Orange Public Schools

Office of Curriculum & Instruction
2019-2020 Mathematics Curriculum Guide

6th Grade Mathematics

Illustrative Mathematics - Unit 6: Expression & Equations

March 9, 2020 – April 9, 2020

Board Approved: 1.14.2020

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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

Table of Contents

References

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

I. Unit Overview

Students begin the unit by working with linear equations that have single occurrences of one variable, e.g., x+1=5 and 4x=2. They represent relationships with tape diagrams and with linear equations, explaining correspondences between these representations. They examine values that make a given linear equation true or false, and what it means for a number to be a solution to an equation. Solving equations of the form px=q where p and q are rational numbers can produce complex fractions (i.e., quotients of fractions), so students extend their understanding of fractions to include those with numerators and denominators that are not whole numbers.

The second section introduces balanced and unbalanced "hanger diagrams" as a way to reason about solving the linear equations of the first section. Students write linear equations to represent situations, including situations with percentages, solve the equations, and interpret the solutions in the original contexts (MP2), specifying units of measurement when appropriate (MP6). They represent linear expressions with tape diagrams and use the diagrams to identify values of variables for which two linear expressions are equal. Students write linear expressions such as 6w−24 and 6(w−4) and represent them with area diagrams, noting the connection with the distributive property (MP7). They use the distributive property to write equivalent expressions.

In the third section of the unit, students write expressions with whole-number exponents and whole-number, fraction, or variable bases. They evaluate such expressions, using properties of exponents strategically (MP5). They understand that a solution to an equation in one variable is a number that makes the equation true when the number is substituted for all instances of the variable. They represent algebraic expressions and equations in order to solve problems. They determine whether pairs of numerical exponential expressions are equivalent and explain their reasoning (MP3). By examining a list of values, they find solutions for simple exponential equations.

In the last section of the unit, students represent collections of equivalent ratios as equations. They use and make connections between tables, graphs, and linear equations that represent the same relationships (MP1).

Essential Questions

- When are exponents used and why are they important?
- How do powers affect numbers?
- How can order of operations, the distributive property, and combining like terms help solve an algebraic equation?
- How can an algebraic expression help me solve a real-world application problem?
- How can equations, tables, and graphs be used to represent real-life scenarios?

Enduring Understanding

- Algebraic expressions and equations can help solve real-world application problems.
- When the value of one variable depends on the value of another, it is called a dependent variable; when the value of one variable does not depend on the value of the other, it is called an independent variable.
- A table can show the relationship between a dependent and independent variable.
- Using tables to recognize a pattern and write an expression using the pattern.

II. Pacing Guide

Activity	New Jersey State Learning Standards (NJSLS)	Estimated Time (Blocks)
Unit 6 Pre-Unit Diagnostic Assessment *Optional*	1.OA.B.4; 2.MD.B.5; 3.OA.A; 3.OA.B.6; 3.OA.B.5 5.NBT.A.2; 5.G.A.2; 5.OA.A	**1/2**
Lesson 1: Tape Diagrams and Equations	6.EE.B.6	1
Lesson 2: Truth and Equations	6.EE.B.5	1
Lesson 3: Staying Balance	6.EE.B.5; 6.EE.B.6; 6.EE.B.7	1
Lesson 4: Practice Solving Equations and Representing Situations with Equations	6.EE.B.5; 6.EE.B.6; 6.EE.B.7; 6.NS.B.3	1
Lesson 5: A New Way to Interpret a over b	6.EE.B.5; 6.EE.B.6; 6.EE.B.7	1
Lesson 6: Write Expressions Where Letters Stand for Numbers	6.EE.A.2a; 6.EE.A.2c; 6.EE.B.6	1
Lesson 7: Revisit Percentages	6.EE.B.6; 6.EE.B.7; 6.RP.A.3c	1
Lesson 8: Equal and Equivalent	6.EE.A.4; 6.EE.B.5	1
Lesson 9: The Distributive Property (Part 1)	6.EE.A.3; 6.EE.A.4;	1
Lesson 10: The Distributive Property (Part 2)	6.EE.A.2; 6.EE.A.3; 6.EE.A.4;	1
Lesson 11: The Distributive Property (Part 3)	6.EE.A.2; 6.EE.A.3; 6.EE.A.4;	1
Lesson 12: Meaning of Exponents	6.EE.A.1	1
Lesson 13: Expressions with Exponents	6.EE.A.1	1
Lesson 14: Evaluating Expressions with Exponents	6.EE.A.1; 6.EE.A.2c	1
Lesson 15: Equivalent Exponential Expressions	6.EE.A.1; 6.EE.A.2c; 6.EE.B.5	1
Lesson 16: Two Related Quantities (Part 1)	6.EE.C.9; 6.RP.A.3b	1
Lesson 17: Two Related Quantities (Part 2)	6.EE.C.9; 6.RP.A.3b	1
Lesson 18: More Relationships***(Project Based Learning)***	6.EE.C.9	1
Unit 6 End-Unit Assessment *Optional*	6.EE.A.1; 6.EE.A.3; 6.EE.B.5; 6.EE.B.6; 6.EE.B.7; 6.EE.C.9	**1**
Performance Task 6	6.EE.A.3	**1 /2**
Total Time		**20 Blocks**
Grade 6 Interim Assessment 3	6.NS.A.1; 6.EE.A.3; 6.EE.B.4; 6.EE.B.5; 6.EE.B.6; 6.EE.B.7	**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)*.

