Orange Public Schools

Office of Curriculum & Instruction
2019-2020 Mathematics Curriculum Guide

7th Grade Mathematics (Accelerated)

Math in Focus - Unit 2: Proportionality & Linear Relationships

November 14, 2019 – January 30, 2020

Board Approved: 1.14.2020

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From the New Jersey Student Learning Standards:

Traditional Pathway Accelerated 7th Grade

In **Accelerated 7th Grade,** instructional time should focus on four critical areas: (1) Rational Numbers and Exponents; (2) Proportionality and Linear Relationships; (3) Introduction to Sampling Inference; (4) Creating, Comparing, and Analyzing Geometric Figures

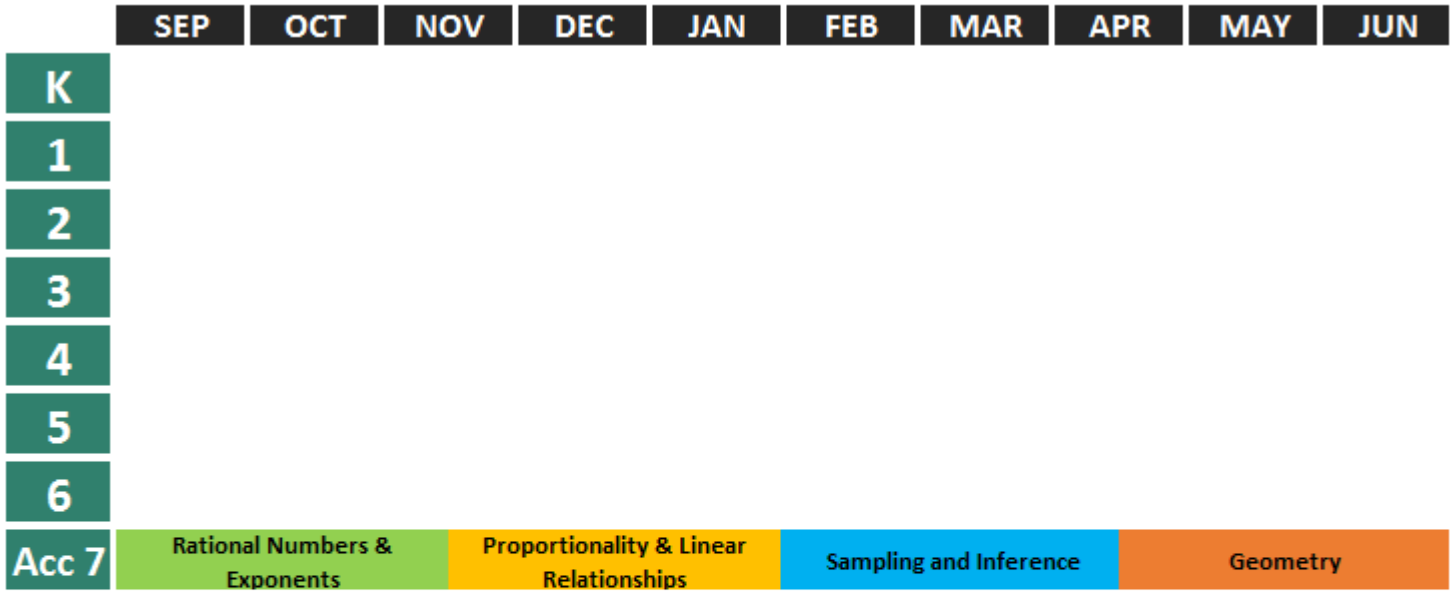
1. Students develop a unified understanding of number, recognizing fractions, decimals (that have a finite or a repeating decimal representation), and percents as different representations of rational numbers. Students extend addition, subtraction, multiplication, and division to all rational numbers, maintaining the properties of operations and the relationships between addition and subtraction, and multiplication and division. By applying these properties, and by viewing negative numbers in terms of everyday contexts (e.g., amounts owed or temperatures below zero), students explain and interpret the rules for adding, subtracting, multiplying, and dividing with negative numbers. They use the arithmetic of rational numbers as they formulate expressions and equations in one variable and use these equations to solve problems. They extend their mastery of the properties of operations to develop an understanding of integer exponents, and to work with numbers written in scientific notation.

2. Students use linear equations and systems of linear equations to represent, analyze, and solve a variety of problems. Students recognize equations for proportions ($y/x = m$ or $y = mx$) as special linear equations ($y= mx + b$), understanding that the constant of proportionality (m) is the slope, and the graphs are lines through the origin. They understand that the slope (m) of a line is a constant rate of change, so that if the input or x-coordinate changes by an amount A, the output or y-coordinate changes by the amount $m \times A$. Students strategically choose and efficiently implement procedures to solve linear equations in one variable, understanding that when they use the properties of equality and the concept of logical equivalence, they maintain the solutions of the original equation.

