



Geometry

Concepts and Applications

Practice Workbook



To the Teacher:

Answers to each worksheet are found in Glencoe's *Algebra: Concepts and Applications Practice Masters* and also in the Teacher's Wraparound Edition of Glencoe's *Geometry: Concepts and Applications*.



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*Geometry: Concepts and Applications
Practice Workbook*

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Practice***Patterns and Inductive Reasoning******Find the next three terms of each sequence.***

1. 2, 4, 8, 16, ...

2. 18, 9, 0, -9, ...

3. 6, 8, 12, 18, ...

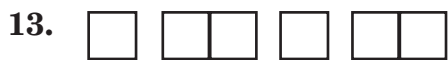
4. 3, -4, -11, -18, ...

5. -11, -6, -1, 4, ...

6. 9, 10, 13, 18, ...

7. 1, 7, 19, 37, ...

8. 14, 15, 17, 20, ...

Draw the next figure in each pattern.

15. Find the next term in the sequence.

$$\frac{1}{19}, \frac{3}{19}, \frac{5}{19}, \dots$$

16. What operation would you use to find the next term in the sequence 96, 48, 24, 12, ...?

17. Find a counterexample for the statement "All birds can fly."

18. Matt made the conjecture that the sum of two numbers is always greater than either number. Find a counterexample for his conjecture.

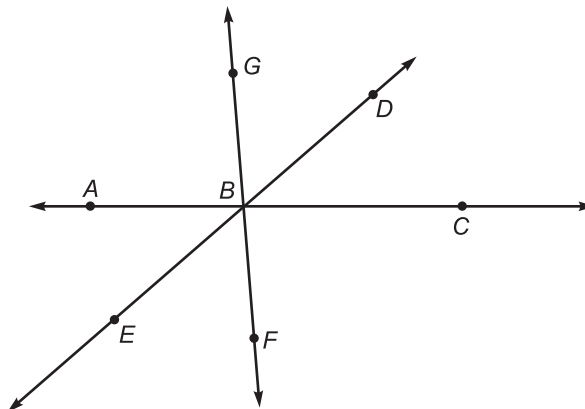
19. Find a counterexample for the statement "All numbers are less than zero."

20. Find a counterexample for the statement "All bears are brown."

Points, Lines, and Planes

Use the figure at the right to name examples of each term.

- ray with point C as the endpoint
- point that is not on \overline{GF}
- two lines
- three rays



Draw and label a figure for each situation described.

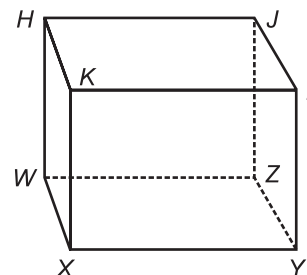
- Lines ℓ , m and j intersect at P .
- Plane \mathcal{N} contains line ℓ .
- Points A , B , C , and D are noncollinear.

Determine whether each model suggests a point, a line, a ray, a segment, or a plane.

- the edge of a book
- a floor of a factory
- the beam from a car headlight

Refer to the figure at the right to answer each question.

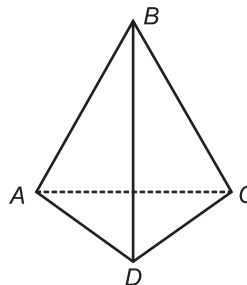
- Are points H , J , K , and L coplanar?
- Name three lines that intersect at X .
- What points do plane $WXYZ$ and HW have in common?
- Are points W , X , and Y collinear?
- List the possibilities for naming a line contained in plane $WXKH$.



Practice

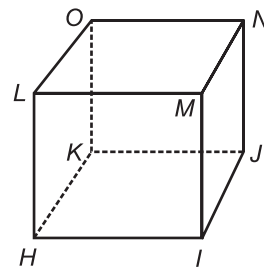
Postulates

- Points A , B , and C are noncollinear. Name all of the different lines that can be drawn through these points.
- What is the intersection of \overleftrightarrow{LM} and \overleftrightarrow{LN} ?
- Name all of the planes that are represented in the figure.



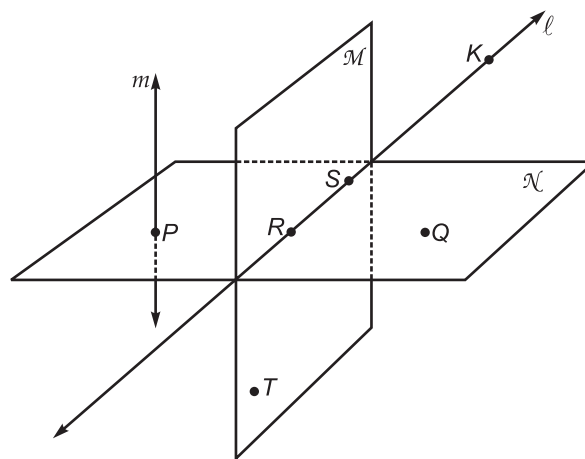
Refer to the figure at the right.

- Name the intersection of ONJ and KJI .
- Name the intersection of KOL and MLH .
- Name two planes that intersect in \overleftrightarrow{MI} .



In the figure, P , Q , R , and S are in plane \mathcal{N} . Determine whether each statement is true or false.

- R , S , and T are collinear.
- There is only one plane that contains all the points R , S , and Q .
- $\angle PQT$ lies in plane \mathcal{N} .
- $\angle SPR$ lies in plane \mathcal{N} .
- If X and Y are two points on line m , then \overleftrightarrow{XY} intersects plane \mathcal{N} at P .
- Point K is on plane \mathcal{N} .
- \mathcal{N} contains \overleftrightarrow{RS} .
- T lies in plane \mathcal{N} .
- R , P , S , and T are coplanar.
- ℓ and m intersect.



Practice***Conditional Statements and Their Converses******Identify the hypothesis and the conclusion of each statement.***

1. If it rains, then I bring my umbrella.
2. If it is Saturday, then I go to the movies.
3. I will go swimming tomorrow if it is hot.
4. If it is a birthday party, I will buy a gift.
5. If I draw a straight line, I will need my ruler.
6. I will do better at my piano recital if I practice each day.

Write two other forms of each statement.

7. If you floss regularly, your gums are healthier.
8. We are in the state finals if we win tomorrow.
9. All odd numbers can be written in the form $2n + 1$.

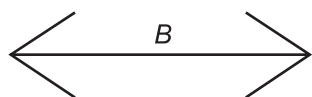
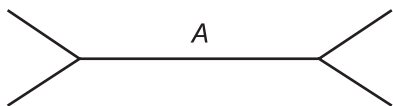
Write the converse of each statement.

10. If two lines never cross, then they are parallel lines.
11. All even numbers are divisible by 2.
12. If $x + 4 = 11$, then $x = 7$.

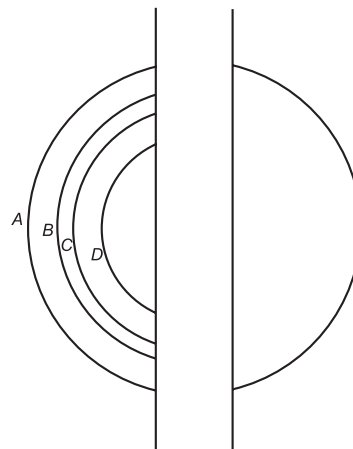
Tools of the Trade

Use a straightedge or compass to answer each question.

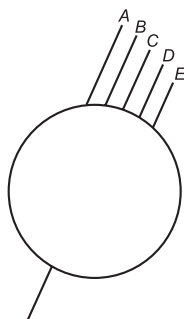
1. Which segment is longer?



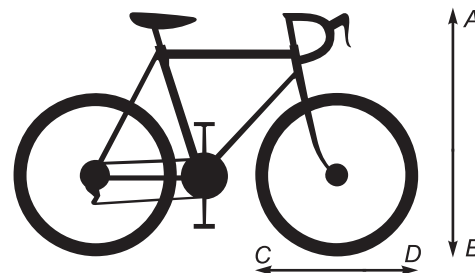
2. Which arc on the left side of the figure corresponds to the right side of the figure?



3. Which line forms a straight line with the segment on the bottom of the figure?

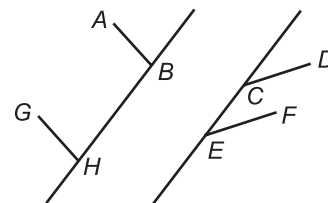


4. Which is greater, the height of the bicycle (from A to B) or the width of the tire (from C to D)?

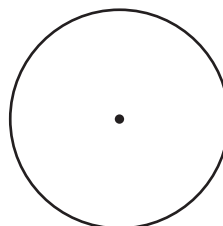


5. If extended, will \overline{AB} intersect \overline{EF} ?

6. If extended, will \overline{GH} and \overline{EF} form a 90° angle?

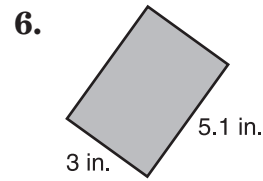
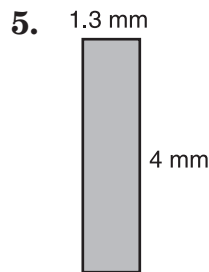
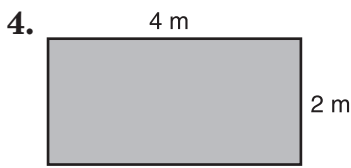
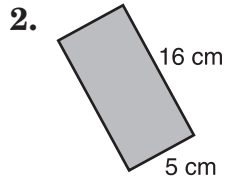
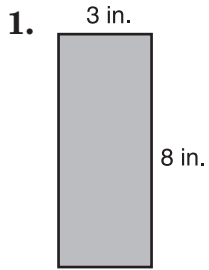


7. Use a compass to draw a circle with the same center as the given circle, but larger in size.



A Plan for Problem Solving

Find the perimeter and area of each rectangle.



Find the perimeter and area of each rectangle described.

7. $\ell = 6$ in., $w = 7$ in.

8. $\ell = 3.2$ m, $w = 6$ m

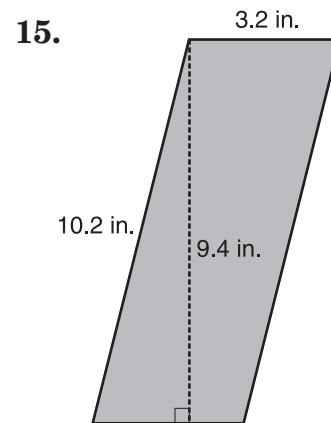
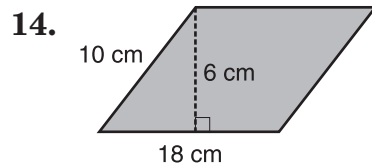
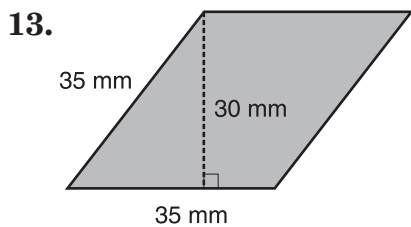
9. $\ell = 5$ mm, $w = 1.4$ mm

10. $\ell = 12$ mi, $w = 12$ mi

11. $\ell = 5.4$ in., $w = 10$ in.

12. $\ell = 3$ cm, $w = 7.7$ cm

Find the area of each parallelogram.



Practice**Real Numbers and Number Lines**

For each situation, write a real number with ten digits to the right of the decimal point.

1. a rational number less than 0 with a 3-digit repeating pattern
2. an irrational number between 7 and 8
3. two irrational numbers between -1 and -2

Use the number line to find each measure.



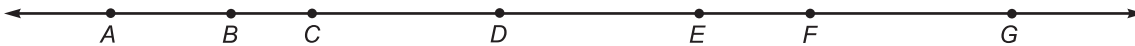
4. FI
5. AG
6. DH
7. CG
8. AI
9. BH
10. CE
11. BC
12. In Detroit, Michigan, the weather report said today's high was 3°F with a windchill factor of -10°F . Find the measure of the difference between the two temperatures.
13. In North Carolina, the temperature one Saturday was 95°F . The heat index made the temperature feel 15° hotter. Find the resulting temperature.
14. The city of Lockett is piling rock salt for use during ice storms.
 - a. If the pile from last year is 29 feet high and 14 feet are added this year, how high is the pile of rock salt?
 - b. If the mayor of Lockett wants to have a pile of rock salt that is 50 feet high, how much more rock salt needs to be added?

Segments and Properties of Real Numbers

Three segment measures are given. The three points named are collinear. Determine which point is between the other two.

- $AB = 12$, $BC = 5$, $AC = 17$
- $PT = 25.3$, $PR = 21$, $RT = 4.3$
- $QD = 6.7$, $CD = 1.4$, $QC = 5.3$
- $XW = 4.1$, $WY = 18.9$, $XY = 23$
- $MN = 6.2$, $NP = 3.2$, $MP = 9.4$
- $OL = 3$, $OZ = 21$, $LZ = 18$

Use the line to find each measure.



- If $AD = 27$ and $BD = 19$, find AB .
- If $FG = 9$ and $EF = 6$, find EG .
- If $DG = 56$ and $DE = 18$, find EG .
- If $AE = 64.9$ and $DE = 12.6$, find AD .

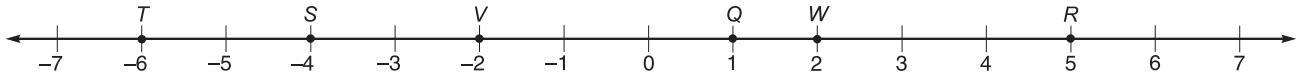
Find the length of each segment in centimeters and in inches.

- _____
- _____
- _____
- _____

Practice

Congruent Segments

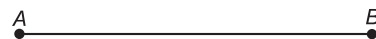
Use the number line to determine whether each statement is true or false. Explain your reasoning.



1. W is the midpoint of \overline{QR} .
2. S is the midpoint of \overline{TV} .
3. $\overline{SV} \cong \overline{TS}$
4. V is the midpoint of \overline{TW} .
5. W is the midpoint of \overline{VR} .
6. $\overline{WR} \cong \overline{QV}$
7. \overline{SW} is longer than \overline{VR} .
8. $\overline{VW} \leq \overline{TV}$

Determine whether each statement is true or false. Explain your reasoning.

9. $\overline{XY} \cong \overline{YX}$
10. If $\overline{AB} \cong \overline{BC}$ and $\overline{BC} \cong \overline{XY}$, then $\overline{AC} \cong \overline{XY}$.
11. If \overline{BX} is half the length of \overline{BY} , then B is the midpoint of \overline{BY} .
12. If $\overline{AY} \cong \overline{XR}$, then $\overline{XR} \cong \overline{AY}$.
13. A line has only one bisector.
14. Use a compass and straightedge to bisect the segment.



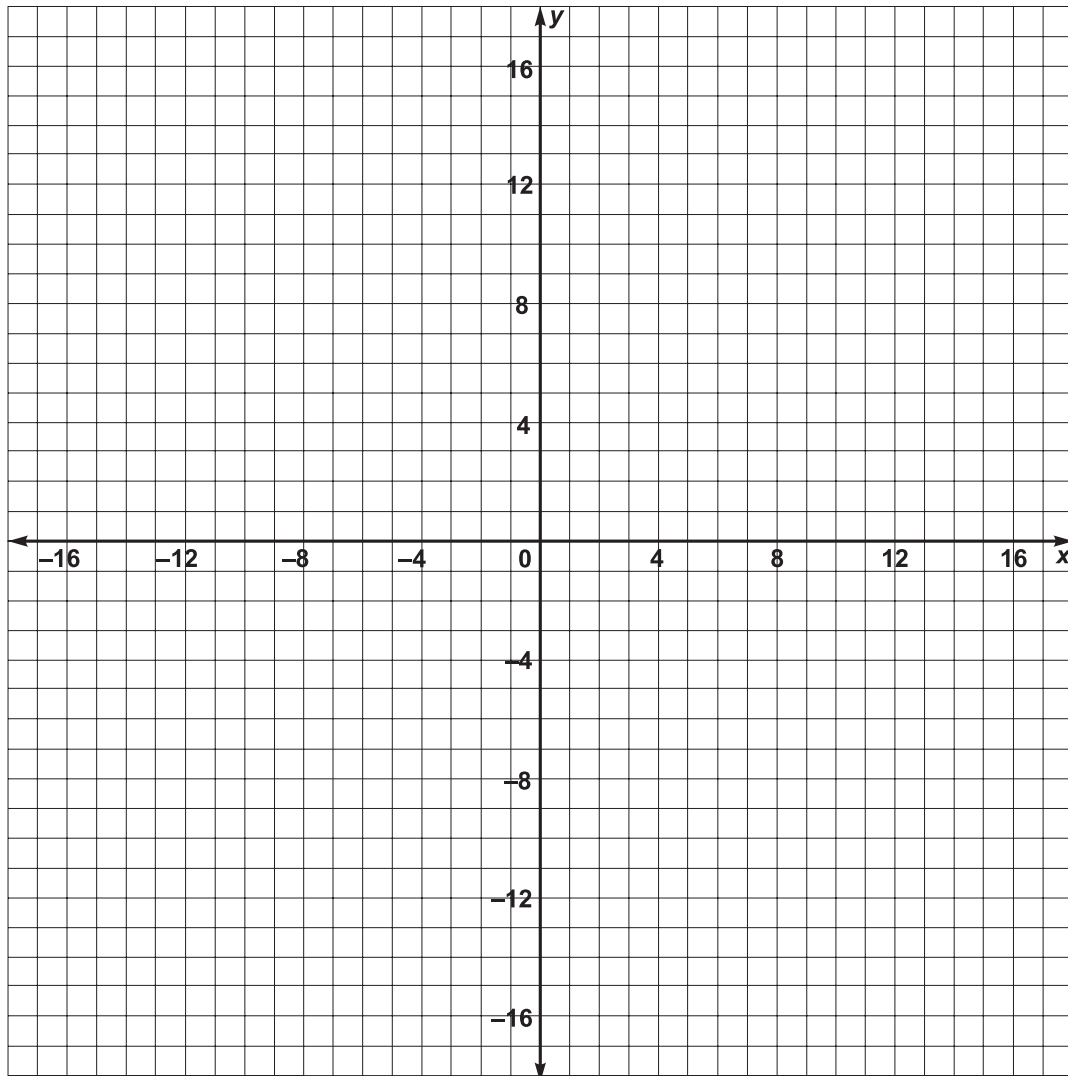
Practice

The Coordinate Plane

Graph each of the points below. Connect the points in order as you graph them.

- | | | | | |
|----------------|---------------|---------------|----------------|-----------------|
| 1. $(-2, 2)$ | 22. $(3, -9)$ | 28. $(3, 5)$ | 34. $(7, 16)$ | 40. $(-10, 12)$ |
| 2. $(-4, 0)$ | 23. $(3, -6)$ | 29. $(4, 2)$ | 35. $(5, 17)$ | 41. $(-10, 9)$ |
| 3. $(-6, -3)$ | 24. $(2, -3)$ | 30. $(5, 1)$ | 36. $(3, 17)$ | 42. $(-7, 6)$ |
| 4. $(-6, -8)$ | 25. $(1, 0)$ | 31. $(8, 4)$ | 37. $(1, 16)$ | 43. $(-5, 5)$ |
| 5. $(-4, -12)$ | 26. $(0, 2)$ | 32. $(9, 7)$ | 38. $(-1, 15)$ | 44. $(-2, 4)$ |
| 6. $(-4, -14)$ | 27. $(1, 4)$ | 33. $(9, 11)$ | 39. $(-7, 14)$ | 45. $(-2, 2)$ |

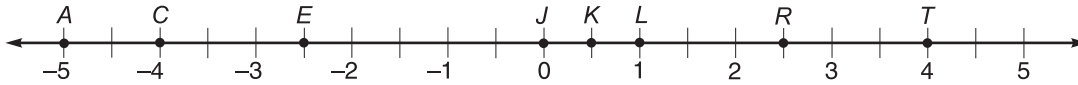
7. $(-7, -12)$
8. $(-9, -12)$
9. $(-6, -16)$
10. $(-3, -17)$
11. $(-1, -17)$
12. $(-2, -15)$
13. $(-2, -13)$
14. $(1, -13)$
15. $(0, -16)$
16. $(1, -17)$
17. $(3, -15)$
18. $(6, -11)$
19. $(6, -9)$
20. $(4, -11)$
21. $(2, -11)$



Practice

Midpoints

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



1. \overline{LT}

2. \overline{JL}

3. \overline{LR}

4. \overline{CJ}

5. \overline{EK}

6. \overline{CR}

The coordinates of the endpoints of a segment are given. Find the coordinates of the midpoint of each segment.

7. (2, 4), (6, 8)

8. (6, 4), (2, 10)

9. (9, 3), (-3, 1)

10. (1, -1), (5, 9)

11. (-1, 4), (5, -4)

12. (-4, -7), (2, 1)

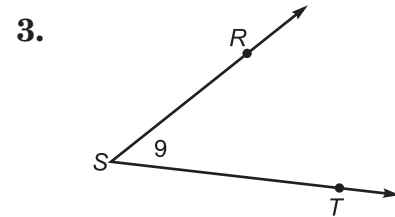
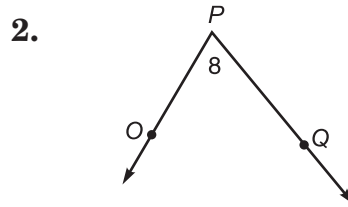
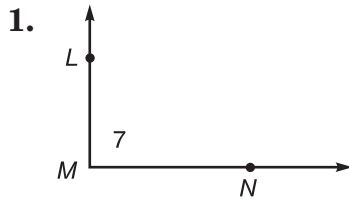
13. Find the midpoint of the segment that has endpoints at (-4, -5) and (10, -2).

