

7th Grade Mathematics

Expressions & Equations: Generate equivalent expressions and solve real-life problems using expressions & equations

Unit 2 Pacing Calendar – Math in Focus



ORANGE PUBLIC SCHOOLS
OFFICE OF CURRICULUM AND INSTRUCTION
OFFICE OF MATHEMATICS

From the Common Core State Standards:

In **Grade 7**, instructional time should focus on four critical areas: (1) developing understanding of and applying proportional relationships; (2) developing understanding of operations with rational numbers and working with expressions and linear equations; (3) solving problems involving scale drawings and informal geometric constructions, and working with two- and three-dimensional shapes to solve problems involving area, surface area, and volume; and (4) drawing inferences about populations based on samples.

1. Students extend their understanding of ratios and develop understanding of proportionality to solve single- and multi-step problems. Students use their understanding of ratios and proportionality to solve a wide variety of percent problems, including those involving discounts, interest, taxes, tips, and percent increase or decrease. Students solve problems about scale drawings by relating corresponding lengths between the objects or by using the fact that relationships of lengths within an object are preserved in similar objects. Students graph proportional relationships and understand the unit rate informally as a measure of the steepness of the related line, called the slope. They distinguish proportional relationships from other relationships.

2. 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.

3. 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 in Grade 8 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.

4. 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.

A STORY OF UNITS

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



The Number System:
Operations with
Rational Numbers



Expressions & Equations: Use properties of operations to generate equivalent fractions and solve real-life problems using numerical & algebraic expressions & equations



Ratios & Proportional Relationships:
Analyze proportional relationships and use them to solve real-world and mathematical problems



Statistics & Probability / Geometry: Use random sampling, draw inferences, investigate chance processes, evaluate probability models, construct geometrical figures, and solve real-life problems.

Pacing Guide

Activity	New Jersey State Learning Standards (NJSLS)	Estimated Time (Blocks)
Chapter 3 Opener	7.EE.1; 7.EE.2; 7.EE.3	1 ½
Chapter 3 Pre-Test (MIF)	7.EE.1; 7.EE.2; 7.EE.3	½
3.1- Adding Algebraic Terms	7.EE.1	2
3.2- Subtracting Algebraic Terms	7.EE.1	1
3.3- Simplifying Algebraic Expressions	7.EE.1	2
3.4- Expanding Algebraic Expressions	7.EE.1	3
3.5- Factoring Algebraic Expressions	7.EE.1	2
3.6- Writing Algebraic Expressions	7.EE.2	3
3.7- Real World Problems: Algebraic Reasoning	7.EE.3	2
Chapter 3 Wrap Up/ Review Lesson	7.EE.1; 7.EE.2; 7.EE.3	1
Chapter 3 Test (MIF) *Optional*	7.EE.1; 7.EE.2; 7.EE.3	1
Performance Task 1	7.EE.1	1
Unit 2 Review Lesson	7.EE.1; 7.EE.2;	1
Unit 2 Assessment 1	7.EE.1; 7.EE.2;	1
Chapter 4 Opener	7.EE.4; 7.EE.4a; 7.EE.4b	1 ½
Chapter 4 Pre-Test (MIF)	7.EE.4; 7.EE.4a; 7.EE.4b	½
Transition Lesson Skills 23-26	7.EE.1; 7.EE.2; 7.EE.3	2
4.1- Understanding Equivalent Equations	7.EE.4	1
4.2- Solving Algebraic Equations	7.EE.4	3
4.3- Real-World Problems: Algebraic Equations	7.EE.4a	1
Performance Task 2	7.EE.4b	1
4.4- Solving Algebraic Inequalities	7.EE.4	3
4.5- Real-World Problems: Algebraic Inequalities	7.EE.4b	1
Chapter 4 Wrap Up/ Review Lesson	7.EE.3; 7.EE.4; 7.EE.4a; 7.EE.4b	1
Chapter 2 Test (MIF) *Optional*	7.EE.3; 7.EE.4; 7.EE.4a; 7.EE.4b	1
Unit 2 Review Lesson	7.EE.3; 7.EE.4	1
Unit 2 Assessment 2	7.EE.3; 7.EE.4	1
Solidify Unit 2 Concepts / Project Based Learning	7.EE.1; 7.EE.2; 7.EE.3; 7.EE.4	5
Total Time		45 Blocks

Major Work Supporting Content Additional Content

Pacing Calendar

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

Chapter 3: Algebraic Expressions: In this chapter, students extend their knowledge to more complex expressions. They learn to simplify, expand, and factor increasingly complex algebraic expressions. Students close the chapter by solving real-world problems. They create bar models and diagrams to help them visualize algebraic situations.

