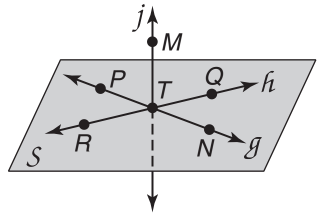
NAME ______________________________ DATE ____________ PERIOD _____

1-1 Practice

Points, Lines, and Planes

Refer to the figure.



1. Name a line that contains points T and P.

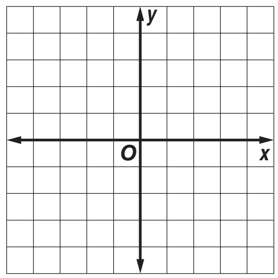
2. Name a line that intersects the plane containing points Q, N, and P.

3. Name the plane that contains $\overleftrightarrow{TN}$ and $\overleftrightarrow{QR}$.

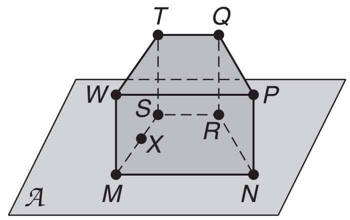
Draw and label a figure for each relationship.

4. $\overleftrightarrow{AK}$ and $\overleftrightarrow{CG}$ intersect at point M in plane $\mathcal{T}$.

5. A line contains $L(-4, -4)$ and $M(2, 3)$. Line q is in the same coordinate plane but does not intersect $\overleftrightarrow{LM}$. Line q contains point N.



Refer to the figure.



6. How many planes are shown in the figure?

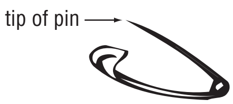
7. Name three collinear points.

8. Are points N, R, S, and W coplanar? Explain.

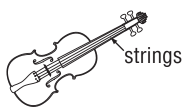
VISUALIZATION Name the geometric term(s) modeled by each object.

9.

10.



11.



12. a car antenna

13. a library card

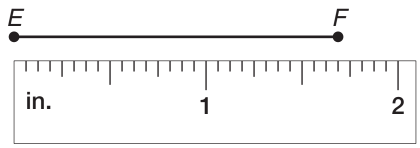
Lesson 1-1

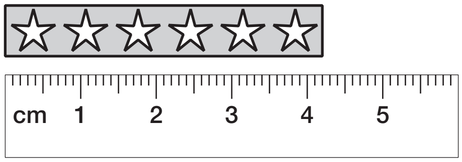
NAME ____ DATE ____________ PERIOD _____

1-2 Practice

Linear Measure and Precision

Find the length of each line segment or object.

1. 

2. 

Find the precision for each measurement.

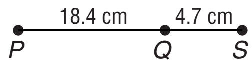
3. 120 meters

4. $7\frac{1}{4}$ inches

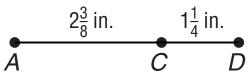
5. 30.0 millimeters

Find the measurement of each segment.

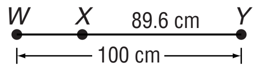
6. $\overline{PS}$



7. $\overline{AD}$



8. $\overline{WX}$



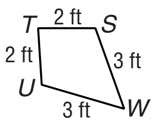
Find the value of the variable and *KL* if *K* is between *J* and *L*.

9. $JK = 6r$, $KL = 3r$, and $JL = 27$

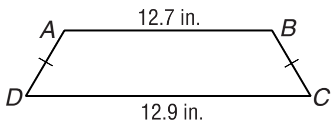
10. $JK = 2s$, $KL = s + 2$, and $JL = 5s - 10$

Use the figures to determine whether each pair of segments is congruent.

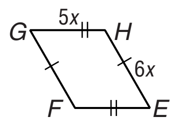
11. $\overline{TU}$, $\overline{SW}$



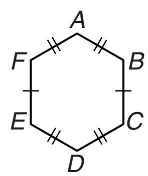
12. $\overline{AD}$, $\overline{BC}$



13. $\overline{GF}$, $\overline{FE}$



14. CARPENTRY Jorge used the figure at the right to make a pattern for a mosaic he plans to inlay on a tabletop. Name all of the congruent segments in the figure.

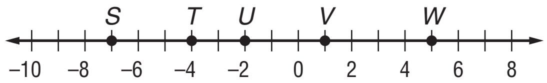


NAME ____ DATE ____________ PERIOD _____

1-3 Practice

Distance and Midpoints

Use the number line to find each measure.

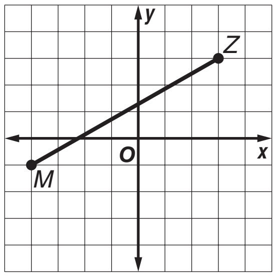


1. *VW* **2.** *TV*

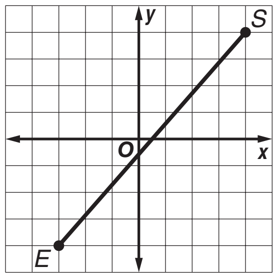
3. *ST* **4.** *SV*

Use the Pythagorean Theorem to find the distance between each pair of points.

5.



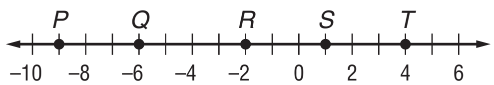
6.



Use the Distance Formula to find the distance between each pair of points.

7. $L(-7, 0)$, $Y(5, 9)$ **8.** $U(1, 3)$, $B(4, 6)$

Use the number line to find the coordinate of the midpoint of each segment.



9. $\overline{RT}$ **10.** $\overline{QR}$

11. $\overline{ST}$ **12.** $\overline{PR}$

Find the coordinates of the midpoint of a segment having the given endpoints.

13. $K(-9, 3)$, $H(5, 7)$ **14.** $W(-12, -7)$, $T(-8, -4)$

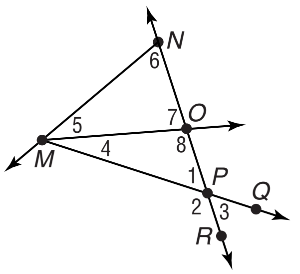
Find the coordinates of the missing endpoint given that E is the midpoint of $\overline{DF}$.

15. $F(5, 8)$, $E(4, 3)$ **16.** $F(2, 9)$, $E(-1, 6)$ **17.** $D(-3, -8)$, $E(1, -2)$

18. PERIMETER The coordinates of the vertices of a quadrilateral are $R(-1, 3)$, $S(3, 3)$, $T(5, -1)$, and $U(-2, -1)$. Find the perimeter of the quadrilateral. Round to the nearest tenth.

1-4 Practice
Angle Measure

For Exercises 1–10, use the figure at the right.



Name the vertex of each angle.

1. $\angle 5$

2. $\angle 3$

3. $\angle 8$

4. $\angle NMP$

Name the sides of each angle.

5. $\angle 6$

6. $\angle 2$

7. $\angle MOP$

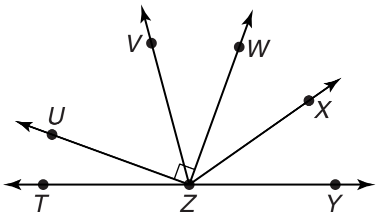
8. $\angle OMN$

Write another name for each angle.

9. $\angle QPR$

10. $\angle 1$

Measure each angle and classify it as *right*, *acute*, or *obtuse*.



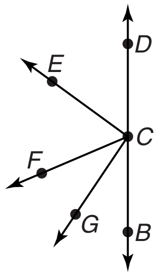
11. $\angle UZW$

12. $\angle YZW$

13. $\angle TZW$

14. $\angle UZT$

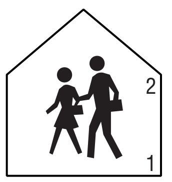
ALGEBRA In the figure, $\overrightarrow{CB}$ and $\overrightarrow{CD}$ are opposite rays, $\overrightarrow{CE}$ bisects $\angle DCF$, and $\overrightarrow{CG}$ bisects $\angle FCB$.



15. If $m\angle DCE = 4x + 15$ and $m\angle ECF = 6x - 5$, find $m\angle DCE$.

16. If $m\angle FCG = 9x + 3$ and $m\angle GCB = 13x - 9$, find $m\angle GCB$.

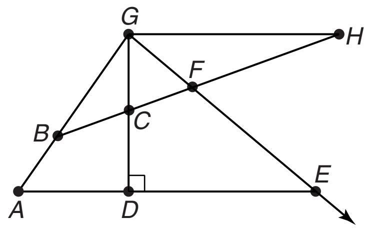
17. TRAFFIC SIGNS The diagram shows a sign used to warn drivers of a school zone or crossing. Measure and classify each numbered angle.



1-5 Practice

Angle Relationships

For Exercises 1–4, use the figure at the right and a protractor.



1. Name two obtuse vertical angles.

2. Name a linear pair whose vertex is B.

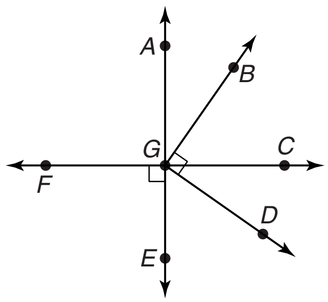
3. Name an angle not adjacent to but complementary to $\angle FGC$.

4. Name an angle adjacent and supplementary to $\angle DCB$.

5. Two angles are complementary. The measure of one angle is 21 more than twice the measure of the other angle. Find the measures of the angles.

6. If a supplement of an angle has a measure 78 less than the measure of the angle, what are the measures of the angles?

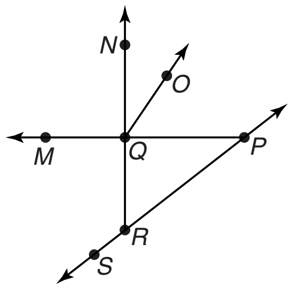
ALGEBRA For Exercises 7–8, use the figure at the right.



7. If $m\angle FGE = 5x + 10$, find x so that $\overleftrightarrow{FC} \perp \overleftrightarrow{AE}$.

8. If $m\angle BGC = 16x - 4$ and $m\angle CGD = 2x + 13$, find x so that $\angle BGD$ is a right angle.

Determine whether each statement can be assumed from the figure. Explain.

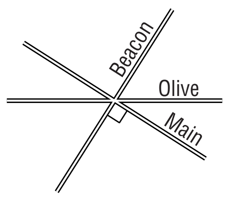


9. $\angle NQO$ and $\angle OQP$ are complementary.

10. $\angle SRQ$ and $\angle QRP$ is a linear pair.

11. $\angle MQN$ and $\angle MQR$ are vertical angles.

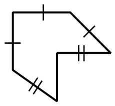
12. STREET MAPS Darren sketched a map of the cross streets nearest to his home for his friend Miguel. Describe two different angle relationships between the streets.

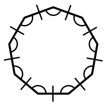


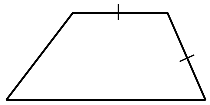
1-6 Practice

Two-Dimensional Figures

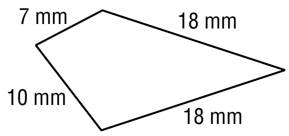
Name each polygon by its number of sides and then classify it as *convex* or *concave* and *regular* or *irregular*.

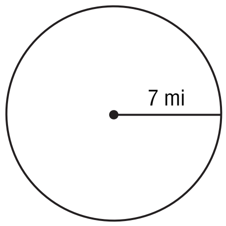
1. 

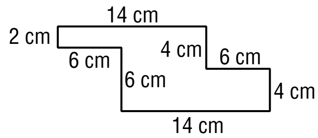
2. 

3. 

Find the perimeter or circumference of each figure.

4. 

5. 

6. 

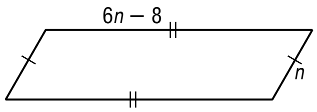
COORDINATE GEOMETRY Find the area of each polygon.

7. rectangle $OPQR$ with vertices $O(-3, 2)$, $P(1, 2)$, $Q(1, -4)$, and $R(-3, -4)$

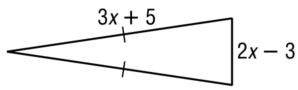
8. triangle STU with vertices $S(0, 0)$, $T(3, -2)$, and $U(8, 0)$

ALGEBRA Find the length of each side of the polygon for the given perimeter.

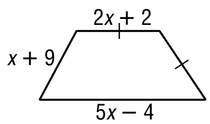
9. $P = 26$ inches



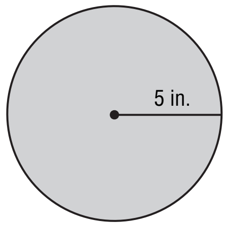
10. $P = 39$ centimeters



11. $P = 89$ feet



SEWING For Exercises 12–13, use the following information.
Jasmine plans to sew fringe around the circular pillow shown in the diagram.



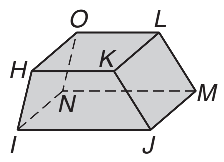
12. How many inches of fringe does she need to purchase?

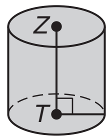
13. If Jasmine doubles the radius of the pillow, what is the new area of the top of the pillow?

1-7 Practice

Three-Dimensional Figures

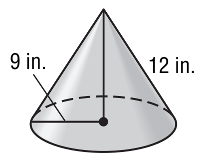
Identify each solid. Name the bases, faces, edges, and vertices.

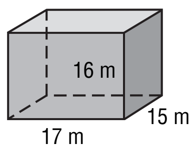
1. 

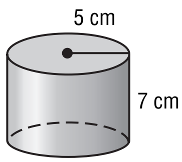
2. 

3. MINERALS Pyrite, also known as fool's gold, can form crystals that are perfect cubes. Suppose a gemologist wants to cut a cube of pyrite to get a square and a rectangular face. What cuts should be made to get each of the shapes? Illustrate your answers.

Find the surface area and volume of each solid.

4. 

5. 

6. 

7. COOKING A cylindrical can of soup has a height of 4 inches and a radius of 2 inches. What is the volume of the can? Round to the nearest tenth.

8. BUSINESS A company needs boxes to hold stacks 8.5 inch by 11 inch papers. If they would like the volume of the box to be 500 cubic inches, then what should the height of the box be? Round to the nearest tenth.

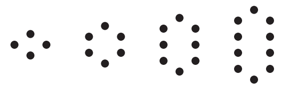
NAME _______________ DATE _______ PERIOD _____

2-1 Practice

Inductive Reasoning and Conjecture

Make a conjecture about the next item in each sequence.

1.



2. $5, -10, 15, -20$

3. $-2, 1, -\frac{1}{2}, \frac{1}{4}, -\frac{1}{8}$

4. 12, 6, 3, 1.5, 0.75

Make a conjecture based on the given information. Draw a figure to illustrate your conjecture.

5. $\angle ABC$ is a right angle.

6. Point S is between R and T.

7. P, Q, R, and S are noncollinear and $\overline{PQ} \cong \overline{QR} \cong \overline{RS} \cong \overline{SP}$.

8. $ABCD$ is a parallelogram.

Determine whether each conjecture is true or false. Give a counterexample for any false conjecture.

9. Given: S, T, and U are collinear and $ST = TU$.
Conjecture: T is the midpoint of $\overline{SU}$.

10. Given: $\angle 1$ and $\angle 2$ are adjacent angles.
Conjecture: $\angle 1$ and $\angle 2$ form a linear pair.

11. Given: $\overline{GH}$ and $\overline{JK}$ form a right angle and intersect at P.
Conjecture: $\overline{GH} \perp \overline{JK}$

12. ALLERGIES Each spring, Rachel starts sneezing when the pear trees on her street blossom. She reasons that she is allergic to pear trees. Find a counterexample to Rachel's conjecture.

Lesson 2-1

2-2 Practice

Logic

Use the following statements to write a compound statement for each conjunction and disjunction. Then find its truth value.

***p*: 60 seconds = 1 minute**

***q*: Congruent supplementary angles each have a measure of 90.**

***r*: −12 + 11 < −1**

1. $p \wedge q$

2. $q \vee r$

3. $\sim p \vee q$

4. $\sim p \wedge \sim r$

Copy and complete each truth table.

5.

p	q	$\sim p$	$\sim q$	$\sim p \vee \sim q$
T	T			
T	F			
F	T			
F	F			

6.

p	q	$\sim p$	$\sim p \vee q$	$p \wedge (\sim p \vee q)$
T	T			
T	F			
F	T			
F	F			

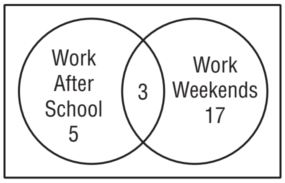
Construct a truth table for each compound statement.

7. $q \vee (p \wedge \sim q)$

8. $\sim q \wedge (\sim p \vee q)$

SCHOOL For Exercises 9 and 10, use the following information.

The Venn diagram shows the number of students in the band who work after school or on the weekends.



9. How many students work after school and on weekends?

10. How many students work after school or on weekends?

NAME ____ DATE ____________ PERIOD _____

2-3 Practice

Conditional Statements

Identify the hypothesis and conclusion of each statement.

1. If $3x + 4 = -5$, then $x = -3$.

2. If you take a class in television broadcasting, then you will film a sporting event.

Write each statement in if-then form.

3. "Those who do not remember the past are condemned to repeat it." (*George Santayana*)

4. Adjacent angles share a common vertex and a common side.

Determine the truth value of the following statement for each set of conditions.
If DVD players are on sale for less than $100, then you buy one.

5. DVD players are on sale for $95 and you buy one.

6. DVD players are on sale for $100 and you do not buy one.

7. DVD players are not on sale for under $100 and you do not buy one.

8. Write the converse, inverse, and contrapositive of the conditional statement. Determine whether each statement is true or false. If a statement is false, find a counterexample.
If $(-8)^2 > 0$, then $-8 > 0$.

SUMMER CAMP For Exercises 9 and 10, use the following information.
Older campers who attend Woodland Falls Camp are expected to work. Campers who are juniors wait on tables.

9. Write a conditional statement in if-then form.

10. Write the converse of your conditional statement.

2-4 Practice

Deductive Reasoning

Determine whether the stated conclusion is valid based on the given information. If not, write *invalid*. Explain your reasoning.

If a point is the midpoint of a segment, then it divides the segment into two congruent segments.

1. **Given:** R is the midpoint of $\overline{QS}$.
   Conclusion: $\overline{QR} \cong \overline{RS}$

2. **Given:** $\overline{AB} \cong \overline{BC}$
   Conclusion: B divides $\overline{AC}$ into two congruent segments.

Use the Law of Syllogism to determine whether a valid conclusion can be reached from each set of statements. If a valid conclusion is possible, write it.

