Lesson 11.1 • Similar Polygons

All measurements are in centimeters.

1. $HAPIE \sim N W Y R S$
   \[ AP = \ldots, \quad EI = \ldots, \quad SN = \ldots, \quad Y R = \ldots \]

2. $Q U A D \sim S I M L$
   \[ SL = \ldots, \quad MI = \ldots, \quad m \angle D = \ldots, \quad m \angle U = \ldots, \quad m \angle A = \ldots \]

In Exercises 3–6, decide whether or not the figures are similar. Explain why or why not.

3. $A B C D$ and $E F G H$

4. $\triangle A B C$ and $\triangle A D E$

5. $J K O N$ and $J K L M$

6. $A B C D$ and $A E F G$

7. Draw the dilation of $A B C D$ by a scale factor of $\frac{1}{2}$. What is the ratio of the perimeter of the dilated quadrilateral to the perimeter of the original quadrilateral?

8. Draw the dilation of $\triangle D E F$ by a scale factor of 2. What is the ratio of the area of the dilated triangle to the area of the original triangle?
Lesson 11.2 • Similar Triangles

All measurements are in centimeters.

1. $\triangle TAR \sim \triangle MAC$
   $MC = \underline{\quad}$

2. $\triangle XYZ \sim \triangle QRS$
   $\angle Q \equiv \underline{\quad}$
   $QR = \underline{\quad}$
   $QS = \underline{\quad}$

3. $\triangle ABC \sim \triangle EDC$
   $\angle A \equiv \underline{\quad}$
   $CD = \underline{\quad}$
   $AB = \underline{\quad}$

4. $\triangle TRS \sim \triangle TQP$
   $TS = \underline{\quad}$
   $QP = \underline{\quad}$

For Exercises 5 and 6, refer to the figure at right.

5. Explain why $\triangle CAT$ and $\triangle DAG$ are similar.

6. $CA = \underline{\quad}$

In Exercises 7–9, identify similar triangles and explain why they are similar.

7.  

8.  

9.  

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Lesson 11.3 • Indirect Measurement with Similar Triangles

1. At a certain time of day, a 6 ft man casts a 4 ft shadow. At the same time of day, how tall is a tree that casts an 18 ft shadow?

2. Driving through the mountains, Dale has to go up and over a high mountain pass. The road has a constant incline for \(\frac{7}{3}\) miles to the top of the pass. Dale notices from a road sign that in the first mile he climbs 840 feet. How many feet does he climb in all?

3. Sunrise Road is 42 miles long between the edge of Moon Lake and Lake Road and 15 miles long between Lake Road and Sunset Road. Lake Road is 29 miles long. Find the length of Moon Lake.

4. Marta is standing 4 ft behind a fence 6 ft 6 in. tall. When she looks over the fence, she can just see the top edge of a building. She knows that the building is 32 ft 6 in. behind the fence. Her eyes are 5 ft from the ground. How tall is the building? Give your answer to the nearest half foot.

5. You need to add 5 supports under the ramp, in addition to the 3.6 m one, so that they are all equally spaced. How long should each support be? (One is drawn in for you.)
Lesson 11.4 • Corresponding Parts of Similar Triangles

All measurements are in centimeters.

1. \( \triangle ABC \sim \triangle PRQ \). \( M \) and \( N \) are midpoints. Find \( h \) and \( j \).

2. The triangles are similar. Find the length of each side of the smaller triangle to the nearest 0.01.

3. \( \triangle ABC \sim \triangle WXY \)

\[
\begin{align*}
WX &= \underline{\quad} \\
AD &= \underline{\quad} \\
DB &= \underline{\quad} \\
YZ &= \underline{\quad} \\
XZ &= \underline{\quad}
\end{align*}
\]

4. Find \( x \) and \( y \).

5. Find \( a, b, \) and \( c \).

6. Find \( CB, CD, \) and \( AD \).
Lesson 11.5 • Proportions with Area

All measurements are in centimeters unless otherwise indicated.

1. $\triangle ABC \sim \triangle DEF$. Area of $\triangle ABC = 15$ cm$^2$.

   Area of $\triangle DEF = ____$

2. Area of circle $O$ = $\frac{4}{9}$.

   $a = ____$

3. Area of square $SQUA$ = $____$

4. Area of circle $O$ = $____$

5. $RECT \sim ANGL$

   Area of $RECT$ = $____$

6. The ratio of the corresponding midsegments of two similar trapezoids is 4:5. What is the ratio of their areas?

7. The ratio of the areas of two similar pentagons is 4:9. What is the ratio of their corresponding sides?

8. If $ABCDE \sim FGHJ$, $AC = 6$ cm, $FH = 10$ cm, and area of $ABCDE = 320$ cm$^2$, then area of $FGHJ = ____$.

9. Stefan is helping his mother retile the kitchen floor. The tiles are 4-by-4-inch squares. The kitchen is square, and the area of the floor is 144 square feet. Assuming the tiles fit snugly (don’t worry about grout), how many tiles will be needed to cover the floor?
Lesson 11.6 • Proportions with Volume

All measurements are in centimeters unless otherwise indicated.

