions, one can always find another fraction, just as any given unit of measurement can always be divided into smaller units. The specific concepts addressed in this unit include these:

- Mass is the amount of stuff, of matter, in an object. In third grade, mass is measured in units of grams and kilograms. The tool for measuring mass is the pan balance scale, with which we compare an object's mass to the known mass of objects, such as the metric measures that often accompany balance scales.
- Volume is the space that an object or substance occupies. In third grade, liquid volume is measured in units of milliliters and liters. The tool to measure volume is a graduated cylinder (a measuring container that is marked in units).
- Time is measured in seconds, minutes, and hours, as well as in larger units such as days, weeks, months, and years. Third graders extend the time-telling skills they developed in second grade to telling time on analog and digital clocks to the minute. They also work with situations and story problems to determine the amount of time that has passed, or elapsed. Here, the number line proves to be a valuable tool.
- Fractions have multiple meanings. They are complex concepts. A fraction involves the relationship between the numerator to the denominator. With the part-whole definition of fractions, we can find fractions of sets and fractions of whole. We can also talk about the measurement meaning of fractions. When we consider a distance traveled that falls between 0 and 1 on a number line, the point that marks the end of that distance can be called the location of a particular fraction on the number line.
- Unit fractions are fractions with the numerator 1. They represent an individual's share in a fair sharing situation. They also represent the distance from 0 to the unit fraction. Common

fractions are fractions with a number other than 1 in the numerator. Common fractions can be written as the sum of unit fractions. For example, 1/3 + 1/3 = 2/3.

Unit Overview
Unit Title: Unit 5 Multiplication, Division & Area
Unit Summary
Unit 5 returns to the study of multiplication, especially as it relates to division. Students again build arrays, but use them to model and solve division as well as multiplication problems. Story problems play a major role in the first two modules, helping students to connect their everyday experiences with division to more formal mathematical concepts. As they solve and pose story problems, students encounter two different interpretations of division—sharing and grouping—and have numerous opportunities to build understandings of both. Much of the work in Modules 2 and 3 revolves around fact families, while Module 4 features an introduction to area, a topic that will be revisited in Unit 6.
Approximate Time Needed
5 weeks - February / March
Unit Foundation
Assessed Competencies
Measurement and Data Operations and Algebraic Thinking
Assessed Standards *(includes standards on both required and optional assessments)*
3.OA.1 Interpret products of whole numbers; write story problems or describe problem situations to match a multiplication expression or equation **3.OA.2** Interpret quotients of whole numbers, write story problems or describe problem situations to match a division expression or equation **3.OA.3** Solve division story problems with dividends to 100 involving situations of equal groups **3.OA.4** Solve for the unknown in a multiplication or division equation involving 3 whole numbers **3.OA.6** Solve division problems by finding an unknown factor **3.OA.7** Fluently multiply with products to 100 with strategies **3.OA.7** Fluently divide with dividends to 100 using strategies **3.OA.8** Solve two-step story problems using multiplication and division **3.MD.5a** Demonstrate an understanding that a square with a side length of 1 unit is called a “unit square” and has 1 square unit of area **3.MD.5b** Demonstrate an understanding that a plane figure that can be covered without gaps or overlaps by n unit squares has an area of n square units **3.MD.6** Measure the area of a plane figure by counting the number of square units that cover it, with no gaps or overlaps **3.MD.7a** Find the area of a rectangle with whole-number side lengths by tiling it **3.MD.7b** Represent the product of two numbers as the area of a rectangle with side lengths equal to those two numbers

3.MD.7b Find the area of a rectangle by multiplying its side lengths

Curriculum Framing Questions

Enduring Understandings

Students will understand how to:

- Solve multiplication and division problems
- Calculate the area of rectangles
- Use rectangular arrays to model and solve multiplication and division problems

Mathematical Concepts

Unit 5 addresses three distinct but interrelated concept clusters: the relationship between multiplication and division, the two different interpretations of division, and the relationship between multiplication and area. Each of these clusters is described below.

The Relationship Between Multiplication & Division

The Common Core Standards require that third graders become fluent with multiplication and division facts to 100. Before they can develop fluency—accuracy, efficiency, and flexibility—with division facts, they must understand the operation itself and its connection to multiplication. In some ways, division is more easily understood than multiplication; it is almost certainly a more common function in students' daily lives. There are very few third graders who have not been asked to share food, toys, clothing, and space with siblings or friends, and most 7- and 8-year olds have a pretty well-developed sense of splitting or dividing things fairly (i.e., into equal groups so no one gets the short end of the stick). Our task, then, is to connect students' informal understandings of division to the more formal nature of school mathematics. Story problems that feature familiar situations prove very useful in this way. We can pose such problems and work from students' solutions to teach formal notation and vocabulary.

A greater challenge than developing conceptual understandings of division may be to gain fluency with division facts. Here, the link between multiplication and division becomes crucial. Just as students are able to make use of familiar addition facts to solve related subtraction facts, so too can they make use of well-known multiplication facts to solve related division facts. A student who knows that 3×4 is 12 might solve $12 \div 3$ by understanding the problem in terms of an unknown or missing factor. She might reason that $12 \div 3$ is 4 since 4×3 is 12. By helping students understand that division is the inverse of multiplication, we empower them to use the multiplication facts they're familiar with to help solve related but less familiar division facts.

Two Different Interpretations of Division

There are two different interpretations of division: sharing and grouping. When we interpret division as sharing (sometimes called equal sharing, fair sharing, or partitive division), we share out a quantity equally, as shown below at left. We know how many groups we have to make; we have to find out what the size of each group is. When we interpret division as grouping (sometimes called measurement or quotative division), we know what the size of each group is; we have to find out

how many groups we can make given the dividend we're working with, as shown below at right.

Notice that the answer is the same in both interpretations, but it means something different in each case. In the sharing interpretation of division, the result of dividing 8 by 2 tells us the size of each group; each person gets 4. In the grouping interpretation, we already know the size of the group—2. The result of dividing 8 by 2 tells us how many groups of 2 are in 8. (There are 4.)

Most of us are so used to thinking of division in terms of sharing that the grouping interpretation can be challenging. While third graders aren't expected to verbalize the differences between the two interpretations, it is very important that they have experiences with both types of situations. The grouping interpretation of division takes on added importance as students move into long division and division of fractions in fourth and fifth grade. While it makes sense to use a sharing model for a situation like 16 ÷ 4, it makes less sense to think of 1,656 ÷ 48 in terms of sharing. Instead, we encourage students to consider how many groups of 48 there are in 1,656. Likewise, the grouping interpretation makes the operation of dividing a whole number by a fraction more accessible than it might otherwise be, as we can solve a problem like 4 ÷ 1/2 by reasoning about how many groups of 1/2 there are in 4.

Multiplication & Area

The array model, introduced in Unit 2, is tremendously helpful in moving third grade students toward multiplicative thinking. In this model, the numbers being multiplied correspond to the dimensions of a rectangle, and the product of those numbers corresponds to the area of the rectangle. Because multiplication is a major part of the third grade year, area is a particularly valuable type of measurement to pursue. The Common Core Standards for Grade 3 describe the learning expectations related to this cluster of concepts in the following words.

Students recognize area as an attribute of two-dimensional regions. They measure the area of a shape by finding the total number of same size units of area required to cover the shape without gaps or overlaps, a square with sides of unit length being the standard unit for measuring area. Students understand that rectangular arrays can be decomposed into identical rows or into identical columns. By decomposing rectangles into rectangular arrays of squares, students connect area to multiplication, and justify using multiplication to determine the area of a rectangle.

Unit 5, Module 4 features an introduction to area in which students cover rectangles and rectangular surfaces around the classroom with nonstandard units and then count them to determine area in square units. By the third session in Module 4, the students discover that each colored tile has an area of exactly 1 square inch, and they begin to measure area in customary units. It's not long before they begin to devise methods more efficient than counting the tiles 1 by 1, and soon some of them recognize that if they've covered a surface with 5 rows of 8 square-inch tiles, they can multiply the number of rows by the number in each row to find the area. Area will be addressed more extensively in Unit 6, but including the topic in Unit 5 helps draw together many of the concepts that students have been working on for much of the year

Unit Overview

Unit Title: Unit 6 Geometry

Unit Summary

In Unit 6, students develop increasingly precise ways to describe, classify, and make generalizations about two-dimensional shapes, particularly quadrilaterals. In Module 1, students explore polygons in a variety of creative ways. In Module 2, they form polygons and special quadrilaterals to build understanding that shared attributes can define a larger category. Module 3 combines geometry and measurement as students measure the perimeters and areas of polygons. Module 4 offers students opportunities to apply what they've learned about quadrilaterals and area in the context of fractions.

Approximate Time Needed

5 Week - March and April

Unit Foundation

Assessed Competencies

Geometry
Measurement and Data

Assessed Standards *(includes standards on both required and optional assessments)*

3.MD.7b Find the area of a rectangle by multiplying its side lengths
3.MD.7d Find the area of a figure that can be decomposed into non-overlapping rectangles, and solve related story problems
3.MD.8 Find the perimeter of a polygon, given its side lengths, and solve related story problems
3.MD.8 Find an unknown side length of a polygon, given its perimeter and other side lengths
3.MD.8 Create rectangles with the same perimeter but different areas, and rectangles with the same area but different perimeters
3.G.1 Identify rhombuses, rectangles, and squares as quadrilaterals
3.G.1 Draw or construct quadrilaterals that are not rhombuses, rectangles, or squares
3.G.1 Identify shared attributes of shapes in different categories
3.G.1 Group shapes in different categories according to shared attributes that define a broader category

Curriculum Framing Questions

Enduring Understandings

Students will understand how to:

- Describe and classify two dimensional shapes, especially quadrilaterals

- Calculate area and perimeter
- Represent fractions as parts of a whole shape

Math Concepts

In 1957, two Dutch educators, Pierre van Hiele and Dina van Hiele-Geldof, puzzled by the difficulty their students had with geometry, published what has become a very influential theory in the design of geometry curriculum. According to the van Hiele theory, students pass through certain levels as they become more sophisticated in their geometric thinking, and these levels must unfold in order, propelled by students' own explorations and discoveries.

Progress through the levels of geometric understanding is more dependent on educational experiences than on age or maturity. It's interesting to note that while traditional high school geometry textbooks are generally pitched at about level 3, many high school students enter functioning at level 0 or, at best, level 1. To arrive at level 3, students must move through all the prior levels. To move through a level means that a student has experienced geometric thinking appropriate for that level and has created in his or her own mind the types of objects or relationships that are the focus of thought at the next level.

The van Hieles believe that instruction must begin at a student's current level and provide many years of visual and exploratory work before moving into formal deductions. Experience with shapes, terms, and geometry-related concepts is the greatest single factor influencing advancement through the levels. So, the question for us as teachers of primary students is two-fold: at what level are our students currently working, and what can we do to support their development?

Most K–2 students think and work largely at level 0 but start to move into level 1 if given frequent opportunities to explore and investigate shapes in language-rich settings. Students who enter third grade having had numerous experiences with shapes are generally solid level 1 thinkers, ready to learn new terms and concepts that will allow them to be more precise in describing, sorting, and classifying shapes. In general, the move into and through level 1, with a nod in the direction of level 2, might be considered the main focus of geometry instruction through elementary school. Activities that encourage children to explore, talk about, and interact with content at the next level, while increasing their experiences at the current level, have the best chance of advancing their thinking. Listed here are some of the features of effective instruction at levels 0, 1, and 2.

Features of Level 0 Activities

- Involve lots of sorting, identifying, and describing of various shapes.
- Use lots of physical models that can be manipulated by the students.
- Include many different and varied examples of shapes so that irrelevant features, such as size, color, and orientation, do not become important.
- Provide opportunities to build, make, draw, put together, and take apart shapes.

Features of Level 1 Activities

- Begin to focus more on properties of figures than on simple identification. Define, measure, observe, and change properties with the use of models.
- Use problem-solving contexts in which properties of shapes are important components.
- Continue to use models, as with level 0, but include models that permit the exploration of

various properties of figures.

- Classify figures based on properties of shapes as well as by names of shapes. For example, investigate properties of triangles, such as side length and angle measure, that make some alike and others different.

Features of Level 2 Activities

- Use models and drawings as tools to think with, and begin to look for generalizations and nonexamples.
- Make property lists, and discuss which properties are necessary and which are sufficient conditions for a specific shape or concept.
- Include language of an informal deductive nature: all, some, none, if-then, what if, etc.
- Investigate the converse of certain relationships for validity. For example, the converse of “If it is a square, it must have four right angles” is “If it has four right angles, it must be a square.”

Unit Overview
Unit Title: Unit 7 Extending Multiplication & Fractions
Unit Summary
Unit 7 provides a review of material covered earlier in the year, as well as opportunities to extend skills and concepts into work with larger numbers and bigger ideas. Early in the unit, students learn to multiply single digits by multiples of 10. That skill is then extended into building and sketching 1-digit by 2-digit multiplication combinations. Working with multiplication beyond the basic facts provides rich opportunities to review the commutative and distributive properties and tap into the power of the associative property of multiplication. Having worked previously with fractions as parts of a whole and distances along a number line, students are introduced to linear and area models that allow them to see fractions as parts of a set as well as a parts of a whole. These models include a ruler, an egg carton, a 12-foot strip of adding machine tape, and a circle graph. The unit ends with a foray into data collection, representation, and interpretation, foreshadowing the work with measurement and data students will do in Unit 8.
Approximate Time Needed
5 Weeks - May and June
Unit Foundation
Assessed Competencies
Geometry Measurement and Data Number and Operations in Base Ten Number and Operations Fractions Operations and Algebraic Thinking
Assessed Standards *(includes standards on both required and optional assessments)*
3.OA.1 Interpret products of whole numbers **3.OA.2** Interpret quotients of whole numbers **3.OA.3** Solve division story problems with dividends to 100 involving situations of equal groups **3.OA.5** Multiply using the commutative, associative, and distributive properties **3.OA.7** Fluently multiply with products to 100 using strategies **3.OA.8** Solve two-step story problems using addition, subtraction, and multiplication **3.OA.8** Write equations with a letter standing for the unknown quantity to represent two-step story problems **3.OA.8** Assess the reasonableness of answers to story problems using mental computation, rounding, and other estimation strategies **3.NBT.3** Multiply whole numbers from 1 to 9 by multiples of 10 from 10 to 90 using strategies based on place value and properties of operations **3.NF.1** Demonstrate an understanding of a unit fraction 1/b as 1 of b equal parts into which a whole

has been partitioned, or of a fraction a/b as a equal parts, each of which is 1/b of a whole
3.NF.2 Locate fractions on a number line, and place fractions in their correct positions
***Supports* 3.NF** Represent fractions with denominators of 2, 3, 4, 6, and 12 as parts of a set and parts of a whole
3.NF.2b Show a fraction a/b on a number line by marking off, starting at 0, a lengths of 1/b each and labeling the resulting interval a/b
3.NF.3a Identify equivalent fractions by comparing their sizes or their locations on a number line
3.NF.3b Generate and recognize simple equivalent fractions
3.NF.3c Recognize fractions that are equivalent to whole numbers
3.NF.3d Compare two fractions with the same numerator or the same denominator
3.NF.3d Use the symbols >, =, and < to record comparisons of two fractions, and explain why one fraction must be greater than or less than another fraction
3.MD.7a Demonstrate that the area of a rectangle with whole-number side lengths can be found by multiplying the side lengths
3.MD.7b Find the area of a rectangle by multiplying its side lengths
3.MD.7c Use the area model for multiplication to illustrate the distributive property
3.G.2 Express the area of each equal part of a whole as a unit fraction of the whole

Curriculum Framing Questions

Enduring Understandings

Students will understand how to:

- Develop and use strategies for multiplying by 11 and 12
- Multiply single-digit numbers by multiples of 10
- Multiply single-digit numbers by two-digit numbers
- Solve problems involving fractions

Mathematical Concepts

Multiplication and fractions are central to the math instruction in third grade and continue to be classified as major topics in fourth grade. It seems wise, then, to address multiplication and fraction skills and concepts one more time before the end of the school year, allowing students to consolidate what they have already learned and extend their thinking about both topics. For this reason, Unit 7 is devoted to the review and extension of both topics—multiplication in the first half of the unit, and fractions in the second half.

Multiplication

The Common Core standards specify that third graders will develop computational fluency with basic multiplication facts and that this will include the memorization of these facts so that they can be recalled quickly. It is also expected that they will become proficient in multiplying single-digit numbers by multiples of 10, solve a wide variety of story problems that involve multiplication as well as other operations, and write equations to represent two-step story problems. This unit takes an applied and visual path toward helping students achieve such proficiency with multiplication, so their computational fluency is supported by an understanding of the operation and a strong number sense. Through the first two modules, students will revisit the meaning of multiplication and its properties, develop useful models and mental strategies for multiplying single-digit by double-digit

numbers, and have repeated opportunities to write and solve equations for two-step problems.

When students move beyond the basic facts into multiplication of larger numbers, the difficulties tend to, well, multiply. Unless carefully taught, some children may enter fourth grade with the idea that to multiply 4 × 27, "you go 4 × 7 and 4 × 2." Depending on how they handle the fact that 4 × 7 = 28, their answers may range all the way from 88 to 828. What's missing is the fundamental insight that when you multiply 4 × 27, you are actually multiplying 4 × 7 and 4 × 20. Once students understand this clearly, they are poised to use a variety of multi-step procedures to produce the correct answer. Until then, they are quite likely to use some form of skip-counting or repeated addition instead of attempting to multiply, because they can rely on these additive methods to produce the right answer.

Fractions

The primary goal of the instruction in the third and fourth modules of this unit is to help students continue to develop a solid sense of fractions—what they are, how they differ from whole numbers, how big they are, and how they relate to one another. In Module 3, students are introduced to three new ways to model, compare, and generate equivalent fractions—a 12-inch ruler, a 12-foot long strip of adding machine tape folded into foot-long sections, and tiles in an egg carton subdivided with pieces of yarn. In Module 4, students practice locating and placing fractions along a number line as they prepare their own boards for a new game. The rest of the module features opportunities to apply fractions to the realm of data and statistics, as students conduct their own surveys and embark on a tile-sampling experiment.

Models for Multiplication

As has been the case throughout the year, the array, or area model, continues to figure prominently in the multiplication instruction in Unit 7. During the first and second modules, students build multiplication arrays with base ten pieces and learn to make sketches of their arrays on specialized grid paper. Their work with these models reinforces the importance of the distributive property and helps them understand this property in new and powerful ways, as shown in the illustration below.

The Array Model
The purpose of extending the array model into working with multiplication of larger numbers is to help students decompose numbers to make them easier to multiply. It also helps students move from additive to multiplicative reasoning, because it enables them to actually see the partial products. When they build a 4-by-27 array with base ten area and linear pieces, they can see and discuss the fact that they are multiplying tens and ones. It is this fundamental understanding that allows students to make the difficult transition from additive to multiplicative thinking, providing them with a solid foundation from which to work as they head into fourth grade.

Models for Fractions

The Common Core standards state that students in grade 3 should build their understanding of fractions as parts of a whole, focusing primarily on halves, thirds, fourths, sixths, and eighths. (We have stretched this a bit to include twelfths because models that involve twelve parts offer rich opportunities to explore the relationships among halves, thirds, fourths, and sixths—all of which can

be seen as different numbers of twelfths.) In this unit, we use a variety of visual models for fractions to help students clarify ideas that are often confusing when presented only with symbolic language. The physical models employed in this unit—number lines, folded paper strips, egg cartons, and rulers—help students understand fractions as parts of a whole and as parts of a collection or set. Students use the models to build and compare fractions, explore equivalent fractions, and even add fractions informally.

The 12-inch Ruler
At the beginning of Module 3, students consider a length or measurement model of fractions by using a ruler to measure and evenly divide strips of paper. You'll ask them, for example, to think of 6 inches as half of a foot or 6 out of 12 inches; 4 inches as a third of a foot or 4 out of 12 inches; 3 inches as a fourth of a foot or 3 out of 12 inches, and so on. After students have cut and labeled halves, thirds, fourths, sixths, and twelfths, they compare the sizes of these fractions and record a variety of observations about them.

The Egg Carton Model
The egg carton model involves a 12-egg carton, yarn to divide the carton into equal sections, and colored tiles to represent eggs. While most visual or physical models of fractions specifically portray fractions as either parts of a whole or parts of a set, the egg carton simultaneously models fractions in both ways. Eight eggs set into a carton of 12 can be viewed as 2/3 of a whole (the whole being the entire egg carton) or 8 out of a set of 12 eggs. Throughout the second half of Unit 7, students will alternate between considering fractions as parts of a whole and parts of a set.

After being introduced to the new model, students spend the next three sessions exploring egg carton fractions. They model and name some of the many fractions that can be represented with the egg carton model, use the model to investigate equivalent fractions, and practice adding fractions informally by playing a game that involves combining different numbers of tiles in a single carton.

Pizzas & Circle Graphs

Students also use a circle to represent the whole when they think of fractions as fair shares, dividing different numbers of pizzas between different numbers of students. In Module 4, students pose survey questions to 12 classmates, organize the information, and record the information on circle graphs. They interpret the data as fractional parts of a set of 12.

Algebra Connections in This Unit

Students continue to work with equations during the first part of Unit 7, with a specific focus on using a letter to stand for the unknown quantity to represent and solve two-step story problems. Using the distributive property of multiplication over addition, they write equations to describe the partitioning of arrays. For example, a 15 × 6 array can be partitioned into a 10 × 6 and a 5 × 6 array, so students record 15 × 6 = (10 × 6) + (5 × 6) = 90. The associative and commutative properties of multiplication also figure heavily in students' work with larger multiplication combinations.

Unit Overview
Unit Title: Unit 8 Bridge Design & Construction: Data Collection & Analysis (optional unit)
Unit Summary
In the final unit of the year, students learn about different kinds of bridges by reading nonfiction, looking at pictures, doing research, and building their own model bridges. This unit integrates mathematics and science with a primary focus on designing and building model bridges, which are then tested in systematic ways to collect data. Students graph and analyze the data, finding the range and mean, to make conjectures and draw conclusions about effective bridge design and construction.
Approximate Time Needed
Optional Unit - Can integrate with Science
Unit Foundation
Assessed Competencies
Geometry Measurement and Data Number and Operations in Base Ten Number and Operations Fractions Operations and Algebraic Thinking
Assessed Standards *(all assessments in this unit are optional)*
3.NF.1 Demonstrate an understanding of a unit fraction 1/b as 1 of b equal parts into which a whole has been partitioned, and a fraction a/b as a equal parts, each of which is 1/b of a whole **3.NF.3d** Compare two fractions with the same numerator or denominator; use the symbols >, =, and < to record comparisons of two fractions **3.MD.1** Tell and write time to the nearest minute **3.MD.1** Measure time intervals in minutes; solve story problems involving addition and subtraction of time intervals in minutes **3.MD.2** Estimate and measure mass in grams and kilograms; solve story problems involving addition, subtraction, multiplication, or division of mass measurements given in grams and kilograms **3.MD.3** Make a scaled bar graph to represent a data set with several categories; solve one- and two-step comparison problems using data shown on a scaled bar graph with several categories **3.MD.4** Generate measurement data by measuring lengths to the nearest half or fourth of an inch, and make a line plot to show the data **3.MD.7b** Find the area of a rectangle by multiplying its side lengths **3.G.1** Identify rhombuses, rectangles, and squares as quadrilaterals; draw quadrilaterals that are not rhombuses, rectangles, or squares **3.G.1** Identify shared attributes of shapes in different categories; group shapes in different categories according to shared attributes that define a broader category

3.G.2 Partition shapes into parts with equal areas; express the area of each equal part of a whole as a unit fraction of the whole

Curriculum Framing Questions

Enduring Understandings

Students will understand how to:

- Research bridge engineering and design
- Design and build model bridges to meet specific criteria and constraints
- Plan and carry out tests to find failure points and make improvements to their model bridges
- Practice math skills developed earlier this year, including work with fractions, time and measurement, estimation, geometry, and multiplication

Mathematical Concepts

One reason for an applied math unit about bridges is that many of the variables that influence the length and strength of bridge designs can be quantified. As students investigate these variables, they estimate and measure the spans of their bridges in inches or centimeters, and the strength of their bridges in grams, kilograms, milliliters, and liters. Students study how different shapes influence the strength and structure of bridges and apply this understanding to their designs. Throughout the unit, students organize their data using line plots, picture graphs, and bar graphs, then analyze the results to determine the factors that influence bridge strength. Students also plan and monitor their own time during the building sessions.

Strategies

The sessions in this unit include a good deal of informal discovery time when students can experiment with different building materials and bridge designs. These experiences will prompt them to generate and test conjectures about the merits, drawbacks, and interplay of materials and design features as they build their bridges.

Algebra Connections in This Unit

In addition to the mathematical concepts practiced during the bridge designs and investigations, Daily Practice assignments in this unit offer opportunities for additional practice with many algebraic concepts, including:

- Determining the unknown whole number in a multiplication or division equation relating three whole numbers
- Applying properties of operations as strategies to multiply and divide
- Understanding division as an unknown-factor problem
- Fluently multiplying and dividing within 100, using strategies such as the relationship between multiplication and division or properties of operations
- Solving two-step story problems using the four operations, and representing these problems using equations with a letter standing for the unknown quantity
- Identifying arithmetic patterns and explaining them using properties of operations

Statistical Analysis

Students are likely to be interested not only in why their bridges perform as they do but in how their bridges compare to those made by the group at large. This unit uses the natural opportunities in data collection and graphing to give students an early foundation in statistical analysis. The concepts of range and mathematical mean (average) are revisited and introduced, respectively, and extension activities offer chances to discuss the concepts of mode and median.

