7th Grade Mathematics

Introducing Proportional Relationships

Unit 2 Pacing Calendar - Illustrative Mathematics

ORANGE PUBLIC SCHOOLS

OFFICE OF CURRICULUM AND INSTRUCTION

OFFICE OF MATHEMATICS

Revised: 10/18/2019

From the New Jersey Student Learning 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.

Yearlong Pacing Guide
Grade 7

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:** Scale Drawings

Unit 2 — **Ratios & Proportional Relationships:** Introducing Proportional Relationships

Unit 3 — **Geometry:** Measuring Circles

Unit 4 — **Ratios & Proportional Relationships:** Proportional Relationships & Percentages

Unit 5 — **Number System:** Rational Number Arithmetic

Unit 6 — **Expressions & Equations:** Expressions, Equations &

Unit 7 — **Geometry:** Angles, Triangles, and Prisms

Unit 8 — **Statistics & Probability:** Probability and Sampling

2019-2020 Grade 7 (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
7.G.1(A)	7.RP.2a(M) 7.RP.2b(M) 7.RP.2c(M) 7.RP.2d(M)	7.G.4(A)	7.RP.1(M) 7.RP.3(M)	7.NS.1(M) 7.NS.2(M) 7.NS.3(M)	7.EE.3(M) 7.EE.4(M) 7.EE.2(M) 7.EE.1(M)	7.G.5(A) 7.G.2(A) 7.G.3(A) 7.G.6(A)	7.SP.6(S) 7.SP.5(S) 7.SP.7(S) 7.SP.8(S) 7.SP.1(S) 7.SP.2(S) 7.SP.3(S) 7.SP.4(S)
15 Days	17 Days	13 Days	19 Days	19 Days	25 Days	19 Days	22 Days
Oct. 1	Oct. 30	Nov. 22	Jan. 8	Feb. 7	Mar. 27	May 5	Jun. 9

Major Work Supporting Content Additional Content

Table of Contents

I. Unit Overview

In this unit, students develop the idea of a proportional relationship out of the grade 6 idea of equivalent ratios. Proportional relationships prepare the way for the study of linear functions in grade 8.

Students learn that any proportional relationship can be represented by an equation of the form y=kx where k is the constant of proportionality, that its graph lies on a line through the origin that passes through Quadrant I, and that the constant of proportionality indicates the steepness of the line. By the end of the unit, students should be able to easily work with common contexts associated with proportional relationships (such as constant speed, unit pricing, and measurement conversions) and be able to determine whether a relationship is proportional or not.

Because this unit focuses on understanding what a proportional relationship is, how it is represented, and what types of contexts give rise to proportional relationships, the contexts have been carefully chosen. The first tasks in the unit employ contexts such as servings of food, recipes, constant speed, and measurement conversion, that should be familiar to students from the grade 6 course. These contexts are revisited throughout the unit as new aspects of proportional relationships are introduced.

Associated with the contexts from the grade 6 course are derived units: miles per hour; meters per second; dollars per pound; or cents per minute. In this unit, students build on their grade 6 experiences in working with a wider variety of derived units, such as cups of flour per tablespoon of honey, hot dogs eaten per minute, and centimeters per millimeter. The tasks in this unit avoid discussion of measurement error and statistical variability, which will be addressed in later units.

