

7th Grade Mathematics

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

Unit 3 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 5 Opener	7.RP.A.1; 7.RP.A.2;7.RP.A.3;	1 ½
Chapter 5 Pre-Test (MIF)	7.RP.A.1; 7.RP.A.2; 7.RP.A.3	½
5.1- Understanding Direct Proportion	7.RP.A.2; 7.RP.A.2a; 7.RP.A.2b;	3
5.2- Representing Direct Proportion Graphically	7.RP.A.2b; 7.RP.A.2d;	1
5.3- Solving Direct Proportion Problems	7.RP.A.2c; 7.RP.A.3;	2
Performance Task 1		1
5.4- Solving Direct Proportion Problems	7.RP.A.1; 7.RP.A.2; 7.RP.A.3;	4
Chapter 5 Wrap Up/ Review Lesson	7.RP.A.1; 7.RP.A.2; 7.RP.A.3;	2
Chapter 5 Test (MIF) *Optional*		1
Grade 7 Module 1 (Engage NY) Lesson 14	7.RP.A.3	1
Grade 6 Math in Focus 6.5-Percent of Change	7.RP.A.3	2
Performance Task 2	7.RP.A.3	1
7.5-Understanding Scale Drawings	7.RP.A.2; 7.G.A.1	3
Unit 2 Review Lesson	7.RP.A.1; 7.RP.A.2;7.RP.A.3;	1
Unit 2 Assessment 1	7.RP.A.1; 7.RP.A.2;7.RP.A.3;	1
Total Time		25 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 5: Direct and Inverse Proportion: In this chapter, students extend their knowledge of ratios and rates to the concepts of direct and inverse proportion. They identify both direct and inverse proportion, recognize that a constant of proportionality can be a constant rate, and solve real-world proportional-relationship problems. In addition, students use visual bar models to interpret and solve direct and inverse proportion problems.

FEBRUARY

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			

Pacing Calendar

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

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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

Pacing Calendar

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

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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					

PARCC Assessment Evidence Statements

Type I

Type II

Type III



NJSLS	Evidence Statement	Clarification	Math Practices	Calculator ?
<u>7.RP.A.2</u>	Base explanations/reasoning on a coordinate plane diagram (whether provided in the prompt or constructed by the student in her response). Content Scope: Knowledge and skills articulated in 7.RP.A	i) Tasks use only coordinates in Quadrant 1 and use only a positive constant of proportionality.	MP.2 MP.3 MP.5 MP.6	Yes
<u>7.RP.A.2</u>	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
<u>7.RP.A.3</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.RP.3	i) Tasks use only coordinates in Quadrant 1 and use only a positive constant of proportionality	MP.1 MP.3 MP.6 MP.7 MP.8	Yes
<u>6.RP.A</u>	Solve multi-step contextual problems with degree of difficulty appropriate to grade 7, requiring application of knowledge and skills articulated in 6.RP.A, 6.EE.C, 6.G.	i) Tasks may have scaffolding, if necessary, in order to yield a degree of difficulty appropriate to grade 7.	MP.1 MP.2 MP.4 MP.5 MP.7	Yes



Differentiated Instruction

Chapter 5

Assessment and Intervention

	ASSESSMENT	 STRUGGLING LEARNERS
DIAGNOSTIC	<ul style="list-style-type: none"> Quick Check in Recall Prior Knowledge in Student Book A, pp. 245–247 Chapter 5 Pre-Test in <i>Assessments</i> 	<ul style="list-style-type: none"> Skills 27–31 in <i>Transition Guide, Course 2</i>
ON-GOING	<ul style="list-style-type: none"> Guided Practice Lesson Check Ticket Out the Door 	<ul style="list-style-type: none"> Reteach worksheets Extra Practice worksheets. Chapters 3–5 Cumulative Practice worksheets Activity Book, Chapter 5
END-OF-CHAPTER	<ul style="list-style-type: none"> Chapter Review/Test Chapter 5 Test, Mid-Course Test in <i>Assessments</i>  ExamView® Assessment Suite CD-ROM Course 2 	<ul style="list-style-type: none"> Reteach worksheets

ELL ENGLISH LANGUAGE LEARNERS


Review the terms *ratio* and *proportion*.

Model Draw a row of 2 open circles and below it a row of 3 shaded circles. Above the rows, write the ratio $\frac{2}{3}$.

Say A ratio compares two amounts. This ratio compares the number of open circles, 2, to the number of shaded circles, 3.

Model Draw 4 more open circles in the top row and 6 more shaded circles in the bottom row. Above them, next to the $\frac{2}{3}$, write $= \frac{6}{9}$.