14. Where is the midpoint of \overline{XY} if the endpoints are $X(4x, 2y)$ and $Y(0, -2y)$?

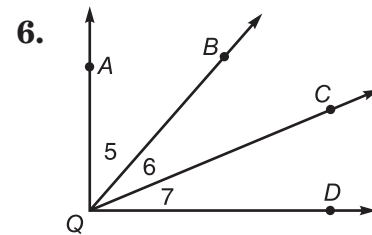
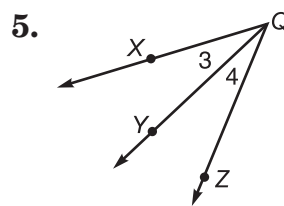
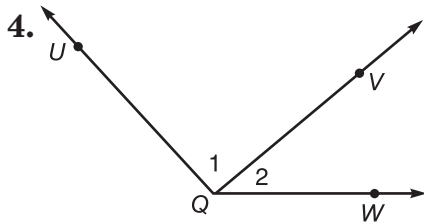
Practice

Angles

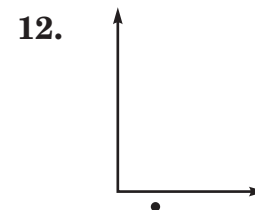
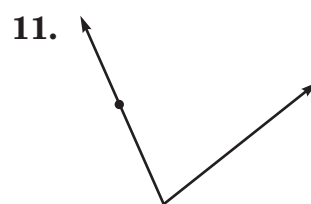
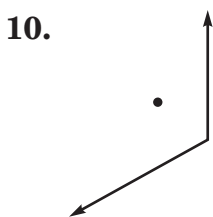
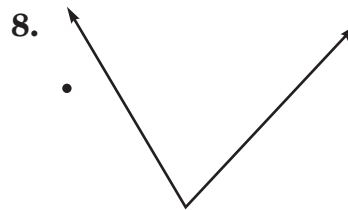
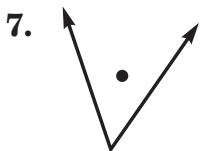
Name each angle in four ways. Then identify its vertex and its sides.



Name all angles having Q as their vertex.



Tell whether each point is in the interior, exterior or on the angle.



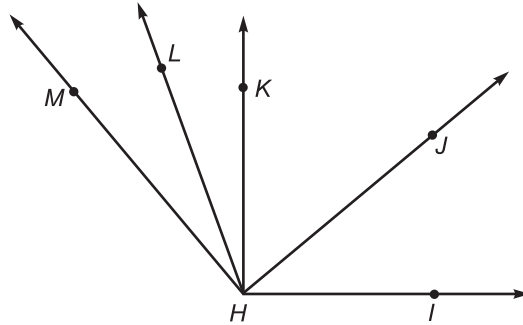
Tell whether each statement is true or false.

13. The vertex is in the exterior of the angle.
14. $\angle ABC$, $\angle CBA$, and $\angle B$ are all the same angle.
15. Three rays are necessary to determine an angle.

Practice**Angle Measure**

*Use a protractor to find the measure of each angle.
Then classify each angle as acute, obtuse, or right.*

1. $\angle JHI$
2. $\angle KHI$
3. $\angle MHI$
4. $\angle LHI$
5. $\angle LHM$
6. $\angle LHK$
7. $\angle MHJ$
8. $\angle MHK$
9. $\angle KHJ$
10. $\angle LHJ$



*Use a protractor to draw an angle having each measurement.
Then classify each angle as acute, obtuse, or right.*

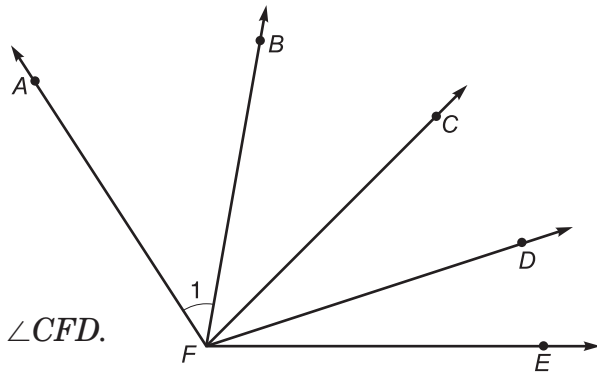
- | | |
|-----------------|-----------------|
| 11. 32° | 12. 178° |
| 13. 105° | 14. 92° |
| 15. 80° | 16. 15° |
| 17. 29° | 18. 150° |
| 19. 163° | 20. 120° |

Practice

The Angle Addition Postulate

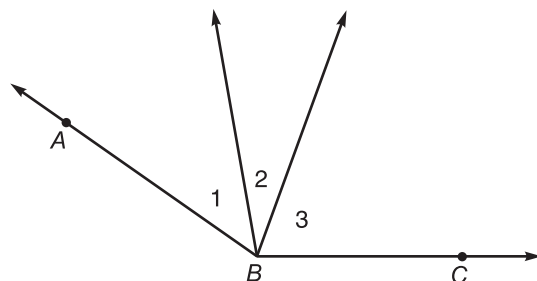
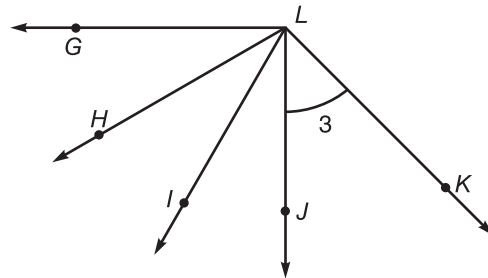
Refer to the figure at the right.

- If $m\angle BFC = 35$ and $m\angle AFC = 78$
find $m\angle 1$.
- If $m\angle BFC = 20$ and $m\angle CFD = 37$
find $m\angle BFD$.
- If $m\angle BFD = 60$ and \overrightarrow{FC} bisects $\angle BFD$, find $\angle CFD$.
- If $m\angle AFB = 70$ and $m\angle BFC = 15$, find $m\angle AFC$.
- If $m\angle DFE = 18$ and $m\angle CFE = 45$, find $\angle CFD$.



Refer to the figure at the right.

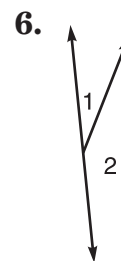
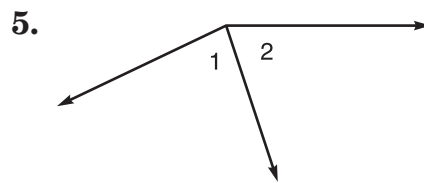
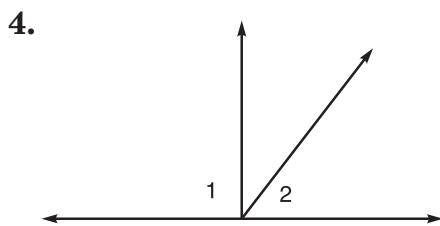
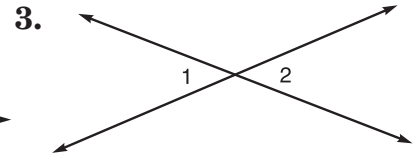
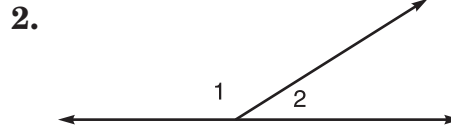
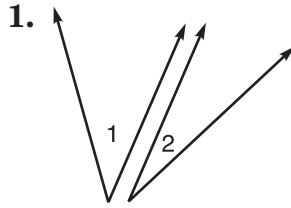
- If $m\angle 3 = 45$ and $m\angle JLI = 20$,
find $m\angle ILK$.
- If $m\angle GLJ = 90$, $m\angle GLH = 30$, and
 $m\angle HLI = 30$, find $m\angle ILJ$.
- If $m\angle HLJ = 70$ and $m\angle GLJ = 90$, find $m\angle GLH$.
- If $m\angle 3 = 40$ and $m\angle JLH = 60$, find $m\angle KLI$.
- If $m\angle GLI = 62$ and $m\angle GLH = 40$, find $m\angle HLI$.
- If a right angle is bisected, what type of angles
are formed?
- What type of angles are formed if a 40° angle
is bisected?
- If $m\angle 1 = 30$, $m\angle 2 = 3x$, $m\angle ABC = 145$, and
 $m\angle 3 = 5x - 5$, find x .



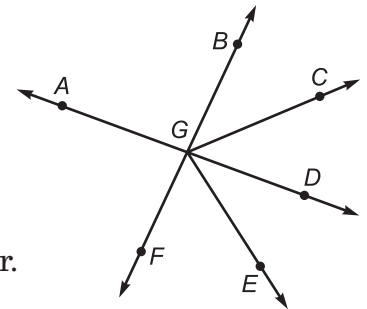
Practice

Adjacent Angles and Linear Pairs of Angles

Use the terms adjacent angles, linear pair, or neither to describe angles 1 and 2 in as many ways as possible.



In the figure at the right \overrightarrow{GB} and \overrightarrow{GF} are opposite rays and \overrightarrow{GA} and \overrightarrow{GD} are opposite rays.



7. Which angle forms a linear pair with $\angle AGC$?

8. Do $\angle FGE$ and $\angle EGC$ form a linear pair? Justify your answer.

9. Name two angles that are adjacent angles.

10. Name three angles that are adjacent to $\angle EGD$.

11. Which angle forms a linear pair with $\angle BGC$?

12. Name two adjacent angles that form a linear pair.

Complementary and Supplementary Angles

Refer to the figures at the right.

1. Name an angle supplementary to $\angle CBD$.

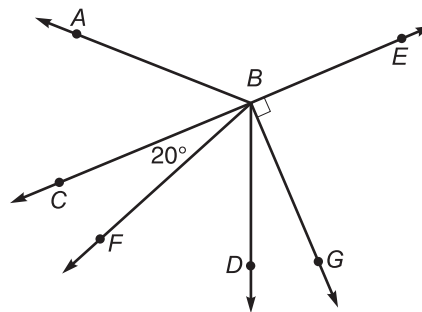
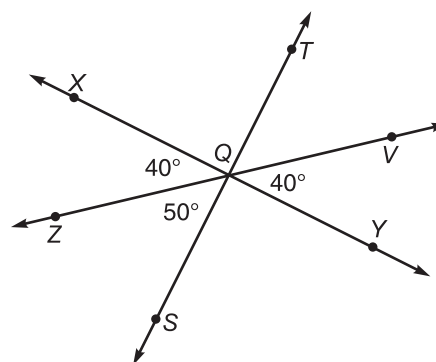
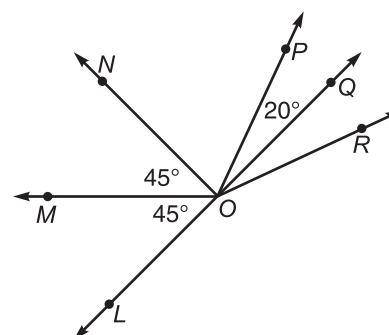
2. Name a pair of adjacent supplementary angles.

3. Name an angle complementary to $\angle CBF$.

4. Name two angles that are complementary.

5. Find the measure of an angle that is supplementary to $\angle XQZ$.6. Find the measure of the complement of $\angle VQY$.

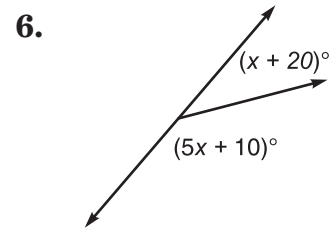
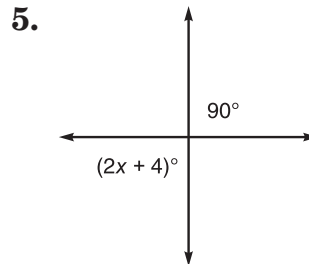
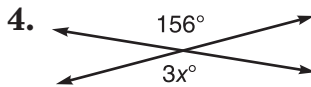
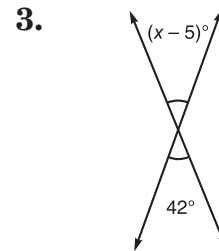
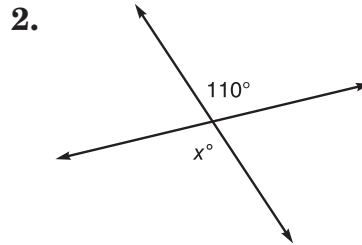
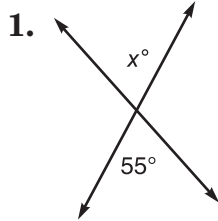
7. Name two angles that are supplementary.

8. Name an angle complementary to $\angle MON$.9. Name an angle supplementary to $\angle POQ$.10. Find the measure of $\angle NOP$.**Exercises 1-3****Exercises 4-7****Exercises 8-10**

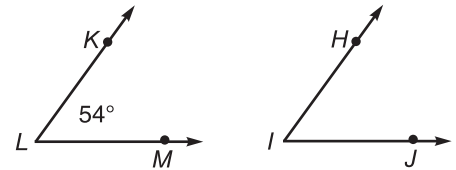
Practice

Congruent Angles

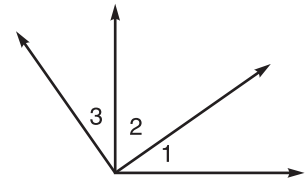
Find the value of x in each figure.



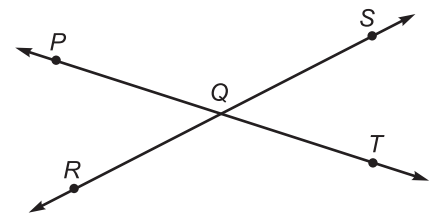
7. What is the measure of an angle that is supplementary to $\angle HIJ$ if $\angle HIJ \cong \angle KLM$?



8. If $\angle 2$ is complementary to $\angle 3$, $\angle 1$ is complementary to $\angle 2$, and $m\angle 1 = 35$, what are $m\angle 2$ and $m\angle 3$?



9. What is the value of x if $\angle PQR$ and $\angle SQT$ are vertical angles and $m\angle PQR = 47$ and $m\angle SQT = 3x + 2$?



10. Find the measure of an angle that is supplementary to $\angle B$ if the measure of $\angle B$ is 58.

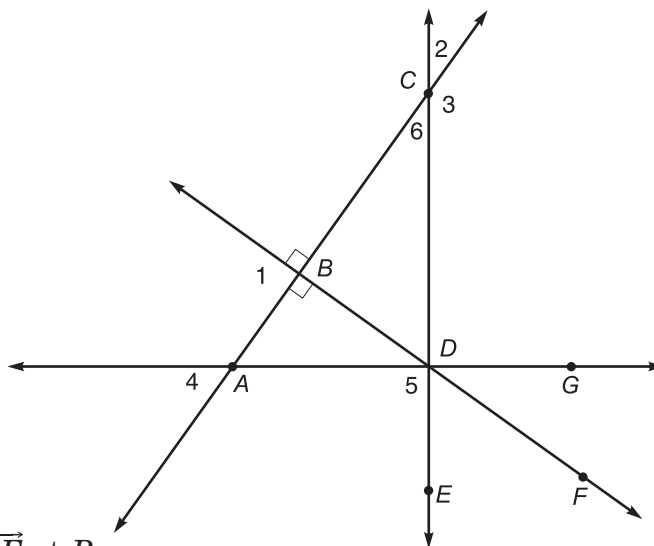
Practice

Perpendicular Lines

$\overline{AG} \perp \overline{CE}$, $\overline{AC} \perp \overline{BF}$ and point B is the midpoint of \overline{AC} .

Determine whether the following is true or false.

- $\angle 1 \cong \angle CBD$
- $\angle 1$ is a right angle.
- $\angle 2$ and $\angle 3$ are complementary angles.
- $m\angle GDF + m\angle FDE = 90$
- $\angle 1 \cong \angle 5$
- \overline{AC} is the only line perpendicular to \overline{BF} at B .
- $\angle 3$ is an acute angle.
- $\angle 1 \cong \angle 2$
- $\angle 2 \cong \angle 6$
- \overline{AG} is perpendicular to \overline{DE} .
- Name four right angles.
- Name a pair of supplementary angles.
- If $m\angle 3 = 120$, find $m\angle 2$.
- Which angle is complementary to $\angle FDE$?
- If $m\angle 6 = 45$, find $m\angle 2$.



Practice

Parallel Lines and Planes

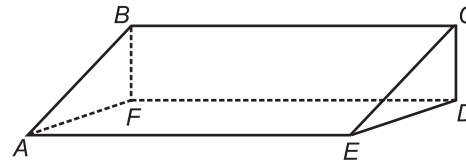
Describe each pair of segments in the prism as parallel, skew, or intersecting.

1. $\overline{AF}, \overline{BF}$

2. $\overline{AE}, \overline{FD}$

3. $\overline{AB}, \overline{FD}$

5. $\overline{BC}, \overline{AE}$



4. $\overline{EC}, \overline{BF}$

6. $\overline{BF}, \overline{AB}$

Name the parts of the cube shown at the right.

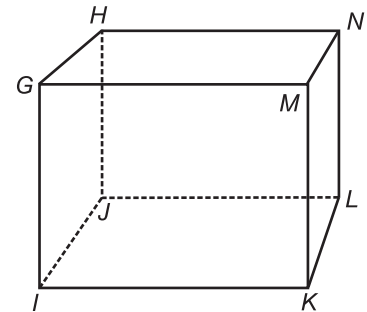
7. six planes

8. all segments parallel to \overline{GI}

9. all segments skew to \overline{MN}

10. all segments parallel to \overline{IK}

11. all segments skew to \overline{HJ}



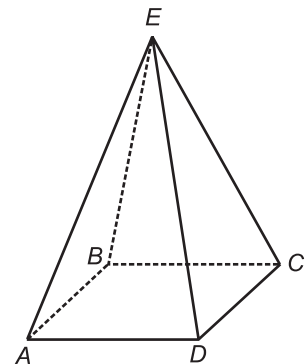
Name the parts of the pyramid shown at the right.

12. all pairs of parallel segments

13. all pairs of skew segments

14. all planes parallel to plane EDC

15. all planes that intersect to form line BC



Draw and label a figure to illustrate each pair.

16. segments not parallel or skew

17. intersecting congruent segments

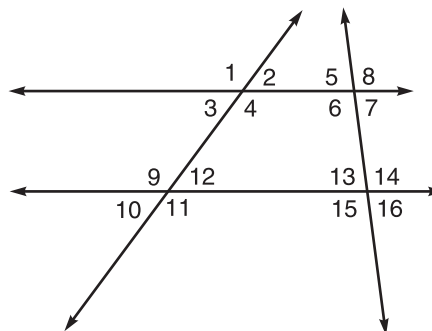
18. skew rays

Practice

Parallel Lines and Transversals

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

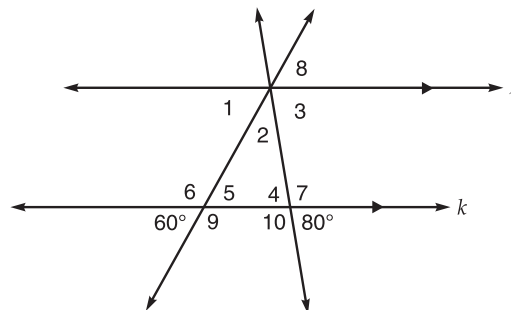
1. $\angle 9$ and $\angle 11$
2. $\angle 3$ and $\angle 9$
3. $\angle 3$ and $\angle 12$
4. $\angle 8$ and $\angle 6$
5. $\angle 8$ and $\angle 15$
6. $\angle 4$ and $\angle 5$
7. $\angle 1$ and $\angle 7$



Exercises 1-7

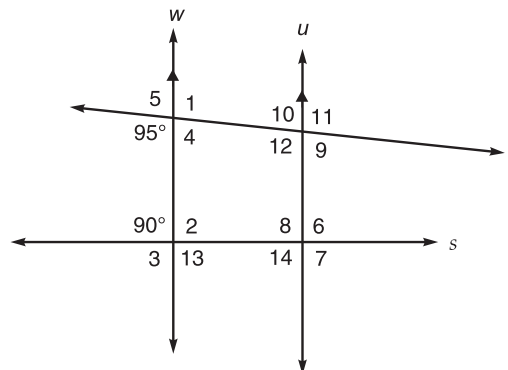
Find the measure of each angle. Give a reason for each answer.

8. $\angle 5$
9. $\angle 4$
10. $\angle 6$
11. $\angle 1$
12. $\angle 8$



Exercises 8-12

13. $\angle 10$
14. $\angle 1$
15. $\angle 2$
16. $\angle 10$
17. $\angle 11$
18. $\angle 8$
19. $\angle 6$
20. $\angle 5$
21. $\angle 4$

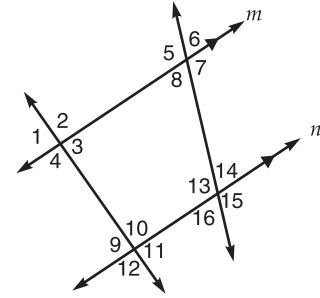


Exercises 13-21

Practice

Transversal and Corresponding Angles

In the figure, $m \parallel n$. Name all angles congruent to the given angle. Give a reason for each answer.



1. $\angle 13$

2. $\angle 12$

3. $\angle 4$

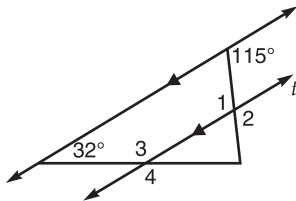
4. $\angle 16$

5. $\angle 9$

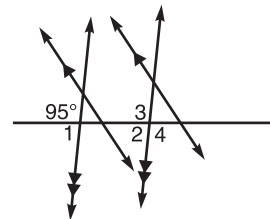
6. $\angle 15$

Find the measure of each numbered angle.

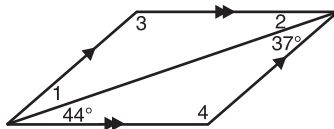
7.