II. Pacing Guide

Activity	New Jersey State Learning Standards (NJSLS)	Estimated Time (Blocks)
Unit 2 Pre-Unit Assessment (IM) *Optional*	6.RP.A.1, 6.RP.A.3.a, 6.RP.A.2, 6.RP.A.3.b, 6.RP.A.3	½
Lesson 1: One of These Things Is Not Like the Others	7.G.A.1	1
Lesson 2: Introducing Proportional Relationships with Tables	7.RP.A.2, 7.RP.A.2.a, 7.RP.A.2.b	1
Lesson 3: More about Constant of Proportionality	7.RP.A.2, 7.RP.A.2.a, 7.RP.A.2.b	1
Lesson 4: Proportional Relationships and Equations	7.RP.A.2, 7.RP.A.2.c	1
Lesson 5: Two Equations for Each Relationship	7.RP.A, 7.RP.A.2, 7.RP.A.2.b, 7.RP.A.2.c	1
Lesson 6: Using Equations to Solve Problems	7.RP.A.2, 7.RP.A.2.c	1
Lesson 7: Comparing Relationships with Tables	7.RP.A.2	1
Lesson 8: Comparing Relationships with Equations	7.RP.A.1	1
Lesson 9: Solving Problems about Proportional Relationships	7.RP.A, 7.RP.A.2	1
Lesson 10: Introducing Graphs of Proportional Relationships	7.RP.A.2, 7.RP.A.2.a	1
Lesson 11: Interpreting Graphs of Proportional Relationships	7.RP.A	1
Lesson 12: Using Graphs to Compare Relationships	7.RP.A.2	1
Lesson 13: Two Graphs for Each Relationship	7.RP.A.2	1
Lesson 14: Four Representations	7.RP.A, 7.RP.A.2	1
Lesson 15: Using Water Efficiently*(Project Based Learning)*	7.RP.A.2	1
Performance Task 1	7.RP.A.1, 7.RP.A.2b	½
Unit 2 End of Unit Assessment (IM) *Optional*	7.RP.A.2.a, 7.RP.A.2.d, 7.RP.A.2.c, 7.RP.A.2.b, 7.RP.A.2.a	**1**
Total Time		**17 Blocks**
Grade 7 Interim Assessment 1	7.G.A.1,7.RP.A.2.a, 7.RP.A.2.b, 7.RP.A.2.c, 7.RP.A.2.d	**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 2)*.

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 (*see Pacing Guide on page 2)*.

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. PARCC Assessment Evidence Statements

Type I Type II Type III

NJSLS	Evidence Statement	Clarification	Math Practices	Calculator ?
7.RP.1	Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. For example, if a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction 1/2/1/4 miles per hour, equivalently 2 miles per hour.	i) Tasks have a real-world context. ii) Tasks do not assess unit conversions.	MP. 2 MP. 4 MP. 5	Yes
7.RP.2a	Recognize and represent proportional relationships between quantities: a. Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.	i) Tasks may or may not have context	MP. 2 MP. 5	Yes
7.RP.2b	Recognize and represent proportional relationships between quantities: b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.	i) Tasks may or may not have context. ii) Tasks sample equally across the listed representations (graphs, equations, diagrams, and verbal descriptions). iii) Tasks use only coordinates in Quadrant 1 and use only a positive constant of proportionality.	MP. 2 MP. 5 MP. 8	No
7.RP.2c	Recognize and represent proportional relationships between quantities: c. Represent proportional relationships by equations. For example, if total cost t is proportional to the number n of items purchased at a constant price p, the relationship between the total cost and the number of items can be expressed as t = pn.	i) Tasks have a context. ii) Tasks use only coordinates in Quadrant 1 and use only a positive constant of proportionality.	MP. 2 MP. 8	No

7.RP.2d	Recognize and represent proportional relationships between quantities. d. Explain what a point (x, y) on the graph of a proportional relationships means in terms of the situation, with special attention to the points (0, 0) and (1, r) where r is the unit rate.	i) Tasks require students to interpret a point (x, y) on the graph of a proportional relationship in terms of the situation. For the explain aspect of 7.RP.2d, see 7.C.6.1. ii) Tasks use only coordinates in Quadrant 1 and use only a positive constant of proportionality	MP. 2 MP. 4	No
7.C.6.1	Construct, autonomously, chains of reasoning that will justify or refute propositions or conjectures. Content Scope: Knowledge and skills articulated in 7.RP.2	i) Tasks use only coordinates in Quadrant 1 and use only a positive constant of proportionality.	MP. 2 MP. 3 MP. 6	Yes

