

Orange Public Schools

Office of Curriculum & Instruction
2019-2020 Mathematics Curriculum Guide



6th Grade Mathematics

Illustrative Mathematics - Unit 2: Introducing Ratios

October 14, 2019 – November 15, 2019

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From the New Jersey Student Learning Standards:

In **Grade 6**, instructional time should focus on four critical areas: (1) connecting ratio and rate to whole number multiplication and division and using concepts of ratio and rate to solve problems; (2) completing understanding of division of fractions and extending the notion of number to the system of rational numbers, which includes negative numbers; (3) writing, interpreting, and using expressions and equations; and (4) developing understanding of statistical thinking.

(1) Students use reasoning about multiplication and division to solve ratio and rate problems about quantities. By viewing equivalent ratios and rates as deriving from, and extending, pairs of rows (or columns) in the multiplication table, and by analyzing simple drawings that indicate the relative size of quantities, students connect their understanding of multiplication and division with ratios and rates. Thus students expand the scope of problems for which they can use multiplication and division to solve problems, and they connect ratios and fractions. Students solve a wide variety of problems involving ratios and rates.

(2) Students use the meaning of fractions, the meanings of multiplication and division, and the relationship between multiplication and division to understand and explain why the procedures for dividing fractions make sense. Students use these operations to solve problems. Students extend their previous understandings of number and the ordering of numbers to the full system of rational numbers, which includes negative rational numbers, and in particular negative integers. They reason about the order and absolute value of rational numbers and about the location of points in all four quadrants of the coordinate plane.

(3) Students understand the use of variables in mathematical expressions. They write expressions and equations that correspond to given situations, evaluate expressions, and use expressions and formulas to solve problems. Students understand that expressions in different forms can be equivalent, and they use the properties of operations to rewrite expressions in equivalent forms. Students know that the solutions of an equation are the values of the variables that make the equation true. Students use properties of operations and the idea of maintaining the equality of both sides of an equation to solve simple one-step equations. Students construct and analyze tables, such as tables of quantities that are in equivalent ratios, and they use equations (such as $3x = y$) to describe relationships between quantities.

(4) Building on and reinforcing their understanding of number, students begin to develop their ability to think statistically. Students recognize that a data New Jersey Student Learning Standards for Mathematics 40 distribution may not have a definite center and that different ways to measure center yield different values. The median measures center in the sense that it is roughly the middle value. The mean measures center in the sense that it is the value that each data point would take on if the total of the data values were redistributed equally, and also in the sense that it is a balance point. Students recognize that a measure of variability (interquartile range or mean absolute deviation) can also be useful for summarizing data because two very different sets of data can have the same mean and median yet be distinguished by their variability. Students learn to describe and summarize numerical data sets, identifying clusters, peaks, gaps, and symmetry, considering the context in which the data were collected.

Yearlong Pacing Guide

Grade 6

Grade	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
5	Unit 1 5.NBT	Unit 2 5.NBT	Unit 3 5.NF	Unit 4 5.NF	Unit 5 5.MD	Unit 6 5.OA & 5.G				
6	Unit 1 6.G	Unit 2 6.RP	Unit 3 6.RP	Unit 4 6.NS	Unit 5 6.NS	Unit 6 6.EE	Unit 7 6.NS	Unit 8 6.SP		
7	Unit 1 7.G	Unit 2 7.RP	Unit 3 7.G	Unit 4 7.RP	Unit 5 7.NS	Unit 6 7.EE	Unit 7 7.G	Unit 8 7.SP		
8	Unit 1 8.G	Unit 2 8.G	Unit 3 8.EE	Unit 4 8.EE	Unit 5 8.F	Unit 6 8.SP	Unit 7 8.EE	Unit 8 8.G		

Unit 1	Geometry: Area and Surface Area	Unit 2	Ratios & Proportional Relationships: Introducing Ratios	Unit 3	Ratios & Proportional Relationships: Unit Rates & Percentages	Unit 4	Number System: Dividing Fractions
Unit 5	Number System: Arithmetic in Base Ten	Unit 6	Expressions & Equations: Expressions & Equations	Unit 7	Number System: Rational Numbers	Unit 8	Statistics & Probability: Data Sets and Distributions