3. Students build on their previous work with single data distributions to compare two data distributions and address questions about differences between populations. They begin informal work with random sampling to generate data sets and learn about the importance of representative samples for drawing inferences

4. Students continue their work with area from Grade 6, solving problems involving the area and circumference of a circle and surface area of three-dimensional objects. In preparation for work on congruence and similarity, they reason about relationships among two-dimensional figures using scale drawings and informal geometric constructions, and they gain familiarity with the relationships between angles formed by intersecting lines. Students work with three-dimensional figures, relating them to two-dimensional figures by examining cross sections. They solve real- world and mathematical problems involving area, surface area, and volume of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes and right prisms. Students use ideas about distance and angles, how they behave under translations, rotations, reflections, and dilations, and ideas about congruence and similarity to describe and analyze two-dimensional figures and to solve problems. Students show that the sum of the angles in a triangle is the angle formed by a straight line, and that various configurations of lines give rise to similar triangles because of the angles created when a transversal cuts parallel lines. Students complete their work on volume by solving problems involving cones, cylinders, and spheres.

A STORY OF UNITS



Rational Numbers and Exponents: Operations with rational numbers, learn of irrational numbers, expressions and equations work with radical and integer exponents

Proportionality and Linear Relationships: Analyze proportional relationships, generate equivalent expressions using properties of operations, and understand connections between proportional relationships and

Sampling and Inference: Use random sampling, draw inferences, investigate chance processes, develop, use, and evaluate probability models

Geometry: construct geometrical figures, understand congruence and similarity using physical models, and solve real-life problems involving angle measure, area, surface area and volume

Table of Contents

References

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

I. Unit Overview

Chapter4: Algebraic Equations and Inequalities: In this chapter, students learn to identify equivalent equations. They solve multi-step equations with variables on both sides, including equations with parentheses, and they learn to solve real-world problems algebraically. After solving equations, students learn how to solve inequalities, graph the solution set of an inequality, and use inequalities to solve real-world problems.

EngageNY Grade 7 Module 1: Ratios and Proportional Relationship (Topic A - C): Students explore multiple representations of proportional relationships by looking at tables, graphs, equations, and verbal descriptions. Students extend their understanding about ratios and proportional relationships to compute unit rates for ratios and rates specified by rational numbers**.**

EngageNY Grade 7 Module 3: Expressions and Equations (Topic B): This module consolidates and expands upon students' understanding of equivalent expressions as they apply the properties of operations to write expressions in both standard form and in factored form. Students use the number line to understand the properties of inequality and recognize when to preserve the inequality and when to reverse the inequality when solving problems leading to inequalities. They interpret solutions within the context of problems.

EngageNY Grade 8 Module 4: Linear Equations (Topic A – C): students extend what they already know about unit rates and proportional relationships to linear equations and their graphs. Students understand the connections between proportional relationships, lines, and linear equations in this module. Students learn to apply the skills they acquired in Grades 6 and 7, with respect to symbolic notation and properties of equality to transcribe and solve equations in one variable and then in two variables**.**

Essential Questions

- How can we generate equivalent expressions?
- What is an equation?
- How can we create an equation (or inequality) for a given situation?
- What does it mean to evaluate algebraic expressions?
- How can we solve multi-step equations?
- How can we check that solution?
- How can we simplify equations, using the number properties, before looking for a solution?
- How should we apply inverse operations to solve equations and or inequalities?
- How should we deal with negative coefficients, when solving inequalities?
- How can we model solutions to multi-step inequalities?

Enduring Understanding

- Expressions are powerful tools for exploring, reasoning about, and representing situations.
- Variables have many different meanings, depending on context and purpose.
- Variables permit writing expressions whose values are unknown or vary under different circumstances.
- Equations and inequalities may be used as models to solve mathematical and real-world problems.
- Real world problems may be represented by the formation and solution of linear equations.
- An inequality is another way to describe a relationship between expressions; instead of showing that the values of two expressions are equal, inequalities indicate that the value of one expression is greater than (or greater than or equal to) the value of the other expression.
- In solving an inequality, multiplying or dividing both expressions by a negative number reverses the sign that indicates the relationships between the two expressions