Chapter 4: 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.

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		

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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						

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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			

PARCC Assessment Evidence Statements

Type I

Type II

Type III

NJSLS	Evidence Statement	Clarification	Math Practices	Calculator ?
<u>7.EE.1</u>	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 $y(3+x) + yk$).	MP.7	No
<u>7.EE.2</u>	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."	-	MP.7	No
<u>7.EE.3</u>	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 $\frac{1}{10}$ of her salary an hour, or \$2.50, for a new salary of \$27.50. If you want to place a towel bar $9\frac{3}{4}$ inches long in the center of a door that is $27\frac{1}{2}$ 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.	-	MP.5	Yes

7th Grade Unit 2: Expressions and Equations

<u>7.EE.4a-1</u>	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.	MP.1 MP.2 MP.6 MP.7	No
<u>7.EE.4a-2</u>	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.	MP.6 MP.7	No
<u>7.EE.4b</u>	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 $, \leq$ or $\geq$.	MP.1 MP.2 MP.5 MP.6 MP.7	No
<u>7.C.1.2</u>	Base explanations/reasoning on the properties of operations. Content Scope: Knowledge and skills articulated in 7.EE.	i) Tasks should not require students to identify or name properties.	MP.3 MP.6 MP.7	Yes
<u>7.C.5</u>	Given an equation, present the solution steps as a logical argument that concludes with the set of solutions (if any). Content Scope: Knowledge and skills articulated in 7.EE.4a	-	MP.1 MP.2 MP.3 MP.6 MP.7	Yes

7th Grade Unit 2: Expressions and Equations

<u>7.C.7.4</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 7.EE.3	-	MP.1 MP.3 MP.6 MP.7 MP.8	Yes
<u>7.C.8</u>	Construct, autonomously, chains of reasoning that will justify or refute propositions or conjectures. Content Scope: Knowledge and skills articulated in 6.NS.C, 6.EE.A, 6.EE.B.	i) Tasks may have scaffolding 1, if necessary, in order to yield a degree of difficulty appropriate to Grade 7.	MP.3 MP.6	Yes
<u>7.D.1</u>	Solve multi-step contextual word problems with degree of difficulty appropriate to Grade 7, requiring application of knowledge and skills articulated in Type I, Sub-Claim A Evidence Statements.	i) Tasks may have scaffolding, if necessary, in order to yield a degree of difficulty appropriate to grade 7. ii) Tasks involving writing or solving an equation should not go beyond the equation types described in 7.EE.4a. ($px + q = r$ and $p(x + q) = r$ where p , q , and r are specific rational numbers.	MP.1 MP.2 MP.4 MP.5 MP.7	Yes



Differentiated Instruction

Chapter 3

Assessment and Intervention

	ASSESSMENT	 STRUGGLING LEARNERS
DIAGNOSTIC	- Quick Check in Recall Prior Knowledge in Student Book A, pp. 129–131 - Chapter 3 Pre-Test in Assessments	Skills 16–22 in <i>Transition Guide</i>, Course 2
ON-GOING	- Guided Practice - Lesson Check - Ticket Out the Door	- Reteach worksheets - Extra Practice worksheets - Activity Book, Chapter 3
END-OF-CHAPTER	- Chapter Review/Test - Chapter 3 Test in Assessments  ExamView® Assessment Suite CD-ROM Course 2	Reteach worksheets

ELL

ENGLISH LANGUAGE LEARNERS

Review the terms *variable*, *coefficient*, *algebraic expression*, and *term*.