Say A proportion tells you that two ratios are equal. This proportion says the ratio $\frac{2}{3}$ is equal to the ratio $\frac{6}{9}$.

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

ADVANCED LEARNERS

- Tell students that some proportional relationships demonstrate a concept known as “diminishing returns.” Ask them to investigate the concept and to consider how it pertains to some proportional relationships.
- As needed, provide direction for students. For instance, discuss the example about window cleaners on page 281 of the Student Book. Ask students to think about what would really happen if more and more window cleaners were added to the crew cleaning the windows. Students should realize that eventually the window cleaners could get in each other’s way, hampering efforts to clean effectively. Thus, the number of hours needed to clean the windows might increase as more cleaners are added. Ask students to think about how this would affect the graph in the example.

To provide additional challenges use:


- Enrichment*, Chapter 5
- Student Book A, Brain@Work problem



Differentiated Instruction

Chapter 7

Assessment and Intervention

	ASSESSMENT	 STRUGGLING LEARNERS
DIAGNOSTIC	<ul style="list-style-type: none"> Quick Check in Recall Prior Knowledge in Student Book B, pp. 63–68 Chapter 7 Pre-Test in Assessments 	<ul style="list-style-type: none"> Skills 34–39 in <i>Transition Guide, Course 2</i>
ON-GOING	<ul style="list-style-type: none"> Guided Practice Lesson Check Ticket Out the Door 	<ul style="list-style-type: none"> Reteach worksheets Extra Practice worksheets Activity Book, Chapter 7
END-OF-CHAPTER	<ul style="list-style-type: none"> Chapter Review/Test Chapter 7 Test in Assessments ExamView® Assessment Suite CD-ROM Course 2 	<ul style="list-style-type: none"> Reteach worksheets


ELL ENGLISH LANGUAGE LEARNERS

Review the terms *construct*, *midpoint*, and *equidistant*.

Say When you *construct* something you make it. You build it. You can construct a house of wood. You can construct a toy airplane of paper. You can construct an angle bisector with a compass and a straightedge. A thing you construct is called a *construction*.

Model Draw a line segment AB . Draw its perpendicular bisector.

Say The middle point of a line segment is called the *midpoint*. (*Mark the midpoint, C.*) The midpoint, C , divides \overline{AB} into two equal parts. (*Indicate the equal parts and write $AC = CB$.*) The distance from A to the midpoint, C , is the same as the distance from B to the midpoint, C . The midpoint is an equal distance from both ends of the segment. We say the midpoint is *equidistant* from both ends of the segment.

For definitions, see Glossary, page 321, and  Online Multi-Lingual Glossary.

ADVANCED LEARNERS

- Students can explore scale factors when a figure is enlarged and/or reduced repeatedly. Ask them to solve the following problem.

A photo has side lengths of 8 in. and 10 in. It is enlarged to three times its original size. Then the enlargement is reduced to half its size. What is the final size of the photo? (*12 in. by 15 in.*) What scale factor relates the final photo to the original? $\left(\frac{3}{2}\right)$

- As needed, provide direction for students, such as suggesting they sketch each version of the photo.
- Finally, ask students to state a rule for finding the scale factor that compares an original figure to a version that has been reduced and/or enlarged multiple times. (*The scale factor that compares the original figure to the final figure is the product of all the individual scale factors.*)

To provide additional challenges use:

- Enrichment*, Chapter 7
- Student Book B, Brain@Work problem

7th Grade Portfolio Assessment: Unit 3 Performance Task 1

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.



- Suppose the juice was instead packaged like the cider. Approximately what is the cost per gallon of the juice?
- Suppose the cider was instead packaged like the juice. Approximately what is the cost per eight 4.23-ounce boxes of cider?
- Peter wants to have at least a gallon of either only cider or only juice. Which product is the better deal?
- State the unit rate(s) you used to compare the cost of cider versus juice in your answer to Question c.
- List two or more additional unit rates that could be used to make this comparison.

