ALPHA PLUS

TEACHER'S GUIDE

Math 7

SUCCESS with OAS

Oklahoma Academic Standards

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SUCCESS with OAS

Math 7

Ensuring Student Success
with
Oklahoma Academic Standards

Written by Oklahoma Teachers for Oklahoma Teachers

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SUCCESS with OAS

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FOREWORD

Adopted in 2016 by the State Board of Education, the Oklahoma Academic Standards (OAS) mathematics objectives are measurably more rigorous in content and different in terms of vertical alignment than previous curriculum frameworks.

Immediately, Alpha Plus Educational Systems sought highly qualified teachers to develop a teaching and learning resource specifically aligned to the new standards. CEO Jan Barrick also enlisted my help and that of Dr. Frank Wang, President of the Oklahoma School of Science and Mathematics (OSSM), who is a nationally known, accomplished mathematics educator and an experienced textbook publisher. It has been my pleasure to help ensure the content is of high quality and will provide a solid mathematical foundation.

Written by Oklahoma teachers for Oklahoma teachers, the *Success with OAS: Alpha Plus Mathematics* series provides a robust set of resources relating mathematical skills to the real world of Oklahoma students.

-- Edna McDuffie Manning, *EdD., Mathematics*
Founder and President Emerita, Oklahoma School of Science and Mathematics

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INTRODUCTION

The *Success with OAS: Alpha Plus Mathematics* framework for instruction, independent student work, and continuous review will prepare students for comprehensive assessments at each grade level. Following is a summary addressing the most effective way to use each element.

Teacher's Guide

Objective Statement: At the beginning of each lesson, the OAS objective is stated as adopted. This is helpful when writing lesson plans and understanding the focus of the lesson.

Real-World Connections: Students must be engaged and must relate the concept to their daily lives. Connecting to a real-world application taps into students' prior knowledge and shows the practicality behind the concept. It is suggested that the teacher start with a relevant, age-appropriate game, class discussion, website or video, role-play, or other group activity. This will illustrate the need to learn the skill so that students can use it in their daily lives.

Vocabulary: A list of vocabulary words critical to each OAS Objective is provided, particularly those used in the state's *Test and Item Specifications*. A complete vocabulary definition can be found in the student workbook and in the comprehensive Glossary at the end of the book.

Modeling: The Modeling section provides step-by-step instructions for one or more ways to teach the objective and the skills related to the lesson. Teachers may use this to direct students and add more examples or details as needed for the teachers' lesson plans.

Extension Activities: This is a list of possible resources to enhance the objective lesson. Every author provided links to tools they use in class, to online content available at no charge for teacher use, and to other lesson-planning resources.

Answer Key: Every Teacher's Guide includes a complete Answer Key for each assessment item in the student workbook. The Answer Key for the Continuous Review designates what objectives are assessed.

Comprehensive Examination: A Comprehensive Examination was developed to resemble the state assessment and encompasses every objective taught. It can be used as a pre-test and post-test for the school year to better prepare students for state-mandated tests. The Answer Key provides the answers with objective numbers.

Student Workbook

Objective Statement: At the beginning of each student lesson is the objective statement. It clearly defines the focus of the lesson.

Real-World Connections: Written in age-appropriate language, this section reminds students of prior knowledge they have on the topic and how they might use this skill in their daily lives. Relevance is essential to student engagement in the lesson. Teachers can highlight this scenario for the students with a game, role-play, or other group activity.

Vocabulary: Each lesson includes a vocabulary list with definitions for the words the students will encounter on state assessments. Students should also learn to use the Glossary in the back of the book.

Guided Practice: Every objective lesson includes a Guided Practice, which is a set of items available for use in class as part of, or after, instruction. The ten practice problems reflect every skill students will use when they work independently.

Independent Practice: The Independent Practice is a series of twenty questions and activities the student may do independently, either in the classroom or for homework. The Independent Practice can also be used for reinforcement or review as needed.

Continuous Review: At the end of each lesson, there is a Continuous Review with ten questions covering objectives taught previously in the book or aligned to key skills from previous grade level(s). The Answer Key designates the objective each question assesses. The Continuous Review is in sequence after each objective lesson or can be used as a weekly assessment to reinforce past skills.

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OAS Mathematics Table of Contents 7th grade

Suggested Order	Strand Number	Strand Description	Teacher Guide Page Number	Student Book Page Number
1	7.N.1.1	Know that every rational number can be written as the ratio of two integers or as a terminating or repeating decimal.	1	1
2	7.N.1.2	Compare and order rational numbers expressed in various forms using the symbols <, >, and =.	10	6
3	7.N.1.3	Recognize and generate equivalent representations of rational numbers, including equivalent fractions.	19	11
4	7.N.2.1	Estimate solutions to multiplication and division of integers in order to assess the reasonableness of results.	31	18
5	7.N.2.2	Illustrate multiplication and division of integers using a variety of representations.	40	24
6	7.N.2.3	Solve real-world and mathematical problems involving addition, subtraction, multiplication and division of rational numbers; use efficient and generalizable procedure including but not limited to standard algorithms.	55	34
7	7.N.2.4	Raise integers to positive integer exponents.	68	42
8	7.N.2.5	Solve real-world and mathematical problems involving calculations with rational numbers and positive integer exponents.	76	46
9	7.N.2.6	Explain the relationship between the absolute value of a rational number and the distance of that number from zero on a number line. Use the symbol for absolute value.	87	53

ALPHA PLUS Educational Systems

OAS Mathematics Table of Contents 7th grade

Suggested Order	Strand Number	Strand Description	Teacher Guide Page Number	Student Book Page Number
10	7.A.1.1	Describe that the relationship between two variables, x and y, is proportional if it can be expressed in the form k or y=kx; distinguish proportional relationships from other relationships, including inversely proportional relationships (xy=k or y=).	97	59
11	7.A.1.2	Recognize that the graph of a proportional relationship is a line through the origin and the coordinate (1,r), where both r and slope are the unit rate (constant of proportionality, k).	111	68
12	7.A.2.1	Represent proportional relationships with tables, verbal descriptions, symbols, and graphs; translate from one representation to another. Determine and compare the unit rate (constant of proportionality, slope, or rate of change) given any of these representations.	142	86
13	7.A.2.2	Solve multi-step problems involving proportional relationships involving distance-time, percent increase or decrease, discounts, tips, unit pricing, similar figures, and other real-world and mathematical situations.	168	102
14	7.A.2.3	Use proportional reasoning to solve real-world and mathematical problems involving ratios.	182	111
15	7.A.2.4	Use proportional reasoning to assess the reasonableness of solutions.	196	121