V. Differentiated Instruction

Supporting English Language Learners

The purpose of this document is to nudge the field forward by offering support to the next generation of mathematics learners and by challenging persistent assumptions about how to support and develop students' disciplinary language. The goal is to provide guidance to mathematics teachers for recognizing and supporting students' language development processes in the context of mathematical sense making. UL/SCALE provides a framework for organizing strategies and special considerations to support students in learning mathematics practices, content, and language. The framework is intended to help teachers address the specialized academic language demands in math when planning and delivering lessons, including the demands of reading, writing, speaking, listening, conversing, and representing in math (Aguirre & Bunch, 2012). Therefore, while the framework can and should be used to support all students learning mathematics, it is particularly well-suited to meet the needs of linguistically and culturally diverse students who are simultaneously learning mathematics while acquiring English.

For more information, click the link below:

Supporting ELL Learners

Supporting Students with Disabilities

The philosophical stance that guided the creation of these materials is the belief that with proper structures, accommodations, and supports, all children can learn mathematics. 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.

For more information, click the link below:

Supporting Students with Disabilities

VI. Vocabulary

Corresponding: If a part of the original figure matches up with a part of the copy, we call them corresponding parts. The part could be an angle, point, or side, and you can have corresponding angles, corresponding points, or corresponding sides.

If you have a distance between two points in the original figure, then the distance between the corresponding points in the copy is called the corresponding distance.

Equivalent Ratios: 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 $b \cdot s = d$.

Origin: In the coordinate plane, the origin is the point (0,0).

Proportional Relationship: If there is a positive constant *k* so that the quantities *x* and *y* are related by the equation $y=kx$, then we say that *y* and *x* are in a proportional relationship, and that *y* is proportional to *x.* The constant *k* is called the constant of proportionality.

Scaled Copy: Scaled copy of a figure is a figure in which every length in the original figure is increased or decreased by the same scale factor.

Scale Drawing: A scale drawing of an object is a drawing in which all lengths in the drawing correspond to lengths in the object by the same scale. The scale tells you how the lengths correspond; for example, a scale of "1 inch to 2 feet" means that 1 inch in the drawing represents 2 feet in the object.

Scale Factor: Scale factor is the factor by which every length in an original figure is increased or decreased when you make a scaled copy. For example, if you draw a copy of a figure in which every length is magnified by 2, then you have a scaled copy with a scale factor of 2.

VII. Assessment Framework

Unit 2 Assessment Framework				
Assessment	**NJSLS**	**Estimated Time**	**Format**	**Graded ?**
Pre-Unit Diagnostic Assessment (Beginning of Unit – Optional) *Illustrative Mathematics*	6.RP.A.1, 6.RP.A.3.a, 6.RP.A.2, 6.RP.A.3.b, 6.RP.A.3	½ Block	Individual	Yes (No Weight)
End-of-Unit Assessment (End of Unit – Optional) *Illustrative Mathematics*	7.RP.A.2a,7.RP.A.2d 7.RP.A.2c,7.RP.A.2b, 7.RP.A.2a	1 Block	Individual	Yes
Grade 7 Interim Assessment 1 (Early November) *iReady Standards Mastery*	7.G.A.1,7.RP.A.2a, 7.RP.A.2b,7.RP.A.2c, 7.RP.A.2d	1 Block	Individual	Yes

Unit 2 Performance Assessment Framework				
Assessment	**NJSLS**	**Estimated Time**	**Format**	**Graded ?**
Unit 2 Performance Task 1 (Early November) *Cider Versus Juice*	7.RP.A.1, 7.RP.A.2b	½ Block	Individual	Yes; Rubric
Unit 2 Performance Task Option 1 (Optional) *Buying Coffee*	7.RP.A.2	Teacher Discretion	Teacher Discretion	Yes, if administered

Name _____ Block _____ Date _____

Cider Versus Juice (7.RP.A.1, 7.RP.A.2b)

The price of a gallon of apple cider is $7.00. The price of eight 4.23-ounce juice boxes is $2.39.

a. Suppose the juice was instead packaged like the cider. Approximately what is the cost per gallon of the juice?

b. Suppose the cider was instead packaged like the juice. Approximately what is the cost per eight 4.23-ounce boxes of cider?

c. Peter wants to have at least a gallon of either only cider or only juice. Which product is the better deal?

d. State the unit rate(s) you used to compare the cost of cider versus juice in your answer to Question c.

e. List two or more additional unit rates that could be used to make this comparison.