3. If two angles form a linear pair, then the two angles are supplementary.
   If two angles are supplementary, then the sum of their measures is 180.

4. If a hurricane is Category 5, then winds are greater than 155 miles per hour.
   If winds are greater than 155 miles per hour, then trees, shrubs, and signs are blown down.

Determine whether statement (3) follows from statements (1) and (2) by the Law of Detachment or the Law of Syllogism. If it does, state which law was used. If it does not, write *invalid*.

5. (1) If a whole number is even, then its square is divisible by 4.
   (2) The number I am thinking of is an even whole number.
   (3) The square of the number I am thinking of is divisible by 4.

6. (1) If the football team wins its homecoming game, then Conrad will attend the school dance the following Friday.
   (2) Conrad attends the school dance on Friday.
   (3) The football team won the homecoming game.

7. **BIOLOGY** If an organism is a parasite, then it survives by living on or in a host organism. If a parasite lives in or on a host organism, then it harms its host. What conclusion can you draw if a virus is a parasite?

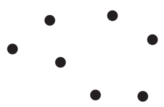
NAME ______________________________________ DATE ____________ PERIOD _____

2-5 Practice

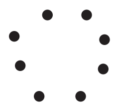
Postulates and Paragraph Proofs

Determine the number of line segments that can be drawn connecting each pair of points.

1.



2.

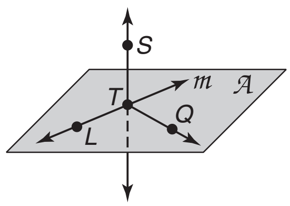


Determine whether the following statements are *always*, *sometimes*, or *never* true. Explain.

3. The intersection of two planes contains at least two points.

4. If three planes have a point in common, then they have a whole line in common.

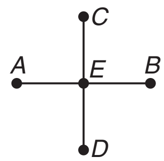
In the figure, line m and $\overleftrightarrow{TQ}$ lie in plane $\mathcal{A}$. State the postulate that can be used to show that each statement is true.



5. L, T, and line m lie in the same plane.

6. Line m and $\overline{ST}$ intersect at T.

7. In the figure, E is the midpoint of $\overline{AB}$ and $\overline{CD}$, and $AB = CD$. Write a paragraph proof to prove that $\overline{AE} \cong \overline{ED}$.



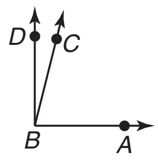
8. LOGIC Points A, B, and C are not collinear. Points B, C, and D are not collinear. Points A, B, C, and D are not coplanar. Describe two planes that intersect in line BC.

2-6 Practice

Algebraic Proof

PROOF Write a two-column proof.

1. If $m\angle ABC + m\angle CBD = 90$, $m\angle ABC = 3x - 5$, and $m\angle CBD = \frac{x + 1}{2}$, then $x = 27$.



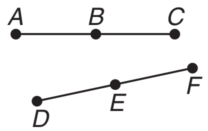
2. FINANCE The formula for simple interest is $I = prt$, where I is interest, p is principal, r is rate, and t is time. Solve the formula for r and justify each step.

2-7 Practice

Proving Segment Relationships

Complete the following proof.

1. Given: $\overline{AB} \cong \overline{DE}$
B is the midpoint of $\overline{AC}$.
E is the midpoint of $\overline{DF}$.



Prove: $\overline{BC} \cong \overline{EF}$

Proof:

Statements	**Reasons**
a. ______________________	**a.** Given
______________________	
______________________	
b. $AB = DE$	**b.** ______________________
c. ______________________	**c.** Definition of Midpoint
______________________	
d. $BC = DE$	**d.** ______________________
e. $BC = EF$	**e.** ______________________
f. ______________________	**f.** ______________________

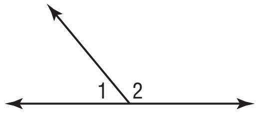
2. TRAVEL Refer to the figure. DeAnne knows that the distance from Grayson to Apex is the same as the distance from Redding to Pine Bluff. Prove that the distance from Grayson to Redding is equal to the distance from Apex to Pine Bluff.

2-8 Practice

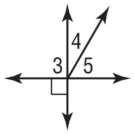
Proving Angle Relationships

Find the measure of each numbered angle.

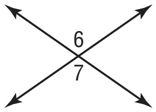
1. $m\angle 1 = x + 10$
$m\angle 2 = 3x + 18$



2. $m\angle 4 = 2x - 5$
$m\angle 5 = 4x - 13$



3. $m\angle 6 = 7x - 24$
$m\angle 7 = 5x + 14$

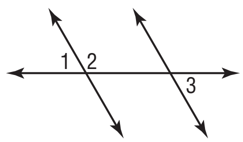


Determine whether the following statements are *always*, *sometimes*, or *never* true.

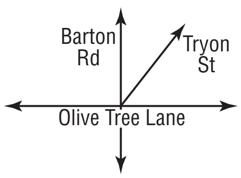
4. Two angles that are supplementary are complementary.

5. Complementary angles are congruent.

6. Write a two-column proof.
Given: $\angle 1$ and $\angle 2$ form a linear pair.
$\angle 2$ and $\angle 3$ are supplementary.
Prove: $\angle 1 \cong \angle 3$



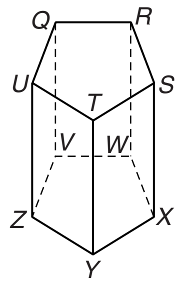
7. STREETS Refer to the figure. Barton Road and Olive Tree Lane form a right angle at their intersection. Tryon Street forms a 57° angle with Olive Tree Lane. What is the measure of the acute angle Tryon Street forms with Barton Road?



3-1 Practice

Parallel Lines and Transversals

For Exercises 1–4, refer to the figure at the right.



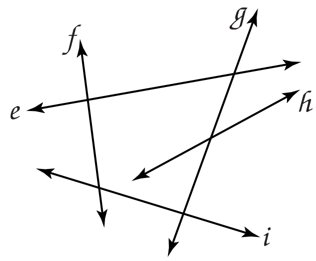
1. Name all planes that intersect plane STX.

2. Name all segments that intersect $\overline{QU}$.

3. Name all segments that are parallel to $\overline{XY}$.

4. Name all segments that are skew to $\overline{VW}$.

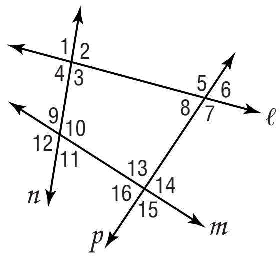
Identify the sets of lines to which each given line is a transversal.



5. e

6. h

Identify each pair of angles as *alternate interior*, *alternate exterior*, *corresponding*, or *consecutive interior* angles.



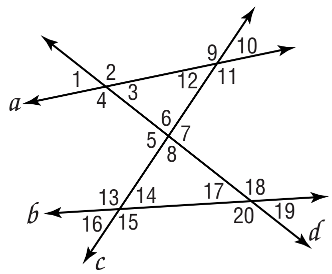
7. $\angle 9$ and $\angle 13$

8. $\angle 6$ and $\angle 16$

9. $\angle 3$ and $\angle 10$

10. $\angle 8$ and $\angle 14$

Name the transversal that forms each pair of angles. Then identify the special name for the angle pair.



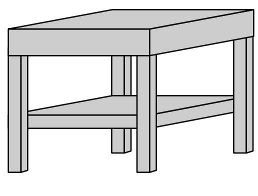
11. $\angle 2$ and $\angle 12$

12. $\angle 6$ and $\angle 18$

13. $\angle 13$ and $\angle 19$

14. $\angle 11$ and $\angle 7$

FURNITURE For Exercises 15–16, refer to the drawing of the end table.



15. Find an example of parallel planes.

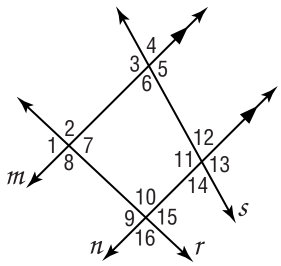
16. Find an example of parallel lines.

NAME ______________________________ DATE ____________ PERIOD _____

3-2 Practice

Angles and Parallel Lines

In the figure, $m\angle 2 = 92$ and $m\angle 12 = 74$. Find the measure of each angle.



1. $\angle 10$

2. $\angle 8$

3. $\angle 9$

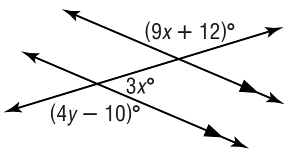
4. $\angle 5$

5. $\angle 11$

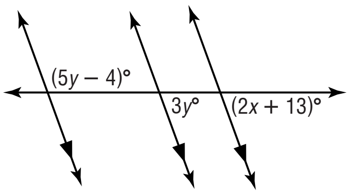
6. $\angle 13$

Find *x* and *y* in each figure.

7.

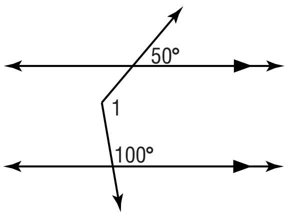


8.

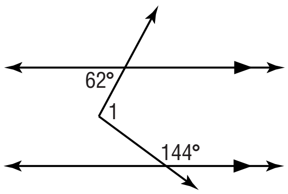


Find $m\angle 1$ in each figure.

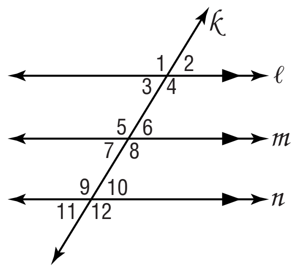
9.



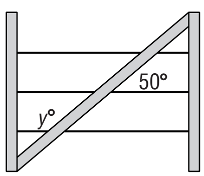
10.



11. **PROOF** Write a paragraph proof of Theorem 3.3.
Given: $\ell \parallel m$, $m \parallel n$
Prove: $\angle 1 \cong \angle 12$



12. **FENCING** A diagonal brace strengthens the wire fence and prevents it from sagging. The brace makes a 50° angle with the wire as shown. Find *y*.



NAME ____ DATE ____________ PERIOD _____

3-3 Practice

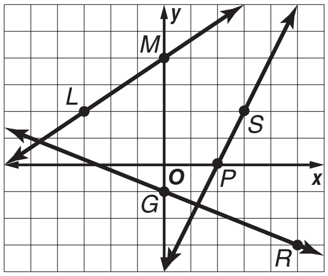
Slopes of Lines

Determine the slope of the line that contains the given points.

1. $B(-4, 4)$, $R(0, 2)$

2. $I(-2, -9)$, $P(2, 4)$

Find the slope of each line.



3. $\overleftrightarrow{LM}$

4. $\overleftrightarrow{GR}$

5. a line parallel to $\overleftrightarrow{GR}$

6. a line perpendicular to $\overleftrightarrow{PS}$

Determine whether $\overleftrightarrow{KM}$ and $\overleftrightarrow{ST}$ are *parallel*, *perpendicular*, or *neither*.

7. $K(-1, -8)$, $M(1, 6)$, $S(-2, -6)$, $T(2, 10)$

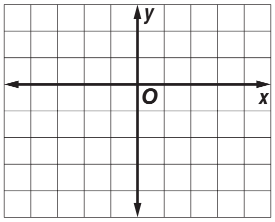
8. $K(-5, -2)$, $M(5, 4)$, $S(-3, 6)$, $T(3, -4)$

9. $K(-4, 10)$, $M(2, -8)$, $S(1, 2)$, $T(4, -7)$

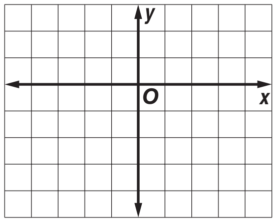
10. $K(-3, -7)$, $M(3, -3)$, $S(0, 4)$, $T(6, -5)$

Graph the line that satisfies each condition.

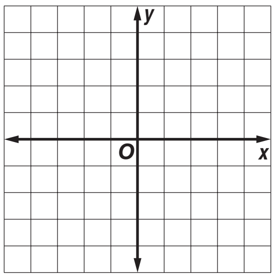
11. slope $= -\frac{1}{2}$, contains $U(2, -2)$



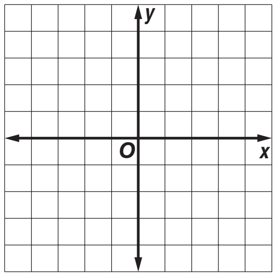
12. slope $= \frac{4}{3}$, contains $P(-3, -3)$



13. contains $B(-4, 2)$, parallel to $\overleftrightarrow{FG}$ with $F(0, -3)$ and $G(4, -2)$



14. contains $Z(-3, 0)$, perpendicular to $\overleftrightarrow{EK}$ with $E(-2, 4)$ and $K(2, -2)$



15. PROFITS After Take Two began renting DVDs at their video store, business soared. Between 2000 and 2005, profits increased at an average rate of \$9,000 per year. Total profits in 2005 were \$45,000. If profits continue to increase at the same rate, what will the total profit be in 2009?

3-4 Practice

Equations of Lines

Write an equation in slope-intercept form of the line having the given slope and *y*-intercept.

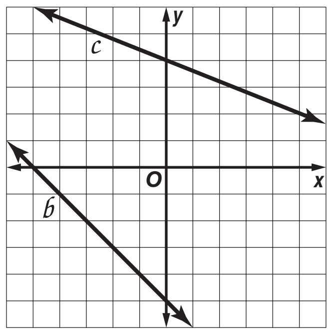
1. m: $\frac{2}{3}$, y-intercept: -10 **2.** m: $-\frac{7}{9}$, $\left(0, -\frac{1}{2}\right)$ **3.** m: 4.5, (0, 0.25)

Write equations in point-slope form and slope-intercept form of the line having the given slope and containing the given point.

4. m: $\frac{3}{2}$, (4, 6) **5.** m: $-\frac{6}{5}$, $(-5, -2)$

6. m: 0.5, $(7, -3)$ **7.** m: -1.3, $(-4, 4)$

Write an equation in slope-intercept form for each line.



8. b **9.** c

10. parallel to line b, contains $(3, -2)$

11. perpendicular to line c, contains $(-2, -4)$

Write an equation in slope-intercept form for the line that satisfies the given conditions.

12. $m = -\frac{4}{9}$, y-intercept $= 2$ **13.** $m = 3$, contains $(2, -3)$

14. x-intercept is -6, y-intercept is 2 **15.** x-intercept is 2, y-intercept is -5

16. passes through $(2, -4)$ and $(5, 8)$ **17.** contains $(-4, 2)$ and $(8, -1)$

18. COMMUNITY EDUCATION A local community center offers self-defense classes for teens. A \$25 enrollment fee covers supplies and materials and open classes cost \$10 each. Write an equation to represent the total cost of x self-defense classes at the community center.

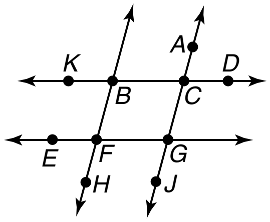
Lesson 3-4

NAME ____ DATE ____________ PERIOD _____

3-5 Practice

Proving Lines Parallel

Given the following information, determine which lines, if any, are parallel. State the postulate or theorem that justifies your answer.



1. $m\angle BCG + m\angle FGC = 180$

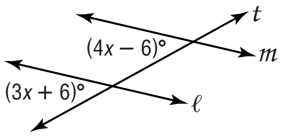
2. $\angle CBF \cong \angle GFH$

3. $\angle EFB \cong \angle FBC$

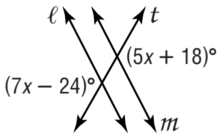
4. $\angle ACD \cong \angle KBF$

Find x so that $\ell \parallel m$.

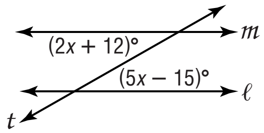
5.



6.



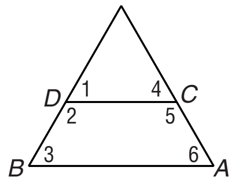
7.



8. PROOF Write a two-column proof.

Given: $\angle 2$ and $\angle 3$ are supplementary.

Prove: $\overline{AB} \parallel \overline{CD}$



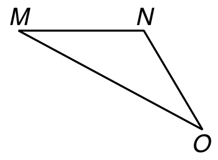
9. LANDSCAPING The head gardener at a botanical garden wants to plant rosebushes in parallel rows on either side of an existing footpath. How can the gardener ensure that the rows are parallel?

3-6 Practice

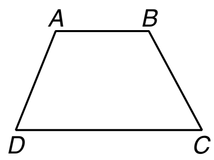
Perpendiculars and Distance

Draw the segment that represents the distance indicated.

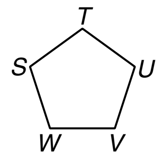
1. O to $\overleftrightarrow{MN}$



2. A to $\overleftrightarrow{DC}$

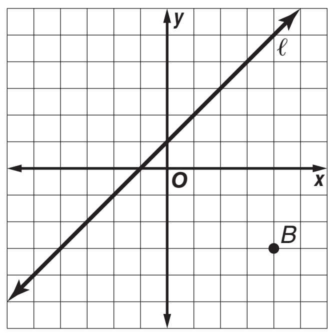


3. T to $\overleftrightarrow{VU}$

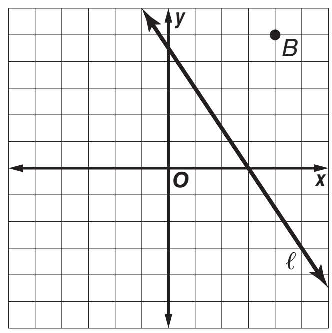


Construct a line perpendicular to ℓ through B. Then find the distance from B to ℓ.

4.



5.



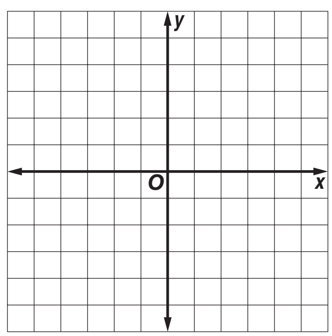
Find the distance between each pair of parallel lines.

6. $y = -x$
$y = -x - 4$

7. $y = 2x + 7$
$y = 2x - 3$

8. $y = 3x + 12$
$y = 3x - 18$

9. Graph the line $y = -x + 1$. Construct a perpendicular segment through the point at $(-2, -3)$. Then find the distance from the point to the line.



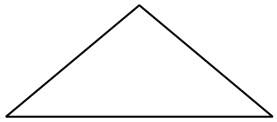
10. CANOEING Bronson and a friend are going to carry a canoe across a flat field to the bank of a straight canal. Describe the shortest path they can use.