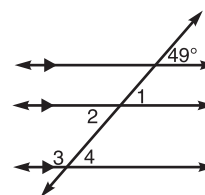
8.



9.

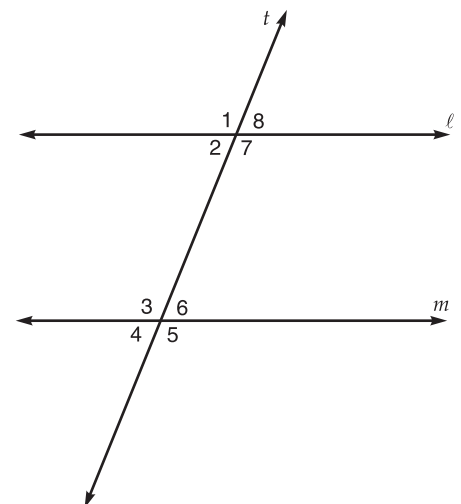


10.



11. If $m\angle 8 = 2x + 2$ and $m\angle 6 = 4x - 40$, find x , $m\angle 8$, and $m\angle 6$.

12. If $m\angle 1 = 6x - 2$ and $m\angle 5 = 4x + 38$, find x , $m\angle 1$, and $m\angle 5$.

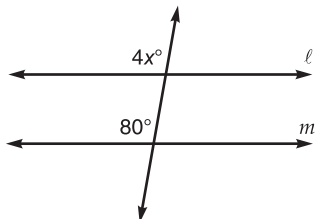


Practice

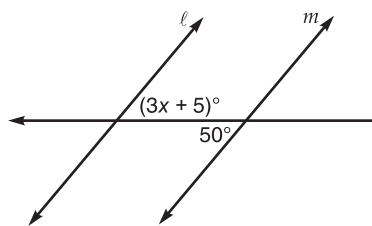
Proving Lines Parallel

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

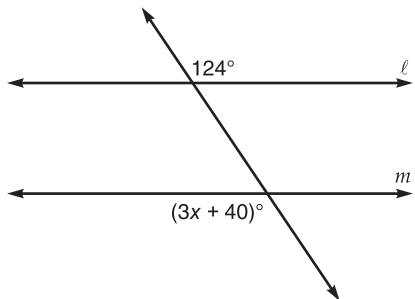
1.



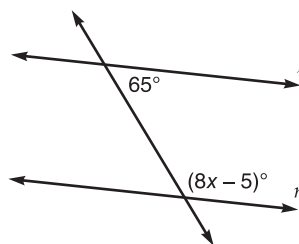
2.



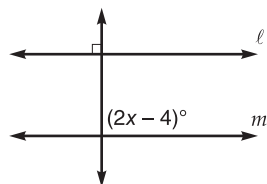
3.



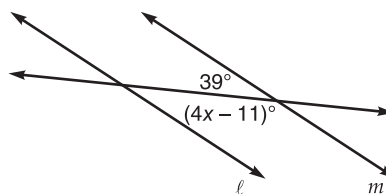
4.



5.

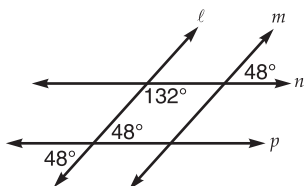


6.

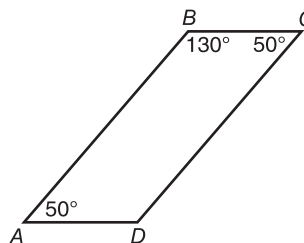


Name the pairs of parallel lines or segments.

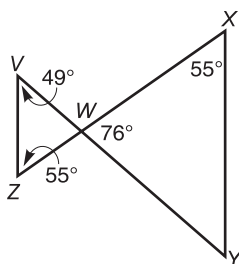
7.



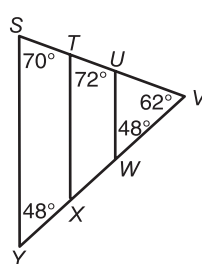
8.



9.

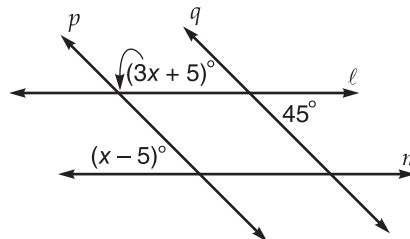


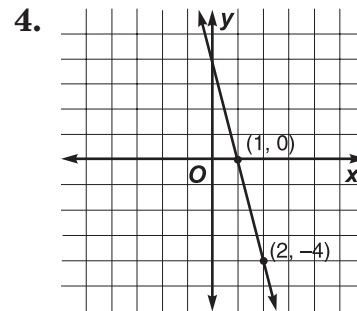
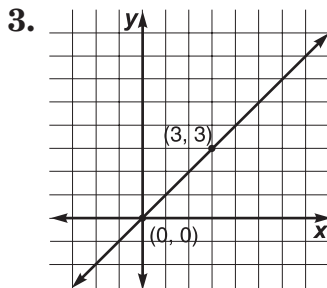
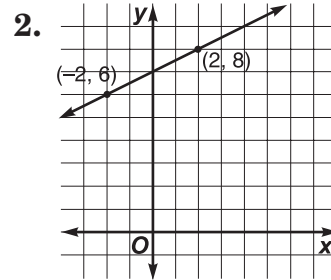
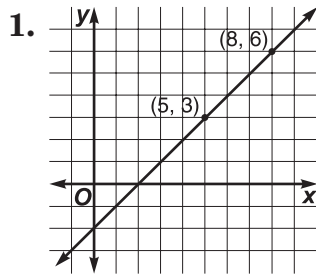
10.



11. Refer to the figure at the right.

- Find x so that the $\ell \parallel m$.
- Using the value you found in part a, determine whether lines p and q are parallel.



Slope**Find the slope of each line.**

5. the line through
(6, 5) and (5, 1)

6. the line through $(-1\frac{1}{2}, 3)$
and $(2\frac{1}{2}, 2)$

7. the line through
(1.5, -1.5) and (2.5, -1)

8. the line through
(8, 1) and (-8, 9)

Given each set of points, determine if \overline{AB} and \overline{CD} are parallel, perpendicular, or neither.

9. $A(2, 2), B(0, 0), C(2, 0), D(0, -2)$

10. $A(0, -1), B(1, 0), C(-3, 2), D(3, -4)$

11. $A(3, 2), B(3, 3), C(-1, 2), D(-3, 7)$

12. $A(0, 4), B(0, -2), C(2, 0), D(-1, 0)$

13. $A(1, 3), B(3, -2), C(3, 5), D(5, 0)$

14. Find the slope of the line passing through points at (2, 2) and (-1, 0).

15. $A(0, k)$ and $B(1, -2)$ are two points on a line. If the slope of the line is -3 , find the value of k .

Practice

Equations of Lines

Name the slope and y-intercept of the graph of each equation.

1. $y = 3x + 8$

2. $5x + y = 17$

3. $3x - 2y = 8$

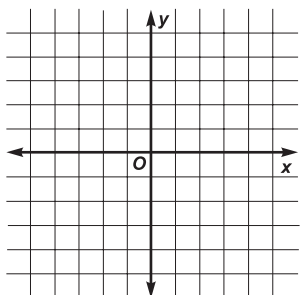
4. $3y - x = 12$

5. $y = 6$

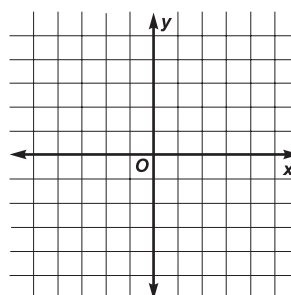
6. $x = 2$

Graph each equation using the slope and y-intercept.

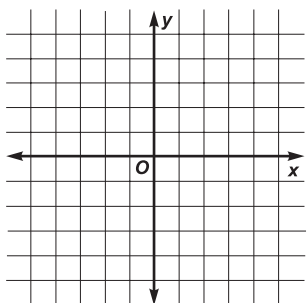
7. $y = -\frac{1}{2}x + 3$



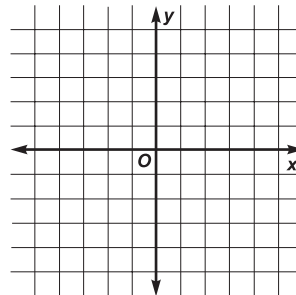
8. $3y + 6 = 2x$



9. $y = \frac{1}{3}x + 2$



10. $y = \frac{1}{2}x + 1$



Write an equation of the line satisfying the given conditions.

11. slope = -2 , goes through the point at $(2, -4)$

12. parallel to the graph of $y = -5x - 3$, passes through the point at $(0, 2)$

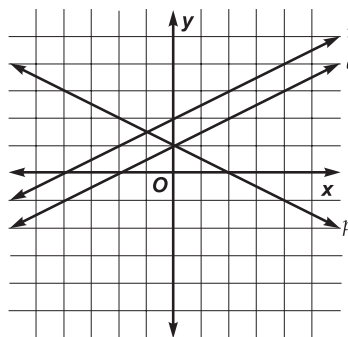
13. perpendicular to the graph of $y = 2x - 5$, passes through the point at $(10, -1)$

Choose the correct graph of lines p , q , and r for each equation.

14. $y = \frac{1}{2}x + 2$

15. $y = -\frac{1}{2}x + 1$

16. $y = \frac{1}{2}x + 1$

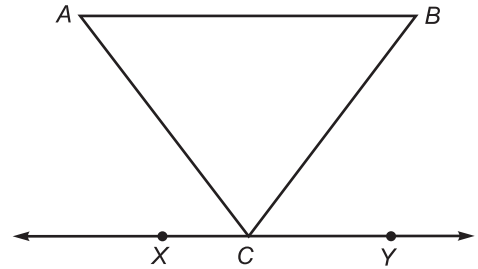


Practice

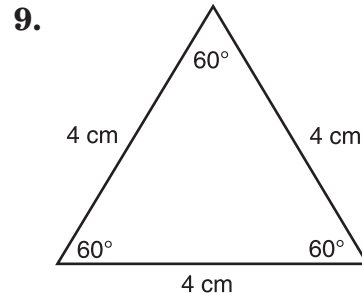
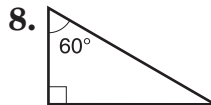
Classifying Triangles

For Exercises 1–7, refer to the figure at the right. Triangle ABC is isosceles with $AB > AC$ and $AB > BC$. Also, $\overleftrightarrow{XY} \parallel \overline{AB}$. Name each of the following.

1. sides of the triangle
2. angles of the triangle
3. vertex angle
4. base angles
5. side opposite $\angle BCA$
6. congruent sides
7. angle opposite \overline{AC}



Classify each triangle by its angles and by its sides.

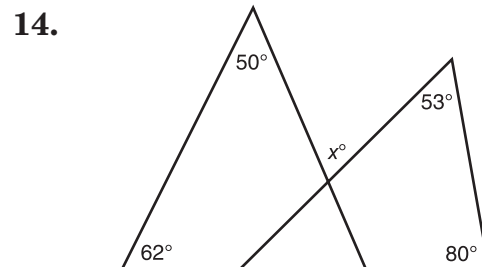
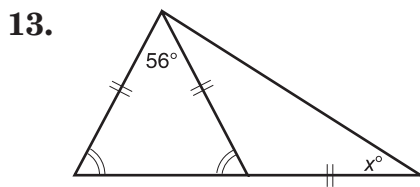
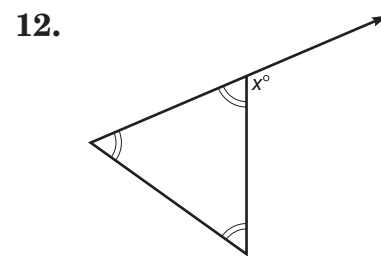
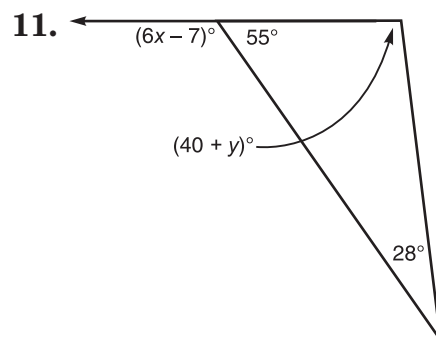
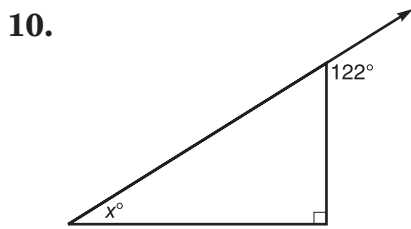
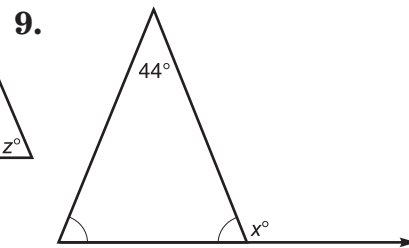
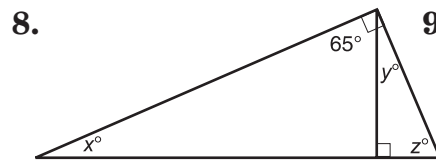
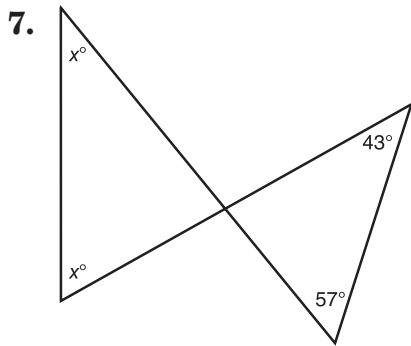
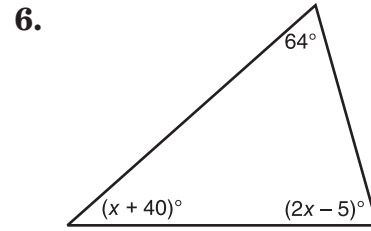
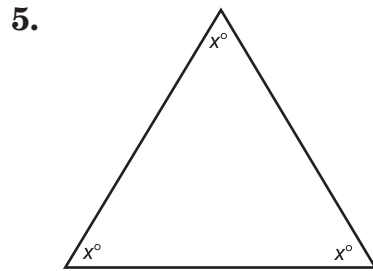
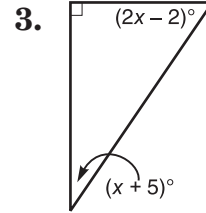
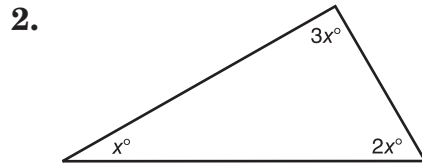
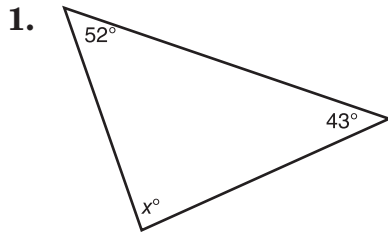


10. Find the measures of the legs of isosceles triangle ABC if $AB = 2x + 4$, $BC = 3x - 1$, $AC = x + 1$, and the perimeter of $\triangle ABC$ is 34 units.

Practice

Angles of a Triangle

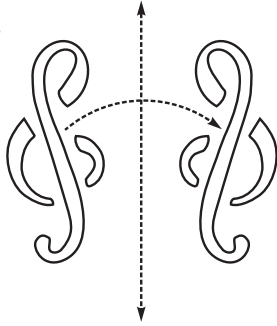
Find the value of each variable.



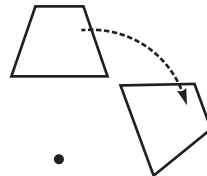
Geometry in Motion

Identify each motion as a translation, reflection, or rotation.

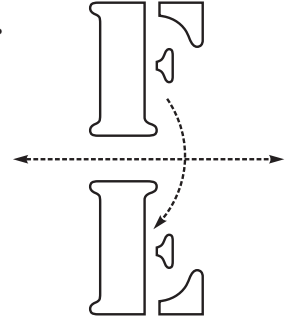
1.



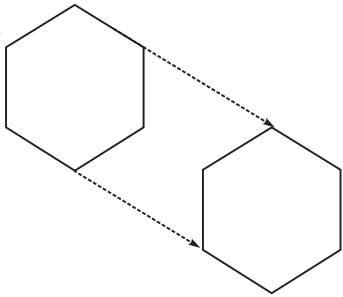
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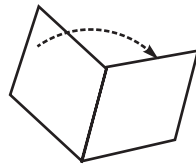
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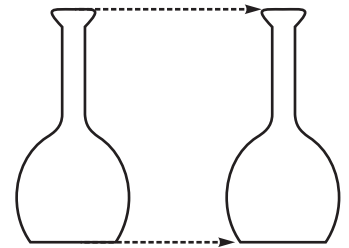
4.



5.



6.



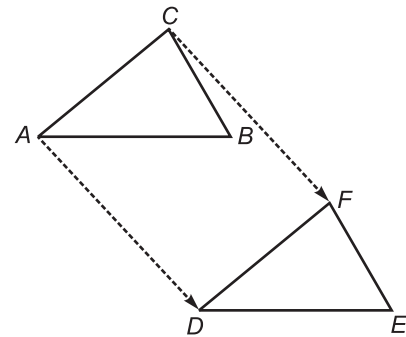
In the figure at the right, $\triangle ABC \rightarrow \triangle DEF$.

7. Which angle corresponds to $\angle C$?

8. Name the image of \overline{AB} .

9. Name the side that corresponds to \overline{EF} .

10. Name the image of $\angle A$.



Practice

Congruent Triangles

If $\triangle RST \cong \triangle ABC$, use arcs and slash marks to show the congruent angles and sides. Complete each congruence statement.

1. $\angle C \cong$?

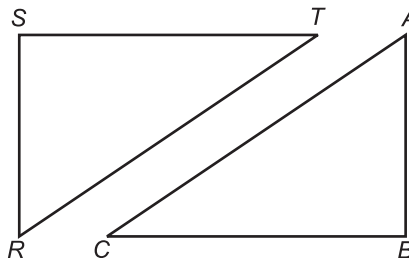
2. $\angle R \cong$?

3. $\overline{AC} \cong$?

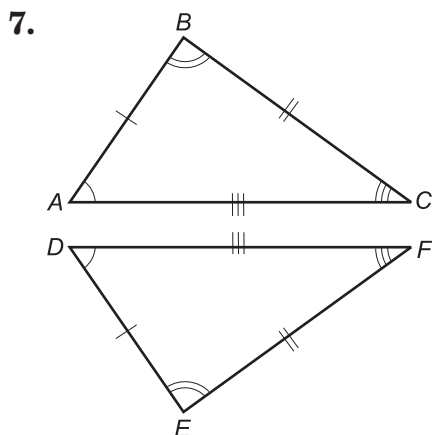
4. $\overline{ST} \cong$?

5. $\overline{RS} \cong$?

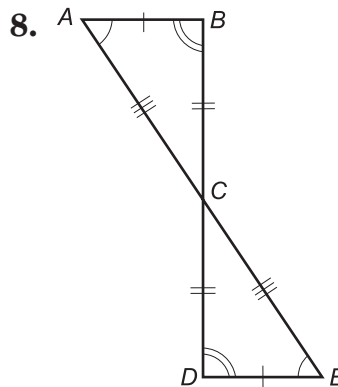
6. $\angle B \cong$?



Complete each congruence statement.



$\triangle ABC \cong \triangle$?



$\triangle ACB \cong \triangle$?

9. Given $\triangle ABC \cong \triangle DEF$, $AB = 15$, $BC = 20$, $AC = 25$, and $FE = 3x - 7$, find x .

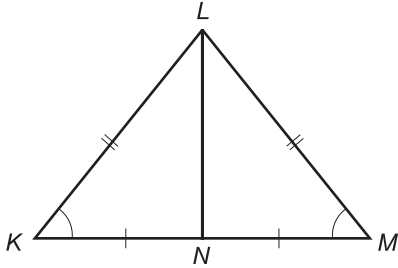
10. Given $\triangle ABC \cong \triangle DEF$, $DE = 10$, $EF = 13$, $DF = 16$, and $AC = 4x - 8$, find x .

Practice

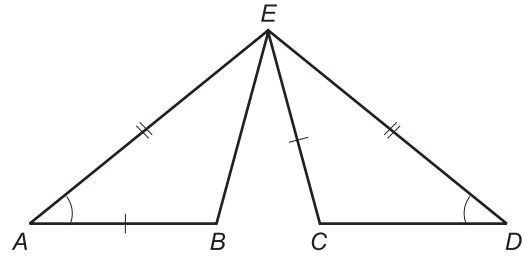
SSS and SAS

Determine whether each pair of triangles is congruent. If so, write a congruence statement and explain why the triangles are congruent.

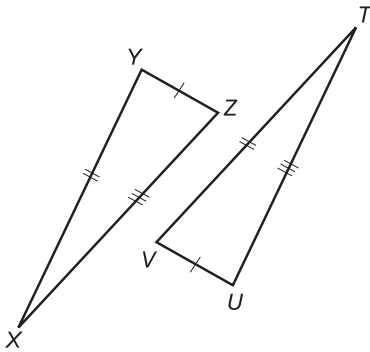
1.



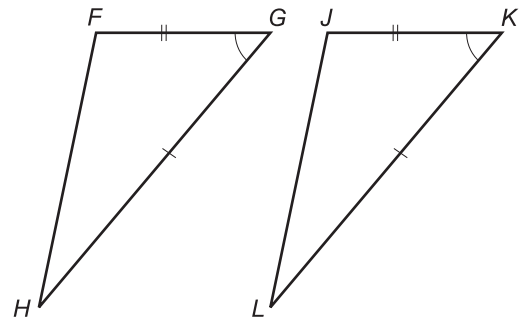
2.



