PRE ALGEBRA 2 - PA CORE 8 – COURSE 3

STUDENT WORKBOOK

UNIT 4 – GEOMETRY

Before

After

Unit 4	Geometry	PURPLE	GREEN	RED
5.5	The Pythagorean Theorem	11.2	11.7	
5.6	Use the Pythagorean Theorem	11.3	11.8	
5.7	Distance on the Coordinate Plane	11.3	11.7	
6.1	Translations	9.8		
6.2	Reflections	9.9		
6.3	Rotations	9.1		
6.4	Dilations			
7.1	Congruence and Transformations	9.5		
7.2	Congruence	9.5		
7.3	Similarity and Transformations			
7.4	Properties of Similar Polygons			
7.5	Similar Triangles and Indirect Measurement		A-1	
7.6	Slope and Similar Triangles		A-1	
8.1	Volume of Cylinders	10.7		
8.2	Volume of Cones	10.9		
8.3	Volume of Spheres	10.9		

STUDY ISLAND TOPICS

Object Transformation
Similarity and Congruence
Pythagorean Theorem
Volume

Name: _____ Period ____

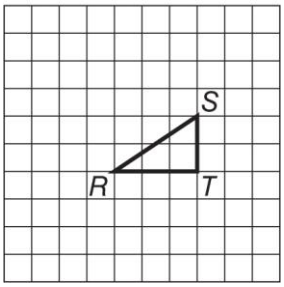
Lesson 1 Skills Practice

OBJECTIVE:
KEY NOTES:

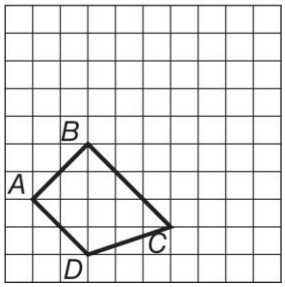
Translations

Graph the image of the figure after the indicated translation.

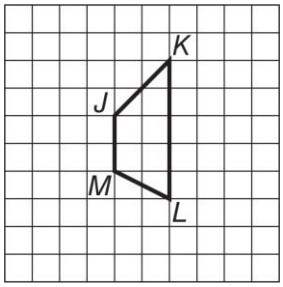
1. 2 units left and 3 units up



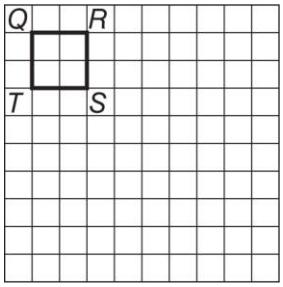
2. 4 units right and 1 unit up



3. 1 unit left and 2 units down

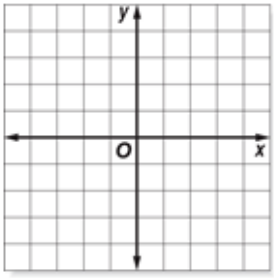


4. 5 units right and 3 units down

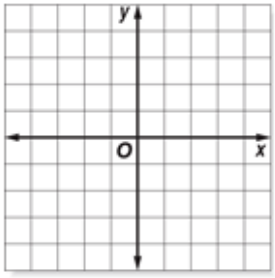


Graph the figure with the given vertices. Then graph the image of the figure after the indicated translation and write the coordinates of its vertices.

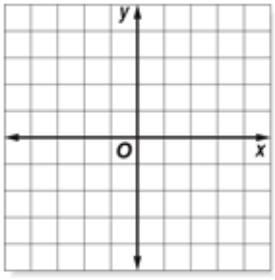
5. triangle *ABC* with vertices *A*(–3, –1), *B*(–4, –4), and *C*(–1, –2) translated 4 units right and 1 unit up



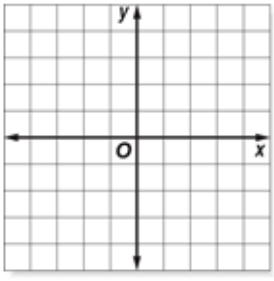
6. triangle *XYZ* with vertices *X*(1, –2), *Y*(3, –5), and *Z*(4, 1) translated 5 units left and 3 units up



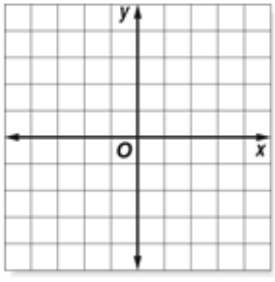
7. triangle *EFG* with vertices *E*(1, 4), *F*(–1, 1), and *G*(2, –1) translated 3 units left and 1 unit down



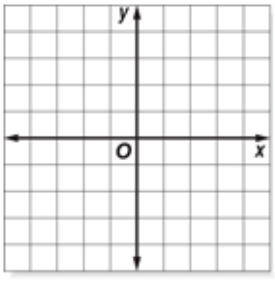
8. rhombus *WXYZ* with vertices *W*(–4, 3), *X*(–1, 1), *Y*(2, 3), and *Z*(–1, 5) translated 2 units right and 5 units down



9. rectangle *QRST* with vertices *Q*(–2, –4), *R*(–2, 1), *S*(–4, 1), and *T*(–4, –4) translated 3 units right and 3 units up



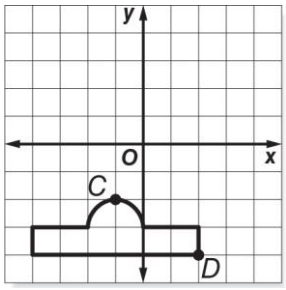
10. trapezoid *BCDE* with vertices *B*(2, –1), *C*(3, –3), *D*(–3, –3), and *E*(0, –1) translated 1 unit left and 4 units up



Lesson 1 Problem-Solving Practice

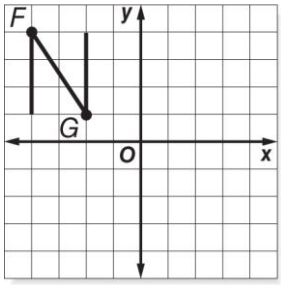
Translations

1. BUILDINGS The figure shows an outline of the White House in Washington, D.C., plotted on a coordinate system. Find the coordinates of points *C* and *D* after the figure is translated 2 units right and 3 units up.



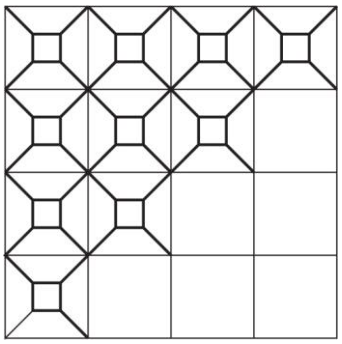
2. BUILDINGS Refer to the figure in Exercise 1. Find the coordinates of points *C* and *D* after the figure is translated 1 unit left and 4 units up.

3. ALPHABET The figure shows a capital "N" plotted on a coordinate system. Find the coordinates of points *F* and *G* after the figure is translated 2 units right and 2 units down.



4. ALPHABET Refer to the figure in Exercise 3. Find the coordinates of points *F* and *G* after the figure is translated 5 units right and 6 units down.

5. QUILT The beginning of a quilt is shown below. Look for a pattern in the quilt. Copy and translate the quilt square to finish the quilt.



6. BEACH Tylia is walking on the beach. Copy and translate her footprints to show her path in the sand.

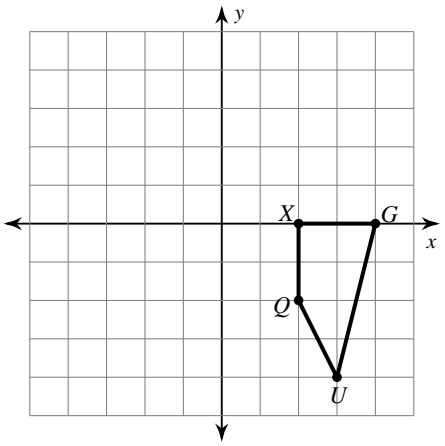
 Name_____

Translations of Shapes

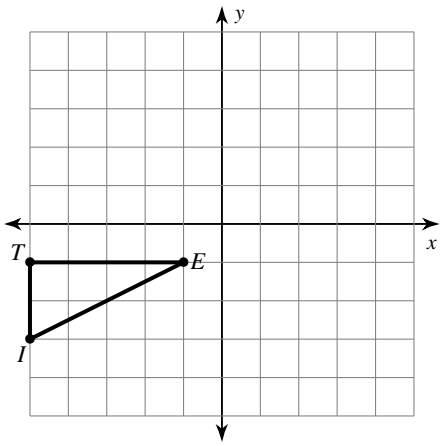
Date_____ Period____

Graph the image of the figure using the transformation given.

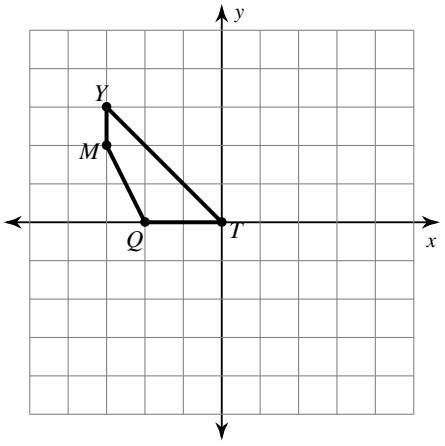
1) translation: 1 unit left



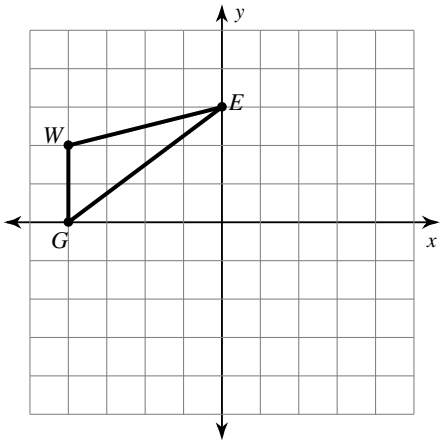
2) translation: 1 unit right and 2 units down



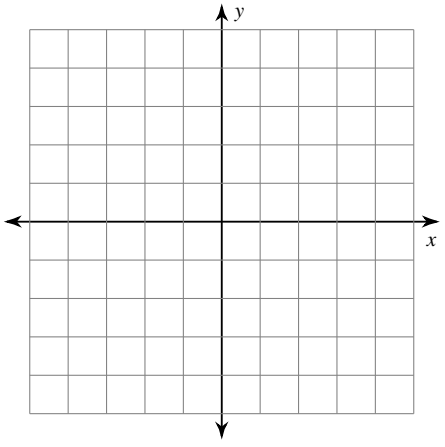
3) translation: 3 units right



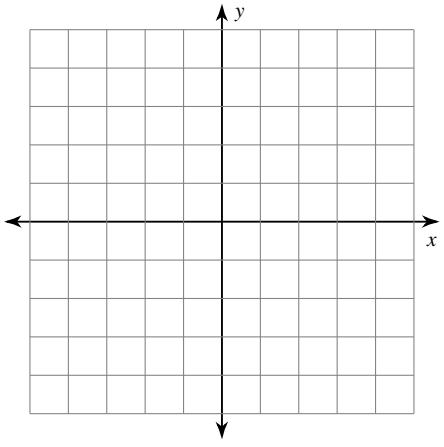
4) translation: 1 unit right and 2 units down



5) translation: 5 units up
$U(-3, -4)$, $M(-1, -1)$, $L(-2, -5)$



6) translation: 3 units up
$R(-4, -3)$, $D(-4, 0)$, $L(0, 0)$, $F(0, -3)$



Find the coordinates of the vertices of each figure after the given transformation.

7) translation: 2 units left and 1 unit down
$Q(0, -1)$, $D(-2, 2)$, $V(2, 4)$, $J(3, 0)$

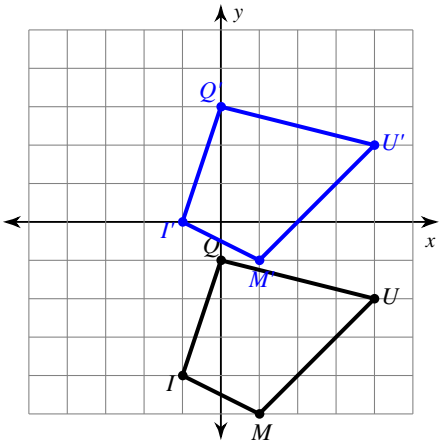
8) translation: 2 units down
$D(-4, 1)$, $A(-2, 5)$, $S(-1, 4)$, $N(-1, 2)$

9) translation: 4 units left and 4 units up
$J(-1, -2)$, $A(-1, 0)$, $N(3, -3)$

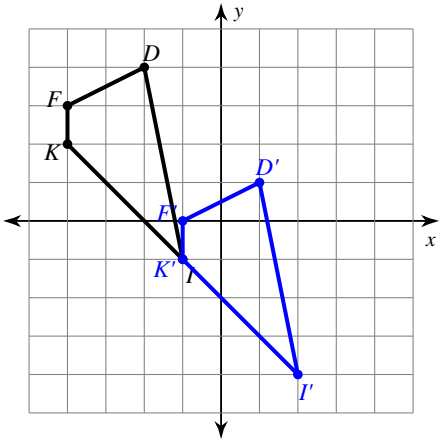
10) translation: 3 units right and 4 units up
$Z(-4, -3)$, $I(-2, -2)$, $V(-2, -4)$

Write a rule to describe each transformation.

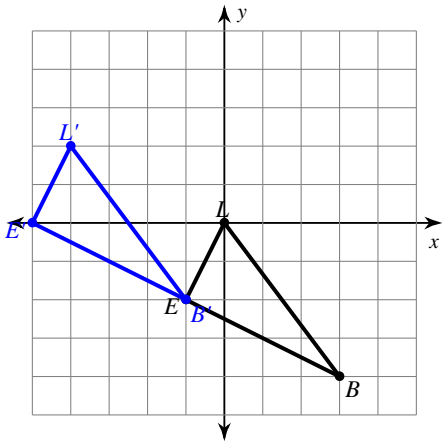
11)



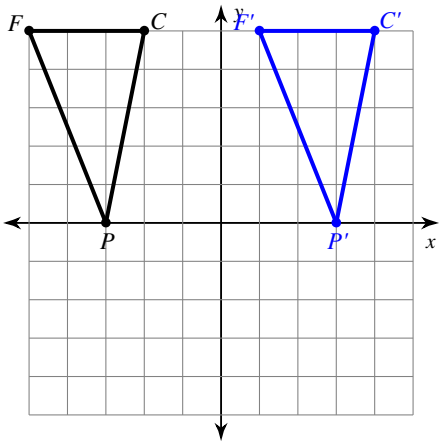
12)



13)



14)

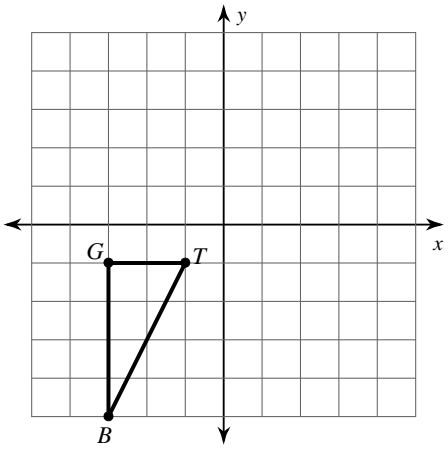


Translations

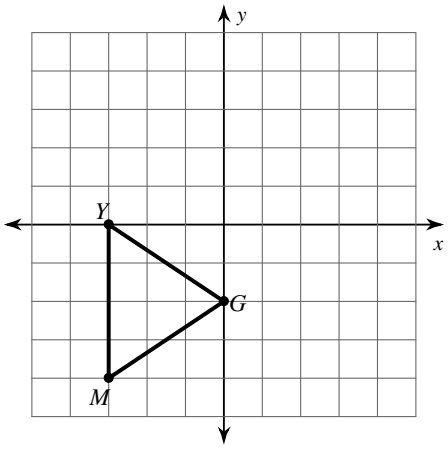
Date_____ Period____

Graph the image of the figure using the transformation given.