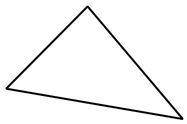
NAME ____ DATE ____________ PERIOD _____

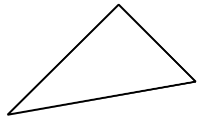
4-1 Practice

Classifying Triangles

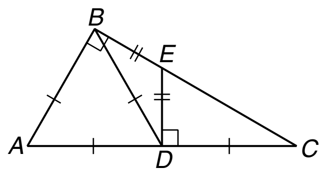
Use a protractor to classify each triangle as *acute*, *equiangular*, *obtuse*, or *right*.

1. 

2. 

3. 

Identify the indicated type of triangles if $\overline{AB} \cong \overline{AD} \cong \overline{BD} \cong \overline{DC}$, $\overline{BE} \cong \overline{ED}$, $\overline{AB} \perp \overline{BC}$, and $\overline{ED} \perp \overline{DC}$.



4. right

5. obtuse

6. scalene

7. isosceles

ALGEBRA Find x and the measure of each side of the triangle.

8. $\triangle FGH$ is equilateral with $FG = x + 5$, $GH = 3x - 9$, and $FH = 2x - 2$.

9. $\triangle LMN$ is isosceles, $\angle L$ is the vertex angle, $LM = 3x - 2$, $LN = 2x + 1$, and $MN = 5x - 2$.

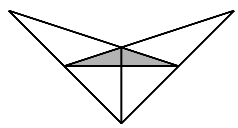
Find the measures of the sides of $\triangle KPL$ and classify each triangle by its sides.

10. $K(-3, 2)$ $P(2, 1)$, $L(-2, -3)$

11. $K(5, -3)$, $P(3, 4)$, $L(-1, 1)$

12. $K(-2, -6)$, $P(-4, 0)$, $L(3, -1)$

13. DESIGN Diana entered the design at the right in a logo contest sponsored by a wildlife environmental group. Use a protractor. How many right angles are there?



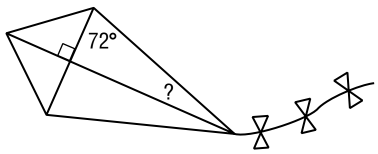
NAME ____ DATE ____________ PERIOD _____

4-2 Practice

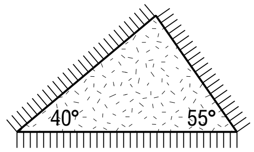
Angles of Triangles

Find the missing angle measures.

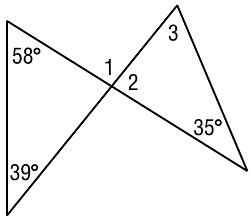
1.



2.



Find the measure of each angle.

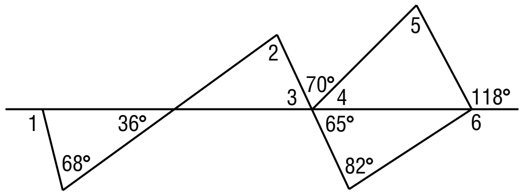


3. $m\angle 1$

4. $m\angle 2$

5. $m\angle 3$

Find the measure of each angle.



6. $m\angle 1$

7. $m\angle 4$

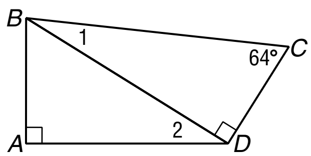
8. $m\angle 3$

9. $m\angle 2$

10. $m\angle 5$

11. $m\angle 6$

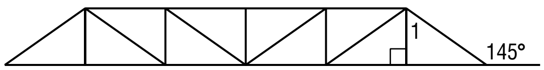
Find the measure of each angle if $\angle BAD$ and $\angle BDC$ are right angles and $m\angle ABC = 84$.



12. $m\angle 1$

13. $m\angle 2$

14. CONSTRUCTION The diagram shows an example of the Pratt Truss used in bridge construction. Use the diagram to find $m\angle 1$.

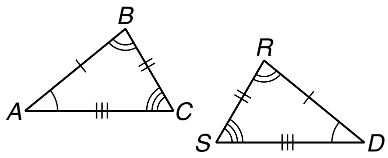


4-3 Practice

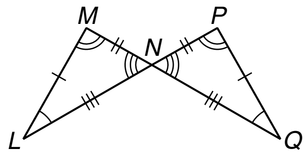
Congruent Triangles

Identify the congruent triangles in each figure.

1.



2.



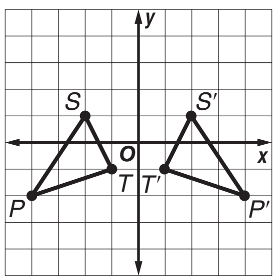
Name the congruent angles and sides for each pair of congruent triangles.

3. $\triangle GKP \cong \triangle LMN$

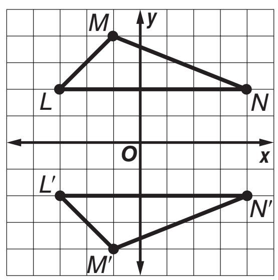
4. $\triangle ANC \cong \triangle RBV$

Verify that each of the following transformations preserves congruence, and name the congruence transformation.

5. $\triangle PST \cong \triangle P'S'T'$



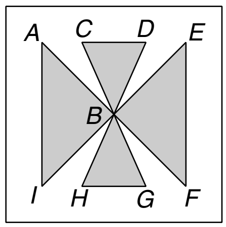
6. $\triangle LMN \cong \triangle L'M'N'$



QUILTING For Exercises 7 and 8, refer to the quilt design.

7. Indicate the triangles that appear to be congruent.

8. Name the congruent angles and congruent sides of a pair of congruent triangles.



4-4 Practice

Proving Congruence—SSS, SAS

Determine whether $\triangle DEF \cong \triangle PQR$ given the coordinates of the vertices. Explain.

1. $D(-6, 1)$, $E(1, 2)$, $F(-1, -4)$, $P(0, 5)$, $Q(7, 6)$, $R(5, 0)$

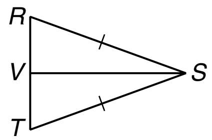
2. $D(-7, -3)$, $E(-4, -1)$, $F(-2, -5)$, $P(2, -2)$, $Q(5, -4)$, $R(0, -5)$

3. Write a flow proof.

Given: $\overline{RS} \cong \overline{TS}$

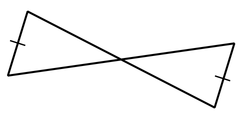
V is the midpoint of $\overline{RT}$.

Prove: $\triangle RSV \cong \triangle TSV$

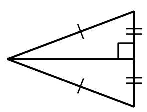


Determine which postulate can be used to prove that the triangles are congruent. If it is not possible to prove that they are congruent, write *not possible*.

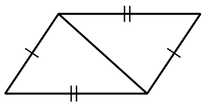
4.



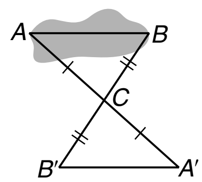
5.



6.



7. INDIRECT MEASUREMENT To measure the width of a sinkhole on his property, Harmon marked off congruent triangles as shown in the diagram. How does he know that the lengths $A'B'$ and AB are equal?



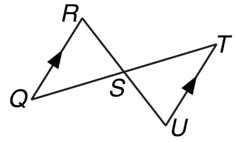
4-5 Practice

Proving Congruence—ASA, AAS

1. Write a flow proof.

Given: S is the midpoint of $\overline{QT}$.
$\overline{QR} \parallel \overline{TU}$

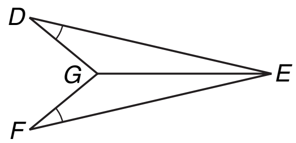
Prove: $\triangle QSR \cong \triangle TSU$



2. Write a paragraph proof.

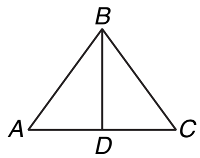
Given: $\angle D \cong \angle F$
$\overline{GE}$ bisects $\angle DEF$.

Prove: $\overline{DG} \cong \overline{FG}$



ARCHITECTURE For Exercises 3 and 4, use the following information.

An architect used the window design in the diagram when remodeling an art studio. $\overline{AB}$ and $\overline{CB}$ each measure 3 feet.



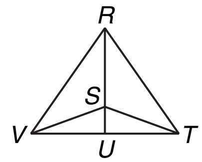
3. Suppose D is the midpoint of $\overline{AC}$. Determine whether $\triangle ABD \cong \triangle CBD$. Justify your answer.

4. Suppose $\angle A \cong \angle C$. Determine whether $\triangle ABD \cong \triangle CBD$. Justify your answer.

4-6 Practice

Isosceles Triangles

Refer to the figure.



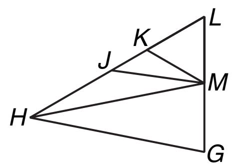
1. If $\overline{RV} \cong \overline{RT}$, name two congruent angles.

2. If $\overline{RS} \cong \overline{SV}$, name two congruent angles.

3. If $\angle SRT \cong \angle STR$, name two congruent segments.

4. If $\angle STV \cong \angle SVT$, name two congruent segments.

Triangles *GHM* and *HJM* are isosceles, with $\overline{GH} \cong \overline{MH}$ and $\overline{HJ} \cong \overline{MJ}$. Triangle *KLM* is equilateral, and $m\angle HMK = 50$. Find each measure.



5. $m\angle KML$ **6.** $m\angle HMG$ **7.** $m\angle GHM$

8. If $m\angle HJM = 145$, find $m\angle MHJ$.

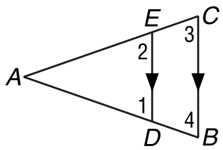
9. If $m\angle G = 67$, find $m\angle GHM$.

10. Write a two-column proof.

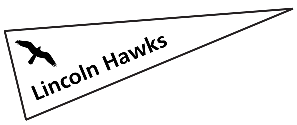
Given: $\overline{DE} \parallel \overline{BC}$

$\angle 1 \cong \angle 2$

Prove: $\overline{AB} \cong \overline{AC}$



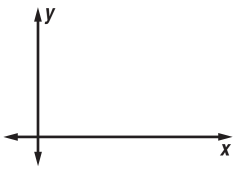
11. SPORTS A pennant for the sports teams at Lincoln High School is in the shape of an isosceles triangle. If the measure of the vertex angle is 18, find the measure of each base angle.



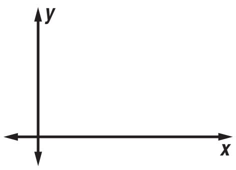
4-7 Practice
Triangles and Coordinate Proof

Position and label each triangle on the coordinate plane.

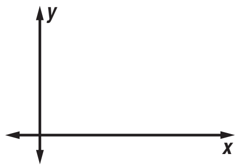
1. equilateral $\triangle SWY$ with sides $\frac{1}{4}a$ long



2. isosceles $\triangle BLP$ with base $\overline{BL}$ $3b$ units long

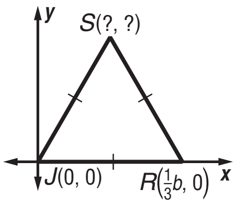


3. isosceles right $\triangle DGJ$ with hypotenuse $\overline{DJ}$ and legs $2a$ units long

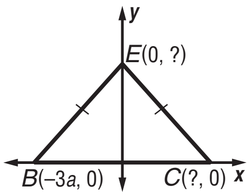


Find the missing coordinates of each triangle.

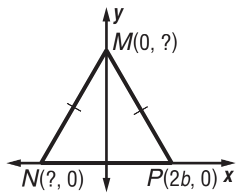
4.



5.



6.



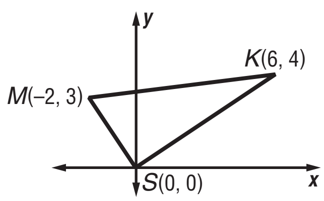
NEIGHBORHOODS For Exercises 7 and 8, use the following information.

Karina lives 6 miles east and 4 miles north of her high school. After school she works part time at the mall in a music store. The mall is 2 miles west and 3 miles north of the school.

7. Write a coordinate proof to prove that Karina's high school, her home, and the mall are at the vertices of a right triangle.

Given: $\triangle SKM$

Prove: $\triangle SKM$ is a right triangle.



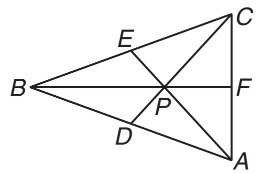
8. Find the distance between the mall and Karina's home.

NAME ____ DATE ____________ PERIOD _____

5-1 Practice

Bisectors, Medians, and Altitudes

ALGEBRA In $\triangle ABC$, $\overline{BF}$ is the angle bisector of $\angle ABC$, $\overline{AE}$, $\overline{BF}$, and $\overline{CD}$ are medians, and P is the centroid.



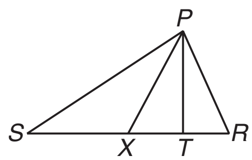
1. Find x if $DP = 4x - 3$ and $CP = 30$.

2. Find y if $AP = y$ and $EP = 18$.

3. Find z if $FP = 5z + 10$ and $BP = 42$.

4. If $m\angle ABC = x$ and $m\angle BAC = m\angle BCA = 2x - 10$, is $\overline{BF}$ an altitude? Explain.

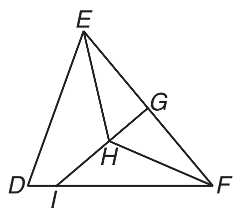
ALGEBRA In $\triangle PRS$, $\overline{PT}$ is an altitude and $\overline{PX}$ is a median.



5. Find RS if $RX = x + 7$ and $SX = 3x - 11$.

6. Find RT if $RT = x - 6$ and $m\angle PTR = 8x - 6$.

ALGEBRA In $\triangle DEF$, $\overline{GI}$ is a perpendicular bisector.



7. Find x if $EH = 16$ and $FH = 6x - 5$.

8. Find y if $EG = 3.2y - 1$ and $FG = 2y + 5$.

9. Find z if $m\angle EGH = 12z$.

COORDINATE GEOMETRY The vertices of $\triangle STU$ are $S(0, 1)$, $T(4, 7)$, and $U(8, -3)$. Find the coordinates of the points of concurrency of $\triangle STU$.

10. orthocenter **11.** centroid **12.** circumcenter

13. MOBILES Nabuko wants to construct a mobile out of flat triangles so that the surfaces of the triangles hang parallel to the floor when the mobile is suspended. How can Nabuko be certain that she hangs the triangles to achieve this effect?

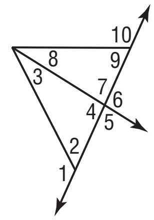
Lesson 5-1

NAME ______________________________ DATE ____________ PERIOD _____

5-2 Practice

Inequalities and Triangles

Determine which angle has the greatest measure.



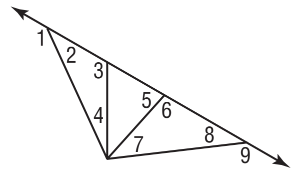
1. $\angle 1, \angle 3, \angle 4$

2. $\angle 4, \angle 8, \angle 9$

3. $\angle 2, \angle 3, \angle 7$

4. $\angle 7, \angle 8, \angle 10$

Use the Exterior Angle Inequality Theorem to list all angles that satisfy the stated condition.



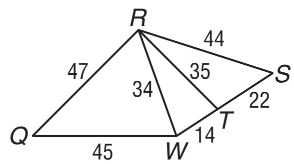
5. all angles whose measures are less than $m\angle 1$

6. all angles whose measures are less than $m\angle 3$

7. all angles whose measures are greater than $m\angle 7$

8. all angles whose measures are greater than $m\angle 2$

Determine the relationship between the measures of the given angles.



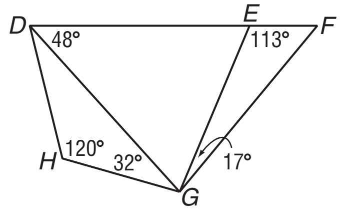
9. $m\angle QRW, m\angle RWQ$

10. $m\angle RTW, m\angle TWR$

11. $m\angle RST, m\angle TRS$

12. $m\angle WQR, m\angle QRW$

Determine the relationship between the lengths of the given sides.



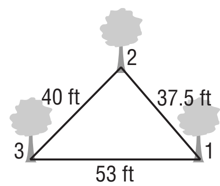
13. $\overline{DH}, \overline{GH}$

14. $\overline{DE}, \overline{DG}$

15. $\overline{EG}, \overline{FG}$

16. $\overline{DE}, \overline{EG}$

17. SPORTS The figure shows the position of three trees on one part of a Frisbee™ course. At which tree position is the angle between the trees the greatest?



5-3 Practice

Indirect Proof

Write the assumption you would make to start an indirect proof of each statement.

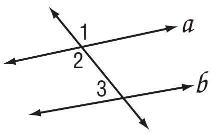
1. $\overline{BD}$ bisects $\angle ABC$.

2. $RT = TS$

PROOF Write an indirect proof.

3. Given: $-4x + 2 < -10$
Prove: $x > 3$

4. Given: $m\angle 2 + m\angle 3 \neq 180$
Prove: $a \nparallel b$



5. PHYSICS Sound travels through air at about 344 meters per second when the temperature is 20°C. If Enrique lives 2 kilometers from the fire station and it takes 5 seconds for the sound of the fire station siren to reach him, how can you prove indirectly that it is not 20°C when Enrique hears the siren?

5-4 Practice

The Triangle Inequality

Determine whether the given measures can be the lengths of the sides of a triangle. Write *yes* or *no*.

1. 9, 12, 18

2. 8, 9, 17

3. 14, 14, 19

4. 23, 26, 50

5. 32, 41, 63

6. 2.7, 3.1, 4.3

7. 0.7, 1.4, 2.1

8. 12.3, 13.9, 25.2

Find the range for the measure of the third side of a triangle given the measures of two sides.

9. 6 and 19

10. 7 and 29

11. 13 and 27

12. 18 and 23

13. 25 and 38

14. 31 and 39

15. 42 and 6

16. 54 and 7

ALGEBRA Determine whether the given coordinates are the vertices of a triangle. Explain.

17. $R(1, 3)$, $S(4, 0)$, $T(10, -6)$

18. $W(2, 6)$, $X(1, 6)$, $Y(4, 2)$

19. $P(-3, 2)$, $L(1, 1)$, $M(9, -1)$

20. $B(1, 1)$, $C(6, 5)$, $D(4, -1)$

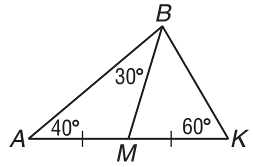
21. GARDENING Ha Poong has 4 lengths of wood from which he plans to make a border for a triangular-shaped herb garden. The lengths of the wood borders are 8 inches, 10 inches, 12 inches, and 18 inches. How many different triangular borders can Ha Poong make?