7th Grade Cider Versus Juice – Rubric Name: _____ Date: _____

NJSLS: 7.RP.A.1, 7.RP.A.2b 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:*** ***Distinguished Command*** Perform the task items accurately or with minor computation errors.	***Level 4:*** ***Strong Command*** Perform the task items with some non-conceptual errors.	***Level 3:*** ***Moderate Command*** Perform the task items with minor conceptual errors and some computation errors.	***Level 2:*** ***Partial Command*** 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	*12-14 pts*	*9-11 pts*	*6-8 pts*	*3-5 pts*	*0-2 pt*
Task Score & PLD Assigned					

7th Grade Cider Versus Juice – Scoring Guide **NAME: _____**

#	Answer	Scoring
Part A	$\frac{2.39 \text{ dollars}}{33.84 \text{ ounces}} = \frac{x \text{ dollars}}{1 \text{ gallon}}$ $\frac{2.39 \text{ dollars}}{33.84 \text{ ounces}} \cdot \frac{128 \text{ ounces}}{1 \text{ gallon}} \approx \frac{9.04 \text{ dollars}}{1 \text{ gallon}}$, so $x \approx 9.04$, and the price of the juice is about \$9.04 per gallon.	1 point for correctly setting up the proportion 2 points for the correct unit rate and showing the work 1 point for the correct statement including the correct units **4 TOTAL POINTS**
Part B	$\frac{7 \text{ dollars}}{128 \text{ ounces}} = \frac{x \text{ dollars}}{1 \text{package of boxes}}$ $\frac{7 \text{ dollars}}{128 \text{ ounces}} \cdot \frac{33.84 \text{ ounces}}{1 \text{ package of boxes}} \approx \frac{1.85 \text{ dollars}}{1 \text{ package of boxes}}$, and $x \approx 1.85$ and the price of the cider is about \$1.85 per eight 4.23-ounce boxes.	1 point for correctly setting up the proportion 2 points for the correct unit rate and showing the work 1 point for the correct statement including the correct units **4 TOTAL POINTS**
Part C	c. Utilizing our previous answers to part a and b, we see that the cider is the more cost-effective choice. (In fact, Peter would have to buy four 8-packs of juice to get at least a gallon, for a cost of \$9.56, much more than the \$7 it would take to get a gallon of cider.)	1 point for the correct statement 1 point for justifying **2 TOTAL POINTS**

Part D	d. The unit rates we used in parts a and b are dollars per gallon and dollars per pack of eight 4.23-ounce boxes.	1 point for the correct units for the cider 1 point for the correct units for the juice **2 TOTAL POINTS**
Part E	e. Additional unit rates could be dollars per ounce, cents per ounce, ounces per dollar, dollars per 4.23-ounce box, etc.	1 point for each additional unit rate **2 TOTAL POINTS**

Name _____ Block _____ Date _____

Buying Coffee (7.RP.A.2)

Coffee costs $18.96 for 3 pounds.

1. What is the cost for one pound of coffee?

2. At this store, the price for a pound of coffee is the same no matter how many pounds you buy. Let x be the number of pounds of coffee and y be the total cost of x pounds. Draw a graph of the relationship between the number of pounds of coffee and the total cost.

3. Where can you see the cost per pound of coffee in the graph? What is it?

IX. 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** .

References

"Illustrative Mathematics" *Open Up Resources.* 2018

<https://auth.openupresources.org/register/complete>