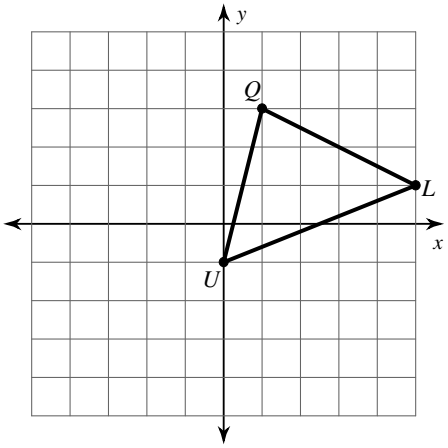
1) translation: 5 units right and 1 unit up



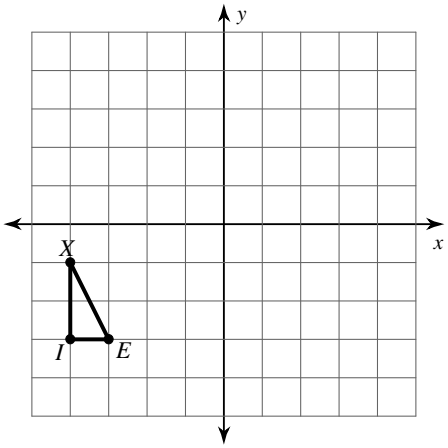
2) translation: 1 unit left and 2 units up



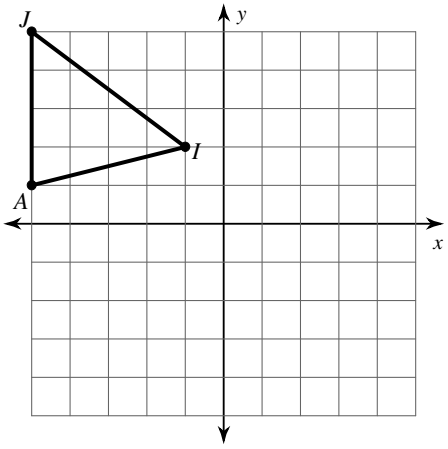
3) translation: 3 units down



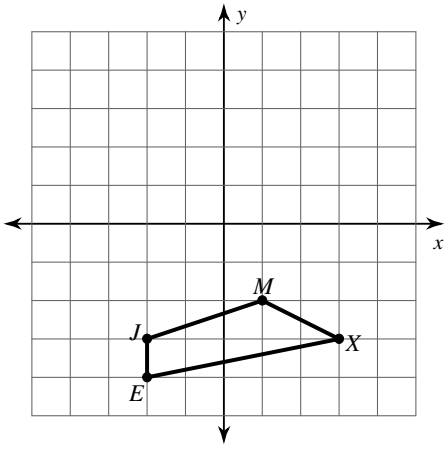
4) translation: 5 units right and 2 units up



5) translation: 4 units right and 4 units down

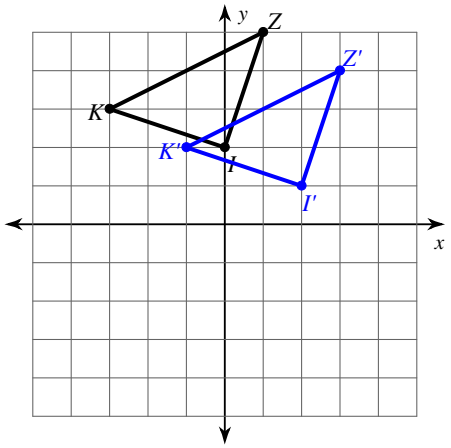


6) translation: 2 units right and 3 units up

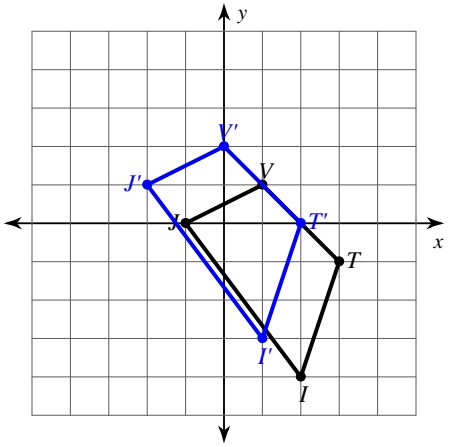


Write a rule to describe each transformation.

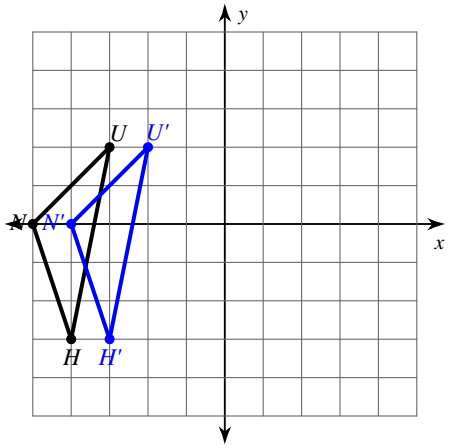
7)



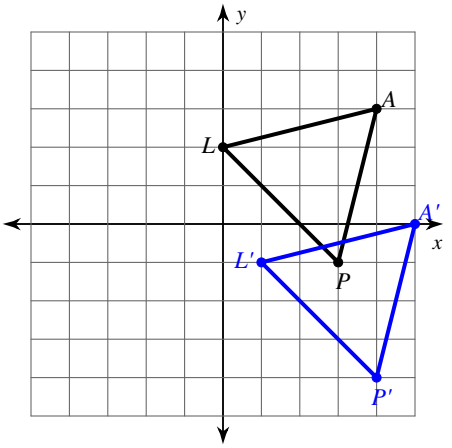
8)



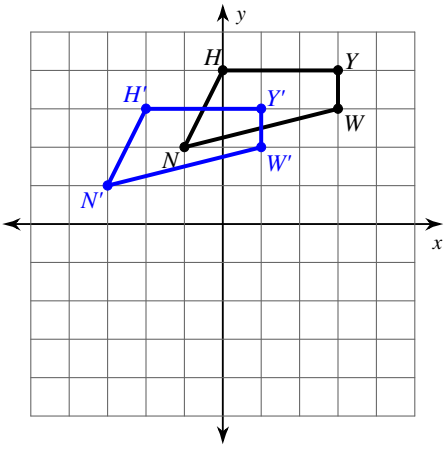
9)



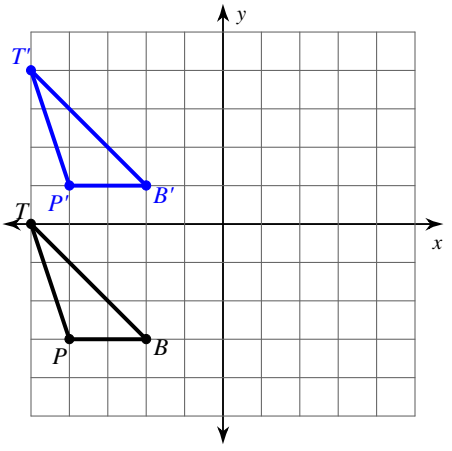
10)



11)



12)



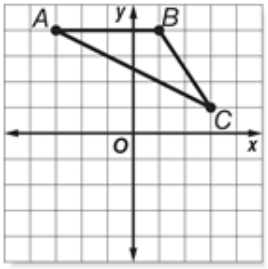
OBJECTIVE:
KEY NOTES:

Lesson 2 Skills Practice

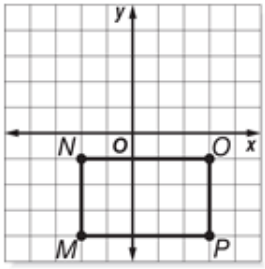
Reflections

Graph the figure and its reflection over the *x*-axis. Then find the coordinates of the reflected image.

1. triangle *ABC* with vertices *A*(–3, 4), *B*(1, 4), and *C*(3, 1)

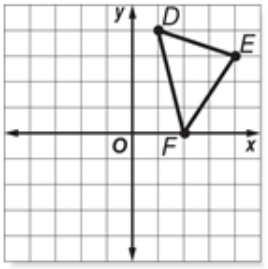


2. rectangle *MNOP* with vertices *M*(–2, –4), *N*(–2, –1), *O*(3, –1), and *P*(3, –4)

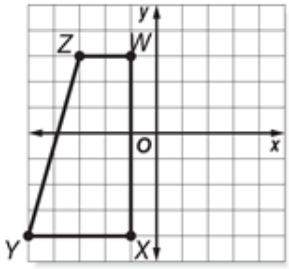


Graph the figure and its reflection over the *y*-axis. Then find the coordinates of the reflected image.

3. triangle *DEF* with vertices *D*(1, 4), *E*(4, 3), and *F*(2, 0)

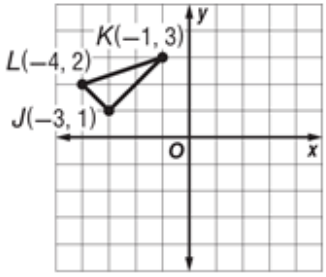


4. trapezoid *WXYZ* with vertices *W*(–1, 3), *X*(–1, –4), *Y*(–5, –4), and *Z*(–3, 3)



For Exercises 5–8, use the following information.

Triangle *JKL* has vertices *J*(–3, 1), *K*(–1, 3), and *L*(–4, 2).



5. What are the coordinates of the image of point *J* after a reflection over the *y*-axis?

6. What are the coordinates of the image of point *K* after a reflection over the *y*-axis?

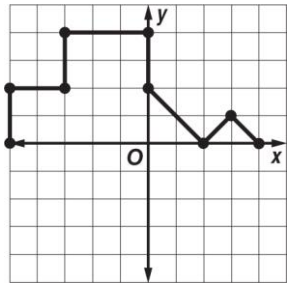
7. What are the coordinates of the image of point *L* after a reflection over the *y*-axis?

8. Graph triangle *JKL* and its image after a reflection over the *y*-axis.

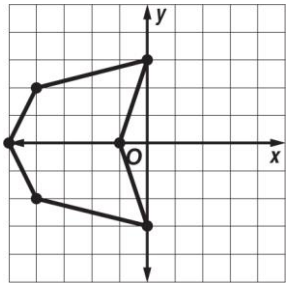
Lesson 2 Problem-Solving Practice

Reflections

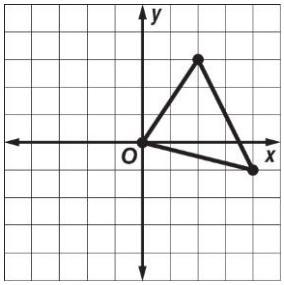
1. DESIGNS Half of a design is shown below. Reflect the figure across the *x*-axis to obtain the completed design.



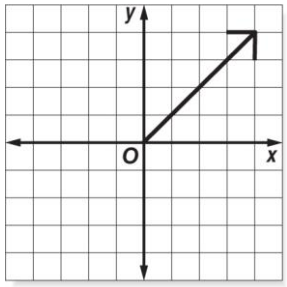
2. DESIGNS Half of a design is shown below. Reflect the figure across the *y*-axis to obtain the completed design.



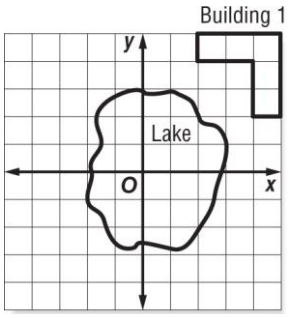
3. LOGO Half of a logo is shown below. Reflect the figure across the *y*-axis to obtain the completed figure.



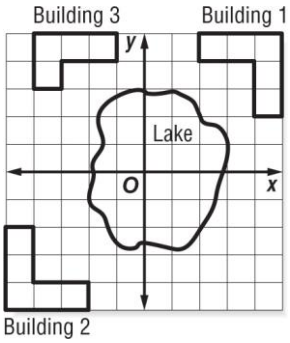
4. SYMBOLS The figure shows a ray plotted on a coordinate system. Reflect the ray across the *x*-axis. Graph the reflected image.



5. ARCHITECTURE A corporate plaza is to be built around a small lake. Building 1 has already been built. Suppose there are axes through the lake as shown. Show where Building 2 should be built if it will be a reflection of Building 1 across the *y*-axis followed by a reflection across the *x*-axis.



6. ARCHITECTURE Use the information from Exercise 5. Suppose that a third building is to be built as shown. To complete the business park, show where a fourth building should be built if it is a reflection of Building 3 across the *x* and *y*-axis.



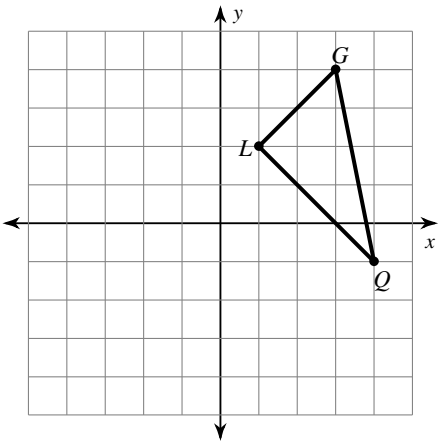
 Name_____

Reflections of Shapes

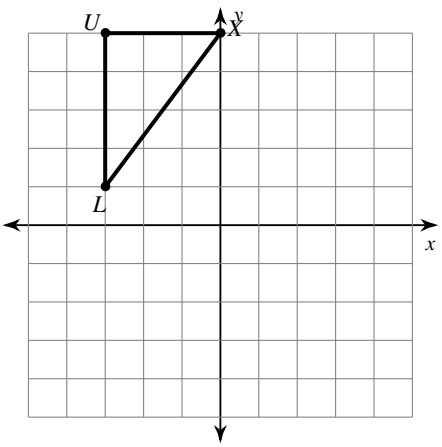
Date_____ Period____

Graph the image of the figure using the transformation given.

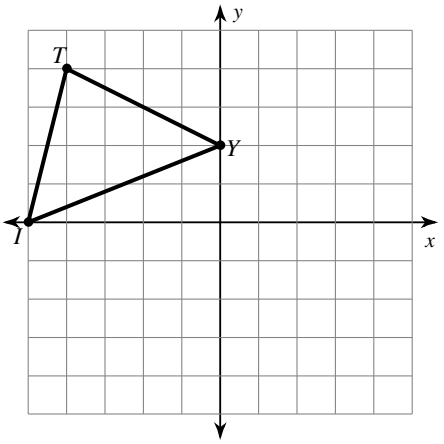
1) reflection across the x-axis



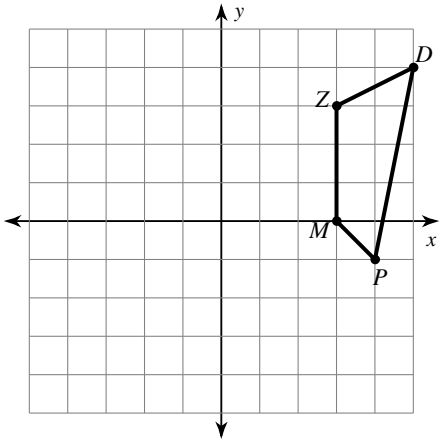
2) reflection across $y = 3$



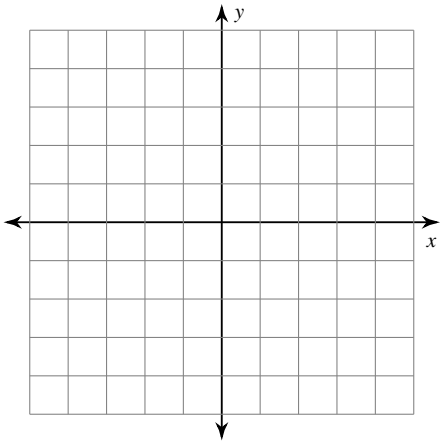
3) reflection across $y = 1$



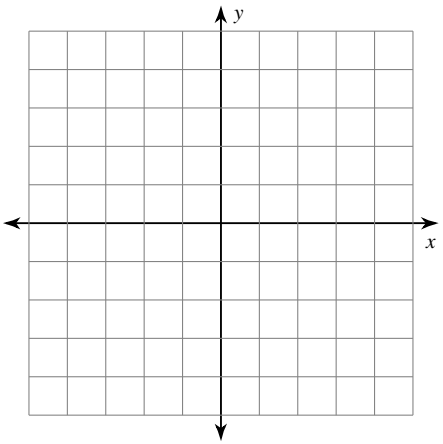
4) reflection across the x-axis



5) reflection across the x-axis
$T(2, 2)$, $C(2, 5)$, $Z(5, 4)$, $F(5, 0)$



6) reflection across $y = -2$
$H(-1, -5)$, $M(-1, -4)$, $B(1, -2)$, $C(3, -3)$



Find the coordinates of the vertices of each figure after the given transformation.

7) reflection across the x-axis
$K(1, -1)$, $N(4, 0)$, $Q(4, -4)$

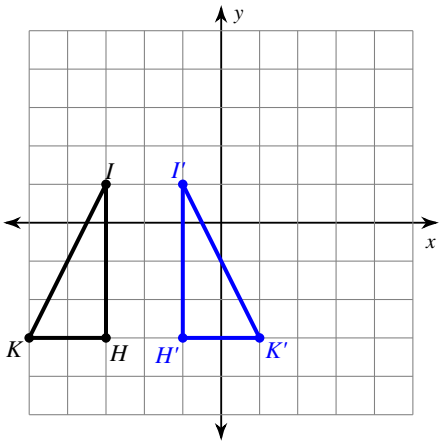
8) reflection across $y = -1$
$R(-3, -5)$, $N(-4, 0)$, $V(-2, -1)$, $E(0, -4)$

9) reflection across $x = 3$
$F(2, 2)$, $W(2, 5)$, $K(3, 2)$

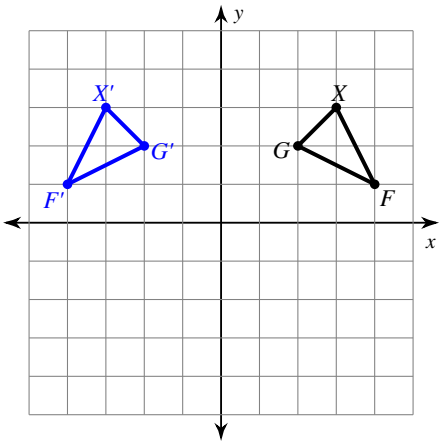
10) reflection across $x = -1$
$V(-3, -1)$, $Z(-3, 2)$, $G(-1, 3)$, $M(1, 1)$

Write a rule to describe each transformation.