Model Write the expression $4 + 3x$. Point to x .

Say You can use a letter like x to stand for a quantity that can change. The letter x is called a *variable*. It stands for a number that can change. x might be 2. It might be -6 . It might be 1.5. (Point to the 3.) A number right before a variable is called a *coefficient*. A coefficient tells you how many times to multiply the variable. (Under $3x$, write “ $3 \cdot x$.”) $3x$ means “3 times x .”

Explain Contrast the expression $3x$ with the equation $3x = 12$. The expression can have infinitely many values, depending on what value of x is multiplied by 3. In the equation, only one value, 4 can be multiplied by 3 to get 12.

Say An *algebraic expression* must have one or more variables. This expression $4 + 3x$ means “4 plus 3 times a number x .” An algebraic expression is made up of *terms*. (Box the 4 and the $3x$.) This expression has two terms, 4 and $3x$, that are added together. (Circle the $+$ sign.)

For definitions, see Glossary, page 308, and



Online Multi-Lingual Glossary.

ADVANCED LEARNERS

- Students can identify algebraic situations in their own lives or in the world around them. Encourage students to identify situations that involve two variables and two or more operations. Then have students describe each situation using words and using an algebraic expression, as shown below.

Mary's job pays her the same amount of money each week. Last year, she also received an end-of-year bonus of \$2,000. Mary's total pay for the year can be describes as $(52p + 2,000)$ dollars, where p represents her weekly salary.

- As needed, provide direction for students, such as suggesting that they look for situations that recur on a regular basis but include one or more values that can change. You may also point out that real-world situations that involve money, time, or distance are a good place to start.

To provide additional challenges use:

- Enrichment*, Chapter 3
- Student Book A, Brain@Work problem



Differentiated Instruction

Chapter 4

Assessment and Intervention

	ASSESSMENT	 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 <i>Transition Guide, Course 2</i>
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



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

Name _____

Block _____

Date _____

Miles to Kilometers (NJSL 7.EE.A.1)

The students in Mr. Sanchez's class are converting distances measured in miles to kilometers. To estimate the number of kilometers, Abby takes the number of miles, doubles it, and then subtracts 20% of the result. Renato first divides the number of miles by 5, and then multiplies the result by 8.

- Write an algebraic expression for each method.
- Use your answer to part (a) to decide if the two methods give the same answer. Explain your work.

7th Grade Miles to Kilometers Task – Rubric

Name: _____ Date: _____

NJSLS: 7.EE.A.1

Type: _____ Teacher: _____

Task Description	- 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. - Clearly constructs and communicates a complete response by ➤ using a logical approach based on a conjecture and/or stated assumptions ➤ providing an efficient and logical progression of steps ➤ using grade-level vocabulary, symbols, and labels ➤ providing a justification of a conclusion with minor computational error ➤ evaluating, interpreting and critiquing the validity and efficiency of others' responses				
Command Level Description	<i>Level 5:</i> <i>Distinguished Command</i> Perform the task items accurately or with minor computation errors.	<i>Level 4:</i> <i>Strong Command</i> Perform the task items with some non-conceptual errors	<i>Level 3:</i> <i>Moderate Command</i> Perform the task items with minor conceptual errors and some computation errors.	<i>Level 2:</i> <i>Partial Command</i> Perform the task items with some errors on both math concept and computation.	<i>Level 1:</i> Perform the task items with serious errors on both math concept and computation.
Score range	<i>5 pts</i>	<i>4 pts</i>	<i>3 pts</i>	<i>2 pts</i>	<i>0-1 pt</i>
Task Score & PLD Assigned					

