

Orange Public Schools

Office of Curriculum & Instruction
2019-2020 Mathematics Curriculum Guide



6th Grade Mathematics

Math in Focus - Unit 1: The Number System

September 9, 2019 – November 13, 2019

ORANGE TOWNSHIP BOARD OF EDUCATION

Tyrone Tarver
President

Brenda Daughtry
Vice President

Members

Guadalupe Cabido
Shawneque Johnson

Sueann Gravesande
Cristina Mateo
Jeffrey Wingfield

Derrick Henry
Siaka Sherif

SUPERINTENDENT OF SCHOOLS

Gerald Fitzhugh, II, Ed.D.

BUSINESS ADMINISTRATOR/BOARD SECRETARY

Adekunle O. James

EXECUTIVE DIRECTOR OF HUMAN RESOURCES

Glasshebra Jones-Dismuke

DIRECTORS

Karen Harris, *English Language Arts/Testing*
Tina Powell, Ed.D., *Math/Science*

Shelly Harper, *Special Services*
Terri Russo, D.Litt., *Curriculum & Instruction*

SUPERVISORS

Olga Castellanos, *Math (K-4)*
Meng Li Chi Liu, *Math (9-12)*
Daniel Ramirez, *Math (5-8)*
Donna Sinisgalli, *Visual & Performance Arts*
Kurt Matthews, *ELA (8-12) & Media Specialist*
Linda Epps, *Social Studies (5-12) / Tech Coordinator*
Tia Burnett, *Testing*
Jahmel Drakeford, *CTE (K-12)/Health & Phys Ed*

Janet McCloudden, Ed.D., *Special Services*
Rosa Lazzizzera, *ELA (3-7) & Media Specialist*
Adrianna Hernandez, *ELA (K-2) & Media Specialist*
Frank Tafur, *Guidance*
Henie Parillon, *Science (K-12)*
Caroline Onyesonwu, *Bilingual/ESL & World Lang*
David Aytas, *STEM Focus (8-12)*
Amina Mateen, *Special Services*

PRINCIPALS

Faith Alcantara, *Heywood Avenue School*
Yancisca Cooke, Ed.D., *Forest St. Comm School*
Robert Pettit, *Cleveland Street School (OLV)*
Cayce Cummins, Ed.D., *Newcomers Academy*
Debra Joseph-Charles, Ed.D., *Rosa Parks Comm School*
Denise White, *Oakwood Ave. Comm School*

Jason Belton, *Orange High School*
Jacquelyn Blanton, *Orange Early Childhood Center*
Dana Gaines, *Orange Prep Academy*
Myron Hackett, Ed.D., *Park Ave. School*
Karen Machuca, *Scholars Academy*
Erica Stewart, Ed.D., *STEM Academy*
Frank Iannucci, Jr., *Lincoln Avenue School*

ASSISTANT PRINCIPALS

Carrie Halstead, *Orange High School*
Mohammed Abdelaziz, *Orange High/Athletic Director*
Oliverto Agosto, *Orange Prep Academy*
Terence Wesley, *Rosa Parks Comm School*
Samantha Sica-Fossella, *Orange Prep. Academy*
Kavita Cassimiro, *Orange High School*
Lyle Wallace, *Twilight Program*
Isabel Colon, *Lincoln Avenue School*

Nyree Delgado, *Forest Street Comm School*
Devonii Reid, Ed.D., *STEM Academy*
Joshua Chuy, *Rosa Parks Comm School*
Gerald J. Murphy, *Heywood Ave School*
Shadin Belal, Ed. D. *Orange Prep Academy*
April Stokes, *Park Avenue School*
Noel Cruz, *Dean of Students/Rosa Parks Comm School*
Patrick Yearwood, *Lincoln Avenue School*

A STORY OF UNITS

	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
K										
1										
2										
3										
4										
5										
6	The Number System			Ratios & Proportional Relationships		Expressions & Equations			Geometry	
7										



The Number System:
Division of fractions, computation of multi-digit numbers, and the system of rational numbers



Ratios & Proportional Relationships:
Understand ratio concepts and use ratio reasoning to solve problems



Expressions & Equations:
Arithmetic with algebraic expressions, solve simple equations/inequalities, and analyze relationships



Geometry: Solve real-world and mathematical problems involving area, surface area, and volume

Table of Contents

I.	Unit Overview	p. 1
II.	Pacing Guide	p. 2-3
III.	Pacing Calendar	p. 4-6
IV.	Math Background	p. 7-8
V.	NJSLA Assessment Evidence Statement	p.9-14
VI.	Differentiated Instruction	p.15-16
VII.	Connections to Mathematical Practices	p.17-18
VIII.	Vocabulary	p.19
IX.	Potential Student Misconceptions	p. 20
X.	Teaching to Multiple Representations	p. 21-23
XI.	Assessment Framework	p. 24-25
XII.	Performance Tasks	p. 26-36
XIII.	Modifications	p. 37-40
XIV.	Core Instruction & Supplemental Resources	p. 41-44

References

“Math in Focus” *Houghton Mifflin Harcourt*. 2015 <<https://my.hrw.com>>

I. Unit Overview

In this unit students will ...

- Apply knowledge of prime factorization to find the greatest common factor or least common multiple of a set of numbers.
- Square and cube to evaluate numerical expressions.
- Use absolute value to interpret real-world situations involving positive and negative numbers.
- Interpret and compute quotients of fractions.
- Solve word problems involving division of fractions by fractions using visual fraction models and equations to represent the problem.
- Fluently divide multi-digit numbers using the standard algorithm.
- Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.

Essential Questions

- How can you add and subtract decimals?
- How can you multiply decimals?
- How can models help us understand multiplication and division of decimals?
- How can you use base ten blocks to model decimal division?
- How do you determine the patterns when multiplying decimal numbers by 10, 100 or 1,000?
- What methods can you use to estimate the product of a decimals and whole number?
- How can you determine where the decimal belongs when multiplying numbers?
- What happens when multiplying a decimal number by a factor smaller than 1?
- What patterns occur in our number system when dividing?

Enduring Understanding

- Rational numbers can be represented in multiple ways and are useful when examining situations involving numbers that are not whole
- Decimal computation is necessary to solve real world application problems.
- Fluently add, subtract, multiply, and divide whole numbers and decimals using the standard algorithm.
- Multiplication of a positive number by a factor smaller than 1 results in a product less than the original number. • (Ex. $23.4 \times 0.8 = 18.72$)
- The decimal/fraction of a quotient must be interpreted as to the real world situation (round up, round down, or exact answer).

II. Pacing Guide

Activity	New Jersey Student Learning Standards (NJSLS)	Estimated Time
Chapter 1		
Chapter 1 Recall Prior Knowledge / Pre-Test (MIF)	6.NS.4, 6.EE.1, 6.EE.2, 6.NS.6, 6.NS.7a, 6.EE.2c, 8.EE.2	1 Block
Chapter 1 (MIF) Transition Lesson	6.NS.4, 6.EE.1, 6.EE.2, 6.NS.6, 6.NS.7a, 6.EE.2c, 8.EE.2	1 Block
Chapter 1 (MIF) Lesson 1.1	6.NS.6, 6.NS.7a	2 Blocks
Chapter 1 (MIF) Lesson 1.2	6.NS.4	1 Block
Chapter 1 (MIF) Lesson 1.3	6.NS.4	2 Blocks
Chapter 1 (MIF) Lesson 1.4	6.EE.1, 6.EE.2	1 Block
Chapter 1 (MIF) Lesson 1.5	6.EE.2c, 8.EE.2	2 Blocks
Chapter 1 (MIF) Wrap-Up / Review	6.NS.4, 6.EE.1, 6.EE.2, 6.NS.6, 6.NS.7a, 6.EE.2c, 8.EE.2	1 Block
Chapter 1 Assessment (MIF) *Optional*	6.NS.4, 6.EE.1, 6.EE.2, 6.NS.6, 6.NS.7a, 6.EE.2c, 8.EE.2	1 Block *Optional*
Total Time		12 Blocks
	Major Work Supporting Content Additional Content	

Activity	New Jersey Student Learning Standards (NJSLS)	Estimated Time
Chapter 2		
Chapter 2 Recall Prior Knowledge / Pre-Test (MIF)	6.NS.6, 6.NS.6a, 6.NS.7a, 6.NS.7b, 6.NS.7c, 6.NS.7d	1 Block
Chapter 2 (MIF) Transition Lesson	6.NS.6, 6.NS.6a, 6.NS.7a, 6.NS.7b, 6.NS.7c, 6.NS.7d	1 Block
Grade 6 Module 3 Lesson 2 (EngageNY) TE / SE	6.NS.5	1 Block
Chapter 2 (MIF) Lesson 2.1	6.NS.5, 6.NS.6, 6.NS.6a, 6.NS.7a, 6.NS.7b	2 Blocks
Chapter 2 (MIF) Lesson 2.2	6.NS.7c, 6.NS.7d	1 Block
Chapter 2 (MIF) Wrap-Up / Review	6.NS.6, 6.NS.6a, 6.NS.7a, 6.NS.7b, 6.NS.7c, 6.NS.7d	1 Block
Chapter 2 Assessment (MIF) *Optional*	6.NS.6, 6.NS.6a, 6.NS.7a, 6.NS.7b, 6.NS.7c, 6.NS.7d	1 Block *Optional*
Unit 1 Assessment 1	6.NS.4, 6.NS.5, 6.NS.6, 6.NS.7	1 Block
Total Time		9 Blocks
	Major Work Supporting Content Additional Content	