MARCH

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 (*see Pacing Guide on page 1)*.

APRIL

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 ?
6.EE.1-1	Write numerical expressions involving whole-number exponents	i) Tasks involve expressing b-fold products $a \cdot a \cdot \ldots \cdot a$ in the form $a\ b$, where a and b are non-zero whole numbers ii) Tasks do not require use of the laws of exponents	MP.8	No
6.EE.1-2	Evaluate numerical expressions involving whole-number exponents.	i) Tasks may involve simple fractions raised to small whole-number powers, e.g. (1/2)3 , (2/3)2 . ii) Tasks may involve nonnegative decimals raised to whole-number powers. iii) Tasks do not have a context.	MP.8	Yes
6.EE.2a	Write, read, and evaluate expressions in which letters stand for numbers. a. Write expressions that record operations with numbers and with letters standing for numbers. For example, express the calculation “Subtract y from 5” as 5 – y	i) Tasks do not have a context. ii) Numerical values in these expressions may include whole numbers, fractions, and decimals.	MP.8	Yes
6.EE.2b	Write, read, and evaluate expressions in which letters stand for numbers. b. Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity. For example, describe the expression 2 (8 + 7) as a product of two factors; view (8 + 7) as both a single entity and a sum of two terms.	i) Tasks do not have a context. ii) Numerical values in these expressions may include whole numbers, fractions, and decimals.	MP.7	Yes

6.EE.2c-1	Write, read, and evaluate expressions in which letters stand for numbers. c. Evaluate expressions at specific values of their variables. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations)	i) Tasks do not have a context. ii) Numerical values in these expressions may include whole numbers, fractions, and decimals. iii) Task will not require operations on negative numbers.	MP.7	Yes
6.EE.2c-2	Write, read, and evaluate expressions in which letters stand for numbers. c. Evaluate expressions that arise from formulas used in real-world problems at specific values of their variables. For example, use the formulas V = s 3 and A = 6s2 to find the volume and surface area of a cube with sides of length s = 1/2	i) Tasks are simple applications of formulas that are provided in the prompt. ii) Tasks do not require the student to manipulate the formula or isolate variables to solve an equation. iii) Tasks have "thin context" or no context. iv) Numerical values in these expressions may include whole numbers, fractions, and decimals. v) Task will not require operations on negative numbers.	MP.7	Yes
6.EE.4	Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them). For example, the expressions y + y + y and 3y are equivalent because they name the same number regardless of which number y stands for	-	MP.7	No
6.EE.5-1	Understand solving an equation as a process of answering a question: which values from a specified set, if any, make the equation true?	-		Yes

6.EE.5-2	Use substitution to determine whether a given number in a specified set makes an inequality true.	i) Most of tasks involve values from an infinite set of nonnegative numbers (e.g., even numbers; whole numbers; fractions). Some tasks involve values from a finite set of nonnegative numbers (e.g., {2, 5, 7, 9}).	MP.5 MP.6	Yes
6.EE.6	Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.	i) Tasks may require students to write an expression to represent a real-world or mathematical problem. Tasks do not require students to find a solution. ii) Tasks may require students to interpret a variable as a specific unknown number, or, as a number that could represent any number in a specified set.	MP.2 MP.6 MP.7	No
6.EE.7	Solve real-world and mathematical problems by writing and solving equations of the form x +p = q and px = q for cases in which p, q and x are all nonnegative rational numbers.	i) Tasks are algebraic, not arithmetic. See Progression for Expressions and Equations, pp. 3,4. ii) Half of the tasks involve whole-number values of p and q; and half of the tasks involve fraction or decimal values of p and q. iii) Fractions and decimals should not appear together in the same problem. iv) These tasks only involve equations with addition & multiplication. v) A valid equation and the correct answer are both required for full credit.	MP.1 MP.2 MP.6 MP.7	Yes