ALPHA PLUS Educational Systems

OAS Mathematics Table of Contents 7th grade

Suggested Order	Strand Number	Strand Description	Teacher Guide Page Number	Student Book Page Number
16	7.A.3.1	Write and solve problems leading to linear equations with one variable in the form px + q = r and p(x + q), where p, q, and r are rational numbers.	209	130
17	7.A.3.2	Represent, write, solve, and graph problems leading to linear inequalities with one variable in the form x + p> q and x + p< q, where p and q are nonnegative rational numbers.	225	140
18	7.A.3.3	Represent real-world or mathematical situations using equations and inequalities variable and rational numbers.	240	148
19	7.A.4.1	Use properties of operations (limited to associative, commutative, and distributive) to generate equivalent numerical and algebraic expressions containing rational numbers, grouping symbols and whole number components.	254	157
20	7.A.4.2	Apply understanding of order of operations and grouping symbols when using calculators and other technologies.	268	167
21	7.GM.1.1	Using a variety of tools and strategies, develop the concept that surface area of a rectangular prism with rational-valued edge lengths can be found by wrapping the figure with same-sized square units without gaps or overlap. Use appropriate measurements such as cm^2.	283	175

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OAS Mathematics **Table of Contents** **7th grade**

Suggested Order	Strand Number	Strand Description	Teacher Guide Page Number	Student Book Page Number
22	7.GM.1.2	Using a variety of tools and strategies, develop the concept that the volume of rectangular prisms with rational-valued edge lengths can be found by counting the total number of same-sized unit cubes that fill a shape without the gaps or overlaps. Use appropriate measurements such as cm^2.	298	186
23	7.GM.2.1	Develop and use the formula to determine the area of a trapezoid to solve problems.	311	195
24	7.GM.2.2	Find the area and perimeter of composite figures to solve real-world and mathematical problems.	328	206
25	7.GM.3.1	Demonstrate an understanding of the proportional relationship between the diameter and circumference of a circle and that the unit rate (constant of proportionality) is π and can be approximated by rational numbers such as $\frac{22}{7}$ and 3.14.	345	218
26	7.GM.3.2	Calculate the circumference and area of circles to solve problems in various contexts, in terms and using approximations for π.	360	228
27	7.GM.4.1	Describe the properties of similarity, compare geometric figures for similarity, and determine scale factors resulting from dilations.	375	239
28	7.GM.4.2	Apply proportions, ratios, and scale factors to solve problems involving scale drawings and determine side lengths and areas of similar triangles and rectangles.	394	252

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OAS Mathematics **Table of Contents** **7th grade**

Suggested Order	Strand Number	Strand Description	Teacher Guide Page Number	Student Book Page Number
29	7.GM.4.3	Graph and describe translations and reflections of figures on a coordinate plane and determine the coordinates of the vertices of the figure after the transformation.	412	265
30	7.D.1.1	Design simple experiments, collect data, and calculate measure of central tendency (mean, median, and mode) and spread (range). Use these quantities to draw conclusions about the data collected and make predictions.	431	278
31	7.D.1.2	Use reasoning with proportions to display and interpret data in circle graphs (pie charts) and histograms. Choose the appropriate data display and know how to create the display using a spreadsheet or other graphing technology.	448	290
32	7.D.2.1	Determine the theoretical probability of an event using the ratio between the size of the even and the size of the sample space; represent probabilities as a percent, fraction, and decimal between 0 and 1.	473	307
33	7.D.2.2	Calculate probability as a fraction of sample space or as a fraction of area. Express probabilities as a percent, fraction, and decimal.	487	317
34	7.D.2.3	Use proportional reasoning to draw conclusions about and predict relative frequencies of outcomes based on probabilities.	505	329

7.GM.4.2 Apply proportions, ratios, and scale factors to solve problems involving scale drawings and determine side lengths and areas of similar triangles and rectangles.

Real-World Connections

Builders use a scale drawing of a house or building that has the same shape as the real house or building it represents, but a different size. Students will apply proportions, ratios, and scale factors to solve problems involving scale drawings and determine side lengths and areas of similar triangles and rectangles.

Vocabulary

scale drawings, side, lengths, area of similar triangles, transformation

Modeling

Step 1: Students are given Guided Practice #1 where the length of a car is to be drawn to scale. The scale of the drawing is 1:20. If the length of the drawing of the car on paper is 12 inches, how long is the vehicle in real life? Set up a proportion that will look like this $\frac{\text{drawing length}}{\text{actutal length}} = \frac{1}{20} = \frac{12}{x}$. To solve for x, ask the students, what fraction of 1 could be used? Guide them if needed with 1 × what = 12? Then complete the proportion using the fraction $\frac{12}{12}$ for 1. It will now look like this: $\frac{1}{20} \times \frac{12}{12} = \frac{12}{x}$ and $x = 240$ inches, the actual length of the car.

Step 2: In Guided Practice #2, students are given similar triangles to calculate lengths they do not know. First, find the ratio of corresponding sides in pairs of the similar triangles. The following angles are congruent (≅ congruent symbol) (may mark with 1, 2, and 3 arcs) $\angle ABC \cong \angle DEF$, $\angle BCA \cong \angle EFD$ and $\angle CAB \cong \angle FDE$.
Δ EFB has a side of 5.3. Using the corresponding angles, you can match it to ΔABC. It has a side length of 8. The ratio is $\frac{5.3}{8}$. Students will solve for r, $\frac{5.3}{8} \times 3$ and solve for t, $\frac{5.3}{8} \times 6$. $r = 2$ and $t = 4$. Round to the nearest whole number.

Step 3: In Guided Practice #3, students are given similar triangles to calculate a missing length. First, find the ratio of corresponding sides in pairs of the similar triangles. The following angles are congruent (may mark with 1, 2, and 3 arcs) $\angle ABC \cong \angle DEF$, $\angle BCA \cong \angle EFD$ and $\angle CAB \cong \angle FDE$. Set up the following ratio with students $\frac{\overline{FD}}{\overline{CA}} = \frac{20}{80}$ and $\frac{\overline{EF}}{\overline{BC}} = \frac{x}{40}$. Solve for x, $\frac{20}{80} = \frac{x}{40}$ ($\frac{20}{80} \div \frac{2}{2} = \frac{x}{40}$), $x = 10$ cm.

Step 4: In Guided Practice #4, students are given the similar triangles in Guided Practice #3 to calculate similar area. These two triangles are similar with sides in the ratio 4:1 (the sides of one are four times as long as the other): If two similar triangles have sides in the ratio $x : y$, their areas are in the ratio $x^2 : y^2$. Area = 16 : 1

Step 5: In Guided Practice #5, students will use their prior knowledge of similarity to calculate the missing length. Set up the following ratio $\frac{5}{10} = \frac{x}{5}$. Find the factor of one to reduce the shape $\frac{5}{10} \div \frac{2}{2} = \frac{x}{5}$, $x = 2.5$. The scale factor is $\frac{1}{2}$, $x^2 : y^2$ or 1: 4. Using A = bh, check the area of each rectangle. The large rectangle is (10)(5) = 50 in^2, and the small rectangle is (5)(2.5) = 12.5 in^2, which is 1: 4 (12.5 × 4 = 50). The bigger rectangle is four times the size of the smaller one.