Grade 3 Scope & Sequence

Number Corner Second Edition

	August / September	October	November	December	January	February	March	April	May / June
Calendar Grid	**Multiplication Models** *3.OA.1, 3.OA.3* (OA)	**Two-Dimensional Shapes** *3.G.1* (G)	**Multiplication Arrays** *3.OA.1, 3.OA.5, 3.OA.7, 3.MD.7* (OA)	**Unit Fraction Squares** *3.NF.1, 3.NF.3a–d* (NF)	**Equivalent Fractions** *3.NF.1, 3.NF.3a–d* (NF)	**Investigating Area & Perimeter** *3.MD.5b, 3.MD.6, 3.MD.8* (MD)	**Time & Data Displays** *3.MD.1, 3.MD.3* (MD)	**More Equivalent Fractions** *3.NF.2a, 3.NF.3b–c* (NF)	**Fractions & Area with Rectilinear Figures** *3.NF.3, 3.MD.5, 3.MD.7* (MD)
Calendar Collector	**Collecting Survey Data** *3.MD.3* (MD)	**Collecting Liters & Milliliters** *3.MD.2* (MD)	**Unit Fraction Race** *3.NF1–3.NF3* (NF)	**Collecting Grams** *3.MD.2* (MD)	**Collecting Minutes & Hours** *3.NBT.3* (MD)	**Collecting Fractions of a Dollar** *3.NF.1* (NF)	**Area & Perimeter of Rectilinear Figures** *3.MD 5a–b, 3.MD.6, 3.MD.7a–d, 3.MD.8* (MD)	**Collecting Fractions of an Hour** *3.NF.1, 3.NF.3, 3.MD.1* (NF)	**Roll & Multiply** *3.OA.7, 3.OA.9, 3.MD.3* (OA)
Computational Fluney	**Loops & Groups** *3.OA.1, 3.OA.3* (OA)	**Frog Jump Multiplication** *3.OA.1* (OA)	**Array Race** *3.OA.1, 3.OA.5, 3.OA.7* (OA)	**Fact Fluency for Multiplying by Zero, One & Two** *3.OA.7, 3.OA.9* (OA)	**Fact Fluency for Multiplying by Ten & Five** *3.OA.6, 3.OA.7, 3.OA.9* (OA)	**Fact Fluency for Multiplying by Three, Four & Eight** *3.OA.6, 3.OA.7, 3.OA.9* (OA)	**Fact Fluency for Multiplying by Six & Nine** *3.OA.6, 3.OA.7, 3.OA.9* (OA)	**Quick Facts & Games** *3.OA.5, 3.OA.7* (OA)	**More Quick Facts & Games** *3.OA.7* (OA)
Number Line	**Up to One Thousand** *2.NBT.1, 2.NBT.2, 2.NBT.3, 2.NBT.8* (NBT)	**Changing Endpoints** *3.NBT.2* (NBT)	**Rounding to the Nearest Ten** *3.NBT.1, 3.NBT.2* (NBT)	**Rounding to the Nearest Hundred** *3.NBT.1, 3.NBT.2* (NBT)	**Benchmark Fractions on a Number Line** *3.NF.2, 3.NF.3* (NF)	**Comparing Fractions** *3.NF.2, 3.NF.2a, 3.NF.3c, 3.NF.3d* (NF)	**Find the Fraction** *3.NF.2a, 3.NF.3c, 3.NF.3d* (NF)	**Put It on the Line** *3.NF.1, 3.NF.2a, 3.NF.3a–c* (NF)	**Put It on the Line with Fractions & Mixed Numbers** *3.NF.2, 3.NF.3a–c* (NF)
Solving Probelms	**Adding 2- and 3-Digit Numbers** *3.NBT.2* (NBT)	**Subtracting Two- & Three-Digit Numbers** *3.NBT.2* (NBT)	**One-Step Story Problems with Equations** *3.OA.3, 3.OA.4* (OA)	**Multiplying with the Distributive Property** *3.OA.1, 3.OA.5, 3.OA.7, 3.OA.9* (OA)	**Multi-Step Problems & Equations** *3.OA.8* (OA)	**Data Problems** *3.MD.3* (MD)	**Area & Perimeter Puzzles** *3.MD.7, 3.MD.8* (MD)	**Multiplication & Division Practice** *3.OA.5, 3.OA.6, 3.OA.7* (OA)	**More Multiplication & Division Practice** *3.OA.4, 3.OA.6* (OA)

Primary Focus: OA - Operations & Algebraic Thinking **NBT** - Number & Operations in Base Ten **MD** - Measurement & Data **G** - Geometry **NF** - Fractions

Number Corner is an additional component of our mathematics curriculum. It is a skill-building program that revolves around the classroom calendar, providing daily practice as well as continual experiences with broader mathematical concepts in 20 minutes of engaging instruction.

SAU 39 Grade 4 Mathematics Curriculum

Grade 4 Scope & Sequence - 39

Bridges in Mathematics Second Edition

	August / September - Done by Oct. 7th	October/November - Done by Nov. 22nd	November/December - Done by Jan. 6th	January/February - Done by Feb. 10th	February/March - Done by March 24th	March/April - Done by April 21st	May/June	Optional/Integrate in Science
	Unit 1 Multiplicative Thinking	**Unit 2** Multi-Digit Multiplication & Early Division	**Unit 3** Fractions & Decimals	**Unit 4** Addition, Subtraction & Measurement	**Unit 5** Geometry & Measurement	**Unit 6** Multiplication & Division, Data & Fractions	**Unit 7** Reviewing & Extending Fractions, Decimals & Multi-Digit Multiplication	**Unit 8** Playground Design
Module 1	**Models for Multiplication & Division** *3.OA, 4.OA.1, 4.OA 2 4.NBT.5, 4.NBT.6* OA	**Building Multiplication Arrays** *4.NBT.1, 4.NBT.5, 4.MD.1, 4.MD.3* NBT	**Equivalent Fractions** *4.NF.1, 4.NF.2, 4.NF.3* NF	**Place Value & the Standard Algorithm** *4.NBT.1, 4.NBT.2, 4.NBT.3, 4.NBT.4* NBT	**Measuring Angles** *4.MD.5, 4.MD.6, 4.MD.7, 4.G.1, 4.G.2* MD G	**Multiplication & Division Strategies** *4.NBT.5, 4.NBT.6* NBT	**Comparing Fractions & Writing Equivalent Fractions** *4.NF.1, 4.NF.2* NF	**Introducing Playground Design** *4 MD.1, 4 MD.2, 4 MD.3, 4 MD.5, 4 MD.6, 4 MD.7, 4.G.1* MD G
Module 2	**Primes & Composites** *3.OA, 4.OA.4* OA	**Arrays & Ratio Tables** *4.OA.3, 4.OA.4, 4 NBT.1, 4.NBT.5* NBT	**Comparing, Composing & Decomposing Fractions & Mixed Numbers** *4.NF.1, 4.NF.2, 4.NF.3a–d, 4.NF.4a–b* NF	**The Standard Subtraction Algorithm** *4.NBT.1, 4.NBT.2,4.NBT.3, 4.NBT.4* NBT	**Polygons & Symmetry** *4.OA 5, 4.MD 5b, 4 MD.6, 4.G.1, 4.G.2, 4.G.3* G	**Revisiting Area & Perimeter** *4.NBT.5, 4.NBT.6, 4.MD.1, 4.MD.2, 4.MD.3* MD	**Decimals & Decimal Fractions** *4.NF.5, 4.NF.6, 4.NF.7* NF	**Making Decisions** *4 MD.1, 4 MD.2, 4 MD.3, 4.G.1* MD G
Module 3	**Multiplicative Comparisons & Equations** *3.OA, 4.OA.1, 4.OA 2, 4.OA.3, 4.OA.4* OA	**Multiplication Stories & Strategies** *4.OA.3, 4.NBT.5, 4.MD.2* NBT	**Introducing Decimals** *4.NF.5, 4.NF.6, 4.NF.7* NF	**Measurement** *4.MD.1, 4.MD.2* MD	**Area & Perimeter** *4.NBT.5, 4.MD.3, 4.G.1, 4.G.2, 4.G.3* MD	**Line Plots, Fractions & Division** *4.OA.3, 4.OA.4, 4 NBT.6, 4.NF.1, 4.MD.4* NBT	**Introducing the Standard Multiplication Algorithm** *4.OA.3, 4.NBT.5* NBT	**Using Scale Models for Our Playground & Field** *4 MD.1, 4 MD.2, 4 MD.3, 4 MD.4, 4.G.1* MD G
Module 4	**Measurement Experiences** *4.OA 2, 4.MD.1, 4.MD 2* MD	**Early Division with Remainders** *4.NBT.5, 4.NBT.6* NBT	**Fractions & Decimals** *4.NF.2, 4.NF.5, 4.NF.6, 4.NF.7* NF	**Measurement & Data Displays** *4.MD.2, 4.MD.4* MD	**Angles in Motion** *4.MD.5, 4.MD.6, 4.MD.7* G	**More Division** *4.OA.3, 4.OA.4, 4 NBT.6* NBT	**Extending the Standard Multiplication Algorithm** *4.NBT.5, 4.NBT.6* NBT	**Building Model Playgrounds** *4 MD.1, 4 MD.2, 4 MD.6, 4.G.1, 4.G.2* MD G

Primary Focus: OA - Operations & Algebraic Thinking **NBT** - Number & Operations in Base Ten **MD** - Measurement & Data **G** - Geometry **NF** - Fractions

Approved by the Amherst School Board on February 16, 2023
Pending Approval of the Mont Vernon School District

Unit Overview
Unit Title: Unit 1 Multiplicative Thinking
Unit Summary
Unit 1 begins the year with a study of multiplication and division, focusing in particular on models, strategies and multiplicative comparisons. In Module 1, students use open number lines, arrays, and ratio tables. They also solve multiplication and division story problems and participate in their first math forum. In Module 2, they use the area model to investigate factors and multiples and prime and composite numbers. They also review strategies for finding single-digit multiplication facts. Module 3 has them working with factors and products as well as multiplicative comparisons and equations. Module 4 extends the idea of multiplicative comparison into the arena of measurement, as students develop deeper understandings of the relative sizes of metric units for length, mass, and liquid volume.
Approximate Time Needed
5 Weeks - August and September
Unit Foundation
Assessed Competencies
Operations and Algebraic Thinking
Assessed Standards *(includes standards on both required and optional assessments)*
3.OA.4 Determine the unknown whole number in a multiplication or division equation relating three whole numbers ***Supports* 3.OA** Use and explain additive and multiplicative strategies to demonstrate an understanding of multiplication **3.OA.5** Multiply using the commutative property **3.OA.5** Multiply using the distributive property **3.OA.6** Solve division problems by finding an unknown factor (e.g., Solve 32 ÷ 8 by finding the number that makes 32 when multiplied by 8) **3.OA.7** Fluently multiply with products to 100 using strategies **3.OA.9** Explain patterns among basic multiplication facts by referring to properties of the operation **3.NBT.3** Multiply whole numbers from 1–9 by multiples of 10 from 10–90 using strategies based on place value and properties of operations **3.MD.7b** Find the area of a rectangle by multiplying its side lengths **3.MD.7c** Use the area model for multiplication to illustrate the distributive property (e.g., the area of a rectangle with side lengths a and b + c is equal to a × (b + c) or a × b + a × c) **4.OA.1** Make a comparison statement to match a multiplication equation; write a multiplication equation to represent a verbal statement of a multiplicative comparison **4.OA.2** Solve story problems involving a multiplicative comparison using multiplication or division **4.OA.3** Solve multi-step story problems involving only whole numbers, using addition, ,

multiplication, and division
4.OA.4 Find all factor pairs for a whole number between 1 and 100
4.OA.4 Demonstrate an understanding that a whole number is a multiple of each of its factors
4.OA.4 Determine whether a whole number between 1 and 100 is a multiple of a given 1-digit number
4.OA.4 Determine whether a whole number between 1 and 100 is prime or composite

Curriculum Framing Questions

Enduring Understandings

Students will understand how to:

- Fluently multiply and divide within 100
- Apply properties of operations as strategies to multiply and divide
- Use multiplication and division within 100 to solve story problems in situations involving equal groups, arrays, and measurement quantities
- Find the area of a rectangle

Mathematical Concepts

Much of the work in Unit 1 is a review of key multiplication and division skills and concepts from Grade 3, including the following:

- Interpreting products and quotients of whole numbers
- Using multiplication and division within 100 to solve story problems in situations involving equal groups, arrays, and measurement quantities
- Determining the unknown whole number in a multiplication or division equation
- Applying properties of operations as strategies to multiply and divide
- Fluently multiplying and dividing within 100

Even though students are required to know from memory all products of two 1-digit numbers by the end of third grade, it's probably not reasonable to expect that this will be the case for all incoming fourth graders without a few weeks to revisit the strategies and models. Also, basic fact strategies such as doubling to multiply by 2 or using a Double-Doubles strategy to multiply by 4 can be extended to situations in which students are multiplying much larger numbers by single digits. For example, to solve 4 × 125, a student familiar with the Double-Doubles strategy for single-digit multiplication might double 125 to get 250, and double it again to get 500. A student familiar with the Half-Tens strategy might solve 5 × 68 by multiplying 10 × 68 and halving the result: 680 ÷ 2 = 340.

While multiplication and division were major topics in Grade 3, the transition from additive to multiplicative thinking is a journey of several years for most learners. To help students make the transition, the authors of the Common Core Standards stipulate that fourth graders learn to interpret a multiplication equation as a comparison. Students who learned to interpret the multiplication equation 4 × 6 = 24 as 4 groups of 6 is equal to 24 in Grade 3 are now expected to interpret that equation to mean 24 is 4 times as many as 6, and 6 times as many as 4. Although this sounds simple—perhaps just a matter of linguistics—understanding what it really means when we say that something is twice as big, three times as tall, or four times as much is not easy.

In addition to being able to interpret multiplication equations as statements of multiplicative comparison, fourth graders are expected to multiply or divide to solve story problems involving multiplicative comparison. To do this, they must be able to translate comparative situations into equations with an unknown. Here are examples of three different types of story problems Grade 4 students are expected to be able to solve and write equations for:

Unknown Product
Jon has 12 matchbox cars. His brother, Andrew, has 3 times that many matchbox cars. How many matchbox cars does Andrew have? (12 × 3 = n)

Group Size Unknown
Sara bought a book and a CD. The book cost $21, which was 3 times more than the CD cost. How much did the CD cost? (21 ÷ n = 3 or 3 × n = 21)

Number of Groups Unknown
Jacob bought a pair of shoes for $20 and a jacket for $60. How many times as much did the jacket cost than the shoes? (60 ÷ 20 = n or 20 × n = 60)

Because these types of situations are so central to multiplicative reasoning, and this type of reasoning is so central to Grade 4, you will find them throughout Bridges and Number Corner all year long. Students are given numerous opportunities to write and identify equations and statements for multiplicative comparison, as well as to solve contextual problems, starting in the first session of Unit 1.

Another element new to the fourth grade year is an understanding of factors, multiples, prime, and composite numbers. Here, the array model used in Grade 3 proves its worth as students discover that they can make several different rectangles with 12 tiles, but only one rectangle with 13 tiles. Building on the work they did during the previous year, students come to recognize the dimensions of an array as factors and the area as a product. It's but a short hop to go from building and recording arrays built with 12 tiles to listing the factors of 12.

Twelve is a composite number because it has more factors than just itself and 1. I can see that the factors of 12 are 1, 2, 3, 4, 6, and 12. Thirteen is a prime number. No matter how hard you try, you can only build one rectangle with 13 tiles, so it only has two factors—1 and 13.

Unit Overview
Unit Title: Unit 2 Multi-Digit Multiplication & Early Division
Unit Summary
Students continue to build multiplicative reasoning as they work with multi-digit multiplication and early division. In Module 1, students use base ten area pieces to investigate place value patterns, as well as model and solve single- and double-digit multiplication problems. In Module 2, they move from building multiplication arrays to sketching them. They also build ratio tables and use them to make generalizations about the effects of multiplying by 10, 100, and 1,000. In the third module, students solve a variety of multiplication story problems, and work together to compile and compare the strategies they have been practicing. In Module 4, students solve division problems that require them to make sense of remainders in a variety of contexts. New Work Places provide more practice with multiplication facts, multi-digit multiplication, and division with remainders.
Approximate Time Needed
6 weeks - October and November
Unit Foundation
Assessed Competencies
Measurement and Data Number and Operations in Base Ten Operations and Algebraic Thinking
Assessed Standards *(includes standards on both required and optional assessments)*
3.OA.4 Solve for the unknown in a multiplication or division equation involving 3 whole numbers **3.OA.5** Multiply using the commutative and associative properties **3.OA.7** Fluently divide with dividends to 100 with strategies **4.MD.2** Solve story problems involving money using addition, multiplication, and division of whole numbers **4.MD.3** Apply the area formula for a rectangle to solve a problem **4.OA.1** Make a comparison statement to match a multiplication equation **4.OA.2** Solve story problems involving a multiplicative comparison using multiplication or division **4.OA.3** Solve multi-step story problems involving only whole numbers, using multiplication **4.OA.4** Demonstrate an understanding that a whole number is a multiple of each of its factors **4.OA.4** Determine whether a whole number between 1 and 100 is prime or composite **4.NBT.1** Demonstrate an understanding that in a multi-digit number, each digit represents ten times what it represents in the place to its right **4.NBT.5** Multiply 2- and 3-digit whole numbers by a 1-digit whole number using strategies based on place value and the properties of operations **4.NBT.5** Multiply two 2-digit numbers using strategies based on place value and the properties of operations

4.NBT.5 Use an equation or a rectangular array to explain strategies for multiplying with multi-digit numbers
4.NBT.6 Divide a 2- or 3-digit number by a 1-digit number, using strategies based on place value, the properties of operations, or the relationship between multiplication and division
4.NBT.6 Use a rectangular array to explain strategies for dividing a multidigit number by a 1-digit number
4.MD.2 Solve story problems involving money, using multiplication
4.MD.3 Apply the area formula for a rectangle to solve a problem.

Curriculum Framing Questions

Enduring Understandings

Students will understand how to:

- Multiply by 10, 100, and 1,000
- Multiply 2-digit numbers
- Represent multiplication with arrays and ratio tables
- Divide with and without remainders
- Solve multiplication and division story problems

Mathematical Concepts

In the Principles and Standards for School Mathematics, 2000, the National Council of Teachers of Mathematics points out that while additive reasoning develops in the primary grades, multiplicative reasoning should become a central focus in grades 3–5. This is strongly supported in the design and intent of the Common Core State Standards for third, fourth, and fifth grade. Most upper elementary grade teachers will tell you, however, that the development of such reasoning is a long journey; it is no small task to move intermediate students from additive to multiplicative thinking. Even those students who are fluent with most of their basic multiplication facts may not fully understand the operation itself, as evidenced in their difficulty posing and solving story problems to match such expressions as 5 × 8 or 25 ÷ 5.

When students move beyond the basic facts into the realm of multi-digit multiplication and division, the difficulties tend to multiply. A common misconception among fourth graders is that to multiply 4 × 27, “you go 4 × 7 and 4 × 2.” Depending on how they handle the fact that 4 × 7 = 28, their answers may range all the way from 88 to 828. What’s missing is the fundamental insight that when you multiply 4 × 27, you are actually multiplying 4 × 7 and 4 × 20. Once students understand this clearly, they can use any number of efficient algorithms or multi-step procedures to produce the correct answer. Until then, they are more likely to use some form of skip-counting or repeated addition instead of attempting to multiply, because they can rely on these additive methods to produce the right answer.

What do our students need to develop multiplicative reasoning? Here are some of the most important prerequisites:

- Deep understanding of the operations of multiplication and division and how they relate to one another, as well as proficiency with basic multiplication and division facts.

- Experience using estimation to decide whether a solution is reasonable.
- Solid place value understandings. (To comprehend that 4 × 270 is actually 4 × 200 plus 4 × 70, you have to know that 270 is 2 hundreds, 7 tens, and 0 ones. Furthermore, to apply one's knowledge of 3 × 5 to a larger problem such as 30 × 50, you have to understand that 30 and 50 are 10 times the size of 3 and 5 and that as a result, their product is 100 times the size of the product of 3 × 5.)
- Experience with geometric models, such as the rectangular array (area model).
- Many opportunities to solve problems that involve multi-digit multiplication and division, as well as opportunities to generate and share a variety of strategies for doing so.
- An understanding of and ability to apply properties of operations. The associative property, for example, plays an important role in helping students multiply by multiples of 10. To solve 8 × 30, for example, students come to understand that this combination can be expressed as 8 × (3 × 10). Using the associative property, 8 × (3 × 10) can be thought of as (8 × 3) × 10, or 24 × 10, which many fourth graders can solve mentally. The distributive property also plays an important role in both understanding and computing single- and double-digit multiplication combinations. For example, 4 × 23 is equal to (4 × 20) + (4 × 3), while 18 × 26 is equal to (10 × 20) + (10 × 6) + (8 × 20) + (8 × 6). By virtue of the distributive property, these and similar combinations can be broken down into pieces that require basic multiplication facts and multiplication of single digits by multiples of 10. These pieces or partial products are made visible when students model the combinations with base ten area pieces or sketches of arrays.

Unit Overview
Unit Title: Unit 3 Fractions & Decimals
Unit Summary
In this unit, students work with a variety of tools, including folded paper strips, egg cartons, geoboards, number lines, and base ten pieces, to model, read, write, compare, order, compose, and decompose fractions and decimals. Their investigations and explorations range from the purely mathematical—the relationship between fifths and decimals, for example—to applied, as they determine a strategy to figure out how many candy bars the fourth grade teacher will have to buy if she plans to give an undefined number of students three-quarters of a bar each.
Approximate Time Needed
6 Weeks - November and December
Unit Foundation
Assessed Competencies
Number and Operations Fractions
Assessed Standards *(includes standards on both required and optional assessments)*
4.NF.1 Use a visual model to explain why a fraction a/b is equivalent to a fraction (n × a)/ (n × b) **4.NF.1** Recognize equivalent fractions **4.NF.1** Generate a fraction equivalent to fraction a/b by multiplying the numerator (a) and denominator (b) by the same number **4.NF.2** Compare two fractions with different numerators and different denominators using the symbols >, =, and <, and explain why one fraction must be greater than or less than another fraction **4.NF.2** Demonstrate an understanding that a comparison of fractions is valid only when they refer to the same whole **4.NF.3** Write an equation showing a fraction a/b as the sum of a number of the unit fraction 1/b **4.NF.3a** Explain addition of fractions as joining parts referring to the same whole **4.NF.3b** Express a fraction as the sum of other fractions with the same denominator in more than one way **4.NF.3c** Add and subtract fractions and mixed numbers with like denominators **4.NF.3d** Solve story problems involving addition and subtraction of fractions and mixed numbers referring to the same whole and with like denominators **4.NF.4c** Solve story problems that involve multiplying a fraction by a whole number **4.NF.5** Express a fraction with denominator 10 as an equivalent fraction with denominator 100 **4.NF.5** Add a fraction with denominator 10 to a fraction with denominator 100 by rewriting the first fraction as an equivalent fraction with denominator 100 ***Supports* 4.NF** Represent decimal numbers with digits to the hundredths place using place value models **4.NF.6** Write fractions with denominator 10 or 100 in decimal notation

4.NF.7 Compare two decimal numbers with digits to the hundredths place using the symbols >, =, and < to record the comparison

Curriculum Framing Questions

Enduring Understandings

Students will understand how to:

- Compare fractions with like and unlike denominators
  Locate fractions on a number line
- Add and subtract fractions with like and unlike denominators
- Identify equivalent fractions and decimals
- Compare decimal numbers

Mathematical Concepts

Unit 3 takes an applied and visual approach to fractions and decimals. Over the course of 20 sessions, students make extensive use of concrete manipulatives and visual models to explore unit fractions, common fractions, mixed numbers, improper fractions, equivalent fractions, and decimals. They come to understand that two fractions with unlike numerators and denominators, such as 4/6 and 8/12, can be equal, and they develop methods for generating and recognizing equivalent fractions. Students also investigate the relationship between unit fractions, such as 1/3, 1/4, and 1/12 and common fractions, such as 2/3, 3/4, and 6/12. They come to understand that common fractions are composed of unit fractions, which makes for an easy transition to multiplying fractions by whole numbers. (When one understands that 3/4 = 1/4 + 1/4 + 1/4, it's not hard to see that 3/4 is also equal to 3 x 1/4.)

Students' work with fractions extends into decimals, where the use of base ten pieces—with the mat now assigned a value of 1—makes the equivalence of tenths and hundredths readily apparent.

Understanding the relationship between tenths and hundredths makes it possible for fourth graders to add such fractions by rewriting the tenths as hundredths and then combining them, which in turn lays the foundations for adding and subtracting fractions with unlike denominators in fifth grade.

The specific concepts addressed in this unit include the following:

- Equivalent fractions can be created by dividing a model into various parts, or multiplying both the numerator and denominator by the same number.
- Fractions with unlike numerators can be compared by finding common denominators, although at this grade level, much of the work focuses on visual fraction models rather than algorithms.
- Comparisons of fractions or decimals are valid only when the two fractions or the two decimals refer to the same whole. Half a mini pizza is probably not greater than one-fourth of a giant pizza. Likewise, 5/10 of an apple is probably less than 25/100 of a watermelon.
- A fraction with a numerator of 1, such as 1/6, is called a unit fraction. A common fraction, or a fraction with a numerator greater than 1, such as 4/6, is the sum of unit fractions with the same denominator: 1/6 + 1/6 + 1/6 + 1/6, or 4 x 1/6.
- Fractions can be decomposed into a sum of fractions with the same denominator in more than one way. For example, 4/6 also equals 2/6 + 2/6 and 3/6 + 1/6.