6.EE.8	Write an inequality of the form x > c or x < c to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form x > c or x < c have infinitely many solutions; represent solutions of such inequalities on number line diagrams.	i) Values of c are not limited to integers. ii) Tasks involve < and >, not ≤ and ≥.	MP.2 MP.6 MP.7	No
6.EE.9	Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation d = 65t to represent the relationship between distance and time.	i) Tasks that involve writing an equation should not go beyond the equation types described in 6.EE.7 (x+p =q and px = q where p, q, and x are all nonnegative rational numbers).	MP.2 MP.4 MP.6 MP.8	Yes
6.C.1.1	Base explanations/reasoning on the properties of operations. Content Scope: Knowledge and skills articulated in 6.EE.3, 6.EE.4	i) Tasks should not require students to identify or name properties	MP.3 MP.6 MP.7	Yes
6.C.6	Given an equation, present the solution steps as a logical argument that concludes with a solution. Content Scope: Knowledge and skills articulated in 6.EE.B	i) Tasks do not require students to write an equation or inequality.	MP.3 MP.6	Yes
6.C.7	Construct, autonomously, chains of reasoning that will justify or refute propositions or conjectures. Content Scope: Knowledge and skills articulated in 6.EE.4	-	MP.3 MP.6	Yes

6.C.8.1	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.EE.9	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
6.D.1	Solve multi-step contextual word problems with degree of difficulty appropriate to Grade 6, requiring application of knowledge and skills articulated in Type I, Sub-Claim A Evidence Statements.	i) Tasks may have scaffolding, if necessary, in order yield a degree of difficulty appropriate to Grade 6.	MP.1 MP.2 MP.4 MP.5 MP.7	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
solution to an equation	A solution to an equation with a variable in it is a number that can be used in place of the variable to make the equation true.
variable	A variable is a letter in an equation.
coefficient	In an algebraic expression, the coefficient of a variable is the constant the variable is multiplied by. If the variable appears by itself then it is regarded as being multiplied by 1 and the coefficient is 1.
equivalent expressions	Expressions that are always equal for the same value of their variable are called equivalent expressions.
dependent variable	A variable representing the output of a function.
independent variable	A variable representing the input of a function.

VII. Assessment Framework

Unit 6 Assessment Framework				
Assessment	**NJSLS**	**Estimated Time**	**Format**	**Graded ?**
Pre-Unit Diagnostic Assessment (Beginning of Unit – Optional) *Illustrative Mathematics*	1.OA.B.4; 2.MD.B.5; 3.OA.A; 3.OA.B.6; 3.OA.B.5 5.NBT.A.2; 5.G.A.2; 5.OA.A	½ Block	Individual	Yes (No Weight)
End-of-Unit Assessment (End of Unit – Optional) *Illustrative Mathematics*	6.EE.A.1, 6.EE.A.3, 6.EE.B.5,6.EE.B.6, 6.EE.B.7, 6.EE.C.9	1 Block	Individual	Yes
Grade 6 Interim Assessment 3 (Late March) *iReady Standards Mastery*	6.NS.A.1; 6.EE.A.3; 6.EE.B.4; 6.EE.B.5; 6.EE.B.6; 6.EE.B.7	1 Block	Individual	Yes

Unit 6 Performance Assessment Framework				
Assessment	**NJSLS**	**Estimated Time**	**Format**	**Graded ?**
Unit 6 Performance Task 1 (Early April) ***Which Goes with Which?***	6.EE.A.3	½ Block	Individual w/ Interview Opportunity	Yes; Rubric
Unit 6 Performance Task Option 1 (Optional) ***Firefighters Allocations***	6.EE.B.6 6.EE.B.7	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 _____

Which Goes with Which? (6.EE.A.3)

Decide which of the following equations best represents each situation.

$x+2=10$	$x=10+2$	$2 \cdot 10=x$
$x+10=2$	$10x=2$	$2x=10$

a. After Lou poured 2 liters of water into a large jug, the jug contained 10 liters of water. How many liters were in the jug to start?

b. Clara ran 10 miles, which was twice as far as Nina ran. How far did Nina run?

Unit 6 Performance Task 1 PLD Rubric				
SOLUTION • A) x + 2 = 10 • B) 2x + 10				
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 minor computational 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 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	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 • majr calculation errors • partial justification of a conclusion	No parts are correct. The student shows no work or justification.

Name _____ Block _____ Date _____

Firefighter Allocation (6.EE.B.6, 6.EE.B.7)

Task

A town's total allocation for firefighter's wages and benefits in a new budget is $600,000. If wages are calculated at $40,000 per firefighter and benefits at $20,000 per firefighter, write an equation whose solution is the number of firefighters the town can employ if they spend their whole budget. Solve the equation.

IX. 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.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	• **Teacher Edition: Unit 1-9** • Online Course Guide	• Student Workbook Set: Unit 1-9 • Online Student Access (Digital Applets)
7	• **Teacher Edition: Unit 1-9** • Online Course Guide	• Student Workbook Set: Unit 1-9 • Online Student Access (Digital Applets)
8	• **Teacher Edition: Unit 1-9** • Online Course Guide	• 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	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/

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/