II. Pacing Guide

Activity	New Jersey State Learning Standards (NJSLS)	Estimated Time
Grade 7 MIF Chapter 4 Pretest	7.EE.4	1 Block
Grade 7 Module 1 (EngageNY) Lesson 1-5	7.RP.1, 7.RP.3	5 Blocks
Grade 7 Module1 (EngageNY) Lesson 6-10	7.RP.1, 7.RP.2, 7.RP.3	5 Blocks
Unit 2 Performance Task 1	7.RP.2, 7.RP.3	½ Block
Grade 7 Module 1 (EngageNY) Lesson 11-15	7.RP.1, 7.RP.2, 7.RP.3	5 Blocks
Unit 2 Assessment 1 *(Optional)*	7.RP.1, 7.RP.2, 7.RP.3	½ Block
Grade 7 Chapter 4 (MIF) Lesson 1-5	7.EE.1, 7.EE.2, 7.EE.3, 7.EE.4	4 Blocks
Grade 7 Module 3 (EngageNY) Lesson 7-15	7.EE.3, 7.EE.4, 7.G.5	8 Blocks
Unit 2 Assessment 2 *(Optional)*	7.EE.1, 7.EE.2, 7.EE.3, 7.EE.4	1 Block
Grade 8 Module 4 (EngageNY) Lesson 1-9	8.EE.5, 8.EE.6, 8.EE.7	8 Blocks
Unit 2 Performance Task 2	7.EE.3	½ Block
Grade 8 Module 4 (EngageNY) Lesson 10-13	8.EE.5, 8.EE.6, 8.EE.7	3 Blocks
Unit 2 Performance Task 3	8.EE.5	½ Block
Grade 8 Module 4 (EngageNY) Lesson 15-22	8.EE.5, 8.EE.6, 8.EE.7	7 Blocks
Unit 2 Assessment 3 *(Optional)*	8.EE.5, 8.EE.6, 8.EE.7	1 Block
Total Time		**50 Blocks**

Major Work Supporting Content Additional Contents

III. Pacing Calendar

Please complete the pacing calendar based on the suggested pacing (*see Pacing Guide)*.

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**

DECEMBER

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	27	28	29	30

JANUARY

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	

IV. NJSLA Assessments Evidence Statements

NJSLS	Evidence Statement	Clarification	Math Practices	Calculator?
7.RP.1	Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. For example, if a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction miles per hour, equivalently 2 miles per hour.	i) Tasks have a context	2, 6, 4	Yes
7.RP.2a	Recognize and represent proportional relationships between quantities. a. Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.	i) Tasks have "thin context" or no context. ii) Tasks may offer opportunities for students to investigate a relationship by constructing graphs or tables; however, students can opt not to use these tools. iii) Tasks are not limited to ratios of whole numbers	2,5	Yes
7.RP.2b	Recognize and represent proportional relationships between quantities. b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.	i) Pool should contain tasks with and without context. ii) Tasks sample equally across the listed representations (graphs, equations, diagrams, and verbal descriptions).	2,5,8	No
7.RP.2c	Recognize and represent proportional relationships between quantities. c. Represent proportional relationships by equations. *For example*, *if total cost t is proportional to the number n of items purchased at a constant price p*, *the relationship between total the total cost and the number of items can be expressed as* $t = pn$.	i) Tasks have a context	2, 8	No
7.RP.2d	Recognize and represent proportional relationships between quantities. d. Explain what a point (*x, y*) on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (1, *r*) where *r* is the unit rate.	i) Tasks require students to interpret a point (*x y*) on the graph of a proportional relationship in terms of the situation, with special attention to the points (0, 0) and (1, *r*) where *r* is the unit rate.	2, 4	No
7.RP.3-1	Use proportional relationships to solve multi-step ratio problems.	i) Tasks will include proportional relationships that only involve positive numbers.	1, 2, 6	Yes
7.RP.3-2	Use proportional relationships to solve multi-step percent problems. *Examples*: *simple interest*, *markups and markdowns*, *gratuities and commissions*, *fees*, *percent increase and decrease*, *percent error*.	-	1, 2, 5, 6	Yes

7.G.1	Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.	i) Tasks may or may not have context	2, 5	Yes
7.EE.1	Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients	i) Tasks are not limited to integer coefficients. ii) Tasks may involve issues of strategy, e.g., by providing a factored expression such as y(3+x+k) and a fully expanded expression 3y + xy + ky, and requiring students to produce or identify a new expression equivalent to both (such as y(3+x) + yk).	7	No
7.EE.2	Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. *For example, a + 0.05a = 1.05a means that "increase by 5%" is the same as "multiply by 1.05."*	-	7	No
7.EE.3	Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies*. For example: If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50. If you want to place a towel bar 9 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.*	-	5	Yes
7.EE.4a-1	Use variables to represent quantities in a real world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. a. Solve word problems leading to equations of the form px + q = r and p(x + q) = r, where p, q, and r are specific rational numbers.	i) Comparison of an algebraic solution to an arithmetic solution is not assessed here; for this aspect of 7.EE.4a, see 7.C.5.	1,2,6,7	No
7.EE.4a.2	Use variables to represent quantities in a real world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. a. Fluently solve equations of the form px + q = r and p(x+q) = r, where p, q, and r are specific rational numbers.	i) Each task requires students to solve two equations (one of each of the given two forms). Only the answer is required. ii) Comparison of an algebraic solution to an arithmetic solution is not assessed here; for this aspect of 7.EE.4a, see 7.C.5.	6,7	No