6th Grade Unit 1: The Number System

Activity	New Jersey Student Learning Standards (NJSLS)	Estimated Time
Chapter 3		
Chapter 3 Recall Prior Knowledge / Pre-Test (MIF)	6.NS.1, 6.NS.2, 6.NS.3	1 Block
Chapter 3 (MIF) Transition Lesson	6.NS.1, 6.NS.2, 6.NS.3	1 Block
Chapter 3 (MIF) Lesson 3.1	6.NS.1	3 Blocks
Chapter 3 (MIF) Lesson 3.2	6.NS.3	2 Blocks
Chapter 3 (MIF) Lesson 3.3	6.NS.2, 6.NS.3	2 Blocks
Chapter 3 (MIF) Lesson 3.4	6.NS.1, 6.NS.3	2 Blocks
Chapter 3 (MIF) Wrap-Up / Review	6.NS.1, 6.NS.2, 6.NS.3	2 Blocks
Chapter 3 Assessment (MIF) *Optional*	6.NS.1, 6.NS.2, 6.NS.3	1 Block *Optional*
Unit 1 Assessment 2	6.NS.1, 6.NS.2, 6.NS.3	1 Block
Total Time		15 Blocks

Major Work Supporting Content Additional Content

Unit 1 Overview		
Activity	New Jersey Student Learning Standards (NJSLS)	Estimated Time
Chapter 1 (MIF)	6.NS.4, 6.EE.1, 6.EE.2, 6.NS.6, 6.NS.7a, 6.EE.2c, 8.EE.2	12 Blocks
Chapter 2 (MIF)	6.NS.6, 6.NS.6a, 6.NS.7a, 6.NS.7b, 6.NS.7c, 6.NS.7d	9 Blocks
Chapter 3 (MIF)	6.NS.1, 6.NS.2, 6.NS.3	15 Blocks
Solidify Unit 1 Concepts / (Project Based Learning)		5 Blocks
Total Time		41 Blocks

Major Work Supporting Content Additional Content

III. Pacing Calendar

Please complete the pacing calendar based on the suggested pacing (see *Pacing Guide on pages 3-4*).

SEPTEMBER						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

OCTOBER

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

NOVEMBER

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

IV. Math Background

Chapter 1: Positive Numbers and the Number Line

In this chapter, students learn that

- A single number can be represented in many ways. (Example, the number 10 can also be expressed as the fraction $\frac{10}{1}$, the decimal 10.0, in factored form as $2 \cdot 5$, as the square root of 100, or as the cube root of 1,000.
- A number line can help students compare positive whole numbers. On a horizontal number line, numbers increase in value from left to right. On a vertical number line, numbers increase from the bottom to the top.
- The distance between any two whole numbers on a number line can be divided into fractional parts to represent and compare decimals as fractions.
- Prime numbers have exactly two factors, the number 1 and itself. The first prime number is 2 and it is the only even prime number. Similarly, 5 is the only prime ending in 5, since all whole numbers that end in 5 are divisible by 5.
- Composite numbers are greater than one and have more than two factors. Composite numbers are divisible by numbers other than themselves and 1.
- The number 1 is neither prime nor composite because it has only one factor, 1.
- Every integer greater than 1 can be expressed as a product of the prime factors in only one way (except for the order of the factors). The result will always be the same, no matter how you start to factor the number. This is called the Fundamental Theorem of Arithmetic.

Chapter 2: Negative Numbers and the Number Line

In this chapter, students learn that

- On a horizontal number line, positive numbers are to the right of 0 and negative numbers are to the left of 0.
- The number 0 is neither positive nor negative.
- Each number on the number line has an opposite, the number that is the same distance away from 0.
- Number lines help to compare and order negative and positive numbers visually.
- The (-) sign also means “negative” or “the opposite of” a number.
- Negative numbers are used to record temperatures, elevations, money owed, and other quantities.
- The absolute value of a number is its distance from 0 on a number line. Absolute value bars are used to show absolute value: $|7|$ or $|-3|$.
- Since absolute value expresses the distance, the absolute value is always positive $|-2| = 2$
- Two opposites have the same absolute value $|-4| = 4$ and $|4| = 4$.

Chapter 3: Multiplying & Dividing Fractions and Decimals

In this chapter, students learn to

- Divide fractions
- Multiply and divide decimals.
- Relate division to multiplication.
- Apply multiplication and division skills to real-world problems involving fractions and decimals.
- Draw and revise bar models to aid solving multi-step real-world problems.

V. NJSLA Assessment Evidence Statements

NJSLs	Evidence Statement	Clarification	Math Practices	Calculator ?
<u>6.NS.1-2</u>	Solve word problems involving division of fractions by fractions, For example, How much chocolate will each person get if 3 people share $\frac{1}{2}$ lb. of chocolate equally? How many $\frac{3}{4}$ -cup servings are in $\frac{2}{3}$ of a cup of yogurt? How wide is a rectangular strip of land with length $\frac{3}{4}$ mi and area $\frac{1}{2}$ square mi?	<p>i) Only the answer is required; explanations and representations are not assessed here.</p> <p>ii) Note that the italicized examples correspond to three meanings/uses of division: (1) equal sharing; (2) measurement; (3) unknown factor. These meanings/uses of division should be sampled equally.</p> <p>iii) Tasks may involve fractions and mixed numbers but not decimals</p>	MP.4	No
<u>6.NS.2</u>	Fluently divide multi-digit numbers using the standard algorithm.	<p>i) Tasks assess fluency implicitly; simply in virtue of the fact that there are two substantial computations on the EOY (see also 6.NS.3-1, 6.NS.3-2, 6.NS.3-3, 6.NS.3-4). Tasks need not be timed.</p> <p>ii) The given dividend and divisor are such as to require an efficient/standard algorithm (e.g., $40584 \div 76$). Numbers in the task do not suggest any obvious ad hoc or mental strategy (as would be present for example in a case such as $40064 \div 16$).</p> <p>iii) Tasks do not have a context.</p> <p>iv) Only the answer is required.</p> <p>v) Tasks have five-digit dividends and two-digit divisors, with or without remainders.</p>	–	No
<u>6.NS.3-1</u>	Fluently add multi-digit decimals using the standard algorithm.	<p>i) Tasks do not have a context.</p> <p>ii) Only the sum is required</p> <p>iii) The given addends require an efficient/standard algorithm (e.g., $72.63 + 4.875$).</p> <p>iv) Each addend is greater than or equal to 0.001 and less than or equal to 99.999.</p>	–	No

6th Grade Unit 1: The Number System

<u>6.NS.3-2</u>	Fluently subtract multi-digit decimals using the standard algorithm.	<p>i) Tasks do not have a context. ii) Only the difference is required. iii) The given subtrahend and minuend require an efficient/standard algorithm (e.g., $177.3 - 72.635$). iv) The subtrahend and minuend are each greater than or equal to 0.001 and less than or equal to 99.999. Positive differences only.</p>	–	No
<u>6.NS.3-3</u>	Fluently multiply multi-digit decimals using the standard algorithm.	<p>i) Tasks do not have a context. ii) Only the product is required. iii) The given factors require an efficient/standard algorithm (e.g., 72.3×4.8). iv) For purposes of assessment, the possibilities are 1-digit x 2-digit, 1-digit x 3-digit, 2-digit x 3-digit, 2-digit x 4-digit, or 2-digit x 5-digit.</p>	–	No
<u>6.NS.3-4</u>	Fluently divide multi-digit decimals using the standard algorithm.	<p>i) Tasks do not have a context. ii) Only the quotient is required. iii) The given dividend and divisor require an efficient/standard algorithm (e.g., $177.3 \div 0.36$). iv) Tasks are either 4-digit \div 2-digit or 3-digit \div 3-digit. (For example, $14.28 \div 0.68$ or $2.39 \div 0.684$). v) Every quotient is a whole number or a decimal terminating at the tenths, hundredths, or thousandths place.</p>	–	No
<u>6.NS.4-1</u>	Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12.	<p>i) Tasks do not have a context.</p>	–	No
<u>6.NS.4-2</u>	Use the distributive property to express a sum of two whole numbers 1–100 with a common factor as a multiple of a sum of two whole numbers with no common factor. For example, express $36 + 8$ as $4(9 + 2)$.	<p>i) Tasks do not have a context. ii) Tasks require writing or finding the equivalent expression with the greatest common factor.</p>	MP.7	No