- Multiplying a fraction by a whole number involves repeated addition. For example 3 x 1/6 = 1/6 + 1/6 + 1/6, or 3/6. By extension, 4 x 2/3 = 2/3 + 2/3 + 2/3 + 2/3, or 8/3, which can also be expressed as 2 2/3.
- Fractions with denominator 10 can be expressed as equivalent fractions with denominator 100. This technique can be used to add tenths and hundreds: 2/10 + 34/100 = 20/100 + 34/100 = 54/100.
- Fractions with denominator 10 or 100 can be written in

Unit Overview
Unit Title: Unit 4 Addition, Subtraction & Measurement
Unit Summary
In this unit, students study addition, subtraction, and measurement concepts. As part of their work, students investigate and use the standard addition and subtraction algorithms. They compare the use of algorithms to other methods and make generalizations about which work best for certain problems. In Module 3, students explore length and distance, liquid volume, time, mass, and weight. They investigate the relationships between common measures, and they solve problems that require them to convert measurements to smaller units within the same system of measure.
Approximate Time Needed
6 weeks - January / February
Unit Foundation
Assessed Competencies
Measurement and Data Number and Operations in Base Ten Operations and Algebraic Thinking
Assessed Standards *(includes standards on both required and optional assessments)*
4.OA Find the value of an unknown in an equation ***Supports*** **4.NBT** Estimate sums or differences to approximate solutions to problems ***Supports*** **4.NBT** Fluently add and subtract multi-digit whole numbers, using an algorithm or another strategy **4.NBT.1** Demonstrate an understanding that in a multi-digit number, each digit represents ten times what it represents in the place to its right **4.NBT.2** Read and write multi-digit whole numbers represented with base ten numerals, number names, and expanded form **4.NBT.2** Compare pairs of multi-digit numbers; use , =, and < symbols to record comparisons **4.NBT.3** Round multi-digit whole numbers to the nearest ten, hundred, thousand, ten thousand, hundred thousand, million **4.NBT.4** Use the standard algorithm with fluency to add and subtract multi-digit whole numbers **4.MD.1** Identify the relative sizes of centimeters, meters, and kilometers; ounces and pounds; milliliters and liters; and seconds, minutes, and hours **4.MD.1** Record equivalent measurements in different units from the same system of measurement using a 2-column table **4.MD.1** Express a measurement in a larger unit in terms of a smaller unit within the same system of measurement (e.g., convert from km to m, l to ml, kg to g, lbs to oz) **4.MD.2** Solve story problems involving intervals of time, distance, liquid volume, and mass using addition, subtraction, multiplication and division of whole numbers

4.MD.2 Solve story problems that involve expressing measurements given in a larger unit in terms of a smaller unit within the same system of measurement

Curriculum Framing Questions

Enduring Understandings

Students will understand how to:

- Compare multi-digit numbers and identify the value of the digits in such numbers
- Use the standard algorithms for addition and subtraction
- Measure length, distance, liquid volume, time, mass, and weight
- Convert measurements from one unit to another within the same system (e.g., centimeters to meters but not centimeters to inches)

Mathematical Concepts

In this unit, a strand of numeric exploration and investigation that was launched in Grade 1 and developed throughout Grades 2 and 3 comes to a logical conclusion as students are introduced to the standard, or traditional, algorithms for multi-digit addition and subtraction. An algorithm, by definition, is a series of steps that can be applied to all problems of a certain type. Thus, the addition and subtraction algorithms work for any multi-digit combinations. The algorithms are compact and nontransparent, however, which can obscure the values of the digits in such computations. For many, the steps become a series of single-digit calculations (e.g., 475 + 567—7 + 5 is 12, carry the 1; 6 + 7 is 13, and 1 more makes 14, carry the 1; 4 + 5 and 1 more is 10).

Moreover, the standard algorithms are not always the most effective and efficient strategies. If you consider a combination such as 1,000 – 999, this becomes immediately apparent. It's true that students could borrow across three zeros to solve the problem, but we would far prefer that they had enough number sense to recognize the difference as 1, and move on. Or, consider the following addition problem: 473 + 998. This combination is easily and quickly solved with the standard algorithm, but even more efficiently solved using a compensation strategy in which 2 is taken from 473 and given to 998 to yield a much simpler combination: 471 + 1,000.

The beauty of the standard algorithms is that they can always be counted upon to work. When there is no easier way to add or subtract a pair of multi-digit numbers, and an exact solution is required, there they are. On the other hand, estimation and mental math strategies are often the order of the day, especially given the prevalence of calculators and computers in the work place and daily life.

Our goal for students, then, is that they retain many of the strategies and methods they have learned and invented over the previous three years rather than blindly discarding all of these in favor of carrying and borrowing. One of the overarching themes of Unit 4 is to encourage students to think critically about when best to deploy the several methods they have for adding and subtracting multi-digit numbers, and make the decision based on the numbers themselves.

The specific concepts addressed in this unit include the following:

- Numbers can be written in a variety of ways, including base ten numerals, number names, and in expanded form. For example, 15,675 can also be written as fifteen thousand, six hundred seventy-five or 10,000 + 5,000 + 600 + 70 + 5.

- Multi-digit numbers can be rounded finely or more broadly, depending on the degree of accuracy required. For example, 46,783 can be rounded to the nearest ten (46,780) all the way to the nearest ten thousand (50,000). If you know there are 60,000 seats in the stadium with 46,783 of them filled, you might round to the nearest ten thousand to make a quick estimate of the number still available (roughly 10,000 because 60,000 – 50,000 = 10,000). If you need an exact count of the remaining seats, you probably won't round 46,783 at all.
- Rounding and computational estimation go hand in hand.
- There are standard algorithms for multi-digit addition and subtraction that work in a consistent and reliable manner for all combinations.
- There are units of measure other than those studied in previous grades for dealing with length and distance, weight and mass, liquid volume, and time. Units newly introduced at this grade level and featured in Unit 4 include kilometers, pounds and ounces, milliliters, and seconds.
- Within one system of measurement, larger units can be converted to smaller units and vice versa, and these conversions can be displayed in two-column tables, enabling students to solve problems and make generalizations. For example, if we're planning to serve each of our guests 7 ounces of grapes, and we have purchased a 4-pound bag of grapes, we might use a conversion table to find out how many guests we can serve.

Unit Overview
Unit Title: Unit 5 Geometry & Measurement
Unit Summary
In this unit, students are formally introduced to a host of new geometric concepts, including angles and angle measure, parallel and perpendicular lines, and reflective symmetry. In Module 1, students focus on comparing, analyzing, classifying, and measuring angles. In Module 2, students investigate parallel and perpendicular lines as well as line symmetry and use these terms and concepts to sort and classify a wide variety of polygons. During Module 3, students measure the area and perimeter of rectangles, making generalizations that support the introduction of the formulas for both. Module 4 features a return to angle measure, with an emphasis on the fact that angles involve turns or rotations around a fixed point and are additive in nature.
Approximate Time Needed
5 weeks - February / March
Unit Foundation
Assessed Competencies
Geometry Measurement and Data
Assessed Standards *(includes standards on both required and optional assessments)*
4.MD.3 Apply the area and perimeter formulas for a rectangle to solve a problem **4.MD.6** Use a protractor to measure angles in whole degrees, and sketch an angle of a specified measure **4.MD.7** Decompose an angle into non-overlapping parts **4.MD.7** Express the measure of an angle as the sum of the angle measures of the non-overlapping parts into which it has been decomposed **4.MD.7** Demonstrate an understanding that angle measure is additive **4.MD.7** Solve problems involving finding the unknown angle in a diagram, using addition and subtraction **4.G.1** Draw lines, line segments, angles (right, acute, obtuse), and perpendicular and parallel lines **4.G.1** Identify points, lines, line segments, rays, angles (right, acute, obtuse), parallel lines, and perpendicular lines in 2-D figures **4.G.2** Classify 2-D figures based on the presence or absence of parallel lines, perpendicular lines, or angles of a specified size **4.G.2** Identify right triangles **4.G.3** Identify and draw lines of symmetry, and identify figures with line symmetry

Curriculum Framing Questions

Enduring Understandings

Students will understand how to:

- Measure angles and determine angle measurements based upon given information
- Sort and classify shapes based upon the number and kinds of sides and angles they have
- Calculate the area and perimeter of rectangles

Mathematical Concepts

In 1957, two Dutch educators, Pierre van Hiele and Dina van Hiele-Geldof, puzzled by the difficulty their students had with geometry, published what has become a very influential theory in the design of geometry curriculum. According to the van Hiele theory, students pass through certain levels as they become more sophisticated in their geometric thinking, and these levels must unfold in order, propelled by students' own explorations and discoveries.

Progress through the levels of geometric understanding is more dependent on educational experiences than on age or maturity. It's interesting to note that while traditional high school geometry textbooks are generally pitched at about level 3, many high school students enter functioning at level 0 or, at best, level 1. To arrive at level 3, students must move through all the prior levels. To move through a level means that a student has experienced geometric thinking appropriate for that level and has created in his or her own mind the types of objects or relationships that are the focus of thought at the next level.

The van Hieles believe that instruction must begin at a student's current level and provide many years of visual and exploratory work before moving into formal deductions. Experience with shapes, terms, and geometry-related concepts is the greatest single factor influencing advancement through the levels. So, the question for us as teachers of upper elementary students is twofold: at what level are our students currently working, and what can we do to support their development?

Most third, fourth, and fifth graders think and work largely at level 1, although we can begin to nudge our fourth and fifth graders in the direction of level 2 thinking. In fact, deepening students' level 1 thinking as they move toward level 2 might be considered the main focus of geometry instruction in the upper elementary grades. Activities that encourage students to explore, talk about, and interact with content at the next level, while increasing their experiences at the current level, have the best chance of advancing their thinking. Listed here are some of the features of effective instruction at both level 1 and level 2.

Features of Level 1 Activities

- Begin to focus more on properties of figures than on simple identification. Define, measure, observe, and change properties with the use of models.
- Use problem-solving contexts in which properties of shapes are important components.
- Continue to use models, as with level 0, but include models that permit the exploration of various properties of figures.
- Classify figures based on properties of shapes as well as by names of shapes. For example, investigate properties of triangles, such as side length and angle measure, that make some alike and others different.

Features of Level 2 Activities

- Use models and drawings as tools to think with, and begin to look for generalizations and nonexamples.
- Make property lists, and discuss which properties are necessary and which are sufficient conditions for a specific shape or concept.
- Include language of an informal deductive nature: all, some, none, if-then, what if, etc.
- Investigate the converse of certain relationships for validity. For example, the converse of "If it is a square, it must have four right angles" is "If it has four right angles, it must be a square."

If most of our kindergarten students come to school as level 0 thinkers, and we are still working on developing level 1 thinking in fourth grade, we may well ask ourselves why the pace is so slow. One part of the answer is that level 1 thinking cuts across a very broad swath of concepts, skills, and terms. Although most students will enter fourth grade knowing that shapes can be combined and partitioned in a variety of ways, that there are many different kinds of quadrilaterals, and that shapes can be classified by the number of sides and vertices they possess, fourth graders are still quite limited in their ability to describe, sort and classify shapes by their attributes.

The terms and concepts introduced at this grade level are designed to provide students with a number of new and important ways in which to describe, as well as operate with and on, shapes. These include:

- basic elements: points, rays, line segments, lines, and degrees of rotation
- angle types (right, straight, obtuse, and acute), as well as angles of specified measure
- parallel and perpendicular lines
- reflective or line symmetry

The addition of these terms and concepts to students' repertoire makes it possible to operate at level 1 and move toward level 2 in new and powerful ways. For the first time, students have the language needed to describe and classify different types of triangles by their side lengths and their angle measures. Now, too, students have the tools needed to classify quadrilaterals on the basis of parallel and perpendicular sides, distinguishing between two entire classes—trapezoids and parallelograms—based on the fact that trapezoids have exactly one pair of parallel sides while parallelograms have two pairs of parallel sides. Equipped with the ability to measure, sketch, and think about angles, students are able to start considering whether or not it would be possible for a triangle to have more than one obtuse angle, or for a trapezoid to have more than two right angles, or for a parallelogram to have both acute and obtuse angles. These are important and intriguing questions students can now access on their path toward becoming level 2 thinkers over the next few years.

Unit Overview
Unit Title: Unit 6 Multiplication & Division, Data & Fractions
Unit Summary
The instruction in Unit 6 is designed to help students understand, in ways that are both deep and robust, the many connections between multiplication and division. Each module in the unit is rich with opportunities to model and solve problems, share and explain strategies, play games, and apply computational skills and concepts in a variety of contexts.
Approximate Time Needed
5 Week - March and April
Unit Foundation
Assessed Competencies
Measurement and Data Number and Operations in Base Ten Number and Operations Fractions Operations and Algebraic Thinking
Assessed Standards *(includes standards on both required and optional assessments)*
4.OA.3 Solve multi-step story problems involving only whole numbers, using addition, subtraction, and multiplication **4.OA.3** Solve story problems involving division with remainders **4.OA.4** Find all factor pairs for a whole number between 1 and 100 **4.OA.4** Demonstrate an understanding that a whole number is a multiple of each of its factors, and determine whether a whole number between 1 and 100 is a multiple of a given 1-digit number **4.NBT.4** Use the standard algorithm with fluency to add and subtract multi-digit whole numbers **4.NBT.5** Multiply a 1 or 2-digit whole number by a 1 or 2-digit whole number using strategies based on place value and the properties of operations **4.NBT.5** Multiply 2- and 3-digit whole numbers by 1-digit whole numbers using strategies based on place value and the properties of operations **4.NBT.5** Multiply two 2-digit numbers using strategies based on place value and the properties of operations **4.NBT.5** Use equations and rectangular arrays to explain strategies for multiplying with multi-digit numbers **4.NBT.6** Divide a 2-, 3-, or 4-digit number by a 1-digit number, with or without a remainder, using strategies based on place value, the properties of operations, or the relationship between multiplication and division **4.NBT.6** Use equations and rectangular arrays to explain strategies for dividing a multi-digit number by a 1-digit number

4.NF.1 Recognize and generate equivalent fractions; Use a visual model to explain why a fraction a/b is equivalent to a fraction (n × a)/(n × b)
4.NF.3c Add mixed numbers and fractions with like denominators
4.MD.3 Apply the area or perimeter formulas for a rectangle to solve a problem

Curriculum Framing Questions

Enduring Understandings

Students will understand how to:

- Multiply multi-digit numbers
- Divide a multi-digit number by a 1-digit number
- Solve problems about the area and perimeter of rectangles
- Review equivalent fractions, and add and subtract fractions and mixed numbers

Math Concepts

Typically, students entering fourth grade understand that division means sharing. Even relatively large combinations tend to elicit a sharing strategy in which students deal out counters or tally marks in a one-for-you, one-for-me manner. In the second session of Module 1, however, students are encouraged to move beyond sharing by ones to working in chunks of tens and ones, skip-counting, and using familiar multiplication facts instead.

Much of the work that follows Session 2 is predicated on the relationship between multiplication and division. Just as younger students often add to subtract, building from the subtrahend to the minuend to determine the difference between the two, so do third, fourth, and fifth graders with good number sense tend to lean heavily on multiplication to help solve division problems. Many of the sessions throughout the unit encourage students to build up to the dividend using groups of the divisor. For example, in solving 252 ÷ 7, students employ arrays and ratio tables to find out how many groups of 7 it takes to make 252, using familiar combinations such as 10 × 7, 20 × 7, and the like.

In this unit, students also continue to interpret remainders based on the contexts in which they occur. When sharing money, students learn that the remainder can be partitioned into decimals. For example, $81.00 shared by 5 people results in $16.20 for each person. When sharing continuous items, such as cookies or brownies, students learn that the leftovers can be split into fractional parts. When division involves discrete objects, such as balloons or fish, they learn that the answer is often rounded up or down. For example, students will generally opt to leave the leftover balloon whole, and round the answer down to 16 when the situation involves dividing 81 balloons evenly to decorate 5 tables. On the other hand, most are able to see the wisdom of rounding up when each aquarium only accommodates 5 fish and there are 81 fish, reasoning that it is better to have 17 aquariums than to leave 1 fish high and dry.

Unit Overview
Unit Title: Unit 7 Reviewing & Extending Fractions, Decimals & Multi-Digit Multiplication
Unit Summary
Unit 7 reviews and extends skills and concepts in several areas that are foundational to the major work of fourth grade. In the first two modules, students refine their skills at recognizing and generating equivalent fractions, as well as comparing fractions with unlike denominators using visual models, benchmarks such as one half, and rewriting to share common denominators. In the latter half of the unit, students review some of the strategies they have developed for multi-digit multiplication over the year and explore the standard multiplication algorithm.
Approximate Time Needed
5 Weeks - May and June
Unit Foundation
Assessed Competencies
Measurement and Data Number and Operations in Base Ten Number and Operations Fractions Operations and Algebraic Thinking
Assessed Standards *(includes standards on both required and optional assessments)*
4.OA.3 Solve multi-step story problems involving only whole numbers, using addition, subtraction, multiplication, and division **4.OA.3** Select and write equations with a letter standing for an unknown quantity to represent a multi-step story problem **4.OA.3** Assess the reasonableness of answers to multi-step story problems using mental computation, rounding, and other estimation strategies **4.NBT.5** Multiply a 2- or 3-digit whole number by a 1-digit whole number using strategies based on place value and the properties of operations **4.NBT.5** Multiply two 2-digit numbers using strategies based on place value and the properties of operations **4.NBT.5** Use equations, rectangular arrays, or an area model to explain strategies for multiplying with multi-digit numbers **4.NF.1** Use a visual model to explain why a fraction a/b is equivalent to a fraction (n × a)/(n × b) **4.NF.1** Recognize equivalent fractions **4.NF.1** Generate a fraction equivalent to fraction a/b by multiplying the numerator (a) and denominator (b) by the same number **4.NF.2** Compare two fractions with different numerators and different denominators **4.NF.2** Use the symbols >, =, and < to record comparisons of two fractions with different numerators and different denominators

4.NF.2 Explain why one fraction must be greater than or less than another fraction
4.NF.5 Express a fraction with denominator 10 as an equivalent fraction with denominator 100
4.NF.5 Add a fraction with denominator 10 to a fraction with denominator 100 by rewriting the first fraction as an equivalent fraction with denominator 100
4.NF.6 Write fractions with denominator 10 or 100 in decimal notation 4.NF.7 Compare two decimal numbers with digits to the hundredths place
4.NF.7 Use the symbols >, =, and < to record comparisons of two decimal numbers with digits to the hundredths place
4.NF.7 Explain why one decimal number must be greater than or less than another decimal number
4.MD.3 Apply the area formula for a rectangle to solve a problem

Curriculum Framing Questions

Enduring Understandings

Students will understand how to:

- Compare fractions
- Recognize and generate equivalent fractions
- Represent and compare decimal numbers
- Multiply two-digit numbers with the standard algorithm and other methods

Mathematical Concepts

Unit 7 reviews some of the skills and concepts central to fourth grade, including those most relevant to comparing fractions with unlike denominators, solving multi-digit multiplication combinations, and working multi-step story problems. This unit also extends some of these skills to the next level in anticipation of the next school year.

The first half of the unit reviews identifying and generating equivalent fractions, and comparing fractions with unlike numerators and denominators. While students have used visual models and benchmarks such as 1/2 to compare fractions in earlier units and Number Corner workouts, challenging pairs such as 3/5 and 2/3 or 3/8 and 5/12 elicit the strategy of finding common denominators, a skill that is critical to students' success in learning to add and subtract fractions with unlike denominators in fifth grade. Adding tenths and hundredths in Module 2 reinforces the need to rewrite fractions so they share the same denominator in order to compare or combine them.

The second half of the unit provides a review of multi-digit multiplication, with a fairly tight focus on four-part and two-part arrays and partial products. These models and strategies are then use as bridges into the standard multiplication algorithm. While students will not be expected to master the standard algorithm until next year, fourth graders are invited to consider it as another option. They are also asked to evaluate a variety of methods for multi-digit multiplication, including the standard algorithm, in terms of when each method might be particularly useful.

Recognizing & Generating Equivalent Fractions
Students use bar models throughout Module 1 to investigate equivalent fractions. Initially, they line up the bars to determine whether or not two fractions are equivalent.

In Session 5, the bar model serves to introduce the fact that a fraction a/b is equivalent to a fraction (n × a)/(n × b). Later in the same session, student pairs make posters of equivalent fractions, applying this principle to generate at least three fractions equivalent to the one they were assigned to start with.

Comparing Fractions with Unlike Denominators
Although students have used visual and benchmarking strategies to compare fractions throughout the year, the work in this unit drives toward rewriting fractions so they share a common denominator by presenting pairs of fractions that are close together with denominators that are not factors or multiples of one another. Take, for example, 3/8 and 5/12. While it's certainly possible to model both fractions on bars, it's challenging to compare them visually with any degree of precision. By making use of what they've learned about equivalent fractions, however, students are able to determine that 5/12 is, in fact, greater than 3/8, but only by a very tiny amount.

Adding Tenths & Hundredths
Work with decimal fractions in Module 2 reinforces the fact that you can't compare, combine, or subtract two fractions unless they share the same denominator.

Multi-Digit Multiplication
The Common Core Standards set the following expectations for fourth graders with regard to multi-digit multiplication:

Multiply a whole number of up to four digits by a 1-digit whole number, and multiply two 2-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, or area models.

While these expectations don't preclude the standard multiplication algorithm, the authors have wisely left the mastery of this algorithm as a task to be accomplished in fifth grade, allowing fourth graders the time and space they need to develop deep understandings of the operations, as well as a variety of strategies, many of which are particularly efficient for solving combinations that involve specific types of numbers. The Over strategy, for example, takes advantage of the fact that one of the multipliers is very close to a multiple of 10 or 100, is more efficient than the standard algorithm for combinations like 98 × 7 or 299 × 5. The same could be said of such strategies as Doubling & Halving, and Five Is Half of Ten.

As far as strategies that can be used to solve any multiplication combination in the range expected of fourth graders (2- and 3-digit by 1-digit and 2-digit by 2-digit), regardless of the numbers involved, students have by this time investigated and reached some level of fluency with the partial products that emerge when combinations are modeled on an open array. In Module 3 of this unit, students also learn to write out the partial products with and without the visual support of the array. This, in turn, invites the introduction of the standard algorithm, which also involves partial products, albeit in a much more compressed and less transparent way. When this occurs in Module 3, Session 2, and again in Module 4, Session 2, students use partial products to solve a multiplication problem, and then use their current understandings of partial products to help interpret the standard algorithm.

Students are also asked to compare and contrast the partial products strategy and the standard algorithm. In doing so, many allude to the fact that the partial products strategy is more transparent

than the algorithm.

Unit Overview
Unit Title: Unit 8 Playground Design (optional unit)
Unit Summary
In this final unit of the year, students design and build scaled model playgrounds that incorporate simple machines. They investigate simple machines in playground equipment and conduct research to help them make decisions about safety issues. They then survey the school community to find the most important playground items to use in their designs and use graphs to visualize the data they collect. Students use the information to create a scaled map of their designs, from which they build a scaled 3-D model. They also discuss the needs of plants and plant a model grass field in preparation for finding the scaled measurements and cost for planting a much larger field. They work with mass, liquid volume, area and perimeter during this portion of the unit. An optional Playground Model Showcase gives students an opportunity to prepare their work for sharing with friends and family members or students from other classrooms.
Approximate Time Needed
Optional Unit - Can integrate with Science
Unit Foundation
Assessed Competencies
Geometry Measurement and Data Number and Operations in Base Ten Number and Operations Fractions Operations and Algebraic Thinking
Assessed Standards *(all assessments in this unit are optional)*
***Supports* 4.MD** Display and analyze data in bar graphs; determine the range and mode of a set of data comprising whole numbers and describe what they indicate about the data **4.MD.1** Identify the relative sizes of units of measurement within the same system of measurement **4.MD.1** Express a measurement in a larger unit in terms of a smaller unit within the same system of measurement **4.MD.2** Solve story problems involving money using addition and multiplication of whole numbers and decimals **4.MD.2** Solve story problems involving distance using addition and multiplication of whole numbers, simple fractions, and decimals **4.MD.2** Use diagrams to represent measurement quantities **4.MD.3** Apply the perimeter and area formulas for a rectangle to solve problems **4.MD.5** Measure angles by identifying the fraction of the circular arc between the points where the two rays forming the angle intersect the circle whose center is at the endpoints of those rays **4.MD.6** Use a protractor to measure angles in whole degrees

4.G.1 Draw right, acute, obtuse angles, parallel lines and perpendicular lines
4.G.1 Draw line segments and angles
4.G.3 Draw lines of symmetry

Curriculum Framing Questions

Enduring Understandings

Students will:

- Learn about simple machines such as pendulums, levers, inclined planes, and wheels
- Research and evaluate considerations for playground features and safety through reading, online research, and student surveys
- Design and build model playgrounds to meet specific criteria and constraints
- Work with scaled drawings and dimensions
- Research project costs to determine an appropriate budget proposal
- Practice math skills developed earlier this year, especially those involving measurement, money, and geometry

Mathematical Concepts

Students apply many measurement strategies they've learned throughout the year when they design and build their playground models. Both the bird's-eye-view scaled map and 3-D models require students to use different scale factors. They apply multiplication and division strategies to map a large outdoor space onto a small piece of paper, and then from the paper to a larger 3-D scaled model. Students also investigate how different simple machines work and apply this understanding when building their playground models. Angle measurements and symmetry come into play as they investigate slides, swings, and merry-go-rounds.

Students discuss the needs of plants and then grow a scaled model of a grassy field. They calculate the dimensions using fractions, find the area and perimeter, the mass of soil needed, and the water it will consume. They then use their model to determine the size and costs of a much larger grassy field. Students keep a data log of the amount of water they use and the height of their grass. They create class line plots to determine whether the amount of water used affected the height of the grass.

Before designing their playground, students collect data, first as a class and then from the whole school. They organize, display, and analyze the data using graphs made with either spreadsheet software or paper and pencil methods. Students make decisions about the most important playground items to include in their designs based on their analysis. They also plan and monitor their own time during the building sessions.