2019-2020 Grade 6 (iM)							
Quarter 1		Quarter 2		Quarter 3		Quarter 4	
Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	Unit 7	Unit 8
6.G.1(S) 6.G.4(S)	6.RP.1(M) 6.RP.3a(M)	6.RP.2(M) 6.RP.3(M) 6.RP.3b(M) 6.RP.3c(M) 6.RP.3d(M)	6.NS.1(M) 6.G.2(S)	6.NS.3(A) 6.NS.2(A)	6.EE.6(M) 6.EE.5(M) 6.EE.7(M) 6.EE.4(M) 6.EE.2(M) 6.EE.3(M) 6.EE.1(M) 6.EE.9(M)	6.NS.5(M) 6.NS.6(M) 6.NS.7(M) 6.EE.8(M) 6.NS.8(M) 6.NS.4(A) 6.G.3(S)	6.SP.1(A) 6.SP.5(A) 6.SP.4(A) 6.SP.2(A) 6.SP.3(A)
22 Days	19 Days	19 Days	20 Days	18 Days	20 Days	20 Days	21 Days
Oct. 11	Nov. 15	Dec. 19	Jan. 31	Mar. 6	Apr. 9	May 19	Jun. 19

Major Work Supporting Content Additional Content

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References

“Illustrative Mathematics” *Open Up Resources*. 2018
<<https://auth.openupresources.org/register/complete>>

I. Unit Overview

In this unit, students learn that a ratio is an association between two quantities. Students analyze contexts that are often expressed in terms of ratios, such as recipes, mixtures of different paint colors, constant speed (an association of time measurements with distance measurements), and uniform pricing (an association of item amounts with prices). Equivalent ratios are first encountered in terms of multiple batches of a recipe and “equivalent” is first used to describe a perceivable sameness of two ratios. This unit introduces *discrete diagrams* and *double number line diagrams*, representations that students use to support thinking about equivalent ratios before their work with tables of equivalent ratios. After some work with double number line diagrams, students use tables to represent equivalent ratios. Use of tables to represent equivalent ratios is an important stepping-stone toward use of tables to represent linear and other functional relationships in grade 8 and beyond.

Essential Questions

- What is the connection between a ratio and a fraction?
- How is a ratio or rate used to compare two quantities or values?
- How and where are ratios and rates used in the real world?
- How can I model and represent rates and ratios?
- What are similarities and differences between fractions and ratios?

Enduring Understanding

- Reasoning with ratios involves attending to and coordinating two quantities.
- A ratio is a multiplicative comparison of two quantities, or it is a joining of two quantities in a composed unit.
- Equivalent ratios can be represented in a table, double number line, or a tape diagram.
- Forming a ratio as a measure of a real-world attribute involves isolating that attribute from other attributes and understanding the effect of changing each quantity on the attribute of interest.
- A number of mathematical connections link ratios and fractions:
 - Ratios are often expressed in fraction notation, although ratios and fractions do not have identical meaning.
 - Ratios are often used to make “part-part” comparisons, but fractions are not.
 - Ratios can often be meaningfully reinterpreted as fractions.
- Ratios can be meaningfully reinterpreted as quotients.

II. Pacing Guide

Activity	New Jersey State Learning Standards (NJSLs)	Estimated Time (Blocks)
Unit 2 Pre-Unit Diagnostic Assessment <i>Optional</i>	6.RP.A.1; 6.RP.A.2; 6.RP.A.3; 6.RP.A.3b	1/2
Lesson 1: Introducing Ratios and Ratio Language	6.RP.A.1	1
Lesson 2: Representing Ratios with Diagrams	6.RP.A.1	1
Lesson 3: Recipes	6.RP.A.1	1
Lesson 4: Color Mixtures	6.RP.A.1	1
Lesson 5: Defining Equivalent Ratios	6.RP.A.1	1
Lesson 6: Introducing Double Number Line Diagrams	6.RP.A.3	1
Lesson 7: Creating Double Number Line Diagrams	6.RP.A.3	1
Lesson 8: How much for one?	6.RP.A.3b	1
Lesson 9: Constant Speed	6.RP.A.3b	1
Lesson 10: Comparing Situations by Examining Ratios	6.RP.A.1; 6.RP.A.2; 6.RP.A.3b	1
Lesson 11: Representing Ratios with Tables	6.RP.A.3a	1
Lesson 12: Navigating a Table of Equivalent Ratios	6.RP.A.3; 6.RP.A.3a	1
Lesson 13: Tables and Double Number Lines	6.RP.A.3; 6.RP.A.3a	1
Lesson 14: Solving Equivalent Ratio Problems	6.RP.A.3	1
Lesson 15: Part-Part-Whole Ratios	6.RP.A.3	1
Lesson 16: Solving More Ratio Problems	6.RP.A.3	1
Lesson 17: A Fermi Problem (Project Based Learning)	6.RP.A.; 6.RP.A.3	1
Unit 2 End-of-Unit Assessment <i>Optional</i>	6.RP.A.1; 6.RP.A.2; 6.RP.A.3; 6.RP.A.3b	1
Performance Task 2	6.RP.A.1	1/2
Total Time		19 Blocks
Grade 6 Interim Assessment 1	6.G.A.1, 6.G.A.4, 6.RP.A.1, 6.RP.A.3a	1