6th Grade Unit 1: The Number System

<p><u>6.NS.5</u></p>	<p>Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.</p>	<p>i) Task do not require student to perform any computations. ii) Students may be asked to recognize the meaning of 0 in the situation, but will not be asked to explain.</p>	<p>MP.2</p>	<p>No</p>
<p><u>6.NS.6a</u></p>	<p>Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates.</p> <p>a. Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., $-(-3) = 3$, and that 0 is its own opposite.</p>	<p>i) Tasks have “thin context”² or no context.</p>	<p>MP.5 MP.8</p>	<p>No</p>
<p><u>6.NS.6b-1</u></p>	<p>Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates.</p> <p>b. Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane.</p>	<p>i) Tasks have “thin context” or no context. ii) Students need not recognize or use traditional notation for quadrants (such as I, II, III, IV). iii) Coordinates are not limited to integers.</p>	<p>MP.5</p>	<p>No</p>

6th Grade Unit 1: The Number System

<p><u>6.NS.6b-2</u></p>	<p>Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates.</p> <p>b. Recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.</p>	<p>i) Tasks have “thin context” or no context. ii) Students need not recognize or use traditional notation for quadrants (such as I, II, III, IV). iii) Coordinates are not limited to integers.</p>	<p>MP.5 MP.8</p>	<p>No</p>
<p><u>6.NS.6c-1</u></p>	<p>Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates.</p> <p>c. Find and position integers and other rational numbers on a horizontal or vertical number line diagram</p>	<p>i) Tasks have “thin context” or no context. ii) Coordinates are not limited to integers.</p>	<p>MP.5</p>	<p>No</p>
<p><u>6.NS.6c-2</u></p>	<p>Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates.</p> <p>c. Find and position pairs of integers and other rational numbers on a coordinate plane.</p>	<p>i) Tasks have “thin context” or no context. ii) Students need not recognize or use traditional notation for quadrants (such as I, II, III, IV). iii) Coordinates are not limited to integers.</p>	<p>MP.5</p>	<p>No</p>

6th Grade Unit 1: The Number System

<p><u>6.NS.7a</u></p>	<p>Understand ordering and absolute value of rational numbers.</p> <p>a. Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. For example, interpret $-3 > -7$ as a statement that -3 is located to the right of -7 on a number line oriented from left to right.</p>	<p>i) Tasks do not have a context. ii) Tasks are not limited to integers.</p>	<p>MP.2 MP.5</p>	<p>No</p>
<p><u>6.NS.7b</u></p>	<p>Understand ordering and absolute value of rational numbers.</p> <p>b. Write, interpret, and explain statements of order for rational numbers in real-world contexts. For example, write $-3^{\circ}\text{C} > -7^{\circ}\text{C}$ to express the fact that -3°C is warmer than -7°C.</p>	<p>i) Tasks are not limited to integers. ii) For the explain aspect of 6.NS.7b, see 6.C.4</p>	<p>MP.2 MP.3 MP.5</p>	<p>No</p>
<p><u>6.NS.7c-1</u></p>	<p>Understand ordering and absolute value of rational numbers.</p> <p>c. Understand the absolute value of a rational number as its distance from 0 on the number line.</p>	<p>i) Tasks do not have a context. ii) Tasks are not limited to integers.</p>	<p>MP.2 MP.5</p>	<p>No</p>
<p><u>6.NS.7c-2</u></p>	<p>Understand ordering and absolute value of rational numbers.</p> <p>c. Interpret absolute value as magnitude for a positive or negative quantity in a real-world situation. For example, for an account balance of -30 dollars, write $-30 = 30$ to describe the size of the debt in dollars.</p>	<p>i) Tasks have a context. ii) Tasks are not limited to integers.</p>	<p>MP.2</p>	<p>No</p>
<p><u>6.NS.7d</u></p>	<p>Understand ordering and absolute value of rational numbers.</p> <p>d. Distinguish comparisons of absolute value from statements about order. For</p>	<p>i) Tasks may or may not contain context. ii) Tasks are not limited to integers. iii) Prompts do not present students with a number line diagram, but students may draw</p>	<p>MP.2 MP.5</p>	<p>No</p>



6th Grade Unit 1: The Number System

	example, recognize that an account balance less than – 30 dollars represent a debt greater than 30 dollars.	a number line diagram as a strategy.		
--	---	--------------------------------------	--	--

VI. Differentiated Instruction

Chapter 1

Assessment and Intervention

	ASSESSMENT	 STRUGGLING LEARNERS
DIAGNOSTIC	<ul style="list-style-type: none"> Quick Check in Recall Prior Knowledge in Student Book A, pp. 3–4 Chapter 8 Pre-Test in <i>Assessments</i> 	<ul style="list-style-type: none"> Skills 1–4 in <i>Transition Guide, Course 1</i>
ON-GOING	<ul style="list-style-type: none"> Guided Practice Lesson Check Ticket Out the Door 	<ul style="list-style-type: none"> Reteach worksheets Extra Practice worksheets Activity Book, Chapter 1
END-OF-CHAPTER	<ul style="list-style-type: none"> Chapter Review/Test Chapter 1 Test in <i>Assessments</i>  ExamView® Assessment Suite CD-ROM Course 1 	<ul style="list-style-type: none"> Reteach worksheets

ELL ENGLISH LANGUAGE LEARNERS

Review the terms *factor* and *multiple*.

Say A factor of a whole number is a number that divides exactly into the given number with a remainder of 0.

Model Write the number 36 on the board. Then list its factor pairs: 1×36 , 2×18 , 3×12 , 4×9 , 6×6 . Point out that each factor of 36 is equal to or less than the number.

Say A multiple of a number is a number that is the product of the given number and any other whole number.

Model To show the first 5 multiples of 4, write $4 \times 1 = 4$, $4 \times 2 = 8$, $4 \times 3 = 12$, $4 \times 4 = 16$, and $4 \times 5 = 20$. Point out that each multiple of 4 is greater than or equal to the number.

For definitions, see Glossary, page 272, and



Online Multilingual Glossary.

ADVANCED LEARNERS



- Students can explore using the Sieve of Eratosthenes, a method for finding prime numbers that was developed by the ancient Greek mathematician Eratosthenes.
- Using a hundreds grid, have students sequentially write the numbers from 1 to 100. Tell students to cross out the number 1 since it is neither prime nor composite. Students begin using the sieve by circling the next number on the grid, 2, and crossing out all multiples of 2. Students continue the process for 3, 5, and so on, until the only numbers left are prime.
- As students work, discuss with them why they can stop the process when they get to 11 (*Possible answer: The grid only goes up to 100 and $11 \cdot 11 = 121$, which is greater than 100*).

To provide additional challenges use:

- Enrichment*, Chapter 1
- Student Book A, Brain@Work problem

Chapter 2

Assessment and Intervention

	ASSESSMENT	 STRUGGLING LEARNERS
DIAGNOSTIC	<ul style="list-style-type: none"> • Quick Check in Recall Prior Knowledge in Student Book A, pp. 43–44 • Chapter 2 Pre-Test in Assessments 	<ul style="list-style-type: none"> • Skills 5–6 in <i>Transition Guide, Course 1</i>
ON-GOING	<ul style="list-style-type: none"> • Guided Practice • Lesson Check • Ticket Out the Door 	<ul style="list-style-type: none"> • Reteach worksheets • Extra Practice worksheets • <i>Activity Book</i>, Chapter 2
END-OF-CHAPTER	<ul style="list-style-type: none"> • Chapter Review/Test • Chapter 2 Test in Assessments •  ExamView® Assessment Suite CD-ROM Course 1 	<ul style="list-style-type: none"> • Reteach worksheets

ENGLISH LANGUAGE LEARNERS

Review the terms *positive* and *negative* and use a number line to indicate the position of positive and negative numbers in relation to 0.

Explain In real-world situations, you can look for clue words that tell you whether a number is positive or negative. Words such as *gain*, *above*, and *over* signal a positive number. Words such as *loss*, *below*, and *under* signal a negative number.

Model List pairs of words that indicate positive and negative values in a two-column chart. Then provide students with real-life examples and have students write positive or negative numbers to represent the situations. For example: In a football game, the home team lost 5 yards on a play. What number represents this situation? (–5)

For definitions, see Glossary, page 272, and



Online Multilingual Glossary.

ADVANCED LEARNERS

- Students can make a time line of family events using positive and negative numbers on a number line. Explain that the numbers represent years and 0 is the year students were born. Events that happened before they were born are shown as negative numbers and events that happened after they were born are shown as positive numbers.
- Suggest that students identify 10 important events and list the numbers they will plot before they create their number lines.
- Once students have completed their time lines, have them work with partners to ask questions about the events shown. For example: What event happened the greatest number of years before your birth? After your birth?