5-5 Practice

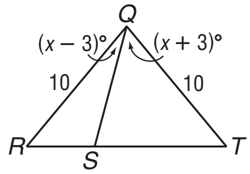
Inequalities Involving Two Triangles

Write an inequality relating the given pair of angles or segment measures.

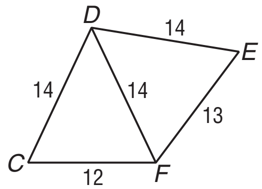
1. AB, BK



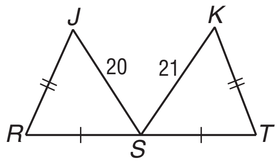
2. ST, SR



3. $m\angle CDF$, $m\angle EDF$



4. $m\angle R$, $m\angle T$

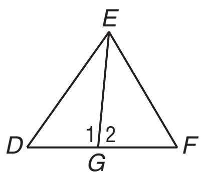


5. Write a two-column proof.

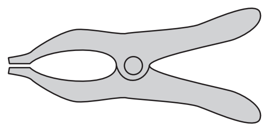
Given: G is the midpoint of $\overline{DF}$.

$m\angle 1 > m\angle 2$

Prove: $ED > EF$



6. TOOLS Rebecca used a spring clamp to hold together a chair leg she repaired with wood glue. When she opened the clamp, she noticed that the angle between the handles of the clamp decreased as the distance between the handles of the clamp decreased. At the same time, the distance between the gripping ends of the clamp increased. When she released the handles, the distance between the gripping end of the clamp decreased and the distance between the handles increased. Is the clamp an example of the SAS or SSS Inequality?



6-1 Practice

Angles of Polygons

Find the sum of the measures of the interior angles of each convex polygon.

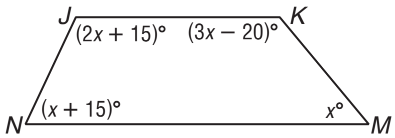
1. 11-gon **2.** 14-gon **3.** 17-gon

The measure of an interior angle of a regular polygon is given. Find the number of sides in each polygon.

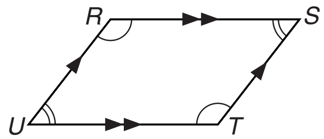
4. 144 **5.** 156 **6.** 160

Find the measure of each interior angle using the given information.

7.



8. quadrilateral $RSTU$ with $m\angle R = 6x - 4$, $m\angle S = 2x + 8$



Find the measures of an interior angle and an exterior angle for each regular polygon. Round to the nearest tenth if necessary.

9. 16-gon **10.** 24-gon **11.** 30-gon

Find the measures of an interior angle and an exterior angle given the number of sides of each regular polygon. Round to the nearest tenth if necessary.

12. 14 **13.** 22 **14.** 40

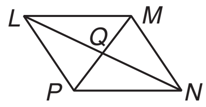
15. CRYSTALLOGRAPHY Crystals are classified according to seven crystal systems. The basis of the classification is the shapes of the faces of the crystal. Turquoise belongs to the triclinic system. Each of the six faces of turquoise is in the shape of a parallelogram. Find the sum of the measures of the interior angles of one such face.

NAME ______________________________ DATE ____________ PERIOD _____

6-2 Practice

Parallelograms

Complete each statement about ▱$LMNP$. Justify your answer.



1. $\overline{LQ} \cong$ __?__

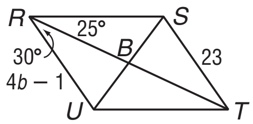
2. $\angle LMN \cong$ __?__

3. $\triangle LMP \cong$ __?__

4. $\angle NPL$ is supplementary to __?__.

5. $\overline{LM} \cong$ __?__

ALGEBRA Use ▱$RSTU$ to find each measure or value.



6. $m\angle RST =$ ______

7. $m\angle STU =$ ______

8. $m\angle TUR =$ ______

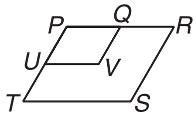
9. $b =$ ______

COORDINATE GEOMETRY Find the coordinates of the intersection of the diagonals of parallelogram $PRYZ$ given each set of vertices.

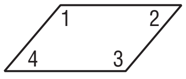
10. $P(2, 5)$, $R(3, 3)$, $Y(-2, -3)$, $Z(-3, -1)$

11. $P(2, 3)$, $R(1, -2)$, $Y(-5, -7)$, $Z(-4, -2)$

12. **PROOF** Write a paragraph proof of the following.
    Given: ▱$PRST$ and ▱$PQVU$
    Prove: $\angle V \cong \angle S$



13. **CONSTRUCTION** Mr. Rodriquez used the parallelogram at the right to design a herringbone pattern for a paving stone. He will use the paving stone for a sidewalk. If $m\angle 1$ is 130, find $m\angle 2$, $m\angle 3$, and $m\angle 4$.

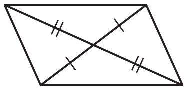


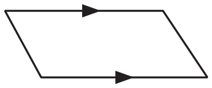
NAME ____ DATE ____________ PERIOD _____

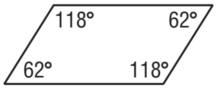
6-3 Practice

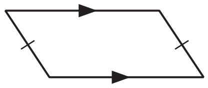
Tests for Parallelograms

Determine whether each quadrilateral is a parallelogram. Justify your answer.

1. 

2. 

3. 

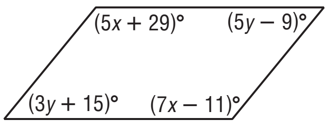
4. 

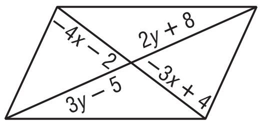
COORDINATE GEOMETRY Determine whether a figure with the given vertices is a parallelogram. Use the method indicated.

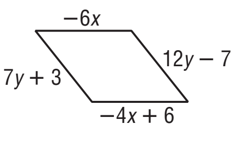
5. $P(-5, 1)$, $S(-2, 2)$, $F(-1, -3)$, $T(2, -2)$; Slope Formula

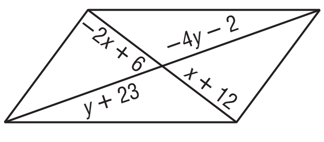
6. $R(-2, 5)$, $O(1, 3)$, $M(-3, -4)$, $Y(-6, -2)$; Distance and Slope Formula

ALGEBRA Find *x* and *y* so that each quadrilateral is a parallelogram.

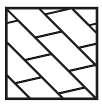
7. 

8. 

9. 

10. 

11. TILE DESIGN The pattern shown in the figure is to consist of congruent parallelograms. How can the designer be certain that the shapes are parallelograms?



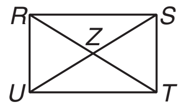
Lesson 6-3

NAME ______________________________ DATE ____________ PERIOD _____

6-4 Practice

Rectangles

ALGEBRA ***RSTU* is a rectangle.**



1. If $UZ = x + 21$ and $ZS = 3x - 15$, find US.

2. If $RZ = 3x + 8$ and $ZS = 6x - 28$, find UZ.

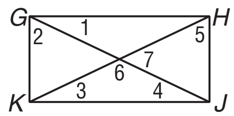
3. If $RT = 5x + 8$ and $RZ = 4x + 1$, find ZT.

4. If $m\angle SUT = 3x + 6$ and $m\angle RUS = 5x - 4$, find $m\angle SUT$.

5. If $m\angle SRT = x^2 + 9$ and $m\angle UTR = 2x + 44$, find x.

6. If $m\angle RSU = x^2 - 1$ and $m\angle TUS = 3x + 9$, find $m\angle RSU$.

***GHJK* is a rectangle. Find each measure if $m\angle 1 = 37$.**



7. $m\angle 2$

8. $m\angle 3$

9. $m\angle 4$

10. $m\angle 5$

11. $m\angle 6$

12. $m\angle 7$

COORDINATE GEOMETRY Determine whether *BGHL* is a rectangle given each set of vertices. Justify your answer.

13. $B(-4, 3)$, $G(-2, 4)$, $H(1, -2)$, $L(-1, -3)$

14. $B(-4, 5)$, $G(6, 0)$, $H(3, -6)$, $L(-7, -1)$

15. $B(0, 5)$, $G(4, 7)$, $H(5, 4)$, $L(1, 2)$

16. LANDSCAPING Huntington Park officials approved a rectangular plot of land for a Japanese Zen garden. Is it sufficient to know that opposite sides of the garden plot are congruent and parallel to determine that the garden plot is rectangular? Explain.

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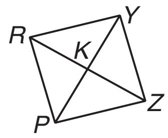
6-5 Practice

Rhombi and Squares

Use rhombus *PRYZ* with $RK = 4y + 1$, $ZK = 7y - 14$, $PK = 3x - 1$, and $YK = 2x + 6$.



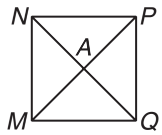
1. Find PY.

2. Find RZ.

3. Find RY.

4. Find $m\angle YKZ$.

Use rhombus *MNPQ* with $PQ = 3\sqrt{2}$, $PA = 4x - 1$, and $AM = 9x - 6$.



5. Find AQ.

6. Find $m\angle APQ$.

7. Find $m\angle MNP$.

8. Find PM.

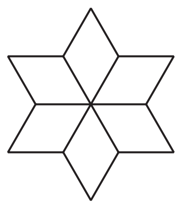
COORDINATE GEOMETRY Given each set of vertices, determine whether ▱*BEFG* is a *rhombus*, a *rectangle*, or a *square*. List all that apply. Explain your reasoning.

9. $B(-9, 1)$, $E(2, 3)$, $F(12, -2)$, $G(1, -4)$

10. $B(1, 3)$, $E(7, -3)$, $F(1, -9)$, $G(-5, -3)$

11. $B(-4, -5)$, $E(1, -5)$, $F(-2, -1)$, $G(-7, -1)$

12. TESSELLATIONS The figure is an example of a tessellation. Use a ruler or protractor to measure the shapes and then name the quadrilaterals used to form the figure.



Lesson 6-5

6-6 Practice

Trapezoids

COORDINATE GEOMETRY *RSTU* is a quadrilateral with vertices *R*(−3, −3), *S*(5, 1), *T*(10, −2), *U*(−4, −9).

1. Verify that *RSTU* is a trapezoid.

2. Determine whether *RSTU* is an isosceles trapezoid. Explain.

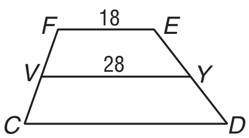
COORDINATE GEOMETRY *BGHJ* is a quadrilateral with vertices *B*(−9, 1), *G*(2, 3), *H*(12, −2), *J*(−10, −6).

3. Verify that *BGHJ* is a trapezoid.

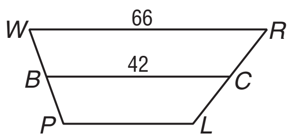
4. Determine whether *BGHJ* is an isosceles trapezoid. Explain.

ALGEBRA Find the missing measure(s) for the given trapezoid.

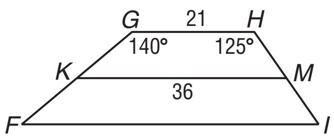
5. For trapezoid *CDEF*, *V* and *Y* are midpoints of the legs. Find *CD*.



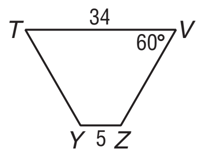
6. For trapezoid *WRLP*, *B* and *C* are midpoints of the legs. Find *LP*.



7. For trapezoid *FGHI*, *K* and *M* are midpoints of the legs. Find *FI*, $m\angle F$, and $m\angle I$.



8. For isosceles trapezoid *TVZY*, find the length of the median, $m\angle T$, and $m\angle Z$.



9. CONSTRUCTION A set of stairs leading to the entrance of a building is designed in the shape of an isosceles trapezoid with the longer base at the bottom of the stairs and the shorter base at the top. If the bottom of the stairs is 21 feet wide and the top is 14 feet wide, find the width of the stairs halfway to the top.

10. DESK TOPS A carpenter needs to replace several trapezoid-shaped desktops in a classroom. The carpenter knows the lengths of both bases of the desktop. What other measurements, if any, does the carpenter need?

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6-7 Practice

Coordinate Proof and Quadrilaterals

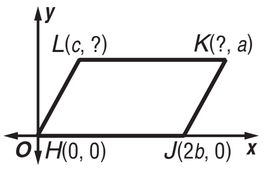
Position and label each quadrilateral on the coordinate plane.

1. parallelogram with side length b units and height a units

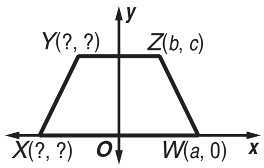
2. isosceles trapezoid with height b units, bases $2c - a$ units and $2c + a$ units

Name the missing coordinates for each quadrilateral.

3. parallelogram



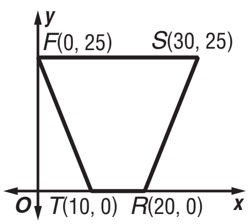
4. isosceles trapezoid



Position and label the figure on the coordinate plane. Then write a coordinate proof for the following.

5. The opposite sides of a parallelogram are congruent.

6. THEATER A stage is in the shape of a trapezoid. Write a coordinate proof to prove that $\overline{TR}$ and $\overline{SF}$ are parallel.



7-1 Practice

Proportions

1. **NUTRITION** One ounce of cheddar cheese contains 9 grams of fat. Six of the grams of fat are saturated fats. Find the ratio of saturated fats to total fat in an ounce of cheese.

2. **FARMING** The ratio of goats to sheep at a university research farm is 4:7. The number of sheep at the farm is 28. What is the number of goats?

3. **ART** Edward Hopper's oil on canvas painting *Nighthawks* has a length of 60 inches and a width of 30 inches. A print of the original has a length of 2.5 inches. What is the width of the print?

Solve each proportion.

4. $\frac{5}{8} = \frac{x}{12}$

5. $\frac{x}{1.12} = \frac{1}{5}$

6. $\frac{6x}{27} = \frac{4}{3}$

7. $\frac{x + 2}{3} = \frac{8}{9}$

8. $\frac{3x - 5}{4} = \frac{-5}{7}$

9. $\frac{x - 2}{4} = \frac{x + 4}{2}$

Find the measures of the sides of each triangle.

10. The ratio of the measures of the sides of a triangle is 3:4:6, and its perimeter is 104 feet.

11. The ratio of the measures of the sides of a triangle is 7:9:12, and its perimeter is 84 inches.

12. The ratio of the measures of the sides of a triangle is 6:7:9, and its perimeter is 77 centimeters.

Find the measures of the angles in each triangle.

13. The ratio of the measures of the angles is 4:5:6.

14. The ratio of the measures of the angles is 5:7:8.

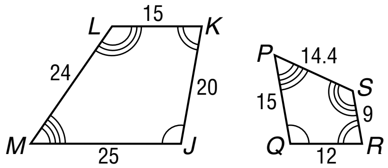
15. **BRIDGES** The span of the Benjamin Franklin suspension bridge in Philadelphia, Pennsylvania, is 1750 feet. A model of the bridge has a span of 42 inches. What is the ratio of the span of the model to the span of the actual Benjamin Franklin Bridge?

7-2 Practice

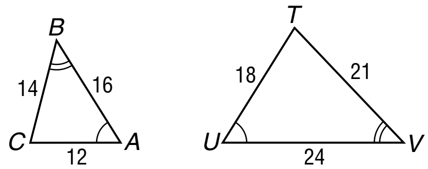
Similar Polygons

Determine whether each pair of figures is similar. Justify your answer.

1.

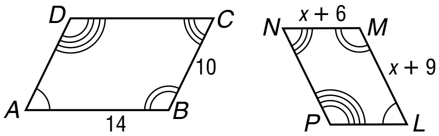


2.

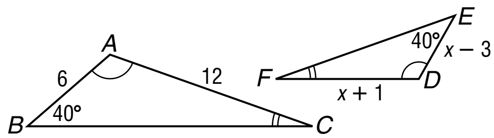


Each pair of polygons is similar. Write a similarity statement, and find *x*, the measure(s) of the indicated side(s), and the scale factor.

3. $\overline{LM}$ and $\overline{MN}$

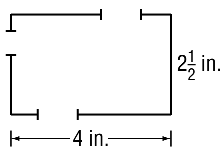


4. $\overline{DE}$ and $\overline{DF}$



5. COORDINATE GEOMETRY Triangle ABC has vertices $A(0, 0)$, $B(-4, 0)$, and $C(-2, 4)$. The coordinates of each vertex are multiplied by 3 to create $\triangle AEF$. Show that $\triangle AEF$ is similar to $\triangle ABC$.

6. INTERIOR DESIGN Graham used the scale drawing of his living room to decide where to place furniture. Find the dimensions of the living room if the scale in the drawing is 1 inch = 4.5 feet.



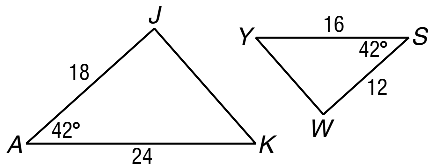
NAME ____ DATE ____________ PERIOD _____

7-3 Practice

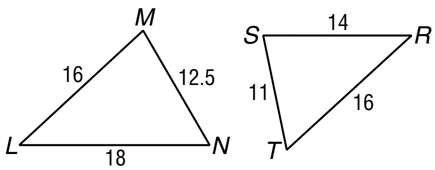
Similar Triangles

Determine whether each pair of triangles is similar. Justify your answer.

1.

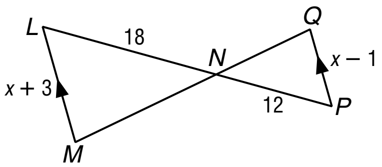


2.

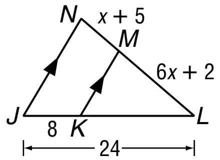


ALGEBRA Identify the similar triangles, and find x and the measures of the indicated sides.

3. $\overline{LM}$ and $\overline{QP}$

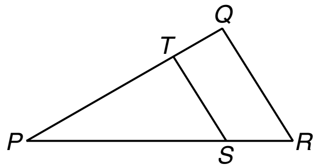


4. $\overline{NL}$ and $\overline{ML}$

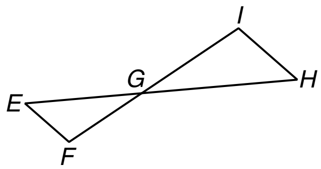


Use the given information to find each measure.