7.EE.4b	Use variables to represent quantities in a real world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. b. Solve word problems leading to inequalities of the form px + q > r or px + q < r, where p, q and r are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem. *For example: As a salesperson, you are paid $50 per week plus $3 per sale. This week you want your pay to be at least $100. Write an inequality for the number of sales you need to make, and describe the solutions.*	i) Tasks may involve <, >, ≤ or ≥.	1,2,5,6,7	No
8.EE.5-1	Graph proportional relationships, interpreting the unit rate as the slope of the graph.	Tasks may or may not contain context.	1, 5	Yes
8.EE.5-2	Compare two different proportional relationships represented in different ways. *For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has a greater speed.*	Tasks may or may not contain context.	7	Yes
8.EE.6-1	Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane.	ii) Tasks do not have a context. ii) Given a non-vertical line in the coordinate plane, tasks might for example require students to choose two pairs of points and record the rise, run, and slope relative to each pair and verify that they are the same. iii) For the explain aspect of 8.EE.6, see 8.C.5.1.	2, 7	Yes
8.EE.7b	Solve linear equations in one variable. b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms	i) Tasks do not have a context.	6,7	No

V. Differentiated Instruction

Chapter 4

Assessment and Intervention

	ASSESSMENT	RtI STRUGGLING LEARNERS
DIAGNOSTIC	• Quick Check in Recall Prior Knowledge in Student Book A, pp. 189–191 • Chapter 4 Pre-Test in *Assessments*	• Skills 23–26 in *Transition Guide, Course 2*
ON-GOING	• Guided Practice • Lesson Check • Ticket Out the Door	• *Reteach* worksheets • *Extra Practice* worksheets • *Activity Book*, Chapter 4
END-OF-CHAPTER	• Chapter Review/Test • Chapter 4 Test in *Assessments* • ExamView® Assessment Suite CD-ROM Course 2	• *Reteach* worksheets

ELL ENGLISH LANGUAGE LEARNERS

Review the terms *expression*, *equation*, and *inequality*.

Model Write the expression $2y + 3$. Next to it, write the equation $2y + 3 = 8$. Next to that, write the inequality $2y + 3 > 4$. Then, write the symbols $\neq$, $>$, $<$, $\geq$, and $\leq$.

Say $2y + 3$ is an algebraic *expression*. It includes the letter *y*, a variable, to stand for a value you do not know.

Say $2y + 3 = 8$ is an *equation*. An equation has an equal sign. This equation tells you that the expression $2y + 3$ is equal to 8. $2y + 3$ has the same value as 8.

Say $2y + 3 > 4$ is an *inequality*. An inequality has an inequality sign. An inequality tells you that two numbers or expressions may not be equal. They may not have the same value. This inequality tells you that $2y + 3$ is greater than 4. There are five different inequality symbols. (Review the meaning of each symbol.)

For definitions, see Glossary, page 308, and Online Multi-Lingual Glossary.

ADVANCED LEARNERS

- Tell students that performing identical operations on both sides of an equation or inequality does not always produce an equivalent statement.
- Challenge students to identify a real number for which this is the case. Ask students to explain for each of the four operations with the number whether the result is an equivalent statement, as well as whether it is a true statement. *(Addition or subtraction of 0 results in the equation or inequality being unchanged, so the statements are identical, rather than equivalent, and true. Multiplication by 0 results in an equation or inequality that is not equivalent. The new equation is a true statement, but the new inequality may not be a true statement. Division by zero is undefined, so the result can be neither true nor equivalent.)*

To provide additional challenges use:

- *Enrichment*, Chapter 4
- Student Book A, Brain@Work problem

Pacing

If pacing is a challenge, consider the following modifications and omissions. Depending on students' strengths, consider consolidating Lessons 5 and 6. In Lesson 5, omit Problem 1 of the Concept Development, and move directly into renaming with the algorithm after Problem 2. Use the Problem Set from Lesson 6 for independent student practice. Consider consolidating Lessons 7 and 8 as well. Ask students to estimate the product beginning with the Concept Development of Lesson 7, and then use the Problem Set from Lesson 8 for student practice. Similarly, Lessons 11 and 12 can also be consolidated. Use estimation from the outset, and have students practice with the Problem Set from Lesson 12.

It is not recommended to omit any lessons from Topic D as it is a foundation for work later in the year. Students convert measurement units from small to large and from large to small using multiplication. This significantly expedites their understanding of and fluency with conversion and fraction multiplication as the year continues. In Lesson 14, students multiply whole numbers by unit fractions, which they learned to do in Grade 4 Module 5. If necessary, consider moving the fluency activity, "Multiply Unit Fractions," from Lesson 14 to Topic C to provide a few extra days of practice prior to beginning Lesson 14.