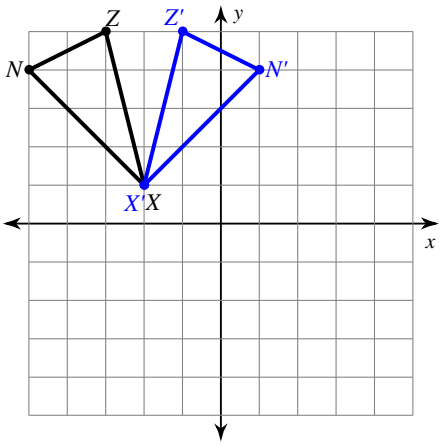
11)



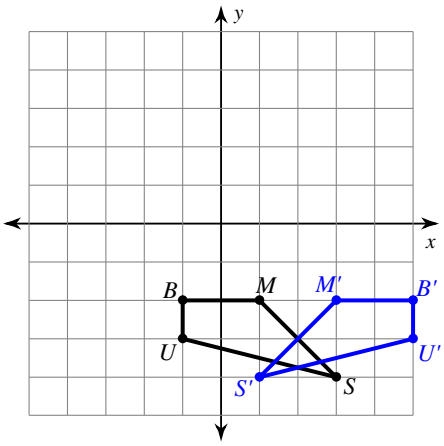
12)



13)



14)

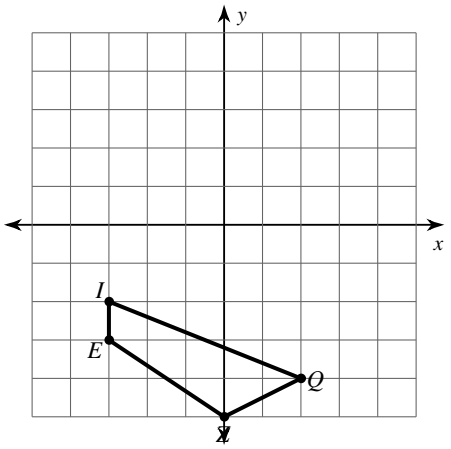


Reflections

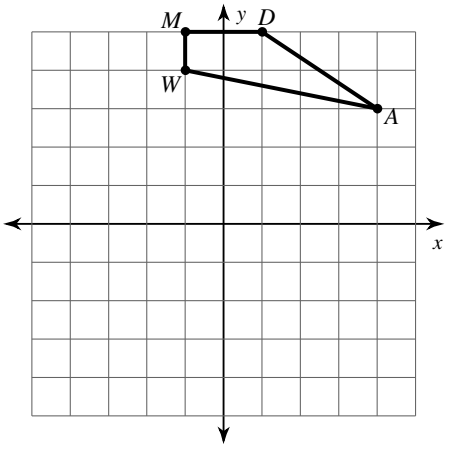
Date_____ Period____

Graph the image of the figure using the transformation given.

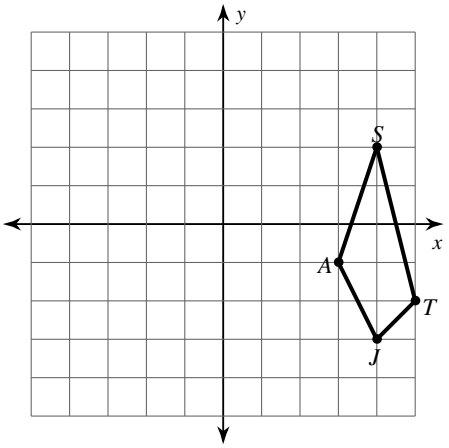
1) reflection across $y = -2$



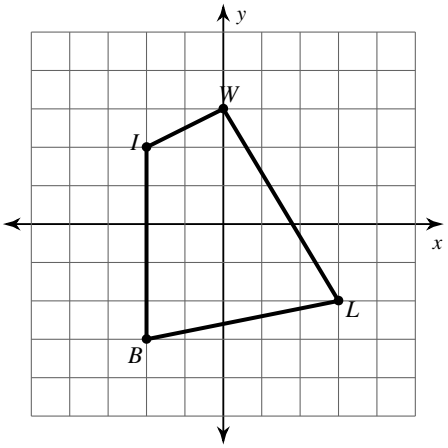
2) reflection across the x-axis



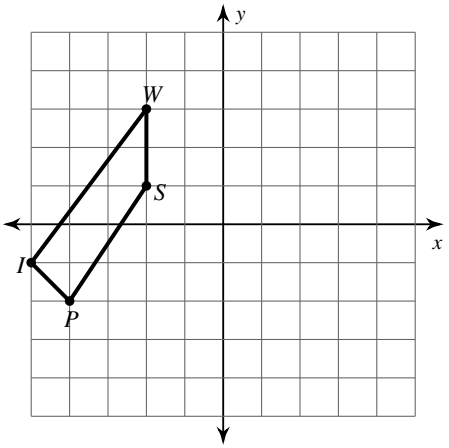
3) reflection across $y = -x$



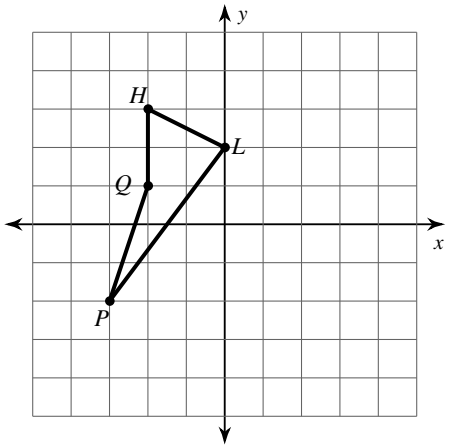
4) reflection across $y = -1$



5) reflection across $x = -3$

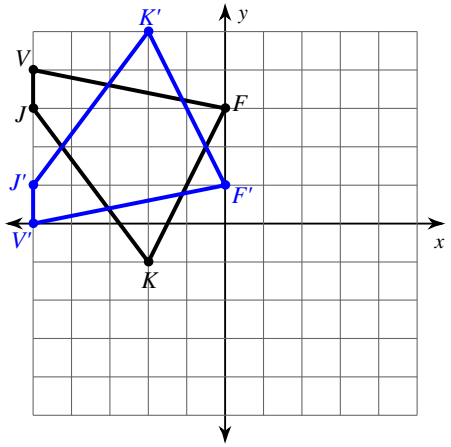


6) reflection across $y = x$

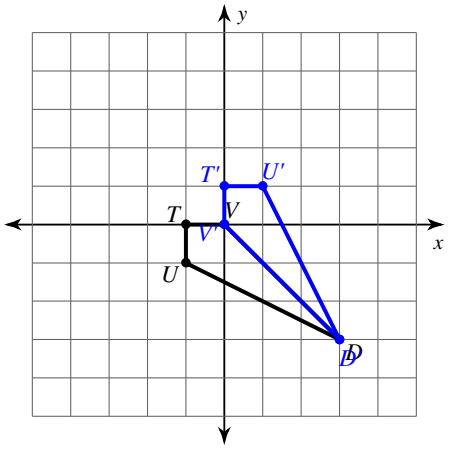


Write a rule to describe each transformation.

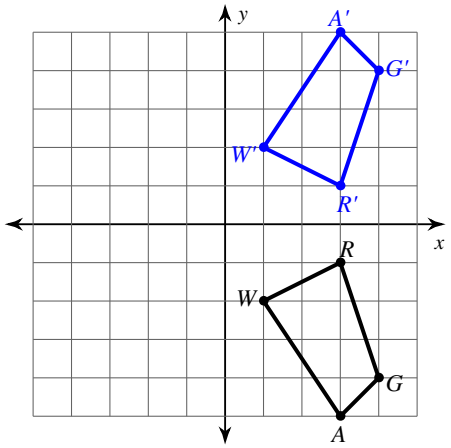
7)



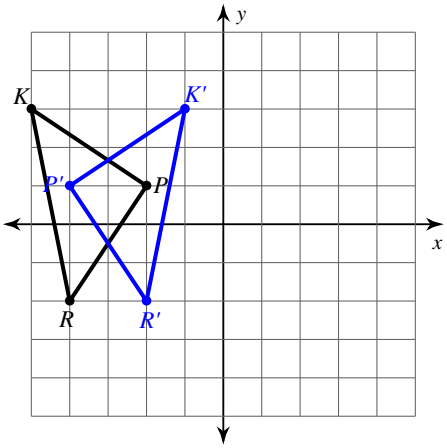
8)



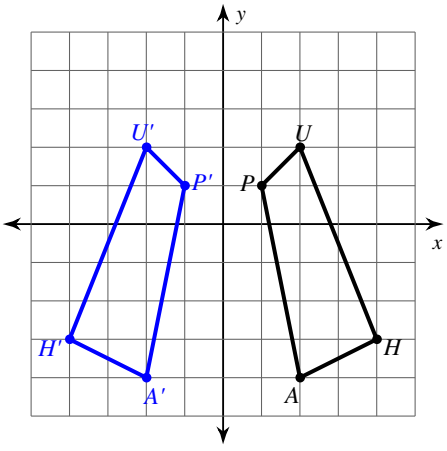
9)



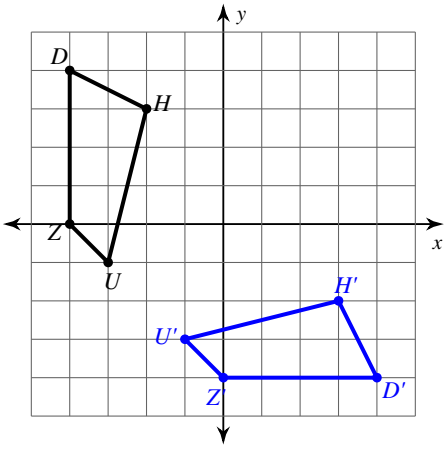
10)



11)



12)



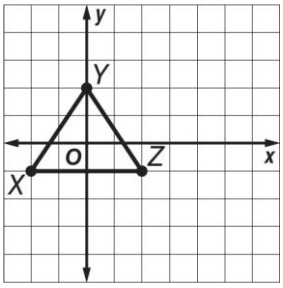
Lesson 3 Skills Practice

OBJECTIVE:
KEY NOTES:

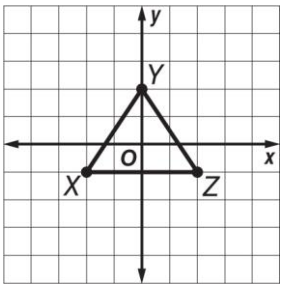
Rotations

For Exercises 1 and 2, graph ΔXYZ and its image after each rotation. Then give the coordinates of the vertices for $\Delta X'Y'Z'$.

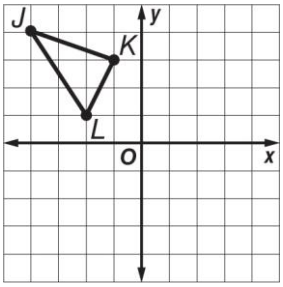
1. 180° clockwise about vertex *Z*



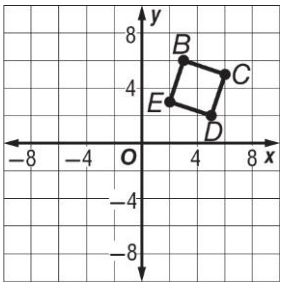
2. 90° clockwise about vertex *X*



3. Triangle *JKL* has vertices *J*(-4, 4), *K*(-1, 3), and *L*(-2, 1). Graph the figure and its rotated image after a clockwise rotation of 90° about the origin. Then give the coordinates of the vertices for triangle *J'K'L'*.



4. Quadrilateral *BCDE* has vertices *B*(3, 6), *C*(6, 5), *D*(5, 2), and *E*(2, 3). Graph the figure and its rotated image after a counterclockwise rotation of 180° about the origin. Then give the coordinates of the vertices for quadrilateral *B'C'D'E'*.

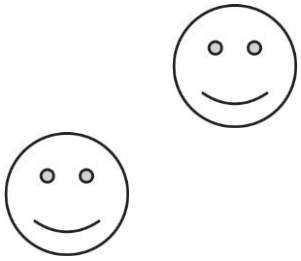


Lesson 3 Problem-Solving Practice

Rotations

1. OPEN-ENDED Draw a figure that has rotational symmetry with 90° and 180° as its angles of rotation.

2. CLASSIFY Identify the transformation shown below as a translation, reflection, or rotation. Explain.

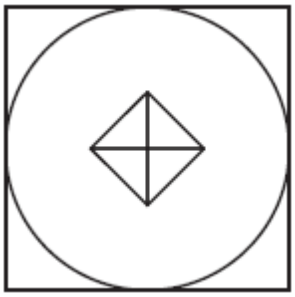


3. ROTATIONS Which figure below was rotated 90° counterclockwise?

4. LETTERS Which capital letters in the word TRANSFORMATION produce the same letter after being rotated 180°?

5. REAL-WORLD Describe a real-world example of where you could find a rotation.

6. ART An art design is shown. State the angles of rotation.



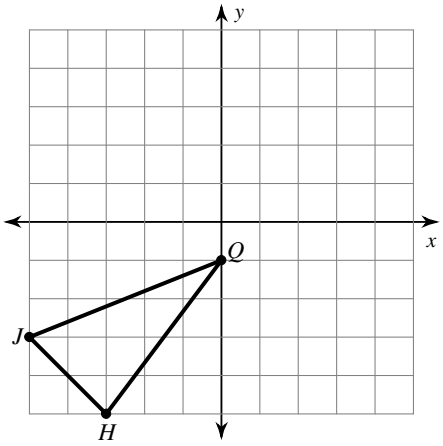
 Name_____

Rotations of Shapes

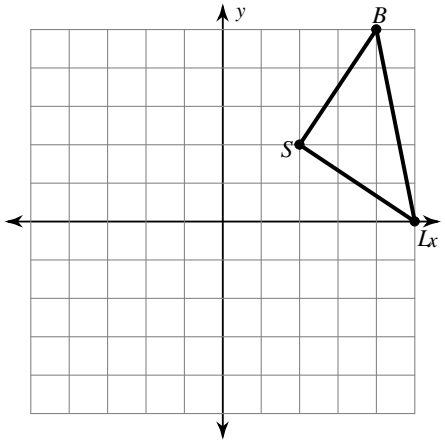
Date_____ Period____

Graph the image of the figure using the transformation given.

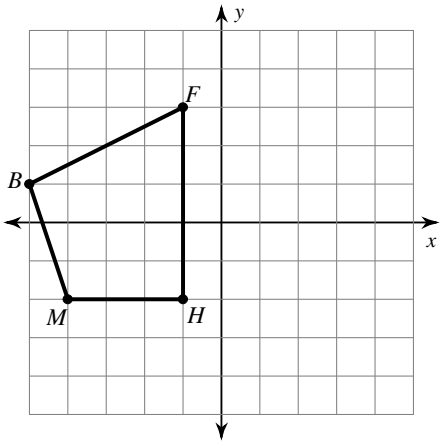
1) rotation 180° about the origin



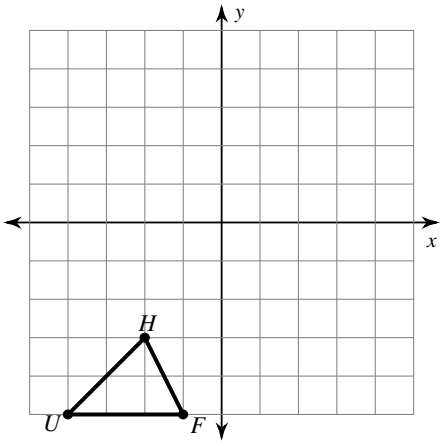
2) rotation 90° counterclockwise about the origin



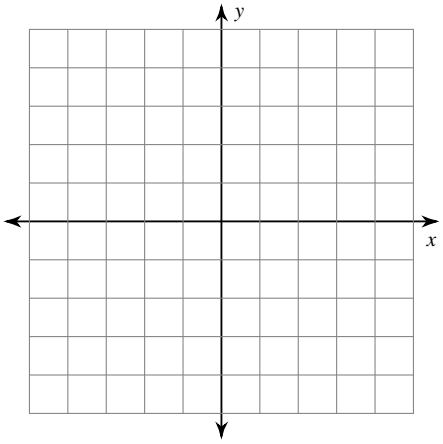
3) rotation 90° clockwise about the origin



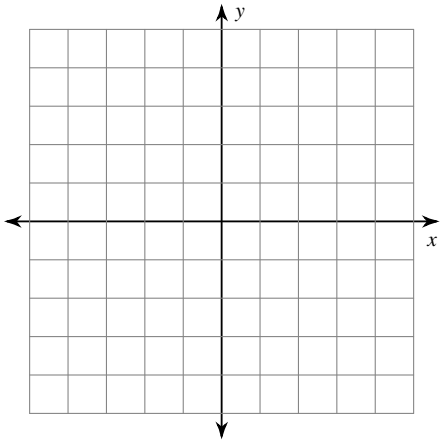
4) rotation 180° about the origin



5) rotation 90° clockwise about the origin
$U(1, -2)$, $W(0, 2)$, $K(3, 2)$, $G(3, -3)$



6) rotation 180° about the origin
$V(2, 0)$, $S(1, 3)$, $G(5, 0)$



Find the coordinates of the vertices of each figure after the given transformation.