Strategies
In this unit, students apply the different measurement strategies they've learned throughout the year. They use rulers, number lines, colored tiles, and simple algorithms to review and work with fractions. Students make diagrams, draw sketches, and use 2-column tables to determine the scale factors for the different measurements quantities. The sessions in this unit include a good deal of informal discovery time when students can experiment with different building materials, simple machines, and playground designs. These experiences will prompt students to generate and test

conjectures about the merits, drawbacks, and interplay of materials and design features as they build their models.

Algebra Connections in This Unit

Daily Practice pages sessions allow students to work with many algebraic concepts, including:

- Solving story problems involving a multiplicative comparison using multiplication or division.
- Solving multi-step story problems involving only whole numbers, using addition, subtraction, multiplication, division
- Solving multi-step story problems involving division with remainders.
- Assessing the reasonableness of answers to multi-step story problems using mental computation.
- Assessing the reasonableness of answers to multi-step story problems using rounding and other estimation strategies.
- Determining whether a whole number between 1 and 100 is a multiple of a given 1-digit number.
- Generating a number pattern that follows a given rule.

In addition, students conduct experiments in which several numerical aspects are held constant while others vary. They also calculate the mean (average) of sample data. These activities further help students develop algebraic thinking.

Grade 4 Scope & Sequence

Number Corner Second Edition

	August / September	October	November	December	January	February	March	April	May / June
Calendar Grid	**Ancient Egyptian Symbols** *4.OA 5, 4.NBT.1, 4.NBT.2* NBT	**Fractions & Decimals** *4.NF.1, 4.NF.2* NF	**Night & Day** *4.OA 5, 4.MD.1, 4.MD.2* MD	**Pentominoes** *4.MD.3, 4.G.1, 4.G.3* G	**Similar Figures** *4.OA.1, 4.OA.5, 4.MD.3* OA	**Constructing Angles & Polygons** *4.MD.7, 4.G.1, 4.G.2* G	**The Function Machine** *4.OA 5* OA	**Perimeter Puzzles** *4.MD.3, 4.G.2, 4.G.3* MD	**Quilt Block Symmetry** *4.G.3* G
Calendar Collector	**Six Inches a Day** *4.NF.1, 4.NF.3, 4.NF.4, 4.MD.1, 4.MD.2* NF	**Race to the Millions** *4.NBT.2* NBT	**A Cup a Day** *4.NF.1, 4.NF.2, 4.NF.3, 4.MD.1, 4.MD.2* NF	**Up & Down to Two Thousand** *4.NBT.2, 4.NBT.4* MD	**Three Quarters a Day** *4.NF3a–d, 4 NF.4a–b, 4.MD.2* NF	**Spin, Add & Measure** *4.MD.5, 4.MD.6, 4.MD.7* MD	**The Great Fraction Race** *4.NF.1–4.NF.3d* NF	**A Decimeter a Day** *4.OA.1, 4.OA.2, 4.MD.1, 4.MD.2* MD	**Water Evaporation Experiment** *4.MD.1, 4.MD.2* MD
Computational Fluency	**The Number Line & Splat!** *4.OA.4, 4.NBT.1, 4.NBT.5* NBT	**The Number Line & Put It on the Line, Part 1** *4.OA.3, 4.OA.4, 4.NBT.1 – 4.NBT.3* NBT	**The Number Line & Roll & Compare** *4.OA.4, 4.NBT.2* NBT	**The Number Line & The Mystery Grid Game** *4.OA.4, 4.MD.3* OA	**Division Capture** *4.NF.1, 4.NF.2* NF	**The Number Line & Put It on the Line, Part 2** *4.NF.1 – 4 NF.3, 4.NF.3a–c, 4 NF.4* NF	**Don't Break 3.00** *4.NF1–4.NF.7* NF	**Color Ten** *4.NF.2–4.NF.4* NF	**Decimal Draw** *4.NF.5–4.NF.7* NF
Problem Strings	**Multiplication Models** *4.OA.1, 4.NBT.1, 4.NBT.5* NBT	**Ratio Tables** *4.NBT.5* NBT	**Multi-Digit Addition Strategies** *4.NBT.2, 4.NBT.4, 4.MD.2* NBT	**Multi-Digit Subtraction Strategies** *4.NBT.4, 4.NBT.2, 4.MD.2* NBT	**Division Strategies** *4.NBT.5, 4.NBT.6* NBT	**Adding & Subtracting Fractions with Like & Unlike Denominators** *4.NF.3a–c, 4 NF.4* NF	**Generating Equivalent Fractions** *4.NF.1, 4.NF.5* NF	**More Division Strategies** *4.NBT.6* NBT	**Multiplying Fractions & Whole Numbers** *4.NF.4* NF
Solving Problems	**One-Step Multiplication Problems** *4.OA.1 , 4.OA 2, 4.OA.4, 4.NBT.5* OA	**Multi-Step Multiplication Problems** *4.OA.3, 4.NBT.5* NBT	**Place Value, Rounding & Comparing** *4.NBT.2, 4.NBT.3* NBT	**Lines & Symmetry** *4.G.1, 4.G.2, 4.G.3* G	**Multi-Step Division Problems** *4.OA.3, 4.NBT.6* OA	**Multi-Step Problems & Equations** *4.OA.3* OA	**Multiplying Fractions & Whole Numbers Story Problems** *4.NF.3a–d, 4 NF.4* NF	**Line Plots** *4.MD.4* MD	**Measurement Conversions** *4.MD.1, 4.MD.2* MD

Primary Focus: OA - Operations & Algebraic Thinking **NBT** - Number & Operations in Base Ten **MD** - Measurement & Data **G** - Geometry **NF** - Fractions

Number Corner is an additional component of our mathematics curriculum. It is a skill-building program that revolves around the classroom calendar, providing daily practice as well as continual experiences with broader mathematical concepts in 20 minutes of engaging instruction.

Consent Agenda Item #13

Grade 5 Scope & Sequence - 39

Bridges in Mathematics Second Edition

	August / September - Done by Oct. 7th	October/November - Done by Nov. 22nd	November/December - Done by Jan. 6th	January/February - Done by Feb. 10th	February/March - Done by March 24th	March/April - Done by April 21st	May/June	Optional/Integrate in Science
	Unit 1 Expressions, Equations & Volume	**Unit 2** Adding & Subtracting Fractions	**Unit 3** Place Value & Decimals	**Unit 4** Multiplying & Dividing Whole Numbers & Decimals	**Unit 5** Multiplying & Dividing Fractions	**Unit 6** Graphing, Geometry & Volume	**Unit 7** Division & Decimals	**Unit 8** Solar Design
Module 1	**Multiplication & Volume** *4.OA.4, 5.OA.1, 5.OA.2, 5.MD.3b, 5.MD.5a* MD	**Adding & Subtracting Fractions** *5.NF.1, 5.NF.2* NF	**Whole Number & Decimal Place Value** *5.NBT.1, 5.NBT.2, 5.NBT.7* NBT	**Multiplication & Division Strategies** *5.OA.2, 5.NBT.5, 5.NBT.6, 5.NBT.7, 5.NF.4a* NBT	**Multiplying Whole Numbers by Fractions** *5.NF.1, 5.NF.4a–b, 5.NF.5b, 5.NF.6, 5.MD.1* NF	**Graphing Ordered Pairs** *5.OA.3 5.G.1 5.G.2* G	**Division of Fractions & Whole Numbers** *5.OA.1, 5.NBT.2, 5.NBT.6, 5.NF.3, 5.NF.7a–c* NBT NF	**Investigating Solar Energy** *5.MD.5a–b, 5.G.2* MD G
Module 2	**Factors, Multiples & the Associative Property** *4.OA.4, 4.NBT.5, 5.OA.1, 5.OA.2, 5.NF.5a, 5.MD.3a–b, 5.MD.5a* OA	**Introducing Common Denominators** *5.NBT.7, 5.NF.1, 5.NF.2, 5.NF.3, 5.NF.4a* NF	**Adding & Subtracting Decimals** *5.NBT.1, 5.NBT.3a, 5.NBT.3b, 5.NBT.4, 5.NBT.7* NBT	**More Multiplication & Division Strategies** *5.OA.1, 5.NBT.5, 5.NBT.7, 5.NF.4a* NBT	**Multiplying Fractions by Fractions** *5.NF.1, 5.NF.4a–b, 5.NF.5a–b, 5.NF.6* NF	**Classifying Polygons** *5.MD.3a, 5.G.1, 5.G.3, 5.G.4* G	**Division Interpretations & Strategies** *5.NBT.6, 5.NF.3, 5.NF.7a–c* NBT NF	**Investigating Passive Solar Design** *5.NBT.5, 5.NBT.6, 5.NBT.7, 5.NF.4a–b, 5.NF.6, 5.NF.7c, 5.MD.1, 5.MD.5a–b, 5.G.2* NBT NF MD G
Module 3	**Multiplication Strategies** *4.NBT.5, 5.OA.1, 5.OA.2, 5.NBT.6* OA	**Common Denominators** *5.NBT.7, 5.NF.1, 5.NF.2, 5.NF.3, 5.NF.4a* NF	**Conversions** *5.NBT.2, 5.NBT.4, 5.NBT.6, 5.NBT.7, 5.MD.1* NBT MD	**From Array to Algorithm** *5.NBT.5, 5.NBT.6, 5.NBT.7, 5.MD.5b* NBT	**More Fraction-by-Fraction Multiplication** *5.NF.4a–b, 5.NF.5b, 5.NF.6* NF	**Volume** *5.OA.1, 5.NBT.6, 5.MD.3b, 5.MD.4, 5.MD.5a–c, 5.G.1, 5.G.3, 5.G.4* MD	**Powers of Ten** *5.NBT.2, 5.NBT.6, 5.NBT.7* NBT	**Designing Solar Homes** *5.NBT.5, 5.NBT.6, 5.NBT.7, 5.NF.4a–b, 5.NF.6, 5.NF.7c, 5.MD.1, 5.MD.5a–b, 5.G.2* NBT NF MD G
Module 4	**From Multiplication to Division** *4.NBT.6, 5.MD.5a, 5.NBT.6* NBT	**LCMs and GCFs** *5.NF.1, 5.NF.2* NF	**Division & the Area Model** *5.NBT.6* NBT	**Multiplying to Divide** *5.NBT.5, 5.NBT.6* NBT	**Dividing Fractions & Whole Numbers** *5.NBT.6, 5.NF.7a–c* NF	**Banners & Flags** *5.NF.4b, 5.NF.5a–b, 5.NF.6* NF	**Decimal Multiplication & Division** *5.NBT.2, 5.NBT.7* NBT	**Finishing Our Models** *5.NBT.5, 5.NF.4a–b, 5.NF.6, 5.MD.1, 5.G.2* NBT NF MD G

Primary Focus: OA - Operations & Algebraic Thinking **NBT** - Number & Operations in Base Ten **MD** - Measurement & Data **G** - Geometry **NF** - Fractions **NF** - Fractions

Approved by the Amherst School Board on February 16, 2023
Pending Approval of the Mont Vernon School District

Unit Overview
Unit Title: Unit 1 Expressions, Equations & Volume
Unit Summary
In this first unit, students use the study of volume to review and extend a host of skills and concepts related to multiplication. In Module 1, students investigate a scenario in which they find different ways to arrange 24 cubes into a rectangular prism. This prompts a deep look at the associative and commutative properties of multiplication as students use expressions with parentheses to represent different rectangular prisms. In Module 2, students find the surface area of boxes to further develop an understanding of volume (and the ways in which it differs from area), as well as the use of the associative property in expressions with parentheses. In Module 3, students develop major multi-digit multiplication strategies to solve real-world and mathematical problems in elegant and efficient ways. In Module 4, the link between multiplication and division is revisited through the lens of the area model and extended into dividing 3-digit by 2-digit numbers. Over the course of the unit, students are introduced to four Work Place games to build multiplicative thinking—a key component for success with division and fractions throughout the rest of the year.
Approximate Time Needed
5 Weeks - August and September
Unit Foundation
Assessed Competencies
Measurement and Data Number and Operations in Base Ten Number and Operations Fractions Operations and Algebraic Thinking
Assessed Standards *(includes standards on both required and optional assessments)*
3.OA.7 Fluently multiply with products to 100 using strategies. **4.OA.4** Find all factor pairs for a whole number between 1 and 100. **4.OA.4** Find all factor pairs for a whole number in the range 1–100. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1–100 is a multiple of a given one-digit number. Determine whether a given whole number in the range 1–100 is prime or composite. **4.NBT.5** Multiply a 2-, 3-, or 4-digit whole number by a 1-digit whole number or multiply two 2-digit numbers using strategies based on place value and the properties of operations. **5.OA.1** Write numerical expressions with parentheses. **5.OA.1** Evaluate numerical expressions that contain parentheses. **5.OA.2** Write a simple expression to record calculations with numbers. **5.OA.2** Interpret numerical expressions without evaluating them. **5.NBT.6** Divide a 3-digit whole number by a 2-digit whole number using strategies based on place

value, the properties of operations, or the relationship between multiplication and division.
5.NF.5a Compare the size of a product to the size of one of its factors on the basis of the size of the other factor, without performing the indicated multiplication.
5.MD.3b Demonstrate an understanding that a solid figure that can be packed without gaps or overlaps by n unit cubes has a volume of n cubic units.
5.MD.4 Measure the volume of a solid figure by counting the number of cubic units that fill it, with no gaps or overlaps.
5.MD.5a Show that the volume of a right rectangular prism with whole number edge lengths can be found by multiplying the edge lengths or by multiplying the area of the base by the height.
5.MD.5a Represent the product of three whole numbers as the volume of a right rectangular prism whose edge lengths are equal to those three whole numbers.

Curriculum Framing Questions

Enduring Understandings

Students will understand how to:

- Solve multi-step story problems involving multiplication and division with remainders
- Multiply and divide with multi-digit numbers
- Demonstrate an understanding of volume using multiplication
- Find all factor pairs for whole numbers between 1 and 100

Mathematical Concepts

In Unit 1, an exploration of volume serves as a bridge between fourth and fifth grade. Working with volume provides the context in which students review and extend skills and concepts from fourth grade, while introducing skills and concepts that are central to this year's studies.

In the first module, students consider the problem of how to pack 24 cubic boxes, each of which contains a single baseball. They begin by imagining how they could arrange the 24 cubes in a single layer, then in 2 layers, and so on. This process requires them to identify the factors of 24, as well as the factors of those factors (12, 8, 6, 4, 3, 2, and 1).

In writing expressions to represent the dimensions and number of each layer in each arrangement, students are developing a conceptual understanding of the formula for finding the volume of a rectangular prism ($V = b \times h$, where b is the area of the base and h is height). For the purpose of notation during this exploration, we write the measurements of the base in parentheses, expanding the expression for the formula to $V = (l \times w) \times h$.

Unit Overview

Unit Title: Unit 2 Adding & Subtracting Fractions

Unit Summary

In this unit, students add and subtract fractions with unlike denominators, using a variety of strategies to find common denominators. In Module 1, money and clocks serve to help students develop intuitions about finding common denominators in order to compare, add, and subtract fractions. In Module 2, students are introduced to the use of double number lines and tables to rewrite fractions with common denominators. In Module 3, they extend these strategies and models to solving a variety of story problems, and make generalizations about finding common denominators. Module 4 gives students more explicit experience with greatest common factors and least common multiples as they find common denominators and learn to simplify fractions.

Approximate Time Needed

6 weeks - October and November

Unit Foundation

Assessed Competencies

Number and Operations Fractions

Assessed Standards *(includes standards on both required and optional assessments)*

5.NF.1 Add fractions with unlike denominators, including mixed numbers
5.NF.1 Subtract fractions with unlike denominators, including mixed numbers
5.NF.1 Rewrite fractions with unlike denominators as equivalent fractions with a common denominator in order to find their sum or difference
5.NF.2 Solve story problems involving addition of fractions referring to the same whole, with like and unlike denominators
5.NF.2 Solve story problems involving subtraction of fractions referring to the same whole, with like and unlike denominators
5.NF.2 Mentally estimate the answers to story problems involving addition and subtraction of fractions with like and unlike denominators
5.NF.2 Assess the reasonableness of answers to story problems involving addition or subtraction of fractions with like and unlike denominators
5.NF.3 Solve story problems involving division of whole numbers with fraction or mixed number quotients
5.NF.4a Multiply a whole number by a fraction
5.NF.4a Solve story problems involving multiplying a whole number by a fraction

Curriculum Framing Questions

Enduring Understandings

Students will understand how to:

- Add and subtract fractions with unlike denominators
- Solve story problems involving addition and subtraction of fractions with unlike denominators
- Find common denominators for fractions with unlike denominators
- Find the greatest common factor and least common multiple to help simplify fractions and find common denominators
- Multiply multi-digit numbers

Mathematical Concepts

Understanding equivalence is critical to adding and subtracting fractions. We want students to have many meanings come to mind when they see a fraction. For 1/4, for example, a student might think of 1 quarter, 25 cents, $0.25, half of 1/2, double 1/8, 25%, dividing something by 4, 1/4 of an hour, 15 minutes out of 60 minutes, a distance 1/4 of a unit from 0, and so on. Then when students see 1/4 added to another fraction, they can use the meaning that is most helpful, given the denominator of the other fraction. For instance, if the problem is 1/4 + 1/10, students might think of the fractions in terms of money: $0.25 + $0.10 = $0.35, so 1/4 + 1/10 = 35/100. Also, 35 cents is 7 nickels, so 35/100 is equivalent to 7 nickels out of 20 nickels. The use of pennies and nickels allows students to see and understand that 35/100=7/20.

If the problem is 1/4 + 1/3, students might think of the fractions in terms of time: 15 minutes and 20 minutes is 35 minutes out of 60 minutes, therefore 1/4 + 1/3 = 35/60. Since there are seven 5-minute chunks in 35 minutes and twelve 5-minute chunks in 60 minutes, students can see and understand that 35/60 = 7/12.

If the problem involves fractions with denominators that are not factors of 100 or 60, 1/7 + 2/9, for example, students are supported by two different models to find common denominators. The first of these models is a double number line, presented in the context of a running track. The second is the ratio table, which students have already encountered in third and fourth grade, as well as in the previous unit. Both are described in the next section.

The process of learning to add and subtract fractions with understanding as well as fluency allows for an investigation of several other important concepts related to fractions during Unit 2. The first of these is the idea of multiplying whole numbers by fractions; finding 1/5 of 20 or 1/3 of 24, for example. Closely related is the operation of scaling up unit fractions to find non-unit fractions of whole numbers. To find 3/5 of 20, for instance, students first find 1/5 of 20, which is 4. Then they scale up by 3 to find 3/5 of 20, which is $3 \times 4 = 12$. These ideas are developed through the use of money, time, the double number line, and the ratio table, and will be formalized in Unit 5 when students deal with multiplication of whole numbers by fractions and vice versa.

Another important concept addressed in this unit is the connection between division and fractions. The division of whole numbers, $a \div b$, can also be written as a fraction, a/b. This holds true when $a > b$, in which case the quotient is greater than 1. For example, $40 \div 5 = 40/5 = 8$. This is also holds true when $a < b$, but now the quotient is less than 1. For example, $5 \div 40 = 5/40$. The reverse is also true; a fraction a/b can be interpreted as the numerator divided by the denominator, $a \div b$. For example, 8/10 can be interpreted as $8 \div 10$. Students will work with both of these concepts as they find the

better buy, given, for example, 10 snack bars for $8 or 23 snack bars for $20.

Unit Overview

Unit Title: Unit 3 Place Value & Decimals

Unit Summary

In this unit, students study skills and concepts related to place value, from reading, writing, and comparing decimals to rounding and examining the decimal patterns of multiplying and dividing numbers by 10. Students use their place value understandings to convert within a measurement system, and they use both whole number strategies and place value understanding to add and subtract decimals to hundredths. Division is the focus of Module 4, in which students model, solve, and pose long division problems.

Approximate Time Needed

6 Weeks - November and December

Unit Foundation

Assessed Competencies

Measurement and Data
Number and Operations in Base Ten
Number and Operations Fractions

Assessed Standards *(includes standards on both required and optional assessments)*

5.NBT.1 Demonstrate an understanding that in a multi-digit number, each digit represents one-tenth what it represents in the place to its left
5.NBT.2 Explain patterns in the number of zeroes in the product when multiplying by powers of 10 and in the placement of the decimal point when multiplying or dividing by powers of 10
5.NBT.3a Write decimals to thousandths with base ten numerals, words, and in expanded form
5.NBT.3b Compare pairs of decimals to thousandths, based on an understanding of what the digit in each place represents
5.NBT.3b Use >, =, and < symbols to record comparisons of two decimals to thousandths
5.NBT.4 Round decimals to the nearest one, tenth, and hundredth
5.NBT.6 Divide a 3-digit whole number by a 2-digit whole number using strategies based on place value, the properties of operations, or the relationship between multiplication and division
5.NBT.7 Add and subtract decimals to hundredths, using concrete models or drawings and strategies based on place value and properties of operations, and the relationship between addition and subtraction
5.NF.1 Add and subtract fractions with unlike denominators, including mixed numbers
5.MD.1 Convert among different sized standard measurement units within a given measurement system

Curriculum Framing Questions

Enduring Understandings

Students will understand how to:

- Divide multi-digit whole numbers
- Read, write, order, model, and compare decimal numbers
- Multiply and divide whole and decimal numbers by 10
- Add and subtract decimal numbers to the hundredths place
- Identify equivalent fractions and decimals

Mathematical Concepts

In Unit 3, the focus of instruction shifts from fractions to decimals, which invites a closer look at the base ten place value system. The Great Wall of Base Ten, first introduced in Bridges Grade 4 to investigate larger numbers as well as decimals through hundredths, is reintroduced early in the unit. It is used as a springboard for introducing powers of 10 and exponential notation. After examining and labeling the pieces through 104 , students are invited to consider the appearance and value of the pieces to the right of the unit; pieces that are smaller than 1.

Because these pieces are almost too small to work with, the teacher proposes a shift in which the mat becomes the new unit and is assigned a value of 1, while the values of the other pieces are rescaled proportionally.

While this shift leaves the two smallest pieces on the display unaccounted for, it allows students to use the base ten area pieces to model and compare decimals through hundredths.

With visual support from the Great Wall of Base Ten, as well as the base ten area pieces, much of the work toward the end of the first module revolves around modeling, reading, writing, and understanding decimal numbers through hundredths, as well as connecting these numbers to unit fractions. During the first session of Module 2, students are introduced to the Decimal Grid, a greatly magnified version of the area unit so finely divided that it's possible to identify tenths, hundredths, thousandths, and ten-thousandths on it. Students shade in a quarter of the Decimal Grid and examine the shaded area, identifying and recording as many equivalent fractions and decimals as they can find.

Much of the work in Unit 3 is designed to further students' understanding that unit fractions, common fractions, and decimal fractions are quotients; the result of dividing one whole number by another. For example, if 3 pizzas are shared by 4 people, each person gets 3/4 of a pizza (3 ÷ 4 = 3/4). This concept is important for a number of reasons, including the following:

- Understanding fractions as quotients helps students forge a link between fractions and decimals. As adults, we're accustomed to the idea that 3/4 and 0.75 are equivalent. Students have access to this understanding by punching 3 ÷ 4 into a calculator, but the result makes little sense unless fractions and division are explicitly connected, as they are throughout the first two modules in this unit.
- Thinking of a fraction as the result of a division problem (i.e., 1 ÷ 2 = 1/2) helps students understand that fractions themselves are single numbers. Some fifth graders, especially this early in the school year, still believe that a fraction is two separate numbers. These students are likely to assert that 3/8 is greater than 1/2 because 3 is greater than 1 and 8 is greater than 2. They are also likely to persist in adding and subtracting numerators and

denominators as if they were separate numbers (e.g., 1/2 + 2/3 = 3/5), no matter how little sense the results make.

- The expression x/y, which students will encounter in middle school algebra, makes no sense at all in a part-whole context. What does it mean to say, "x out of y parts"? In this case, students must understand the expression to mean x ÷ y in order to work with it.

When students start to see the connections between fractions and decimals, the repertoire of strategies they have developed for comparing, adding, and subtracting fractions will increase. Representing fractions in decimal form enables us to use our familiar and practical base ten system to interpret and operate with rational numbers. It's not too difficult to add 1/4 + 1/2 in your head and get 3/4, but it may even be easier to add 0.25 + 0.50 to get 0.75. Or compare the ease of adding 0.20 + 0.25 instead of 1/5 + 1/4, or subtracting 0.75 – 0.40 instead of 3/4 – 2/5.

In light of these connections, students are invited from the very start of the unit to apply familiar strategies for adding and subtracting whole numbers to adding and subtracting decimal numbers.

