7th Grade Mathematics
Scale Drawings
Unit 1 Pacing Calendar - Illustrative Mathematics

ORANGE PUBLIC SCHOOLS

OFFICE OF CURRICULUM AND INSTRUCTION

OFFICE OF MATHEMATICS

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 study scaled copies of pictures and plane figures, then apply what they have learned to scale drawings, e.g., maps and floor plans. This provides geometric preparation for grade 7 work on proportional relationships as well as grade 8 work on dilations and similarity.

Students begin by looking at copies of a picture, some of which are to scale, and some of which are not. They use their own words to describe what differentiates scaled and non-scaled copies of a picture. As the unit progresses, students learn that all lengths in a scaled copy are multiplied by a scale factor and all angles stay the same. They draw scaled copies of figures. They learn that if the scale factor is greater than 1, the copy will be larger, and if the scale factor is less than 1, the copy will be smaller. They study how area changes in scaled copies of an image.

Next, students study scale drawings. They see that the principles and strategies that they used to reason about scaled copies of figures can be used with scale drawings. They interpret and draw maps and floor plans. They work with scales that involve units (e.g., "1 cm represents 10 km"), and scales that do not include units (e.g., "the scale is 1 to 100"). They learn to express scales with units as scales without units, and vice versa. They understand that actual lengths are products of a scale factor and corresponding lengths in the scale drawing, thus lengths in the drawing are the product of the actual lengths and the reciprocal of that scale factor. They study the relationship between regions and lengths in scale drawings. Throughout the unit, they discuss their mathematical ideas and respond to the ideas of others (MP3, MP6). In the culminating lesson of this unit, students make a floor plan of their classroom or some other room or space at their school. This is an opportunity for them to apply what they have learned in the unit to everyday life (MP4).

In the unit, several lesson plans suggest that each student have access to a geometry toolkit. Each toolkit contains tracing paper, graph paper, colored pencils, scissors, centimeter ruler, protractor (clear protractors with no holes that show radial lines are recommended), and an index card to use as a straightedge or to mark right angles. Providing students with these toolkits gives opportunities for students to develop abilities to select appropriate tools and use them strategically to solve problems (MP5). Note that even students in a digitally enhanced classroom should have access to such tools; apps and simulations should be considered additions to their toolkits, not replacements for physical tools.

Note that the study of scaled copies is limited to pairs of figures that have the same rotation and mirror orientation (i.e. that are not rotations or reflections of each other), because the unit focuses on scaling, scale factors, and scale drawings. In grade 8, students will extend their knowledge of scaled copies when they study translations, rotations, reflections, and dilations.

II. Pacing Guide

Activity	New Jersey State Learning Standards (NJSLS)	Estimated Time (Blocks)
Unit 1 Pre-Unit Assessment (IM) *Optional*	4.MD.A.1; 5.MD.A.1; 5.NF.B.5.a; 6.G.A.1; 6.EE.A.2.c; 6.RP.A.3.a; 7.G.A.1	½
Lesson 1: What are Scaled Copies?	7.G.A.1	1
Lesson 2: Corresponding Parts and Scale Factors	7.G.A.1	1
Lesson 3: Making Scaled Copies	7.G.A.1	1
Lesson 4: Scaled Relationships	7.G.A.1	1
Lesson 5: The Size of the Scale Factor	7.G.A.1	1
Lesson 6: Scaling and Area	7.G.A.1; 7.G.B.6	1
Lesson 7: Scale Drawings	7.G.A.1	1
Lesson 8: Scale Drawings and Maps	7.G.A.1	1
Lesson 9: Creating Scale Drawings	7.G.A.1	1
Lesson 10: Changing Scales in Scale Drawings	7.G.A.1	1
Lesson 11: Scales without Units	7.G.A.1	1
Lesson 12: Units in Scale Drawings	7.G.A.1	1
Lesson 13: Draw It to Scale *(Project Based Learning: Optional)*	7.G.A.1	1
Performance Task 1	7.G.A.1	½
Unit 1 End of Unit Assessment (IM) *Optional*	7.G.A.1	**1**
Total Time		**15 Blocks**

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).*

SEPTEMBER

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					

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		

IV. PARCC Assessment Evidence Statements

Type I   Type II   Type III

NJSLS	Evidence Statement	Clarification	Math Practices	Calculator ?
7.G.1	Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.	i) Tasks may or may not have context	MP.2 MP.5	No
7.G.6	Solve real-world and mathematical problems involving area, volume, and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.	i) Tasks may or may not have context	MP.2 MP.5	No
7.D.2	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

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.