7) rotation 180° about the origin
$Z(-1, -5)$, $K(-1, 0)$, $C(1, 1)$, $N(3, -2)$

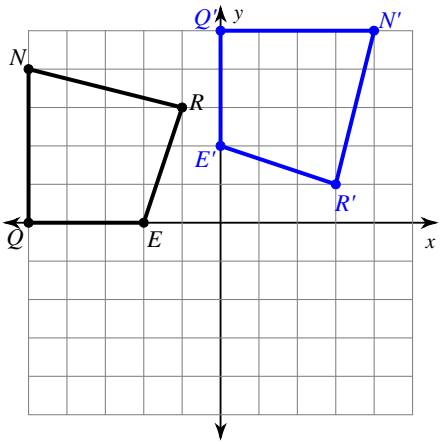
8) rotation 180° about the origin
$L(1, 3)$, $Z(5, 5)$, $F(4, 2)$

9) rotation 90° clockwise about the origin
$S(1, -4)$, $W(1, 0)$, $J(3, -4)$

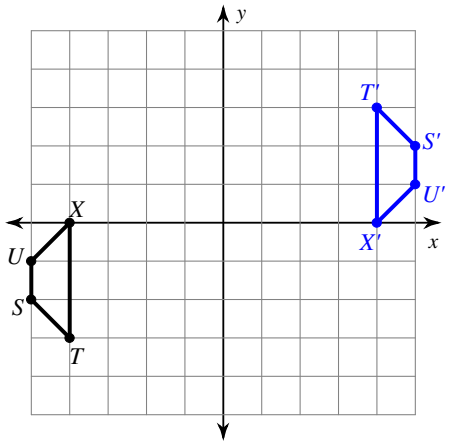
10) rotation 180° about the origin
$V(-5, -3)$, $A(-3, 1)$, $G(0, -3)$

Write a rule to describe each transformation.

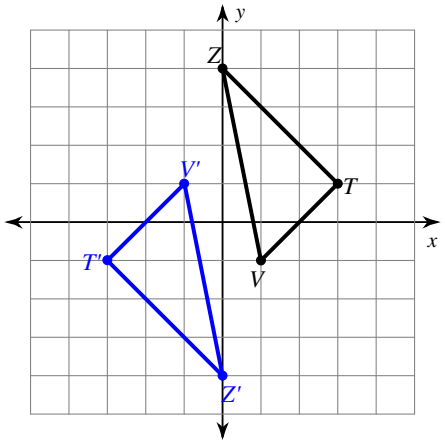
11)



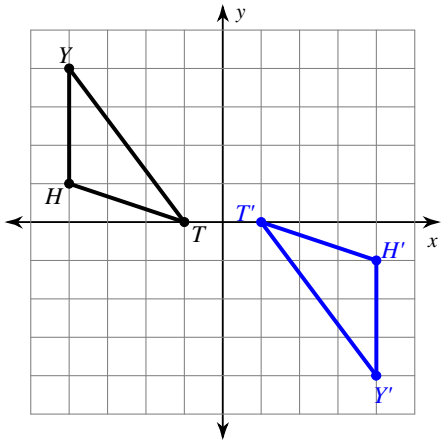
12)



13)



14)

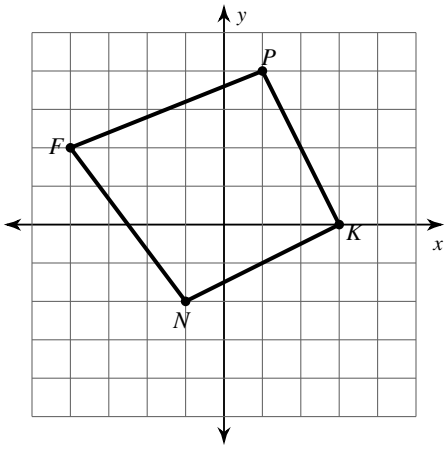


Rotations

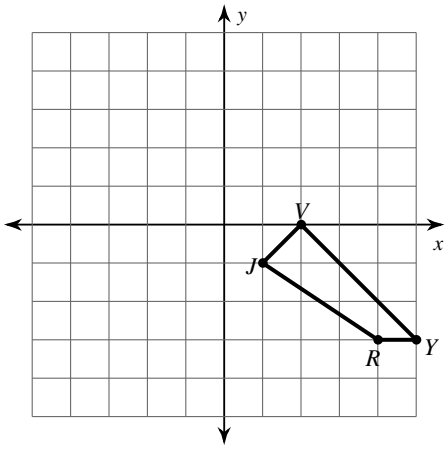
Date_____ Period____

Graph the image of the figure using the transformation given.

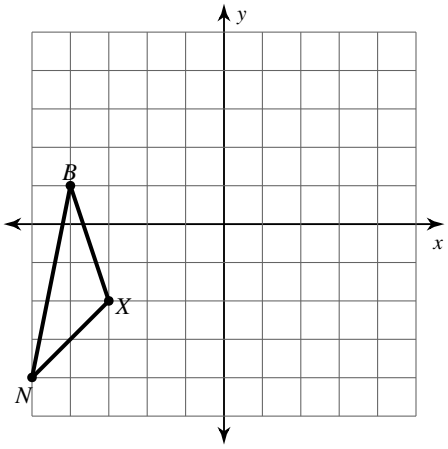
1) rotation 180° about the origin



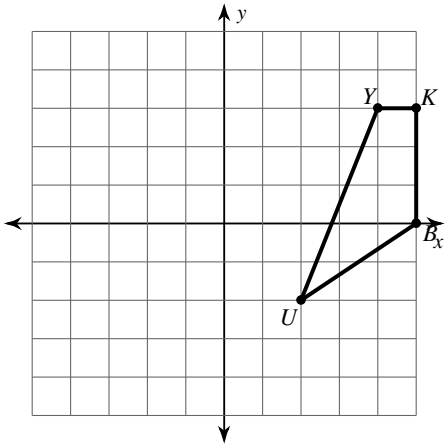
2) rotation 180° about the origin



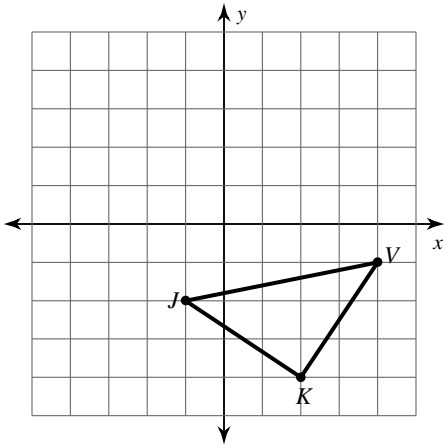
3) rotation 90° counterclockwise about the origin



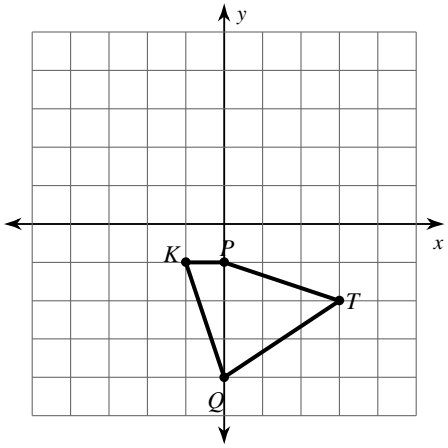
4) rotation 90° clockwise about the origin



5) rotation 90° clockwise about the origin

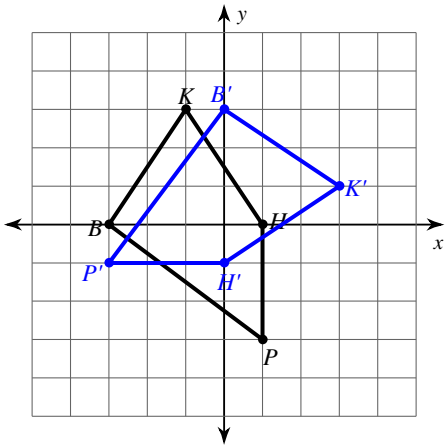


6) rotation 180° about the origin

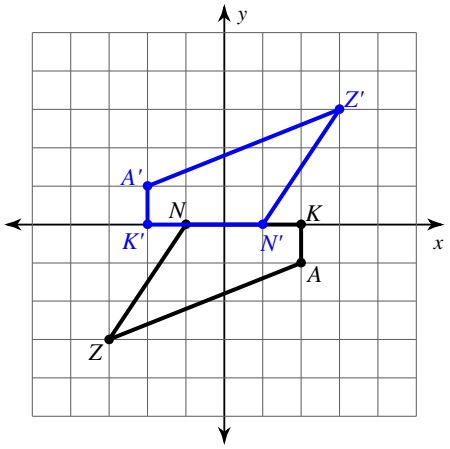


Write a rule to describe each transformation.

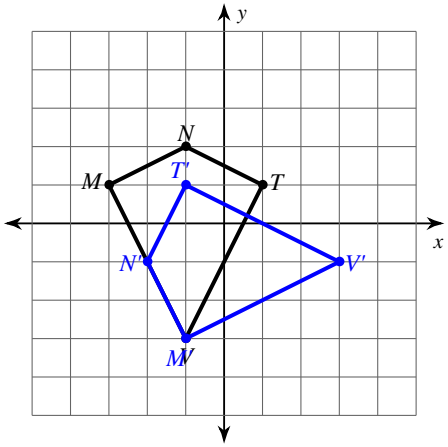
7)



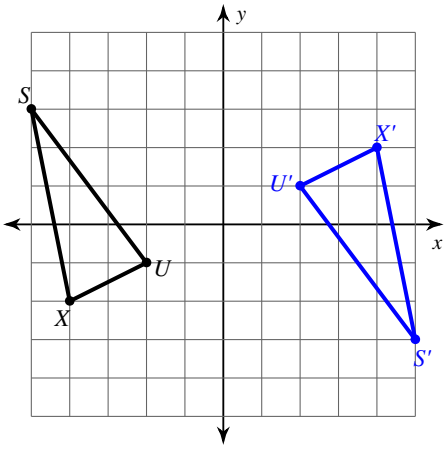
8)



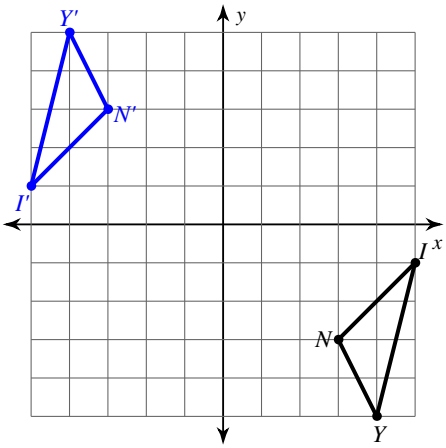
9)



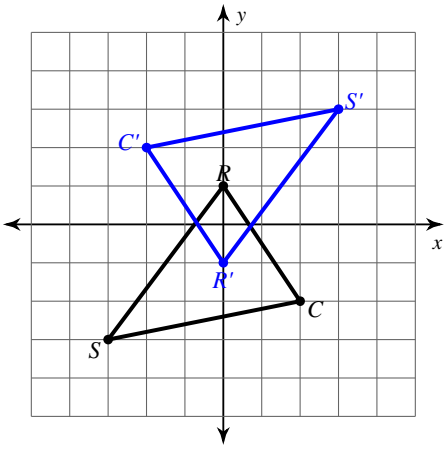
10)



11)



12)



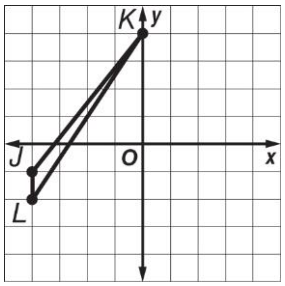
Lesson 4 Skills Practice

Dilations

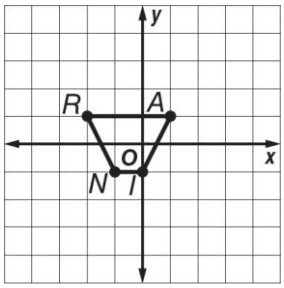
OBJECTIVE:
KEY NOTES:

Find the coordinates of the vertices of each figure after a dilation with the given scale factor *k*. Then graph the original image and the dilation.

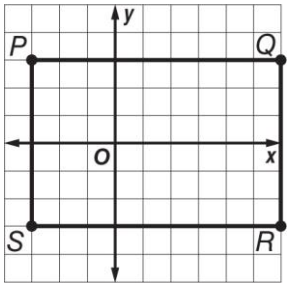
1. $J(-4, -1)$, $K(0, 4)$, $L(-4, -2)$; $k = \frac{1}{2}$



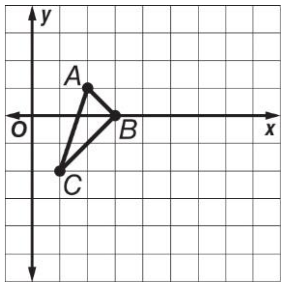
2. $R(-2, 1)$, $A(1, 1)$, $I(0, -1)$, $N(-1, -1)$; $k = 2$



3. $P(-3, 3)$, $Q(6, 3)$, $R(6, -3)$, $S(-3, -3)$; $k = \frac{1}{3}$



4. $A(2, 1)$, $B(3, 0)$, $C(1, -2)$; $k = 3$



5. PHOTOS Kiesha used a photo that measured 4 inches by 6 inches to make a copy that measured 8 inches by 12 inches. What is the scale factor of the dilation?

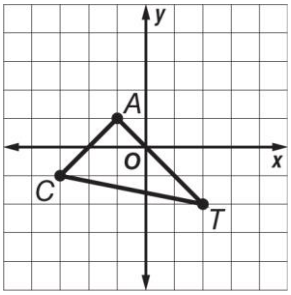
6. MODELS David built a model of a regulation basketball court. His model measured approximately 3.75 feet long by 2 feet wide. The dimensions of a regulation court are 94 feet long by 50 feet wide. What is the scale factor David used to build his model?

7. BLUEPRINTS On the blueprints of Mr. Wong's house, his great room measures 4.5 inches by 5 inches. The actual great room measures 18 feet by 20 feet. What is the scale factor of the dilation?

Lesson 4 Problem-Solving Practice

Dilations

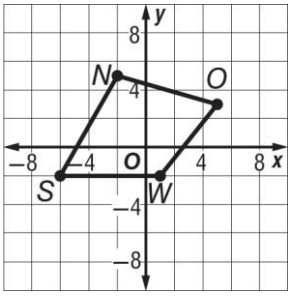
1. GEOMETRY Find the coordinates of the triangle shown below after a dilation with a scale factor of 4.



2. PHOTOS Daniel is using a scale factor of 10 to enlarge a class photo that measures 3.5 inches by 5 inches. What are the dimensions of the photo after the dilation?

3. DOGS Isabel has a mother dog and her puppy that look exactly alike. The puppy weighs 6 pounds, and the mother weighs 48 pounds. Assuming the two dogs are similar, what is the scale factor of the dilation?

4. GEOMETRY Find the coordinates of the quadrilateral shown below after a dilation with a scale factor of $\frac{1}{2}$.



5. BLUEPRINTS Abby's family is building a new house. On the blueprints of the house, Abby's bedroom measures 3 inches by 3.75 inches. Her actual bedroom will measure 8 feet by 10 feet. What is the scale factor for the dilation?

6. ART William saw a painting in a museum, and later found a picture of that same painting in a book. The actual painting measured 36 inches by 54 inches. The picture of the painting measured 4 inches by 6 inches. What is the scale factor for the dilation?

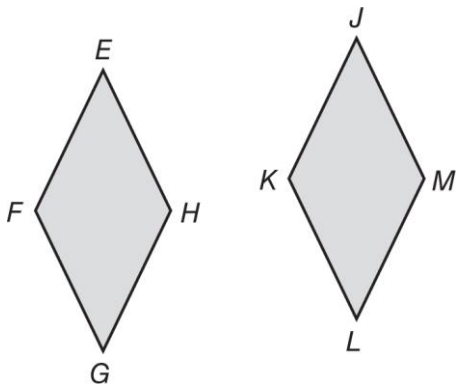
OBJECTIVE:
KEY NOTES:

Lesson 1 Skills Practice

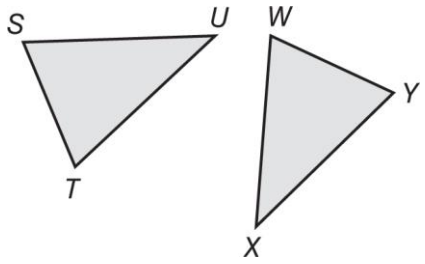
Congruence and Transformations

Determine if the two figures are congruent by using transformations. Explain your reasoning.

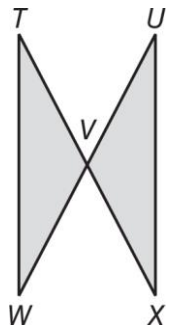
1.