To provide additional challenges use:

- *Enrichment*, Chapter 2
- Student Book A, Brain@Work problems

VII. Connections to the Mathematical Practices

1	Make sense of problems and persevere in solving them
	<ul style="list-style-type: none"> – Make sense of real-world rate and proportion problem situations by representing the context in tactile and/or virtual manipulatives, visual, or algebraic models – Understand the problem context in order to translate them into ratios/rates
2	Reason abstractly and quantitatively
	<ul style="list-style-type: none"> – Understand the relationship between two quantities in order to express them mathematically – Use ratio and rate notation as well as visual models and contexts to demonstrate reasoning
3	Construct viable arguments and critique the reasoning of others
	<ul style="list-style-type: none"> – Construct and critique arguments regarding the proportion of a whole as represented in the context of real-world situations – Construct and critique arguments regarding appropriateness of representations given ratio and rate contexts, EX: does a tape diagram adequately represent a given ratio scenario
4	Model with mathematics
	<ul style="list-style-type: none"> – Model a problem situation symbolically (tables, expressions, or equations), visually (graphs or diagrams) and contextually to form real-world connections
5	Use appropriate tools strategically
	<ul style="list-style-type: none"> – Choose appropriate models for a given situation, including tables, expressions or equations, tape diagrams, number line models, etc.
6	Attend to precision
	<ul style="list-style-type: none"> – Use and interpret mathematical language to make sense of ratios and rate – Attend to the language of problems to determine appropriate representations and operations for solving real-world problems. – Attend to the precision of correct decimal placement used in real-world problems
7	Look for and make use of structure
	<ul style="list-style-type: none"> – Use knowledge of problem solving structures to make sense of real world problems – Recognize patterns that exist in ratio tables, including both the additive and multiplicative properties – Use knowledge of the structures of word problems to make sense of real-world problems

6th Grade Unit 1: The Number System

8	Look for and express regularity in repeated reasoning
	<ul style="list-style-type: none">- Utilize repeated reasoning by applying their knowledge of ratio, rate and problem solving structures to new contexts- Generalize the relationship between representations, understanding that all formats represent the same ratio or rate- Demonstrate repeated reasoning when dividing fractions by fractions and connect the inverse relationship to multiplication- Use repeated reasoning when solving real-world problems using rational numbers

VIII. Vocabulary

Term	Definition
Chapter 1 Vocabulary	
<i>Base (of an exponent)</i>	In an expression of the form a^n , the base a is used as a factor n times:
<i>Common Factor</i>	A number that is a factor of two or more whole numbers.
<i>Common Multiple</i>	A number that is a multiple of two or more whole numbers.
<i>Composite Number</i>	A counting number that has more than two factors.
<i>Cube (of a number)</i>	The value of the number raised to an exponent of 3.
<i>Cube Root</i>	A number which, when cubed, is equal to a given number
<i>Exponent</i>	The number to which the base is raised. Example: In 4^5 , the exponent is 5.
<i>Multiple</i>	The product of a whole number and any whole number. Example: 16 is a multiple of 4.
<i>Number Line</i>	A horizontal or vertical line representing whole numbers, fractions, and decimals.
<i>Numerical Expression</i>	A collection of numbers and operations symbols that represent a single value. Example: $3 \times 2 + 7$
<i>Perfect Cube</i>	The cube of a whole number.
<i>Perfect Square</i>	The square of a whole number.
<i>Positive Number</i>	A number that is greater than zero.
<i>Prime Factor</i>	A factor of a number that is also a prime number.
<i>Prime Number</i>	A counting number that has exactly two different factors, 1 and itself. Example: 5 is a prime number because its only factors are 1 and 5.
<i>Square (of a number)</i>	The value of the number raised to an exponent of 2.
<i>Square Root</i>	A number which, when squared, is equal to a given number.
<i>Whole Number</i>	Any of the numbers 0, 1, 2, 3, 4, and so on.
Chapter 2 Vocabulary	
<i>Absolute Value</i>	The distance of a number from zero on a number line.
<i>Negative Number</i>	A number that is less than zero.
<i>Opposite</i>	Having the same numerals but different signs.
Chapter 3 Vocabulary	
<i>Improper Fraction</i>	A fraction in which the numerator is greater than or equal to the denominator.
<i>Mixed Number</i>	A number with a whole number part and a fraction part.
<i>Reciprocals</i>	Two numbers whose product is 1.

IX. Potential Student Misconceptions

Students may believe that dividing by $\frac{1}{2}$ is the same as dividing in half. Dividing by half means to find how many one-halves there are in a quantity, whereas, dividing in half means to take a quantity and split it into two equal parts. $7 \div \frac{1}{2} = 14$ and $7 \div \frac{1}{2} \neq 3$.

Students may understand that $1\frac{1}{2} \div \frac{1}{4}$ means, “How many fourths are in $1\frac{1}{2}$?” So, they set out to count how many fourths (6). But in recording their answer, they can get confused as to what the 6 refers to and think it should be a fraction, and they record $\frac{6}{4}$ when actually it is 6 groups of one-fourths, not $\frac{6}{4}$.

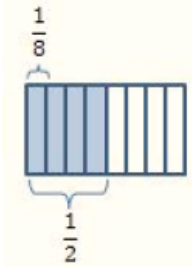
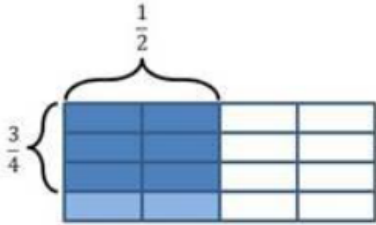
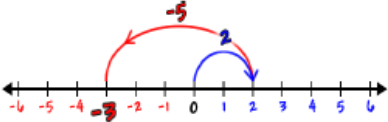



As noted above, knowing what the unit is (the divisor) is critical and must be understood in giving the remainder. In the problem $3\frac{3}{8} \div \frac{1}{4}$, students are likely to count 4 fourths for each whole number (12 fourths) and one more for $\frac{2}{8}$, but then not know what to do with the extra eighths. It is important to be sure they understand the measurement concept of division. Ask, “How much of the next piece do you have?” Context can also help. In this case, if the problem was about pizza servings, there would be 13 full servings and $\frac{1}{2}$ of the next serving.

The most common error in adding fractions is to add both the numerators and the denominators. For example, one teacher asked her fifth graders if the following was correct: $\frac{3}{8} + \frac{2}{8} = \frac{5}{16}$. A student correctly replied, “No because they are eighths. If you put them together, you will still have eighths. See, you can’t make them into sixteenths when you put them together. They are still eighths.”

Many students have trouble finding common denominators because they are not able to come up with common multiples of the denominators quickly. This skill requires having a good command of multiplication facts. Students benefit from knowing that any common denominator will work. Least common denominators are preferred because the computation is more manageable with smaller numbers, and there is less simplifying to do after adding or subtracting. Do not require least common multiples, support all common denominators, and through discussion students will see that finding the smallest multiple is more efficient.

X. Teaching Multiple Representations

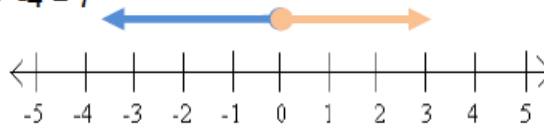
CONCRETE REPRESENTATIONS	
<ul style="list-style-type: none"> Number Lines 	<p>$3 \frac{1}{2} \div \frac{1}{2}$</p> <p>$3 \frac{1}{2} \div \frac{1}{2} = 7$</p>
<ul style="list-style-type: none"> 2-color coin counters to represent negatives and positives Number Lines Thermometers and other equally partitioned tools 	
PICTORIAL REPRESENTATIONS	
<ul style="list-style-type: none"> Number Lines (Division Shown) 	<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>$4 \div \frac{2}{3}$</p> <p>If $\frac{2}{3}$ is one group, how many groups can you make with 4?</p> <p>4 in groups of $\frac{2}{3}$</p> <p>There are 6 groups of $\frac{2}{3}$.</p> </div> <div style="width: 45%;"> <p>If 4 is $\frac{2}{3}$ of a group, how many are in one group?</p> <p>4 is $\frac{2}{3}$ of a group.</p> <p>6 is one group.</p> </div> </div>
<ul style="list-style-type: none"> Rectangular Area Models (Division & Multiplication Shown) 	<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>$\frac{2}{3} \div 4$</p> <p>If 4 is one group, how many groups can you make with $\frac{2}{3}$?</p> <p>$\frac{2}{3}$ in groups of 4</p> <p>There is $\frac{1}{6}$ of a group of 4.</p> </div> <div style="width: 45%;"> <p>If $\frac{2}{3}$ is 4 groups, how many are in one group?</p> <p>$\frac{2}{3}$ is 4 groups</p> <p>$\frac{1}{6}$ is one group.</p> </div> </div>

	<p>$\frac{1}{2} \div \frac{1}{8}$</p>  <p>$\frac{3}{4} \times \frac{1}{2}$</p> 
<ul style="list-style-type: none"> • Number Lines (Horizontal) • Number Lines (Vertical) 	 <p>Figure 3 - Vertical Number Line</p> 
<ul style="list-style-type: none"> • Distance / Vector Model 	<p>Adding Integers Addition is modeled as putting a second vector's tail at the first vector's head and finding where the second vector's head extends to. $3 + -4 = -1$</p>  

Subtracting Integers

Subtraction can be thought of as comparing the two vectors p , and q , by putting both tails together (starting each from zero) and asking the question: "How would one extend a vector from the head of p to the head of q ?" The length and direction of that vector would be the result of the subtraction.