5. If $\overline{TS} \parallel \overline{QR}$, $TS = 6$, $PS = x + 7$, $QR = 8$, and $SR = x - 1$, find PS and PR.



6. If $\overline{EF} \parallel \overline{HI}$, $EF = 3$, $EG = x + 1$, $HI = 4$, and $HG = x + 3$, find EG and HG.



INDIRECT MEASUREMENT For Exercises 7 and 8, use the following information.

A lighthouse casts a 128-foot shadow. A nearby lamppost that measures 5 feet 3 inches casts an 8-foot shadow.

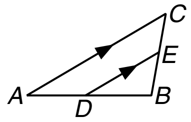
7. Write a proportion that can be used to determine the height of the lighthouse.

8. What is the height of the lighthouse?

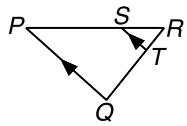
7-4 Practice

Parallel Lines and Proportional Parts

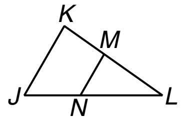
1. If $AD = 24$, $DB = 27$, and $EB = 18$, find CE.



2. Find x, QT, and TR if $QT = x + 6$, $SR = 12$, $PS = 27$, and $TR = x - 4$.



Determine whether $\overline{JK} \parallel \overline{NM}$.

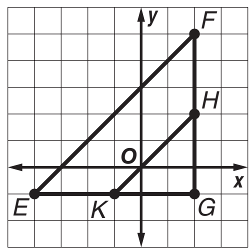


3. $JN = 18$, $JL = 30$, $KM = 21$, and $ML = 35$

4. $KM = 24$, $KL = 44$, and $NL = \frac{5}{6}JN$

COORDINATE GEOMETRY For Exercises 5 and 6, use the following information.

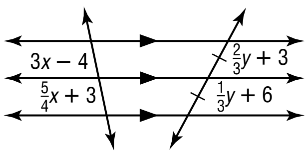
Triangle EFG has vertices $E(-4, -1)$, $F(2, 5)$, and $G(2, -1)$. Point K is the midpoint of $\overline{EG}$ and H is the midpoint of $\overline{FG}$.



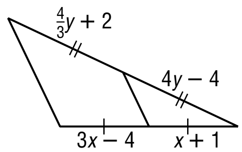
5. Show that $\overline{EF}$ is parallel to $\overline{KH}$.

6. Show that $KH = \frac{1}{2}EF$.

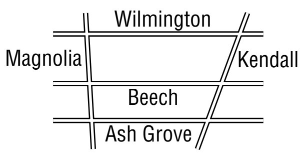
7. Find x and y.



8. Find x and y.



9. MAPS The distance from Wilmington to Ash Grove along Kendall is 820 feet and along Magnolia, 660 feet. If the distance between Beech and Ash Grove along Magnolia is 280 feet, what is the distance between the two streets along Kendall?

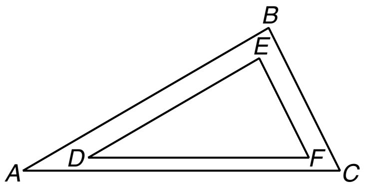


7-5 Practice

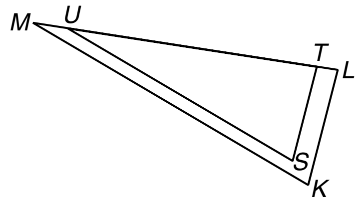
Parts of Similar Triangles

Find the perimeter of the given triangle.

1. $\triangle DEF$, if $\triangle ABC \sim \triangle DEF$, $AB = 36$, $BC = 20$, $CA = 40$, and $DE = 35$

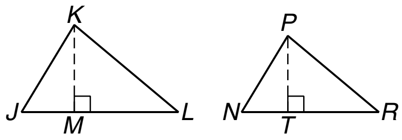


2. $\triangle STU$, if $\triangle STU \sim \triangle KLM$, $KL = 12$, $LM = 31$, $MK = 32$, and $US = 28$

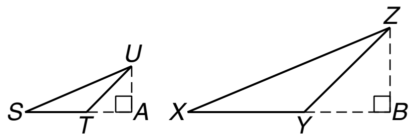


Use the given information to find each measure.

3. Find PR if $\triangle JKL \sim \triangle NPR$, $\overline{KM}$ is an altitude of $\triangle JKL$, $\overline{PT}$ is an altitude of $\triangle NPR$, $KL = 28$, $KM = 18$, and $PT = 15.75$.

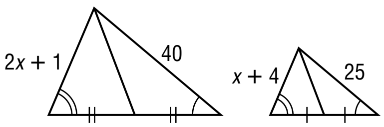


4. Find ZY if $\triangle STU \sim \triangle XYZ$, $\overline{UA}$ is an altitude of $\triangle STU$, $\overline{ZB}$ is an altitude of $\triangle XYZ$, $UT = 8.5$, $UA = 6$, and $ZB = 11.4$.

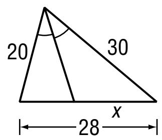


Find *x*.

5.



6.



PHOTOGRAPHY For Exercises 7 and 8, use the following information.

Francine has a camera in which the distance from the lens to the film is 24 millimeters.

7. If Francine takes a full-length photograph of her friend from a distance of 3 meters and the height of her friend is 140 centimeters, what will be the height of the image on the film? (*Hint*: Convert to the same unit of measure.)

8. Suppose the height of the image on the film of her friend is 15 millimeters. If Francine took a full-length shot, what was the distance between the camera and her friend?

8-1 Practice

Geometric Mean

Find the geometric mean between each pair of numbers to the nearest tenth.

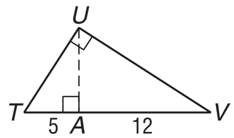
1. 8 and 12

2. $3\sqrt{7}$ and $6\sqrt{7}$

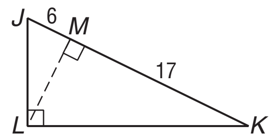
3. $\frac{4}{5}$ and 2

Find the measure of the altitude drawn to the hypotenuse. State exact answers and answers to the nearest tenth.

4.

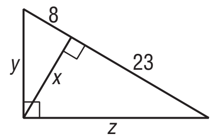


5.

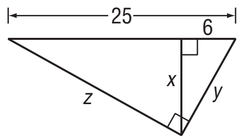


Find *x*, *y*, and *z*.

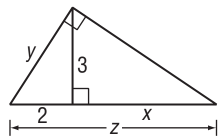
6.



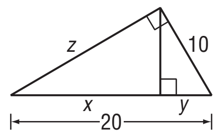
7.



8.



9.



10. CIVIL ENGINEERING An airport, a factory, and a shopping center are at the vertices of a right triangle formed by three highways. The airport and factory are 6.0 miles apart. Their distances from the shopping center are 3.6 miles and 4.8 miles, respectively. A service road will be constructed from the shopping center to the highway that connects the airport and factory. What is the shortest possible length for the service road? Round to the nearest hundredth.

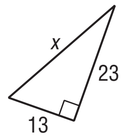
NAME ______________________________ DATE ____________ PERIOD _____

8-2 Practice

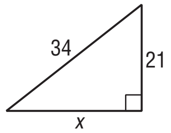
The Pythagorean Theorem and Its Converse

Find x.

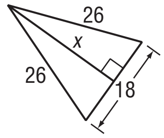
1.



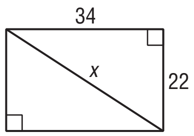
2.



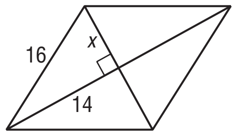
3.



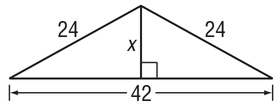
4.



5.



6.



Determine whether $\triangle GHI$ is a right triangle for the given vertices. Explain.

7. $G(2, 7)$, $H(3, 6)$, $I(-4, -1)$

8. $G(-6, 2)$, $H(1, 12)$, $I(-2, 1)$

9. $G(-2, 1)$, $H(3, -1)$, $I(-4, -4)$

10. $G(-2, 4)$, $H(4, 1)$, $I(-1, -9)$

Determine whether each set of measures can be the measures of the sides of a right triangle. Then state whether they form a Pythagorean triple.

11. 9, 40, 41

12. 7, 28, 29

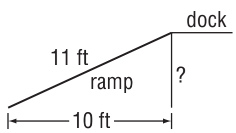
13. 24, 32, 40

14. $\frac{9}{5}, \frac{12}{5}, 3$

15. $\frac{1}{3}, \frac{2\sqrt{2}}{3}, 1$

16. $\frac{\sqrt{4}}{7}, \frac{2\sqrt{3}}{7}, \frac{4}{7}$

17. CONSTRUCTION The bottom end of a ramp at a warehouse is 10 feet from the base of the main dock and is 11 feet long. How high is the dock?



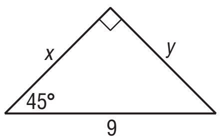
NAME ______________________________ DATE ____________ PERIOD _____

8-3 Practice

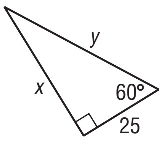
Special Right Triangles

Find x and y.

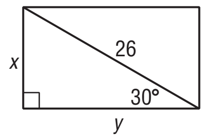
1.



2.



3.



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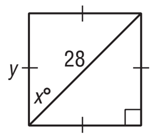
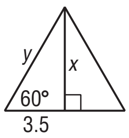


5.



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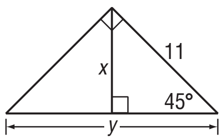
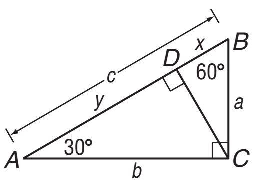


For Exercises 7–9, use the figure at the right.



7. If $a = 4\sqrt{3}$, find b and c.

8. If $x = 3\sqrt{3}$, find a and CD.

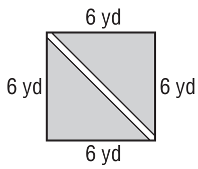
9. If $a = 4$, find CD, b, and y.

10. The perimeter of an equilateral triangle is 39 centimeters. Find the length of an altitude of the triangle.

11. $\triangle MIP$ is a 30°-60°-90° triangle with right angle at I, and $\overline{IP}$ the longer leg. Find the coordinates of M in Quadrant I for $I(3, 3)$ and $P(12, 3)$.

12. $\triangle TJK$ is a 45°-45°-90° triangle with right angle at J. Find the coordinates of T in Quadrant II for $J(-2, -3)$ and $K(3, -3)$.

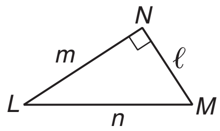
13. BOTANICAL GARDENS One of the displays at a botanical garden is an herb garden planted in the shape of a square. The square measures 6 yards on each side. Visitors can view the herbs from a diagonal pathway through the garden. How long is the pathway?



8-4 Practice

Trigonometry

Use △*LMN* to find sin *L*, cos *L*, tan *L*, sin *M*, cos *M*, and tan *M*. Express each ratio as a fraction and as a decimal to the nearest hundredth.



1. $\ell = 15, m = 36, n = 39$

2. $\ell = 12, m = 12\sqrt{3}, n = 24$

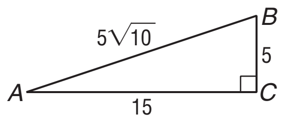
Use a calculator to find each value. Round to the nearest ten-thousandth.

3. sin 72.5

4. tan 27.5

5. cos 64.8

Use the figure to find each trigonometric ratio. Express answers as a fraction and as a decimal rounded to the nearest ten-thousandth.



6. cos A

7. tan B

8. sin A

Find the measure of each acute angle to the nearest tenth of a degree.

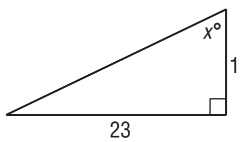
9. $\sin B = 0.7823$

10. $\tan A = 0.2356$

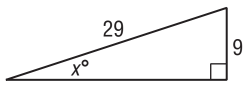
11. $\cos R = 0.6401$

Find *x*. Round to the nearest tenth.

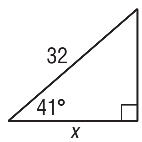
12.



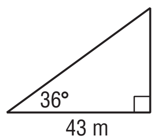
13.



14.



15. GEOGRAPHY Diego used a theodolite to map a region of land for his class in geomorphology. To determine the elevation of a vertical rock formation, he measured the distance from the base of the formation to his position and the angle between the ground and the line of sight to the top of the formation. The distance was 43 meters and the angle was 36 degrees. What is the height of the formation to the nearest meter?

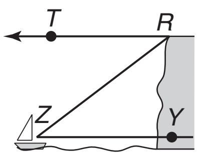


8-5 Practice

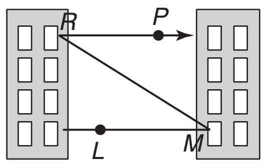
Angles of Elevation and Depression

Name the angle of depression or angle of elevation in each figure.

1.



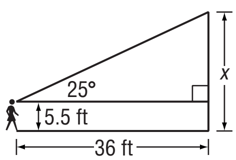
2.



3. **WATER TOWERS** A student can see a water tower from the closest point of the soccer field at San Lobos High School. The edge of the soccer field is about 110 feet from the water tower and the water tower stands at a height of 32.5 feet. What is the angle of elevation if the eye level of the student viewing the tower from the edge of the soccer field is 6 feet above the ground? Round to the nearest tenth degree.

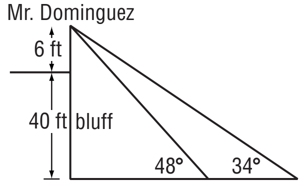
4. **CONSTRUCTION** A roofer props a ladder against a wall so that the top of the ladder reaches a 30-foot roof that needs repair. If the angle of elevation from the bottom of the ladder to the roof is 55°, how far is the ladder from the base of the wall? Round your answer to the nearest foot.

5. **TOWN ORDINANCES** The town of Belmont restricts the height of flagpoles to 25 feet on any property. Lindsay wants to determine whether her school is in compliance with the regulation. Her eye level is 5.5 feet from the ground and she stands 36 feet from the flagpole. If the angle of elevation is about 25°, what is the height of the flagpole to the nearest tenth foot?



6. **GEOGRAPHY** Stephan is standing on a mesa at the Painted Desert. The elevation of the mesa is about 1380 meters and Stephan's eye level is 1.8 meters above ground. If Stephan can see a band of multicolored shale at the bottom and the angle of depression is 29°, about how far is the band of shale from his eyes? Round to the nearest meter.

7. **INDIRECT MEASUREMENT** Mr. Dominguez is standing on a 40-foot ocean bluff near his home. He can see his two dogs on the beach below. If his line of sight is 6 feet above the ground and the angles of depression to his dogs are 34° and 48°, how far apart are the dogs to the nearest foot?



NAME _______________ DATE _______ PERIOD _____

8-6 Practice

The Law of Sines

Lesson 8-6

Find each measure using the given measures from $\triangle EFG$. Round angle measures to the nearest tenth degree and side measures to the nearest tenth.

1. If $m\angle G = 14$, $m\angle E = 67$, and $e = 14$, find g.

2. If $e = 12.7$, $m\angle E = 42$, and $m\angle F = 61$, find f.

3. If $g = 14$, $f = 5.8$, and $m\angle G = 83$, find $m\angle F$.

4. If $e = 19.1$, $m\angle G = 34$, and $m\angle E = 56$, find g.

5. If $f = 9.6$, $g = 27.4$, and $m\angle G = 43$, find $m\angle F$.

Solve each $\triangle STU$ described below. Round measures to the nearest tenth.

6. $m\angle T = 85$, $s = 4.3$, $t = 8.2$

7. $s = 40$, $u = 12$, $m\angle S = 37$

8. $m\angle U = 37$, $t = 2.3$, $m\angle T = 17$

9. $m\angle S = 62$, $m\angle U = 59$, $s = 17.8$

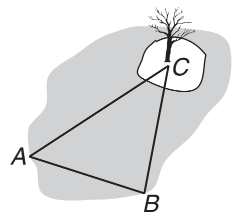
10. $t = 28.4$, $u = 21.7$, $m\angle T = 66$

11. $m\angle S = 89$, $s = 15.3$, $t = 14$

12. $m\angle T = 98$, $m\angle U = 74$, $u = 9.6$

13. $t = 11.8$, $m\angle S = 84$, $m\angle T = 47$

14. INDIRECT MEASUREMENT To find the distance from the edge of the lake to the tree on the island in the lake, Hannah set up a triangular configuration as shown in the diagram. The distance from location A to location B is 85 meters. The measures of the angles at A and B are 51° and 83°, respectively. What is the distance from the edge of the lake at B to the tree on the island at C?



8-7 Practice

The Law of Cosines

In $\triangle JKL$, given the following measures, find the measure of the missing side. Round to the nearest tenth.

1. $j = 1.3$, $k = 10$, $m\angle L = 77$
2. $j = 9.6$, $\ell = 1.7$, $m\angle K = 43$
3. $j = 11$, $k = 7$, $m\angle L = 63$
4. $k = 4.7$, $\ell = 5.2$, $m\angle J = 112$

In $\triangle MNQ$, given the lengths of the sides, find the measure of the stated angle to the nearest tenth.

5. $m = 17$, $n = 23$, $q = 25$; $m\angle Q$
6. $m = 24$, $n = 28$, $q = 34$; $m\angle M$
7. $m = 12.9$, $n = 18$, $q = 20.5$; $m\angle N$
8. $m = 23$, $n = 30.1$, $q = 42$; $m\angle Q$

Determine whether the Law of Sines or the Law of Cosines should be used first to solve $\triangle ABC$. Then solve each triangle. Round angle measures to the nearest degree and side measure to the nearest tenth.

9. $a = 13$, $b = 18$, $c = 19$
10. $a = 6$, $b = 19$, $m\angle C = 38$
11. $a = 17$, $b = 22$, $m\angle B = 49$
12. $a = 15.5$, $b = 18$, $m\angle C = 72$

Solve each $\triangle FGH$ described below. Round measures to the nearest tenth.

13. $m\angle F = 54$, $f = 12.5$, $g = 11$
14. $f = 20$, $g = 23$, $m\angle H = 47$
15. $f = 15.8$, $g = 11$, $h = 14$
16. $f = 36$, $h = 30$, $m\angle G = 54$
17. **REAL ESTATE** The Esposito family purchased a triangular plot of land on which they plan to build a barn and corral. The lengths of the sides of the plot are 320 feet, 286 feet, and 305 feet. What are the measures of the angles formed on each side of the property?