Scaffolds

The Common Core State Standards for Mathematics require that "all students must have the opportunity to learn and meet the same high standards if they are to access the knowledge and skills necessary in their post school lives." The writers of A Story of Units agree and feel strongly that accommodations cannot be just an extra set of resources for particular students. Instead, scaffolding must be folded into the curriculum in such a way that it is part of its very DNA. Said another way, faithful adherence to the modules IS the primary scaffolding tool.

See *III. The Common Core Approach to Differentiating Instruction (Pg. 14)* for additional information.

Use the links below for support with specific groups of learners.

Scaffolds for English Language Learners (Pg. 16-17)

Scaffolds for Students with Disabilities (Pg. 17-18)

Scaffolds for Students Performing Below Grade Level (Pg. 19)

Scaffolds for Students Performing Above Grade Level (Pg. 20)

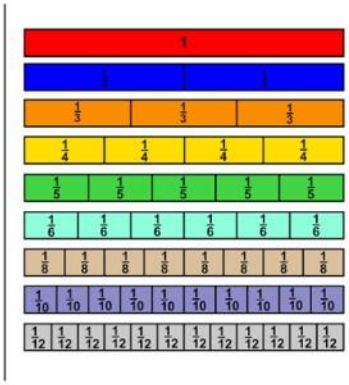
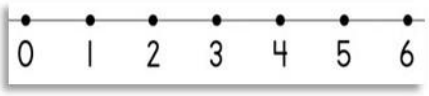
Scaffolding Instruction for English Language Learners: A Resource Guide for Mathematics

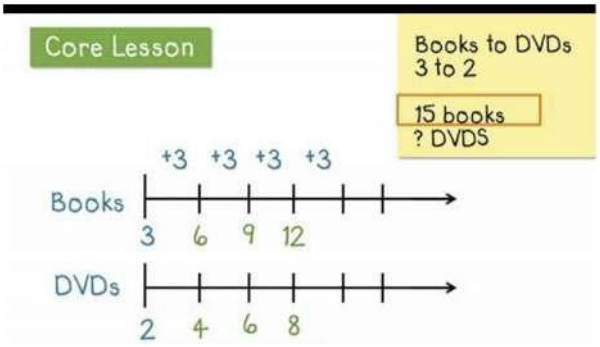
VI. Vocabulary

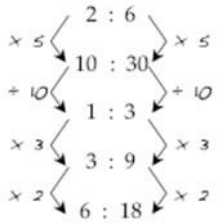
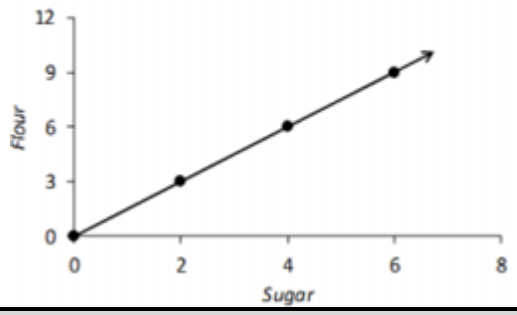
Term	Definition
Constant of Proportionality	Constant value of the ratio of proportional quantities x and y. Written as y = kx, k is the constant of proportionality when the graph passes through the origin. Constant of proportionality can never be zero.
Corresponding Angles	Corresponding angles have the same relative position in similar figures.
Corresponding Sides	Corresponding sides have the same relative position in similar figures.
Directly Proportional	If $y = kx$, then y is said to be directly proportional to x
Equivalent Fractions	Two fractions that have the same value but have different numerators and denominators; equivalent fractions simplify to the same fraction.
Fraction	A number expressed in the form a/b where a is a whole number and b is a positive whole number
Inversely Proportional	y is *inversely proportional* to x if $y = k/x$.
Multiplicative Inverse	Two numbers whose product is 1r. Example (3/4) and (4/3) are multiplicative inverses of one another because (3/4) x (4/3) = (4/3) x (3/4) = 1
Origin	The point of intersection of the vertical and horizontal axes of a Cartesian Grid
Percent rate of change	A rate of change expressed as a percent. Example: if a population grows from 50 to 55 in a year, it grows by (5/50) = 10% per year
Proportion	An equation stating that two ratios are equivalent
Proportional Relationship	Two quantities are said to have a proportional relationship if they vary in such a way that one of the quantities is a constant multiple of the other, or equivalently if they have a constant ratio.
Ratio	A comparison of two numbers using division. The ratio of a to b (where $b \neq 0$) can be written as a to b, as (a/b), or as a:b.
Scale Factor	A ratio between two sets of measurements