#	Answer	Scoring
Part A	**** Solutions may vary **** Abby's method starts doubling m, giving $2m$. She then takes 20% of the result, which we can write $0.2(2m)$. Finally she subtracts this from $2m$, giving $2m - (0.2)2m$. Renato's method starts by dividing m by 5, giving $m \div 5 = \frac{m}{5}$, and then multiplies the result by 8, giving $8 \left(\frac{m}{5} \right)$	2 points: 1 point for each correct expression. 2 TOTAL POINTS
Part B	Abby's expression can be simplified as follows: $2m - (0.2)2m = 2m - 0.4m = (2 - 0.4)m = 1.6m.$ (The step where we rewrite $2m - 0.4m$ as $(2 - 0.4)$ uses the distributive property.) Renato's method gives $8 \cdot \frac{m}{5} = 8 \cdot \frac{1}{5} \cdot m = \frac{8}{5} \cdot m = 1.6m.$ So the two methods give the same answer and the expressions are equivalent.	2 points: for the correctly simplifying Abby's and Renato's expression. OR 1 point: for correctly simplifying Abby's and Renato's expression with minor mistakes. 1 point for correct explanation. 3 TOTAL POINTS

7th Grade Portfolio Assessment: Unit 2 Performance Task 2

Name _____

Block _____

Date _____

Fishing Adventures (7.EE.B.4)

Fishing Adventures rents small fishing boats to tourists for day long fishing trips. Each boat can only carry 1200 pounds of people and gear for safety reasons. Assume the average weight of a person is 150 pounds. Each group will require 200 lbs of gear for the boat plus 10 lbs of gear for each person.

- a. Several groups of people wish to rent a boat.

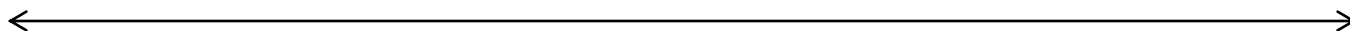
Group 1 has 4 people

Group 2 has 5 people

Group 3 has 8 people

Which of the groups, if any, can safely rent a boat? Justify your answer algebraically.

- b. Create an inequality describing the restrictions on the number of people possible in a rented boat. Graph the solution set.



7th Grade Fishing Adventures– Rubric

Name: _____ Date: _____

NJSLS: 7.EE.B.4

Type: _____ Teacher: _____

Task Description	- 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. - Clearly constructs and communicates a complete response by ➤ using a logical approach based on a conjecture and/or stated assumptions ➤ providing an efficient and logical progression of steps ➤ using grade-level vocabulary, symbols, and labels ➤ providing a justification of a conclusion with minor computational error ➤ evaluating, interpreting and critiquing the validity and efficiency of others' responses				
Command Level Description	Level 5: <i>Distinguished Command</i> Perform the task items accurately or with minor computation errors.	Level 4: <i>Strong Command</i> Perform the task items with some non-conceptual errors	Level 3: <i>Moderate Command</i> Perform the task items with minor conceptual errors and some computation errors.	Level 2: <i>Partial Command</i> Perform the task items with some errors on both math concept and computation.	Level 1: Perform the task items with serious errors on both math concept and computation.
Score range	<i>11-12 pts</i>	<i>8-10 pts</i>	<i>6-7 pts</i>	<i>3-5 pts</i>	<i>0-2 pts</i>
Task Score & PLD Assigned					

#	Answer	Scoring
Part A	For Group 1 : $160(4) + 200 = 840 \leq 1200$ For Group 2 : $160(5) + 200 = 1000 \leq 1200$ For Group 3 : $160(8) + 200 = 1480 \not\leq 1200$	2 points: for each group (1 point for correctly saying if they will arrive safely and 1 point for algebraic justification) (6 points possible) 6 TOTAL POINTS
Part B	- P= the number of people $160p + 200 \leq 1200$ - Graph	1 point for correctly defining their own variables <i>Inequality</i> 3 points: Correct inequality (or something equivalent) 2 points: Students disregards the extra 10 lbs per person OR the extra 200 pounds per group OR uses "<" instead of "<=" (ex: $150p \leq 1000$; $160p \leq 1200$; $160p < 1000$) 1 point: Students disregard the extra 10 lbs per person AND the extra 200 lbs per group AND/OR uses "<" instead of "<=" (ex: $150p < 1000$; $160p \leq 1200$; $160p < 1200$) <i>Graph</i> 2 points: correct intervals and solution shading; 1 point: student uses "<" instead of "<=" 6 TOTAL POINTS

21st Century Career Ready Practices

- 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.

For additional details see [21st Century Career Ready Practices](#) .