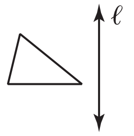
NAME ____ DATE ____________ PERIOD _____

9-1 Practice

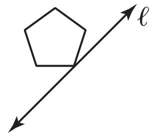
Reflections

Draw the image of each figure under a reflection in line ℓ.

1.

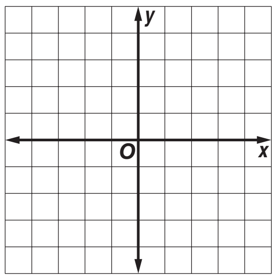


2.

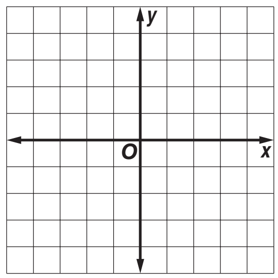


COORDINATE GEOMETRY Graph each figure and its image under the given reflection.

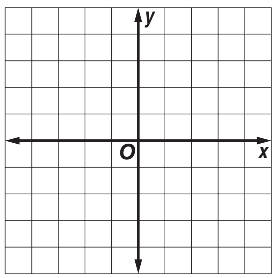
3. quadrilateral *ABCD* with vertices $A(-3, 3)$, $B(1, 4)$, $C(4, 0)$, and $D(-3, -3)$ in the origin



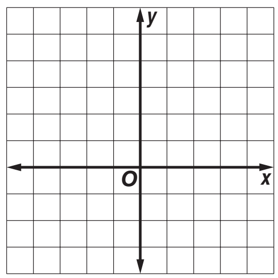
4. $\triangle FGH$ with vertices $F(-3, -1)$, $G(0, 4)$, and $H(3, -1)$ in the line $y = x$



5. rectangle *QRST* with vertices $Q(-3, 2)$, $R(-1, 4)$, $S(2, 1)$, and $T(0, -1)$ in the x-axis

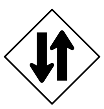


6. trapezoid *HIJK* with vertices $H(-2, 5)$, $I(2, 5)$, $J(-4, -1)$, and $K(-4, 3)$ in the y-axis

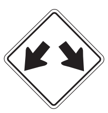


ROAD SIGNS Determine how many lines of symmetry each sign has. Then determine whether the sign has point symmetry.

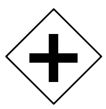
7.



8.



9.



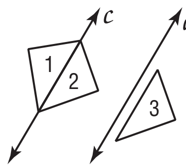
Lesson 9-1

9-2 Practice

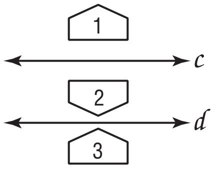
Translations

In each figure, $c \parallel d$. Determine whether Figure 3 is a translation image of Figure 1. Write *yes* or *no*. Explain your answer.

1.

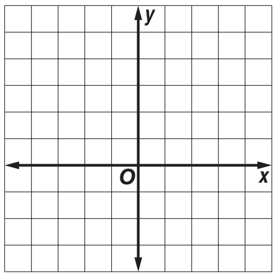


2.

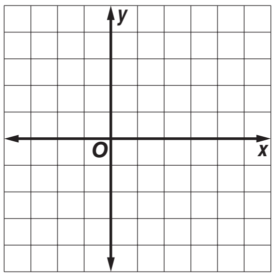


COORDINATE GEOMETRY Graph each figure and its image under the given translation.

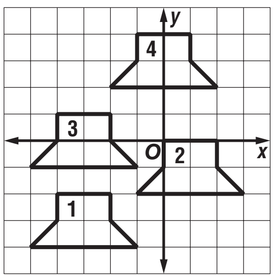
3. quadrilateral $TUWX$ with vertices $T(-1, 1)$, $U(4, 2)$, $W(1, 5)$, and $X(-1, 3)$ under the translation $(x, y) \rightarrow (x - 2, y - 4)$



4. pentagon $DEFGH$ with vertices $D(-1, -2)$, $E(2, -1)$, $F(5, -2)$, $G(4, -4)$, $H(1, -4)$ under the translation $(x, y) \rightarrow (x - 1, y + 5)$



ANIMATION Find the translation that moves the figure on the coordinate plane.



5. figure 1 → figure 2

6. figure 2 → figure 3

7. figure 3 → figure 4

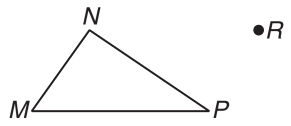
NAME _______________________________ DATE __________ PERIOD _____

9-3 Practice

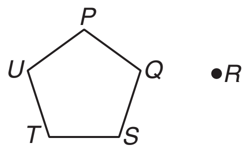
Rotations

Rotate each figure about point R under the given angle of rotation and the given direction. Label the vertices of the rotation image.

1. 80° counterclockwise

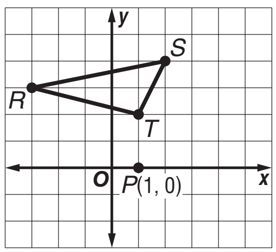


2. 100° clockwise

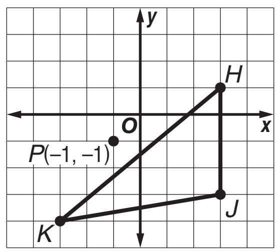


COORDINATE GEOMETRY Draw the rotation image of each figure 90° in the given direction about the center point and label the coordinates.

3. $\triangle RST$ with vertices $R(-3, 3)$, $S(2, 4)$, and $T(1, 2)$ clockwise about the point $P(1, 0)$

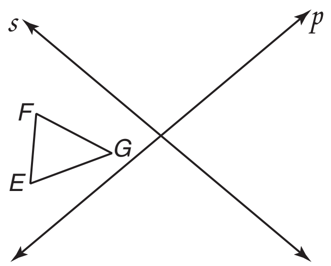


4. $\triangle HJK$ with vertices $H(3, 1)$, $J(3, -3)$, and $K(-3, -4)$ counterclockwise about the point $P(-1, -1)$

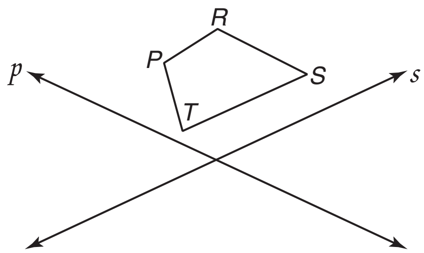


Use a composition of reflections to find the rotation image with respect to lines p and s. Then find the angle of rotation for each image.

5.



6.



7. STEAMBOATS A paddle wheel on a steamboat is driven by a steam engine that rotates the paddles attached to the wheel to propel the boat through the water. If a paddle wheel consists of 18 evenly spaced paddles, identify the order and magnitude of its rotational symmetry.

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9-4 Practice

Tessellations

Determine whether each regular polygon tessellates the plane. Explain.

1. 22-gon

2. 40-gon

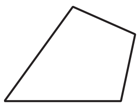
Determine whether a semi-regular tessellation can be created from each set of figures. Assume each figure has a side length of 1 unit.

3. regular pentagons and regular decagons

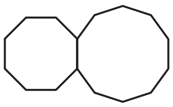
4. regular dodecagons, regular hexagons, and squares

Determine whether each polygon tessellates the plane. If so, describe the tessellation as *uniform*, *not uniform*, *regular*, or *semi-regular*.

5. kite

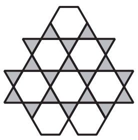


6. octagon and decagon

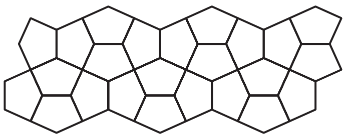


Determine whether each pattern is a tessellation. If so, describe it as *uniform*, *not uniform*, *regular*, or *semi-regular*.

7.

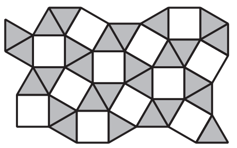


8.



FLOOR TILES For Exercises 9 and 10, use the following information.

Mr. Martinez chose the pattern of tile shown to retile his kitchen floor.



9. Determine whether the pattern is a tessellation. Explain

10. Is the pattern uniform, regular, or semi-regular?

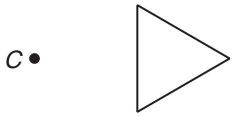
NAME ______________________________ DATE ____________ PERIOD _____

9-5 Practice

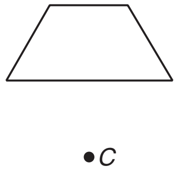
Dilations

Draw the dilation image of each figure with center *C* and the given scale factor.

1. $r = \frac{3}{2}$



2. $r = \frac{2}{3}$



Find the measure of the dilation image $\overline{A'T'}$ or of the preimage $\overline{AT}$ using the given scale factor.

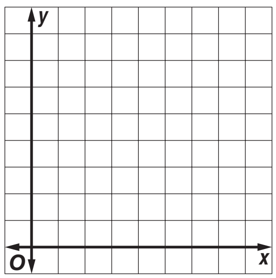
3. $AT = 15, r = \frac{3}{5}$

4. $AT = 30, r = -\frac{1}{6}$

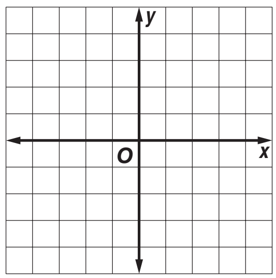
5. $A'T' = 12, r = \frac{4}{3}$

COORDINATE GEOMETRY **Find the image of each polygon, given the vertices, after a dilation centered at the origin with a scale factor of 2. Then graph a dilation centered at the origin with a scale factor of $\frac{1}{2}$.**

6. $A(1, 1), C(2, 3), D(4, 2), E(3, 1)$

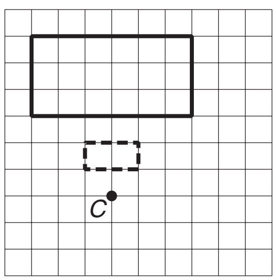


7. $Q(-1, -1), R(0, 2), S(2, 1)$

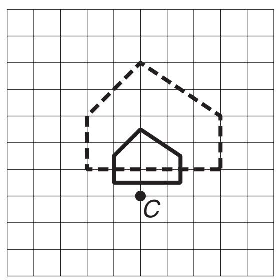


Determine the scale factor for each dilation with center *C*. Determine whether the dilation is an *enlargement*, *reduction*, or *congruence transformation*. The dotted figure is the dilation image.

8.



9.



10. PHOTOGRAPHY Estebe enlarged a 4-inch by 6-inch photograph by a factor of $\frac{5}{2}$. What are the new dimensions of the photograph?

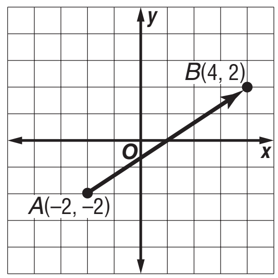
NAME ______________________________ DATE ____________ PERIOD _____

9-6 Practice

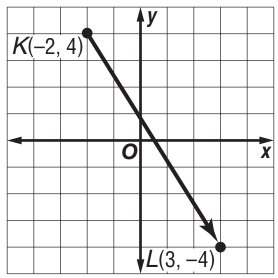
Vectors

Write the component form of each vector.

1.



2.



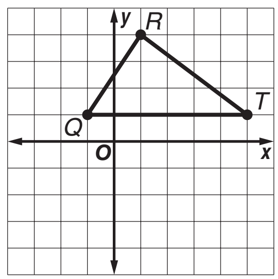
Find the magnitude and direction of $\overrightarrow{FG}$ for the given coordinates. Round to the nearest tenth.

3. $F(-8, -5)$, $G(-2, 7)$

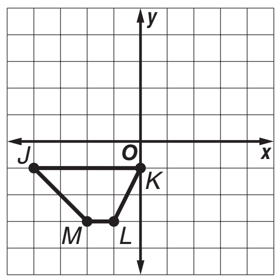
4. $F(-4, 1)$, $G(5, -6)$

Graph the image of each figure under a translation by the given vector(s).

5. $\triangle QRT$ with vertices $Q(-1, 1)$, $R(1, 4)$, $T(5, 1)$; $\vec{\mathbf{s}} = \langle -2, -5 \rangle$



6. trapezoid with vertices $J(-4, -1)$, $K(0, -1)$, $L(-1, -3)$, $M(-2, -3)$; $\vec{\mathbf{c}} = \langle 5, 4 \rangle$ and $\vec{\mathbf{d}} = \langle -2, 1 \rangle$



Find the magnitude and direction of each resultant for the given vectors.

7. $\vec{\mathbf{a}} = \langle -6, 4 \rangle$, $\vec{\mathbf{b}} = \langle 4, 6 \rangle$

8. $\vec{\mathbf{e}} = \langle -4, -5 \rangle$, $\vec{\mathbf{f}} = \langle -1, 3 \rangle$

AVIATION For Exercises 9 and 10, use the following information.

A jet begins a flight along a path due north at 300 miles per hour. A wind is blowing due west at 30 miles per hour.

9. Find the resultant velocity of the plane.

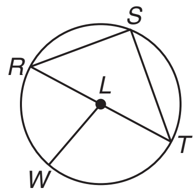
10. Find the resultant direction of the plane.

NAME ______________________________ DATE ____________ PERIOD _____

10-1 Practice

Circles and Circumference

For Exercises 1–7, refer to the circle at the right.



1. Name the circle.

2. Name a radius.

3. Name a chord.

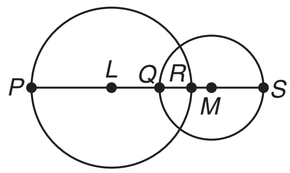
4. Name a diameter.

5. Name a radius not drawn as part of a diameter.

6. Suppose the radius of the circle is 3.5 yards. Find the diameter.

7. If $RT = 19$ meters, find LW.

The diameters of $\odot L$ and $\odot M$ are 20 and 13 units, respectively. Find each measure if $QR = 4$.



8. LQ

9. RM

The radius, diameter, or circumference of a circle is given. Find the missing measures to the nearest hundredth.

10. $r = 7.5$ mm

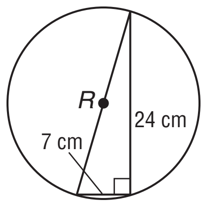
$d =$ ____________, $C \approx$ ____________

11. $C = 227.6$ yd

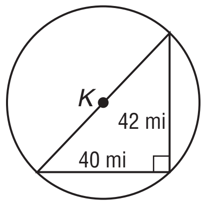
$d \approx$ ____________, $r \approx$ ____________

Find the exact circumference of each circle.

12.



13.



SUNDIALS For Exercises 14 and 15, use the following information.
Herman purchased a sundial to use as the centerpiece for a garden. The diameter of the sundial is 9.5 inches.

14. Find the radius of the sundial.

15. Find the circumference of the sundial to the nearest hundredth.

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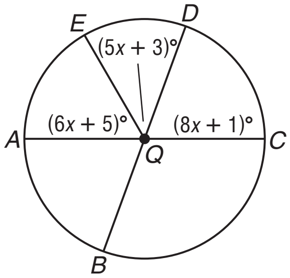
10-2 Practice

Measuring Angles and Arcs

ALGEBRA In $\odot Q$, $\overline{AC}$ and $\overline{BD}$ are diameters. Find each measure.



1. $m\angle AQE$

2. $m\angle DQE$

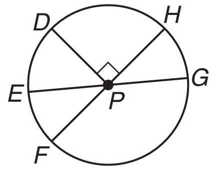
3. $m\angle CQD$

4. $m\angle BQC$

5. $m\angle CQE$

6. $m\angle AQD$

In $\odot P$, $m\angle GPH = 38$. Find each measure.



7. $m\widehat{EF}$

8. $m\widehat{DE}$

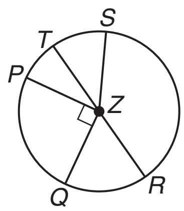
9. $m\widehat{FG}$

10. $m\widehat{DHG}$

11. $m\widehat{DFG}$

12. $m\widehat{DGE}$

The radius of $\odot Z$ is 13.5 units long. Find the length of each arc for the given angle measure.



13. $\widehat{QPT}$ if $m\angle QZT = 120$

14. $\widehat{QR}$ if $m\angle QZR = 60$

15. $\widehat{PQR}$ if $m\angle PZR = 150$

16. $\widehat{QPS}$ if $m\angle QZS = 160$

HOMEWORK For Exercises 17 and 18, refer to the table, which shows the number of hours students at Leland High School say they spend on homework each night.

Homework	
Less than 1 hour	8%
1–2 hours	29%
2–3 hours	58%
3–4 hours	3%
Over 4 hours	2%

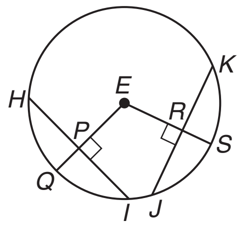
17. If you were to construct a circle graph of the data, how many degrees would be allotted to each category?

18. Describe the arcs associated with each category.

10-3 Practice

Arcs and Chords

In ⊙E, $m\widehat{HQ} = 48$, $HI = JK$, and $JR = 7.5$. Find each measure.



1. $m\widehat{HI}$

2. $m\widehat{QI}$

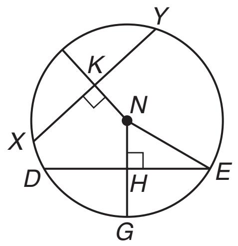
3. $m\widehat{JK}$

4. HI

5. PI

6. JK

The radius of ⊙N is 18, $NK = 9$, and $m\widehat{DE} = 120$. Find each measure.



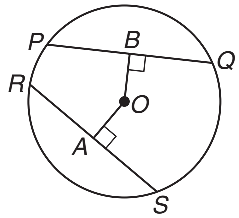
7. $m\widehat{GE}$

8. $m\angle HNE$

9. $m\angle HEN$

10. HN

The radius of ⊙$O = 32$, $\widehat{PQ} \cong \widehat{RS}$, and $PQ = 56$. Find each measure.



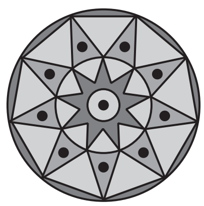
11. PB

14. BQ

12. OB

16. RS

13. MANDALAS The base figure in a mandala design is a nine-pointed star. Find the measure of each arc of the circle circumscribed about the star.

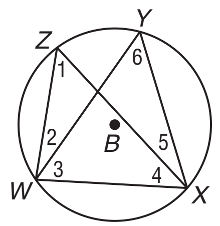


NAME ______________________________ DATE ____________ PERIOD _____

10-4 Practice

Inscribed Angles

In $\odot B$, $m\widehat{WX} = 104$, $m\widehat{WZ} = 88$, and $m\angle ZWY = 26$. Find the measure of each angle.