Cider versus Juice Task – Rubric

Name: _____ Date: _____

NJSLS: 7.RP.A.1; 7.RP.A.2b

Type: _____ Teacher: _____

<p>Task Description</p>	<ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> ➤ 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 				
<p>Command Level Description</p>	<p>Level 5: <i>Distinguished Command</i></p> <p>Perform the task items accurately or with minor computation errors.</p>	<p>Level 4: <i>Strong Command</i></p> <p>Perform the task items with some non-conceptual errors</p>	<p>Level 3: <i>Moderate Command</i></p> <p>Perform the task items with minor conceptual errors and some computation errors.</p>	<p>Level 2: <i>Partial Command</i></p> <p>Perform the task items with some errors on both math concept and computation.</p>	<p>Level 1:</p> <p>Perform the task items with serious errors on both math concept and computation.</p>
<p>Score range</p>	<p><i>12-14 pts</i></p>	<p><i>9-11 pts</i></p>	<p><i>6-8 pts</i></p>	<p><i>3-5 pts</i></p>	<p><i>0-2 pts</i></p>
<p>Task Score & PLD Assigned</p>					

#	Answer	Scoring
Part A	$\frac{2.39 \text{ dollars}}{33.84 \text{ ounces}} = \frac{x \text{ dollars}}{1 \text{ gallon}} \quad \frac{2.39 \text{ dollars}}{33.84 \text{ ounces}} \cdot \frac{128 \text{ ounces}}{1 \text{ gallon}} \approx \frac{9.04 \text{ dollars}}{1 \text{ gallon}},$ <p>so $x \approx 9.04$, and the price of the juice is about \$9.04 per gallon.</p>	<p>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.</p> <p>4 TOTAL POINTS</p>
Part B	$\frac{7 \text{ dollars}}{128 \text{ ounces}} = \frac{x \text{ dollars}}{1 \text{ package of boxes}} \quad \frac{7 \text{ dollars}}{128 \text{ ounces}} \cdot \frac{33.84 \text{ ounces}}{1 \text{ package of boxes}} \approx \frac{1.85 \text{ dollars}}{1 \text{ package of boxes}},$ <p>and $x \approx 1.85$ and the price of the cider is about \$1.85 per eight 4.23-ounce boxes.</p>	<p>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.</p> <p>4 TOTAL POINTS</p>
Part C	<p>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.)</p>	<p>1 point for the correct statement 1 point for justifying</p> <p>2 TOTAL POINTS</p>

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

7th Grade Portfolio Assessment: Unit 3 Performance Task 2

Name _____

Block _____

Date _____

Double Discounts (7.RP.A.3)

Emily has a coupon for 20 percent off of her purchase at the store. She finds a backpack that she likes on the discount rack. Its original price is \$60 but everything on the rack comes with a 30 percent discount. Emily says

Thirty percent and twenty percent make fifty percent so it will cost \$30.

a. Is Emily Correct? Explain

b. What price will Emily pay for the backpack?

7th Double Discounts – Rubric

Name: _____ Date: _____

NJSLS: 7.RP.A.3;

Type: _____ Teacher: _____

<p>Task Description</p>	<ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> ➤ 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 				
<p>Command Level Description</p>	<p>Level 5: <i>Distinguished Command</i> Perform the task items accurately or with minor computation errors.</p>	<p>Level 4: <i>Strong Command</i> Perform the task items with some non-conceptual errors.</p>	<p>Level 3: <i>Moderate Command</i> Perform the task items with minor conceptual errors and some computation errors.</p>	<p>Level 2: <i>Partial Command</i> Perform the task items with some errors on both math concept and computation.</p>	<p>Level 1: <i>No Command</i> Perform the task items with serious errors on both math concept and computation.</p>
<p>Score range</p>	<p>6 pts</p>	<p>4-5 pts</p>	<p>3pts</p>	<p>2pts</p>	<p>0-1pts</p>
<p>Task Score & PLD Assigned</p>					

Double Discounts – Scoring Guide

NAME: _____

#	Answer	Scoring
Part A	<p>a. It is true that 20% and 30% make 50%. But in the context of sale prices it is essential to keep track of the wholes to which these percents apply. For the backpack, the 30% discount applies to the original \$60 price: 30% of \$60 is $0.3 \times 60 = 18$ making the discount on the backpack \$18. So after using the coupon, the backpack price becomes \$42. Emily's additional 20% coupon applies not to the original backpack price but to the discounted price of \$42: 20% of \$42 is \$8.40. Emily would need to save an additional \$12 off the \$42 price in order to buy the backpack for \$30 so her calculations are not correct.</p>	<p>1 point for correctly stating Emily's statement is wrong 2 points for the explanation</p> <p>3 TOTAL POINTS</p>
Part B	<p>b. As seen in part (a), Emily's coupon lowers the discount rack price by \$8.40 so she will pay</p> $42 - 8.40 = 33.60$ <p>or \$33.60.</p>	<p>3 points: Student has correct answer, correct work, and units. 2 points: Student has correct discount amount and correct units but has a minor mistake. 1 point: student only has the correct discount amount</p> <p>3 TOTAL POINTS</p>

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](#) .