Algebraic Expression	An expression consisting of at least one variable and also consisting of numbers and operations
Coefficient	The number part of a term that includes a variable. For example, 3 is the coefficient of the term 3x.
Constant	A quantity having a fixed value that does not change or vary, such as a number. For example, 5 is the constant of x + 5.
Equation	A mathematical sentence formed by setting two expressions equal.
Inequality	*A mathematical sentence formed by placing inequality symbol between two expressions*
Term	A number, a variable, or product and a number and variable
Numerical Expression	An expression consisting of numbers and operations
Variable	A symbol, usually a letter, which is used to represent one or more numbers
Unit Rate	Ratio in which the second team, or denominator, is 1

VII. Multiple Representations

CONCRETE REPRESENTATIONS	
Partitioning with manipulatives Bar model	
Paper strips	
Number line	

PICTORIAL REPRESENTATIONS	
Fraction Strips (Tape Diagrams)	
Double Line Diagrams	
Table representation	
Graphical representation	

Equivalent ratios Ratio Tables Coordinate Plane	 **Ratio Table** Sugar | Flour 2 | 3 4 | 6 6 | 9 **Coordinate Plane** 
ABSTRACT REPRESENTATIONS	
Scale Factor (within and between) Iteration Algorithm Part/Whole Relationships Part/Part Relationships Finding the Unit Rate/Constant of Proportionality Simplifying Rates	Setting up a Proportion Creating an Equation Finding the constant of proportionality Algorithm for Scale Factor: Image/Actual figure Actual Figure/Image a/b = c/d

VIII. Assessment Framework

Unit 2 Assessment Framework				
Assessment	**NJSLS**	**Estimated Time**	**Format**	**Graded ?**
Grade 7 Chapter 4 Pretest *Math in Focus*	7.EE.4	½ Block	Individual	Yes (No Weight)
Unit 2 Assessment 1 (After EngageNY Gr. 7 Module 1) *District Assessment (Optional)*	7.RP.1, 7.RP.2b 7.RP.2a, 7.RP.2 7.RP.2d, 7.RP.3	½ Block	Individual	Yes
Unit 2 Assessment 2 (After EngageNY Gr. 7 Module 3) *District Assessment (Optional)*	7.EE.1, 7.EE.2 7.EE.3, 7.EE.4 7.EE.4b	1 Block	Individual	Yes
Unit 2 Assessment 3 (Conclusion of Unit) *District Assessment (Optional)*	8.EE.5, 8.EE.6, 8.EE.7	1 Block	Individual	Yes
Grade 7 Chapter 4 Test (Optional) *Math in Focus*	7.EE.4	½ Block	Individual	Yes, if administered
Mid- Module Assessment Gr. 7 Module 1 (Optional) *EngageNY*	7.RP.1, 7.RP.2, 7.RP.3	Teacher Discretion	Teacher Discretion	Optional
Mid- Module Assessment Gr. 7 Module 3 (Optional) *EngageNY*	7.EE.1, 7.EE.2 7.EE.3, 7.EE.4	Teacher Discretion	Teacher Discretion	Optional
Mid- Module Assessment Gr. 8 Module 4 (Optional) *EngageNY*	8.EE.5, 8.EE.6, 8.EE.7	Teacher Discretion	Teacher Discretion	Optional
End of Module Assessment Gr. 7 Module 1 (Optional) *EngageNY*	7.RP.1, 7.RP.2, 7.RP.3	Teacher Discretion	Teacher Discretion	Optional
End of Module Assessment Gr. 7 Module 3 (Optional) *EngageNY*	7.EE.1, 7.EE.2 7.EE.3, 7.EE.4	Teacher Discretion	Teacher Discretion	Optional
End of Module Assessment Gr.8 Module 4 (Optional) *EngageNY*	8.EE.5, 8.EE.6, 8.EE.7	Teacher Discretion	Teacher Discretion	Optional
Acc Gr 7 Interim Assessment 2 (Mid January) *District Assessment*	7.EE.1, 7.EE.2, 7.EE.3, 7.EE.4	1 Block	Individual	Yes

Unit 2 Performance Assessment / PBL Framework				
Assessment	**NJSLS**	**Estimated Time**	**Format**	**Graded ?**
Unit 2 Performance Task 1 (Mid-December) *Thunder and Lightning*	7.RP.2	½ Block	Individual w/ Interview Opportunity	Yes; Rubric
Unit 2 Performance Task 2 (Early January) *Buying Protein Bars and Magazines*	7.RP.3	½ Block	Individual w/ Interview Opportunity	Yes: rubric
Unit 2 Performance Task 3 (Late January) *Who has the Best Job?*	8.EE.5	½ Block	Individual w/ Interview Opportunity	Yes; Rubric
Unit 2 Performance Task Option 1 (optional)	7.RP.3	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*

Name _____ Block _____ Date _____

Thunder and Lightning (7.RP.2)

Alyssa sees a lightning bolt in the sky and counts four seconds until she hears the thunder.

a. There are 5280 feet in a mile and about 3.28 feet in a meter. Given that sound travels about 343 meters per second, is the lightning strike within one mile of Alyssa?

b. What is the speed of sound in miles per hour?