Extension Activities

Oklahoma State Department of Education objective analysis of 7.GM.4.2

http://okmathframework.pbworks.com/w/page/112218520/7-A-4-2

"Scale Factor of Similar Polygons" teaching and learning resources are available free online for teachers, © CK-12 Foundation 2017

https://www.ck12.org/geometry/similar-polygons-and-scale-factors/lesson/Scale-Factor-of-Similar-Polygons-MSM7/

Answer Key 7.GM.4.2

Guided Practice

1. $x = 240$ inches, the actual length of the car.
2. The ratio is $\frac{5.3}{8}$. Students will then solve for r, $\frac{5.3}{8} \times 3$ and solve for t, $\frac{5.3}{8} \times 6$. $r = 2$ and $t = 4$. Round to nearest whole number.
3. $\frac{20}{80} = \frac{x}{40}$ ($\frac{20}{80} \div \frac{2}{2} = \frac{x}{40}$), $x = 10$ cm.
4. Their areas are in the ratio 4 : 1, $x^2 : y^2$ Area = 16 : 1
5. $\frac{5}{10} \div \frac{2}{2} = \frac{x}{5}$, $x = 2.5$. The scale factor is $\frac{1}{2}$, $x^2 : y^2$ or 1:4. Using A= bh the large rectangle is (10)(5) = 50 in^2 and the small rectangle is (5)(2.5) = 12.5 in^2, which is 1:4 (12.5 × 4 = 50). The bigger rectangle is four times the size of the smaller one.
6. C
7. 100 yds
8. 3 cm
9. 10 in = 10 yds
   1 in = 1 yd
10. C

Independent Practice

1. Scale factor: $\frac{6}{30} \div \frac{6}{6} = \frac{1}{5}$
2. $\frac{6}{30} \times \frac{3}{3} = \frac{18}{x}$, $x = 90$ ft or 18 × 5 = 90 ft
3. The ratio of areas = 16 : 100 = 4 : 25. Then, the ratio of lengths = $\sqrt{4} : \sqrt{25}$ = 2 : 5. $\overline{BC} = \frac{2}{5} \times 10$ ft = 4 ft
4. The ratio of lengths = 12 : 8 = 3 : 2. The ratio of areas = $3^2 : 2^2$ = 9 : 4. Area of triangle EFD = $\frac{4}{9} \times 81$ units^2 = 36 units^2
5. Scale factor: $\frac{15}{105} \div \frac{15}{15} = \frac{1}{7}$
6. $\frac{15}{30} \times \frac{7}{7} = \frac{105}{x}$, $x = 210$ m
7. Scale factor: $\frac{5}{25} \div \frac{5}{5} = \frac{1}{5}$
8. $\frac{5}{25} \times \frac{4}{4} = \frac{x}{100}$, $x = 20$ yds Scale factor is $\frac{1}{5}$, $x^2 : y^2$ or 1:25. Using A = bh the large rectangle is (100)(25) = 2,500 yds^2 and the small rectangle is (5)(20) = 100 yds^2, which is 1:25 (100 × 25 = 2,500). The bigger rectangle is 25 times the size of the smaller one.

Answer Key 7.GM.4.2

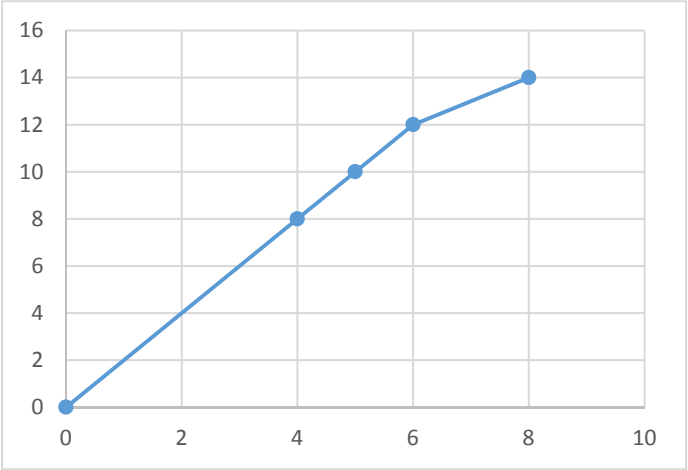
Independent Practice

9. $\frac{\text{small window}}{\text{big window}} = \frac{3}{7} \times \frac{3}{3} = \frac{9}{21}$, small window 9 × 9, large widow 21 × 21, 3 times bigger = 3.50(3) = $10.50
10. 24 × 20 is sixteen times bigger than 5 × 6, 75.00(16) = $1,200.00
11. B
12. 6 in = 48 ft
    1 in = 8 ft
13. 45 m
14. C
15. A
16. C
17. B
18. $\frac{12.7}{25.4} = \frac{9.2}{x}$
    x = 18.4 m
19. 14 in = 56 ft
    1 in = 4 ft
20. 14 cm = 5 m
    84 cm = 30 m
    84 cm

Answer Key 7.G.M.4.2

Continuous Review

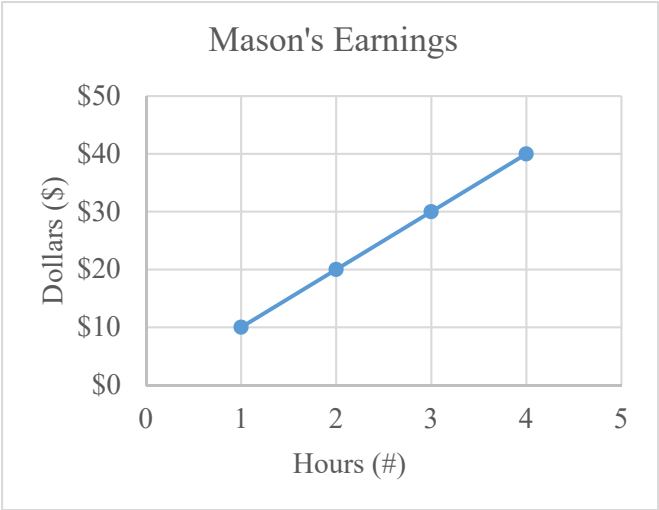
1. (7.GM.4.1) $\frac{3}{15} = \frac{9}{x}$, $x = 45$ in
2. (7.N.2.5) 100
3. (7.N.2.6) -51
4. (7.A.1.1) y = kx 50 = k(10) k = 5 y = 5x
5. (7.GM.3.1) r = 9 cm
6. (7.A.1.2) No the graph does not represent a proportional relationship because it is not a straight line.



x	***y***
4	8
5	10
6	12
8	14

7. (7.A.2.1) Check student table and graph. Unit rate = $10 per hour

x	1	2	3	4
y	10	20	30	40



8. (7.A.2.2) $34.88 + $2.53 = $37.41
9. (7.GM.3.2) A = 4π = 12.56 ÷ 2 = 6.3 feet^2
10. (7.A.4.2) ($15.00 × 8)(2) + ($82.50)(2) + $5.60 + $13.00 = $423.60

Guided Practice Name _____

7.GM.4.2 Apply proportions, ratios, and scale factors to solve problems involving scale drawings and determine side lengths and areas of similar triangles and rectangles.