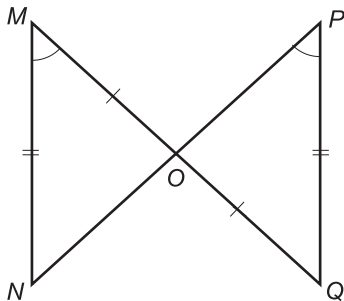
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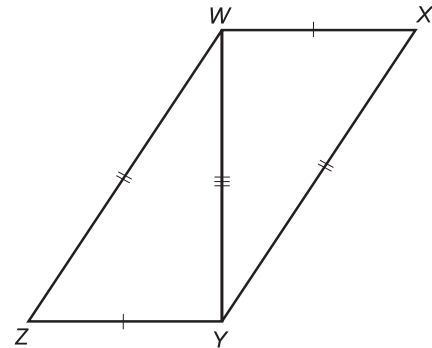
4.



5.



6.

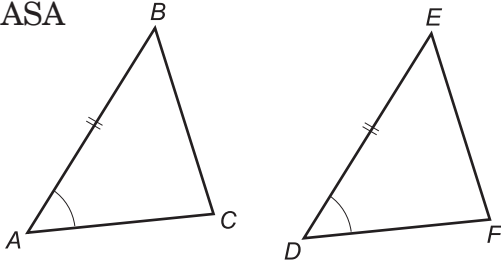


Practice

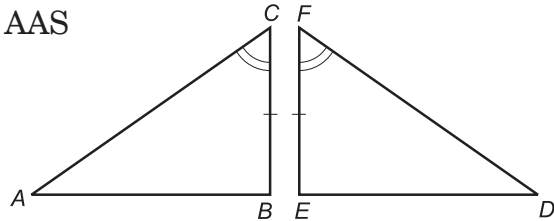
ASA and AAS

Name the additional congruent parts needed so that the triangles are congruent by the postulate or theorem indicated.

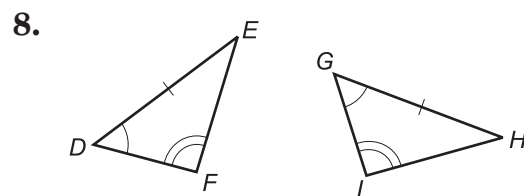
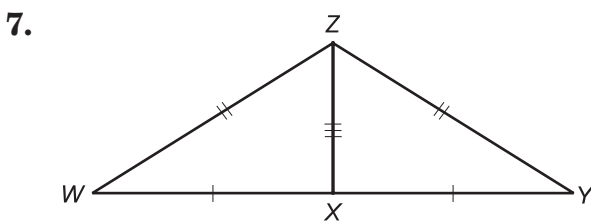
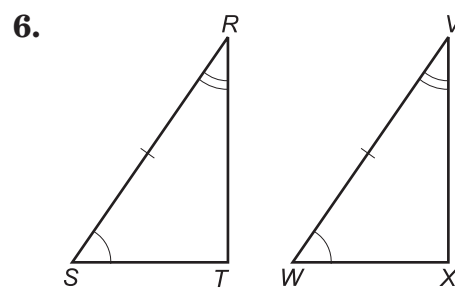
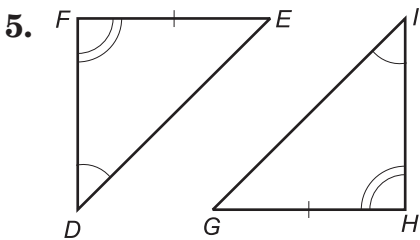
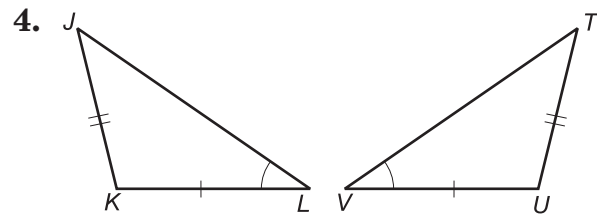
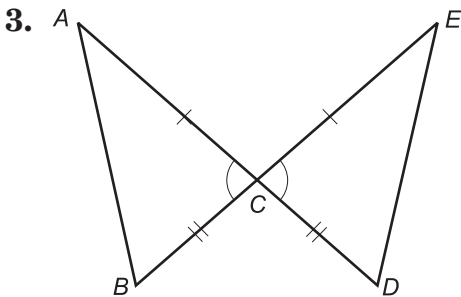
1. ASA



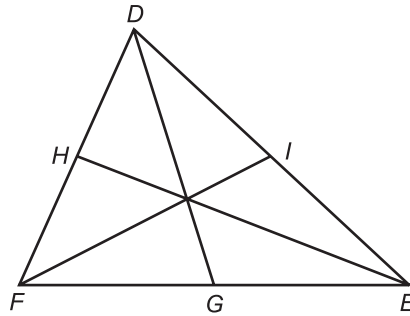
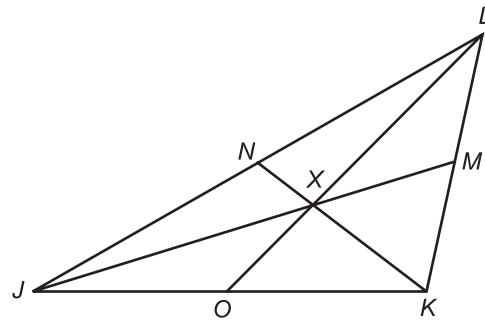
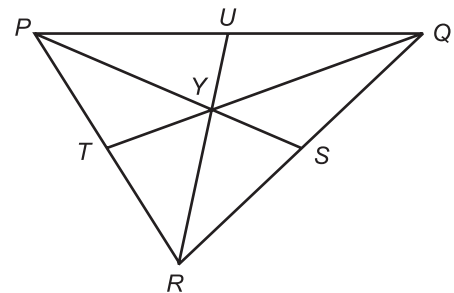
2. AAS



Determine whether each pair of triangles is congruent by SSS, SAS, ASA, or AAS. If it is not possible to prove that they are congruent, write not possible.



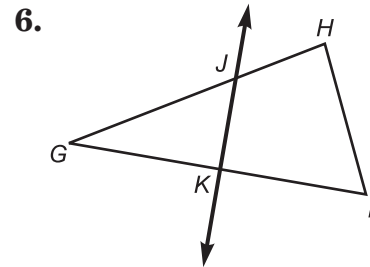
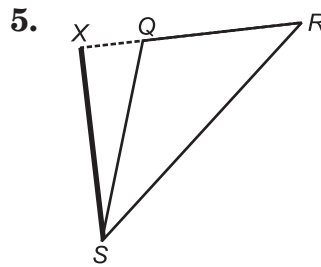
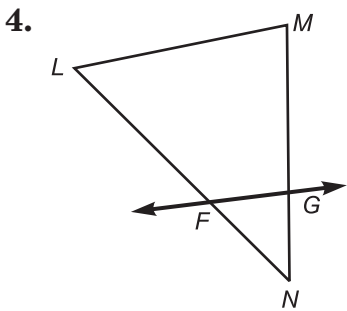
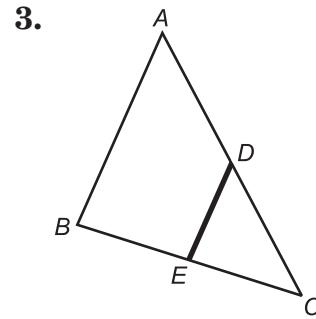
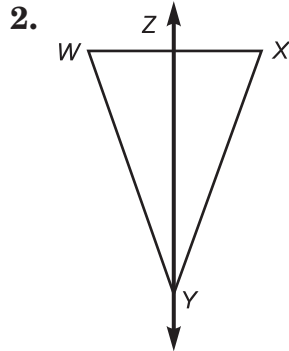
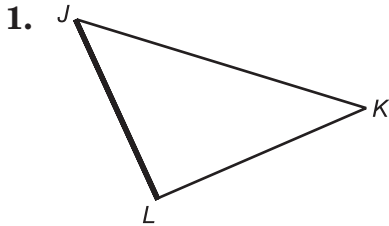
Practice

Medians*In $\triangle DEF$, \overline{DG} , \overline{EH} , and \overline{FI} are medians.*1. Find FG if $GE = 8$.2. Find DH if $DF = 10$.3. If $DI = 7$, find DE .*In $\triangle JKL$, \overline{JM} , \overline{KN} , and \overline{LO} are medians.*4. Find the measure of \overline{XN} if $KX = 26$.5. What is JX if $XM = 25$?6. If $LX = 41$, what is XO ?*In $\triangle PQR$, \overline{PS} , \overline{QT} , and \overline{RU} are medians.*7. What is YU if $RU = 19.5$?8. Find QY if $QT = 24$.9. If $PY = 14.8$, what is the measure of \overline{YS} ?10. If $PU = x + 3$ and $UQ = 2x - 17$, what is x ?

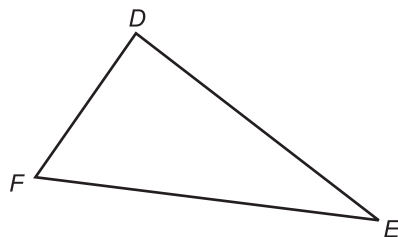
Practice

Altitudes and Perpendicular Bisectors

For each triangle, tell whether the bold segment or line is an altitude, a perpendicular bisector, both, or neither.



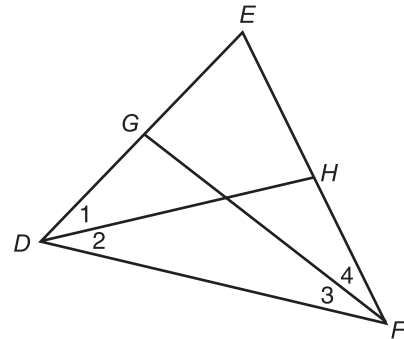
7. Construct the perpendicular bisector of each side of the triangle.



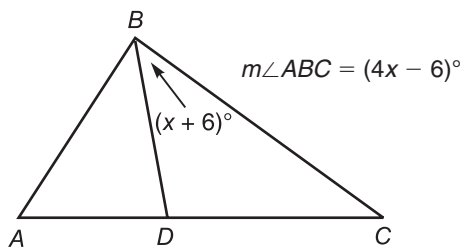
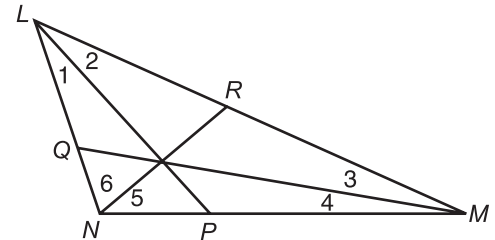
Practice

Angle Bisectors of Triangles*In $\triangle DEF$, \overline{DH} bisects $\angle EDF$, and \overline{FG} bisects $\angle EFD$.*

1. If $m\angle 2 = 36$, what is $m\angle EDF$?
2. Find $m\angle 4$ if $m\angle EFD = 68$.
3. What is $m\angle EDF$ if $m\angle 1 = 27$?
4. If $m\angle 4 = 23$, what is $m\angle 3$?

*In $\triangle LMN$, \overline{LP} bisects $\angle NLM$, \overline{MQ} bisects $\angle LMN$, \overline{NR} bisects $\angle MNL$.*

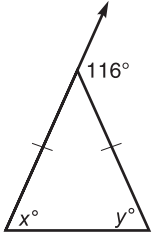
5. Find $m\angle 6$ if $m\angle MNL = 115$.
6. If $m\angle 4 = 18$, what is $m\angle 3$?
7. What is $m\angle 1$ if $m\angle NLM = 48$?
8. Find $m\angle LNM$ if $m\angle 5 = 63$.
9. Find $m\angle ABC$ if \overline{BD} is an angle bisector of $\triangle ABC$.



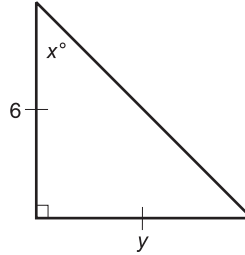
Isosceles Triangles

For each triangle, find the values of the variables.

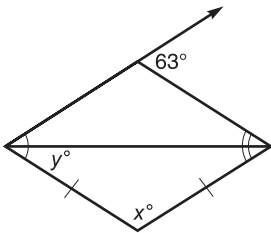
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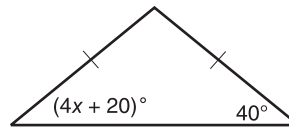
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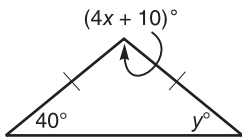
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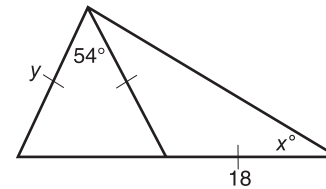
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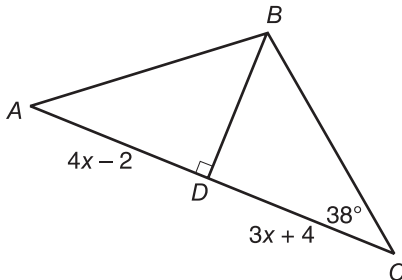
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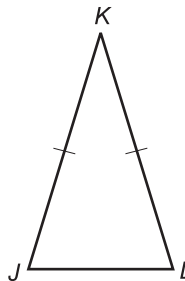
6.



7. In $\triangle ABC$, $m\angle A = m\angle C$ and $m\angle C = 38$. Find $m\angle A$, AD , and AC .



8. In $\triangle JKL$, $\overline{JK} \cong \overline{KL}$. If $\angle J = 4x - 8$ and $\angle L = 3x + 15$, find $m\angle J$ and $m\angle L$.

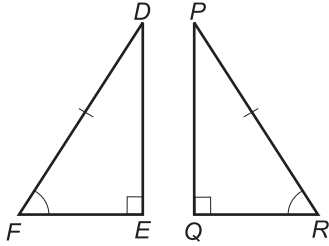


Practice

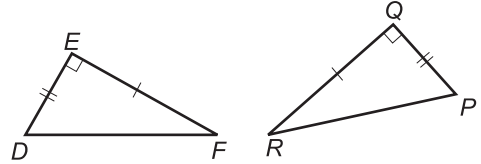
Right Triangles

Determine whether each pair of right triangles is congruent by LL, HA, LA, or HL. If it is not possible to prove that they are congruent, write not possible.

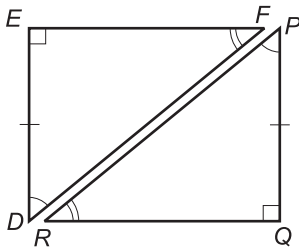
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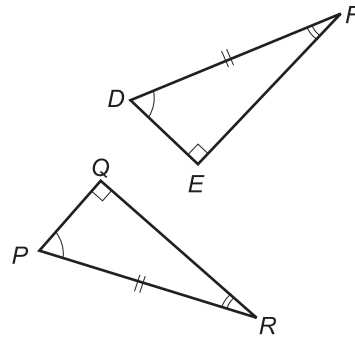
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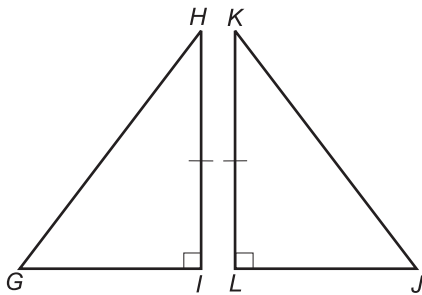
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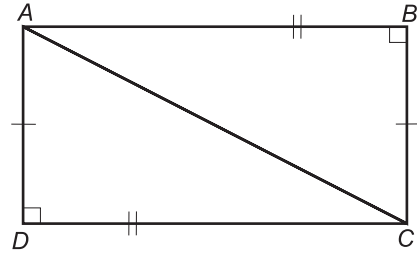
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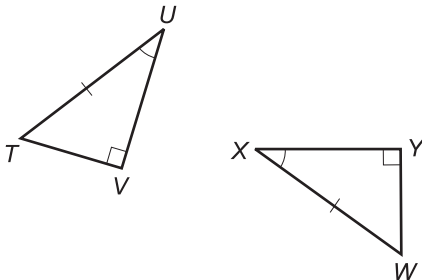
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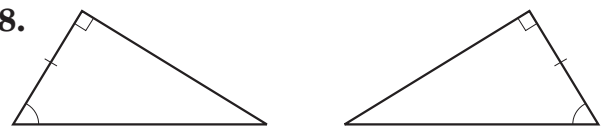
6.



7.



8.



Practice

The Pythagorean Theorem

If c is the measure of the hypotenuse, find each missing measure.
Round to the nearest tenth, if necessary.

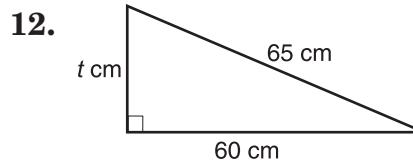
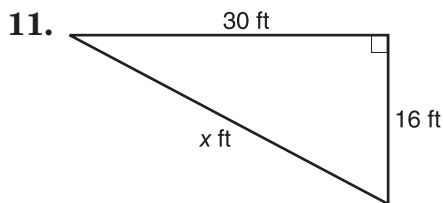
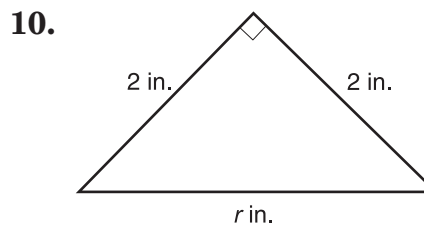
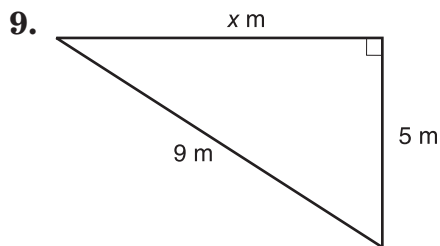
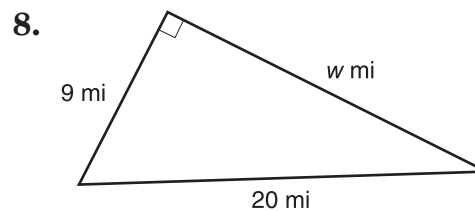
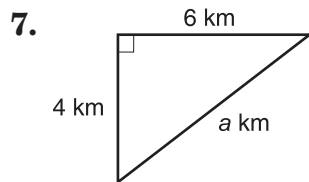
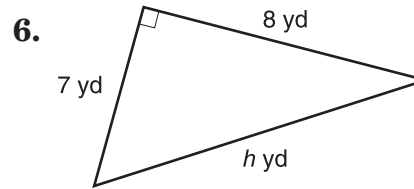
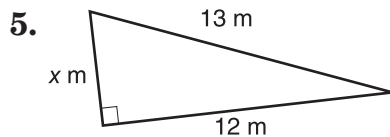
1. $a = 8, b = 13, c = ?$

2. $a = 4, c = 6, b = ?$

3. $a = \sqrt{13}, b = \sqrt{12}, c = ?$

4. $b = \sqrt{52}, c = \sqrt{101}, a = ?$

Find the missing measure in each right triangle. Round to the nearest tenth, if necessary.



The lengths of three sides of a triangle are given. Determine whether each triangle is a right triangle.

13. 14 ft, 48 ft, 50 ft

14. 50 yd, 75 yd, 85 yd

15. 15 cm, 36 cm, 39 cm

16. 45 mm, 60 mm, 80 mm

Distance on the Coordinate Plane

Find the distance between each pair of points. Round to the nearest tenth, if necessary.

1. $A(-1, 5), B(2, -5)$

2. $J(-3, 1), K(-3, -4)$

3. $G(-3, 6), H(-3, 2)$

4. $X(0, 4), N(-3, 2)$

5. $E(8, 6), F(2, 1)$

6. $M(-1, -6), N(-2, -3)$

7. $P(-1, 6), Q(5, 0)$

8. $V(-3, 7), W(2, -5)$

9. $C(0, 0), D(6, 8)$

10. $R(1, 1), S(-4, -4)$

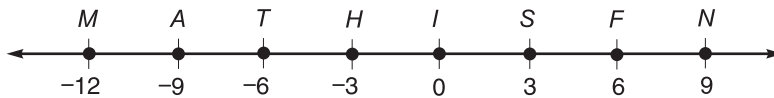
11. Is $\triangle XYZ$ with vertices $X(-3, 1)$, $Y(2, 4)$, and $Z(2, -5)$, a scalene triangle?

12. Determine whether $\triangle RST$ with vertices $R(-1, 5)$, $S(-4, 1)$, and $T(2, 1)$ is isosceles.

13. Determine whether $\triangle DEF$ with vertices $D(-3, -4)$, $E(2, -5)$, and $F(0, 1)$ is a right triangle.

Practice

Segments, Angles, and Inequalities



Exercises 1–9

Replace each \circ with $<$, $>$, or $=$ to make a true sentence.

1. $HS \circ HN$

2. $MH \circ SN$

3. $AT \circ TH$

4. $HF \circ MT$

5. $TN \circ AS$

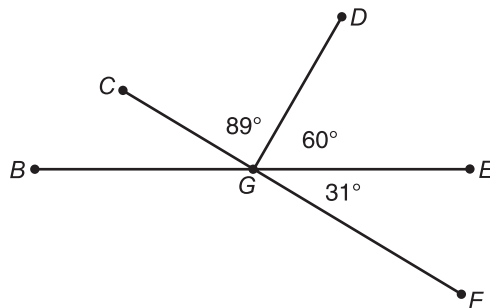
6. $MI \circ TF$

Determine if each statement is true or false.

7. $TS \geq FH$

8. $ST \leq HN$

9. $IM \neq HN$



Exercises 10–18

Replace each \circ with $<$, $>$, or $=$ to make a true sentence.