$3 - -4 = 7$



ABSTRACT REPRESENTATIONS

- Applying the Operations
- Applying Properties of Numbers
- Applying the standard algorithms for addition, subtraction, multiplication, and division

- Applying Properties of Numbers

$$p - q = p + (-q)$$

$$p - -q = p + q$$

XI. Assessment Framework

Unit 1 Assessment Framework				
Assessment	NJSLS	Estimated Time	Format	Graded ?
Chapter 1 Pretest (Beginning of Unit) <i>Math in Focus</i>	6.NS.4, 6.EE.1, 6.EE.2, 6.NS.6, 6.NS.7a 6.EE.2c, 8.EE.2	½ Block	Individual	Yes (No Weight)
Chapter 2 Pretest (After Chapter 1) <i>Math in Focus</i>	6.NS.6, 6.NS.6a, 6.NS.7a, 6.NS.7b, 6.NS.7c, 6.NS.7d	½ Block	Individual	Yes (No Weight)
Unit 1 Assessment 1 (After Chapter 2) <i>District Assessment</i>	6.NS.4, 6.NS.6, 6.NS.7	½ Block	Individual	Yes
Chapter 3 Pretest (After Unit 1 Assessment 1) <i>Math in Focus</i>	6.NS.1, 6.NS.2, 6.NS.3	½ Block	Individual	Yes (No Weight)
Unit 1 Assessment 2 (Conclusion of Unit) <i>District Assessment</i>	6.NS.1, 6.NS.2, 6.NS.3	½ Block	Individual	Yes
Chapter 1 Test (Optional) <i>Math in Focus</i>	6.NS.4, 6.EE.1, 6.EE.2, 6.NS.6, 6.NS.7a 6.EE.2c, 8.EE.2	½ Block	Individual	Yes, if administered
Chapter 2 Test (Optional) <i>Math in Focus</i>	6.NS.6, 6.NS.6a, 6.NS.7a, 6.NS.7b, 6.NS.7c, 6.NS.7d	½ Block	Individual	Yes, if administered
Chapter 3 Test (Optional) <i>Math in Focus</i>	6.NS.1, 6.NS.2, 6.NS.3	½ Block	Individual	Yes, if administered
Grade 6 Interim Assessment 1 (Early November) <i>District Assessment</i>	6.NS.1, 6.NS.5, 6.NS.6, 6.NS.7	1 Block	Individual	Yes

Unit 1 Performance Assessment Framework				
Assessment	NJSLS	Estimated Time	Format	Graded ?
Unit 1 Performance Task 1 (Late September) <i>Extending the Number Line</i>	6.NS.C.6	1 Block	Individual	Yes; Rubric
Unit 1 Performance Task 2 (Mid October) <i>Jumping Flea</i>	6.NS.C.7	1 Block	Individual w/ Interview Opportunity	Yes; Rubric
Unit 1 Performance Task 3 (Late October) <i>How Many Containers in One Cup/ Cups in One Container?</i>	6.NS.A.1	1 Block	Individual	Yes; Rubric
Unit 1 Performance Task Option 1 (Optional)	6.NS.C.7a	Teacher Discretion	Teacher Discretion	Yes, if administered
Extended Constructed Response (ECR)* (click here for access)	Dependent on unit of study & month of administration	Up to 30 minutes	Individual	Yes; Rubric

* Use the following links to access ECR protocol and district assessment scoring documents:

- [Assessment & Data in Mathematics Bulletin](#)
- [Extended Constructed Response Protocol](#)

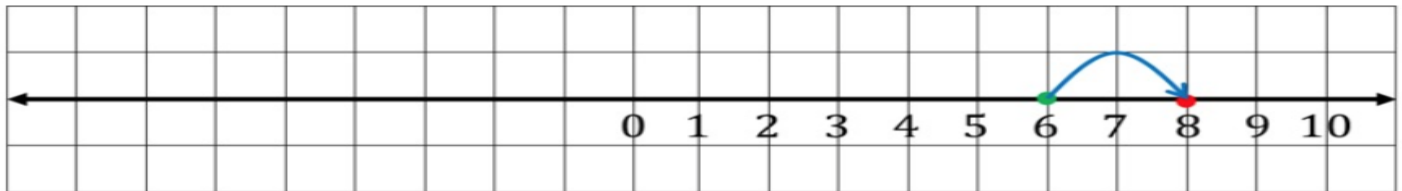
XII. Performance Tasks

Unit 1 Performance Task 1

Extending the Number Line (6.NS.c.6)

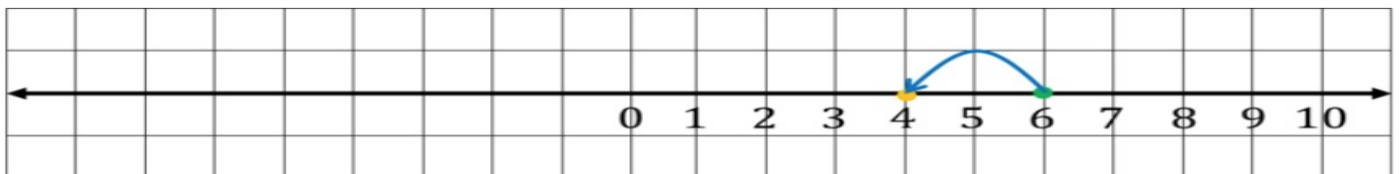
Task

A. Draw a line on graph paper. Make a tick mark in the middle of the line and label it 0. Mark and label 1, 2, 3, ... 10. Since $6+2$ is 2 units to the right of 6 on the number line, we can represent $6+2$ like this:



Describe the location of $3+4$ on the number line in terms of 3 and 4. Draw a picture like the one above.

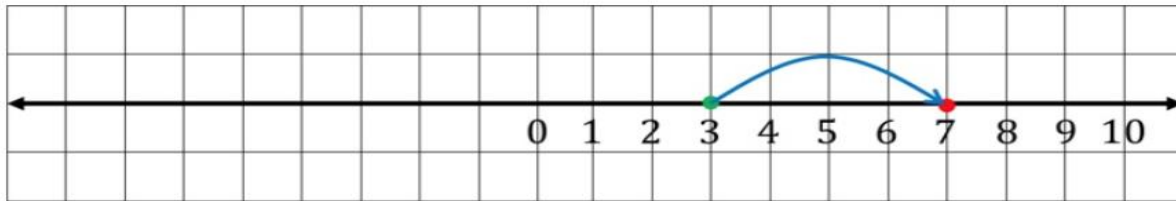
B. $6-2$ is 2 units to the left of 6 on the number line, which we can represent like this:



Describe the location of $3-4$ on the number line in terms of 3 and 4. Draw a picture like the one above

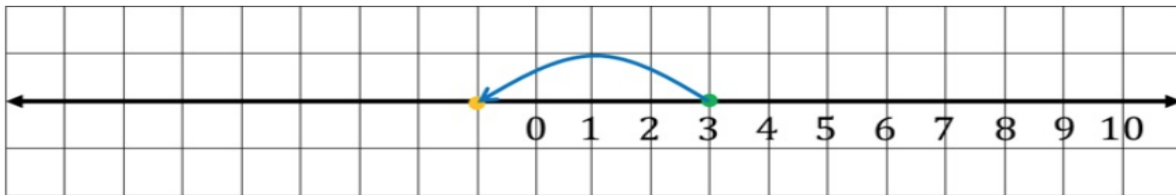
Solution

A. Since $3+4$ is 4 units to the right of 3 on the number line, we can find and represent $3+4$ like this:



We can see from the number line that $3+4=7$.

B. Since $3-4$ is 4 units to the left of 3 on the number line, we can find and represent $3-4$ like this:



The difference $3-4$ has a well determined place on the number line as shown in the picture. This place, however, is not marked and is not a whole number. The difference $3-4$ is one unit to the left of 0.