Solution

Solution

a. Since the thunder from the lightning strike travels at about 343 meters per second, in 4 seconds the sound will have travelled about

$$4 \text{ seconds} \times 343 \frac{\text{meters}}{\text{second}} = 1372 \text{ meters.}$$

Since there are about 3.28 feet in a meter this is

$$1372 \text{ meters} \times 3.28 \frac{\text{feet}}{\text{meter}} \approx 4500 \text{ feet.}$$

This is less than a mile.

b. To convert from meters per second to miles per hour we have to convert both the distances and the times. We will do these separately and then put all of the calculations together to find the speed of the thunder in miles per hour. First we convert 343 meters to miles:

$$\begin{aligned} 343 \text{ meters} &= 343 \text{ meters} \times 3.28 \frac{\text{feet}}{\text{meter}} \times \frac{1}{5280} \frac{\text{mile}}{\text{feet}} \\ &= \frac{343 \times 3.28}{5280} \text{ miles} \\ &\approx 0.213 \text{ miles.} \end{aligned}$$

Next we convert seconds to hours:

$$\begin{aligned} 1 \text{ second} &= 1 \text{ second} \times \frac{1}{60} \frac{\text{minute}}{\text{seconds}} \times \frac{1}{60} \frac{\text{hour}}{\text{minutes}} \\ &= \frac{1}{3600} \text{hours.} \end{aligned}$$

Equivalently, we have 1 hour = 3600 seconds. When we combine all of our unit conversions, we use the complete expression $\frac{343 \times 3.28}{5280}$ miles instead of the rounded 0.213 miles since the rounding should take place after all operations have been performed. Using our calculations we find

$$\begin{aligned} 343 \frac{\text{meters}}{\text{second}} &\approx \frac{340 \times 3.28}{5280} \frac{\text{miles}}{\text{second}} \\ &= \frac{343 \times 3.28}{5280} \frac{\text{miles}}{\text{second}} \times 3600 \frac{\text{seconds}}{\text{hour}} \\ &\approx 767 \frac{\text{miles}}{\text{hour}} \end{aligned}$$

Unit 2 Performance Task 1 PLD Rubric

SOLUTION

A) 4 secs x 343 $\frac{m}{s}$ = 1372 m and 1372 m x 3.28 $\frac{ft}{m}$ = 4500 ft. and this is less than a mile

B) 343 m x 3.28 $\frac{ft}{m}$ x $\frac{1}{5280}\frac{miles}{s}$ = 0.213 miles

Level 5: Distinguished Command	**Level 4: Strong Command**	**Level 3: Moderate Command**	**Level 2: Partial Command**	**Level 1: No Command**
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: • a logical approach based on a conjecture and/or stated assumptions • a logical and complete progression of steps • complete justification of a conclusion with	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: • a logical approach based on a conjecture and/or stated assumptions • a logical and complete progression of steps • complete justification of a conclusionwith minor conceptual error	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: • a logical, but incomplete, progression of steps • minor calculation errors • partial justification of a conclusion • a logical, but incomplete, progression of steps	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: • 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	The student shows no work or justification.

Name _____ Block _____ Date _____

Buying Protein Bars and Magazines (7.RP.A.3)

Tom wants to buy some protein bars and magazines for a trip. He has decided to buy three times as many protein bars as magazines. Each protein bar costs $0.70 and each magazine costs $2.50. The sales tax rate on both types of items is 6½%. How many of each item can he buy if he has $20.00 to spend?

Solution: Making a table

The table below shows the cost for the protein bars and magazines in a 3:1 ratio.

Number of magazines	1	2	3	4
Number of protein bars	3	6	9	12
Value of the magazines	$2.50	$5.00	$7.50	$10.00
Value of the protein bars	$2.10	$4.20	$6.30	$8.40
Value of both magazines and candy bars	$4.60	$9.20	$13.80	$17.40
Cost with tax	$4.90	$9.80	$14.70	$19.60

Looking at the last column of the table, we can see that Tom can buy 4 magazines and 12 protein bars for $20 and that he cannot afford 5 magazines and 15 protein bars.

Unit 2 Performance Task 2 PLD Rubric

SOLUTION

- Student indicates that Tom can buy 4 magazines and 12 protein bars for $20 and that he cannot afford 5 magazines and 15 protein bars and justifies the solution with reasoning.