1. $m\angle 1$

2. $m\angle 2$

3. $m\angle 3$

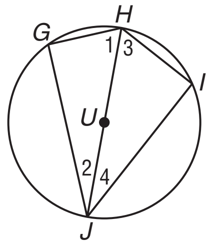
4. $m\angle 4$

5. $m\angle 5$

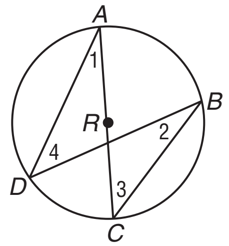
6. $m\angle 6$

ALGEBRA **Find the measure of each numbered angle for each figure.**

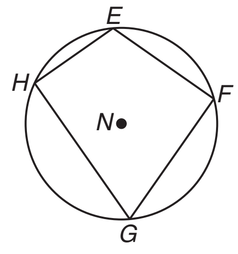
7. $m\angle 1 = 5x + 2$, $m\angle 2 = 2x - 3$, $m\angle 3 = 7y - 1$, $m\angle 4 = 2y + 10$



8. $m\angle 1 = 4x - 7$, $m\angle 2 = 2x + 11$, $m\angle 3 = 5y - 14$, $m\angle 4 = 3y + 8$



Quadrilateral *EFGH* is inscribed in $\odot N$ such that $m\widehat{FG} = 97$, $m\widehat{GH} = 117$, and $m\widehat{EHG} = 164$. Find each measure.



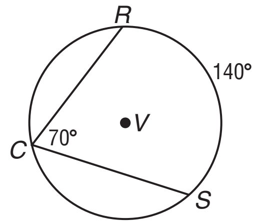
9. $m\angle E$

10. $m\angle F$

11. $m\angle G$

12. $m\angle H$

13. PROBABILITY In $\odot V$, point C is randomly located so that it does not coincide with points R or S. If $m\widehat{RS} = 140$, what is the probability that $m\angle RCS = 70$?

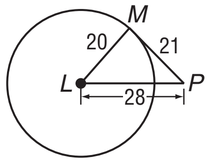


10-5 Practice

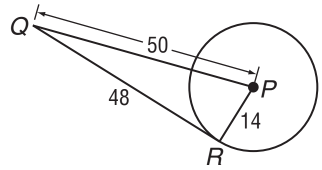
Tangents

Determine whether each segment is tangent to the given circle.

1. $\overline{MP}$

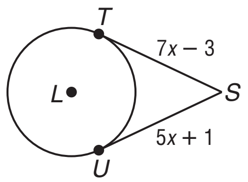


2. $\overline{QR}$

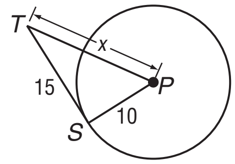


Find *x*. Assume that segments that appear to be tangent are tangent.

3.

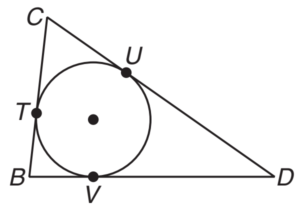


4.

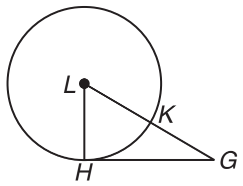


Find the perimeter of each polygon for the given information. Assume that segments that appear to be tangent are tangent.

5. $CD = 52$, $CU = 18$, $TB = 12$

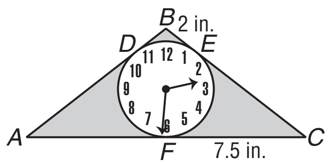


6. $KG = 32$, $HG = 56$



CLOCKS For Exercises 7 and 8, use the following information.

The design shown in the figure is that of a circular clock face inscribed in a triangular base. *AF* and *FC* are equal.



7. Find *AB*.

8. Find the perimeter of the clock.

Lesson 10-5

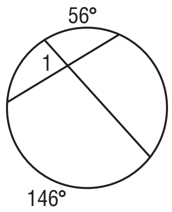
NAME _______________________________________ DATE ____________ PERIOD _____

10-6 Practice

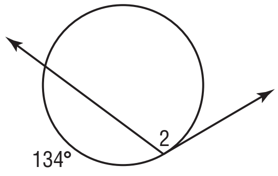
Secants, Tangents, and Angle Measures

Find each measure.

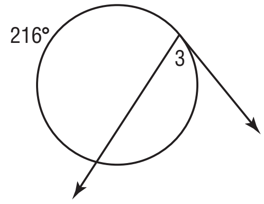
1. $m\angle 1$



2. $m\angle 2$

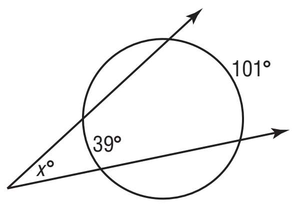


3. $m\angle 3$

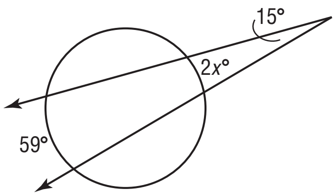


Find *x*. Assume that any segment that appears to be tangent is tangent.

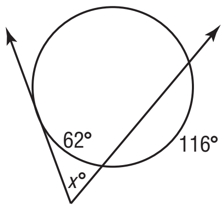
7.



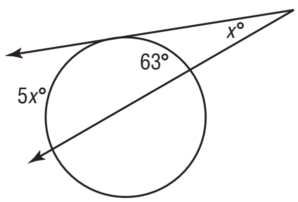
8.



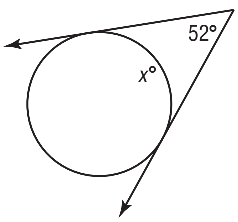
9.



10.



11.



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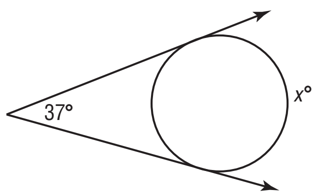
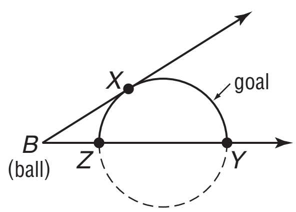


9. RECREATION In a game of kickball, Rickie has to kick the ball through a semicircular goal to score. If $m\widehat{XZ} = 58$ and the $m\widehat{XY} = 122$, at what angle must Rickie kick the ball to score? Explain.



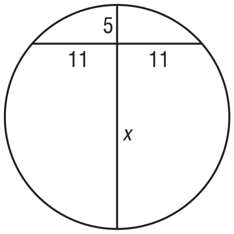
NAME ____ DATE ____________ PERIOD _____

10-7 Practice

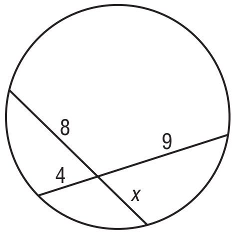
Special Segments in a Circle

Find x to the nearest tenth if necessary. Assume that segments that appear to be tangent are tangent.

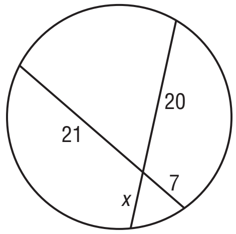
1.



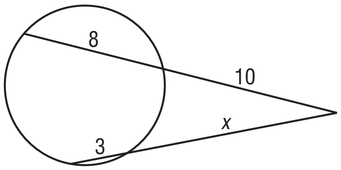
2.



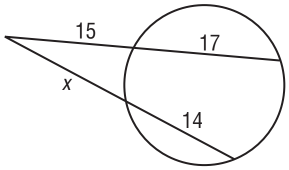
3.



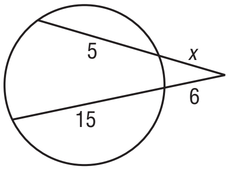
4.



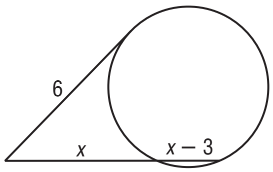
5.



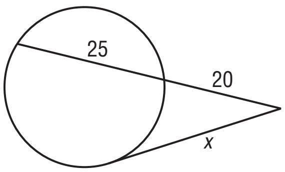
6.



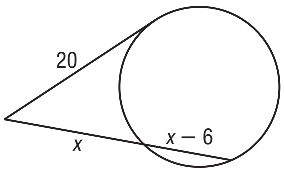
7.



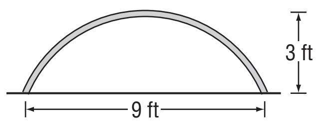
8.



9.



10. CONSTRUCTION An arch over an apartment entrance is 3 feet high and 9 feet wide. Find the radius of the circle containing the arc of the arch.



Lesson 10-7

NAME ______________________________ DATE ____________ PERIOD _____

10-8 Practice

Equations of Circles

Write an equation for each circle.

1. center at origin, $r = 7$

2. center at $(0, 0)$, $d = 18$

3. center at $(-7, 11)$, $r = 8$

4. center at $(12, -9)$, $d = 22$

5. center at $(-6, -4)$, $r = \sqrt{5}$

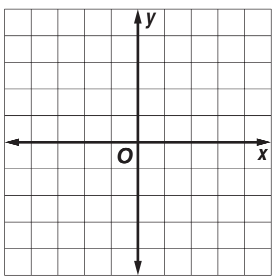
6. center at $(3, 0)$, $d = 28$

7. a circle with center at $(-5, 3)$ and a radius with endpoint $(2, 3)$

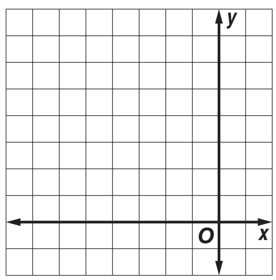
8. a circle whose diameter has endpoints $(4, 6)$ and $(-2, 6)$

Graph each equation.

9. $x^2 + y^2 = 4$



10. $(x + 3)^2 + (y - 3)^2 = 9$



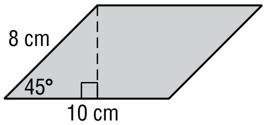
11. EARTHQUAKES When an earthquake strikes, it releases seismic waves that travel in concentric circles from the epicenter of the earthquake. Seismograph stations monitor seismic activity and record the intensity and duration of earthquakes. Suppose a station determines that the epicenter of an earthquake is located about 50 kilometers from the station. If the station is located at the origin, write an equation for the circle that represents a possible epicenter of the earthquake.

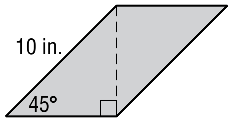
11-1 Practice

Areas of Parallelograms

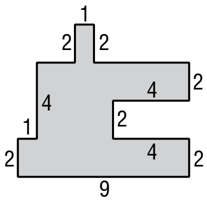
Find the perimeter and area of each parallelogram. Round to the nearest tenth if necessary.

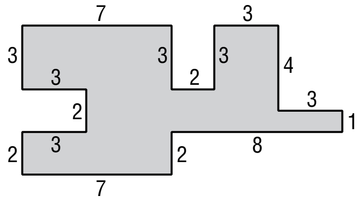
1.


2.


3.


Find the area of each figure.

4.


5.


COORDINATE GEOMETRY Given the coordinates of the vertices of a quadrilateral, determine whether it is a *square*, a *rectangle*, or a *parallelogram*. Then find the area of the quadrilateral.

6. $C(-4, -1), D(-4, 2), F(1, 2), G(1, -1)$

7. $W(2, 2), X(1, -2), Y(-2, -2), Z(-1, 2)$

8. $M(0, 4), N(4, 6), O(6, 2), P(2, 0)$

9. $P(-5, 2), Q(4, 2), R(5, 5), S(-4, 5)$

FRAMING For Exercises 10–12, use the following information.

A rectangular poster measures 42 inches by 26 inches. A frame shop fitted the poster with a half-inch mat border.

10. Find the area of the poster.

11. Find the area of the mat border.

12. Suppose the wall is marked where the poster will hang. The marked area includes an additional 12-inch space around the poster and frame. Find the total wall area that has been marked for the poster.

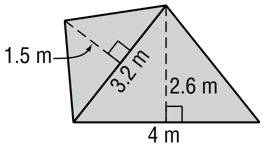
NAME ______________________________ DATE __________ PERIOD _____

11-2 Practice

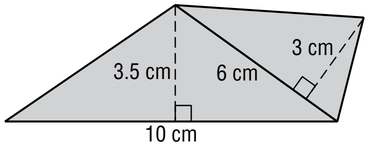
Areas of Triangles, Trapezoids, and Rhombi

Find the area of each figure. Round to the nearest tenth if necessary.

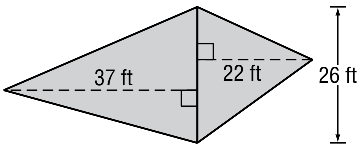
1.



2.



3.



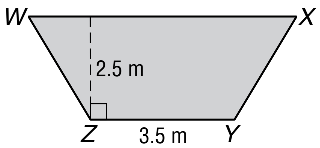
Find the area of each quadrilateral given the coordinates of the vertices.

4. trapezoid $ABCD$
$A(-7, 1)$, $B(-4, 4)$, $C(-4, -6)$,
$D(-7, -3)$

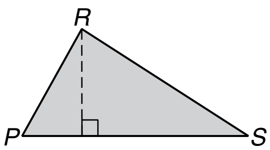
5. rhombus $LMNO$
$L(6, 8)$, $M(14, 4)$, $N(6, 0)$,
$O(-2, 4)$

Find the missing measure for each figure.

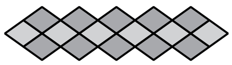
6. Trapezoid $WXYZ$ has an area of 13.75 square meters. Find WX.



7. Triangle PRS has an area of 68 square yards. If the height of $\triangle PRS$ is 8 yards, find the base.



DESIGN For Exercises 8 and 9, use the following information.
Mr. Hagarty used 16 congruent rhombi-shaped tiles to design the midsection of the backsplash area above a kitchen sink. The length of the design is 27 inches and the total area is 108 square inches.



8. Find the area of one rhombus.

9. Find the length of each diagonal.

11-3 Practice

Areas of Regular Polygons and Circles

Find the area of each regular polygon. Round to the nearest tenth.

1. a nonagon with a perimeter of 117 millimeters

2. an octagon with a perimeter of 96 yards

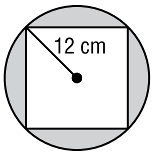
Find the area of each circle. Round to the nearest tenth.

3. a circle with a diameter of 26 feet

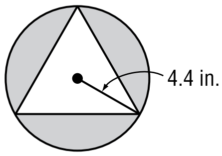
4. a circle with a circumference of 88 kilometers

Find the area of each shaded region. Assume that all polygons are regular. Round to the nearest tenth.

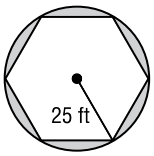
5.



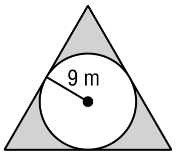
6.



7.



8.



DISPLAYS For Exercises 9 and 10, use the following information.
A display case in a jewelry store has a base in the shape of a regular octagon. The length of each side of the base is 10 inches. The owners of the store plan to cover the base in black velvet.

9. Find the area of the base of the display case.

10. Find the number of square yards of fabric needed to cover the base.

Lesson 11-3

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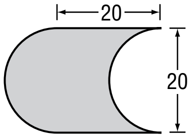
11-4 Practice

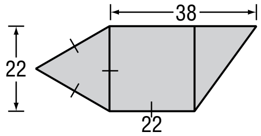
Areas of Composite Figures

Find the area of each figure. Round to the nearest tenth if necessary.

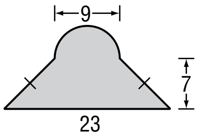
1.



2.



3.



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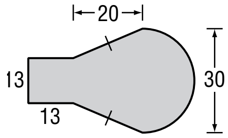
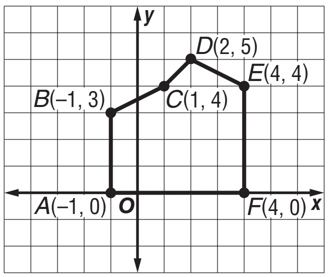
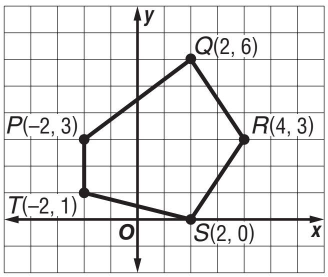


5.

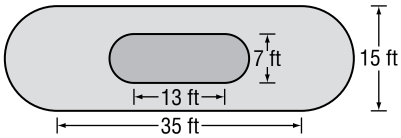


6.



LANDSCAPING For Exercises 7 and 8, use the following information.

One of the displays at a botanical garden is a koi pond with a walkway around it. The figure shows the dimensions of the pond and the walkway.



7. Find the area of the pond to the nearest tenth.

8. Find the area of the walkway to the nearest tenth.

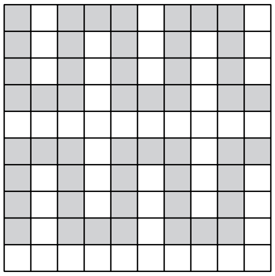
NAME ______________________________ DATE ____________ PERIOD _____

11-5 Practice

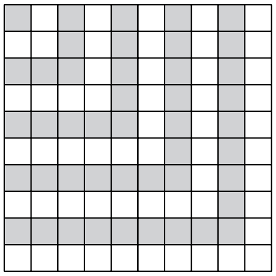
Geometric Probability and Areas of Sectors

Find the probability that a point chosen at random lies in the shaded region.

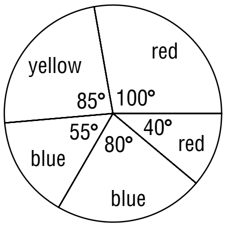
1.



2.



Find the area of the indicated sector. Then find the probability of spinning the color indicated if the diameter of the spinner is 9 meters.



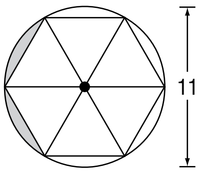
3. red

4. blue

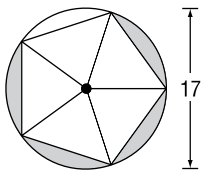
5. yellow

Find the area of the shaded region. Then find the probability that a point chosen at random is in the shaded region. Assume that all inscribed polygons are regular.

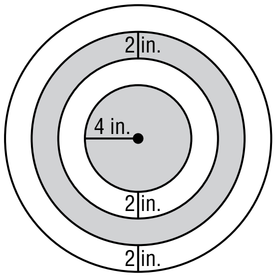
6.



7.