10. $m\angle CGD \circ m\angle DGE$

11. $m\angle BGC \circ m\angle BGD$

12. $m\angle CGE \circ m\angle DGF$

13. $m\angle BGC \circ m\angle FGE$

14. $m\angle DGE \circ m\angle EGF$

15. $m\angle BGC \circ m\angle CGD$

Determine if each statement is true or false.

16. $m\angle BGD \geq m\angle CGD$

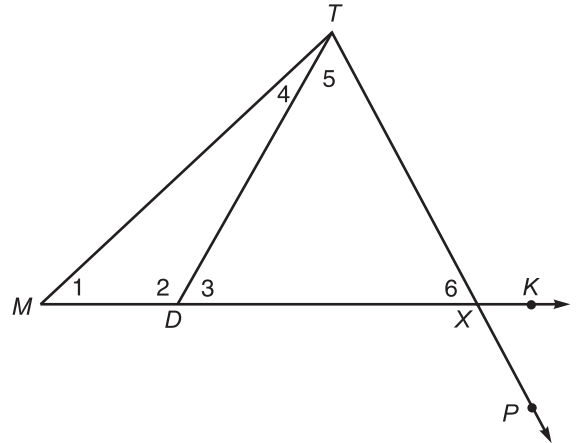
17. $m\angle CGB \neq m\angle EGF$

Practice

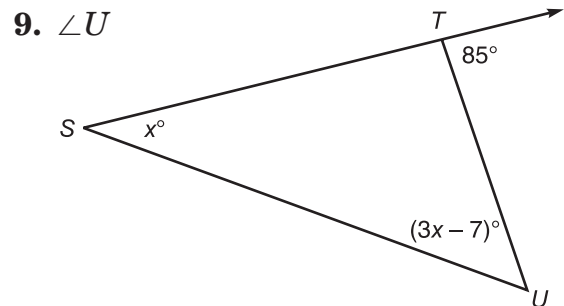
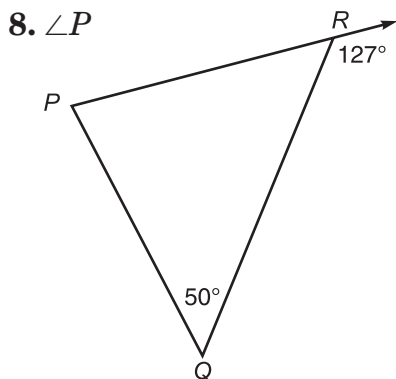
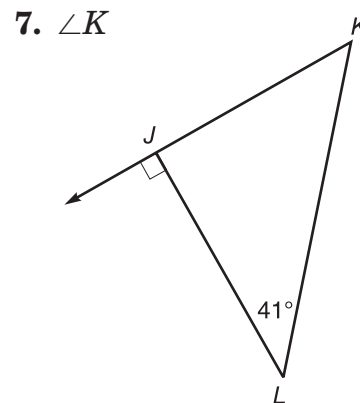
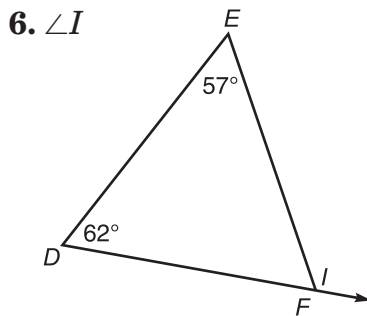
Exterior Angle Theorem

Name the angles.

1. an interior angle of $\triangle MDT$
2. an interior angle of $\triangle TDX$
3. an exterior angle of $\triangle MTX$
4. an exterior angle of $\triangle TDX$
5. a remote interior angle of $\triangle TDX$ with respect to $\angle 2$



Find the measure of each angle.

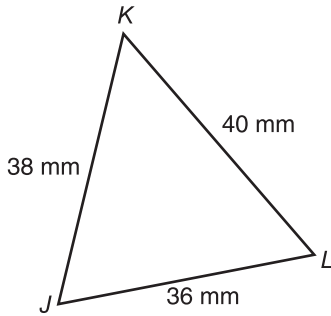


Practice

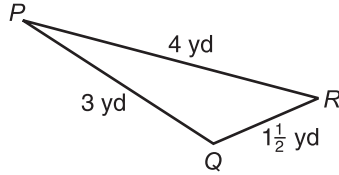
Inequalities Within a Triangle

List the angles in order from least to greatest measure.

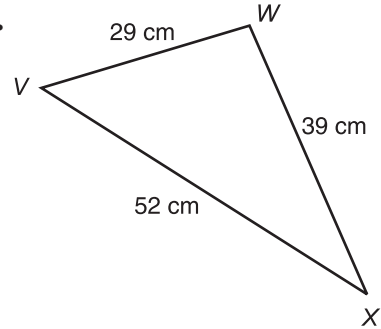
1.



2.

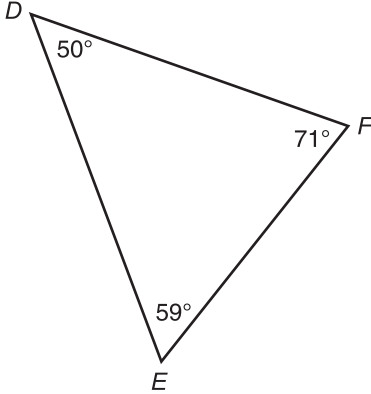


3.

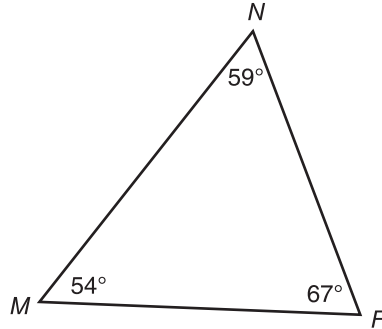


List the sides in order from least to greatest measure.

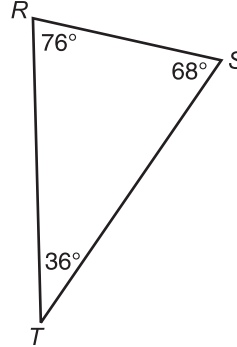
4.



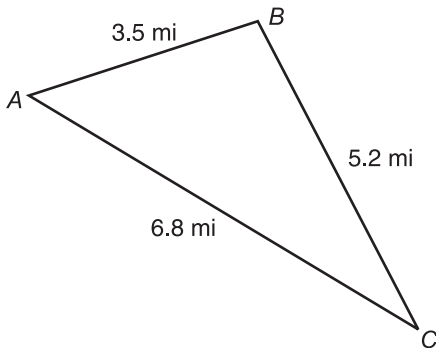
5.



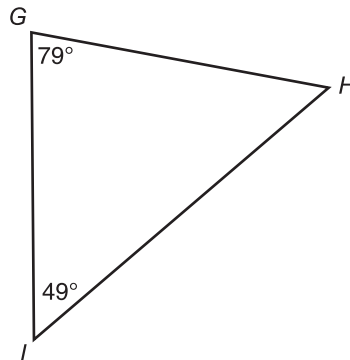
6.



7. Identify the angle with the greatest measure.



8. Identify the side with the greatest measure.



Practice***Triangle Inequality Theorem***

Determine if the three numbers can be measures of the sides of a triangle. Write yes or no. Explain.

1. 3, 3, 3

2. 2, 3, 4

3. 1, 2, 3

4. 8.9, 9.3, 18.3

5. 16.5, 20.5, 38.5

6. 19, 19, 0.5

7. 6, 7, 12

8. 8, 10, 26

9. 26, 28, 32

10. 3, 22, 25

If two sides of a triangle have the following measures, find the range of possible measures for the third side.

11. 3, 7

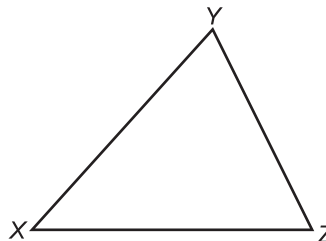
12. 5, 12

13. 29, 30

14. 56, 63

15. The sum of XZ and YZ is greater than _____.

16. If $XY = 10$ and $YZ = 8.5$, then XZ must be greater than _____, and less than _____.



Practice

Quadrilaterals

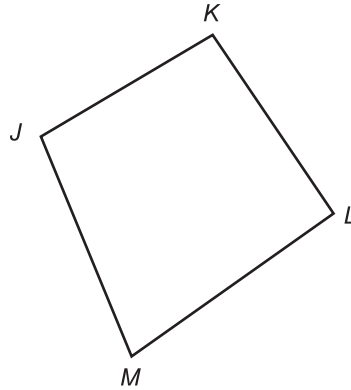
1. Name a side that is consecutive with \overline{JK} .

2. Name the side opposite \overline{KL} .

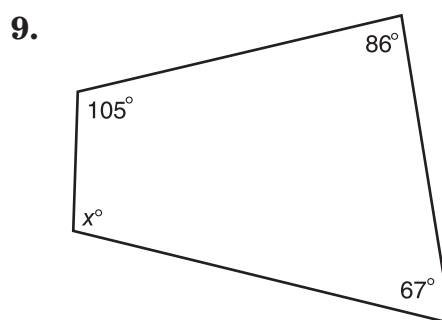
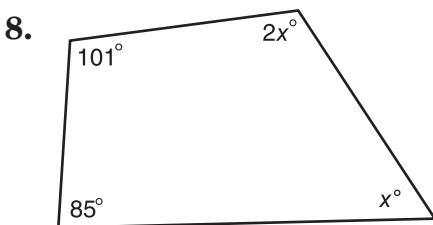
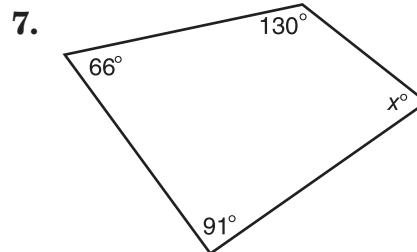
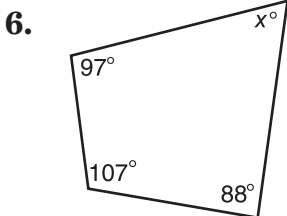
3. Name the vertex that is opposite L .

4. Name a pair of consecutive vertices.

5. Name the angle opposite $\angle K$.



Find the missing measure(s) in each figure.

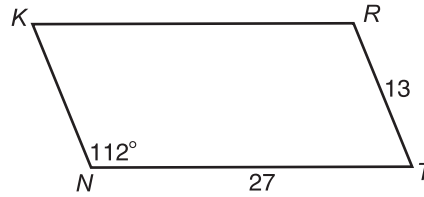


Practice

Parallelograms

Find each measure.

1. $m\angle K$
2. $m\angle R$
3. $m\angle T$
4. KR

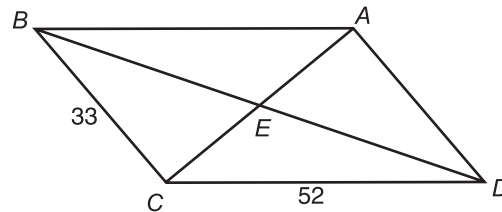


5. KN

6. Suppose the diagonals of $\square KRTN$ intersect at point Y .
If $NY = 12$, find NR .

In the figure, $BD = 74$ and $AE = 29$. Find each measure.

7. ED
8. EC
9. AC
10. BE
11. AD
12. BA

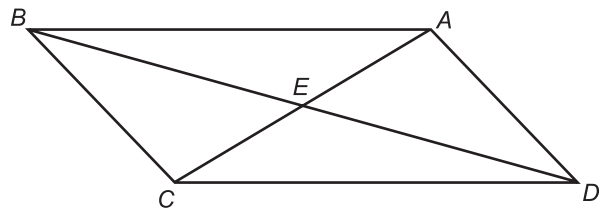


13. If $m\angle BCD = 125$, find $m\angle BAD$.

14. If $m\angle BAC = 45$, find $m\angle ACD$.

15. If $m\angle BEA = 135$, find $m\angle AED$.

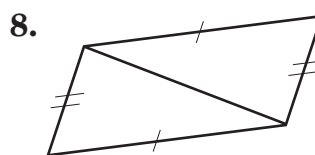
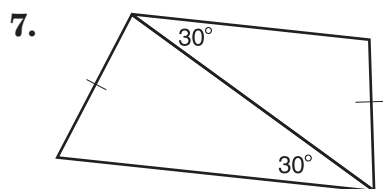
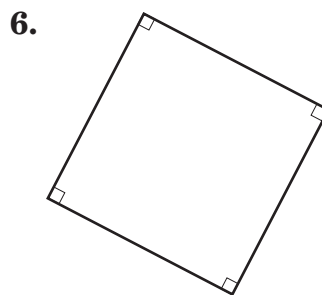
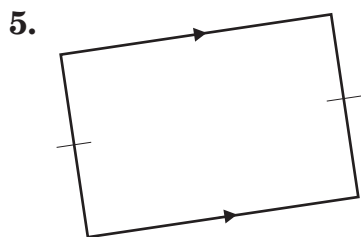
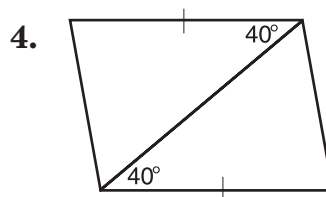
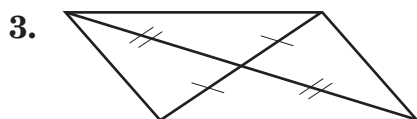
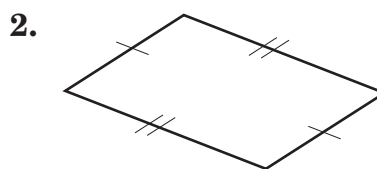
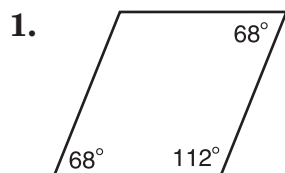
16. If $m\angle ABC = 50$, find $m\angle BCD$.



Practice

Tests for Parallelograms

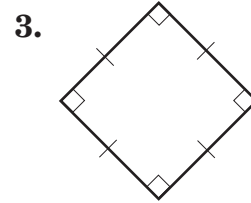
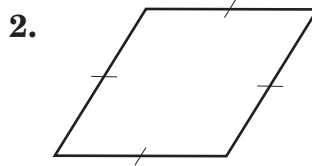
Determine whether each quadrilateral is a parallelogram.
Write yes or no. If yes, give a reason for your answer.



Practice

Rectangles, Rhombi, and Squares

Identify each parallelogram as a rectangle, rhombus, square, or none of these.



Find each measure.

4. TQ

5. TR

6. RP

7. QS

8. SR

9. $m\angle BCE$

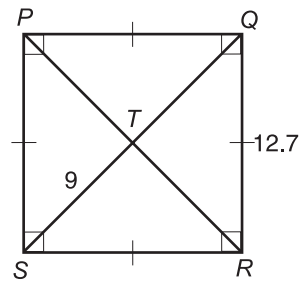
10. $m\angle BEC$

11. AC

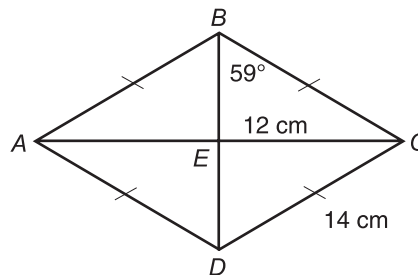
12. $m\angle ABD$

13. AD

14. $m\angle ADC$



Exercises 4–8

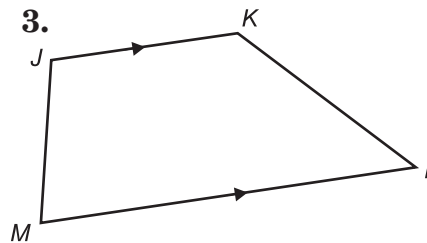
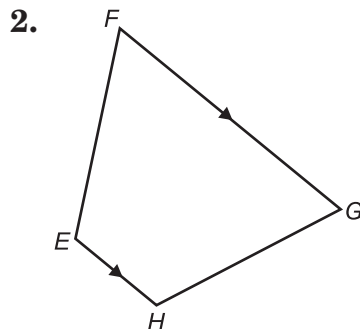
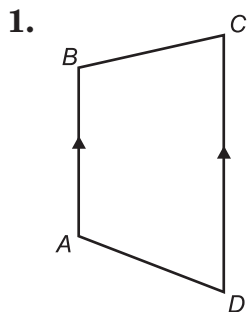


Exercises 9–14

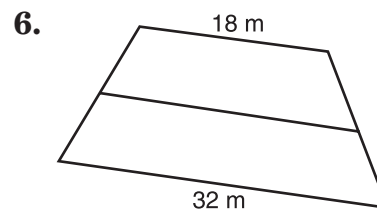
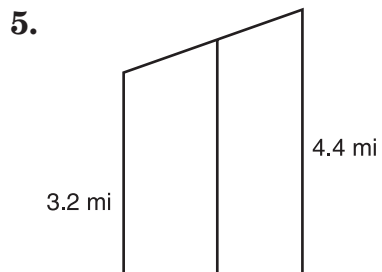
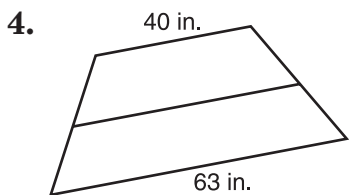
Practice

Trapezoids

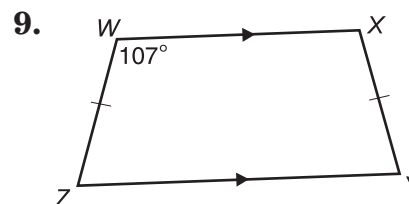
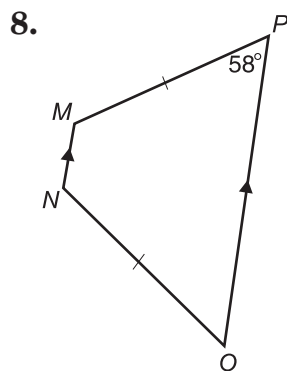
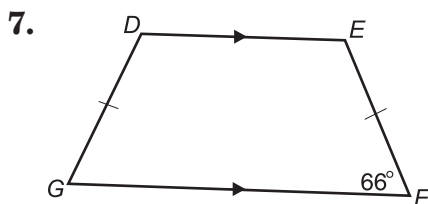
For each trapezoid, name the bases, the legs, and the base angles.



Find the length of the median in each triangle.



Find the missing angle measures in each isosceles trapezoid.



Practice***Using Ratios and Proportions***

Write each ratio in simplest form.

1. $\frac{12}{15}$

2. $\frac{8}{20}$

3. $\frac{3}{24}$

4. $\frac{2}{18}$

5. $\frac{24}{36}$

6. $\frac{12}{9}$

7. 6 meters to 60 centimeters

8. 1 foot to 1 yard

Solve each proportion.

9. $\frac{x}{3} = \frac{10}{15}$

10. $\frac{h}{4} = \frac{7}{14}$

11. $\frac{8}{14} = \frac{12}{a}$

12. $\frac{5}{10} = \frac{4}{m}$

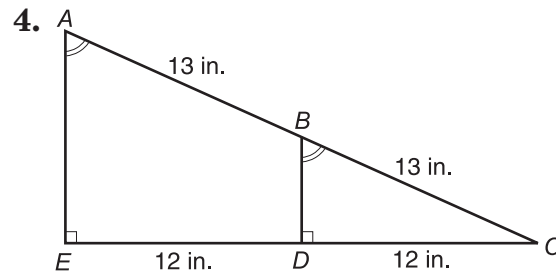
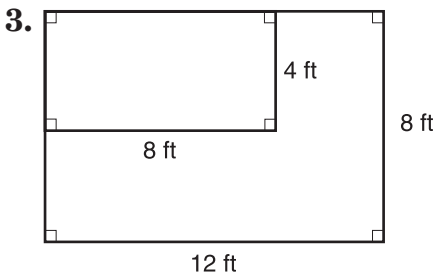
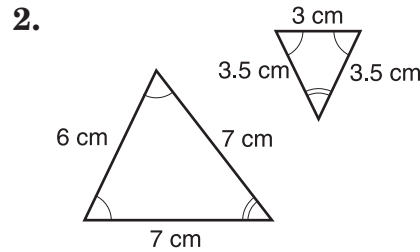
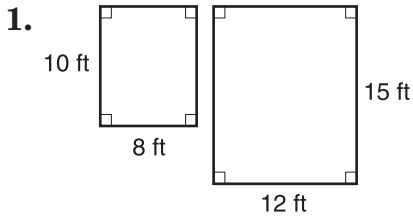
13. $\frac{9}{b} = \frac{15}{40}$

14. $\frac{8}{v} = \frac{28}{35}$

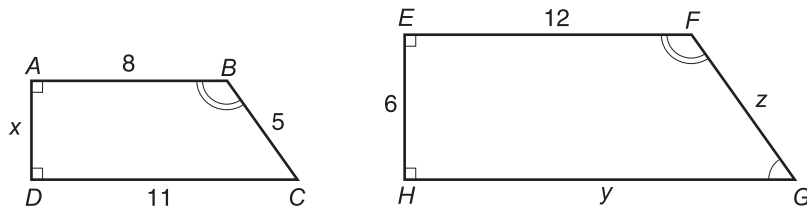
15. The ratio of sophomores to juniors in the Math Club is 2:3. If there are 21 juniors, how many sophomores are in the club?

Similar Polygons

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



In the figure below, trapezoid $ABCD \sim$ trapezoid $EFGH$. Use this information to answer Exercises 5–9.

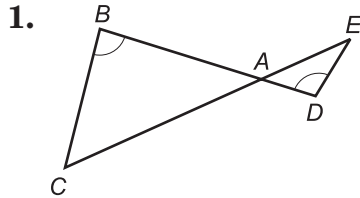


- List all pairs of corresponding angles.
- Write four ratios relating the corresponding sides.
- Write a proportion to find the missing measure x . Then find the value of x .
- Write a proportion to find the missing measure y . Then find the value of y .
- Write a proportion to find the missing measure z . Then find the value of z .