Real-World Connections

Have you ever seen a map? It cannot be the same size as the area it represents. The measurements are scaled down to make the map a size that can be used easily. Builders use scale drawings of a house or building that has the same shape as the real house or building it represents, but a different size. A ratio is used in both cases. Scale drawings of maps and buildings use the following ratios in the scales: of drawing scale = $\frac{\text{draw length}}{\text{actual length}}$ and map scale = $\frac{\text{map distance}}{\text{actual distance}}$. This is the scale factor = $\frac{\text{model}}{\text{acual length}}$. This method can also be used when determining similar triangles and rectangles.

Vocabulary

scale	the ratio of measurement for the drawing compared to the measurement for the original subject
side	the lateral face of a three-dimensional solid; the line joining the vertices of a polygon
lengths	distance from one end to the other
area of similar triangles	if two similar triangles have sides in the ratio x:y, their areas are in the ratio x^2:y^2
transformation	a prescription, or rule, that sets up a one-to-one correspondence between the points in a geometric object and the points in another geometric object; reflections, rotations, translations, and dilations are examples of transformations

Guided Practice (7.GM.4.2) Name _____

Complete the following problems.

1. The length of a car is to be drawn to scale. The scale of the drawing is 1:20. If the length of the scale drawing of the car is 12 inches, how long is the vehicle in real life? Set up a proportion

$$\frac{\text{drawing length}}{\text{actutal length}} = \frac{1}{20} = \frac{12}{x}.$$

_____

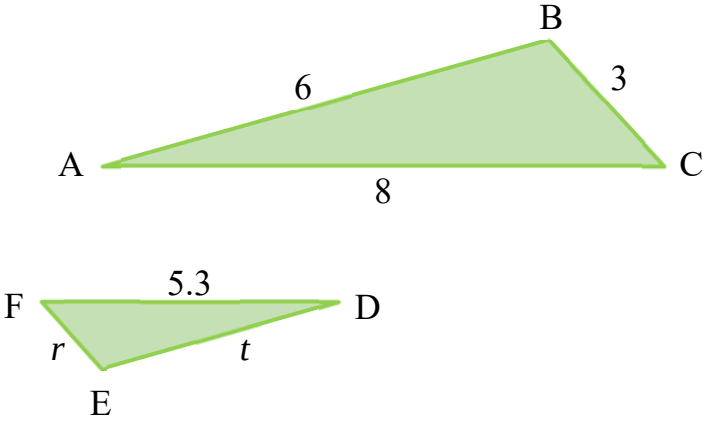
x = actual car

20 inches

2. Given the following angles are congruent. When ∠ ABC ≅ ∠ DEF, ∠ BCA ≅ ∠ EFD, and ∠ CAB ≅ ∠ FDE, and triangle ABC is similar to triangle DEF, what is the length of the missing sides? (Round to the nearest whole number)

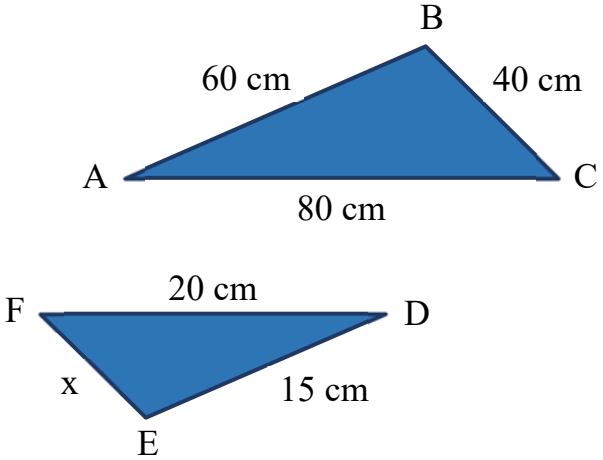
r = _____

t = _____



3. Given the following angles are congruent. When, ∠ ABC ≅ ∠ DEF, ∠ BCA ≅ ∠ EFD, ∠ CAB ≈ ∠ FDE, and triangle ABC is similar to triangle DEF, what is the length of x?

_____

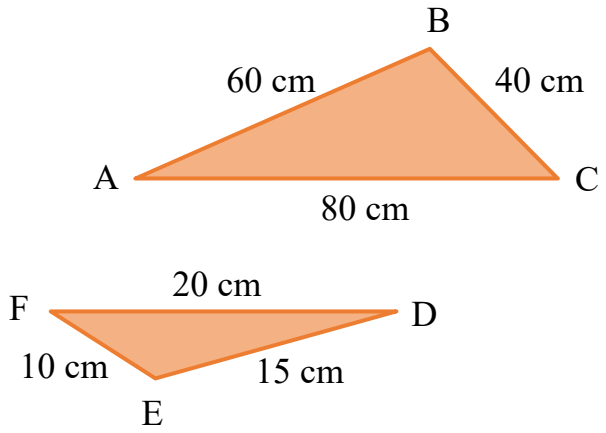


Guided Practice (7.GM.4.2) Name _____

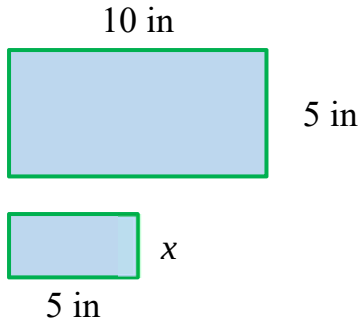
Complete the following problems.

4. Triangle ABC is similar to triangle DEF, what is the ratio of the areas?

_____



5. The following rectangles are similar. Determine the scale factor to calculate the missing length and the area.



x = _____

A = _____

Choose the best answer.

6. Ryker made a scale model of his bedroom. The actual length of his bedroom is 20 feet. The length of his model is 4 inches. What is the ratio of the length of Ryker's bedroom to the length of his model?

   A 1 foot : 4 inches

   B 4 feet : 1 inches

   C 5 feet : 1 inches

   D 20 feet : 1 inches

Complete the following problems.

7. Caroline made a scale drawing of a city. The scale she used was 1 inch = 5 yards. A neighborhood park is 20 inches in the drawing. How wide is the actual park?

_____

Guided Practice (7.GM.4.2) Name _____

Complete the following problems.

8. Chandler drew a scale drawing of a house. He used 1 centimeters = 3 meters. If the actual length of the garage is 9 meters, how long is the garage in the drawing?

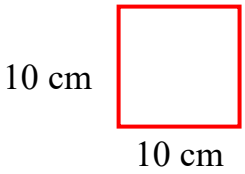
_____

9. Halley measured a house with its lot and made a scale drawing. The porch, which is 10 yards long in real life, is 10 inches long in the drawing. What scale did Halley use?

_____

Choose the best answer.

10. If the side lengths of this square are tripled, which of the following statements will be true?



A The new perimeter will be $\frac{1}{2}$ of the old perimeter.

B The new perimeter will be 2 times the old perimeter.

C The new perimeter will be 3 times the old perimeter.

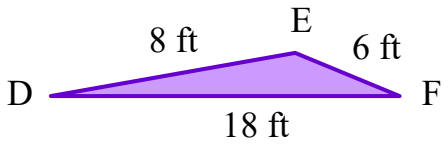
D The new perimeter will be 4 times the old perimeter.

Independent Practice Name _____

7.GM.4.2 Apply proportions, ratios, and scale factors to solve problems involving scale drawings and determine side lengths and areas of similar triangles and rectangles.