Unit Overview
Unit Title: Unit 4 Multiplying & Dividing Whole Numbers & Decimals
Unit Summary
In this unit, students return to the study of multiplication and division strategies, including the standard multiplication algorithm. In the first two modules, students investigate a number of strategies that capitalize on their estimation and mental math skills and help them continue to develop strong number sense. These include strategies that leverage the relationship between multiplication and division; the fact that 5 is half of 10; the relationships between fractions, decimals, and whole numbers; and the process of doubling and halving. In Module 3, the teacher formally introduces the standard multiplication algorithm after reviewing the area model and partial products. Module 4 reinforces the connection between multiplication and division, using the area model and ratio tables to help students develop a degree of comfort with long division.
Approximate Time Needed
6 weeks - January / February
Unit Foundation
Assessed Competencies
Measurement and Data Number and Operations in Base Ten Number and Operations Fractions Operations and Algebraic Thinking
Assessed Standards *(includes standards on both required and optional assessments)*
4.OA.4 Demonstrate an understanding that a whole number is a multiple of each of its factors **4.OA.4** Determine whether a whole number between 1 and 100 is a multiple of a given 1-digit number **4.NBT.5** Multiply a 2, 3, or 4-digit whole number by a 1-digit whole number using strategies based on place value and the properties of operations **4.NBT.5** Multiply two 2-digit numbers using strategies based on place value and the properties of operations **4.NBT.5** Use equations to explain strategies for multiplying with multi-digit numbers **5.OA.1** Evaluate numerical expressions that contain parentheses **5.OA.2** Interpret numerical expressions without evaluating them **5.NBT.5** Use the standard algorithm with fluency to multiply multi-digit whole numbers **5.NBT.6** Divide a 2- or 3-digit whole number by a 2-digit whole number using strategies based on place value, the properties of operations, or the relationship between multiplication and division **5.NBT.7** Add and subtract decimals to hundredths, using concrete models or drawings and strategies based on place value and properties of operations **5.NBT.7** Multiply and divide decimals to hundredths, using concrete models or drawings and

strategies based on place value and properties of operations
5.NBT.7 Use written numbers and symbols to represent strategies for computing with decimals to hundredths
5.NBT.7 Relate strategies for computing with decimals to hundredths to written methods
5.NF.4a Multiply a whole number by a fraction
5.MD.1 Convert among different sized student measurement units within a given measurement system

Curriculum Framing Questions

Enduring Understandings

Students will understand how to:

- Use a variety of strategies for multiplying and dividing multi-digit whole numbers
- Practice using the standard algorithm to multiply multi-digit whole numbers
- Begin multiplying and dividing with decimal numbers

Mathematical Concepts

During Unit 4, students make extensive use of such familiar tools as ratio tables, rectangular arrays, the area model, and money to review and develop a variety of strategies for multiplying and dividing whole numbers and decimals. These include doubling and halving, using the relationship between multiplication and division, using fractions and decimals to assist in multiplying whole numbers, and using familiar and friendly combinations to make problems easier to solve. The commutative, associative, and distributive properties continue to play an important role as well, especially as students move into multiplying decimals by whole numbers. For example, students use the distributive property to solve problems like 32 × 1.25 by observing that 32 × (1 + 0.25) = (32 × 1) + (32 × 0.25) = 32 + (32 × 0.25). Fractions as operators enter the picture at this point, because 0.25 is equal to 1/4, and 1/4 of 32 is 8. Therefore 32 × 1.25 = 32 + 8 = 40.

As useful and powerful as these strategies are, none of them equips students to handle every multiplication combination they might encounter. The doubling & halving strategy is most useful when combinations involve numbers that halve easily, or with decimal numbers that double to become whole numbers (e.g., 3.5 × 2 = 7, 43.5 × 2 = 87, and so on). The strategy of using fractions and decimals is particularly useful when combinations involve 1/4, 0.25, 25; 1/2, 0.50, 50; 3/4, 0.75, 75, or factors that are closely related to those numbers. The over and under strategies, involve finding the product of an easier combination and then removing or adding sets (e.g., 98 × 37 = (100 × 37) – (2 × 38) or 103 × 87 = (100 × 87) + (3 × 87). These strategies are most useful when one of the factors is close to a multiple of 10, 100, or 1,000.

Another tool our students can use, then, is the standard multiplication algorithm—a method that works consistently for all numbers as long as all the steps are carried out correctly. Therein lies the rub, eloquently described by researcher Karen Fuson, who writes about the difficulties inherent in the standard algorithms for multi-digit multiplication and division:

“The multiplication and division algorithms currently most prevalent are complex embedded methods that are not easy to understand or to carry out. They demand high levels of skill in

multiplying a multi-digit number by a single-digit number with complex embedded formats in which multiplying and adding alternate. In these algorithms, the meaning and scaffolding of sub-steps have been sacrificed to using a small amount of paper. The multiplication and division algorithms use aligning methods that keep the steps organized by correct place value without requiring any understanding of what is actually happening with the ones, tens, and hundreds." (Teaching Children Mathematics, February 2003, page 302)

Fuson cites the area model as the method of teaching multiplication and division that leads to algorithms and multi-step procedures that are most accessible to a wide range of students:

"An array drawing shows the quantities; arrays are powerful models of multiplication and division. The accessible methods and drawings demonstrate central features in multi-digit multiplication and division that students must come to understand and do." (Teaching Children Mathematics, February 2003, page 302)

To help ensure that fifth graders understand the standard algorithm, we briefly review some of the work they did with the area model and partial products in fourth grade, and then carefully link those elements to the algorithm, as illustrated below.

While fifth grade teachers are charged with making sure their students can use the standard multiplication algorithm with accuracy, efficiency, and flexibility, it is the responsibility of sixth grade teachers to instruct students in the use of the standard division algorithm. We set the foundation for students' future success with long division by extending the understandings they've developed so far into modeling the operation with open arrays and numeric recording methods that make it clear that division involves subtracting groups of the divisor from the dividend until no further groups can be removed.

Unit Overview
Unit Title: Unit 5 Multiplying & Dividing Fractions
Unit Summary
In Unit 5, students extend their understandings of multiplication and division to working with fractions. During the first module, students review and extend skills and concepts first introduced in Grade 4 to solidify their understandings of whole number-by-fraction multiplication. In Modules 2 and 3, they use rectangular arrays to model and solve fraction-by-fraction multiplication problems. Module 4 features an introduction to division of whole numbers by unit fractions, and unit fractions by whole numbers. There is a strong emphasis throughout the unit on sense-making and understanding, as students tackle material that is conceptually challenging.
Approximate Time Needed
5 weeks - February / March
Unit Foundation
Assessed Competencies
Number and Operations Fractions
Assessed Standards *(includes standards on both required and optional assessments)*
5.NF.1 Add and subtract fractions with unlike denominators, including mixed numbers **5.NF.4a** Multiply a whole number by a fraction **5.NF.4a** Multiply a fraction by a fraction **5.NF.4a** Solve story problems involving multiplying a whole number or a fraction by a fraction **5.NF.4b** Demonstrate that the area of a rectangle with fractional side lengths can be found through tiling or by multiplying the side lengths **5.NF.4b** Represent the product of two fractions as an array whose dimensions are the two fractions being multiplied **5.NF.5a** Compare the size of a product to the size of one of its factors on the basis of the size of the other factor, without performing the indicated multiplication **5.NF.5b** Explain why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; explain why multiplying a given number by a fraction greater than 1 results in a product greater than the given number **5.NF.7a** Divide a unit fraction by a whole number; use a visual model to represent division of a unit fraction by a whole number **5.NF.7b** Divide a whole number by a unit fraction; use a visual model to represent division of a whole number by a unit fraction **5.NF.7c** Solve story problems involving division of a unit fraction by a whole number, and division of a whole number by a fraction

Curriculum Framing Questions

Enduring Understandings

Students will understand how to:

- Multiply fractions by whole numbers (1 3 × 12 = 4)
- Use rectangular arrays to show multiplication of a fraction by a fraction (1 3 × 3 4 = 1 4)
- Divide a whole number by a fraction (4 ÷ 1 3 = 12)
- Divide a unit fraction (a fraction with a 1 in the numerator) by a whole number (1 3 ÷ 4 = 1 12)

Mathematical Concepts

Although multiplication and division of fractions have typically been reserved for middle school, the authors of the Common Core State Standards have designated fifth grade as a starting point for instruction in these operations, providing a three-year period—Grades 5, 6, and 7—for students to master the associated skills and concepts. The goals in fifth grade are limited and well defined. Specifically, Common Core requires fifth grade students to:

- Interpret multiplication of a whole number by a fraction, multiplication of a fraction by a fraction (including mixed numbers or fractions greater than 1), division of a unit fraction by a whole number and division of a whole number by a unit fraction by, for instance, writing and solving story problems to match expressions such as 8 × 3/4, 3/4 × 2/3, 6 ÷ ¼ and ½ ÷ 5.
- Compute such products and quotients using visual models to represent and solve the problems. (Other than the expectation that students be able to write equations to represent story problems involving multiplication and division of fractions, there is no call for specific numeric methods or algorithms.)
- Reason and think sensibly about the answers to problems. For example, having gotten an answer of 1/2 after modeling and solving 2/3 × 3/4, a student might reflect that because 3/4 = 1/4 + 1/4 + 1/4, 2 out of 3 of those parts would be 2/4 or 1/2. Students might also explain or confirm their answers to division combinations by using the inverse relationship between multiplication and division (e.g., I know that 4 ÷ 1/3 = 12 is correct because 12 × 1/3 = 4).

Because the Common Core Standards clearly call for conceptual understanding rather than procedural fluency with these operations, there is strong emphasis throughout Unit 5 on sense-making. Language that helps students understand the operations more clearly is interspersed with language that is more formal and abstract. For example, the teacher reads 3/4 x 3 as three-fourths of 3, rather than 3/4 times 3, in posing problems early in the first module. Similarly, students are invited to think of 6 ÷ 1/2 as the number of halves in 6 rather than 6 divided by one half as they work through situations and problems in the fourth module.

Leading the way are story problems designed to facilitate understanding of operations with fractions and elicit the use of particular models, consistently preceding work with numbers in isolation. Students are also frequently invited to describe and explain the effects of multiplication and division, both of which work quite differently in the context of fractions. For example, students are used to thinking of multiplication as an operation that results in a product greater than either of the factors. Now, suddenly, the opposite is true. When a given number is multiplied by a fraction less than 1, the product is less than the given number. Division is turned upside down as well, resulting

in quotients that are greater than the dividend when a whole number is divided by a fraction less than 1. These reversals can be quite confusing, requiring redoubled efforts to teach for conceptual understanding.

Multiplying Whole Numbers by Fractions
Beginning in Module 1, students will explore finding fractions of whole numbers in the general case. To find 1/4 of 22, they discover that they can use the distributive property: 1/4 × 22 = 1/4 × (20 + 2) = (1/4 × 20) + (1/4 × 2) = 5 + 1/2. They learn to seek friendly chunks of the whole number, find those products, and then add them.

Students also learn to use the associative property when multiplying fractions by whole numbers. To find 3/4 of 22, they can write 3/4 × 22 = (3 × 1/4) × 22 = 3 × (1/4 × 22). Thus, they find 1/4 of 22 and then scale up by 3 by using the associative property and the understanding that 3/4 = 3 × 1/4.

Multiplying Fractions by Fractions
When students begin multiplying pairs of fractions in Module 2, they use the area model, in which the two fractions are the dimensions of a rectangle and their product is the area of the rectangle. They begin by modeling such arrays on the geoboard, which is assigned dimensions of 1 linear unit and an area of 1 square unit. They soon transition to drawing labeled arrays to represent fractions and their products.

Toward the end of the second module, they create a class chart of arrays in which one dimension is always 1/2 and the other dimension begins at 1/6 and increases by 1/6 each time. While creating and studying this sequence of arrays, students make sense of the fact that the product of two fractions is smaller than 1 square unit and smaller than either of the fractions being multiplied. They will also notice other patterns and phenomena that they will explore further in Module 3.

Dividing Fractions by Whole Numbers and Whole Numbers by Fractions
In order to comprehend and solve problems such as 1/3 ÷ 4 and 4 ÷ 1/3, we have to understand that there are two different interpretations of division: sharing and grouping. When we interpret division as sharing (sometimes called equal sharing, fair sharing, or partitive division), we share out a quantity equally, as shown below at left. We know how many groups we have to make; we have to find out what the size of each group is. When we interpret division as grouping (sometimes called measurement or quotative division), we know what the size of each group is; we have to find out how many groups we can make given the dividend with which we're working, as shown below at right.

Notice that the answer is the same in both interpretations, but it means something different in each case. In the sharing interpretation of division the result of dividing 8 by 2 tells us the size of each group; each person gets 4. In the grouping interpretation, we already know the size of the group—2. The result of dividing 8 by 2 tells us how many groups of 2 are in 8. (There are 4.)

The importance of knowing and understanding both interpretations of division cannot be overstated—both are required to make sense of division with fractions. Consider the following: 4 ÷ 1/3. If you read this expression and try to grapple with it in any kind of sensible way, the sharing interpretation of division seems unreasonable. How do you equally share 4 things with a third of a person? On the other hand, the grouping interpretation makes better sense. How many groups of

one-third can you get from 4? In other words, how many thirds are there in 4? We can reason that there are 3 thirds in 1, so there must be 4 × 3 or 12 thirds in 4. We can solve the problem sensibly without resorting to inverting and multiplying. In fact, there are a couple of visual models that make it possible for fifth graders to picture and solve the problem, described in the Models section below.

What about 1/3 ÷ 4? Can we use the grouping interpretation of division to help evaluate this expression? How many groups of 4 can you take out of 1/3? Since that makes little sense, what about the sharing interpretation? Is it possible to divide 1/3 into 4 equal shares? If you divide 1/3 into 4 equal shares, each share is 1/12. This may seem more difficult than figuring out how many thirds there are in 4, but the visual model described in the next section enables fifth graders to represent and solve situations that involve dividing a fraction by a whole number.

What About Invert and Multiply? The models and instructional strategies you use during this unit will lead nicely into the work students do with multiplying and dividing fractions in Grades 6 and 7. Math educators Suzanne Chapin and Art Johnson caution us, however, that some of the division situations students will encounter in sixth and seventh grade include fractions that cannot be easily modeled using pictures or materials (e.g., 3/4 ÷ 2/3). In their book, Math Matters: Understanding the Math You Teach, Chapin and Johnson go on to explain that,

It is important to realize that not all division situations are represented by actions based on partitive division or repeated subtraction (grouping division). For example, if the area of a rectangle is 10 square centimeters and the width is 1/2 centimeter, the length of the rectangle can be found by calculating 10 ÷ 1/2.…Area is a multidimensional quantity that is the product of length and width. The "invert and multiply" algorithm, which relies on the inverse relationships between multiplication and division, and between reciprocals, enables us not only to make sense of other situations but also to divide "messy" fractions.

So, have no doubt that there is still a place for invert and multiply, but not in fifth grade. What you do with the students this year to meet the Common Core expectations will lay solid foundations on which middle school teachers can build so their students are able to use the algorithm with good understanding

Unit Overview
Unit Title: Unit 6 Graphing, Geometry & Volume
Unit Summary
In this unit, students are formally introduced to several new geometric concepts, including coordinate graphing and the use of hierarchies to classify two-dimensional shapes by their properties. Students also review volume, working from counting the cubes that will fit into a box to measuring prisms in continuous units and using standard formulas (V = l × w × h and V = b × h) to find their volumes. Module 4 features a brief review of fraction and mixed number multiplication, set in the context of making banners and flags.
Approximate Time Needed
5 Week - March and April
Unit Foundation
Assessed Competencies
Geometry Measurement and Data Number and Operations in Base Ten Number and Operations Fractions Operations and Algebraic Thinking
Assessed Standards *(includes standards on both required and optional assessments)*
5.OA.3 Generate two numerical patterns given two different rules **5.OA.3** Identify relationships between corresponding terms in two numerical patterns generated according to two different rules **5.OA.3** Graph on a coordinate plane ordered pairs consisting of the corresponding terms in two numerical patterns generated according to two different rules **5.NBT.2** Explain patterns in the placement of the decimal point when multiplying or dividing by powers or 10 **5.NBT.6** Divide a 3-digit whole number by a 2-digit whole number using strategies based on place value, the properties of operations, or the relationship between multiplication and division **5.NBT.7** Add and multiply decimals to hundredths, using strategies based on place value **5.NF.4a** Multiply a fraction by a fraction M4, S3 Multiplying Mixed Numbers & Fractions Checkpoint **5.NF.4b** Demonstrate that the area of a rectangle with fractional side lengths can be found through tiling or by multiplying the side lengths **5.NF.6** Solve story problems involving multiplication of fractions and mixed numbers **5.MD.5a** Show that the volume of a right rectangular prism with whole number edge lengths can be found by multiplying the edge lengths **5.MD.5a** Represent the product of three whole numbers as the volume of a right rectangular prism

whose edge lengths are equal to those three whole numbers
5.MD.5b Use the formula V = l × w × h to find the volume of a right rectangular prism with whole-number edge lengths
5.MD.5b Use the formula V = b × h to find the volume of a right rectangular prism with whole-number edge lengths
5.MD.5c Solve story problems involving finding the volume of a solid figure composed of two non overlapping right rectangular prisms
5.G.1 Locate a point on a coordinate plane based on its ordered pair of coordinates
5.G.1 Write the x- and y-coordinates of a given point in a coordinate plane as an ordered pair
5.G.2 Graph points in the first quadrant of the coordinate plane to represent a problem
5.G.2 Describe the meaning of the values of coordinate points based on the context of a problem or situation
5.G.3 Demonstrate an understanding that attributes of a category of dimensional figures also belong to all subcategories of that category
5.G.4 Classify two-dimensional figures based on their attributes
5.G.4 Classify two-dimensional figures within a hierarchy based on properties

Curriculum Framing Questions

Enduring Understandings

Students will understand how to:

- Calculate the volume of a rectangular prism using a formula and other strategies
- Graph points in the coordinate plane
- Sort and classify triangles, quadrilaterals, and other two-dimensional shapes
- Multiply a mixed number by a whole number and by another mixed number

Math Concepts

In 1957, two Dutch educators, Pierre van Hiele and Dina van Hiele-Geldof, puzzled by the difficulty their students had with geometry, published what has become a very influential theory in the design of geometry curriculum. According to the van Hiele theory, students pass through certain levels as they become more sophisticated in their geometric thinking, and these levels must unfold in order, propelled by students' own explorations and discoveries.

Progress through the levels of geometric understanding is more dependent on educational experiences than on age or maturity. It's interesting to note that while traditional high school geometry textbooks are generally pitched at about Level 3, many high school students enter functioning at Level 0 or, at best, Level 1. To arrive at Level 3, students must move through all the prior levels. To move through a level means that a student has experienced geometric thinking appropriate for that level and has created in his or her own mind the types of objects or relationships that are the focus of thought at the next level.

The van Hieles believe that instruction must begin at a student's current level and provide many years of visual and exploratory work before moving into formal deductions. Experience with shapes, terms, and geometry-related concepts is the greatest single factor influencing advancement through the levels. So, the question for us as teachers of upper elementary students is two-fold: at what

level are our students currently working, and what can we do to support their development?

Most third, fourth, and fifth graders think and work largely at Level 1, although we can begin to nudge our fourth and fifth graders in the direction of Level 2 thinking. In fact, deepening students' Level 1 thinking as they move toward Level 2 might be considered the main focus of geometry instruction in the upper elementary grades. Activities that encourage students to explore, talk about, and interact with content at the next level, while increasing their experiences at the current level, have the best chance of advancing their thinking. Listed here are some of the features of effective instruction at both Level 1 and Level 2.

Features of Level 1 Activities

- Begin to focus more on properties of figures than on simple identification. Define, measure, observe, and change properties with the use of models.
- Use problem-solving contexts in which properties of shapes are important components.
- Continue to use models, as with Level 0, but include models that permit the exploration of various properties of figures.
- Classify figures based on properties of shapes as well as by names of shapes. For example, investigate properties of triangles, such as side length and angle measure, that make some alike and others different.

Features of Level 2 Activities

- Use models and drawings as tools to think with, and begin to look for generalizations and nonexamples.
- Make property lists, and discuss which properties are necessary and which are sufficient conditions for a specific shape or concept.
- Include language of an informal deductive nature: all, some, none, if-then, what if, etc.
- Investigate the converse of certain relationships for validity. For example, the converse of "If it is a square, it must have four right angles" is "If it has four right angles, it must be a square.

If most of our kindergarten students come to school as Level 0 thinkers, and we are only starting to press the issue of Level 2 thinking in fifth grade, why is the pace so slow? The answer, in part, is that Level 1 thinking cuts across a very broad swath of concepts, skills, and terms, including those listed below.

- Names of common two- and three-dimensional shapes, including the various types of triangles and quadrilaterals
- Basic elements: points, rays, line segments, lines, and degrees of rotation
- Angle types (right, obtuse, and acute), as well as angles of specified measure
- Parallel and perpendicular lines
- Reflective or line symmetry

Many of these terms and ideas were introduced as recently as fourth grade. Students must gain some level of proficiency with them before they can begin to classify shapes in hierarchies determined by properties, and to truly understand such propositions as, "Any quadrilateral in which opposite sides are parallel and congruent is a parallelogram; therefore, rectangles are parallelograms."

Unit Overview
Unit Title: Unit 7 Division & Decimals
Unit Summary
In this unit, students continue their study of division, including its relationship to multiplication. In Module 1, students work with problem strings to find partial quotients as they divide 3- and 4-digit dividends by 2-digit divisors. They also investigate scenarios involving rates—cups of fruit per pizza, and minutes it takes to run a mile—which leads to the strategy of finding equivalent ratios to solve division problems, even when the numbers are fractions. Module 2 centers around the sharing and grouping interpretations of division, providing opportunities to review the skills and concepts associated with dividing unit fractions by whole numbers and vice versa. During this module, students also solve and discuss a wide variety of division story problems, including contexts that require decisions about how to handle the remainders. In the last two modules, students review and extend their thinking about the effects of multiplying and dividing by powers of 10, as well as multiplying and dividing decimal numbers.
Approximate Time Needed
5 Weeks - May and June
Unit Foundation
Assessed Competencies
Number and Operations in Base Ten Number and Operations Fractions Operations and Algebraic Thinking
Assessed Standards *(includes standards on both required and optional assessments)*
5.OA.1 Write and evaluate numerical expressions with parentheses and brackets **5.NBT.1** Demonstrate an understanding that in a multi-digit number, each digit represents 10 times what it represents in the place to its right and one-tenth what it represents in the place to its left **5.NBT.2** Explain patterns in the number of zeros in the product when multiplying by powers of 10 **5.NBT.2** Explain patterns in the placement of the decimal point when multiplying or dividing by powers or 10 **5.NBT.2** Denote powers of 10 with whole-number exponents **5.NBT.6** Divide a 2, 3, or 4-digit whole number by a 2-digit whole number using strategies based on place value, the properties of operations, or the relationship between multiplication and division **5.NBT.6** Use equations and rectangular arrays to explain strategies for dividing multi-digit whole numbers **5.NBT.7** Multiply and divide decimals to hundredths, using strategies based on place value, and explain the reasoning behind these strategies **5.NF.7a** Divide a unit fraction by a whole number **5.NF.7a** Write story problems involving division of a unit fraction by a whole number

5.NF.7b Divide a whole number by a unit fraction
5.NF.7b Write story problems involving division of a whole number by a unit fraction
5.NF.7c Solve story problems involving division of a whole number by a unit fraction
5.NF.7c Solve a story problem involving division of a unit fraction by a whole number

Curriculum Framing Questions

Enduring Understandings

Students will understand how to:

- Multiply and divide multi-digit numbers
- Perform addition, subtraction, multiplication, and division with fractions
- Solve story problems with fractions

Mathematical Concepts

Division of whole numbers and fractions, as well as multiplication and division of decimals, is central to the math instruction in fifth grade, and continues to be important in sixth grade. It seems wise, then, to address division and decimal skills and concepts one more time before the end of the school year, allowing students to consolidate what they have already learned and extend their thinking about both topics. For this reason, Unit 7 is devoted to the review and extension of both topics—division of whole numbers and fractions in the first half of the unit, and multiplication and division of decimals in the second half.

Division Concepts
The Common Core standards specify that fifth graders will divide 3- and 4-digit whole numbers by 2-digit whole numbers, using strategies based on place value, the properties of operations, or the relationship between multiplication and division. Furthermore, fifth graders are expected to illustrate and explain their division calculations using equations, rectangular arrays, or area models. Fifth grade sits at the midpoint of a three-year flow of instruction around division that starts in fourth grade with division of 2-, 3-, and 4-digit numbers by 1-digit numbers using models and strategies, and culminates in sixth grade with the standard long division algorithm. By devoting this amount of time to multi-digit division, the authors of the Common Core have signaled their commitment to fostering deep conceptual understandings in fourth and fifth grade, on which to build procedural fluency in sixth grade.

Fifth graders are also expected to divide unit fractions by whole numbers, and divide whole numbers by unit fractions. The work in the first two modules of Unit 7 reviews and extends the fraction division skills and concepts introduced in Unit 5, touching back into the partitive and quotative—or sharing and grouping—interpretations of division. Students also consider both interpretations of division in solving a wide range of whole number story problems, including situations that require a nuanced treatment of remainders.

Decimal Concepts
The last two modules of Unit 7 deal with multiplication and division of decimals to hundreds. Here again, the focus is on conceptual understanding. Fifth graders are expected to use concrete models and sketches, along with strategies based on place value and properties of operations, and be able to explain the reasoning behind their strategies. True understanding of operations with decimals

requires facility with place value, so the first three sessions in Module 3 revolve around multiplying and dividing whole numbers and decimals by powers of 10. As students work with short sets of relatively simple computations such as 235 ÷ 10, 235 ÷ 100, 235 ÷ 1,000 or 0.67 × 0.01, 0.67 × 0.1, 0.67 × 1, 0.67 × 10, they are asked to observe, describe, and explain patterns in the number of zeros in the products, as well as patterns in the placement of the decimal point when multiplying or dividing by powers of 10. Not content to have teachers simply tell their students to add so many zeros, or move the decimal point so many places to the left or to the right, the authors of the Common Core Standards stand firm in the expectation that fifth graders head into middle school with solid understandings on which procedural fluency can be built in sixth and seventh grade. And, indeed, some of the seemingly simple problems students are asked to solve by the end of Unit 7 are potentially confusing without very strong foundations in number and operations. Consider, for example, the fact that 0.56 ÷ 0.01 = 56. It makes very little sense that the quotient could be so much larger than the dividend or the divisor until one understands that the expression 0.56 ÷ 0.01 means, "How many hundredths are there in 0.56?" Students who have grappled with the fact that 8 ÷ 1/4 = 32 prior to working with decimal division are in a better position to understand, rather than to just move the decimal point while wondering what's going on.