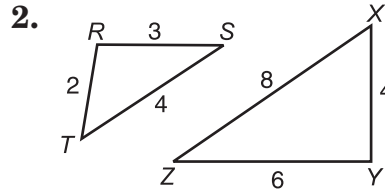
Practice

Similar Triangles

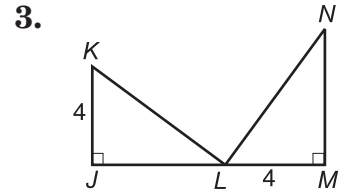
Determine whether each pair of triangles is similar. If so, tell which similarity test is used and complete the statement.



$\triangle ABC \sim \triangle$ _____

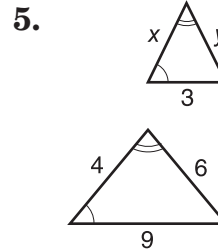
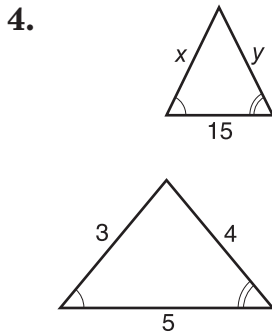


$\triangle RST \sim \triangle$ _____



$\triangle KJL \sim \triangle$ _____

Find the value of each variable.



6. A rug measures 6 feet by 3 feet. Make a scale drawing of the rug if $\frac{1}{2}$ inch represents 1 foot.

7. Draw an example of two similar triangles.

Proportional Parts and Triangles

Complete each proportion.

1. $\frac{AD}{AC} = \frac{AE}{AB}$

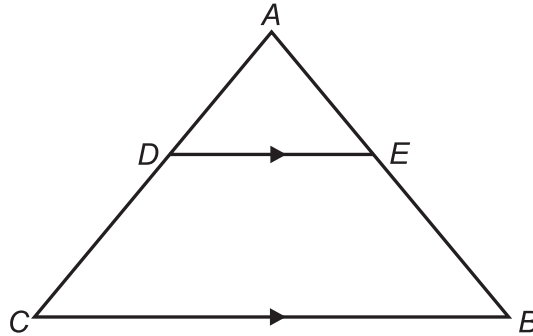
2. $\frac{AD}{DC} = \frac{AE}{EB}$

3. $\frac{DE}{CB} = \frac{AD}{AC}$

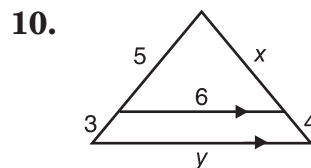
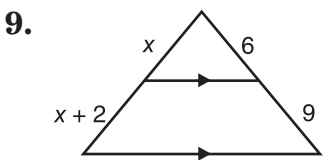
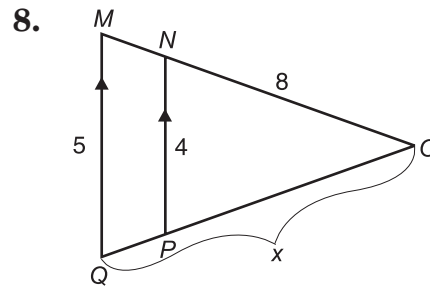
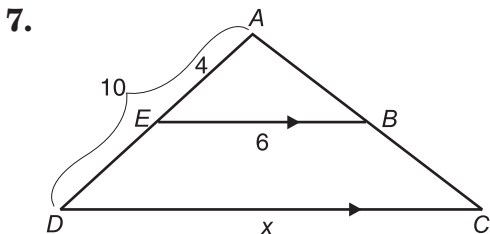
4. $\frac{DE}{AB} = \frac{AE}{AB}$

5. $\frac{AC}{CB} = \frac{AB}{AE}$

6. $\frac{DE}{CB} = \frac{AB}{AE}$



Find the value for each variable.

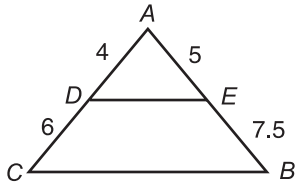


Practice

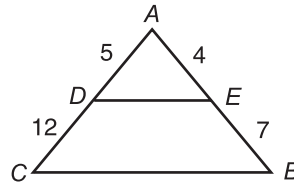
Triangles and Parallel Lines

In each figure, determine whether $\overline{DE} \parallel \overline{CB}$.

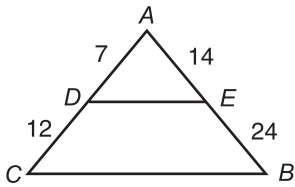
1.



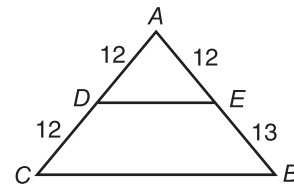
2.



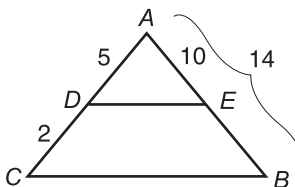
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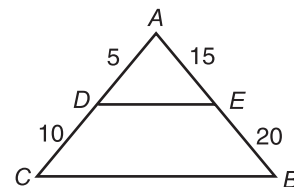
4.



5.



6.



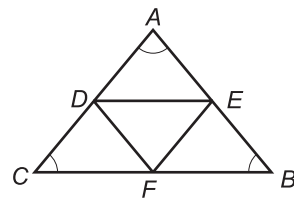
D, E, and F are the midpoints of the sides of $\triangle ABC$. Complete each statement.

7. $\overline{AB} \parallel$?

8. If $AC = 22$, then $EF =$?

9. If $AE = 6$, find the perimeter of $\triangle DEF$.

10. If $CF = 9$, find the perimeter of $\triangle ABC$.



Practice

Proportional Parts and Parallel Lines

Complete each proportion.

1. $\frac{PQ}{QR} = \frac{TW}{PW}$

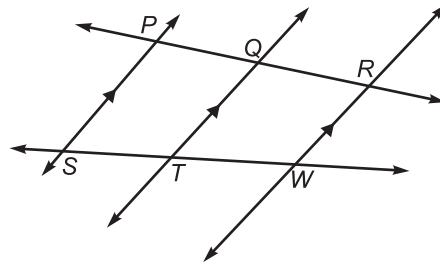
2. $\frac{TW}{ST} = \frac{PQ}{QR}$

3. $\frac{PQ}{PR} = \frac{ST}{PW}$

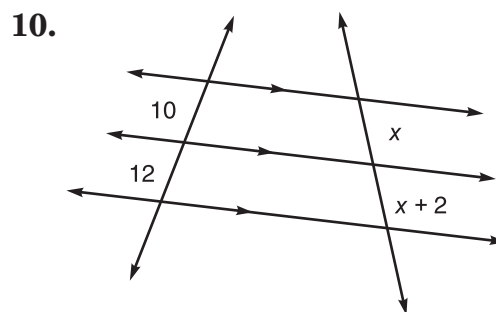
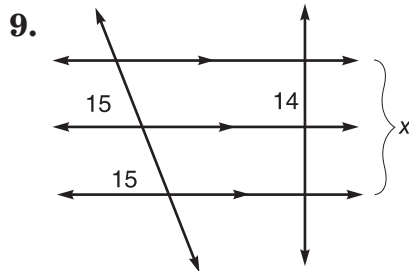
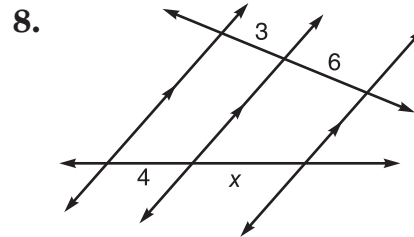
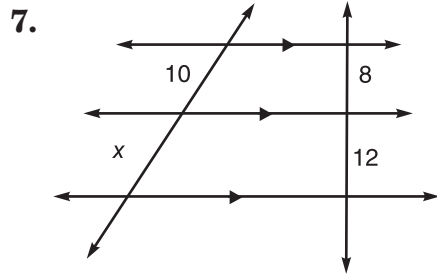
4. $\frac{TW}{SW} = \frac{PQ}{PR}$

5. $\frac{SW}{ST} = \frac{PQ}{QR}$

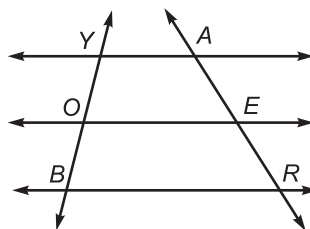
6. $\frac{PR}{QR} = \frac{SW}{PW}$



Find the value of x .



11. In the figure, $\overline{YA} \parallel \overline{OE} \parallel \overline{BR}$.
If $YO = 4$, $ER = 16$, and
 $AR = 24$, find OB and AE .

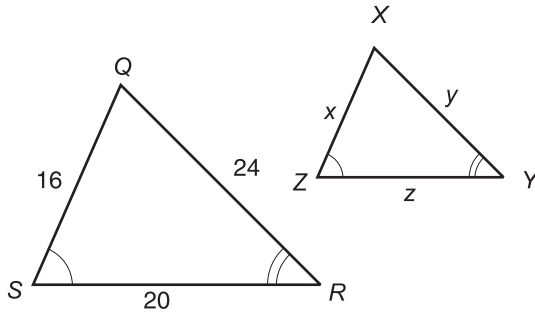


Practice

Perimeters and Similarity

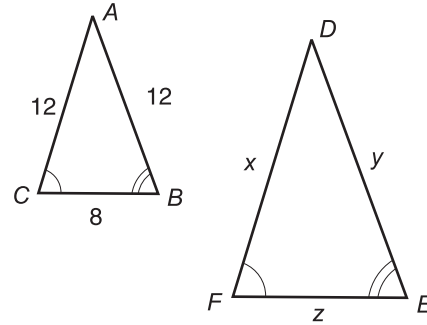
For each pair of similar triangles, find the value of each variable.

1.



Perimeter of $\triangle XYZ = 30$

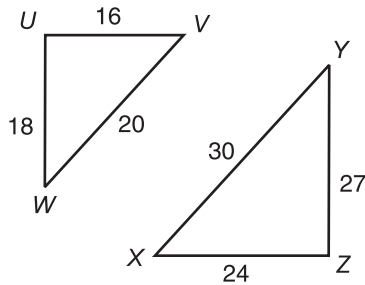
2.



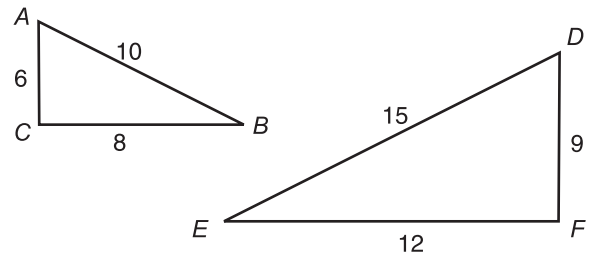
Perimeter of $\triangle DEF = 48$

Determine the scale factor for each pair of similar triangles.

3. $\triangle UVW$ to $\triangle ZXY$



4. $\triangle DEF$ to $\triangle ABC$

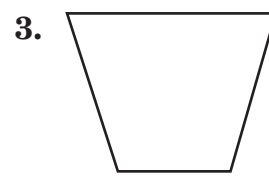
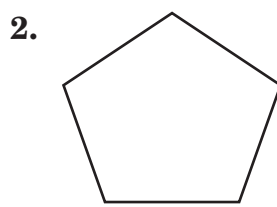
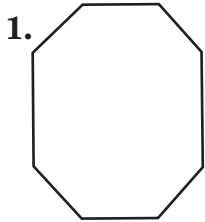


5. The perimeter of $\triangle ABC$ is 24 feet. If $\triangle ABC \sim \triangle LMN$ and the scale factor of $\triangle ABC$ to $\triangle LMN$ is $\frac{2}{3}$, find the perimeter of $\triangle LMN$.

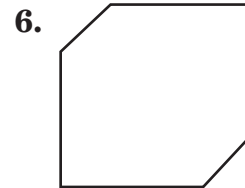
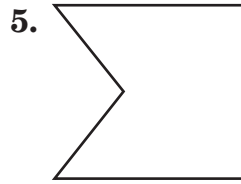
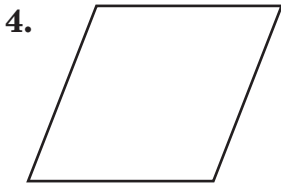
6. Suppose $\triangle XYZ \sim \triangle DEF$ and the scale factor of $\triangle XYZ$ to $\triangle DEF$ is $\frac{3}{5}$. The lengths of the sides of $\triangle XYZ$ are 15 centimeters, 12 centimeters, and 12 centimeters. Find the perimeter of $\triangle DEF$.

Practice**Naming Polygons**

Identify each polygon by its sides. Then determine whether it appears to be regular or not regular. If not regular, explain why.



Classify each polygon as convex or concave.



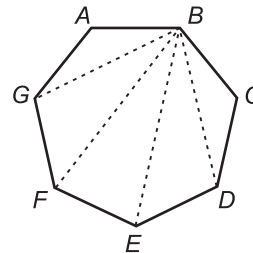
Name each part of heptagon ABCDEFG.

7. two nonconsecutive vertices

8. two diagonals

9. three consecutive sides

10. four consecutive vertices



Practice***Diagonals and Angle Measure***

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

1. heptagon 2. octagon 3. 13-gon

Find the measure of one interior angle and one exterior angle of each regular polygon.

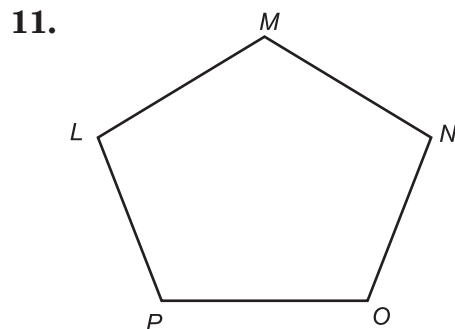
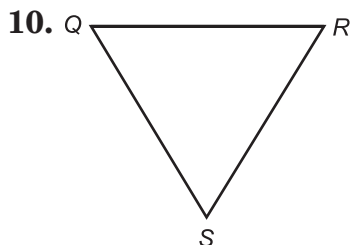
4. 5 5. 9 6. 10

7. The sum of the measures of five interior angles of a hexagon is 535. What is the measure of the sixth angle?

8. The measure of an exterior angle of a regular octagon is $x + 7$. Find x and the measure of each exterior angle of the octagon.

9. The measures of the exterior angles of a quadrilateral are x , $3x$, $5x$, and $3x$. Find x and the measure of each exterior angle of the quadrilateral.

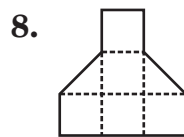
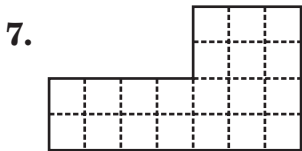
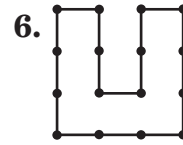
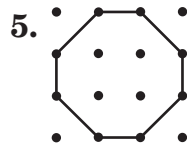
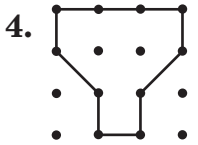
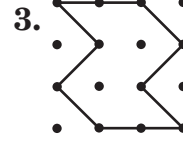
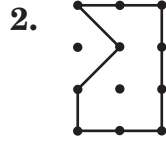
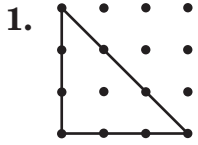
Find the sum of the measures of the interior angles in each figure.



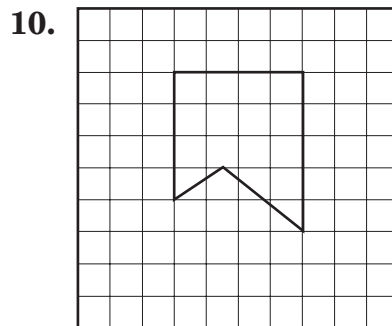
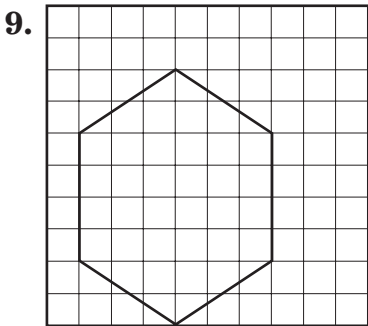
Practice

Areas of Polygons

Find the area of each polygon in square units.

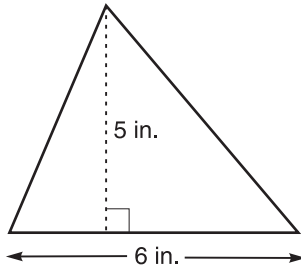


Estimate the area of each polygon in square units.

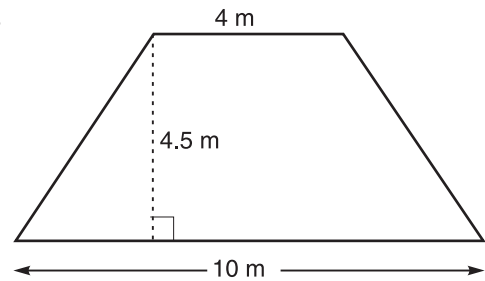


Areas of Triangles and Trapezoids*Find the area of each triangle or trapezoid.*

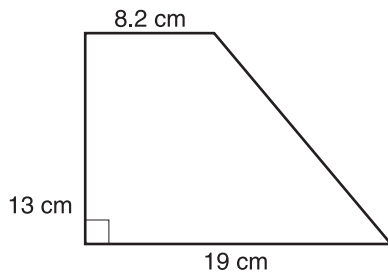
1.



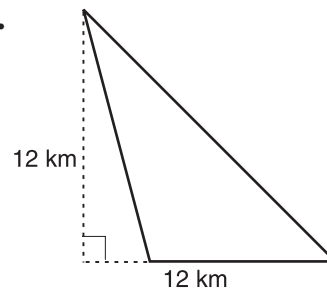
2.



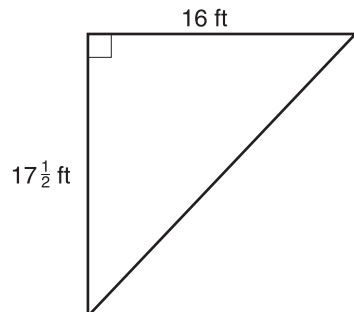
3.



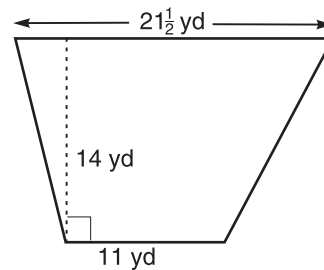
4.



5.



6.

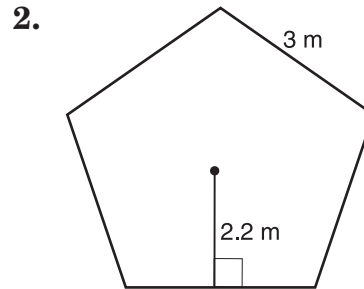
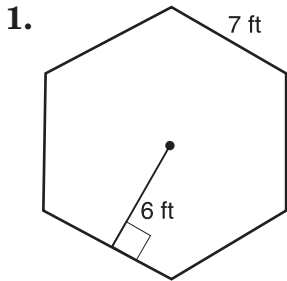


7. The altitude of a triangle is 5 inches and the base is 10 inches long. Find the area.

8. The height of a trapezoid is 9 centimeters. The bases are 8 centimeters and 12 centimeters long. Find the area.

Areas of Regular Polygons

Find the area of each regular polygon. If necessary, round to the nearest tenth.



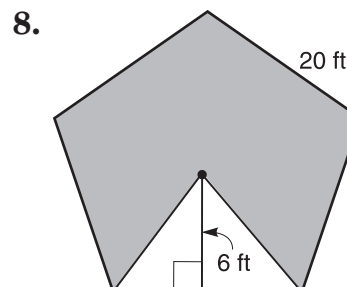
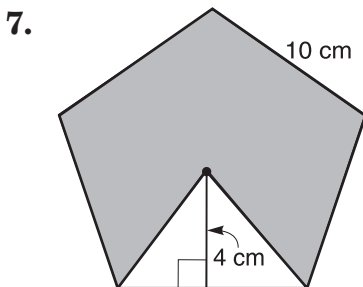
3. an octagon with an apothem 4.8 centimeters long and a side 4 centimeters long

4. a square with a side 24 inches long and an apothem 12 inches long

5. a hexagon with a side 23.1 meters long and an apothem 20.0 meters long

6. a pentagon with an apothem 316.6 millimeters long and a side 460 millimeters long

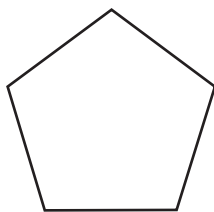
Find the area of the shaded region in each regular polygon.



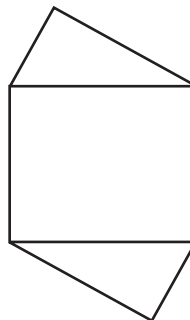
Practice**Symmetry**

Determine whether each figure has line symmetry. If it does, copy the figure and draw all lines of symmetry. If not, write no.

1.



2.



3.

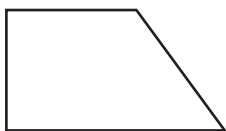


4.

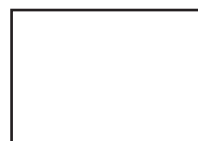


Determine whether each figure has rotational symmetry. Write yes or no.

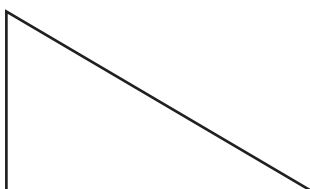
5.