Complete the following problems.

1. Given the following angles are congruent. When ∠ ABC ≅ ∠ DEF, ∠ BCA ≅ ∠ EFD, ∠ CAB ≅ ∠ FDE, and triangle ABC is like triangle DEF, what is the scale factor?



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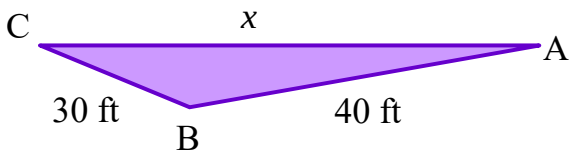
2. What is the length of *x*?



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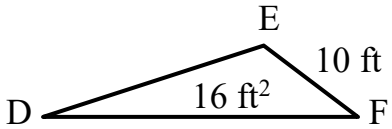
3. Triangles ABC and EFD are similar. The area of triangle ABC is 100 units^2, and the area of triangle EFD is 16 units.^{2} $\overline{EF}$ = 10 feet. What is the length of $\overline{BC}$?



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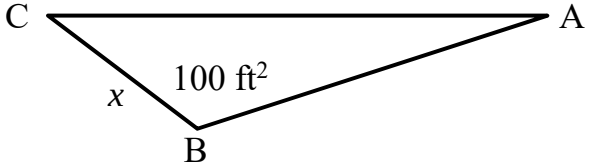
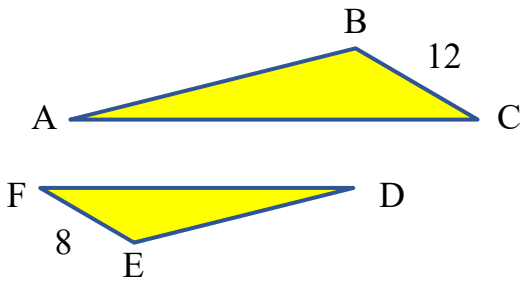


Independent Practice (7.GM.4.2) Name _____

Complete the following problems.

4. Triangles ABC and EFD are similar. The area of triangle ABC is 81 units^2. What is the area of triangle EFD?

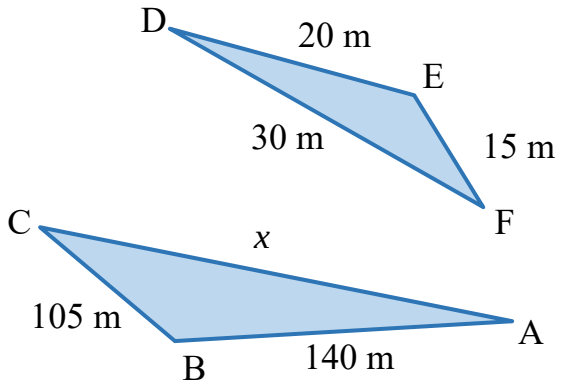


_____

5. Given that the following angles are congruent. When, ∠ ABC ≅ ∠ DEF, ∠ BCA ≅ ∠ EFD, ∠ CAB ≅ ∠ FDE, and triangle ABC is similar to triangle DEF, what is the scale factor?

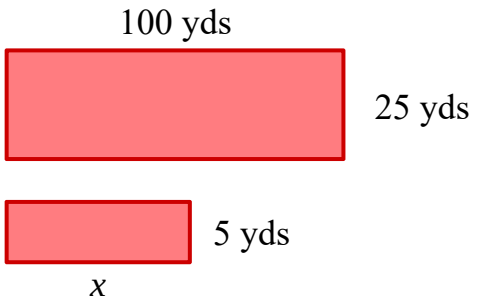
_____

6. What is the length of *x*?



_____

7. The following rectangles are similar. Determine the scale factor to calculate the missing length?



_____

8. What is the area of each?

_____

Independent Practice (7.GM.4.2) Name _____

Complete the following problems.

9. The scale factor of two similar pieces of window glass is 3:7. The smaller piece cost $3.50. How much should the larger piece cost if it is three times bigger?

   _____

10. Chuck is having carpet installed in a small office. It will cost $75.00 for a room that measures 6 feet × 5 feet. At this rate, how much would it cost to have carpet installed in a similarly shaped living room with a larger dimension of 24 feet × 20 feet ?

    _____

Choose the best answer.

11. Anna made a scale model of her lawn. The actual length of her lawn is 32 feet. The length of her model is 8 inches. What is the ratio of the length of Anna's lawn to the length of her model?

    A 1 foot : 4 inches

    B 4 feet : 1 inch

    C 1 feet : 25 inches

    D 25 feet : 1 inch

Complete the following problems.

12. Lance made a scale drawing of a summer camp. The sand volleyball court, which is 48 feet long in real life is 6 inches long in the drawing. What is the scale of the drawing?

    _____

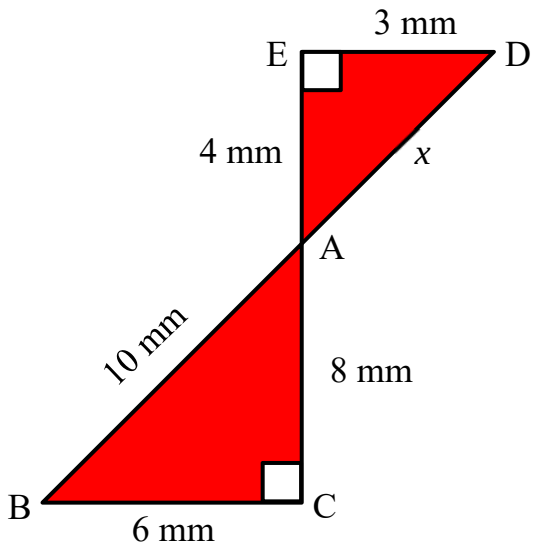
13. Principal Haggard drew a scale drawing of the middle school auditorium. The scale he used was 1 centimeters = 3 meters. If the stage is 15 centimeters in the drawing, how long is the actual stage?

    _____

Independent Practice (7.GM.4.2) Name _____

Complete the following problems.

14. Triangle ABC is similar to triangle ADE. Which proportion can be used to find side length *x*?



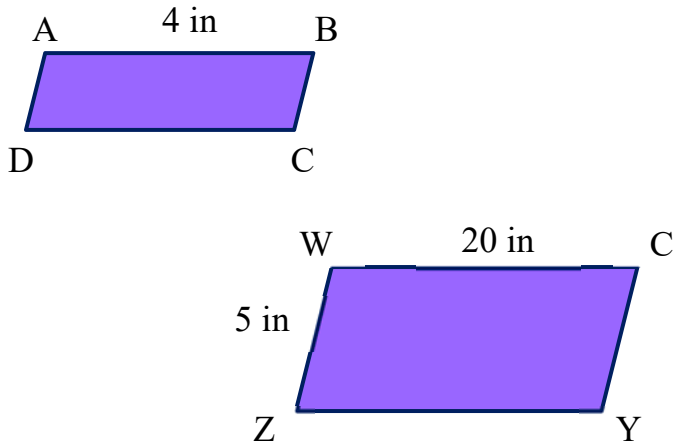
A $\frac{6}{3} = \frac{x}{10}$

B $\frac{4}{10} = \frac{3}{x}$

C $\frac{6}{3} = \frac{10}{x}$

D $\frac{x}{3} = \frac{6}{10}$

15. Quadrilateral ABCD is similar to quadrilateral WXYZ. What is the length of side AD?

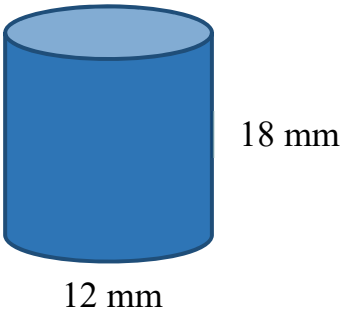


A 1 inch
B 2 inches
C 2.5 inches
D 5 inches

Independent Practice (7.GM.4.2) Name _____

Choose the best answer.