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 1 Assessment Framework				
Assessment	**NJSLS**	**Estimated Time**	**Format**	**Graded ?**
Pre-Unit Diagnostic Assessment (Beginning of Unit – Optional) *Illustrative Mathematics*	4.MD.A.1, 5.MD.A.1, 5.NF.B.5.a, 6.G.A.1, 6.EE.A.2.c, 6.RP.A.3.a, 7.G.A.1	½ Block	Individual	Yes (No Weight)
End-of-Unit Assessment (End of Unit – Optional) *Illustrative Mathematics*	7.G.A.1, 7.RP.A.2.a	1 Block	Individual	Yes

| Unit 1 Performance Assessment Framework				
Assessment	**NJSLS**	**Estimated Time**	**Format**	**Graded ?**
Unit 1 Performance Task 1 (Early October) *Map Distance*	7.G.A.1	½ Block	Individual	Yes; Rubric
Unit 1 Performance Task Option 1 (Optional) *Floor Plan*	7.G.A.1	Teacher Discretion	Teacher Discretion	Yes, if administered

Name _____   Block _____   Date _____

Map Distance (7.G.A.1)

On the map below, ¼ inch represents one mile. Candler, Candor, and Oteen are three cities on the map.
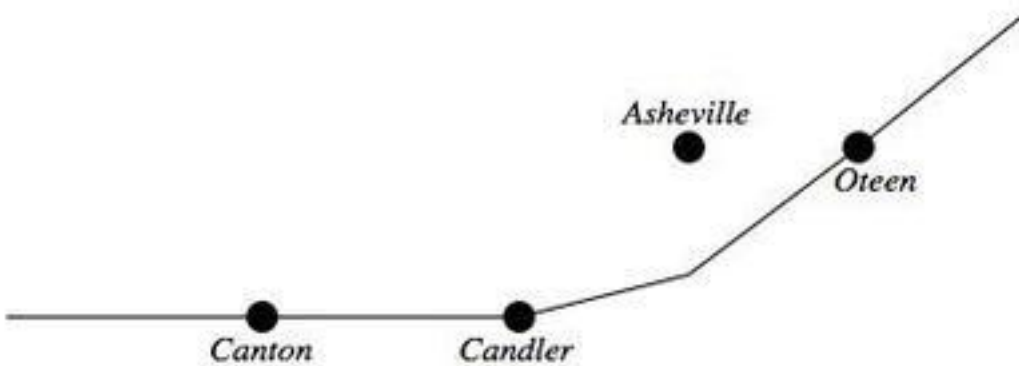
a. If the distance between the real towns of Candler and Canton is 9 miles, how far apart are Canton and Candler on the map?

b. If Candler and Oteen are 3½ inches apart on the map, what is the actual distance between Candler and Oteen in miles?

7th Grade Map Distance – Rubric

Name: _____   Date: _____

NJSLS: 7.G.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	*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	*5 pts*	*4 pts*	*3 pts*	*2 pts*	*0-1 pt*
Task Score & PLD Assigned					

7th Grade Map Distance – Scoring Guide   NAME: _____

#	Answer	Scoring
Part A	**** Solutions may vary *** A distance of nine miles means 9 quarter inches on the map. This is $$9 \times ¼ = 9/4$$ Or 2¼ inches between Candler and Canton on the map. 	2 points: 1 point for the correct strategy and 1 point for an accurate explanation **2 TOTAL POINTS**
Part B	To find this, we divide: $3 ½ ÷ ¼ = 7/2 \times 4/1 = 14$ So, there are 14 miles between Chandler and Oteen.	2 points: for correctly dividing the fractions. OR 1 point: for identifying the necessary expression with minor mistakes. 1 point for correct explanation. **3 TOTAL POINTS**

Name _____   Block _____   Date _____

Floor Plan (7.G.A.1)

Mariko has an 80:1 scale-drawing of the floor plan of her house. On the floor plan, the dimensions of her rectangular living room are 1 7/8 inches by 2 1/2 inches.

What is the area of her real living room in square feet?

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>