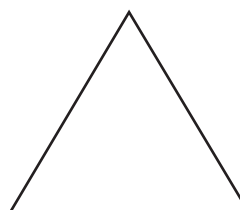
6.



7.



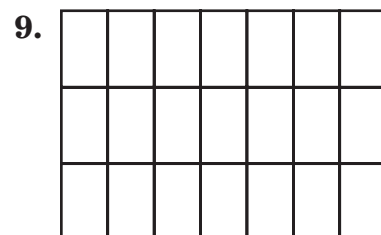
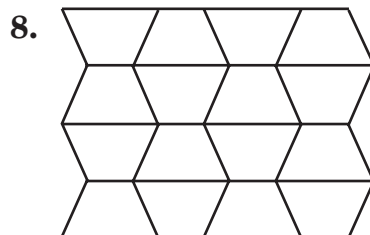
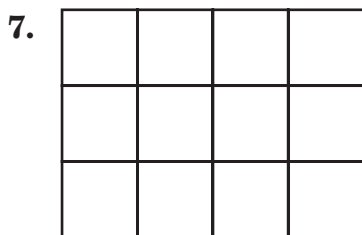
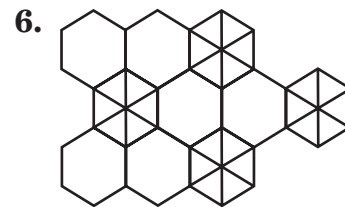
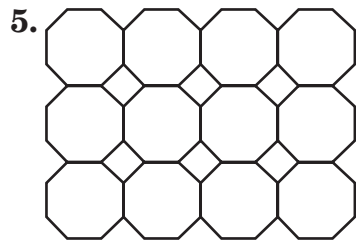
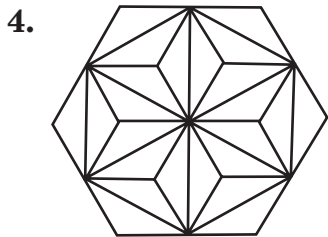
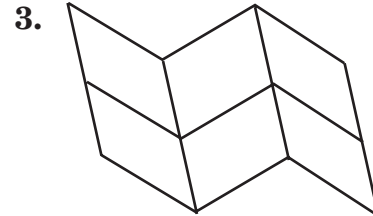
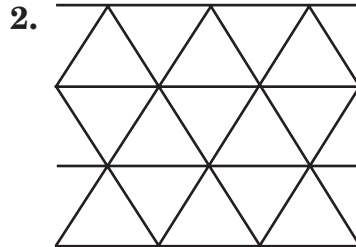
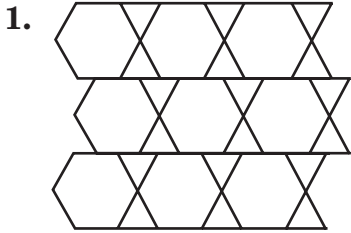
8.



Practice

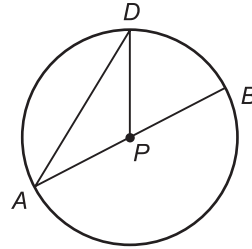
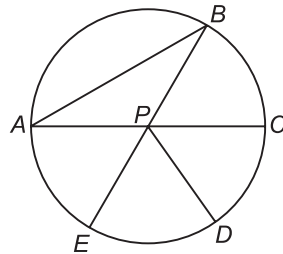
Tessellations

Identify the figures used to create each tessellation. Then identify the tessellation as regular, semi-regular, or neither.



Practice**Parts of a Circle***Refer to the figure at the right.*

1. Name the center of $\odot P$.
2. Name three radii of the circle.
3. Name a diameter.
4. Name two chords.

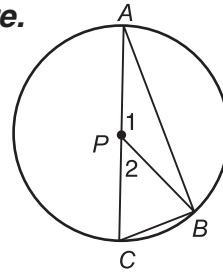
*Use circle P to determine whether each statement is true or false.*

5. \overline{PB} is a radius of circle P .
6. \overline{AB} is a radius of circle P .
7. $CA = 2(PE)$
8. \overline{PB} is a chord of circle P .
9. \overline{AB} is a chord of circle P .
10. \overline{AB} is a diameter of circle P .
11. \overline{AC} is a diameter of circle P .
12. $PA = PD$

Practice

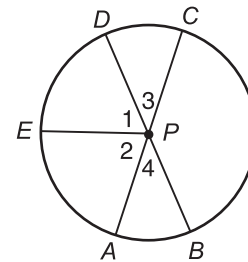
Arcs and Central Angles

In $\odot P$, $m\angle 1 = 140$ and \overline{AC} is a diameter. Find each measure.



1. $m\angle 2$
2. $m\widehat{BC}$
3. $m\widehat{AB}$
4. $m\widehat{ABC}$

In $\odot P$, $m\angle 2 = m\angle 1$, $m\angle 2 = 4x + 35$, $m\angle 1 = 9x + 5$, and \overline{BD} and \overline{AC} are diameters. Find each of the following.



5. x
6. $m\widehat{AE}$
7. $m\widehat{ED}$
8. $m\angle 3$
9. $m\widehat{AB}$
10. $m\widehat{EC}$
11. $m\widehat{EB}$
12. $m\angle CPB$
13. $m\widehat{CB}$
14. $m\widehat{CEB}$
15. $m\widehat{DC}$
16. $m\widehat{CEA}$

17. The table below shows how federal funds were spent on education in 1990.

1990 Federal Funds Spent for Education	
Elementary/Secondary	\$ 7,945,177
Education for the Disabled	4,204,099
Post-Secondary Education	12,645,630
Public Library Services	145,367
Other	760,616
Total	\$25,700,889

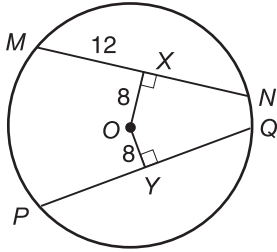
- a. Use the information to make a circle graph.
- b. Out of the \$12,645,630 spent on post-secondary education, \$10,801,185 went to post-secondary financial assistance. What percent is that of the \$12,645,630?

Practice

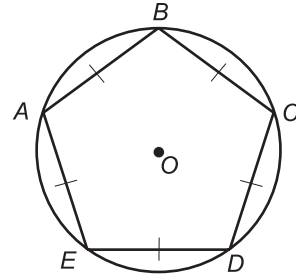
Arcs and Chords

In each figure, O is the center. Find each measure to the nearest tenth.

1. YQ



2. $m\widehat{BC}$

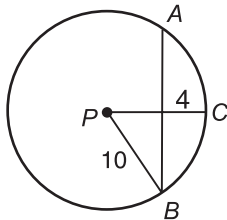


3. Suppose a chord of a circle is 16 inches long and is 6 inches from the center of the circle. Find the length of a radius.

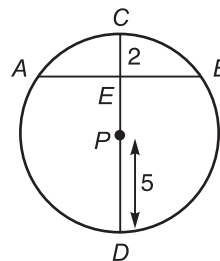
4. Find the length of a chord that is 5 inches from the center of a circle with a radius of 13 inches.

5. Suppose a radius of a circle is 17 units and a chord is 30 units long. Find the distance from the center of the circle to the chord.

6. Find AB .



7. Find AB .



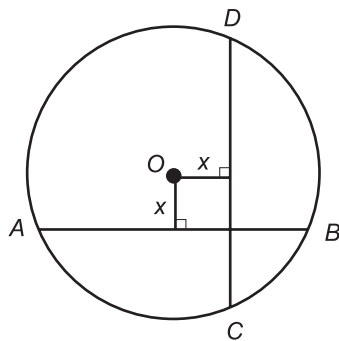
Practice**Inscribed Polygons**

Use a compass and straightedge to inscribe each polygon in a circle. Explain each step.

1. equilateral triangle

2. regular pentagon

Use circle O to find x .



3. $AB = 3x - 5$, $CD = 2x + 1$

4. $AB = 4x + 2$, $CD = 2x + 6$

5. $AB = 2x + 1$, $CD = 3x - 4$

6. $AB = 3(x + 1)$, $CD = 2(x + 5)$

7. $AB = 3(x - 1)$, $CD = 8x - 13$

8. $AB = 5(x + 2)$, $CD = 10(x - 1)$

9. $AB = 3x - 7$, $CD = 4x - 21$

Practice

Circumference of a Circle

Find the circumference of a circle with a radius of the given length. Round your answers to the nearest tenth.

1. 3 cm

2. 2 ft

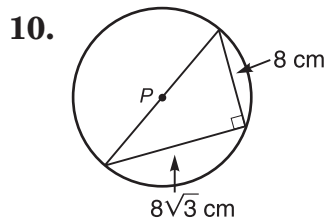
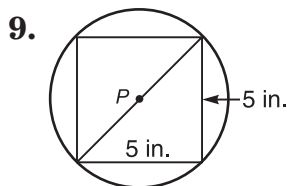
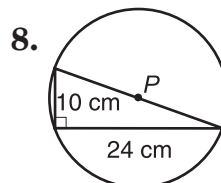
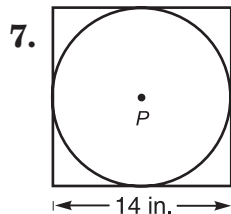
3. 34 mm

4. 4.5 m

5. 6 cm

6. 5 miles

Find the exact circumference of each circle.



Practice**Area of a Circle**

Find the area of each circle described. Round your answers to the nearest hundredth.

1. $r = 3$ cm

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

3. $r = 2.3$ mm

4. $d = 13$ ft

5. $d = 2\frac{2}{3}$ mi

6. $d = 6.42$ in.

7. $C = 80$ mm

8. $C = 15.54$ in

9. $C = 12\frac{1}{2}$ mi

In a circle with radius of 5 cm, find the area of a sector whose central angle has the following measure. Round to the nearest hundredth.

8. 10

9. 180

10. 36

11. 12

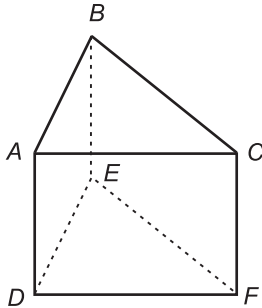
12. 120

13. 45

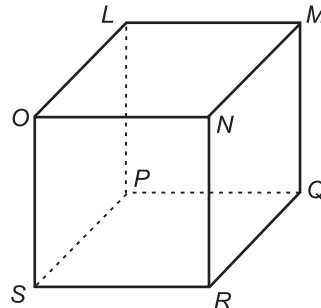
Solid Figures

Name the faces, edges, and vertices of each polyhedron.

1.

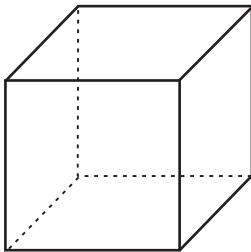


2.

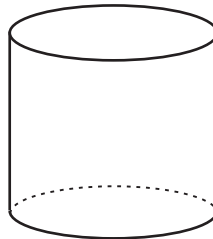


Identify each solid.

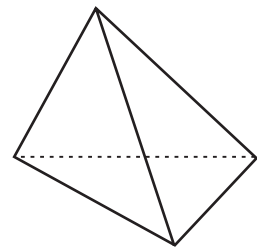
3.



4.

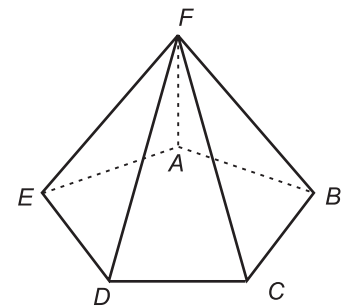


5.



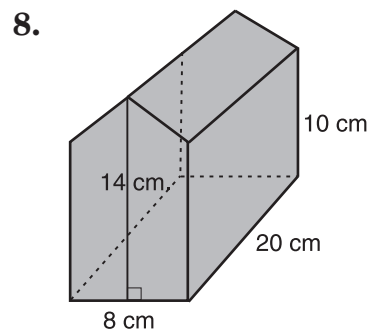
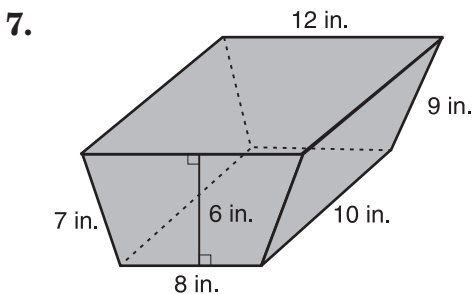
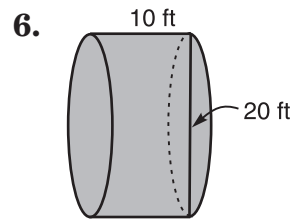
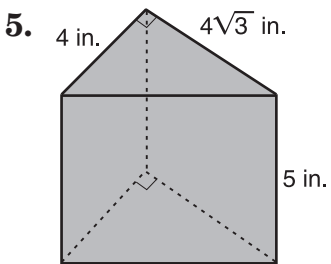
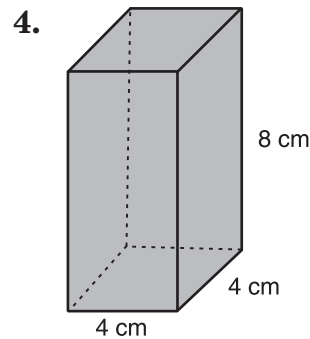
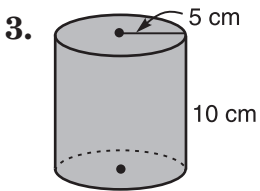
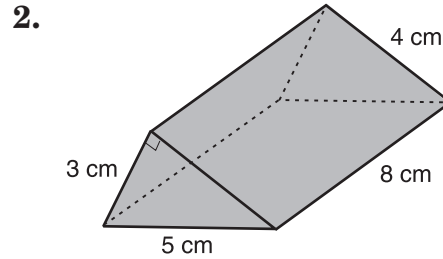
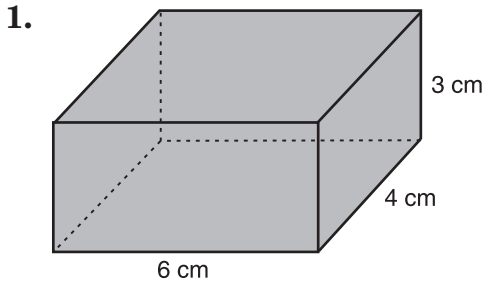
Determine whether each statement is true or false for the solid.

6. The figure is a prism.
7. The figure is a polyhedron.
8. Pentagon $ABCDE$ is a lateral face.
9. The figure has five lateral faces.
10. Pentagon $ABCDE$ is a base.



Surface Areas of Prisms and Cylinders

Find the lateral area and the surface area for each solid.
Round to the nearest tenth, if necessary.

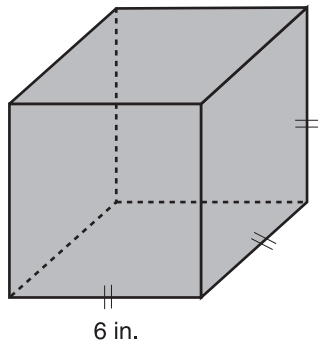


Practice

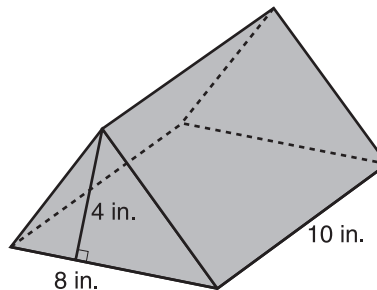
Volumes of Prisms and Cylinders

Find the volume of each solid. Round to the nearest tenth, if necessary.

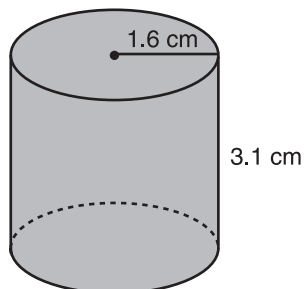
1.



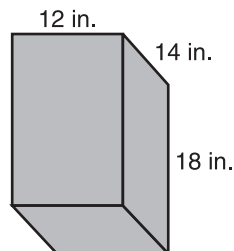
2.



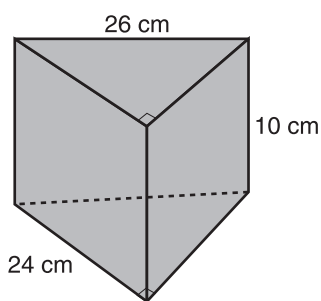
3.



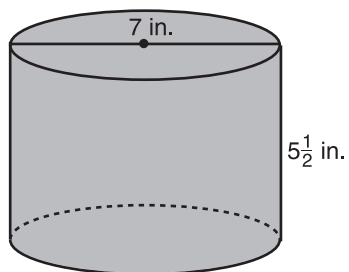
4.



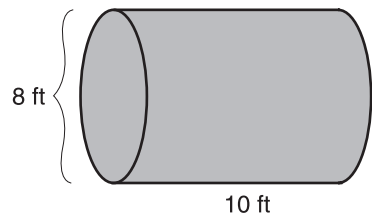
5.



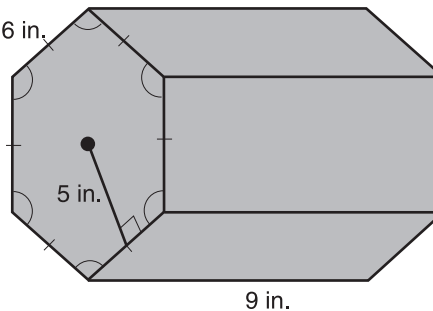
6.



7.

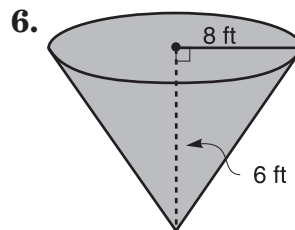
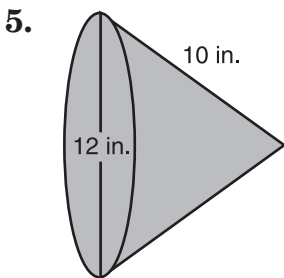
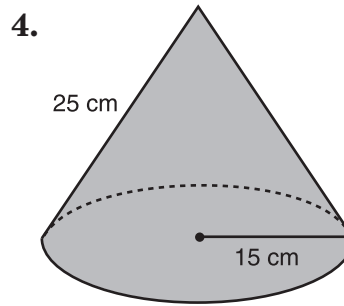
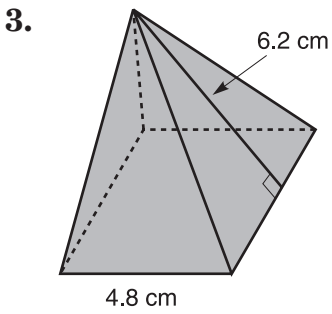
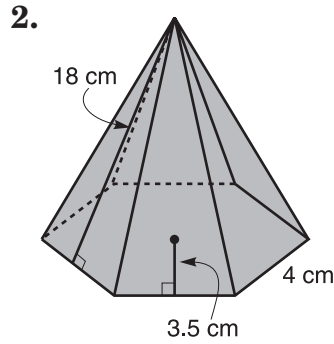
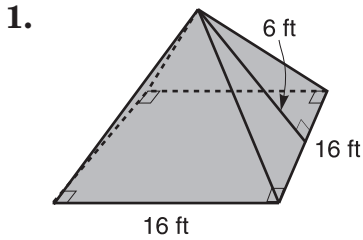


8.



Surface Areas of Pyramids and Cones

Find the lateral area and the surface area of each regular pyramid or cone. Round to the nearest hundredth.

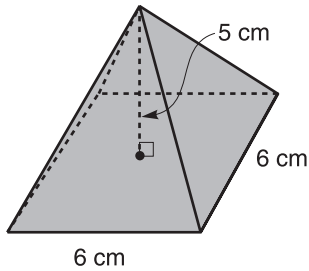


Practice

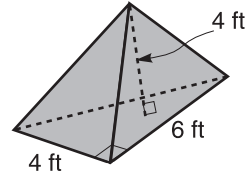
Volumes of Pyramids and Cones

Find the volume of each solid. Round to the nearest hundredth, if necessary.

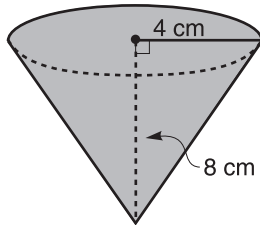
1.



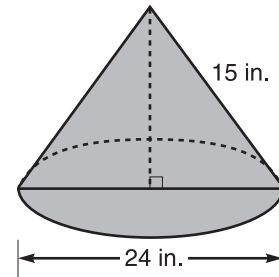
2.



3.



4.



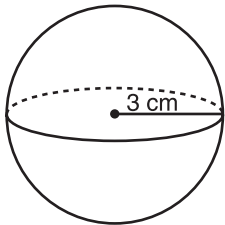
5. A pyramid has a height of 16 centimeters and a base with area of 84 square centimeters. What is its volume?

6. A cone has a height of 12 inches and a base with a radius of 16 centimeters. Find the volume of the cone.

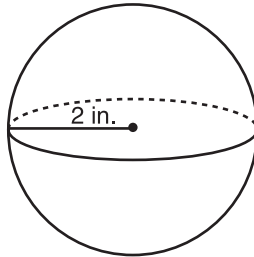
Spheres

Find the surface area and volume of each sphere.
Round to the nearest hundredth.

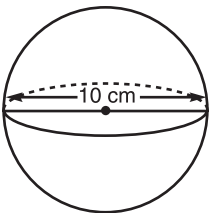
1.



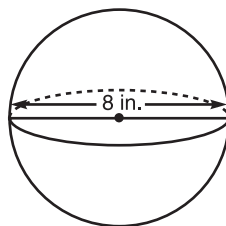
2.



3.



4.