Major Work Supporting Content Additional Content

III. Pacing Calendar

Please complete the pacing calendar based on the suggested pacing (*see Pacing Guide on page 1*).

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		

Please complete the pacing calendar based on the suggested pacing (<i>see Pacing Guide on page 1</i>).						
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. NJSLA Assessment Evidence Statements

Type I

Type II

Type III

NJSLS	Evidence Statement	Clarification	Math Practices	Calculator ?
<u>6.RP.1</u>	Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. For example, “The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak.” “For every vote candidate A received, candidate C received nearly three votes.”	i) Expectations for ratios in this grade are limited to ratios of non-complex fractions. The initial numerator and denominator should be whole numbers.	MP.2	No
<u>6.RP.2</u>	Understand the concept of a unit rate a/b associated with a ratio $a:b$ with $b \neq 0$, and use rate language in the context of a ratio relationship. For example, “This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is $3/4$ cup of flour for each cup of sugar.” “We paid \$75 for 15 hamburgers, which is a rate of \$5 per hamburger.” ¹	i) Expectations for unit rates in this grade are limited to non-complex fractions. The initial numerator and denominator should be whole numbers.	MP.2	No
<u>6.RP.3a</u>	Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations. a. Make tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios.	i) Expectations for ratios in this grade are limited to ratios of non-complex fractions. The initial numerator and denominator should be whole numbers	MP.2 MP.4 MP.5 MP.7 MP.8	Yes

6th Grade Unit 2: Introducing Ratios

<u>6.RP.3b</u>	Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations. b. Solve unit rate problems including those involving unit pricing and constant speed. For example, if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?	i) Expectations for unit rates in this grade are limited to non-complex fractions. The initial numerator and denominator should be whole numbers.	MP.2 MP.5 MP.8	Yes
<u>6.RP.3c-1</u>	Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations. c. Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity);	i) Tasks may or may not contain context. ii) Expectations for ratios in this grade are limited to ratios of non-complex fractions. The initial numerator and denominator should be whole numbers.	MP.2 MP.5 MP.7 MP.8	Yes
<u>6.RP.3c-2</u>	Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations. c. Solve problems involving finding the whole, given a part and the percent.	ii) Expectations for ratios in this grade are limited to ratios of non-complex fractions. The initial numerator and denominator should be whole numbers.	MP.2 MP.5 MP.7 MP.8	Yes
<u>6.C.8.1</u>	Present solutions to multi-step problems in the form of valid chains of reasoning, using symbols such as equals signs appropriately (for example, rubrics award less than full credit for the presence of nonsense statements such as $1 + 4 = 5 + 7 = 12$, even if the final answer is correct), or identify or describe errors in solutions to multi-step problems and present corrected solutions. Content Scope: Knowledge and skills articulated in 6.RP.A	i) Expectations for ratios in this grade are limited to ratios of non-complex fractions. The initial numerator and denominator should be whole numbers.	MP.2 MP.3 MP.6	Yes

V. Differentiated Instruction

Supporting English Language Learners

There are four design principles for promoting mathematical language use and development in curriculum and instruction. The design principles and related routines work to make language development an integral part of planning and delivering instruction while guiding teachers to amplify the most important language that students are expected to bring to bear on the central mathematical ideas of each unit.

The design principles are:

- Design Principle 1: Support sense-making
- Design Principle 2: Optimize output
- Design Principle 3: Cultivate conversation
- Design Principle 4: Maximize linguistic and cognitive meta-awareness

These four principles are intended as guides for curriculum development and planning and execution of instruction, including the structure and organization of interactive opportunities for students, and the observation, analysis, and reflection on student language and learning. The design principles motivate the use of mathematical language routines (MLRs).