Unit 1 Performance Task 1 PLD Rubric

SOLUTION

A) Student indicates & illustrates $3+4$ is 4 units to the right of 3 on the number line.

B) Student indicates & illustrates the difference $3-4$ is one unit to the left of 0.

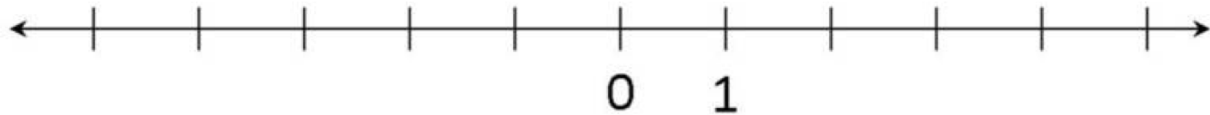
Level 5: Distinguished Command	Level 4: Strong Command	Level 3: Moderate Command	Level 2: Partial Command	Level 1: No Command
<p>Clearly constructs and communicates a complete response based on concrete referents provided in the prompt or constructed by the student such as diagrams that are connected to a written (symbolic) method, number line diagrams or coordinate plane diagrams, including:</p> <ul style="list-style-type: none"> • a logical approach based on a conjecture and/or stated assumptions • a logical and complete progression of steps • complete justification of a conclusion with minor computational error 	<p>Clearly constructs and communicates a complete response based on concrete referents provided in the prompt or constructed by the student such as diagrams that are connected to a written (symbolic) method, number line diagrams or coordinate plane diagrams, including:</p> <ul style="list-style-type: none"> • a logical approach based on a conjecture and/or stated assumptions • a logical and complete progression of steps • complete justification of a conclusion with minor conceptual error 	<p>Clearly constructs and communicates a complete response based on concrete referents provided in the prompt or constructed by the student such as diagrams that are connected to a written (symbolic) method, number line diagrams or coordinate plane diagrams, including:</p> <ul style="list-style-type: none"> • a logical, but incomplete, progression of steps • minor calculation errors • partial justification of a conclusion 	<p>Constructs and communicates an incomplete response based on concrete referents provided in the prompt such as: diagrams, number line diagrams or coordinate plane diagrams, which may include:</p> <ul style="list-style-type: none"> • a faulty approach based on a conjecture and/or stated assumptions • An illogical and incomplete progression of steps • major calculation errors • partial justification of a conclusion 	<p>The student shows no work or justification.</p>

6th Grade Unit 1: The Number System
Unit 1 Performance Task 2

Jumping Flea (6.NS.c.7)

Task

A flea is jumping around on the number line.



- a. If he starts at 1 and jumps 3 units to the right, then where is he on the number line? How far away from zero is he?
- b. If he starts at 1 and jumps 3 units to the left, then where is he on the number line? How far away from zero is he?
- c. If the flea starts at 0 and jumps 5 units away, where might he have landed? d. If the flea jumps 2 units and lands at zero, where might he have started?
- e. The absolute value of a number is the distance it is from zero. The absolute value of the flea's location is 4 and he is to the left of zero. Where is he on the number line?

Solution

It would be a good idea to use a number line to illustrate these solutions.

- a. If he starts at 1 and jumps 3 units to the right, then the flea is at 4. He is 4 units away from zero.
- b. If he starts at 1 and jumps 3 units to the left, then the flea is at -2 . He is $|-2| = 2$ units away from zero.
- c. If the flea starts at 0 and jumps five units away, then he is either at -5 or 5 .
- d. If the flea lands on 0 and jumped 2 units, then he started at either -2 or 2 .
- e. If the absolute value of the flea's location is 4, then he is either at -4 or 4 . Since he is to the left of zero, the flea is at -4 .

Unit 1 Performance Task 2 PLD Rubric

SOLUTION

- A) Student indicates 4. (The flea is 4 units away from zero).
- B) Student indicates -2. (The flea is 2 units away from zero).
- C) Student indicates 5 or -5. (The flea is 5 units away from zero).
- D) Student indicates 2 or -2. (The flea is 2 units away from zero).
- E) Student indicates -4. (The flea is 4 units to the left of zero).

Level 5: Distinguished Command	Level 4: Strong Command	Level 3: Moderate Command	Level 2: Partial Command	Level 1: No Command
<p>Clearly constructs and communicates a complete response based on concrete referents provided in the prompt or constructed by the student such as diagrams that are connected to a written (symbolic) method, number line diagrams or coordinate plane diagrams, including:</p> <ul style="list-style-type: none"> • a logical approach based on a conjecture and/or stated assumptions • a logical and complete progression of steps • complete justification of a conclusion with minor computational error 	<p>Clearly constructs and communicates a complete response based on concrete referents provided in the prompt or constructed by the student such as diagrams that are connected to a written (symbolic) method, number line diagrams or coordinate plane diagrams, including:</p> <ul style="list-style-type: none"> • a logical approach based on a conjecture and/or stated assumptions • a logical and complete progression of steps • complete justification of a conclusion with minor conceptual error 	<p>Clearly constructs and communicates a complete response based on concrete referents provided in the prompt or constructed by the student such as diagrams that are connected to a written (symbolic) method, number line diagrams or coordinate plane diagrams, including:</p> <ul style="list-style-type: none"> • a logical, but incomplete, progression of steps • minor calculation errors • partial justification of a conclusion 	<p>Constructs and communicates an incomplete response based on concrete referents provided in the prompt such as: diagrams, number line diagrams or coordinate plane diagrams, which may include:</p> <ul style="list-style-type: none"> • a faulty approach based on a conjecture and/or stated assumptions • An illogical and Incomplete progression of steps • major calculation errors • partial justification of a conclusion 	<p>The student shows no work or justification.</p>

Unit 1 Performance Task 3

How Many Containers in One Cup / Cups in One Container? (6.NS.A.1)

- a. If $\frac{1}{2}$ cup of water fills $\frac{2}{3}$ of a plastic container, how many containers will 1 cup fill?
- Solve the problem by drawing a picture.
 - Which of the following multiplication or divisions problems represents this situation? Explain your reasoning.

$$\frac{1}{2} \times \frac{2}{3} = ? \quad \frac{1}{2} \div \frac{2}{3} = ? \quad \frac{2}{3} \div \frac{1}{2} = ?$$

- Solve the arithmetic problem you chose in part (3) and verify that you get the same answer as you did with your picture.
- b. If $\frac{1}{2}$ cup of water fills $\frac{2}{3}$ of a plastic container, how many cups of water will the full container hold?
- Solve the problem by drawing a picture.
 - Which of the following multiplication or divisions equations represents this situation? Explain your reasoning.

$$\frac{1}{2} \times \frac{2}{3} = ? \quad \frac{1}{2} \div \frac{2}{3} = ? \quad \frac{2}{3} \div \frac{1}{2} = ?$$

- Solve the arithmetic problem you chose in part (3) and verify that you get the same answer as you did with your picture.
-

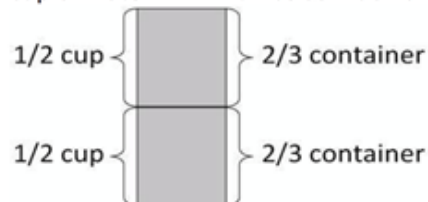
Solution

Part A: Below is a series of pictures that can be used to solve the problem as well as an explanation of what the picture represents at each step.

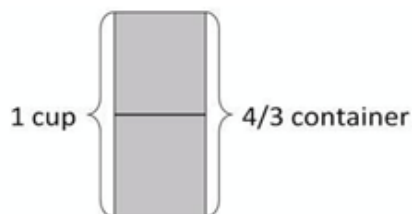
$1/2$ cup of water fills $2/3$ of a plastic container, as shown below.



We know that $1/2$ cup of water fills $2/3$ of a plastic container. The question is asking, "How many containers can be filled with 1 cup of water." Since 1 cup of water is twice as much as $1/2$ cup of water, we know that 1 cup of water will fill twice as much of a container.



The answer to the question can easily be found by relabeling the above picture.



Twice as much water will fill twice as many containers. Thus, 1 cup of water will fill $4/3$ of a container. We are looking for the number of containers filled by 1 cup, and we know $1/2$ of that unknown amount fills $2/3$ of a container. We can write this symbolically as

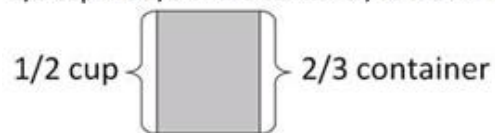
$1/2 \times ? = 2/3$ Which is equivalent to $2/3 \div 1/2$ Computing this by multiplying by the reciprocal, we find that

$$2/3 \div 1/2 = 2/3 \times 2/1 = 4/3$$

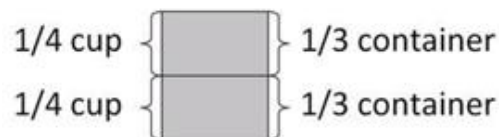
When we solved the problem with a picture, we took the fraction of the container filled by $1/2$ cup and doubled it to find the fraction of a container filled by one cup. This is exactly what we did when we did it through computations: to divide $2/3$ by $1/2$ we multiplied it by 2. The two ways of solving it do result in the same answer and even follow the same process.