1. The triangular prisms are similar and the ratio of \(a\) to \(b\) is \(\frac{5}{2}\).

2. Volume of large prism = 250 cm\(^3\)
Volume of smaller prism = _____

3. The right cylinders are similar and \(r = 10\) cm.
Volume of large cylinder = 64 cm
Volume of small cylinder = 8 cm
\(R = _____\)

5. The corresponding heights of two similar cylinders is 2:5. What is the ratio of their volumes?

6. A rectangular prism aquarium holds 64 gallons of water. A similarly shaped aquarium holds 8 gallons of water. If a 1.5 ft\(^2\) cover fits on the smaller tank, what is the area of a cover that will fit on the larger tank?
Lesson 11.7 • Proportional Segments Between Parallel Lines

Name ____________________________ Period ________ Date ____________

All measurements are in centimeters.

1. \(x = \) ______

2. Is \(XY \parallel BC?\)

3. Is \(XY \parallel MK?\)

4. \(NE = \) ______

5. \(PR = \) ______
   \(PQ = \) ______
   \(RI = \) ______

6. \(a = \) ______
   \(b = \) ______

7. \(RS = \) ______
   \(EB = \) ______

8. \(x = \) ______
   \(y = \) ______

9. \(p = \) ______
   \(q = \) ______
3. \( V = 890.1 \text{ cm}^3; S = 486.9 \text{ cm}^2 \)
4. \( V = 34.1 \text{ cm}^3; S = 61.1 \text{ cm}^2 \)
5. About 3.9 cm
6. About 357.3 cm²
7. 9 quarts

**LESSON 11.1 • Similar Polygons**

1. \( AP = 8 \text{ cm}; EI = 7 \text{ cm}; SN = 15 \text{ cm}; YR = 12 \text{ cm} \)
2. \( SL = 5.2 \text{ cm}; MI = 10 \text{ cm}; m\angle D = 120^\circ; m\angle U = 85^\circ; m\angle A = 80^\circ \)
3. Yes. All corresponding angles are congruent. Both figures are parallelograms, so opposite sides within each parallelogram are equal. The corresponding sides are proportional \( \left( \frac{15}{10} = \frac{3}{2} \right) \).
4. Yes. Corresponding angles are congruent by the CA Conjecture. Corresponding sides are proportional \( \left( \frac{2}{3} = \frac{3}{5} = \frac{4}{6} \right) \).
5. No. \( \frac{6}{18} \neq \frac{8}{22} \).
6. Yes. All angles are right angles, so corresponding angles are congruent. The corresponding side lengths have the ratio \( \frac{3}{2} \), so corresponding side lengths are proportional.
7. \( \frac{1}{2} \)

**LESSON 11.2 • Similar Triangles**

1. \( MC = 10.5 \text{ cm} \)
2. \( \angle Q \equiv \angle X; QR = 4.8 \text{ cm}; QS = 11.2 \text{ cm} \)
3. \( \angle A \equiv \angle E; CD = 13.5 \text{ cm}; AB = 10 \text{ cm} \)
4. \( TS = 15 \text{ cm}; QP = 51 \text{ cm} \)
5. AA Similarity Conjecture

**LESSON 11.3 • Indirect Measurement with Similar Triangles**

1. 27 ft
2. 6510 ft
3. 110.2 mi
4. About 18.5 ft
5. 0.6 m, 1.2 m, 1.8 m, 2.4 m, and 3.0 m

**LESSON 11.4 • Corresponding Parts of Similar Triangles**

1. \( h = 0.9 \text{ cm}; j = 4.0 \text{ cm} \)
2. 3.75 cm, 4.50 cm, 5.60 cm
3. \( WX = 13 \frac{5}{7} \approx 13.7 \text{ cm}; AD = 21 \text{ cm}; DB = 12 \text{ cm}; YZ = 8 \text{ cm}; XZ = 6 \frac{6}{7} \approx 6.9 \text{ cm} \)
4. \( x = \frac{50}{13} \approx 3.85 \text{ cm}; y = \frac{80}{13} \approx 6.15 \text{ cm} \)
5. \( a = 8 \text{ cm}; b = 3.2 \text{ cm}; c = 2.8 \text{ cm} \)
6. \( CB = 24 \text{ cm}; CD = 5.25 \text{ cm}; AD = 8.75 \text{ cm} \)

**LESSON 11.5 • Proportions with Area**

1. \( 5.4 \text{ cm}^2 \)
2. 4 cm
3. \( \frac{9}{25} \)
4. \( \frac{36}{1} \)
5. \( \frac{25}{4} \)
6. 16:25
7. 2:3
8. 888 \frac{8}{5} \text{ cm}^2
9. 1296 tiles