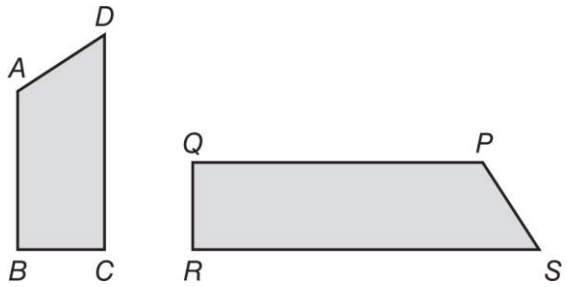
2.



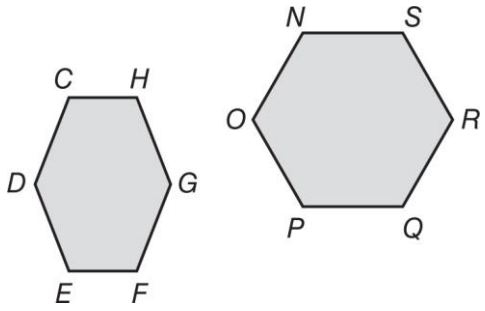
3.



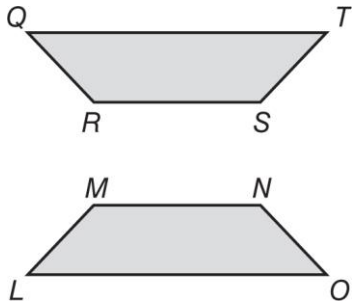
4.



5.



6.

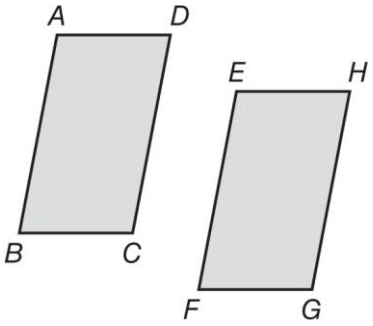


Lesson 1 Problem-Solving Practice

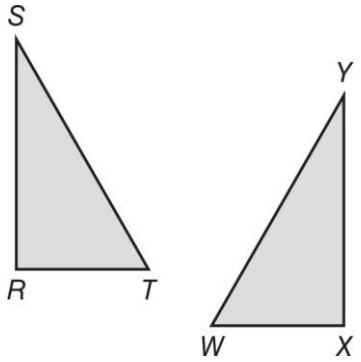
Congruence and Transformations

Determine if the two figures are congruent by using transformations. Explain your reasoning.

1.



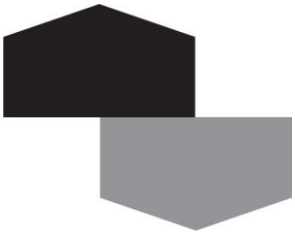
2.



3. The community softball team has created the following logo for their jerseys. What transformations could be used if the letter "M" is the image and the letter "W" is the preimage? Are the two figures congruent? Explain.

4. For the local art gallery opening, the curator had the design shown below created. What transformations could be used if the white figure is the image and the black figure is the preimage? Are the two figures congruent? Explain.

5. For his school web page, Manuel created the logo shown at the right. What transformations could be used if the gray figure is the preimage and the black figure is the image? Are the two figures congruent? Explain.

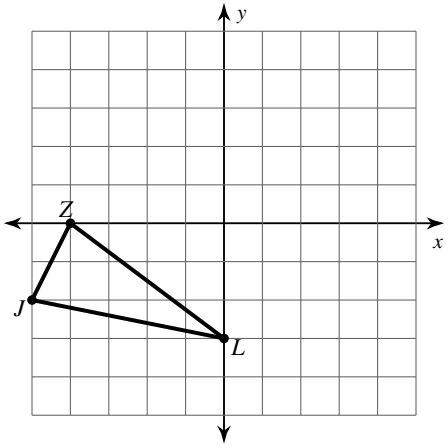


All Transformations

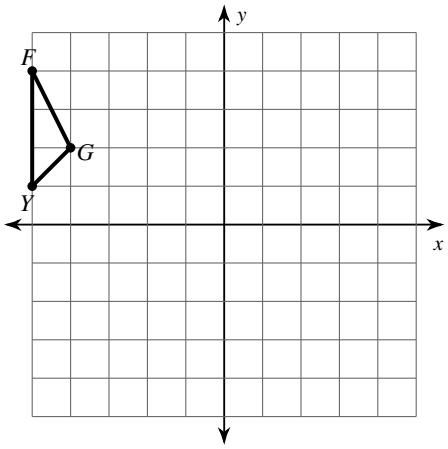
Date_____ Period____

Graph the image of the figure using the transformation given.

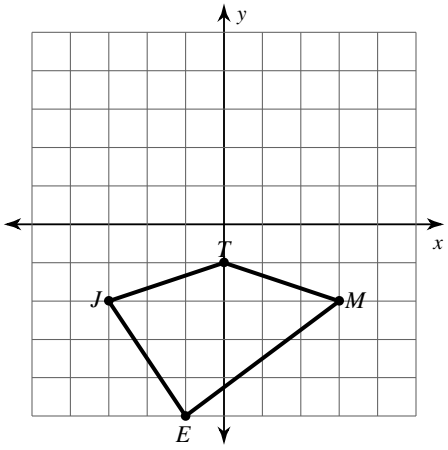
1) rotation 90° counterclockwise about the origin



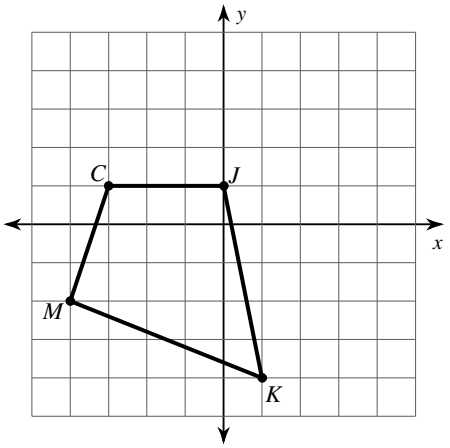
2) translation: 4 units right and 1 unit down



3) translation: 1 unit right and 1 unit up

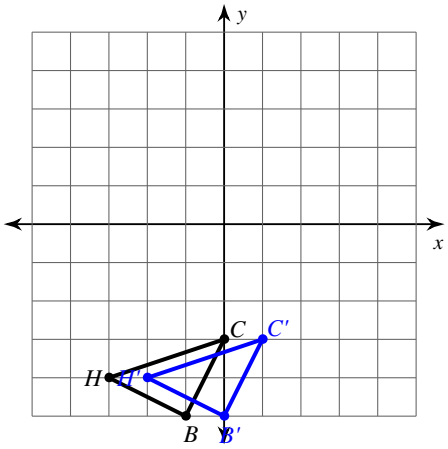


4) reflection across the x-axis

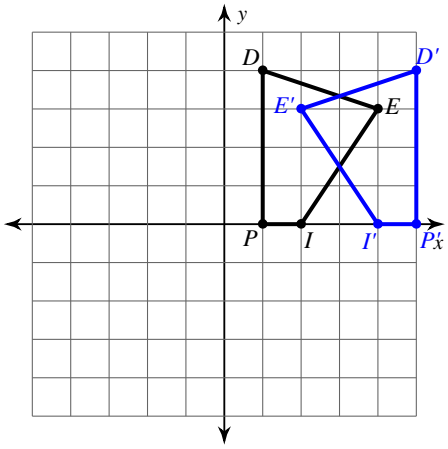


Write a rule to describe each transformation.

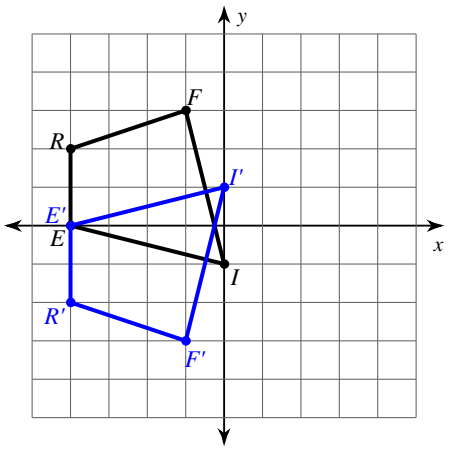
5)



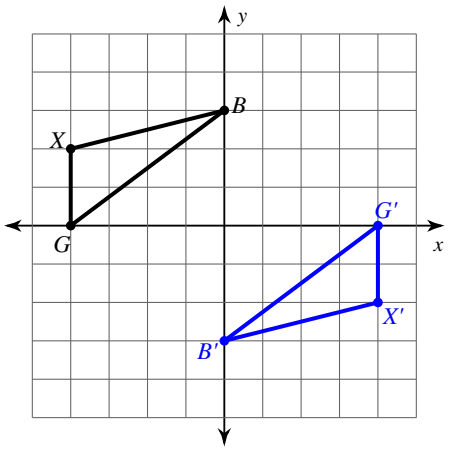
6)



7)

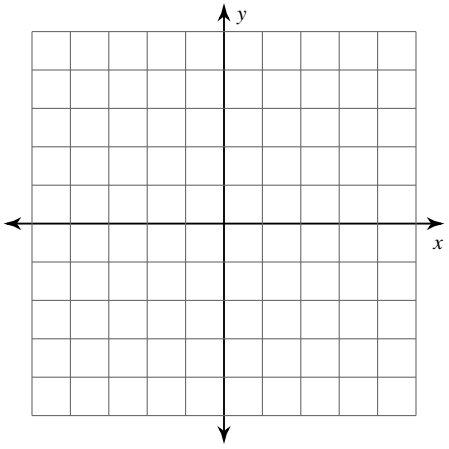


8)

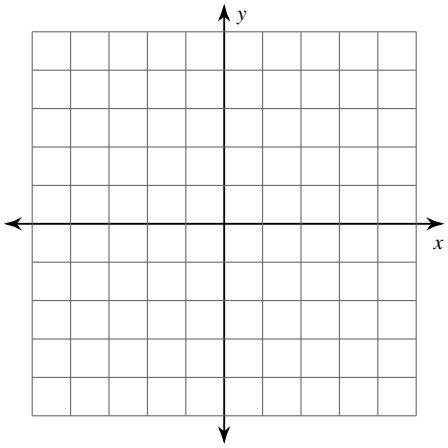


Graph the image of the figure using the transformation given.

9) rotation 90° clockwise about the origin
$B(-2, 0)$, $C(-4, 3)$, $Z(-3, 4)$, $X(-1, 4)$



10) reflection across $y = x$
$K(-5, -2)$, $A(-4, 1)$, $I(0, -1)$, $J(-2, -4)$



Find the coordinates of the vertices of each figure after the given transformation.

11) rotation 180° about the origin
$E(2, -2)$, $J(1, 2)$, $R(3, 3)$, $S(5, 2)$

12) reflection across $y = 2$
$J(1, 3)$, $U(0, 5)$, $R(1, 5)$, $C(3, 2)$

13) translation: 7 units right and 1 unit down
$J(-3, 1)$, $F(-2, 3)$, $N(-2, 0)$

14) translation: 6 units right and 3 units down
$S(-3, 3)$, $C(-1, 4)$, $W(-2, -1)$

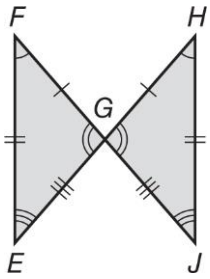
OBJECTIVE:
KEY NOTES:

Lesson 2 Skills Practice

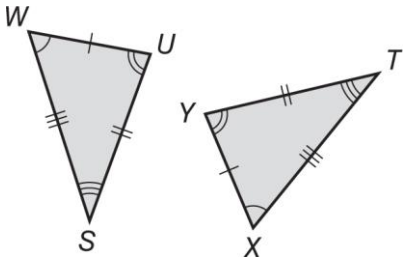
Congruence

Write congruence statements comparing the corresponding parts in each set of congruent figures.

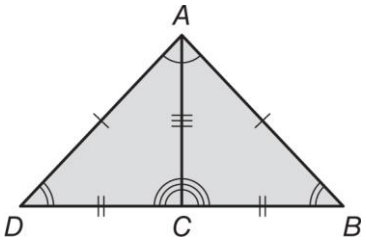
1.



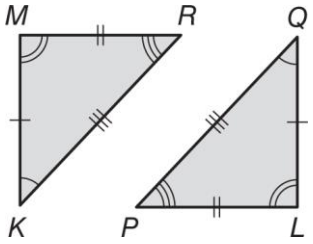
2.



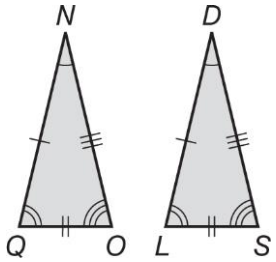
3.



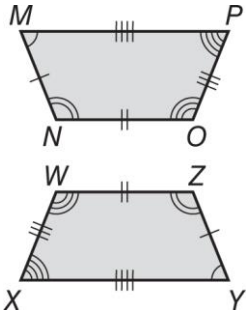
4.



5.



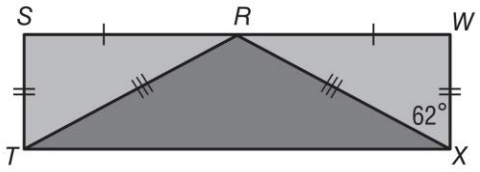
6.



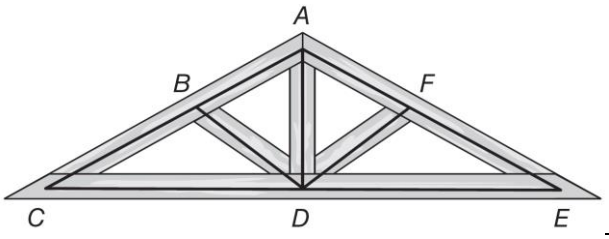
Lesson 2 Problem-Solving Practice

Congruence

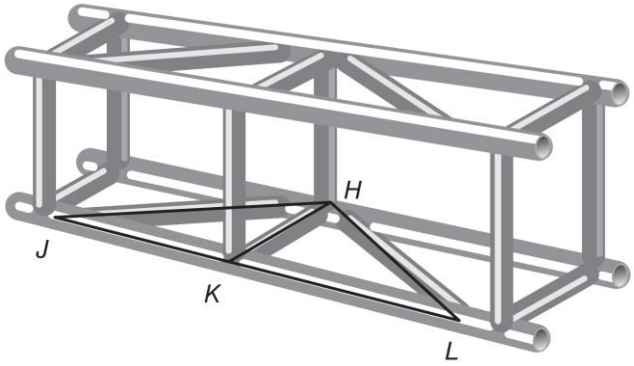
1. In the quilt design shown, $\Delta RST \cong \Delta RWX$. What is the measure of $\angle STR$?



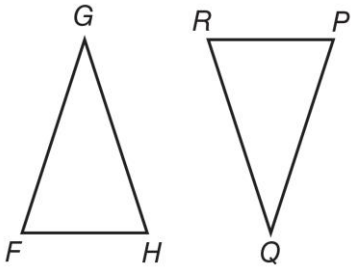
2. In the roof construction shown, $\Delta CBD \cong \Delta EFD$. If $CB = 11$ feet, what is EF?



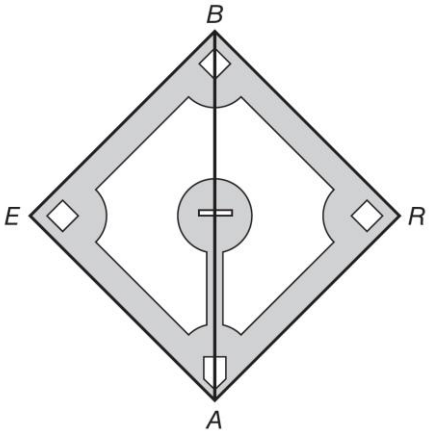
3. In the stage truss shown below, $\Delta HJK \cong \Delta HLK$. If $\angle LHK = 71°$, what is the measure of $\angle JHK$?



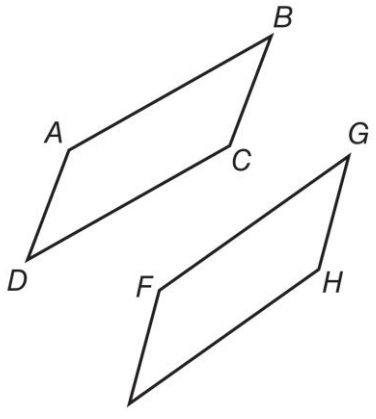
4. Triangle FGH is congruent to ΔPQR. Write congruence statements comparing the corresponding parts. Then determine which transformations map ΔFGH onto ΔPQR.