16. Which of the following could be the dimensions of a different cylinder that is similar to the one shown?



A Diameter = 6 mm, height = 4 mm

B Diameter = 3 mm, height = 4 mm

C Diameter = 4 mm, height = 6 mm

D Diameter = 4 mm, height = 8 mm

17. Reece made a scale drawing of the school art room. The actual room is 16 feet wide and 24 feet in length. Her drawing is 2 inches wide. What is the length in inches of the art room's scale drawing?

A 4 inches

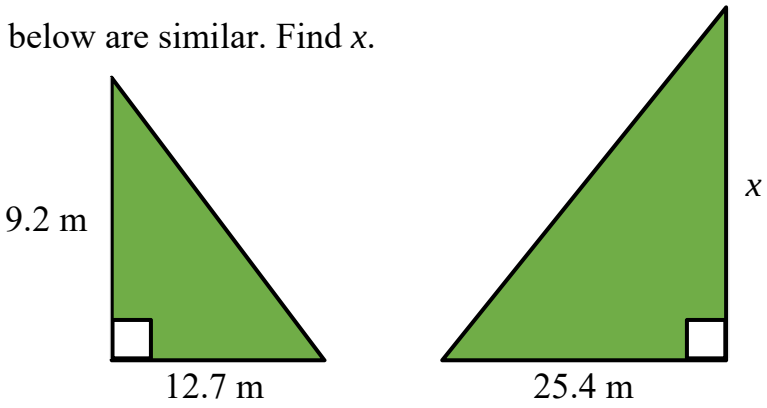
B 3 inches

C 2 inches

D 1 inch

18. The two triangles below are similar. Find *x*.

_____



Independent Practice (7.GM.4.2) Name _____

Complete the following problems.

19. Calvin measured the middle school and made a scale drawing. The actual gym is 56 feet wide. It is 14 inches wide in the drawing. What scale did Calvin use?

    _____

20. An architect made a scale drawing of a house and its lot. The scale of the drawing is 14 centimeters = 5 meters. The actual back patio is 30 meters long in real life. How long is the patio in the drawing?

    _____

Continuous Review (7.GM.4.2) Name _____

Given similar figures find the lengths of the missing sides.

1. Two rectangles are similar. The first is 3 inches wide and 15 inches long. The second is 9 inches wide. Find the length of the second rectangle.

   _____

Solve.

2. $75 + 5^2 =$ _____

3. $-|-63| + |-12| =$ _____

4. Madison is sponsoring a summer basketball camp. She needs to hire enough people to work the camp. There is a proportional relationship between the number of workers Madison hires, *x*, and the number of children who can attend the camp, *y*. If Madison hires 10 workers, 50 children can attend the camp. Write the equation for the relationship between *x* and *y*.

   _____

Solve the problem below using your knowledge of circumference and area concepts. Use 3.14 for π. Round to the nearest tenths.

5. What is the radius of a circle with a diameter of 18 centimeters?

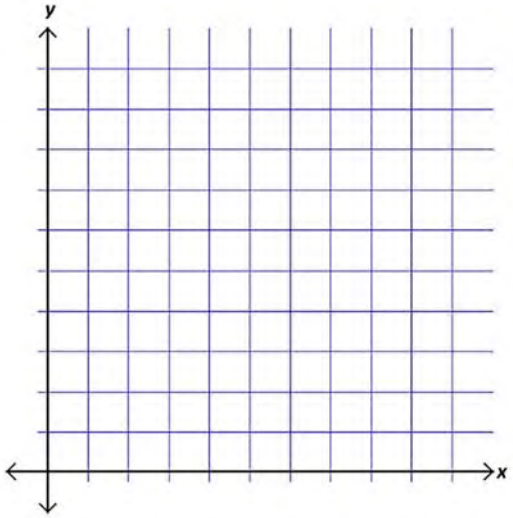
   _____

Continuous Review (7.GM.4.2) Name _____

Complete the following problems.

6. Using the table below, plot the points on the coordinate graph. Does the graph represent a proportional relationship?

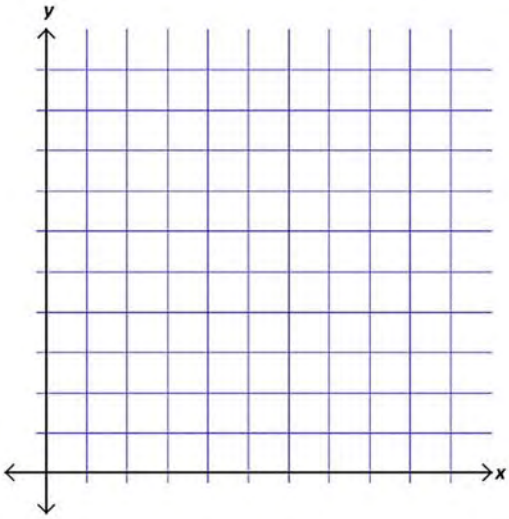
x	***y***
4	8
5	10
6	12
8	14



7. Mason got a job helping his elderly neighbors and makes $40.00 for working 4 hours. Complete the table to show how these two quantities vary, graph them on the coordinate grid, and describe the unit rate or slope.

x	1	2	3	4
y				

Unit rate= _____



Continuous Review (7.GM.4.2) Name _____

Complete the following problems.

8. Your family goes to dinner at a restaurant. The total before tax is $34.88 and the tax is 7.25%. What is the total cost after tax? Round to the nearest hundredth.

   _____

9. A semi-circle rug has a diameter of 4 feet. What is the area of the rug?

   _____

10. Chloe is taking her family on a trip for eight days. She has three dogs. Two dogs stay at Dr. Chambers' Vet Clinic for $15.00 a day per dog. They must also receive their current vaccinations for $82.50 each. Her third dog is going, but needs a flea treatment to stay with her. She finds out she has an outstanding balance of $5.60 for medication, and the flea treatment is $13.00. Write and evaluate an expression for this problem to solve how much Chloe must pay the clinic.