**LESSON 11.6 • Proportions with Volume**

1. Yes
2. No
3. 16 cm³
4. 20 cm
5. 8:125
6. 6 ft²

**LESSON 11.7 • Proportional Segments Between Parallel Lines**

1. \( x = 12 \text{ cm} \)
2. Yes
3. No
4. \( NE = 31.25 \text{ cm} \)
5. \( PR = 6 \text{ cm}; PQ = 4 \text{ cm}; RI = 12 \text{ cm} \)
6. \( a = 9 \text{ cm}; b = 18 \text{ cm} \)
7. \( RS = 22.5 \text{ cm}, EB = 20 \text{ cm} \)
8. \( x = 20 \text{ cm}; y = 7.2 \text{ cm} \)
9. \( p = \frac{16}{3} = 5.3 \text{ cm}; q = \frac{8}{3} = 2.6 \text{ cm} \)

**LESSON 12.1 • Trigonometric Ratios**

1. \( \sin P = \frac{p}{r} \)
2. \( \cos P = \frac{q}{r} \)
3. \( \tan P = \frac{p}{q} \)
4. \( \sin Q = \frac{q}{r} \)
5. \( \sin T = 0.800 \)
6. \( \cos T = 0.600 \)
7. \( \tan T = 1.333 \)
8. \( \sin R = 0.600 \)
9. \( x \approx 12.27 \)
10. \( x \approx 29.75 \)
11. \( x \approx 18.28 \)
12. \( \angle A \approx 71^\circ \)
13. \( \angle B \approx 53^\circ \)
14. \( \angle C \approx 30^\circ \)
15. \( \sin 40^\circ = \frac{w}{38}, w \approx 18.0 \text{ cm} \)
16. \( \sin 28^\circ = \frac{x}{14}, x \approx 7.4 \text{ cm} \)
17. \( \cos 17^\circ = \frac{73}{y}; y \approx 76.3 \text{ cm} \)
18. \( a \approx 28^\circ \)
19. \( t \approx 47^\circ \)
20. \( z \approx 76^\circ \)

**LESSON 12.2 • Problem Solving with Right Triangles**

1. Area \( \approx 2 \text{ cm}^2 \)
2. Area \( \approx 325 \text{ ft}^2 \)
3. Area \( \approx 109 \text{ in}^2 \)
4. \( x \approx 54.0^\circ \)
5. \( y \approx 31.3^\circ \)
6. \( a \approx 7.6 \text{ in} \)
7. Diameter \( \approx 20.5 \text{ cm} \)
8. \( \theta \approx 45.2^\circ \)
9. \( \beta \approx 28.3^\circ \)
10. About 2.0 \text{ m} \)
11. About 445.2 \text{ ft} \)
12. About 22.6 \text{ ft} \)

**LESSON 12.3 • The Law of Sines**

1. Area \( \approx 46 \text{ cm}^2 \)
2. Area \( \approx 24 \text{ m}^2 \)
3. Area \( \approx 45 \text{ ft}^2 \)
4. \( m \approx 14 \text{ cm} \)
5. \( p \approx 17 \text{ cm} \)
6. \( q \approx 13 \text{ cm} \)
7. \( \angle B \approx 66^\circ, \angle C \approx 33^\circ \)
8. \( \angle P \approx 37^\circ, \angle Q \approx 95^\circ \)
9. \( \angle K \approx 81^\circ, \angle M \approx 21^\circ \)
10. Second line: about 153 \text{ ft}; between tethers: about 135 \text{ ft} \)

**LESSON 12.4 • The Law of Cosines**

1. \( t \approx 13 \text{ cm} \)
2. \( b \approx 67 \text{ cm} \)
3. \( w \approx 34 \text{ cm} \)
4. \( \angle A \approx 76^\circ, \angle B \approx 45^\circ, \angle C \approx 59^\circ \)
5. \( \angle A \approx 77^\circ, \angle P \approx 66^\circ, \angle S \approx 37^\circ \)
6. \( \angle S \approx 46^\circ, \angle U \approx 85^\circ, \angle V \approx 49^\circ \)

**LESSON 12.5 • Problem Solving with Trigonometry**

1. About 2.85 \text{ mi/h}; about 15°
2. \( \angle A \approx 50.6^\circ, \angle B \approx 59.7^\circ, \angle C \approx 69.6^\circ \)
3. About 8.0 km from Tower 1, 5.1 km from Tower 2
4. About 853 \text{ miles} \)
5. About 530 \text{ ft of fencing}; about 11,656 \text{ ft}^2 \)

**LESSON 13.1 • The Premises of Geometry**

1. a. Given
b. Distributive property
c. Subtraction property
d. Addition property
e. Division property
2. False

**LESSON 13.2 • Planning a Geometry Proof**

1. Flowchart Proof