5. In the baseball diamond shown, $\Delta BEA \cong \Delta ARB$. If $BE = 90$ feet, what is AR?



6. Parallelograms $ABCD$ and $FGHI$ are congruent. If $AB = 64$ centimeters, what is FG?



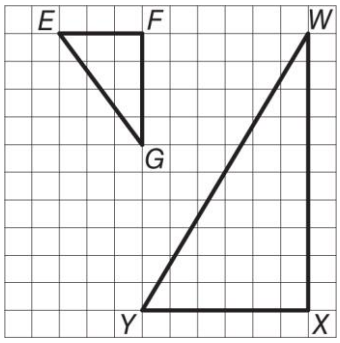
OBJECTIVE:
KEY NOTES:

Lesson 3 Skills Practice

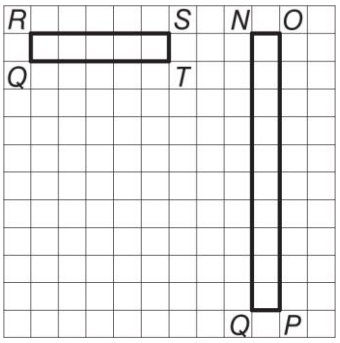
Similarity and Transformations

Determine if the two figures are similar by using transformations. Explain your reasoning.

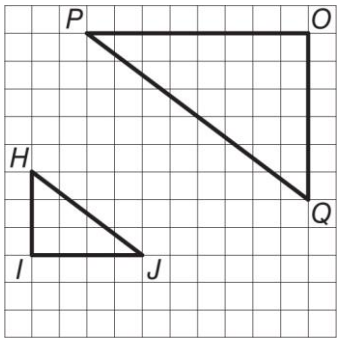
1.



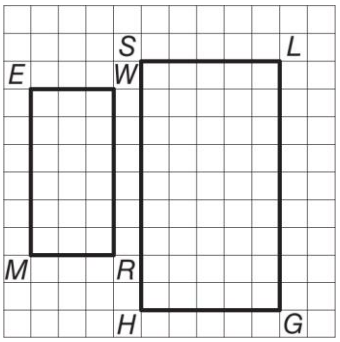
2.



3.

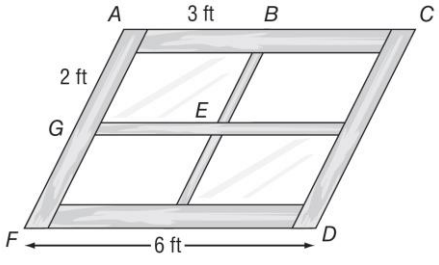


4.



Lesson 3 Problem-Solving Practice

Similarity and Transformations

1. Stephanie has a photo of her family that she is placing in a frame. The original photo is 5 inches by 7 inches. She enlarges the photo by a scale factor of 2 to place in her room. She then enlarges this photo by a scale factor of 1.5 to place above her fireplace. What are the dimensions of the photo above her fireplace? Are the enlarged photos similar to the original?	**2.** An architect is designing a decorative window. The window uses similar parallelograms. If parallelogram *ABEG* is similar to parallelogram *ACDF*, what is the length of *AF*? 
3. An iron-on measures 3 inches by 4 inches. It is enlarged by a scale factor of 2 for a t-shirt. The second iron-on is enlarged by a scale factor of 3 for a bag. What are the dimensions of the largest iron on? Are both of the enlarged iron-ons similar to the original?	**4.** Casey is reducing the size of her painting to make it into a postcard. The painting is 12 inches by 20 inches. She will reduce it by a scale factor of $\frac{1}{4}$. What are the dimensions of the postcard?
5. Ryan is using tiles in his bathroom. He chooses 1-inch by 2-inch tiles for the border and would like tiles that are similar to the border as the interior tiles. The interior tiles will be larger by a scale factor of 3.5. What are the dimensions of the interior tiles?	**6.** For an art show, an artist is projecting a piece of art 5 inches by 7 inches onto a white wall. It will be enlarged by a scale factor of 12. What are the dimensions of the art on the wall?

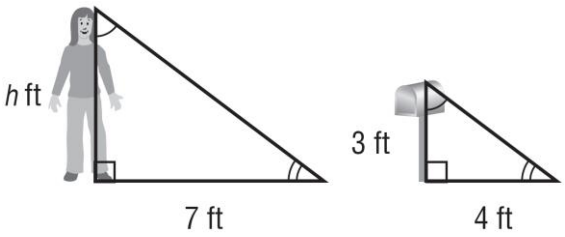
OBJECTIVE:
KEY NOTES:

Lesson 5 Skills Practice

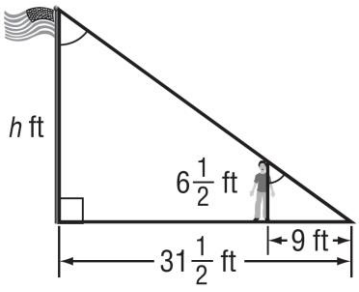
Similar Triangles and Indirect Measurement

In Exercises 1– 6, the triangles are similar. Write a proportion and solve the problem.

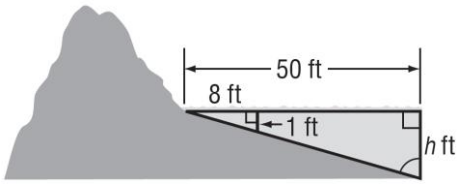
1. **HEIGHT** How tall is Becky?



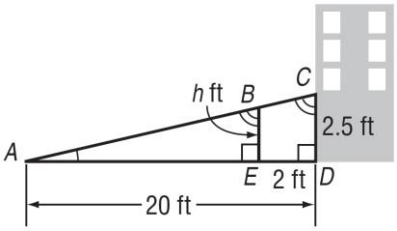
2. **FLAGS** How tall is the flagpole?



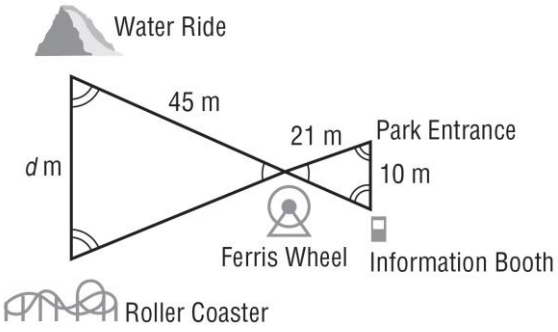
3. **BEACH** How deep is the water 50 feet from shore?



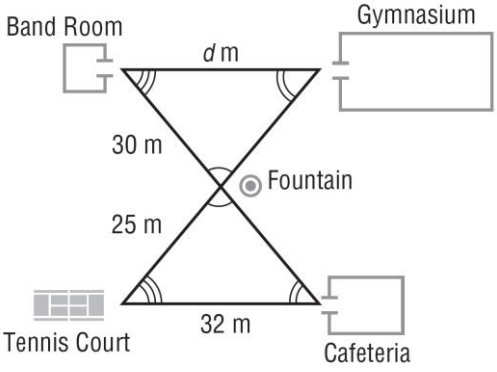
4. **ACCESSIBILITY** How high is the ramp when it is 2 feet from the building? (Hint: $\Delta ABE \sim \Delta ACD$)



5. **AMUSEMENT PARKS** How far is the water ride from the roller coaster? Round to the nearest tenth.

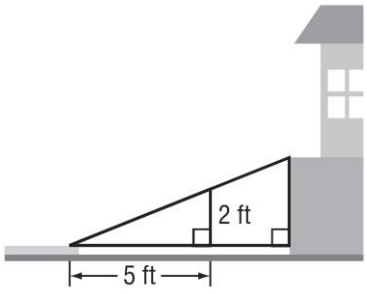


6. **CLASS CHANGES** How far is the entrance to the gymnasium from the band room?



Lesson 5 Problem-Solving Practice

Similar Triangles and Indirect Measurement

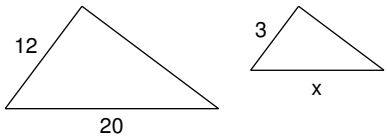
1. HEIGHT Eduardo is 6 feet tall and casts a 12-foot shadow. At the same time, Diane casts an 11-foot shadow. How tall is Diane?	**2. LIGHTING** If a 25-foot-tall house casts a 75-foot shadow at the same time that a streetlight casts a 60-foot shadow, how tall is the streetlight?
3. FLAGPOLE Lena is $5\frac{1}{2}$ feet tall and casts an 8-foot shadow. At the same time, a flagpole casts a 48-foot shadow. How tall is the flagpole?	**4. LANDMARKS** A woman who is 5 feet 5 inches tall is standing near the Space Needle in Seattle, Washington. She casts a 13-inch shadow at the same time that the Space Needle casts a 121-foot shadow. How tall is the Space Needle?
5. NATIONAL MONUMENTS A 42-foot flagpole near the Washington Monument casts a shadow that is 14 feet long. At the same time, the Washington Monument casts a shadow that is 185 feet long. How tall is the Washington Monument?	**6. ACCESSIBILITY** A ramp slopes upward from the sidewalk to the entrance of a building at a constant incline. If the ramp is 2 feet high when it is 5 feet from the sidewalk, how high is the ramp when it is 7 feet from the sidewalk? 

Similar Figures

Date_____ Period____

Each pair of figures is similar. Find the missing side.

1)



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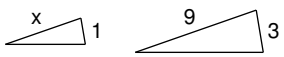

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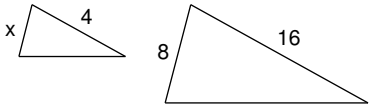

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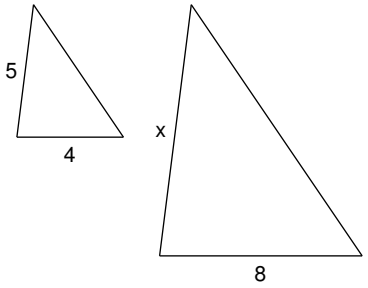

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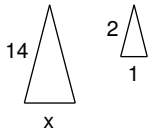

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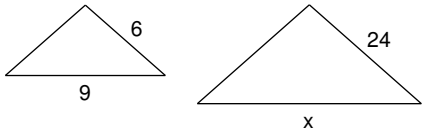

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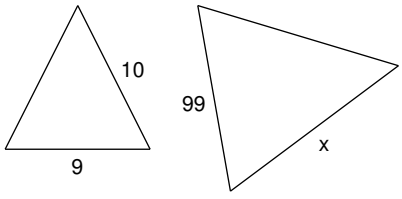

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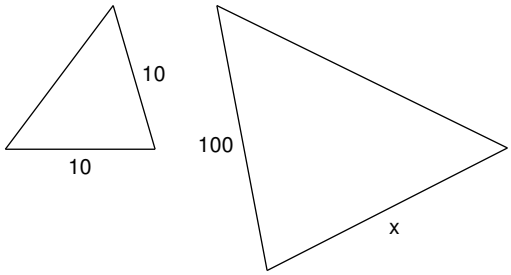

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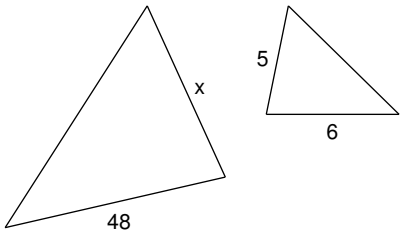

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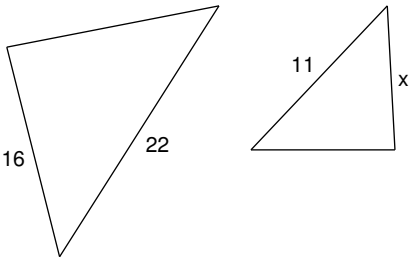

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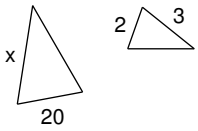

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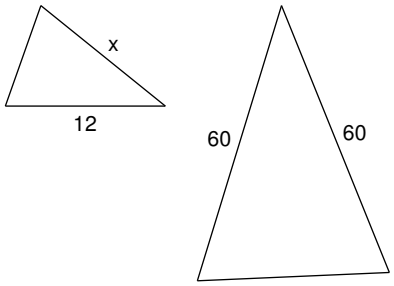

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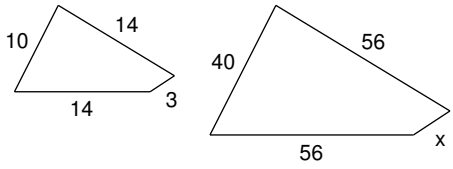

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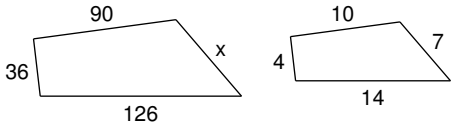

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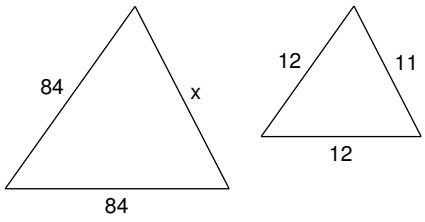

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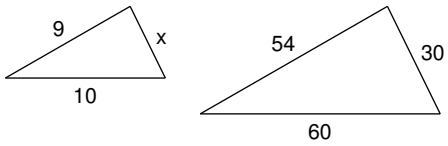


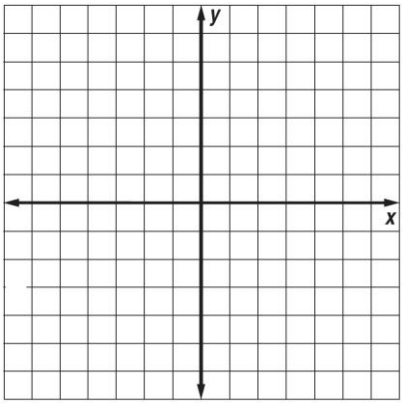
OBJECTIVE:
KEY NOTES:

Lesson 6 Skills Practice

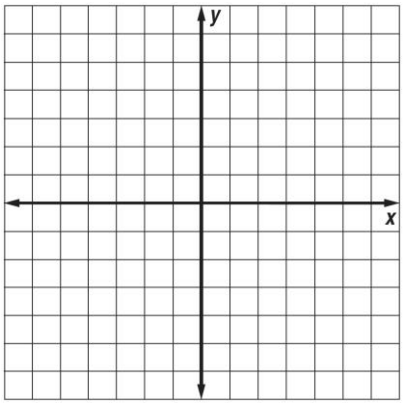
Slope and Similar Triangles

Graph each pair of similar triangles. Then write a proportion comparing the rise to the run for each of the similar slope triangles and find the numeric value.

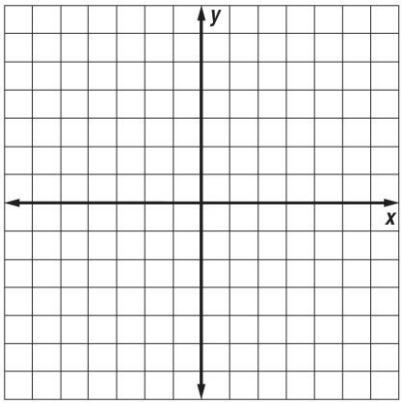
1. Δ*CDE* with vertices C(–6, –3), *D*(–3, –2), and *E*(–3, –3); Δ*MNO* with vertices *M*(0, –1), *N*(6, 1), and *O*(6, –1)



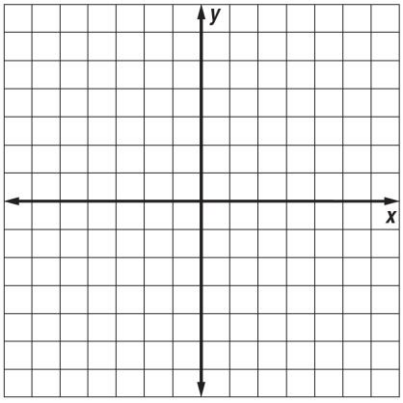
2. Δ*RST* with vertices *R*(–4, 5), *S*(–4, –4), and *T*(2, –4); Δ*UVW* with vertices *U*(–2, 2), *V*(–2, –1), and *W*(0, –1)



3. Δ*QRP* with vertices *Q*(–5, 1), *R*(–1, 3), and *P*(–1, 1); Δ*RKJ* with vertices *R*(–1, 3), *K*(5, 6), and *J*(5, 3).



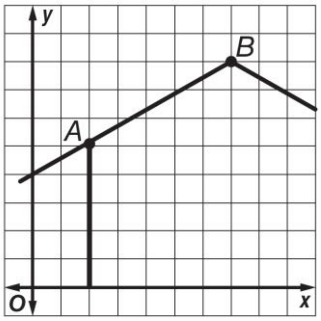
4. Δ*CAM* with vertices at *C*(–1, 6), *A*(–1, 3), and *M*(0, 3); Δ*CEN* with vertices at *C*(–1, 6), *E*(–1, –3), and *N*(2, –3)



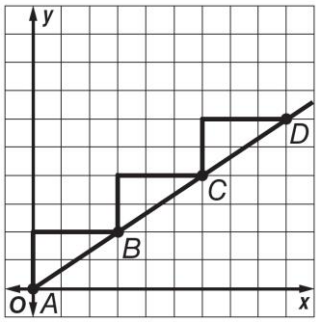
Lesson 6 Problem-Solving Practice

Slope and Similar Triangles

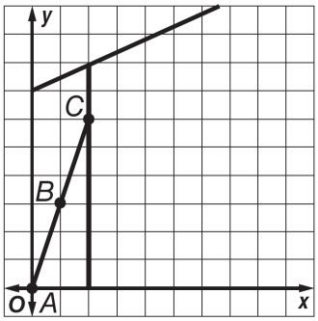
1. The slope of a roof line is also called the pitch. Find the pitch of the roof shown.