These eight routines are:

- MLR1: Stronger and Clearer Each Time
- MLR2: Collect and Display
- MLR3: Critique, Correct, and Clarify
- MLR4: Information Gap
- MLR5: Co-Craft Questions and Problems
- MLR6: Three Reads
- MLR7: Compare and Connect
- MLR8: Discussion Supports

Supporting Students with Disabilities

Lessons are designed to maximize access for all students, and include additional suggested supports to meet the varying needs of individual students. While the suggested supports are designed for students with disabilities, they are also appropriate for many children who struggle to access rigorous, grade-level content. Teachers should use their professional judgment about which supports to use and when, based on their knowledge of the individual needs of students in their classroom.

The inclusion of additional supports for students with disabilities offers additional strategies for teachers to meet the individual needs of a diverse group of learners. Lesson and activity-level supports for students with disabilities are aligned to an area of cognitive functioning and are paired with a suggested strategy aimed to increase access and eliminate barriers. These lesson specific supports help students succeed with a specific activity without reducing the mathematical demand of the task. All of the supports can be used discreetly and are designed to be used as needed.

Suggestions for supports fall under the following categories:

- Eliminate Barriers
- Processing Time
- Peer Tutors
- Assistive Technology
- Visual Aids
- Graphic Organizers
- Brain Breaks

For a more descriptive account of these supports, reference the following:

https://im.openupresources.org/6/teachers/teacher_course_guide.html-supporting-students-with-disabilities

VI. VOCABULARY

Term	Definition
<i>Ratio</i>	A ratio associates two or more quantities. Ratios can be described in words such as “3 to 2” and “3 for every 2” and “3 out of every 5” and “3 parts to 2 parts.” We write ratios with symbols like this: 3:2.
<i>Equivalent Ratios</i>	Two ratios $a:b$ and $c:d$ are equivalent ratios if there is a number s that you can multiply both a and b by to get c and d (respectively). In other words, $a \cdot s = c$ and $b \cdot s = d$.
<i>Double Number Line Diagram</i>	<p>A double number line diagram is a pair of parallel number lines with the numbers 0 aligned. Each number line is marked in equal increments and numbered. The tick marks are aligned, but the numbers on the two lines are often different. A pair of aligned numbers on the diagram represents a ratio that is equivalent to every other pair of aligned numbers on the diagram.</p> <div style="display: flex; align-items: center; margin: 10px 0;"> <div style="margin-right: 10px;">red paint (teaspoons)</div> <div style="text-align: center;"> $\begin{array}{ccccccccc} 0 & 3 & 6 & 9 & 12 \\ \hline + & + & + & + & + \end{array}$ </div> </div> <div style="display: flex; align-items: center;"> <div style="margin-right: 10px;">yellow paint (teaspoons)</div> <div style="text-align: center;"> $\begin{array}{ccccccccc} 0 & 5 & 10 & 15 & 20 \\ \hline + & + & + & + & + \end{array}$ </div> </div>
<i>Per</i>	The word per means “for each.” For example: he paid \$5 for each ticket, so the cost was \$5 per ticket.
<i>Unit Price</i>	The unit price is the cost for one item or one unit of measure.
<i>Meters Per Second</i>	A unit to measure speed that tells you how many meters an object travels in one second.
<i>Same Rate</i>	In two situations involving ratios of the same two quantities, if the ratio of the quantities in one situation is equivalent to the ratio of the quantities in the other situation then we say the two situations involve the same rate.

Table

A table is a way to organize information. Each rectangle in the table is called a cell. Each horizontal set of entries is called a row, and each vertical set of entries is called a column. The first row in a table often contains headers to explain what information is in each column.

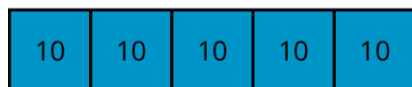
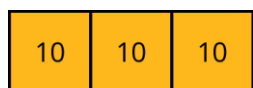
This table shows the tail-lengths of three different pets. It has four rows and two columns.

The first cell in each column tells you what kind of information is in that column.

pet	tail length (inches)
dog	22
cat	12
mouse	2

Tape Diagram

A tape diagram can be used to represent a ratio between two quantities measured in the same units. The tape diagram shows a ratio of 30 gallons of yellow paint to 50 gallons of blue paint.



A tape diagram is composed of one or more rectangles that are partitioned into equal parts. Each part represents a value. It can be any value, as long as the same value is used throughout.