Unit Overview
Unit Title: Unit 8 Solar Design (optional unit)
Unit Summary
In this final unit of the year, students design and build scaled model houses that incorporate solar energy features. They begin by investigating different aspects of solar energy—reflection, absorption, concentration—and ways to collect and store the sun's rays. They analyze their data to inform their own design, using both spreadsheet software and paper and pencil methods. While students investigate these science principles, they apply many math skills they've learned throughout the year, including work with fractions, decimals, volume, surface area, conversions within measurement systems, and coordinate graphing. Student teams build model houses that incorporate passive and active solar features, and then test the models to see which designs allow the most collection and storage of solar energy. They create scaled side-view drawings and floor plans and use the plans to build the rooms in their model houses. Finally, students reflect on their learning and prepare for a showcase of their work to share with friends and family.
Approximate Time Needed
Optional Unit - Can integrate with Science
Unit Foundation
Assessed Competencies
Geometry Measurement and Data Number and Operations in Base Ten Number and Operations Fractions
Assessed Standards *(all assessments in this unit are optional)*
5.NBT.5 Use the standard algorithm with fluency to multiply multi-digit whole numbers **5.NBT.6** Divide a 4-digit whole number by a 2-digit whole number using strategies based on the properties of operations **5.NBT.7** Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on properties of operations **5.NF.4a** Multiply a whole number by a fraction **5.NF.4b** Demonstrate that the area of a rectangle with fractional side lengths can be found by multiplying the side lengths **5.NF.6** Solve story problems involving multiplication of fractions and mixed numbers **5.NF.7c** Solve story problems involving division of a unit fraction by a whole number **5.MD.1** Convert among different-sized standard measurement units within a given measurement system and solve related multi-step story problems **5.MD.5a** Represent the product of three whole numbers as the volume of a right rectangular prism whose edge lengths are equal to those three whole numbers

5.MD.5b Use the formula V = l × w × h or V = b × h to find the volume of a right rectangular prism with whole-number edge lengths
5.G.2 Graph points in the first quadrant of the coordinate plane to represent and solve a problem and describe the meaning of the values of coordinate points based on the context of a problem or situation

Curriculum Framing Questions

Enduring Understandings

Students will:

- Learn about solar home design and thermal energy transfer through reading, research, and experiments
- Design and build model houses to meet specific criteria and constraints
- Collect, graph, and analyze experimental data
- Work with scaled drawings and dimensions
- Practice math skills developed earlier this year, especially those involving measurement, multiplication and division, decimals and fractions, and geometry

Mathematical Concepts

Unit 8 is an integrated theme unit that combines data collection and analysis, measurement and computation, science, design and engineering, reading and writing, and technology in meaningful ways around the very timely topic of solar energy. The sessions in this unit include many structured investigations, as well as less formal periods of discovery time that allow students to experiment with different building materials, solar energy features, and designs. These experiences prompt students to generate and test conjectures about the merits, drawbacks, and interplay of materials and design features as they plan, build, and test several different solar collectors and two different model solar houses over the course of about a month.

Math Concepts
In this unit, students apply many of the most important skills and concepts they've learned this year, including:

- Addition, subtraction, multiplication, and division of whole numbers, decimals, fractions, and mixed numbers in problem-solving contexts
- Conversions between different-sized units within a given measurement system
- Finding volume, and determining sets of dimensions that yield a volume
- Graphing points in the first quadrant of the coordinate plane, and describing the meaning of the values of coordinate points based on the context of the situation
- Data collection, representation, and analysis, including the use spreadsheet software to enter and display data in the form of line graphs
- Use of tools and appropriate levels of precision to measure time, temperature, length, liquid capacity, area, and volume

As might be expected, many of the tasks students encounter throughout the unit are multifaceted, involving two or more of the skill clusters listed above. For example, students work in teams to build their first model solar house out of cardboard. The dimensions are given, so the resulting box-like structures each have a 9" × 12" base and a height of 8". Students are then invited to cut windows for

their houses, with the requirement that the windows take up exactly 1/8 of the wall surface of the entire house. In order to cut their windows, then, students must first determine the total area of the 4 walls, and find 1/8 of the total, or 1/8 × ((2 × 9 × 8) + (2 × 12 × 8)) = 42 square inches. Before cutting the windows in their own model houses, students help the teacher determine how much area has been taken up by the three windows s/he has cut in one of the walls of a demonstration model, how much area still remains for windows, and how to make optimal use of that area.

The second model solar house students build is assigned a volume of 1,152 cubic inches, but it is left up to them to determine the actual dimensions. Although most will use whole number dimensions, students in need of more challenge are invited to use dimensions that involve mixed ii © The Math Learning Center | Bridges in Mathematics Grade 5 Teachers Guide mathlearningcenter.org Unit 8 Introduction numbers. Here is an example of the process some students may employ in generating possible sets of dimensions.

In addition to finding the areas of windows, solar panels, and rooms with whole number and fractional side lengths, students calculate with decimals and fractions, and divide unit fractions when they buy insulation materials for their houses. Students also convert among different-size measurement units when buying their materials and building their models. For example, they convert from feet to inches in the process of determining how best to divide a clear plastic shower curtain for use in making the windows for their houses.

Students collect data on their solar investigations to inform their design. They organize, display, and analyze the data using pencil and paper methods and, if available, spreadsheet software. They then base many of their most important decisions on the results of their experiments. For example, students conduct an experiment very early in the first module to learn that solar energy can be reflected and absorbed by objects, and that when objects absorb solar energy, some of the energy is converted into heat. They set thermometers on black and white paper and take temperature readings every minute for five minutes, recording their data in chart form and then plotting it on a line graph. As you might imagine, black becomes the color of choice for solar collectors later in the unit.

Grade 5 Scope & Sequence

Number Corner Second Edition

	August / September	October	November	December	January	February	March	April	May / June
Calendar Grid	**Fractions & Decimals** *4.NF.1, 4.NF.4a, 4.NF.5, 4.NF.6, 5.NBT.7* NF NBT	**Mystery Buildings: Views & Volume** *5.MD.4, 5.MD.5c* MD	**Tumbling Triangles** *5.G.1, 5.G.2* G	**Classifying Quadrilaterals** *5.G.3, 5.G.4* G	**Numerical Patterns & Graphs** *5.OA.1, 5.OA.2, 5.OA.3* OA	**Using the Area Model to Multiply Fractions** *5.NF.4b* NF	**Multiplication with Decimal Numbers** *5.NBT.1, 5.NBT.5, 5.NBT.7* NBT	**Growing Cube Constructions** *5.MD.3a–b, 5.MD.4, 5.MD.5a–b* MD	**Mumford Mole's Meadow** *5.G.1, 5.G.2* G
Calendar Collector	**Layer a Day** *5.OA.1, 5.OA.2, 5.MD.3a–b, 5.MD.4, 5.MD.5a* OA MD	**Carrot Graphing Experiment** *5.G.1 5.G.2* G	**Meter a Day** *5.NBT.1, 5.NBT.2,* NBT	**Student Height & Foot Lengths** *5.MD.1, 5.MD.2, 5.G.1, 5.G.2* MD G	**Time & Money** *5.NF.1* NF	**Two Liters or Spill** *5.MD.1* MD	**Line Plots & Length** *5.NF.1, 5.NF.2* NF	**Collecting Quarters** *5.NBT.7, 5.NF.1* NF NBT	**Two Quarts or Spill** *5.MD.1* MD
Computational Fluency	**Multiple Game** *4.OA.4* OA	**Group It!** *5.OA.1 5.NF.1* OA	**Expression Bingo** *5.OA.1, 5.OA.2* OA	**Put It on the Line, Part 1** *5.NBT.4, 5.NF.1* NF	**Color Ten** *5.NF.1, 5.NF.4a* NF	**I Have, Who Has?** *5.NBT.5, 5.NBT.6, 5.NBT.7* NBT	**Quotient Bingo** *5.NF.3* NF	**Put It on the Line Decimals** *5.NBT.7, 5.NF.1, 5.NF.4a* NBT NF	**Fraction Splat!** *5.NF.1* NF
Solving Problems	**Solving Problems Using Multiples & Factors** *4.OA.4* OA	**Solving Problems with Organized Lists** *5.OA.3 5.NBT.7* NBT	**Using Logical Reasoning to Solve Problems** *5.MP.1, 5.MP.2, 5.MP.3, 5.MP.4, 5.MP.5* MP	**Problems That Suggest Making an Informed Start** *5.MP.1, 5.MP.2, 5.MP.3, 5.MP.4* MP	**Volume Problems** *5.MD.3a–b, 5.MD.4, 5.MD.5c* MD	**Conversion Problems** *5.NBT.1, 5.NBT.2, 5.MD.1* NBT MD	**Student-Posed Problems** *5.NBT.5, 5.NBT.6, 5.NBT.7* NBT	**More Student-Posed Problems** *5.NF.2, 5.NF.4a, 5.NF.7a, 5.NF.7b* NF	**Problems That Emphasize Reasoning** *5.MP.1, 5.MP.2, 5.MP.3, 5.MP.4, 5.MP.6* MP
Problem Strings	**Addition & Subtraction Strings** *5.NBT.7* NBT	**Fraction Addition with Money & Clocks** *5.NBT.7, 5.NF.1* NF	**Fraction Subtraction with Money & Clock Models** *5.NBT.7, 5.NF.1* NF	**Multiplication & Division** *5.NBT.7* NBT	**More Multiplication & Division Strings** *5.NBT.7* NBT	**Multiplying Whole Numbers by Fractions** *5.NF.4a, 5.NF.5b* NF	**Fraction Addition & Subtraction** *5.NF.1* NF	**Fraction Multiplication & Division** *5.NF.4, 5.NF.6, 5.NF.7* NF	**Fraction Multiplication & Division** *5.NF.4, 5.NF.6, 5.NF.7* NF

Primary Focus: OA - Operations & Algebraic Thinking **NBT** - Number & Operations in Base Ten **MD** - Measurement & Data **G** - Geometry **NF** - Fractions **MP** - Math Practices

Number Corner is an additional component of our mathematics curriculum. It is a skill-building program that revolves around the classroom calendar, providing daily practice as well as continual experiences with broader mathematical concepts in 20 minutes of engaging instruction.

Mont Vernon School Board

February 8th, 2023

Mont Vernon Village School

Mont Vernon, NH

Attendees:

Administration: Christine Landwehrle- Assistant Superintendent, SAU #39 Business Administrator- Amy Facey, and Tom Lecklider- Principal MVVS.

Mont Vernon Village School Board Members: Chair- Sarah Lawrence, Vice Chair- Peter Eckhoff, Secretary- Jessica Hinckley, Stephen O'Keefe, and Kristen Clark.

Meeting Minutes: Danae A. Marotta

Public: MV Community Members

Meeting Summary:

- MVVS Principal, Mr. Tom Lecklider, gave his Principal's Report noting that there was a burst pipe that has been repaired and remediated. There was a number of community events that were aided by the PTO, and he was extremely grateful.
- The Board motioned to approve the consent agenda items 1. MVVS February Principal Report, 2. MVSD Jan. Facilities Update, 3. MV Policy Packet from Jan. 5th 2023, 4. Jan 5th 2023 Draft Minutes and 5. Jan 11th Draft Minutes – Public Hearing
- The board motioned to accept the changes and approve the Chair to sign and accept the MOU for the MVEA Track Change.
- The board motioned to approve the two co-curricular proposals Electric Design Club and Fantasy Drawing Club. Principal Lecklider will update the board on the clubs.
- The Board motioned to rescind Policy CBI due to the Superintendent Evaluation as an SAU Board function.

I. Call to Order

Ms. Sarah Lawrence, Chair of the Mont Vernon School Board called the meeting to order at 7:41PM.

II. Public Comment

No Public Comment

III. Consent Agenda

Ms. Lawrence asked for any questions on the Consent Agenda items.

MVVS Principal, Mr. Tom Lecklider, commented that he wanted to give a quick update. As you know we did have a water situation over the weekend. I wanted to thank SAU #39 Facilities Director, Mr. Roger Preston, for his quick response to the situation. We had a burst pipe and Mr. Preston was able to shut the leak down as soon as possible. It did leak for a while into four classrooms, fortunately, there was no damage to items in the room because the leak was in the

hallway outside of those four rooms. It came through the ceiling and insulation and the installation has been removed. We are drying out the walls, the hallway, ceiling, and the attic area. I am happy to say the report yesterday from the folks that came in to do that work is that the drying process is going well. We returned to school yesterday and I want to thank our staff for stepping up. As you can imagine, there was some restructuring of our schedule, rearranging of some of the some of the things that we do but our students stepped up because our staff took it in stride. Yesterday went smooth as it was an early release, but it went as smooth as could be expected given the situation. I want to thank our team for a great job responding to a challenging situation. We anticipate the drying process will complete in the next few days and then the repairs will happen from there.

Principal Lecklider continued, in terms of the report, we are we have kicked off our Bookopoly, our reading challenge. I would like to thank Ms. Garrity and Ms. Holm for coordinating that challenge. Again, this this year it really is a team approach. We've seen a very positive response over the last few weeks. We did have our first student complete the entire challenge the whole Bookopoly board, so that is going very well. Leading up to the holidays, our PTA sponsored the Winter Wonderland community event, and it was very well attended. I want to recognize and thank our PTO as always, a big supporter to our students and our community. I also wanted to recognize Souhegan High School; we had a couple of students that came in for the Hour of Code in our library. That's an annual event that went very well right before break. We've had some events, and we have another event coming up this Saturday, the Sweetheart Dance is coming back, so we anticipate a big crowd. I just wanted to put one plug out, Dan from The Village Store came into our staff meeting last week. We've been bringing in variety of community members into our staff meetings to talk about the partnership with our school. He told the story of The Village Store, and it was really interesting to hear, the story of the community, and how the store has had an impact on the community over the years. Things are going well, thank you.

Ms. Lawrence inquired if Principal Lecklider could give a summary of the enrollment changes between December and January.

Principal Lecklider replied if you look over the course of this year from September until this past month, we're up to 221. We just did a tour today; we have a kindergartner that's going to be starting. We have seen an increase of 11 students over the last five months, it has been a variety of grade levels and new families.

Ms. Lawrence asked for addition questions.

There were no additional questions.

Ms. Lawrence added that the pipe was in the cold portion of the attic and thank you to everyone that helped, Business Administrator Ms. Amy Facey, Mr. Preston, Principal Lecklider, and Interim Superintendent, Mr. Steven Chamberlin.

A community member inquired the location of the burst pipe.

Mr. Chamberlin replied that although it was insulated, there was a portion where just the cold air froze it. We did get lucky in that it could have been a far greater situation.

Ms. Lawrence asked for other questions.

Ms. Hinckley motioned to approve the consent agenda items, 1. MVVS February Principal Report, 2. MVSD Jan. Facilities Update, 3. MV Policy Packet from Jan. 5th 2023, 4. Jan 5th 2023 Draft Minutes 5. Jan 11th Draft Minutes – Public Hearing. Mr. Eckhoff to second the motion. The vote was unanimous, motion passed.

IV. MVEA Track Change Timeline

Ms. Lawrence asked Interim Superintendent, Mr. Steven Chamberlin, if he would address the change.

Mr. Chamberlin noted that the District's key point is making sure we can budget and then we want to make sure as soon as that the academic work is done then we'll start the track change. This change allows us to do is the year before by September 15th, the anticipation of the projection of a track change for the next fiscal and then as soon as the track change, the transcripts are received, and the work is done, the track change will be initiated as soon as possible, the next paycheck. Currently, it's a spring notification which is challenging the budget process. This is a fall notification and then initiation as soon as the credits are acquired and documented. I would think it's the best for both the district, gets budget notification and the members get movement on the track as soon as the transcript credits arrive. It's clear and we are trying to work on this aligning for HR so we can have the same notification and all SAU schools. We appreciate it very much.

Ms. Lawrence asked for board discussion.

There was no comments or questions.

Ms. Hinckley motioned to accept the changes and approve the Chair to sign and accept the MOU. Mr. Eckhoff seconded the motion. There was no discussion. The vote was unanimous, motion passed.

V. Co-Curricular Activity Proposal

Principal Lecklider noted that there are two co-curricular proposals, Electric Design Club and Fantasy Drawing Club. They have had a well rounded co-curricular program this year with a variety of interests. These are two new ones that will take place this spring.

Ms. Hinckley motioned to approve the two co-curricular proposals. Ms. Clark seconded the motion. There was no discussion. The vote was unanimous, motion passed.

Ms. Hinckley asked for an update for the board.

VI. CBI Discussion

Ms. Lawrence noted that we need to vote to rescind this policy. CBI had minutes that showed that this was adopted and yet no copy has been found on the Mont Vernon website. The policy outlined the superintendent evaluation procedure and since the evaluation procedure is an SAU Board function, we need to vote to rescind this policy.

Ms. Hinckley motioned to rescind Policy CBI . Mr. Eckhoff seconded the motion. There was no discussion. The vote was unanimous. motion passed.

VII. Public Input II of II

No Public Comment

VIII. Non-Public Session

Mr. Eckhoff motioned to enter into non-public session RSA 91-A:3 II (c) at 7:57PM Ms. Clark seconded the motion. The vote was unanimous, motion passed.

Bridges in Mathematics

K-5 Math Program
SAU 39

Bridges in Mathematics - Core Beliefs

Bridges in Mathematics believes...

- Learning is a collaborative and social endeavor.
- Learning is a process of constructing meaning to make sense of concepts.
- Learning requires perseverance and willingness to experience disequilibrium.

Bridges in Mathematics - Core Beliefs

Bridges teachers...

- Encourage students to be responsible for their own learning.
- Use questioning strategies and draw out student thinking.
- Promote discourse while creating a safe learning environment.

Bridges students...

- Solve problems using visual models and manipulatives.
- Make and test conjectures while recording their thinking.
- Talk and move around the classroom as they actively engage in learning.

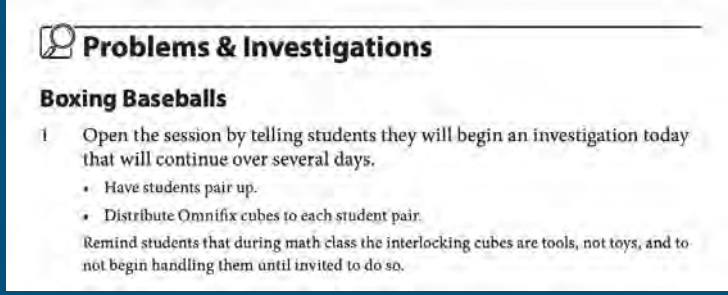
BRIDGES IN MATHEMATICS

Building Mathematical Thinkers

Bridges in Mathematics is a comprehensive PK–5 curriculum that equips teachers to fully address state standards in a rigorous, engaging, and accessible manner. Students gain a deep understanding of concepts, proficiency with key skills, and the ability to solve complex problems. The curriculum is composed of three distinct but integrated components: Problems & Investigations, Work Places and Number Corner.

A unique blend of direct instruction, structured investigation, and open exploration.

Problems and Investigations



Problems & Investigations

Boxing Baseballs

1 Open the session by telling students they will begin an investigation today that will continue over several days.

- Have students pair up.
- Distribute Omnifix cubes to each student pair.

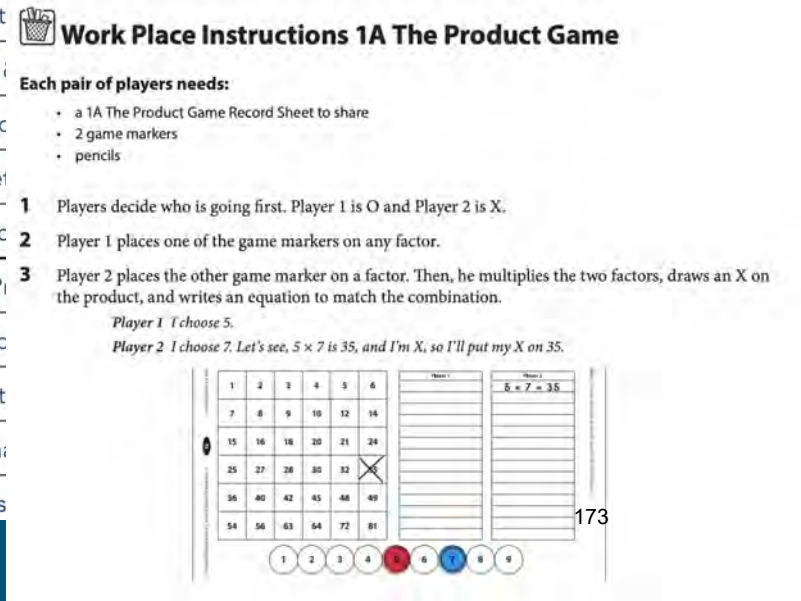
Remind students that during math class the interlocking cubes are tools, not toys, and to not begin handling them until invited to do so.

- Whole-group activities with periods of independent and partner work
- Process:
  - Begins with a problem posed by the teacher
  - Followed by time for students to think independently and work for a period of time
  - Students talk in pairs before reconvening to share and compare strategies and solutions as a whole class

Work Places

- Math stations that offer ongoing practice with key skills
- Are often partner games, but some are independent activities or open-ended partner work
- Introduced and practiced as a whole class, after which students have opportunities to repeat the Work Place over a period of weeks
- Include suggestions that enable the teacher to differentiate each activity to address students' needs for additional support or challenge.

Unit	Work Place Number & Title
1	1A The Product Game
	1B The Multiple Game
	1C Beat the Calculator
	1D Quotients Win
2	2A Clock Fractions
	2B Racing Fractions
	2C Target Practice
3	3A Beat t
	3B Draw
	3C Round
	3D Target
	3E Divisio
4	4A The P
	4B Multip
	4C Beat t
	4D Estima
	4E Lowes



Work Place Instructions 1A The Product Game

Each pair of players needs:

- a 1A The Product Game Record Sheet to share
- 2 game markers
- pencils

1 Players decide who is going first. Player 1 is O and Player 2 is X.

2 Player 1 places one of the game markers on any factor.

3 Player 2 places the other game marker on a factor. Then, he multiplies the two factors, draws an X on the product, and writes an equation to match the combination.

Player 1 I choose 5.

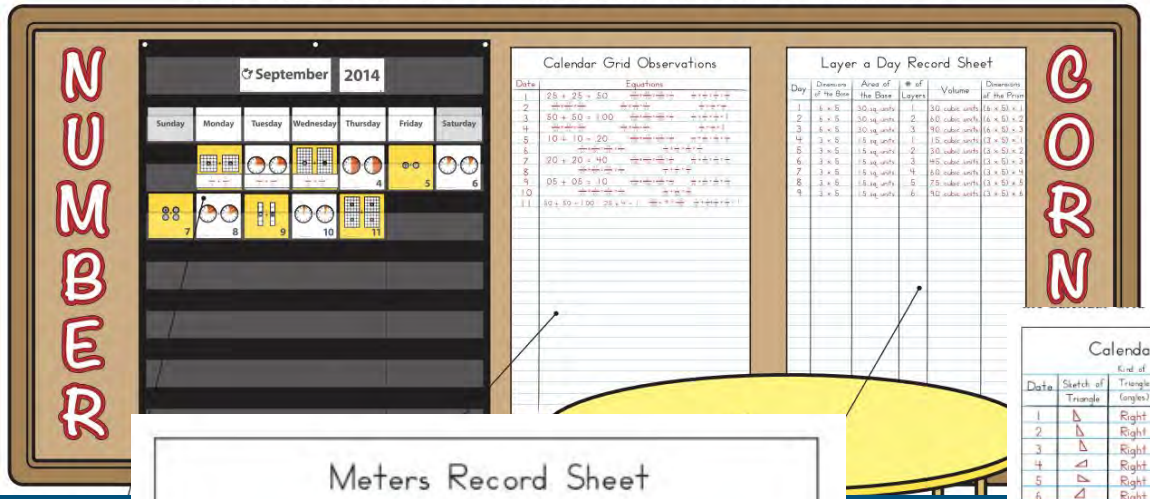
Player 2 I choose 7. Let's see, 5 × 7 is 35, and I'm X, so I'll put my X on 35.

Work Places in Action

Link to Video

September Sample Display

Of the items shown below, some are ready-made and included in your kit; you'll prepare others from classroom materials and the included teacher masters. Refer to the Preparation section in each workout for details about preparing the items shown. The display layout shown fits on a 10' × 4' bulletin board or on two 6' × 4' bulletin boards. Other configurations can be used according to classroom needs. If you have extra space to work with, a Number Corner header may be made from bulletin board letters, student-drawn letters, or other materials.