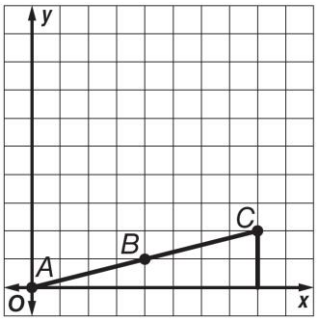
2. A carpenter is building a set of steps for a bunk bed. The plan for the steps is shown below. Using points A and B, find the slope of the line up the steps. Then verify that the slope is the same at a different location by choosing a different set of points.



3. A ladder is leaning up against the side of a house. Use two points to find the slope of the ladder. Then verify that the slope is the same at a different location by choosing a different set of points.



4. The graph shows the plans for a bean bag tossing game. Use two points to find the slope of the game. Then verify that the slope is the same at a different location by choosing a different set of points.



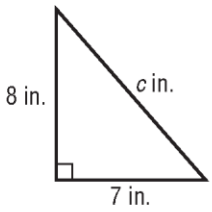
OBJECTIVE:
KEY NOTES:

Lesson 5 Skills Practice

The Pythagorean Theorem

Write an equation you could use to find the length of the missing side of each right triangle. Then find the missing length. Round to the nearest tenth if necessary.

1.



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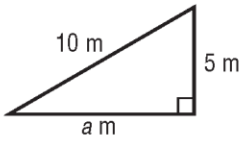

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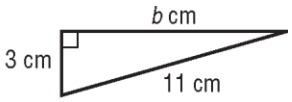
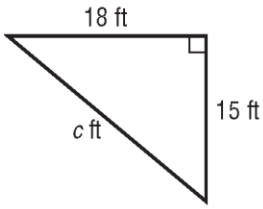


4.



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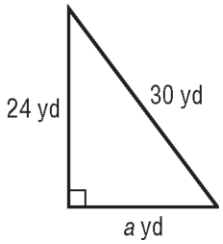
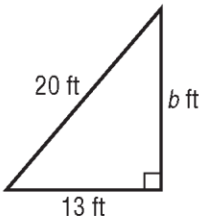


6.



7. $a = 1$ m, $b = 3$ m

8. $a = 2$ in., $c = 5$ in.

9. $b = 4$ ft, $c = 7$ ft

10. $a = 4$ km, $b = 9$ km

11. $a = 10$ yd, $c = 18$ yd

12. $b = 18$ ft, $c = 20$ ft

13. $a = 5$ yd, $b = 11$ yd

14. $a = 12$ cm, $c = 16$ cm

15. $b = 22$ m, $c = 25$ m

16. $a = 21$ ft, $b = 72$ ft

17. $a = 36$ yd, $c = 60$ yd

18. $b = 25$ mm, $c = 65$ mm

Determine whether each triangle with sides of given lengths is a right triangle. Justify your answer.

19. 10 yd, 15 yd, 20 yd

20. 21 ft, 28 ft, 35 ft

21. 7 cm, 14 cm, 16 cm

22. 40 m, 42 m, 58 m

23. 24 in., 32 in., 38 in.

24. 15 mm, 18 mm, 24 mm

Lesson 5 Problem-Solving Practice

The Pythagorean Theorem

1. ART What is the length of a diagonal of a rectangular picture whose sides are 12 inches by 17 inches? Round to the nearest tenth of an inch.	**2. GARDENING** Ross has a rectangular garden in his back yard. He measures one side of the garden as 22 feet and the diagonal as 33 feet. What is the length of the other side of his garden? Round to the nearest tenth of a foot.
3. TRAVEL Troy drove 8 miles due east and then 5 miles due north. How far is Troy from his starting point? Round the answer to the nearest tenth of a mile.	**4. GEOMETRY** What is the perimeter of a right triangle if the hypotenuse is 15 centimeters and one of the legs is 9 centimeters?
5. ART Anna is building a rectangular picture frame. If the sides of the frame are 20 inches by 30 inches, what should be the diagonal measure? Round to the nearest tenth of an inch.	**6. CONSTRUCTION** A 20-foot ladder leaning against a wall is used to reach a window that is 17 feet above the ground. How far from the wall is the bottom of the ladder? Round to the nearest tenth of a foot.
7. CONSTRUCTION A door frame is 80 inches tall and 36 inches wide. What is the length of a diagonal of the door frame? Round to the nearest tenth of an inch.	**8. TRAVEL** Tina measures the distances between three cities on a map. The distances between the three cities are 45 miles, 56 miles, and 72 miles. Do the positions of the three cities form a right triangle?

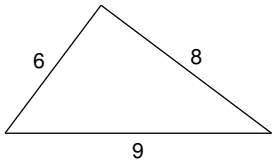
 Name_____

The Pythagorean Theorem

Date_____ Period____

Do the following lengths form a right triangle?

1)



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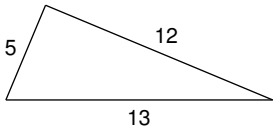

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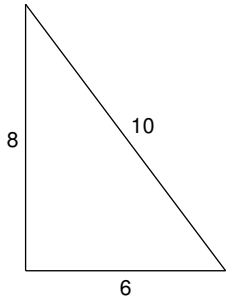

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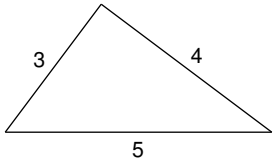
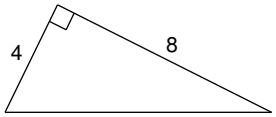


5) *a = 6.4, b = 12, c = 12.2*

6) *a = 2.1, b = 7.2, c = 7.5*

Find each missing length to the nearest tenth.

7)



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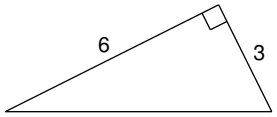

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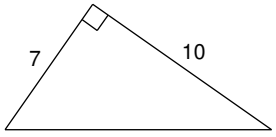

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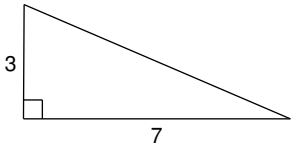

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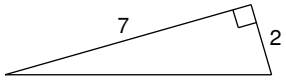

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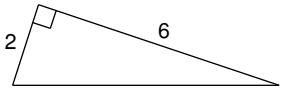

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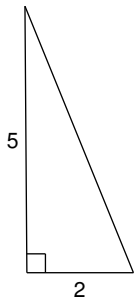

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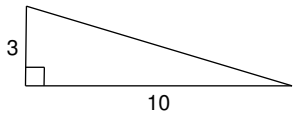

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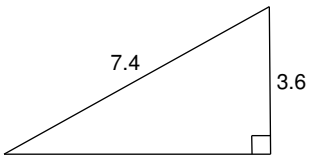
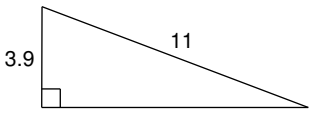


16)



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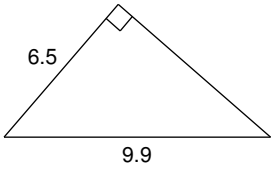

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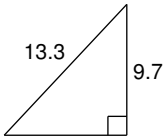

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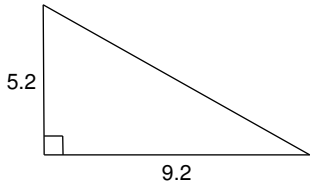

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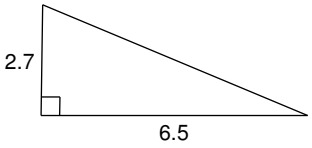

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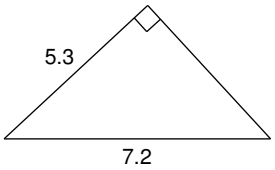

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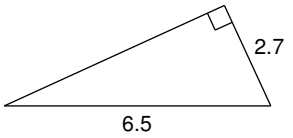
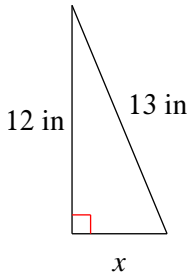


The Pythagorean Theorem and Its Converse

Date_____ Period____

Find the missing side of each triangle. Round your answers to the nearest tenth if necessary.

1)



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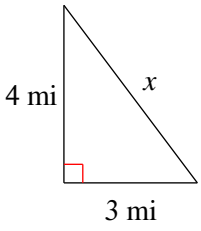

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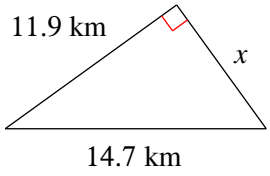

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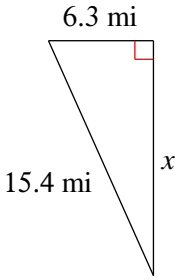
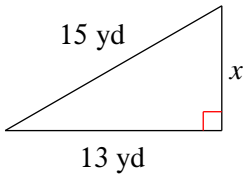


Find the missing side of each triangle. Leave your answers in simplest radical form.

5)



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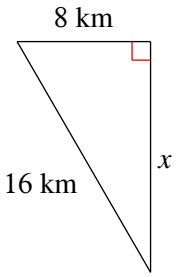


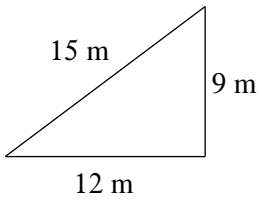
Find the missing side of each right triangle. Side *c* is the hypotenuse. Sides *a* and *b* are the legs. Leave your answers in simplest radical form.

7) $a = 11$ m, $c = 15$ m

8) $b = \sqrt{6}$ yd, $c = 4$ yd

State if each triangle is a right triangle.

9)



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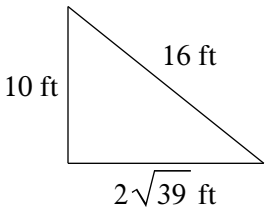

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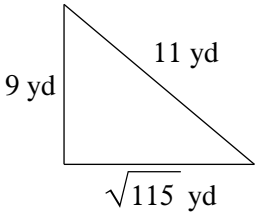

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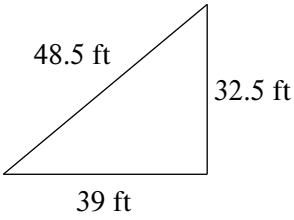


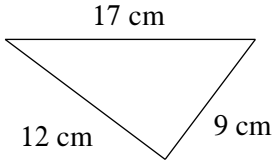
State if the three sides lengths form a right triangle.

13) 10 cm, 49.5 cm, 50.5 cm

14) 9 in, 12 in, 15 in

State if each triangle is acute, obtuse, or right.

15)



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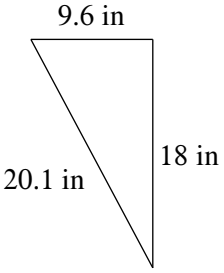


State if the three side lengths form an acute, obtuse, or right triangle.

17) 6 mi, $2\sqrt{55}$ mi, 17 mi

18) 4.8 km, 28.6 km, 29 km

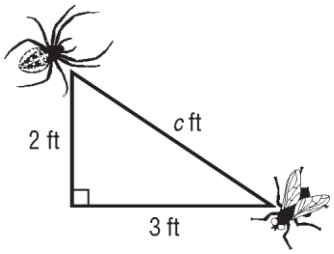
OBJECTIVE:
KEY NOTES:

Lesson 6 Skills Practice

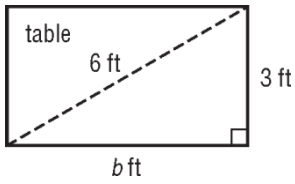
Use the Pythagorean Theorem

Write an equation that can be used to answer the question. Then solve. Round to the nearest tenth if necessary.

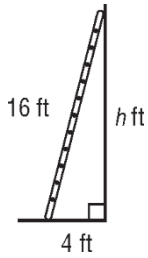
1. How far apart are the spider and the fly?



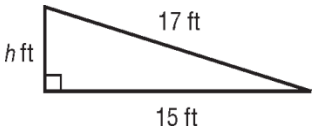
2. How long is the tabletop?



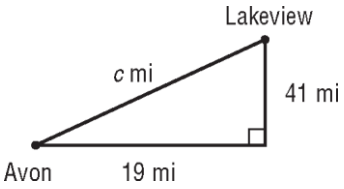
3. How high will the ladder reach?



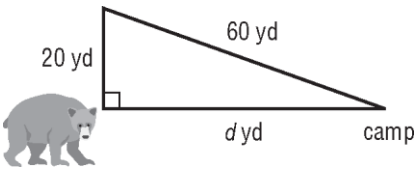
4. How high is the ramp?



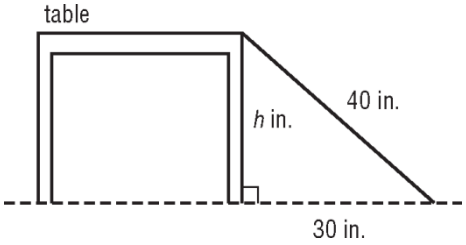
5. How far apart are the two cities?



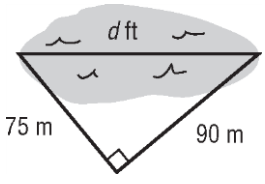
6. How far is the bear from camp?



7. How tall is the table?



8. How far is it across the pond



Lesson 6 Problem-Solving Practice

Use the Pythagorean Theorem

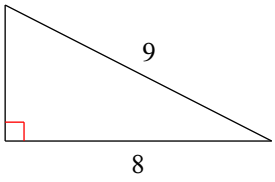
1. RECREATION A pool table is 8 feet long and 4 feet wide. How far is it from one corner pocket to the diagonally opposite corner pocket? Round to the nearest tenth.	**2. TRIATHLON** The course for a local triathlon has the shape of a right triangle. The legs of the triangle consist of a 4-mile swim and a 1l mile run. The hypotenuse of the triangle is the biking portion of the event. How far is the biking part of the triathlon? Round to the nearest tenth if necessary.
3. LADDER A ladder 17 feet long is leaning against a wall. The bottom of the ladder is 8 feet from the base of the wall. How far up the wall is the top of the ladder? Round to the nearest tenth if necessary.	**4. TRAVEL** Tara drives due north for 22 miles then east for 11 miles. How far is Tara from her starting point? Round to the nearest tenth if necessary.
5. FLAGPOLE A wire 3l feet long is stretched from the top of a flagpole to the ground at a point 15 feet from the base of the pole. How high is the flagpole? Round to the nearest tenth if necessary.	**6. ENTERTAINMENT** Isaac's television is 25 inches wide and 18 inches high. What is the diagonal size of Isaac's television? Round to the nearest tenth if necessary.

Multi-Step Pythagorean Theorem Problems

Date_____ Period____

Find the area of each triangle. Round intermediate values to the nearest tenth. Use the rounded values to calculate the next value. Round your final answer to the nearest tenth.

1)



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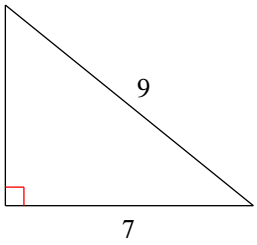

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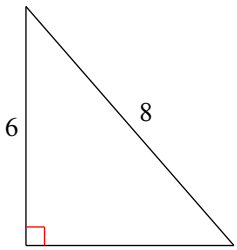

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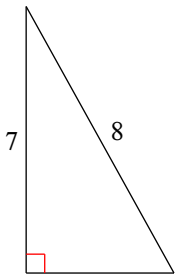

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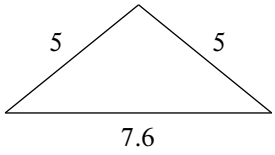

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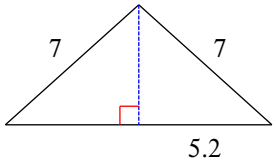

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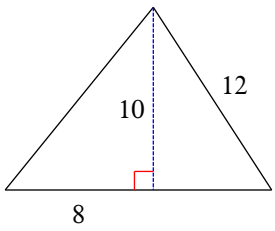

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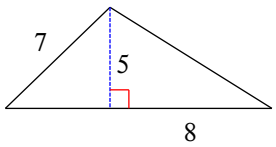

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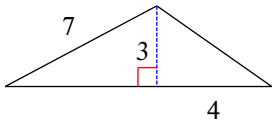

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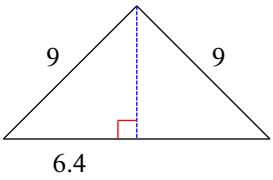

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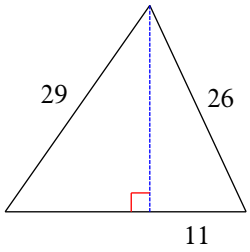

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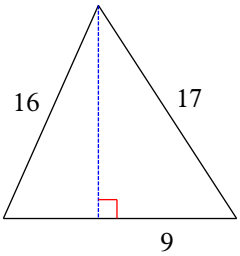

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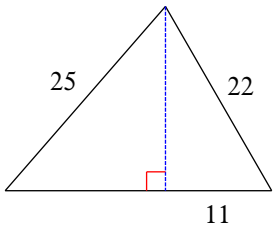

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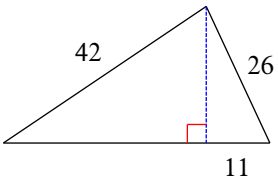

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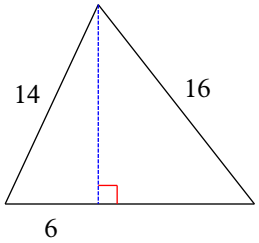

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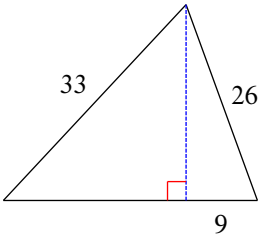


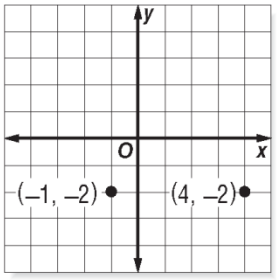
OBJECTIVE:
KEY NOTES:

Lesson 7 Skills Practice

Distance on the Coordinate Plane

Find the distance between each pair of points whose coordinates are given. Round to the nearest tenth if necessary.