    _____

Oklahoma State Testing Program
7th Grade Mathematics Formula Sheet

UNIT CONVERSIONS

1 foot = 12 inches	1 pound = 16 ounces	1 cup = 8 fluid ounces
1 yard = 3 feet	1 ton = 2000 pounds	1 pint = 2 cups
1 mile = 5280 feet	1 kilogram = 1000 grams	1 quart = 2 pints
1 mile = 1760 yards		1 gallon = 4 quarts
1 meter = 100 centimeters		
1 meter = 1000 millimeters		

AREA

Square	$A = s^2$	Parallelogram	$A = bh$
Rectangle	$A = lw$	Circle	$A = \pi r^2$
Triangle	$A = \frac{1}{2}bh$	Trapezoid	$A = \frac{1}{2}(b_1 + b_2)h$

CIRCUMFERENCE

Circle $C = \pi d$ or $C = 2\pi r$

VOLUME

Rectangular Prism $V = Bh$ or $V = lwh$

SURFACE AREA

Rectangular Prism $S = 2B + Ph$ or $S = 2lw + 2lh + 2wh$

LINEAR EQUATIONS

Slope formula	$m = \frac{y_2 - y_1}{x_2 - x_1}$	Direct Variation	$y = kx$

OTHER

$d = rt$

School Year 2016-2017

OKLAHOMA STATE DEPARTMENT OF EDUCATION
CHAMPION EXCELLENCE

A

absolute value: the absolute value of a real number is its (non-negative) distance from 0 on a number line

addition: to join two or more numbers or quantities to get one number called sum or total

algebraic expression: a mathematical phrase combining numbers and/or variable.

- an expression does not contain equality or inequality signs but may include other operators and grouping symbols
- both sides of an equation are expressions

area: a measure of the amount of space within a closed two-dimensional shape

area of a circle: the area of the interior of the circle, which can be found with $A=\Pi r^2$ where r is the radius and Π the irrational number "pi"

area of a trapezoid: the sum of its bases multiplied by the height of the trapezoid then divided by 2; the area is measured in square units

area of similar triangles: if two similar triangles have sides in the ratio x:y, then their areas are in the ratio x^2:y^2

associative property: <u>of addition</u> $(a + b) + c = a + (b + c)$
<u>of multiplication</u> $(a \times b) \times c = a \times (b \times c)$.

B

bar notation: a horizontal bar over decimals to indicate that they repeat

C

calculate: to work something out, a mathematical operation

central tendency: central tendency refers to the measures of a data set. Measures of central tendency include mean, median, and mode

circle: the set of all points that are equidistant from a given point, called the center of the circle; the set of all points that lie inside the circle is called the interior of the circle

circumference of a circle: the length of the circle if cut and opened up to make a straight line segment, which can be found with C = Πr where r is the radius and Π is the irrational number "pi" (approximately 3.14 or $\frac{22}{7}$)

cm^2: a cm raised to the second power which is indicated by a small 2 to its upper right

cm^3: a cm raised to the third power which is indicated by a small 3 to its upper-right

collect: bring or gather together

commutative property: in addition and multiplication, numbers may be added or multiplied together in any order

compare: tells how two or more things are alike
composite figure: a shape composed of a combination of other shapes; composite figures are often split into their component shapes to calculate area
conclusion: the end or finish of an event or process
coordinates: coordinates are written as ordered pairs of numbers or letters and numbers
coordinate plane: a plane in which a point is represented using two coordinates that determine the precise location of the point

D

data: a collection of information
decimals: a number in a number system based on 10, also known as the Base -10 system or Hindu-Arabic system which uses 10 digits to show all numbers… 0, 1, 2, 3, 4, 5, 6, 7, 8, 9
diameter of a circle: a straight-line segment passing through the center of the circle and terminating on the circle
dilations: a transformation moves each point along the ray through the point emanating from a fixed center, and multiplies distances from the center by a common scale factor
discounts: a reduction in normal price
distance: the length between two points (or objects)
distance-time: extent or amount of space between two things, points, lines, etc.; intervals
distributive property: multiplying a number is the same as multiplying its addends by the number, then adding the products
division: sharing or grouping a number to equal parts

E

equal to (=): a sign indicating two numbers are the same (7 = 7)
equations: a number sentence that uses the equal sign (1 + 2 = 3).
equivalent: expressions that simplify to an equal value
equivalent fractions: fractions with the same value
equivalent numerical expressions: two numerical expressions are said to be equivalent if one can be obtained from the other using the properties of operations, such as the commutative, associative, and distributive properties, as well as by representing numbers in the expressions in different but equivalent forms
estimate: to make an approximate calculation, often based on rounding, 2.3 ≈ 2

experiments: a scientific procedure to make a discovery, test a hypothesis, or demonstrate a known fact
exponent: the number that indicates how many times the base is used as a factor, e.g., in $4^3 = 4 \times 4 \times 4 \times 4 = 64$, the exponent 3, indicating that 4 is repeated as a factor three times

F

figure: a visible shape or form; outline
fraction: a number that expresses parts of a whole or set
frequency: the number of times an event or item appears in a set of data; how often something happens, often written as a rate e.g. heartbeats per minute

G

gaps: unfilled spaces
geometric figures for similarity: when two figures are similar, the ratios of the lengths of their corresponding sides are equal
graph: a visual diagram used to represent statistical information or functions and equations
graphing technology: to represent by means of a graph using machinery and equipment developed from the application of scientific knowledge
greater than: is more than, symbol >
grouping symbols: dividing things into equal groups or sets with symbols and signs that are commonly used to represent values, equality, operations, grouping and mathematical terms

H

histogram: a type of bar graph used to display the distribution of measurement data across a continuous range

I

inequality: inequality occurs when things are not equal; <u>four types of inequalities:</u>

- $a \leq b$ …a is less than or equal to b
- $a \geq b$ …a is greater than or equal to b
- $a < b$ …a is less than b
- $a > b$ …a is greater than b

integers: the set of numbers that contains the whole numbers and their additive inverse (opposites); no fractions or decimals
interpret data: provide meaning to facts
inverse relationships: operations that undo each other (e.g., addition and subtraction are inverse operation; multiplication and division are inverse operations)
inversely proportional relationships: when one value decreases at the same rate that the other increases or the value increases at the same rate as the other decreases

L

length: distance from one end to the other
less than: relationship of one number being smaller than another number, symbol $<$
line: a line is a straight one-dimensional figure of infinite length
linear equation: any equation that can be written in the form $Ax + By + C = 0$ where A and B cannot be; the graph of such and equation is a line
linear inequality: like a linear equation such as $y = 3x + 2$ but it will have an inequality symbol $<$, $>$, $\leq$, or $\geq$ instead of an $=$

M

mean: a measure of central tendency in a set of numerical data; computed by adding the values in a list and then dividing by the number of values in the list
measure: use of standard units to determine size or quantity: length, breath, height, area, mass, weight, volume, capacity, temperature and time
median: a measure of central tendency in a set of numerical data; the median of a list of values is the value appearing at the middle of a sorted version of the list; or the mean of the two central values, if the list contains an even number of values
mode: a measurement of central tendency in a set of numerical data; in a set of scores, values or numbers the mode is the one that occurs the most times
multiplication: a mathematical operation where a number is added to itself
multi-step problem: one or more problems must be solved to get the information needed to solve the question being asked