Level 5: Distinguished Command	**Level 4: Strong Command**	**Level 3: Moderate Command**	**Level 2: Partial Command**	**Level 1: No Command**
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Name _____ Block _____ Date _____

Who Has the Best Job? (8.EE.5)

Kell works at an after-school program at an elementary school. The table below shows how much money he earned every day last week.

Time Worked	1.5 hours	2.5 hours	4 hours
Money Earned	$12.60	$21.00	$33.60

Mariko has a job mowing lawns that pays $7 per hour.

a) Who would make more money for working 10 hours? Explain or show work.

b) Draw a graph that represents y, the amount of money Kell would make for working x hours, assuming he made the same hourly rate he was making last week.

c) Using the same coordinate axes, draw a graph that represents y, the amount of money Mariko would make for working x hours.

d) How can you see who makes more per hour just by looking at the graphs? Explain.

Solution

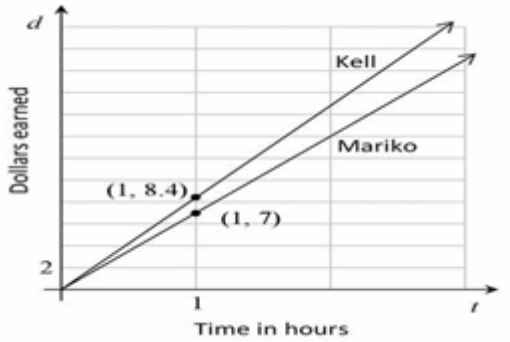
a. Mariko would make $7 \times 10 = 70$ dollars for working 10 hours. Kell's hourly rate can be found by dividing the money earned by the hours worked each day.

Time worked	1.5 hours	2.5 hours	4 hours
Money earned	$12.60	$21.00	$33.60
Pay rate	$8.40 per hour	$8.40 per hour	$8.40 per hour

If Kell works for 10 hours at this same rate, he will earn $8.4 \times 10 = 84$ dollars. So Kell will earn more money for working 10 hours.

Alternatively, we could reason proportionally without computing the unit rate. Since Mariko earned $21.00 for 2.5 hours, she will earn four times as much for working four times as long ($10 = 4 \times 2.5$), for a total of $4 \times \$21 = \$84$.

b) & c) See Below



d. You can see that Kell will make more per hour if you look at the points on the graph where $x = 1$ since this will tell you how much money each person will make for working 1 hour. You can also compare the slopes of the two graphs, which are equal to the hourly rates. See the figure below.

Unit 2 Performance Task 3 PLD Rubric

SOLUTION

A. Student indicates that Kell would earn more money for working 10 hours. Student indicates that Kell would earn (12.60) x 4 + 33.60 = $84 and Mariko will earn (7 x10 = $70).
B. Refer to Graph in Solutions Guide
C. Refer to Graph in Solutions Guide
D. Answers may vary. Student indicates looking at a point on the graph, for example $x = 1$, as it informs you who will earn more money for one hour of work. Students may also compare slopes of the two graphs, which are equivalent to the hourly rate

Level 5: Distinguished Command	**Level 4: Strong Command**	**Level 3: Moderate Command**	**Level 2: Partial Command**	**Level 1: No Command**
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Unit 2 Performance Task Option 1

How fast is Usain Bolt? (7.RP.A.3)

Jamaican sprinter Usain Bolt won the 100-meter sprint gold medal in the 2012 Summer Olympics. He ran the 100-meter race in 9.63 seconds. There are about 3.28 feet in a meter and 5280 feet in a mile. What was Usain Bolt's average speed for the 100-meter race in miles per hour?

X. Modifications

Special Education/ 504:	English Language Learners:
-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	- 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:**
- 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: ● 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)	- 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

- **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.
- **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.7.3	Use knowledge of language and its conventions when writing, speaking, reading, or listening.
SL.7.1	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 7 topics, texts, and issues, building on others' ideas and expressing their own clearly.
W.7.1	Write arguments to support claims with clear reasons and relevant evidence.

XI. Core Instruction & Supplemental Resources

Core Instruction

MATH IN FOCUS v. 2015
(HOUGHTON MIFFLIN HARCOURT)

GRADE	TEACHER RESOURCES	STUDENT RESOURCES
2-5	• **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	• Student Texts (A & B) • Student Workbooks • Online Student Technology Kit • Student Interactivities
6-7	• **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	• Student Texts (A & B) • Online Student Interactive Manipulatives

ENGAGE NY v. 2015
(GREAT MINDS)

GRADE	TEACHER RESOURCES	STUDENT RESOURCES
6 (v. 2015)	• **Teacher Edition: Module 1-6**	• Student Material Set: Module 1-6
7	• **Teacher Edition: Module 1-6**	• Student Material Set: Module 1-6
8	• **Teacher Edition: Module 1-7**	• Student Material Set: Module 1-7

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

* 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/