1.



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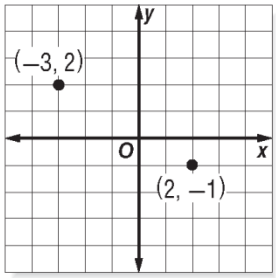

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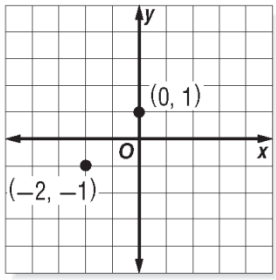

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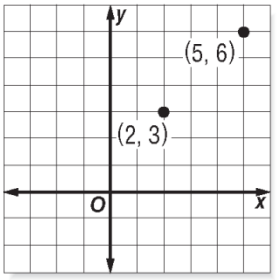
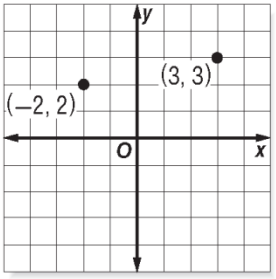


5.



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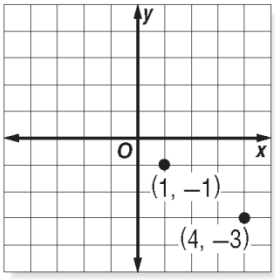
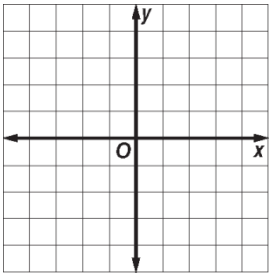
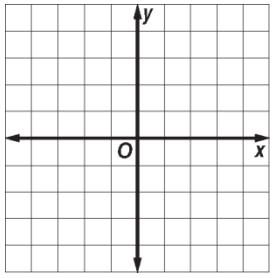


Graph each pair of ordered pairs. Then find the distance between the points. Round to the nearest tenth if necessary.

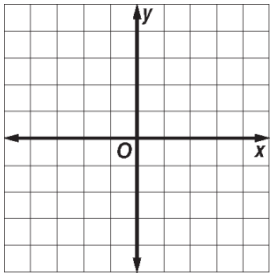
7. (–3, 0), (3, –2)



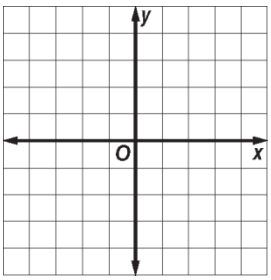
8. (–4, –3), (2, 1)



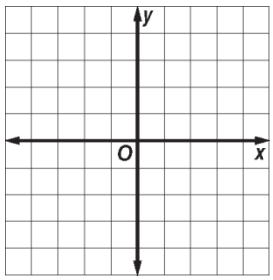
9. (0, 2), (5, –2)

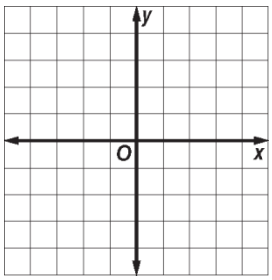


10. (–2, 1), (–1, 2)



11. (0, 0), (–4, –3)





Lesson 7 Problem-Solving Practice

Distance on the Coordinate Plane

1. ARCHAEOLOGY An archaeologist at a dig sets up a coordinate system using string. Two similar artifacts are found—one at position (1, 4) and the other at (5, 2). How far apart were the two artifacts? Round to the nearest tenth of a unit if necessary.	**2. GARDENING** Vega set up a coordinate system with units of feet to locate the position of the vegetables she planted in her garden. She has a tomato plant at (1, 3) and a pepper plant at (5, 6). How far apart are the two plants? Round to the nearest tenth if necessary.
3. CHESS April is an avid chess player. She sets up a coordinate system on her chess board so she can record the position of the pieces during a game. In a recent game, April noted that her king was at (4, 2) at the same time that her opponent's king was at (7, 8). How far apart were the two kings? Round to the nearest tenth of a unit if necessary.	**4. MAPPING** Cory makes a map of his favorite park, using a coordinate system with units of yards. The old oak tree is at position (4, 8) and the granite boulder is at position (–3, 7). How far apart are the old oak tree and the granite boulder? Round to the nearest tenth if necessary
5. TREASURE HUNTING Taro uses a coordinate system with units of feet to keep track of the locations of any objects he finds with his metal detector. One lucky day he found a ring at (5, 7) and an old coin at (10, 19). How far apart were the ring and coin before Taro found them? Round to the nearest tenth if necessary.	**6. GEOMETRY** The coordinates of points A and B are (–7, 5) and (4, –3), respectively. What is the distance between the points, rounded to the nearest tenth?
7. GEOMETRY The coordinates of points A, B, and C are (5, 4), (–2, 1), and (4, –4), respectively. Which point, B or C, is closer to point A?	**8. THEME PARK** Bryce is looking at a map of a theme park. The map is laid out in a coordinate system. Bryce is at (2, 3). The roller coaster is at (7, 8), and the water ride is at (9, 1). Is Bryce closer to the roller coaster or the water ride?

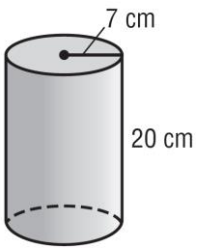
OBJECTIVE:
KEY NOTES:

Lesson 1 Skills Practice

Volume of Cylinders

Find the volume of each cylinder. Round to the nearest tenth.

1.



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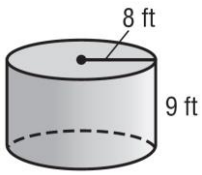

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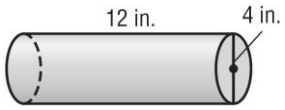

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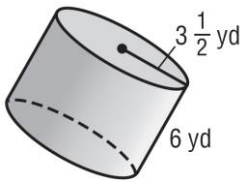

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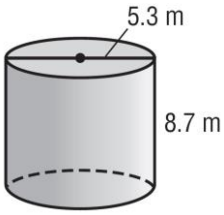
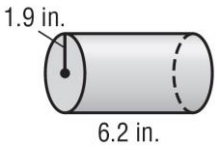


6.



7. radius = 8.8 cm
height = 4.7 cm

8. radius = 4 ft
height = $2\frac{1}{2}$ ft

9. diameter = 10 mm
height = 4 mm

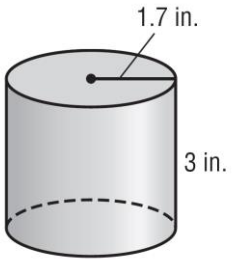
10. diameter = 7.1 in.
height = 1 in.

11. diameter = 12 ft
height = 18 ft

12. diameter = $3\frac{1}{2}$in.
height = 5 in.

Lesson 1 Problem-Solving Practice

Volume of Cylinders

1. WATER STORAGE A cylindrical water tank has a diameter of 5.3 meters and a height of 9 meters. What is the maximum volume that the water tank can hold? Round to the nearest tenth.	**2. PACKAGING** A can of corn has a diameter of 6.6 centimeters and a height of 9.9 centimeters. How much corn can the can hold? Round to the nearest tenth.
3. CONTAINERS Felisa wants to determine the maximum capacity of a cylindrical bucket that has a radius of 6 inches and a height of 12 inches. What is the capacity of Felisa's bucket? Round to the nearest tenth.	**4. GLASS** Antoine is designing a new, cylindrical drinking glass. If the glass has a diameter of 8 centimeters and a height of 12.8 centimeters, what is its volume? Round to the nearest tenth.
5. PAINT A can of paint is 15 centimeters high and has a diameter of 13.6 cm. What is the volume of the can? Round to the nearest tenth.	**6. SPICES** A spice manufacturer uses a cylindrical dispenser like the one shown. Find the volume of the dispenser to the nearest tenth. 

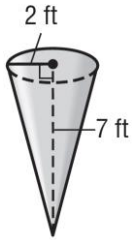
OBJECTIVE:
KEY NOTES:

Lesson 2 Skills Practice

Volume of Cones

Find the volume of each cone. Round to the nearest tenth.

1.



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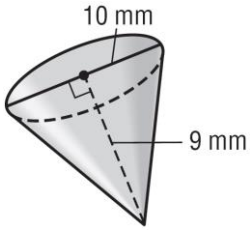

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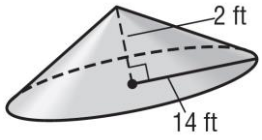

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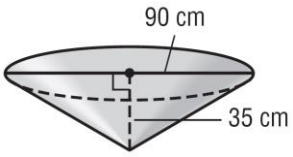


5. diameter: 10 centimeters; height: 14 centimeters

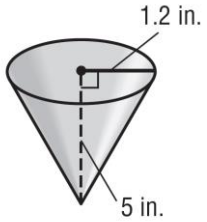
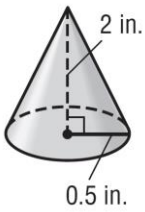
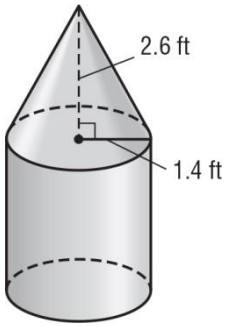
6. radius: 8.7 feet; height: 16 feet

7. height: 34 centimeters; diameter: 6 centimeters

8. **FUNNEL** A funnel is in the shape of a cone. The radius is 2 inches and the height is 4.6 inches. Find the volume of the funnel. Round to the nearest tenth.

Lesson 2 Problem-Solving Practice

Volume of Cones

1. DESSERT Find the volume of the ice cream cone shown below. Round to the nearest tenth.  	**2. SALT** Lecretia uses a small funnel as shown below to fill her salt shaker. Find the volume of the funnel. Round to the nearest tenth. 
3. ENTRYWAY The top of the stone posts at the entry to an estate are in the shape of a cone as shown below. Find the volume of stone needed to make the top of the post. Round to the nearest tenth.  	**4. PAPERWEIGHT** Marta bought a paperweight in the shape of a cone. The radius was 10 centimeters and the height 9 centimeters. Find the volume. Round to the nearest tenth.
5. LAMPSHADE A lampshade is in the shape of a cone. The diameter is 5 inches and the height 6.5 inches. Find the volume. Round to the nearest tenth.	**6. CANDY** A piece of candy is in the shape of a cone. The height of the candy is 2 centimeters and the diameter is 1 centimeter. Find the volume. Round to the nearest tenth.

OBJECTIVE:
KEY NOTES:

Lesson 3 Skills Practice

Volume of Spheres

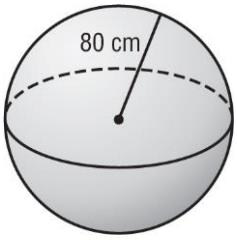
Find the volume of each sphere. Round to the nearest tenth.

1.

2.

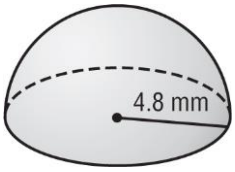
3.

4.



Find the volume of each hemisphere. Round to the nearest tenth.

5.



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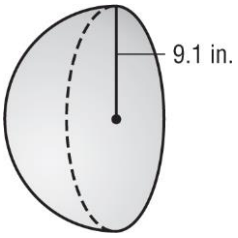

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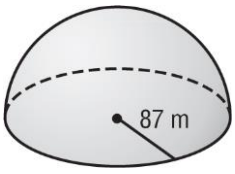

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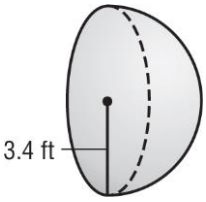


Lesson 3 Problem-Solving Practice

Volume of Spheres

1. DESSERT A scoop of ice cream is in the shape of a sphere. The diameter of the scoop of ice cream is 2.5 inches. Find the volume of the ice cream. Round to the nearest tenth.	**2. TOYS** A playground ball has a radius of 7.5 inches. Find the volume of the ball. Round to the nearest tenth.
3. GLOBE A globe has a diameter of 14 inches. Find the volume of the globe. Round to the nearest tenth.	**4. JEWELRY** Jackie is using spherical beads to create a border on a picture frame. Each bead has a diameter of 1.5 millimeters. Find the volume of each bead. Round to the nearest tenth.
5. DECORATION A glass ball is used to decorate a garden. The radius of the ball is 25 centimeters. Find the volume. Round to the nearest tenth. 	**6. BALLOONS** Mrs. McCullough is purchasing balloons for a party. Each spherical balloon is inflated with helium. How much helium is in the balloon if the balloon has a radius of 9 centimeters? Round to the nearest tenth.

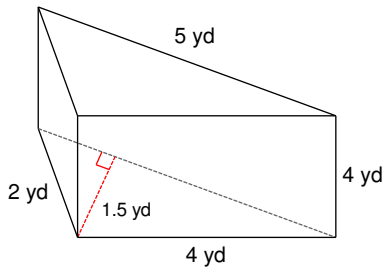
 Name_____

Volumes of Solids

Date_____ Period____

Find the volume of each figure. Round to the nearest tenth.

1)



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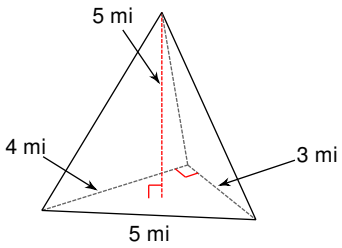

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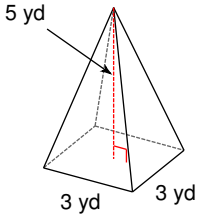

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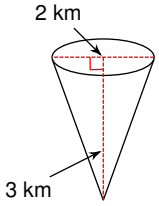

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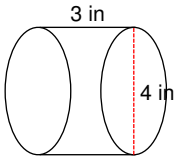

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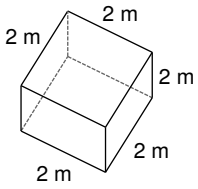

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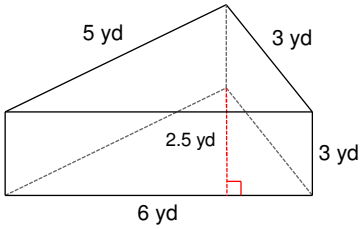

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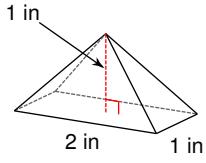

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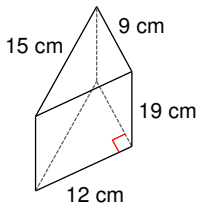

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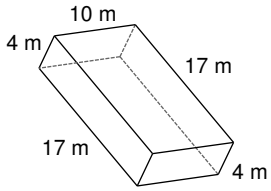

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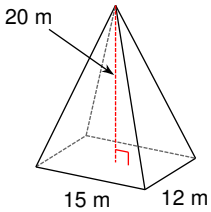

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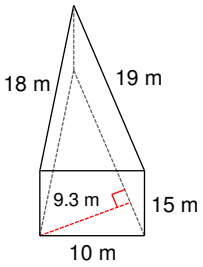

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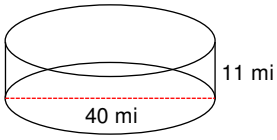

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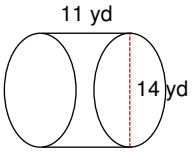

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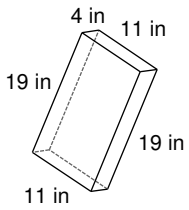

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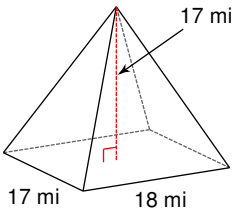

17) A cylinder with a radius of 3 cm and a height of 7 cm.

18) A cone with diameter 20 cm and a height of 20 cm.

19) A cone with diameter 14 yd and a height of 14 yd.

20) A rectangular prism measuring 10 m and 7 m along the base and 12 m tall.