N

natural or counting number: 1, 2, 3, 4, 5… no zero
non-negative rational number: can be expressed as the quotient of two integers, a numerator and a non-zero denominator
non-repeating decimal: a decimal that neither terminates nor repeats

non-terminating decimal: a decimal that does not end in an infinite sequence of zeros; also known as an infinite decimal
number line: a line in which numbers are marked at intervals

O

order: an arrangement of a set group of objects
order of operations: a rule for evaluating expressions : **PEMDAS**

1. perform the operations in parenthesis (**p**arenthesis)
2. compute powers and roots (**e**xponents)
3. perform all multiplication and division from left to right (**m**ultiplication/**d**ivision)
4. perform all addition and subtraction from left to right (**a**ddition/**s**ubtraction)

origin: the point of intersection of the *x* and *y*-axis on a coordinate or Cartesian plane; the coordinate of the origin is (0, 0)
outcome: the result of a single trial of a probability experiment
overlaps: extend over to cover partially

P

percent decrease: a measure of change; the extent to which something loses value
percent increase: a measure of change; the extent to which something gains value
perimeter: the total length of all the edges of a polygon.; often, perimeter is thought of the distance around an object, traversed once along the edges starting from one vertex and ending at the same vertex
pi (π): the irrational number that is the ratio of the circumference to the diameter of a circle; for computational purposes, 3.14 or $\frac{22}{7}$ is frequently used as an approximation of π.
pie chart: a graph using a divided circle where each section represents a percentage of the total; may also be called a circle or sector graph
positive integer exponents: integers are the set of numbers that contain the whole numbers and their additive inverse (opposites); no fractions or decimals; positive integers are the counting or natural numbers in the set; as an exponent, this number indicates how many times the base is used as a factor
predict: estimate that a specified thing will happen in the future or will be a consequence of another action

probability: the chance that a specific outcome will occur, measured as a ratio of the total of possible outcomes

- experimental probability- when trials of probability experiment are run and data is collected, the experimental probability of desired outcome is the relative frequency of that outcome as a ratio of the number such outcome to the total number of outcomes
- theoretical probability- the number of ways that the event can occur, divided by the total number of outcomes. It is finding the probability of events that come from a sample space of known equally likely outcomes

properties of operations: the rules in relation to operations on numbers
properties of similarity: descriptors of polygons with the same shape but not necessarily the same size; the corresponding angles have equal measures and the length of corresponding sides are proportional
proportional reasoning: the relationship between the two things are understood as a multiplicative relationship
proportional relationship: an equation that states that two ratios are equivalent

Q

quantity: amount, number of, total, sum, size or extent; indicates how much or how many

R

range: the difference between the maximum and minimum values of a data set, a measure of the spread of the data
ratio: a relationship between quantities such that for every *a* unit of one quantity there are *b* units for the other; a ratio is often denoted by *a:b* and read "*a to b*".
rational number: a number expressed as a fraction p/q where p and q are integers, and $q \neq 0$
rational-valued length: distance from one end to the other using rational number values, a number expressible in the form $\frac{a}{b}$ or $-\frac{a}{b}$ for some fraction $\frac{a}{b}$; the rational numbers include integers
real-world mathematical problem: a math problem that teach standards through topics that students will likely experience in their world

rectangular prism: a three-dimensional object constructed from three pairs of parallel rectangles (called faces) that share common edges to form an enclosed space such that opposite rectangles are congruent; the vertices of the rectangles are the vertices of the prism, and the sides of the rectangles are called edges; a cube is a rectangular prism in which each face is a square of the same size
reflection: a type of transformation that flips points about a line, called the line of reflection; taken together, the image and the pre-image have the line of reflection as a line of symmetry
repeating decimal: a repeating decimal, also called a recurring decimal, is a number whose decimal becomes the same sequence of digits and repeats indefinitely; the repeating portion of a decimal expansion is denoted with a vinculum, for example, $\frac{1}{3} = 0.3333333 \ldots = 0.\overline{3}$.

S

same sized unit cubes: same unit, a determinate quantity as a standard of measurement of a cube, the regular solid of six equal square sides; ex.  1 unit cube
sample space: in a probability model for a random process, a list of the individual outcomes that are to be considered
scale: the ratio of the measurement of the drawing compared to the measurement of the original subject
scale factors: for similar shapes, the common ratio of corresponding side lengths is called the scale factor; informally, it is the multiplicative amount by which the lengths of one shape are enlarged or shrunk to obtain a shape to which it is similar
side: the lateral face of a three-dimensional solid; also, the line joining the vertices of a polygon
similar figures: figures that have the same shape are said to be similar, the ratios of the lengths of their corresponding sides are equal
slope: a measure of the steepness of a line in a Cartesian plane, found by determines the constant change in the *y*-coordinate per 1 unit change in the *x*-coordinate
solution: the answer to a problem
spreadsheet: a spreadsheet is a computer program which is used to organize and manipulate data; a spreadsheet displays a table where the data is entered into cells arranged in columns and row; each cell has a column letter and a row number, e.g. B4,D6; spreadsheets are also like a calculator because formulas can be applied to the cells to make calculation; calculations in one section can be linked to other sections so all the data in the spreadsheet updates as new entries are made; most spreadsheet programs also have a graphing or charting function so data can be displayed visually

spread: in statistics, spread describes the variability of data set; measures of spread include the range; quartiles, deciles, percentiles; the five-number summary; standard deviation and variance
square unit: the area of a *square* each of whose sides measures 1 unit; it is used to measure area
standard algorithms: are the specific method usually used for solving math problems
subtraction: to reduce one quantity from another; (x-y)
surface area: the total measure of the area of the faces of a rectangular prism; equivalently, the total area of a net for the prism
symbols: symbols and signs are commonly used to represent values, operations, grouping and mathematical terms

T

terminating decimal: a decimal that end.
tips: a gift or a sum of money tendered for a service performed or anticipated; gratuity
transformation: a prescription, or rule, that sets up a one-to-one correspondence between the points in a geometric object and the points in another geometric object; reflections, rotations, translations, and dilations are examples of transformations
translation: a type of transformation that moves every point on a graph or geometric figure by the same distance in the same direction without a change in orientation or size
trapezoid: a quadrilateral only having two sides that are parallel

U

unit pricing: a unit price compares the price of something to a unit of measurement, for example, cost per kilogram or cost liter or gallon
unit rate: a comparison of two measurements in which one of the terms has value of one

V

variable: a quantity that can change or that may take on different value
vertices: a point where:

- two or more rays or the sides of an angle meet, the adjacent sides of a polygon meet, or
- the edges of a solid figure meet.

volume: a measurement of the amount of space within a closed three-dimensional shape; Ex: V= *lwh*

W

whole number exponents: the numbers 0, 1, 2, 3…that indicate how many times the base is used as a factor, e.g., in $4^3 = 4 \times 4 \times 4 = 64$, the exponent 3, indicating that 4 is repeated as a factor three times

whole number: zero and counting numbers; the numbers -3, -2, -1, 0, 1, 2, 3, …

Z

zero: the numeral 0, used as a place holder (nothing, none, nil, naught)

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