Part B: Below is a series of pictures that can be used to solve the problem as well as an explanation of what the picture represents at each step.

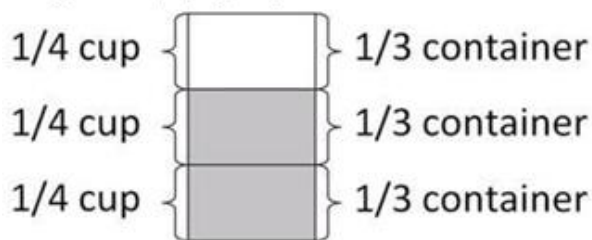
$\frac{1}{2}$ cup fills $\frac{2}{3}$ of the container, as shown in the picture below.



Since the picture represents $\frac{2}{3}$ of the container, $\frac{1}{2}$ of $\frac{2}{3}$ will be $\frac{1}{3}$ of the container. In the picture below, each piece represents $\frac{1}{2}$ of $\frac{2}{3}$, and also represents $\frac{1}{2}$ of $\frac{1}{4}$. Since $12 \times \frac{1}{2} = \frac{1}{4}$, each piece also represents $\frac{1}{4}$ cup.



We have $\frac{2}{3}$ of the container, but we need to know how many cups it takes to fill $\frac{3}{3}$ of the container, so if we take 3 of the thirds, we will have the amount of water needed for the full container. This is the same thing as multiplying $3 \times \frac{1}{4}$.



We can see that $\frac{3}{4}$ cup is needed to fill the whole container.

We are looking for the number of cups needed to fill one container, and we know $\frac{2}{3}$ of that unknown amount requires $\frac{1}{2}$ a cup. We can write this symbolically as

$$\frac{2}{3} \times ? = \frac{1}{2}$$

which is equivalent to $\frac{1}{2} \div \frac{2}{3}$ Computing this by multiplying by the reciprocal, we find that

$$\frac{1}{2} \div \frac{2}{3} = \frac{1}{2} \times \frac{3}{2} = \frac{3}{4}$$

When we solved the problem using a picture, we found $\frac{1}{2}$ of the amount (because we knew it was $\frac{2}{3}$ of the container, and so $\frac{1}{2}$ of that would be $\frac{1}{3}$ of the container) and then we multiplied that amount by 3 to get the amount in the whole container. This is exactly what we did when we multiplied by the reciprocal of $\frac{2}{3}$: multiplying by $\frac{1}{2}$ and then by 3 is the same as multiplying by $\frac{3}{2}$. So whether we solve it with a picture or via computation, we get the same answer (in fact, the process itself is the same).

Unit 1 Performance Task 3 PLD Rubric

SOLUTION

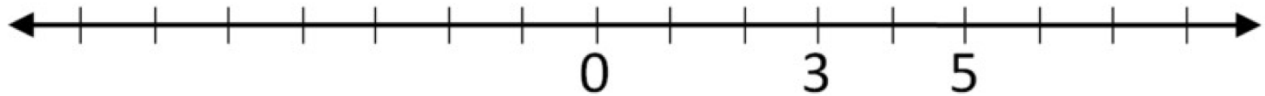
- Student indicates 1 cup of water will fill $\frac{4}{3}$ of a container, states that it's a division problem and shows both the picture and arithmetic work.
- Student indicates $\frac{3}{4}$ cup of water will fill up a container, states that it's a division problem and shows both the picture and arithmetic work.

Level 5: Distinguished Command	Level 4: Strong Command	Level 3: Moderate Command	Level 2: Partial Command	Level 1: No Command
<p>Clearly constructs and communicates a complete response based on concrete referents provided in the prompt or constructed by the student such as diagrams that are connected to a written (symbolic) method, number line diagrams or coordinate plane diagrams, including:</p> <ul style="list-style-type: none"> • a logical approach based on a conjecture and/or stated assumptions • a logical and complete progression of steps • complete justification of a conclusion with minor computational error 	<p>Clearly constructs and communicates a complete response based on concrete referents provided in the prompt or constructed by the student such as diagrams that are connected to a written (symbolic) method, number line diagrams or coordinate plane diagrams, including:</p> <ul style="list-style-type: none"> • a logical approach based on a conjecture and/or stated assumptions • a logical and complete progression of steps • complete justification of a conclusion with minor conceptual error 	<p>Clearly constructs and communicates a complete response based on concrete referents provided in the prompt or constructed by the student such as diagrams that are connected to a written (symbolic) method, number line diagrams or coordinate plane diagrams, including:</p> <ul style="list-style-type: none"> • a logical, but incomplete, progression of steps • minor calculation errors • partial justification of a conclusion 	<p>Constructs and communicates an incomplete response based on concrete referents provided in the prompt such as: diagrams, number line diagrams or coordinate plane diagrams, which may include:</p> <ul style="list-style-type: none"> • a faulty approach based on a conjecture and/or stated assumptions • An illogical and Incomplete progression of steps • major calculation errors • partial justification of a conclusion 	<p>The student shows no work or justification.</p>

Unit 1 Performance Task Option 1

Integers on the Number Line (6.NS.C.7a)

Task



- a. Find and label the numbers -3 and -5 on the number line.
- b. For each of the following, state whether the inequality is true or false. Use the number line diagram to help explain your answers.
- i. $-3 > -5$

 - ii. $-5 > -3$

 - iii. $-5 < -3$

 - iv. $-3 < -5$

XIII. Modifications

Special Education/ 504:	English Language Learners:
<ul style="list-style-type: none"> -Adhere to all modifications and health concerns stated in each IEP. -Give students a MENU options, allowing students to pick assignments from different levels based on difficulty. -Accommodate Instructional Strategies: reading aloud text, graphic organizers, one-on-one instruction, class website (Google Classroom), handouts, definition list with visuals, extended time -Allow students to demonstrate understanding of a problem by drawing the picture of the answer and then explaining the reasoning orally and/or writing , such as Read-Draw-Write -Provide breaks between tasks, use positive reinforcement, use proximity -Assure students have experiences that are on the Concrete- Pictorial- Abstract spectrum by using manipulatives -Implement supports for students with disabilities (click here) - Make use of strategies imbedded within lessons -Common Core Approach to Differentiate Instruction: Students with Disabilities (pg 17-18) - Strategies for students with 504 plans 	<ul style="list-style-type: none"> - Use manipulatives to promote conceptual understanding and enhance vocabulary usage - Provide graphic representations, gestures, drawings, equations, realia, and pictures during all segments of instruction - During i-Ready lessons, click on “Español” to hear specific words in Spanish - Utilize graphic organizers which are concrete, pictorial ways of constructing knowledge and organizing information - Use sentence frames and questioning strategies so that students will explain their thinking/ process of how to solve word problems - Utilize program translations (if available) for L1/ L2 students - Reword questions in simpler language - Make use of the ELL Mathematical Language Routines (click here for additional information) -Scaffolding instruction for ELL Learners -Common Core Approach to Differentiate Instruction: Students with Disabilities (pg 16-17)
Gifted and Talented:	Students at Risk for Failure:
<ul style="list-style-type: none"> - Elevated contextual complexity - Inquiry based or open ended assignments and projects - More time to study concepts with greater depth - Promote the synthesis of concepts and making real world connections - Provide students with enrichment practice that are imbedded in the curriculum such as: <ul style="list-style-type: none"> ● Application / Conceptual Development ● Are you ready for more? - Provide opportunities for math competitions - Alternative instruction pathways available - Common Core Approach to Differentiate Instruction: Students with Disabilities (pg. 20) 	<ul style="list-style-type: none"> - Assure students have experiences that are on the Concrete- Pictorial- Abstract spectrum - Modify Instructional Strategies, reading aloud text, graphic organizers, one-on-one instruction, class website (Google Classroom), inclusion of more visuals and manipulatives, Peer Support - Constant parental/ guardian contact - Provide academic contracts to students & guardians - Create an interactive notebook with samples, key vocabulary words, student goals/ objectives. - Plan to address students at risk in your learning tasks, instructions, and directions. Anticipate where the needs will be, then address them prior to lessons. -Common Core Approach to Differentiate Instruction: Students with Disabilities (pg 19)

21st Century Life and Career Skills:

Career Ready Practices describe the career-ready skills that all educators in all content areas should seek to develop in their students. They are practices that have been linked to increase college, career, and life success. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

<https://www.state.nj.us/education/cccs/2014/career/9.pdf>

- | | |
|--|--|
| <ul style="list-style-type: none">● CRP1. Act as a responsible and contributing citizen and employee.● CRP2. Apply appropriate academic and technical skills.● CRP3. Attend to personal health and financial well-being.● CRP4. Communicate clearly and effectively and with reason.● CRP5. Consider the environmental, social and economic impacts of decisions.● CRP6. Demonstrate creativity and innovation. | <ul style="list-style-type: none">● CRP7. Employ valid and reliable research strategies.● CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.● CRP9. Model integrity, ethical leadership and effective management.● CRP10. Plan education and career paths aligned to personal goals.● CRP11. Use technology to enhance productivity.● CRP12. Work productively in teams while using cultural global competence. |
|--|--|

Students are given an opportunity to communicate with peers effectively, clearly, and with the use of technical language. They are encouraged to reason through experiences that promote critical thinking and emphasize the importance of perseverance. Students are exposed to various mediums of technology, such as digital learning, calculators, and educational websites.