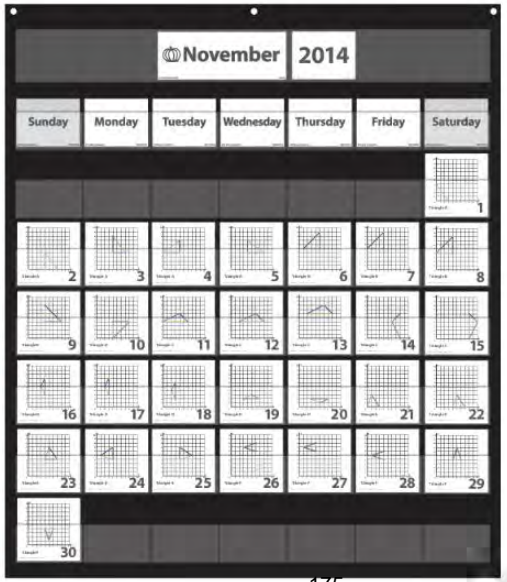


Meters Record Sheet

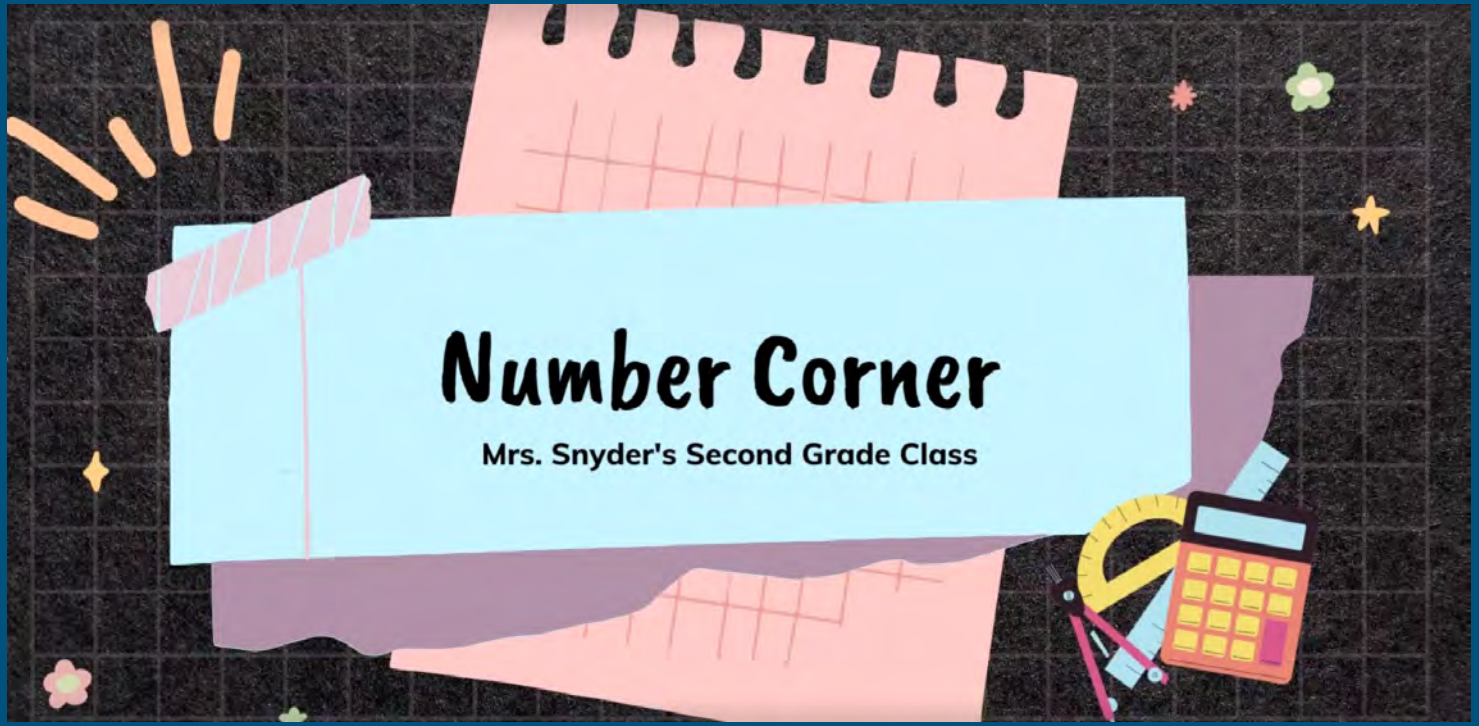
Day	Centimeters	Decimeters	Meters	Decameters	Kilometers
1	100	10	1	$\frac{1}{10}$	$\frac{1}{1,000}$
2	200	20	2	$\frac{2}{10}$	$\frac{2}{1,000}$
3	300	30	3	$\frac{3}{10}$	$\frac{3}{1,000}$
4	400	40	4	$\frac{4}{10}$	$\frac{4}{1,000}$
5	500	50	5	$\frac{5}{10} = \frac{1}{2}$	$\frac{5}{1,000}$
6	600	60	6	$\frac{6}{10}$	$\frac{6}{1,000}$
7	700	70	7	$\frac{7}{10}$	$\frac{7}{1,000}$
8	800	80	8	$\frac{8}{10}$	$\frac{8}{1,000}$
9	900	90	9	$\frac{9}{10}$	$\frac{9}{1,000}$
10	1000	100	10	$\frac{10}{10} = 1$	$\frac{10}{1,000} = \frac{1}{100}$

Number Corner Workouts:

- Calendar Grid
- Calendar Collector
- Computational Fluency
- Solving Problems
- Problem Strings



Video - Number Corner



Link to Video

Math Resource - Timeline

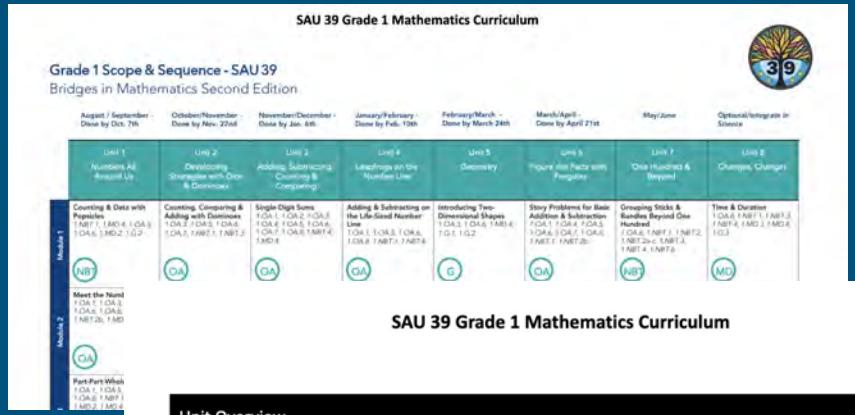
Jan - Feb 2020	Reviewed programs for alignment and fit
March 2021	Math Review Committee formed
March - May 2021	Committee met, reviewed programs, moved 2 to pilot
June 2021	Developed pilot plan and PD supports
2021-2022 School Year	Piloted Bridges in Mathematics and Illustrative Math - Provided PD and implementation support; collected feedback
May/June 2022	Reviewed pilot feedback, determined program to implement

Math Resource - Implementation and Support

- Purchased all necessary materials
- Provided 2 full days of summer PD with Bridges trainers
- Provided 1 day for grade level planning and implementation
- Developed scope and sequence for year 1 implementation
- Provided time during late starts this year for grade level collaboration and implementation support
- October In-Service Day was dedicated to math sessions and grade level work time

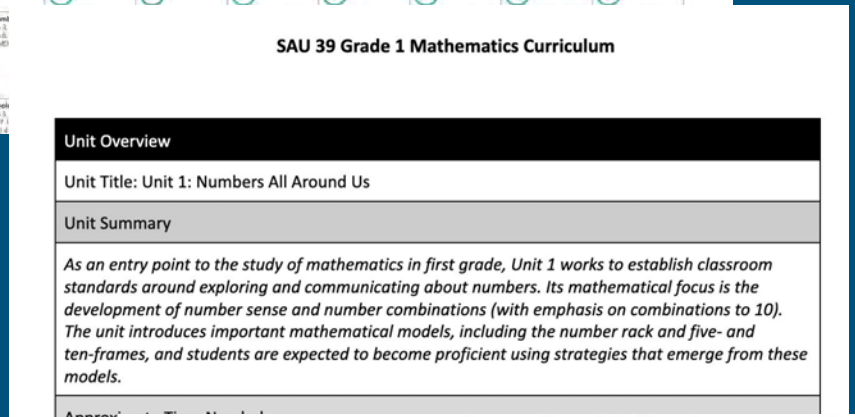
Math Curriculum

- Scope and Sequence
- Unit Details
  - Summary
  - Timeframe
  - Competencies
  - Standards
  - Enduring Understandings
  - Mathematical Concepts
- Number Corner Scope and Sequence

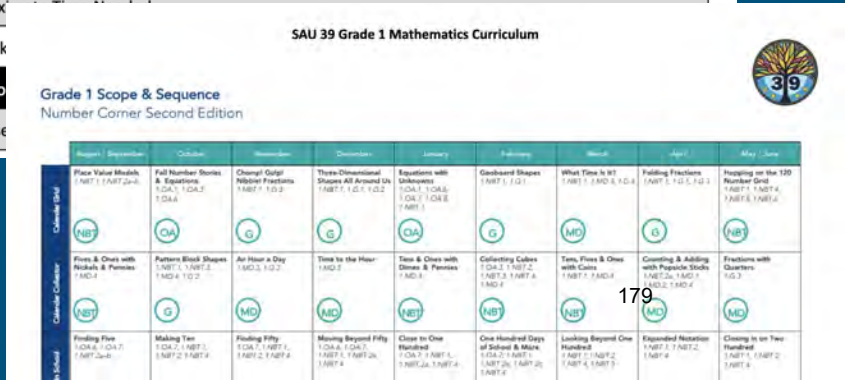

SAU 39 Grade 1 Mathematics Curriculum

Grade 1 Scope & Sequence - SAU 39

Bridges in Mathematics Second Edition


SAU 39 Grade 1 Mathematics Curriculum

Unit Overview
Unit Title: Unit 1: Numbers All Around Us
Unit Summary
As an entry point to the study of mathematics in first grade, Unit 1 works to establish classroom standards around exploring and communicating about numbers. Its mathematical focus is the development of number sense and number combinations (with emphasis on combinations to 10). The unit introduces important mathematical models, including the number rack and five- and ten-frames, and students are expected to become proficient using strategies that emerge from these models.


SAU 39 Grade 1 Mathematics Curriculum

Grade 1 Scope & Sequence

Number Corner Second Edition

Insights Report

Prepared for School Administrative Unit 39

Fall 2021 to Fall 2022

How to Use this Report

About this Report

This report provides clear, actionable insight into your students' academic achievement and growth, as measured by the MAP® Growth™ assessments. Report sections address specific questions to identify areas of strength and areas for improvement. Initial sections provide high-level snapshots, while later sections provide more granular detail. This report serves as a resource for communicating the performance of your students to important stakeholders and for informing decisions about resource allocation and program improvement.

Glossary

Growth: change in achievement over time as measured by the MAP Growth assessment

Median growth percentile (MGP): the middle value when a group of students are rank ordered from lowest to highest growth percentile. A group whose MGP value is 50 showed "typical" improvement over time, relative to NWEA™ norms.

Median status percentile (MSP): the middle value when a group of students are rank ordered from lowest to highest status percentile. A group whose MSP value is 50 showed "typical" achievement at that time, relative to NWEA norms.

Projected college readiness: a prediction about whether students are on track for college readiness, based on their observed MAP Growth score and the MAP Growth college readiness benchmark study.

Projected proficiency: a prediction about students' proficiency status on their state summative test (i.e., what proportion met/exceeded state proficiency standards), based on their observed MAP Growth scores and the relevant NWEA linking study.

Status: achievement at a single point in time as measured by the MAP Growth assessment.

Student growth percentile: expresses how a student's growth compares to NWEA national norms. For example, a student with 75th percentile growth showed improvement over time that was better than 75% of similar students across the United States.

Student status percentile: expresses how a student's achievement at a single point in time compared to NWEA national norms. For example, a student with 50th percentile status performed precisely at the mid-point of similar students across the United States.

Effectiveness Levels

This report uses the following levels to describe the achievement and growth of your students.

GROWTH AND STATUS PERCENTILE VALUES

	≥	<
Substantially above	78.5	100
Moderately above	69.5	78.5
Slightly above	57.5	69.5
About average	42.5	57.5
Slightly below	30.5	42.5
Moderately below	21.5	30.5
Substantially below	0	21.5

Note: these levels are from generally accepted statistical thresholds. These colors are used throughout the report to convey effectiveness levels.

Methodology

This report uses median status and growth percentiles to describe the performance of various groups of students, relative to NWEA norms. Refer to the "NWEA 2020 MAP Norms for Student and School Achievement Status and Growth" report for more information about these percentiles and the combinations of subjects and grades for which norms are available.

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STUDENTS TESTED: FALL 2022

	Reading	Math
K	145	145
1	165	165
2	158	159
3	150	151
4	188	188
5	168	168
6	174	171
7	160	162
8	155	160
9	171	171
10	158	164
11		
12		

The numbers indicate the number of students tested by grade and subject in the fall of 2022. Growth numbers are calculated from students who tested in both the fall of 2021 and fall of 2022, which may be a smaller student count.

Growth and achievement metrics may be less reliable for very small groups of students. Throughout the report, an asterisk (*) will be used to indicate when the number of student scores within that group is fewer than 20, and therefore, the metrics are not reported. A blank indicates that no students fell into that group.

Executive Summary Highlights

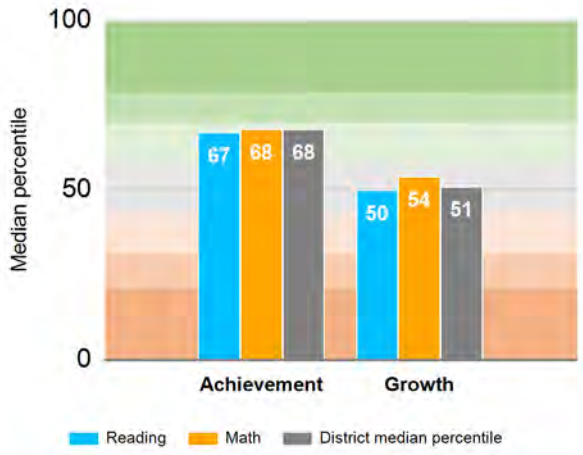
District median student achievement is 68th percentile and district median student growth is 51st percentile.

Achievement is slightly above average, while growth is average**.**

The median status score of all assessments given in fall of 2022 equaled the 68th percentile. One subject equaled the district median: mathematics. One subject was below the district median: reading.

For growth, the median score equaled the 51st percentile, which is average. One subject was above the district median: mathematics. One subject was below the district median: reading.

ACHIEVEMENT AND GROWTH



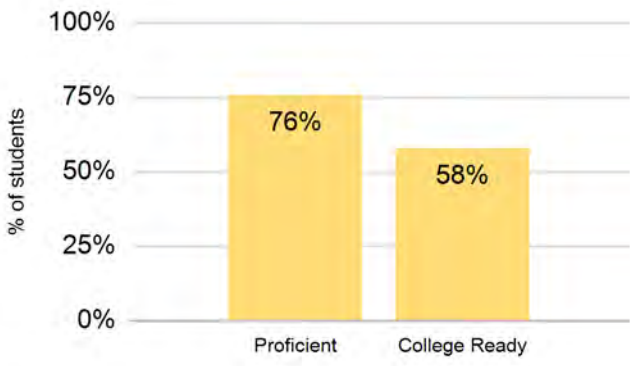
76% of students should meet state standards in at least one subject.

58% of students are on track to meet college readiness in at least one subject.

MAP Growth results predict that 76% of students will meet proficiency standards on state summative tests in at least one subject. 68% will likely meet standards in ELA and 60% in mathematics. 52% of students are predicted to meet standards in both subjects. 23% of students are predicted to not meet either standard.

58% are demonstrating achievement that is on track to meet MAP Growth college readiness benchmarks in at least one subject. 32% are likely on track in both reading and mathematics. 40% are not meeting these benchmarks in either subject.

PROFICIENCY AND COLLEGE READINESS IN AT LEAST ONE SUBJECT



How are District Students Doing?

Overall achievement of district students is slightly above the norm.

Median achievement is 67th percentile; median growth is 51st percentile.

District students demonstrated a median achievement level at the 67th percentile on Fall 2021 MAP Growth assessments. This means that one half of all the students' MAP Growth scores (across all subjects measured) were above the 67th percentile. Looking at growth from fall to fall, the median growth percentile for district students was 51, versus a national median of 50. This means that district students' scores grew at about the same rate as typical students.

Top-Quartile Students: a Larger Proportion than is Typical, with About the Same Growth as the Norm

40% of district students' scores are in the top achievement quartile when all subjects measured are combined, compared to 25% nationally. These students' scores showed about the same growth to similar students', since their median growth percentile was at the 47th percentile from fall to fall. Approximately 17% of district students' scores were in the top achievement decile in fall 2021, compared to 10% nationally. This group grew at the 42nd percentile, which is slightly below average compared to the norm.

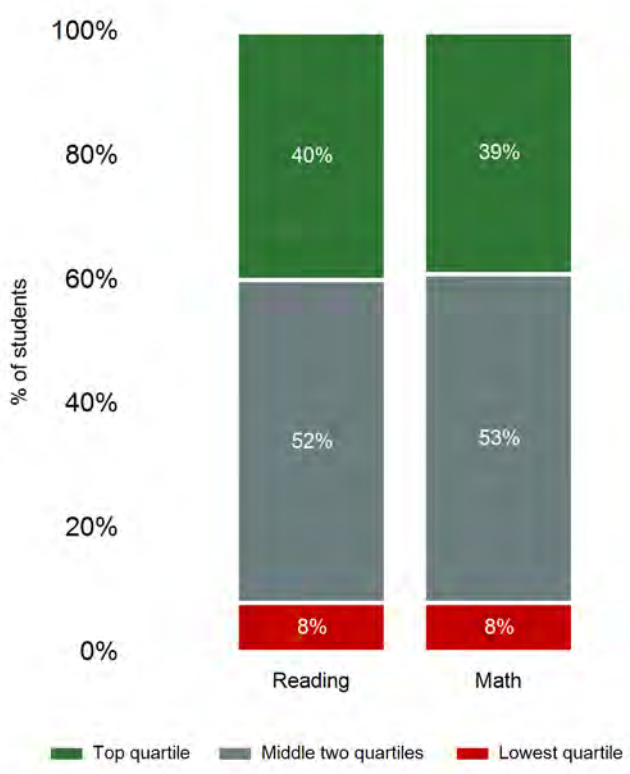
Middle-Two-Quartiles Students: a Typical Proportion, with Growth Approximately Equal to the Norm

Nationally, about 50% of scores fell within the two middle quartiles, versus 52% of district scores. For the district students who produced these scores, median growth was at the 52nd percentile, which is about the same as the national average.

Lowest-Quartile Students: a Smaller Proportion than is Typical, with Growth Moderately Higher than the Norm

Some 8% of district students' scores showed lowest (or bottom) quartile achievement, which is fewer than the 25% that is typical for the country. These students' scores are improving moderately more than similar students, as their median growth percentile was at the 72nd percentile from fall to fall. About 2% of district students demonstrated bottom decile achievement, compared to 10% nationally. This group's scores grew at the 71st median growth percentile from fall to fall, which is moderately above the norm.

HOW MANY DISTRICT STUDENTS ARE ABOVE OR BELOW AVERAGE?



ARE STUDENTS GROWING EQUALLY?

	Lowest quartile	Middle two quartiles	Top quartile
Reading	72nd	51st	43rd
Math	72nd	53rd	51st
Total	72nd	52nd	47th

Fall to Fall growth percentiles

Which Subjects are Strongest?

District students are strong in reading and mathematics for both achievement and growth.

Reading is a high achievement / high growth subject for district students. The median status percentile (MSP) for reading is slightly above the national average. The median growth percentile (MGP) is about average.

Mathematics falls within the high achievement / high growth quadrant. The MSP is above the 50th percentile and slightly above the average range. The MGP is about average.

District Overall:
High Achievement / High Growth

- Median status percentile: 67th
- Median growth percentile: 51st

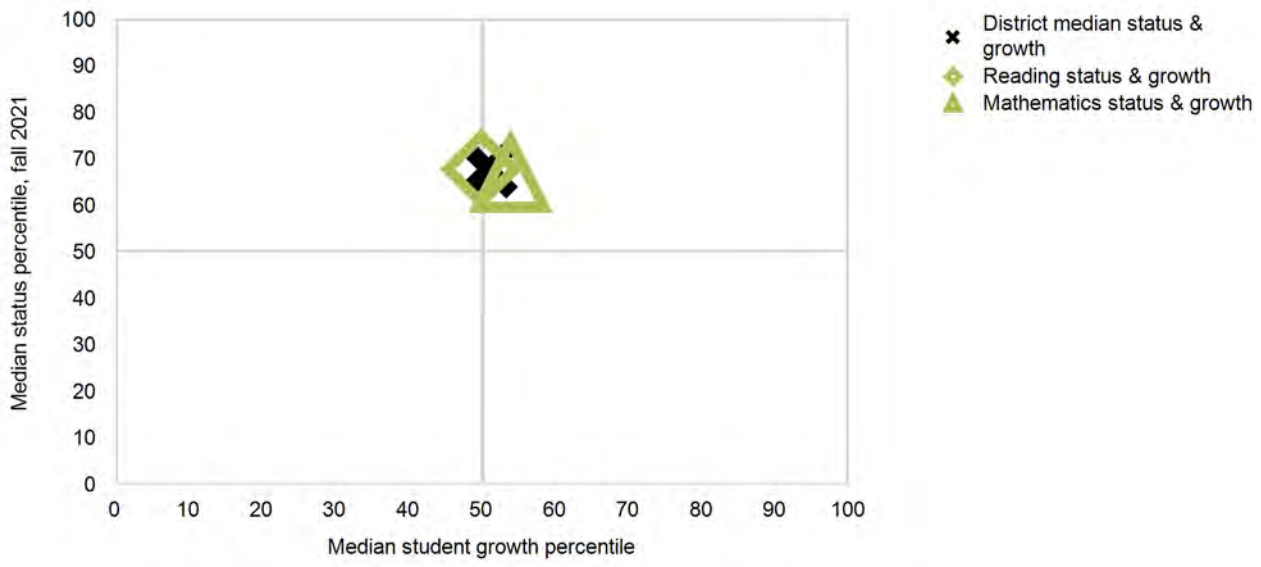
Reading:
High Achievement / High Growth

- Median status percentile: 68th
- Median growth percentile: 50th

Mathematics:
High Achievement / High Growth

- Median status percentile: 67th
- Median growth percentile: 54th

MEDIAN STATUS AND GROWTH PERCENTILE BY SUBJECT FOR ALL STUDENTS



How is School Status & Growth?

50% of district schools (2 of 4) had high achievement and high growth.

No schools had both low achievement and low growth.

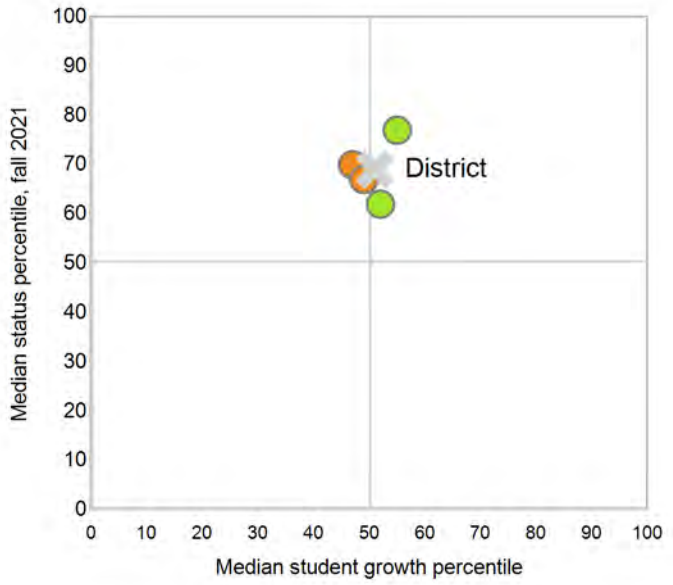
District schools' Median Status Percentiles (MSP) ranged from the 62nd to 77th percentiles. All campuses (100%) demonstrated MSPs equal to or above the 50th percentile.

The Median Growth Percentile (MGP) of district schools ranged from the 47th to 55th percentiles. Half (50%) of campuses produced MGPs equal to or above the 50th percentile.

Two quadrants of the graph had the most schools: upper left quadrant (2 schools or 50%), upper right quadrant (2 schools or 50%).

The following page shows growth and achievement medians by school and subject.

STATUS AND GROWTH BY SCHOOL



OUTLIER SCHOOL BUILDINGS

These schools are listed because of their extreme performance on both status and growth. Within each category, schools below are ranked by growth.

	Status MSP	Growth MGP
High Achievement/High Growth		
Mont Vernon Village School	77th	55th
Amherst Middle School	62nd	52nd
High Achievement/Low Growth		
Souhegan High School	67th	49th
Clark-Wilkins Elementary School	70th	47th

Graph Legend

Each dot shows one school building according to the median status and growth percentiles of its MAP Growth assessments. Colored dots represent the schools in each quadrant that are most extreme, relative to both status and growth.

School-Level Detailed Scores

Median achievement and growth percentiles by school and subject are shown below.

Schools are listed alphabetically.

Color coding shows which quadrant they fall into according to high or low status and growth. Bold schools indicate the schools with the largest deviation from median status and growth scores of 50th percentile each.

High achievement/high growth

High achievement/low growth

Low achievement/high growth

Low achievement/low growth

	Reading		Mathematics	
School	**MSP**	**MGP**	**MSP**	**MGP**
Amherst Middle School	67	51	59	54
Clark-Wilkins Elementary School	67	46	73	48
Mont Vernon Village School	76	56	78	55
Souhegan High School	68	44	67	54

Are We Proficient & College Ready?

68% and 60% of district students are predicted to score at or above proficient levels on state summative tests in reading and mathematics, respectively.

Results predict 55% and 36% of students are on track to be college ready by graduation—in ELA and mathematics, respectively.

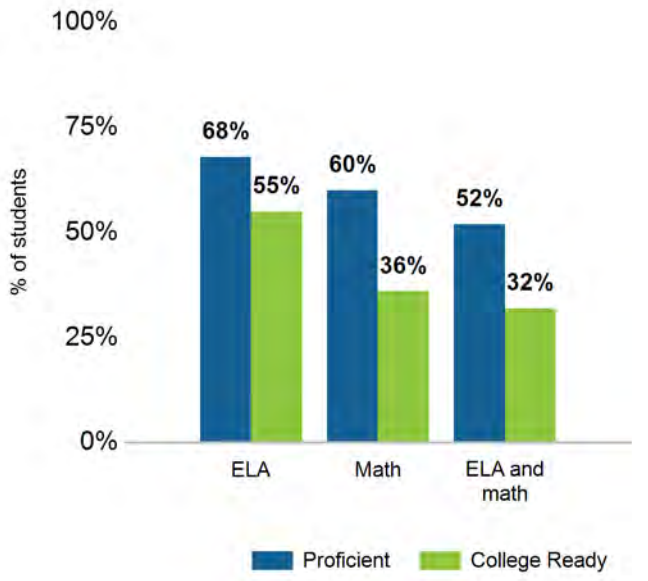
For reading, MAP Growth assessment results from Fall 2022 indicate that 68% of district students are likely to meet or exceed minimum standards for proficiency on the state summative tests. For mathematics, 60% are predicted to meet or exceed the minimum standards for proficiency.