8. ARCHERY A target consists of four concentric rings. The radius of the center circle is 4 inches, and the circles are spaced 2 inches apart. Find the probability that an arrow shot at random by an inexperienced archer will land in a shaded region.



Lesson 11-5

NAME ______________________________ DATE ____________ PERIOD _____

12-1 Practice

Representations of Three-Dimensional Figures

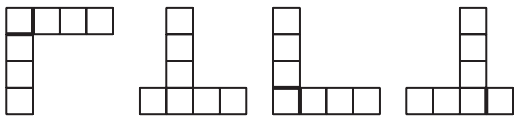
Sketch each solid using isometric dot paper.

1. rectangular prism 3 units high, 3 units long, and 2 units wide

2. triangular prism 3 units high, whose bases are right triangles with legs 2 units and 4 units long

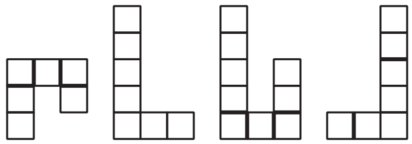
Draw the back view and corner view of a figure given each orthogonal drawing.

3.



top view left view front view right view

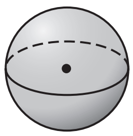
4.



top view left view front view right view

Determine the cross-section resulting from the horizontal and vertical slice of each solid.

5.



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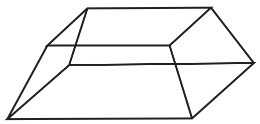


7. SPHERES Consider the sphere in Exercise 5. Based on the cross-section resulting from the horizontal and vertical slice of the sphere, make a conjecture about all spherical cross-sections.

8. MINERALS Pyrite, also known as fool's gold, can form crystals that are perfect cubes. Suppose a gemologist wants to cut a cube of pyrite to get a square and a rectanglar face. What cuts should be made to get each of the shapes? Illustrate your answers.

Lesson 12-1

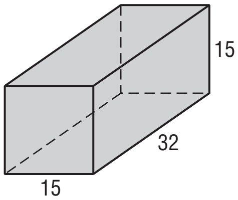
NAME _______________ DATE _______ PERIOD _____

12-2 Practice

Surface Areas of Prisms

Find the lateral area of each prism. Round to the nearest tenth if necessary.

1.



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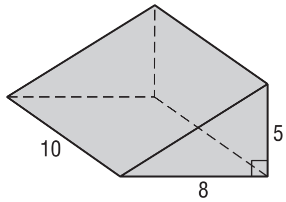

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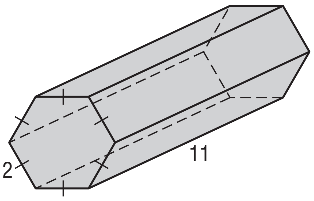

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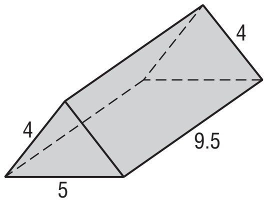
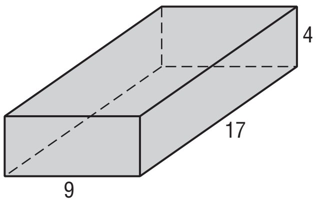


Find the surface area of each prism. Round to the nearest tenth if necessary.

5.



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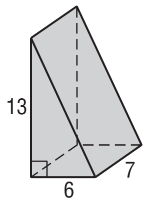

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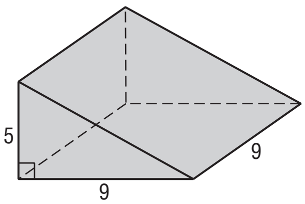

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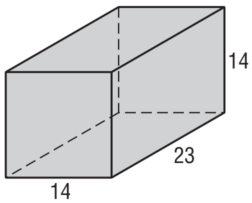


9. CRAFTS Becca made a rectangular jewelry box in her art class and plans to cover it in red silk. If the jewelry box is $6\frac{1}{2}$ inches long, $4\frac{1}{2}$ inches wide, and 3 inches high, find the surface area that will be covered.

Lesson 12-2

12-3 Practice

Surface Areas of Cylinders

Find the surface area of a cylinder with the given dimensions. Round to the nearest tenth.

1. $r = 8$ cm, $h = 9$ cm

2. $r = 12$ in., $h = 14$ in.

3. $d = 14$ mm, $h = 32$ mm

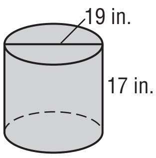
4. $d = 6$ yd, $h = 12$ yd

5. $r = 2.5$ ft, $h = 7$ ft

6. $d = 13$ m, $h = 20$ m

Find the surface area of each cylinder. Round to the nearest tenth.

7.



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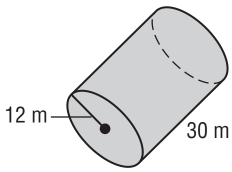


Find the radius of the base of each right cylinder.

9. The surface area is 628.3 square millimeters, and the height is 15 millimeters.

10. The surface area is 892.2 square feet, and the height is 4.2 feet.

11. The surface area is 158.3 square inches, and the height is 5.4 inches.

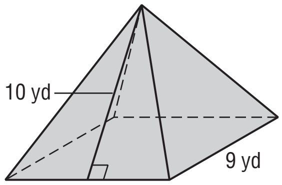
12. KALEIDOSCOPES Nathan built a kaleidoscope with a 20-centimeter barrel and a 5-centimeter diameter. He plans to cover the barrel with embossed paper of his own design. How many square centimeters of paper will it take to cover the barrel of the kaleidoscope?

12-4 Practice

Surface Areas of Pyramids

Find the surface area of each regular pyramid. Round to the nearest tenth if necessary.

1.



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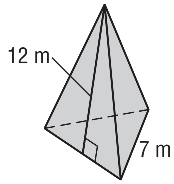

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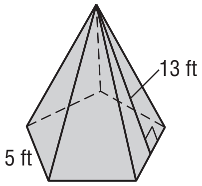

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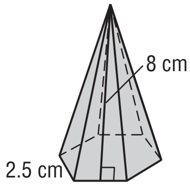

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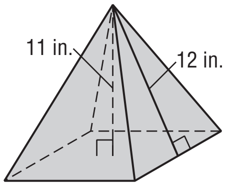

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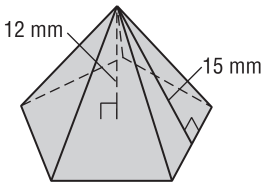

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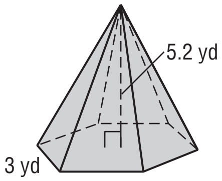

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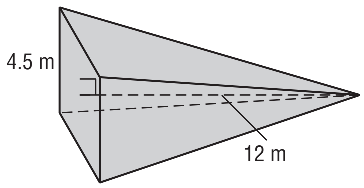


9. GAZEBOS The roof of a gazebo is a regular octagonal pyramid. If the base of the pyramid has sides of 0.5 meters and the slant height of the roof is 1.9 meters, find the area of the roof.

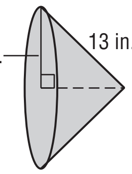
NAME ____ DATE ____________ PERIOD _____

12-5 Practice

Surface Areas of Cones

Find the surface area of each cone. Round to the nearest tenth if necessary.

1.



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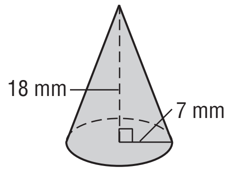

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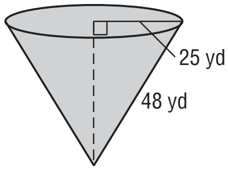

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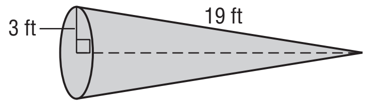
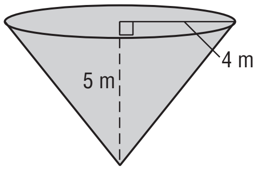


5.



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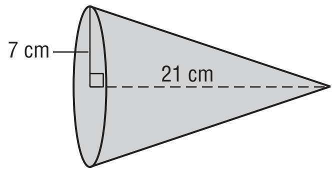


7. Find the surface area of a cone if the height is 8 feet and the slant height is 10 feet.

8. Find the surface area of a cone if the height is 14 centimeters and the slant height is 16.4 centimeters.

9. Find the surface area of a cone if the height is 12 inches and the diameter is 27 inches.

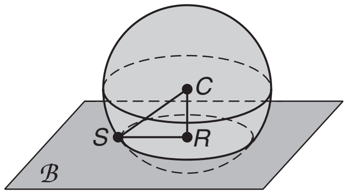
10. HATS Cuong bought a conical hat on a recent trip to central Vietnam. The basic frame of the hat is 16 hoops of bamboo that gradually diminish in size. The hat is covered in palm leaves. If the hat has a diameter of 50 centimeters and a slant height of 32 centimeters, what is the lateral area of the conical hat?

NAME ____ DATE ____________ PERIOD _____

12-6 Practice

Surface Areas of Spheres

In the figure, C is the center of the sphere, and plane $\mathcal{B}$ intersects the sphere in circle R. Round to the nearest tenth if necessary.



1. If $CR = 4$ and $SR = 14$, find CS.

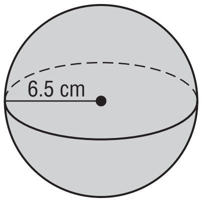
2. If $CR = 7$ and $SR = 24$, find CS.

3. If the radius of the sphere is 28 units and the radius of $\odot R$ is 26 units, find CR.

4. If J is a point on $\odot R$ and $CS = 7.3$, find CJ.

Find the surface area of each sphere or hemisphere. Round to the nearest tenth.

5.



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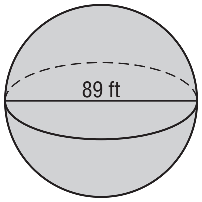


7. a sphere with the area of a great circle 29.8 meters

8. a hemisphere with a radius of the great circle 8.4 inches

9. a hemisphere with the circumference of a great circle 18 millimeters

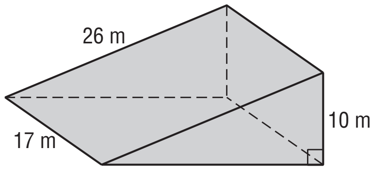
10. SPORTS A standard size 5 soccer ball for ages 13 and older has a circumference of 27–28 inches. Suppose Breck is on a team that plays with a 28-inch soccer ball. Find the surface area of the ball.

13-1 Practice

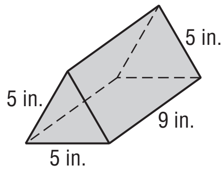
Volumes of Prisms and Cylinders

Find the volume of each prism or cylinder. Round to the nearest tenth if necessary.

1.



2.



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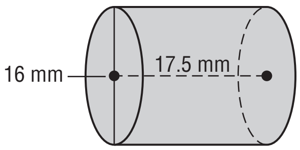

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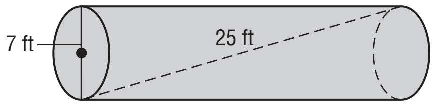

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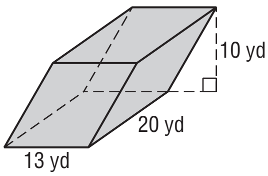

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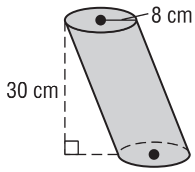


AQUARIUM For Exercises 7–9, use the following information. Round answers to the nearest tenth.

Mr. Gutierrez purchased a cylindrical aquarium for his office. The aquarium has a height of $25\frac{1}{2}$ inches and a radius of 21 inches.

7. What is the volume of the aquarium in cubic feet?

8. If there are 7.48 gallons in a cubic foot, how many gallons of water does the aquarium hold?

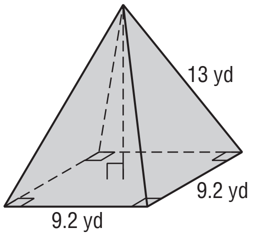
9. If a cubic foot of water weighs about 62.4 pounds, what is the weight of the water in the aquarium to the nearest five pounds?

13-2 Practice

Volumes of Pyramids and Cones

Find the volume of each pyramid or cone. Round to the nearest tenth if necessary.

1.



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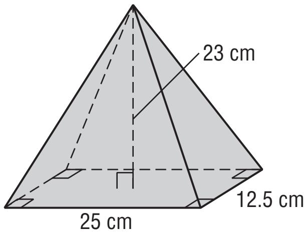

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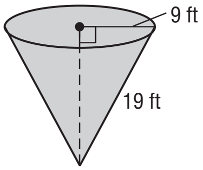

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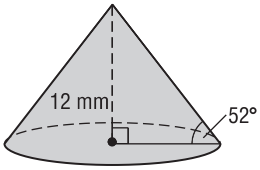

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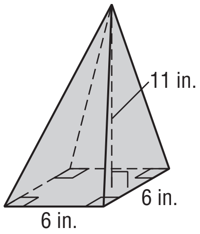

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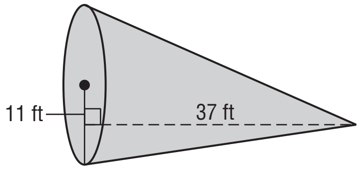


7. CONSTRUCTION Mr. Ganty built a conical storage shed. The base of the shed is 4 meters in diameter, and the height of the shed is 3.8 meters. What is the volume of the shed?

8. HISTORY The start of the pyramid age began with King Zoser's pyramid, erected in the 27th century B.C. In its original state, it stood 62 meters high with a rectangular base that measured 140 meters by 118 meters. Find the volume of the original pyramid.

13-3 Practice

Volumes of Spheres

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

1. The radius of the sphere is 12.4 centimeters.

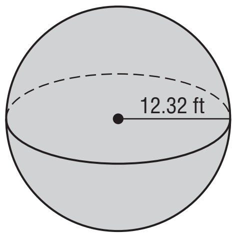
2. The diameter of the sphere is 17 feet.

3. The circumference of the sphere is 38 meters.

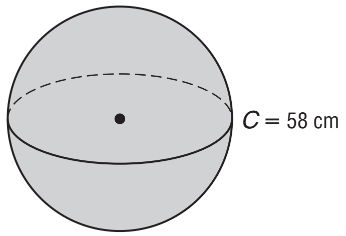
4. The diameter of the hemisphere is 21 inches.

5. The circumference of the hemisphere is 18 millimeters.

6.



7.



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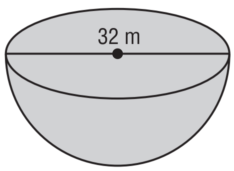
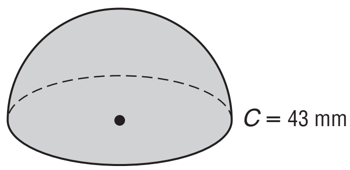


9.



10. PACKAGING Amber plans to ship a mini-basketball she bought for her nephew. The circumference of the ball is 24 inches and the package she wants to ship it in is a rectangular box that measures 8 inches × 8 inches × 9 inches. Will the basketball fit in the box? Explain.

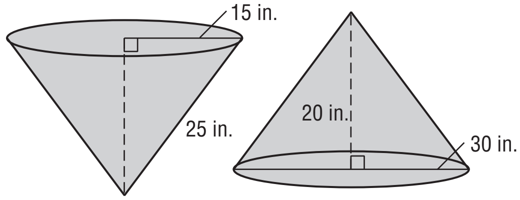
Lesson 13-3

13-4 Practice

Congruent and Similar Solids

Determine whether each pair of solids are *similar*, *congruent*, or *neither*.

1.



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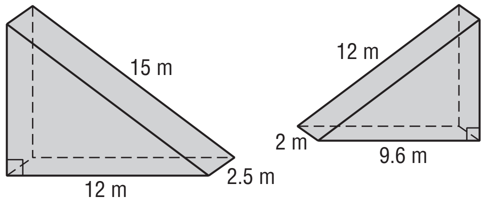

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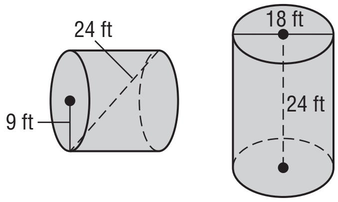

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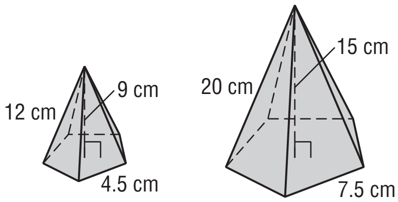
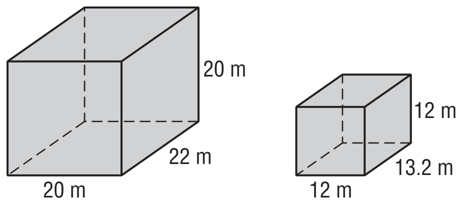


For Exercises 5–8, refer to the two similar prisms.



5. Find the scale factor of the two prisms.

6. Find the ratio of the surface areas.

7. Find the ratio of the volumes.

8. Suppose the surface area of the larger prism is 2560 square meters. Find the surface area of the smaller prism.

9. MINIATURES Frank Lloyd Wright designed every aspect of the Imperial Hotel in Tokyo, including the chairs. The dimensions of a miniature Imperial Hotel chair are 6.25 inches × 3 inches × 2.5 inches. If the scale of the replica is 1:6, what are the dimensions of the original chair?

NAME ____ DATE ____________ PERIOD _____

13-5 Practice

Coordinates in Space

Graph the rectangular solid that contains the given point and the origin as vertices. Label the coordinates of each vertex.

1. $E(4, 6, -2)$ **2.** $R(-3, -5, 4)$

Determine the distance between each pair of points. Then determine the coordinates of the midpoint *M* of the segment joining the pair of points.

3. $Y(-5, 1, 2)$ and $Z(3, -3, 1)$ **4.** $E(4, 2, 0)$ and $F(3, 2, -2)$

5. $B(-2, -2, -3)$ and $C(1, -3, 0)$ **6.** $H(2, 0, -3)$ and $I(4, -1, 5)$

7. ANIMATION Derek wants to animate an image for his science presentation by moving it from one position to another. The mesh of the image is a rectangular prism with coordinates $A(-3, 2, 3)$, $B(-3, 0, 3)$, $C(0, 0, 3)$, $D(0, 2, 3)$, $E(-3, 2, 0)$, $F(-3, 0, 0)$, $G(0, 0, 0)$, and $H(0, 2, 0)$. Find the coordinates of the mesh after the translation $(x, y, z) \rightarrow (x - 7, y, z)$. Graph both the preimage and image of the mesh.