Technology Standards:

All students will be prepared to meet the challenge of a dynamic global society in which they participate, contribute, achieve, and flourish through universal access to people, information, and ideas.

<https://www.state.nj.us/education/cccs/2014/tech/>

8.1 Educational Technology:

All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.

- A. **Technology Operations and Concepts:** Students demonstrate a sound understanding of technology concepts, systems and operations.
- B. **Creativity and Innovation:** Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology.
- C. **Communication and Collaboration:** Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.
- D. **Digital Citizenship:** Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.
- E. **Research and Information Fluency:** Students apply digital tools to gather, evaluate, and use of information.
- F. **Critical thinking, problem solving, and decision making:** Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.

8.2 Technology Education, Engineering, Design, and Computational Thinking - Programming:

All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

- A. **The Nature of Technology: Creativity and Innovation-** Technology systems impact every aspect of the world in which we live.
- B. **Technology and Society:** Knowledge and understanding of human, cultural, and societal values are fundamental when designing technological systems and products in the global society.
- C. **Design:** The design process is a systematic approach to solving problems.
- D. **Abilities in a Technological World:** The designed world in a product of a design process that provides the means to convert resources into products and systems.
- E. **Computational Thinking: Programming-** Computational thinking builds and enhances problem solving, allowing students to move beyond using knowledge to creating knowledge.

Interdisciplinary Connections:

English Language Arts:

L.6.3

Use knowledge of language and its conventions when writing, speaking, reading, or listening.

SL.6.1

Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others' ideas and expressing their own clearly.

W.6.1

Write arguments to support claims with clear reasons and relevant evidence.

XIV. Core Instruction & Supplemental Resources

Core Instruction

MATH IN FOCUS v. 2015
(HOUGHTON MIFFLIN HARCOURT)

GRADE	TEACHER RESOURCES	STUDENT RESOURCES
2-5	<ul style="list-style-type: none"> • Teacher Edition (A & B) • Implementation Guide • Assessment Package • Enrichment Bundle • Extra Practice Guide • Transition Guides • Reteaching Guide • Home -to- School Connection Book • Online Teacher Technology Kit • Fact Fluency • Online Interactive Whiteboard Lessons 	<ul style="list-style-type: none"> • Student Texts (A & B) • Student Workbooks • Online Student Technology Kit • Student Interactivities
6-7	<ul style="list-style-type: none"> • Teacher Edition (A & B) • Implementation Guide • Assessment Package • Enrichment Bundle • Extra Practice Guide • Transition Guides • Reteaching Guide • Home -to- School Connection Book • Online Teacher Technology Kit 	<ul style="list-style-type: none"> • Student Texts (A & B) • Online Student Interactive Manipulatives

5 Practices for Orchestrating Productive Mathematics Discussions

Anticipate

Consider how students might mathematically interpret a problem, the array of strategies—both correct and incorrect—that they might use to tackle it, and how those strategies and interpretations might relate to the mathematical concepts, representations, procedures, and practices that you would like the students to learn.

- Solve the problem yourself first. If possible work with colleagues.
- Ask yourself the following questions:
 - What strategies have students used in the past?
 - What representations are students most likely to use?
 - What incorrect or unproductive strategies are students likely to try?
 - What things might get in the way of students being able to engage with the problem? How can you remove those barriers?
 - What questions will you ask those who struggle?

Monitor

Pay close attention to students' mathematical thinking and solution strategies as they work on the task.

- Create a list of strategies the students may produce.
- Circulate the room. Watch and listen to students as they work.
- If any students use strategies you anticipated, write their name or group number on your list.
- Ask questions that will help students make their thinking visible.
- Ask questions that will help students clarify their thinking.
- Press students to consider aspects of the task to which they need to attend.

Select

Select particular students to share their work with the rest of the class to get specific mathematics into the open for discussion. The selection of particular students and their solutions is guided by the previously anticipated strategies and your assessment of how each approach will contribute to that goal.

- Based on the previously anticipated strategies and the mathematical goal of the activity, decide which student strategies to highlight.
- Select students who will share their work with the class.

Sequence

Make purposeful choices about the order in which students' work is shared to maximize the chances of achieving the mathematical goals for the discussion.

- Based on the mathematical goal, decide on the purpose for the sequence of work. For example: least efficient to most efficient, concrete to abstract, misconceptions to conceptions, or building representations.
- Decide in which order students will present their work.

Connect

Help students draw connections between their solutions and other students' solutions as well as the key mathematical ideas in the lesson. Help students to make judgments about the consequences of different approaches for the range of problems that can be solved, one's likely accuracy and efficiency in solving them, and the kinds of mathematical patterns that can be most easily discerned. Know where you want the discussion to "land" and make choices that are likely to get you there. If necessary, you may have to demonstrate an approach that students didn't come up with themselves.

- As students share, ask questions to elicit and clarify student thinking.
- After each student shares, ask questions to connect it to previously shared work or ask a student to summarize what another student said in their own words.
- Ask students to compare and contrast strategies or representations during the discussion.
- If students did not come up with an approach that you need them to see in order for the discussion to "land," demonstrate this approach and connect it to the work that students did.

IDEAL MATH BLOCK				
Whole Group Instruction	55min	<p>INSTRUCTION (Grades 3 – 8) Daily Routine: Mathematical Content or Language Routine (7 – 10 min)</p> <p>Anchor Task: Anticipate, Monitor, Select, Sequence, Connect Tech Integration: Digital applets embedded within lessons designed to enhance student learning</p> <p>Collaborative Work* Guided Learning/Guided Practice</p> <p>Independent Work (Demonstration of Student Thinking) Additional Activities / Let's Practice</p>		
Rotation Stations (Student Notebooks & Chromebooks Needed)	1-2X 30 min	<p>STATION 1: Focus on current Grade Level Content</p> <p>STUDENT EXPLORATION* Independent or groups of 2-3 Emphasis on MP's 3, 6 (Reasoning and Precision) And MP's 1 & 4 (Problem Solving and Application)</p> <p>TOOLS/RESOURCES Practice Problems Extra Practice/Enrichment Are you ready for more? Put Your Thinking Cap On</p>	<p>STATION 2: Focus on Student Needs</p> <p>TECH STATION Independent</p> <p>TECH INTEGRATION iReady - <i>i-Ready</i> delivers online lessons driven by student data to provide tailored instruction that meets students where they are in their learning trajectory.</p> <p>Dreambox (ELL) – Adaptive online learning platform.</p>	<p>TEACHER STATION: Focus on Grade Level Content; heavily scaffolded to connect deficiencies</p> <p>TARGETED INSTRUCTION 4 – 5 Students</p> <p>TOOLS/ RESOURCES Homework Manipulatives Reteach Workbook Transition Guide *all students seen in 2 weeks</p>
Closure	5 min	<p>INSTRUCTION Exit Ticket (Demonstration of Student Thinking)</p> <p>TOOLS/RESOURCES Notebooks or Exit Ticket Slips</p>		

* Promotes discourse and collaboration



Supplemental Resources

Achieve the Core

Tasks - <https://achievethecore.org/category/416/mathematics-tasks>

Coherence Map - <https://achievethecore.org/page/1118/coherence-map>

Embarc

<https://embarc.online/>

Engage NY

https://www.engageny.org/ccss-library/?f%5B0%5D=field_subject%253Aparents_all%3A13601

iReady Digital Platform

<https://login.i-ready.com/>

Math in Focus

<https://my.hrw.com/>

Illustrative Mathematics

Content Standard Tasks - <https://tasks.illustrativemathematics.org/content-standards>

Practice Standard Tasks - <https://tasks.illustrativemathematics.org/practice-standards>

Open Up Resources - https://access.openupresources.org/sign_in

iM Additional Resources - <https://bit.ly/imshare>

Khan Academy

<https://www.khanacademy.org/math/illustrative-math>

NJDOE Digital Item Library

<https://nj.digitalitemlibrary.com/home?subject=Math>

Ready Teacher Toolbox

<https://teacher-toolbox.com/>