MAP Growth assessment results provide college readiness benchmarks, which predict readiness to successfully perform college-level work. By this measure, 55% of students are on track for college readiness in ELA, while 36% are on track in mathematics.

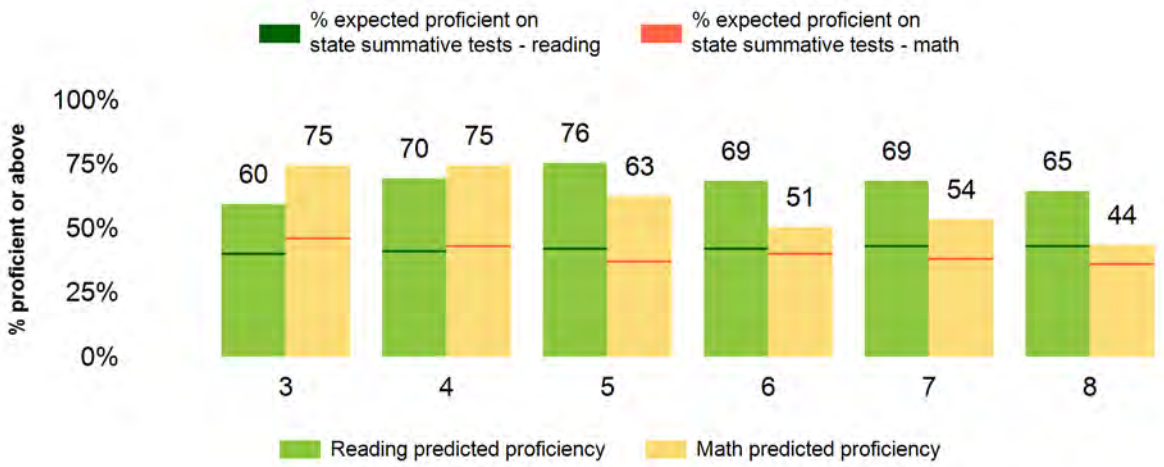
For grade-level results by subject, it is useful to compare predicted proficiency rates of the district with the predicted rates for the nation at large. In the graph below, the orange and green dashes show what percent of students nationally are likely to meet proficiency standards according to the benchmark study. The lower the orange or green dash, the more difficult the proficiency cut score for that grade.

The figure below shows that the predicted proficiency rates for the district are above these national benchmarks for all tested grades with norms in both reading and mathematics.

PROFICIENCY AND COLLEGE READINESS



PERCENT OF STUDENTS PROJECTED TO MEET OR EXCEED STANDARDS BY GRADE AND SUBJECT



How is Status by Grade & Subject?

All grades had above average status in both subjects.

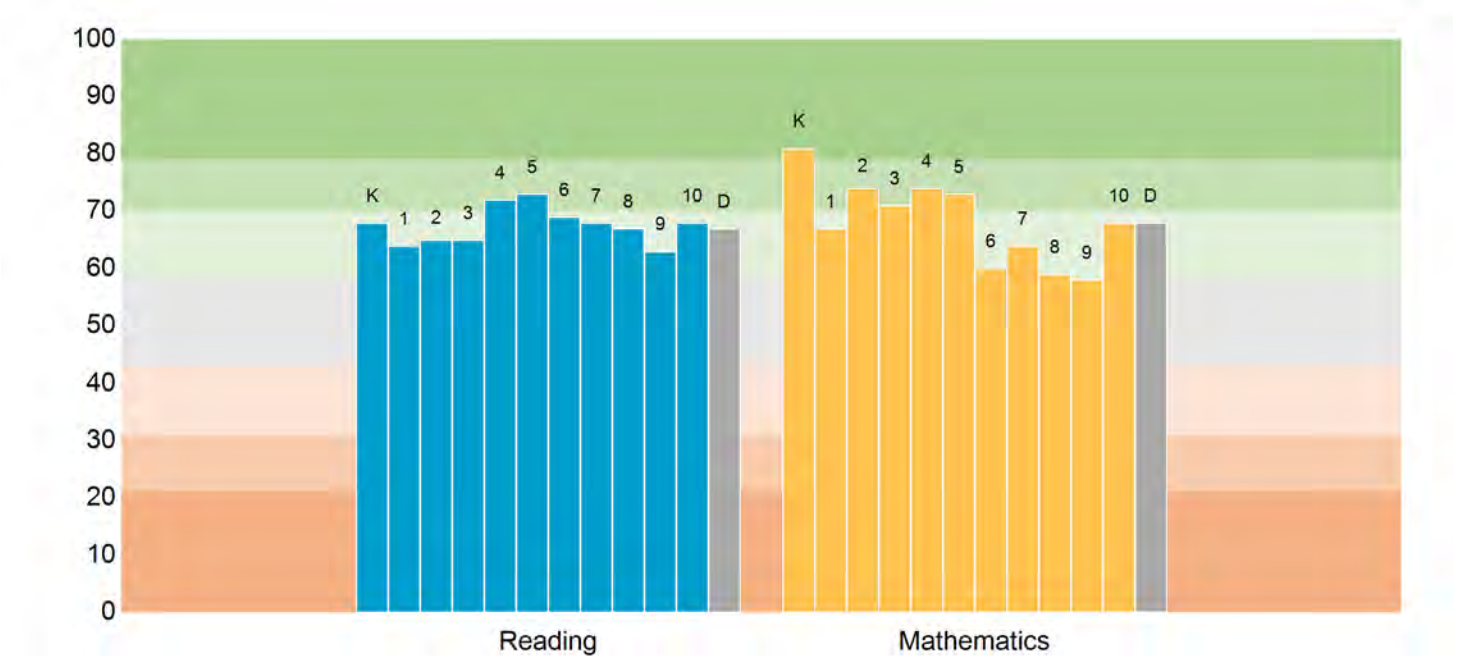
Mathematics had the highest median status percentile for the district overall. The MSP for individual grades ranged from a low of 58th percentile for 9th grade to a high of 81st percentile for K.

Reading had the lowest MSP overall in the district. With a MSP of 73, 5th grade was the highest, while 9th grade was the lowest with a MSP of 63.

ACHIEVEMENT BY GRADE AND SUBJECT

	Reading	Math
Above average	K 1st 2nd 3rd 4th 5th 6th 7th 8th 9th 10th	K 1st 2nd 3rd 4th 5th 6th 7th 8th 9th 10th
Average		
Below average		

MEDIAN STATUS PERCENTILE OF EACH GRADE COMPARED TO NATIONAL AVERAGE



How is Growth by Grade & Subject?

4th, 5th and 7th grades had above average growth in one subject.

1st grade had below average growth in both subjects.

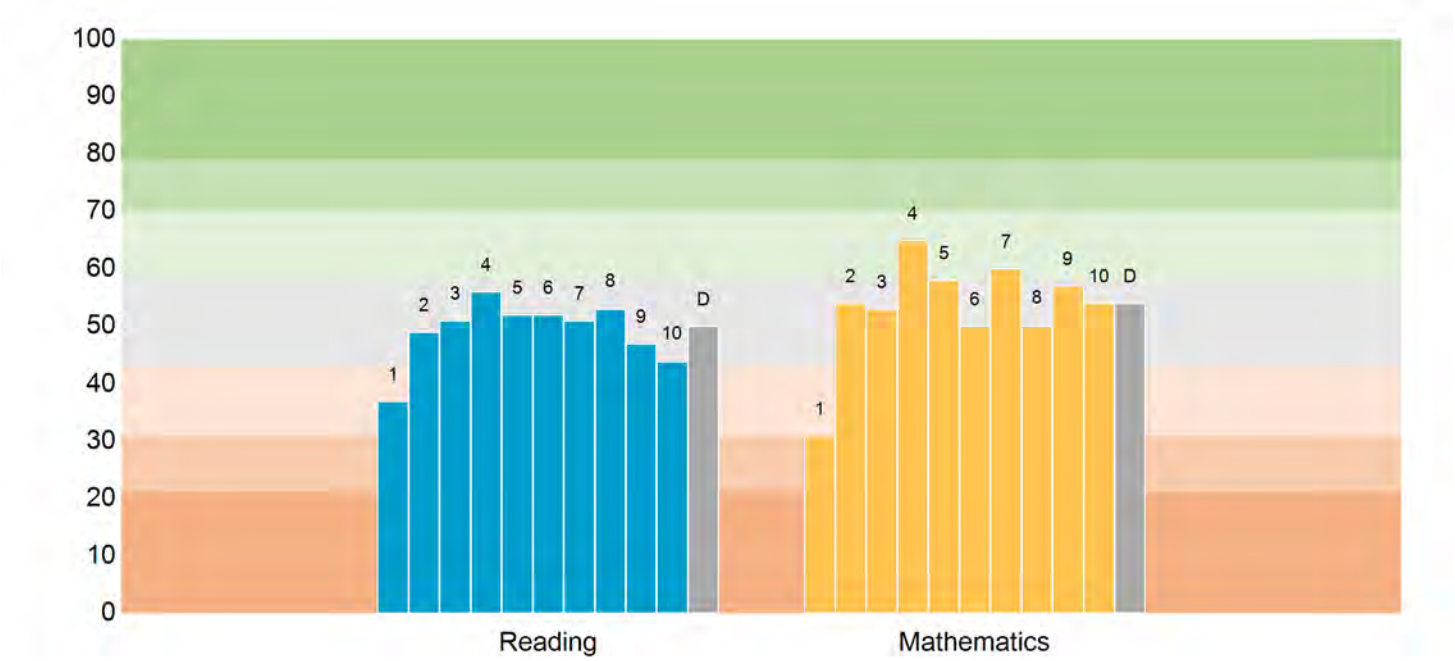
Mathematics had the highest median growth percentile for the district overall. The MGP for individual grades ranged from a low of 31st percentile for 1st grade to a high of 65th percentile for 4th grade.

Reading had the lowest MGP overall in the district. With a MGP of 56, 4th grade was the highest, while 1st grade was the lowest with a MGP of 37.

GROWTH BY GRADE AND SUBJECT

	Reading	Math
Above average		4th 5th 7th
Average	2nd 3rd 4th 5th 6th 7th 8th 9th 10th	2nd 3rd 6th 8th 9th 10th
Below average	1st	1st

MEDIAN GROWTH PERCENTILE OF EACH GRADE COMPARED TO NATIONAL AVERAGE



How Do Boys and Girls Compare?

Both median achievement and growth were about the same for girls and boys, respectively.

By grade-span, there was a slight growth advantage for girls in K-5 reading, and 6-8 mathematics.

Boys had a slight growth advantage in 9-10 mathematics.

Girls overall had a median status percentile of 67, which is slightly above average nationally. The median for boys was the 68th percentile, which is slightly above average.

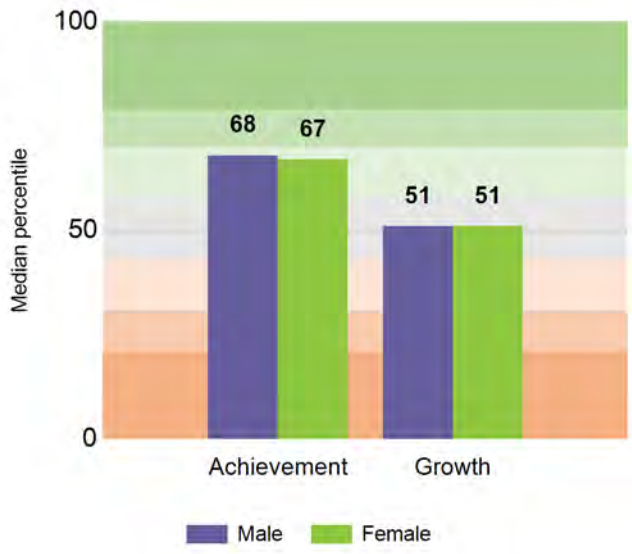
Growth saw a different pattern. Girls had a median growth percentile of 51, which is average. Boys' growth percentile was 51, which is above the national median, but still in the average range.

In grades K-5, girls had slightly larger growth in reading.

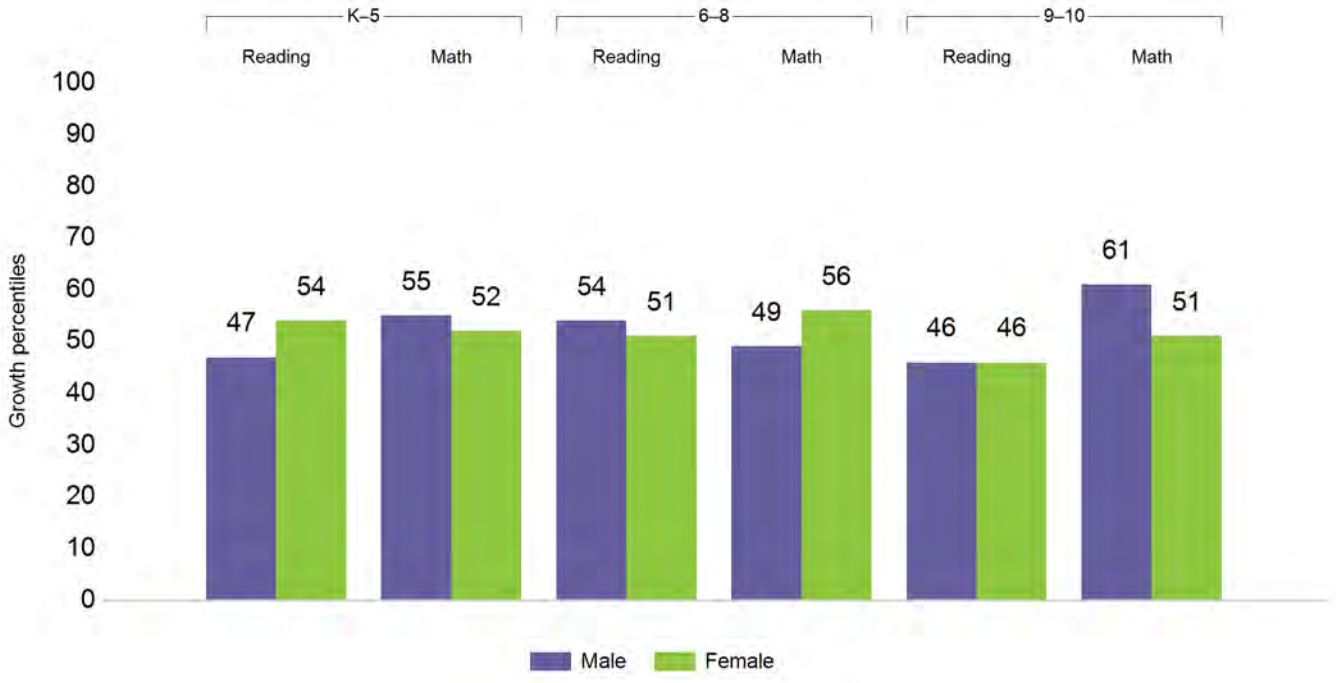
In grades 6-8, girls had slightly larger growth in mathematics.

In grades 9-10, boys had slightly larger growth in mathematics.

ACHIEVEMENT & GROWTH



GROWTH BY SUBJECT AND GRADE SPAN



What About Ethnicity and Gender?

Median status ranges from 64th percentile for Hispanic students to 68th for "Other" students.

Median growth percentile (MGP) ranges from 50th percentile for Hispanic students to 51st for "Other" students.

"Other" students had the highest median status percentile (MSP) compared to other racial or ethnic sub-groups. Their MSP was slightly above average compared to the national norm. Their growth was average.

Hispanic students had the lowest median status percentile (MSP) compared to other racial or ethnic sub-groups. Their MSP was slightly above average nationally. Their growth was average.

The largest difference between female and male students in median growth was in Reading for Hispanics, where males were 50th percentile versus 36th for females.The largest difference between female and male students in median achievement was in Mathematics for Hispanics, where females were 52nd percentile versus 65th for males.

PERCENT OF TEST SCORES BY ETHNICITY

Note: percentages above are of tests taken—not student populations

Note: bold numbers below show where the differences between female and male values are substantial.

ACHIEVEMENT AND GROWTH PERCENTILE BY ETHNICITY AND GENDER

	"Other"		Hispanic		
	Female	Male	Female	Male	
Achievement	69	65	68	67	Reading
	66	72	52	65	Math
Growth	51	48	36	50	Reading
	53	55	50	51	Math

How to Dig Deeper Into the Data?

Premium Reports for Enhanced Analysis

NWEA offers educators the opportunity to order additional premium reports designed to support easy exploration of your student growth data compared to either the national norms or a custom norm group. These reports provide easy-to-access comparative data that educators can use in a variety of ways. The reports can support school improvement work; inform decisions about program planning, professional learning, and curriculum; and help communicate performance to a wide range of audiences.

The Growth Report is created with selected student growth data, providing a view of student growth by school, achievement level, grade, ethnicity, or gender—as compared to national student norms.

The Similar Schools Report takes you beyond national norm comparisons to reveal how students are growing compared to similar students educated in similar schools across the country, providing you with an “apples-to-apples” comparison.

The Instructional Report contains robust information about how well your students understand instructional topics and detailed objectives—and how their knowledge changes over time.

NWEA Professional Learning and Data Coaching

Analyze, Act, Refine, Grow: Embed Data-Driven Education Throughout Your District

Educators deserve professional learning that takes their unique data challenges and opportunities into account. NWEA data coaching starts by helping you analyze a wide range of local data, including student records, examples of student work, and results from different types of assessments. Together we’ll hone your strengths and work to construct and implement data-driven education plans focused on making a positive difference in student learning.

Boost Your Team’s Data Confidence to Benefit Every Student’s Academic Growth

Using quality assessment data effectively and consistently leads to better learning for all our students. Finding time for reflective activities that transform new learning into changed practices can be tough. Our data coaches quickly energize and empower your teams to move beyond common barriers to student learning.

MAP Foundation Series

MAP® Foundation Series workshops let you connect your MAP Growth data to a variety of needs—instructional, programming, and planning—while suiting your goals and your schedule.

Our mix-and-match professional learning options enable your entire staff to access, understand, and apply your school’s or district’s data. Talk to us about your needs: we’re happy to create a custom plan that works for you!

For more information on the Insights Report or any of our premium reports, coaching, and professional learning, please contact your partner accounts representative.

NWEA is a not-for-profit organization that supports students and educators worldwide by providing assessment solutions, insightful reports, professional learning offerings, and research services. Visit NWEA.org to find out how NWEA can partner with you to help all kids learn.

SCHOOL ADMINISTRATIVE UNIT THIRTY-NINE
Amherst, Mont Vernon, and Souhegan Cooperative School Districts

STEVEN CHAMBERLIN
Interim Superintendent of Schools

CHRISTINE M. LANDWEHRLE
Assistant Superintendent

MARGARET A. BEAUCHAMP
Director of Student Services

AMY FACEY
Business Administrator

To: Amy Facey, Business Administrator

From: Krystal Gendreau, Director of Child Nutrition

RE: Nutrition Services Update

DATE: 2/28/23

Dear Amy Facey,

Please see the information below regarding the Mont Vernon School District Child Nutrition Program:

Personnel:

Overall positive changes have been seen this school year throughout the quality of food, service, and student interaction with the addition of Interim Manager Susan Chalker and Child Nutrition Worker Jill McGowan. Susan has included the students in helping create menu options they enjoy, offer Lucky Tray twice a month to help increase participation and worked one on one with the Food Service Director in tightening up inventory and product utilization.

Kitchen & Equipment:

The new equipment has been delivered and installed successfully. The addition of the new dishwasher, oven and stovetop has helped increase the quality of food being able to be offered because of its proper working condition. There is no foreseen need for new equipment in the immediate future.

Financial:

- Please see the attached sheet for the Mont Vernon Village School Child Nutrition Financials.
- MVVS is projecting a loss of $17,855. The loss is due to increased cost in goods and supplies as well as staffing changes and needs. Food Service has seen an increase in cost of goods ranging from 20%-48%.
- Nutrition Services has a fund balance of $31,000. These funds will be used to cover the financial loss at the end of the school year. There is no projected need for a general fund transfer.
- To help decrease the negative financial impact, Nutrition Services is cutting back on staffing hours as well as purchasing. All unnecessary purchases are being denied. The Director is working one on one with the kitchen manager to show how to properly order and create menus based on what is already on hand. From there, the student suggested menu items are incorporated.

							Mont Vernon						
							Food Service						
			3 pay				FY 23		3 pay				
	0	2	20	19	17	16	20	18	20	15	22	6	
	Actual	Actual	Actual	Actual	Actual	Actual	Actual	Proj	Proj	Proj	Proj	Proj	
Revenues	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	Totals
Sales	$0	$461	$5,597	$6,449	$6,009	$5,712	$7,110	$6,122	$7,000	$5,000	$7,500	$1,800	$58,759
Revenue from Special Functions	$0	$0	$0	$0	$0	$14	$0	$0	$0	$0	$0	$0	$14
State/Federal	$0	$0	$1,751	$1,738	$1,714	$1,695	$2,101	$1,658	$2,101	$1,382	$2,200	$553	$16,893
Transfer from GF	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Revenues	$0	$461	$7,349	$8,187	$7,723	$7,421	$9,211	$7,779	$9,101	$6,382	$9,700	$2,353	$75,666
Expenses													
District Allocation	$0	$0	$2,426	$809	$809	$0	$809	$809	$809	$809	$809	$809	$8,894
Wages	$0	$0	$2,906	$4,589	$5,285	$5,150	$3,574	$4,570	$5,057	$4,046	$3,034	$2,832	$41,043
Benefits	$0	$0	$227	$1,071	$633	$1,301	$1,876	$2,861	$878	$699	$528	$479	$10,553
Professional Development	$0	$184	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$184
Repairs	$0	$327	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$327
Travel/Purchased Svs	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Supplies	$0	$0	$3,584	$2,638	$4,171	$3,079	$3,360	$2,808	$3,000	$3,000	$3,000	$1,000	$29,641
Software	$0	$0	$0	$899	$0	$0	$0	$0	$0	$0	$0	$0	$899
Equipment	$0	$0	$0	$424	$156	$0	$0	$1,165	$0	$0	$0	$0	$1,745
Fees	$0	$0	$235	$0	$0	$0	$0	$0	$0	$0	$0	$0	$235
Total Expenses	$0	$511	$9,378	$10,430	$11,054	$9,530	$9,618	$12,213	$9,743	$8,553	$7,371	$5,120	$93,522
Net Income (Loss)	$0	-$51	-$2,029	-$2,242	-$3,330	-$2,109	-$408	-$4,434	-$642	-$2,172	$2,329	-$2,767	-$17,855

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AMY FACEY
Business Administrator

March 4, 2023

To: Sarah Lawrence, Chair, Mont Vernon School Board
Members of the Mont Vernon School Board
From: Steve Chamberlin, Interim Superintendent
RE: 2022-2023 School Calendar/Instructional Time

Executive Summary

This memorandum follows the February 8th School Board meeting. The MVEA provided history and background to their formal request to waive snow days. The meeting concluded with the charge to work with MVEA to determine if the required number of instructional hours were included in a 170-day school year (a school year that did not include snow days).

Background Information

Section Ed 306.18 (the NH minimum standards) regulates the length of school day.
Key points are below:

- Elementary schools must have **945 hours** of instructional time
- Lunch, home room periods, passing time, and breaks shall not be counted toward the required amount of instructional time.
- Elementary schools may count 30 minutes of recess as instructional time for students in kindergarten through grade 6.
- The instructional school day of an individual student shall not exceed 5.75 hours of instructional time in elementary schools.

Summary of Joint Meeting with MVEA

A meeting was held with MVEA leadership and the NEA NH Uniserv Director to determine the number of instructional hours for the 2022-2023 school year. The following was the agreed upon calculation:

- MVEA has at least 5.75 hours of instructional time per day (not including snack/quiet time).
- 5.75 hours is 345 minutes
- 345 minutes x 170 days is 58,650 total minutes
- 58,650 minutes is 977.5 hours
- 977.5 hours – 20 hours due to late starts = 957. 50 hours
- 957 hours is greater than the 945 hours required.

Requested Board Action

1. To determine the last day of school for the 2022-2023 school calendar

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March 4, 2023

To: Sarah Lawrence, Chair Mont Vernon School Board
Members of the Mont Vernon School Board
From: Steve Chamberlin, Interim Superintendent
RE: Nomination Process

Executive Summary
This memorandum describes the nomination process in support of the staffing agenda item for the March 7 School Board Meeting.

Background Information
NH RSA 189:14-a governs the teacher renewal process. Key points are below:

- The word tenure does not appear in NH RSA.
- Teachers are divided into two categories: continuing contract and non continuing contract.
  Continuing contract teachers are those teachers who have taught for five years or more in the same district or three or more years in the same district after achieving continuing contract status in a previous school district in NH. Non Continuing contract teachers are teachers who have not achieved continuing contract status.
- Teachers who have achieved continuing contract status have the right to due process if recommended for nonrenewal by the Superintendent of Schools. Teachers who have not achieved continuing contract status do not have due process rights for a non renewal recommendation.
- The right to due process is a hearing in front of the school board. The standard for a non-renewal of a teacher on continuing contract is the teacher has not met the standards set by the school board by a preponderance of the evidence as presented by the superintendent of schools.
- Teacher for this RSA means any professional employee of any school district whose position requires certification as a professional engaged in teaching. The term also includes principals, assistant principals, librarians, and guidance counselors.

The Nomination Process
All credentialed faculty come to the board for a nomination. This year I requested a written memorandum from principals articulating key points of those teachers who are on the cusp of receiving continuing contract status.

Requested Board Action
1. I recommend the nomination process to be described in public. The nomination slate can be reviewed in nonpublic and then voted on after coming out of the nonpublic session.