VII. Assessment Framework

Unit 2 Assessment Framework				
Assessment	NJSLS	Estimated Time	Format	Graded ?
Pre-Unit Diagnostic Assessment (Beginning of Unit – Optional) <i>Illustrative Mathematics</i>	5.NF.B.5; 4.NF.A.1; 4.NBT.A.1; 4.OA.A.1; 4.NF.B.4b; 2.MD.B.6; 3.NF.A.2; 3.NF.A.3.b; 6.RP.A.3	½ Block	Individual	Yes (No Weight)
End-of-Unit Assessment (End of Unit – Optional) <i>Illustrative Mathematics</i>	6.RP.A.1; 6.RP.A.2 6.RP.A.3; 6.RP.A.3b	1 Block	Individual	Yes
Grade 6 Interim Assessment 1 (Early November) <i>District Assessment</i>	6.G.A.1, 6.G.A.4, 6.RP.A.1	1 Block	Individual	Yes

Unit 2 Performance Assessment Framework				
Assessment	NJSLS	Estimated Time	Format	Graded ?
Unit 2 Performance Task 1 (Mid- November) <i>Games at Recess</i>	6.RP.A.1	½ Block	Individual w/ Interview Opportunity	Yes; Rubric
Unit 2 Performance Task Option 1 (Optional) <i>Riding at a Constant Speed</i>	6.RP.A.2 6.RP.A.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](#)

6th Grade: Unit 2 Performance Task

Name _____ Block _____ Date _____

Games at Recess (NJSLS 6.RP.A.1)

The students in Mr. Hill's class played games at recess.

6 boys played soccer
4 girls played soccer
2 boys jumped rope
8 girls jumped rope

Afterward, Mr. Hill asked the students to compare the boys and girls playing different games.

Mika said, "Four more girls jumped rope than played soccer."

Chaska said, "For every girl that played soccer, two girls jumped rope."

Mr. Hill said, "Mika compared the girls by looking at the difference and Chaska compared the girls using a ratio."

A) Compare the number of boys who played soccer and jumped rope using the difference. Write your answer as a sentence as Mika did.

B) Compare the number of boys who played soccer and jumped rope using a ratio. Write your answer as a sentence as Chaska did.

C) Compare the number of girls who played soccer to the number of boys who played soccer using a ratio. Write your answer as a sentence as Chaska did.

Unit 2 Performance Task 1 PLD Rubric

SOLUTION

- A) Student indicates four more boys played soccer than jumped rope
- B) Student indicates for every three boys that played soccer, one boy jumped rope. Therefore the ratio of the number of boys that played soccer to the number of boys that jumped rope is 3: (or "three to one").
- C) Student indicates for every two girls that played soccer, three boys played soccer. Therefore the ratio of the number of girls that played soccer to the number of boys that played soccer is 2:3 (or "two to three").

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 • a logical, but incomplete, progression of steps 	<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>No parts are correct.</p> <p>The student shows no work or justification.</p>

6th Grade: Unit 2 Performance Task Option 1

Name _____ Block _____ Date _____

Riding at a Constant Speed (6.RP.A.2, 6.RP.A.3)

Task

Lin rode a bike 20 miles in 150 minutes. If she rode at a constant speed,

A. How far did she ride in 15 minutes?

B. How long did it take her to ride 6 miles?

C. How fast did she ride in miles per hour?

D. What was her pace in minutes per mile?

IX. 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.

X. Core Instruction & Supplemental Resources

Core Instruction

ILLUSTRATIVE MATHEMATICS V. 2019
(OPEN UP RESOURCES)

GRADE	TEACHER RESOURCES	STUDENT RESOURCES
6	<ul style="list-style-type: none"> • Teacher Edition: Unit 1-9 • Online Course Guide 	<ul style="list-style-type: none"> • Student Workbook Set: Unit 1-9 • Online Student Access (Digital Applets)
7	<ul style="list-style-type: none"> • Teacher Edition: Unit 1-9 • Online Course Guide 	<ul style="list-style-type: none"> • Student Workbook Set: Unit 1-9 • Online Student Access (Digital Applets)
8	<ul style="list-style-type: none"> • Teacher Edition: Unit 1-9 • Online Course Guide 	<ul style="list-style-type: none"> • Student Workbook Set: Unit 1-9 • Online Student Access (Digital Applets)

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/>

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/>