5. Find the surface area of a sphere with a diameter of 100 centimeters. Round to the nearest hundredth.

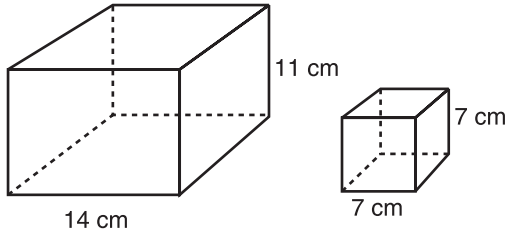
6. What is the volume of a sphere with a radius of 12 inches?
Round to the nearest hundredth.

Practice

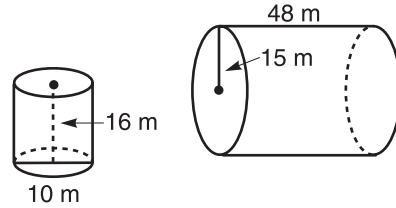
Similarity of Solid Figures

Determine whether each pair of solids is similar.

1.

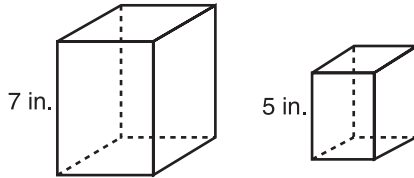


2.

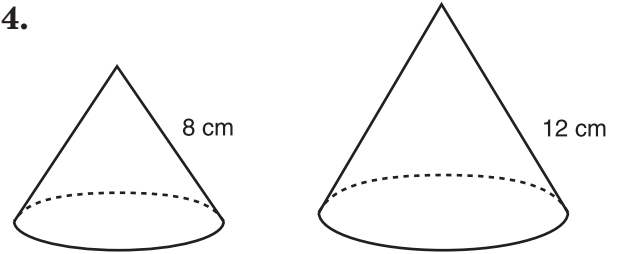


For each pair of similar solids, find the scale factor of the solid on the left to the solid on the right. Then find the ratios of the surface areas and the volumes.

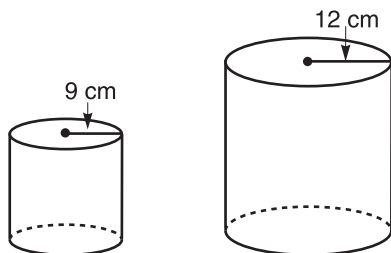
3.



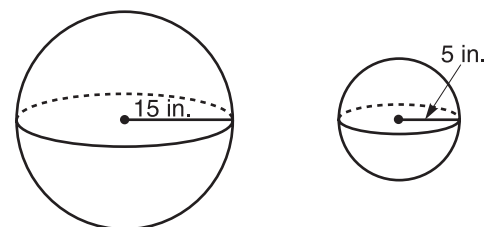
4.



5.



6.



Practice***Simplifying Square Roots****Simplify each expression.*

1. $\sqrt{169}$

2. $\sqrt{36}$

3. $\sqrt{25}$

4. $\sqrt{300}$

5. $\sqrt{75}$

6. $\sqrt{45}$

7. $\sqrt{3} \cdot \sqrt{6}$

8. $\sqrt{3} \cdot \sqrt{7}$

9. $\sqrt{5} \cdot \sqrt{30}$

10. $\frac{\sqrt{35}}{\sqrt{7}}$

11. $\frac{\sqrt{25}}{\sqrt{64}}$

12. $\sqrt{\frac{64}{16}}$

13. $\frac{\sqrt{5}}{\sqrt{3}}$

14. $\frac{\sqrt{3}}{\sqrt{5}}$

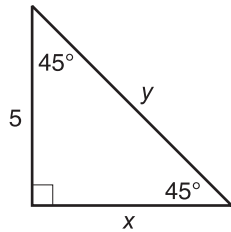
15. $\sqrt{\frac{2}{10}}$

Practice

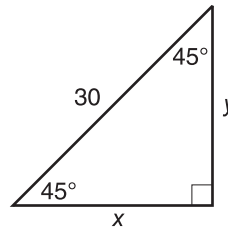
 45° - 45° - 90° Triangles

Find the missing measure. Write all radicals in simplest form.

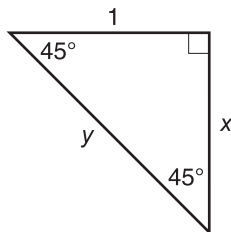
1.



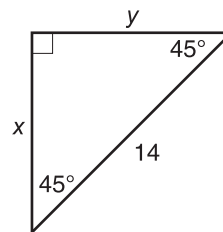
2.



3.



4.



5. Find the length of a diagonal of a square with sides 10 inches long.

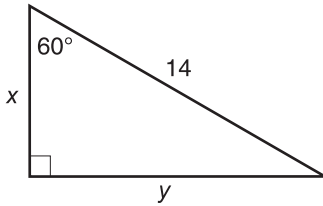
6. Find the length of a side of a square whose diagonal is 4 centimeters.

Practice

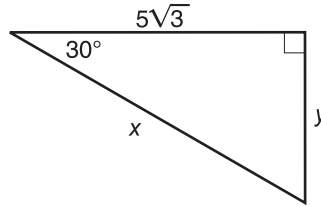
30° - 60° - 90° Triangles

Find the missing measures. Write all radicals in simplest form.

1.



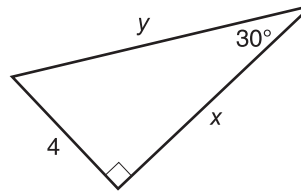
2.



3.

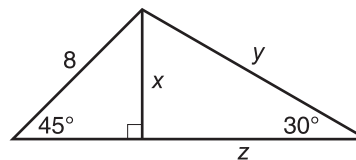


4.



5. One side of an equilateral triangle measures 6 cm. Find the measure of an altitude of the triangle.

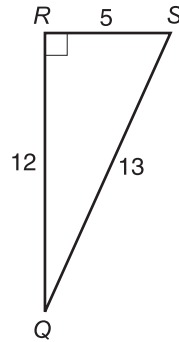
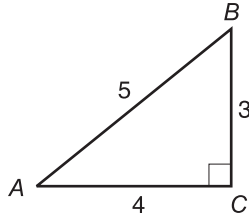
6. Find the missing measures in the triangle. Write all radicals in simplest form.



Practice

Tangent Ratio

Find each tangent. Round to four decimal places, if necessary.



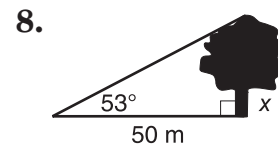
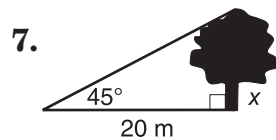
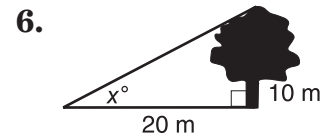
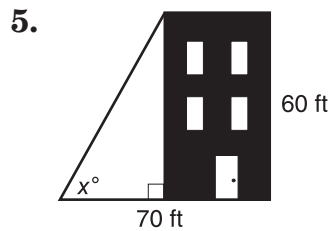
1. $\tan A$

2. $\tan B$

3. $\tan S$

4. $\tan Q$

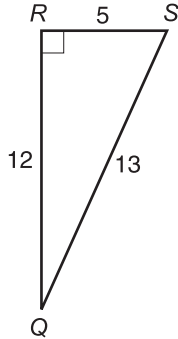
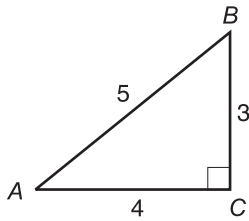
Find each missing measure. Round to the nearest tenth.



Practice

Sine and Cosine Ratios

Find each sine or cosine. Round to four decimal places, if necessary.



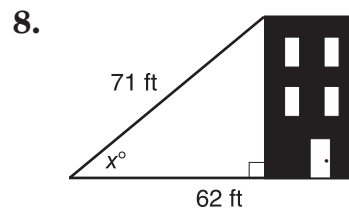
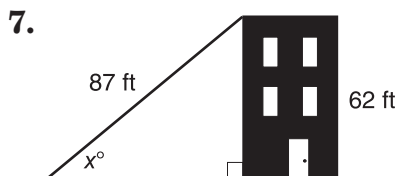
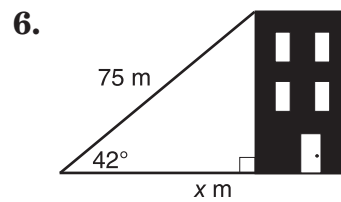
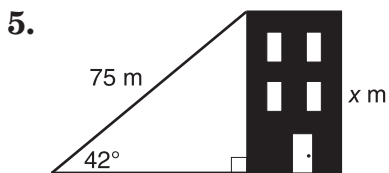
1. $\sin A$

2. $\sin B$

3. $\cos Q$

4. $\cos S$

Find each measure. Round to the nearest tenth.

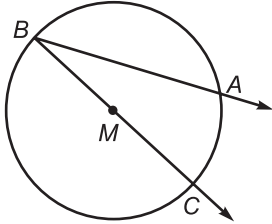


Practice

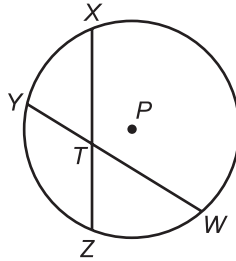
Inscribed Angles

Determine whether each angle is an inscribed angle. Name the intercepted arc for the angle.

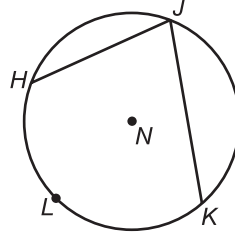
1. $\angle ABC$



2. $\angle XTW$



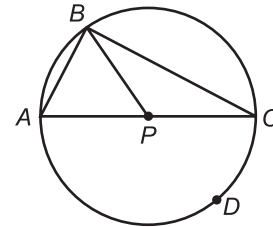
3. $\angle HJK$



In $\odot P$, $m\widehat{AB} = x$ and $m\widehat{BC} = 3x$. Find each measure.

4. $m\widehat{ADC}$

5. $m\angle ABC$



6. $m\widehat{AB}$

7. $m\angle A$

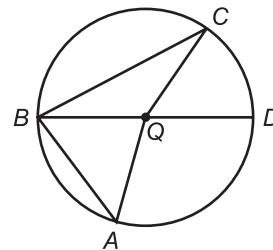
8. $m\widehat{BC}$

9. $m\angle C$

In $\odot Q$, $m\angle ABC = 72$ and $m\widehat{CD} = 46$. Find each measure.

10. $m\widehat{CA}$

11. $m\widehat{BC}$



12. $m\widehat{AD}$

13. $m\angle C$

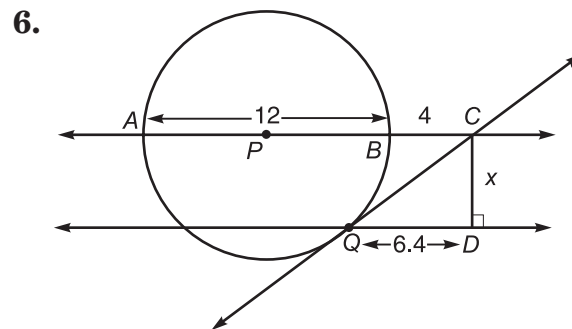
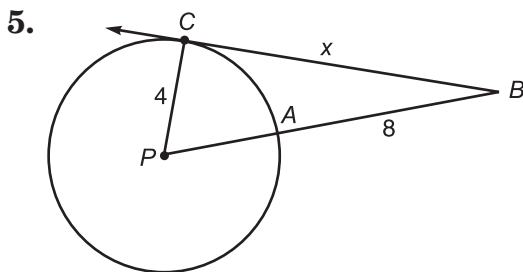
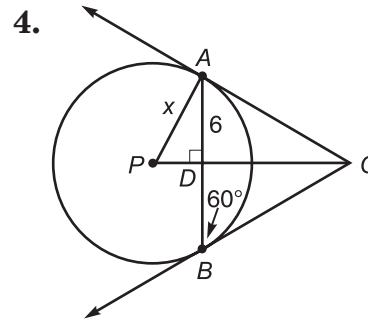
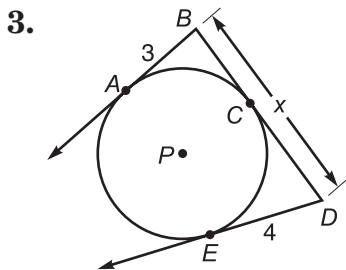
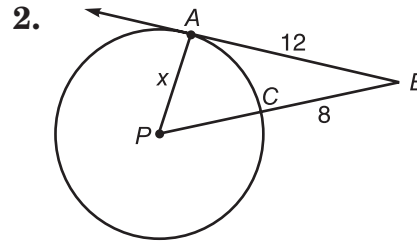
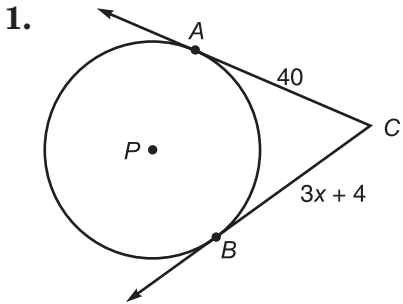
14. $m\angle ABD$

15. $m\angle A$

Practice

Tangents to a Circle

For each $\odot Q$, find the value of x . Assume segments that appear to be tangent are tangent.

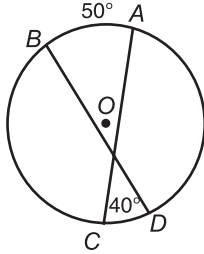


Practice

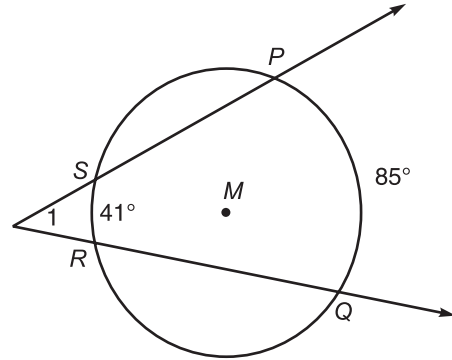
Secant Angles

Find each measure.

1. $m\widehat{CD}$



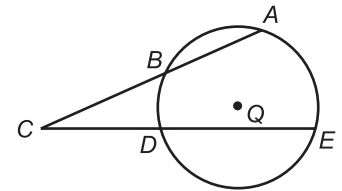
2. $m\angle 1$



In $\odot Q$, $m\widehat{AE} = 140$, $m\widehat{BD} = y$, $m\widehat{AB} = 2y$, and $m\widehat{DE} = 2y$.
Find each measure.

3. $m\widehat{BD}$

4. $m\widehat{AB}$



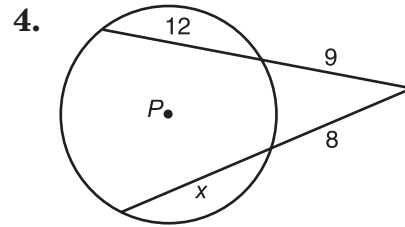
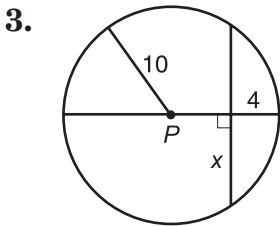
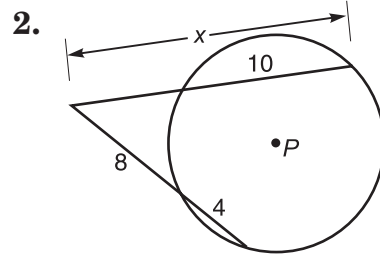
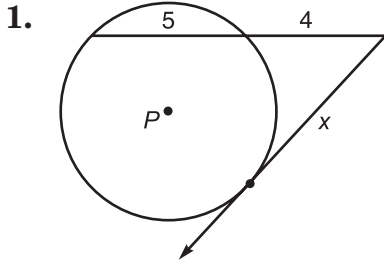
5. $m\widehat{DE}$

6. $m\angle BCD$

Practice

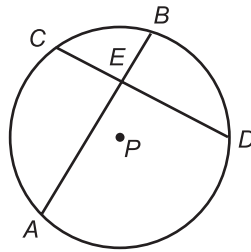
Segment Measures

In each circle, find the value of x . If necessary, round to the nearest tenth. Assume segments that appear to be tangent are tangent.



In $\odot P$, $CE = 6$, $CD = 16$, and $AB = 17$. Find each measure.

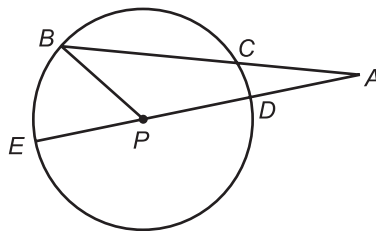
5. EB



6. AE

In $\odot P$, $AC = 3$, $BC = 5$, and $AD = 2$. Find each measure.

7. PD



8. ED

9. PB

Equations of Circles

Find the coordinates of the center and the measure of the radius for each circle whose equation is given.

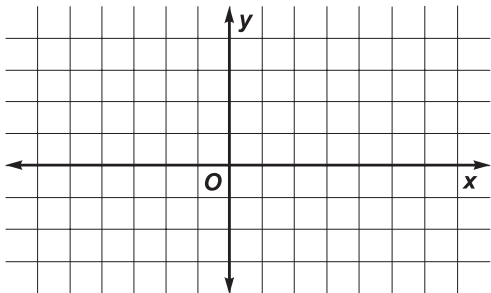
1. $(x - 3)^2 + (y + 1)^2 = 16$

2. $(x + \frac{5}{8})^2 + (y + 2)^2 = \frac{25}{9}$

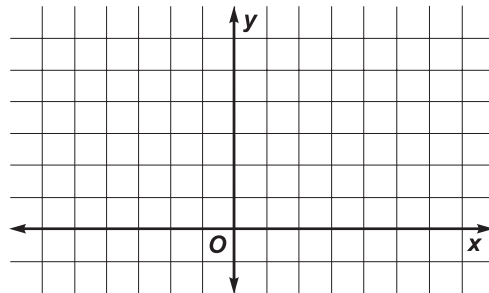
3. $(x - 3.2)^2 + (y - 0.75)^2 = 40$

Graph each equation on a coordinate grid.

4. $(x - 2)^2 + y^2 = 6.25$



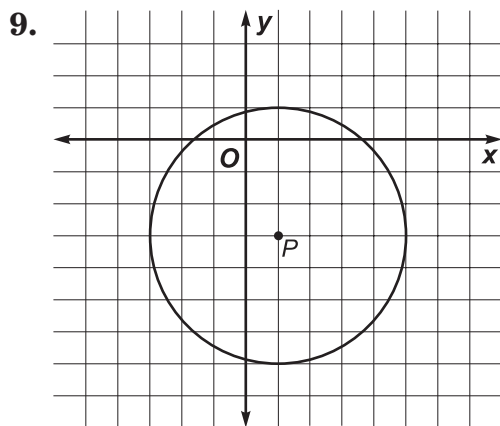
5. $(x + 3)^2 + (y - \frac{3}{2})^2 = 4$



Write the equation of circle *P* based on the given information.

7. center: $P(0, \frac{1}{2})$
radius: 8

8. center: $P(-5.3, 1)$
diameter: 9



10. a diameter whose endpoints are at $(5, -7)$ and $(-2, 4)$

Practice**Logic and Truth Tables**

Use conditionals p , q , r , and s for Exercises 1–9.

p : Labor Day is in April.

q : A quadrilateral has 4 sides.

r : There are 30 days in September.

s : $(5 + 3) \div 3 = 5$

Write the statements for each negation.

1. $\sim p$

2. $\sim q$

3. $\sim r$

Write a statement for each conjunction or disjunction.
Then find the truth value.

4. $p \vee q$

5. $p \wedge q$

6. $\sim p \vee r$

7. $\sim q \wedge s$

8. $p \wedge s$

9. $\sim q \vee \sim r$

Construct a truth table for each compound statement.

10. $\sim p \vee \sim q$

11. $\sim p \wedge q$

Deductive Reasoning

Determine if a valid conclusion can be reached from the two true statements using the Law of Detachment or the Law of Syllogism. If a valid conclusion is possible, state it and the law that is used. If a valid conclusion does not follow, write no valid conclusion.

1. If Jim is a Texan, then he is an American.
Jim is a Texan.
2. If Spot is a dog, then he has four legs.
Spot has four legs.
3. If Rachel lives in Tampa, then Rachel lives in Florida.
If Rachel lives in Florida, then Rachel lives in the United States.
4. If October 12 is a Monday, then October 13 is a Tuesday.
October 12 is a Monday.
5. If Henry studies his algebra, then he passes the test.
If Henry passes the test, then he will get a good grade.

Determine if 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 no valid conclusion.

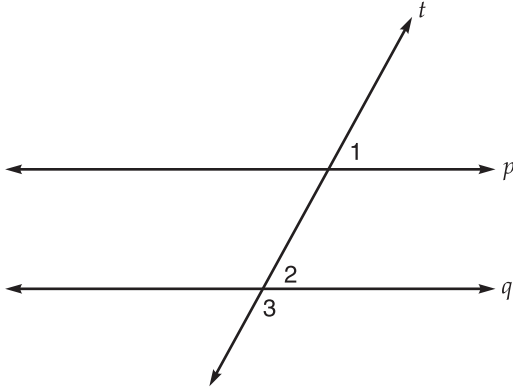
6. (1) If the measure of an angle is greater than 90, then it is obtuse.
(2) $m\angle T$ is greater than 90.
(3) $\angle T$ is obtuse.
7. (1) If Pedro is taking history, then he will study about World War II.
(2) Pedro will study about World War II.
(3) Pedro is taking history.
8. (1) If Julie works after school, then she works in a department store.
(2) Julie works after school.
(3) Julie works in a department store.
9. (1) If William is reading, then he is reading a magazine.
(2) If William is reading a magazine, then he is reading a magazine about computers.
(3) If William is reading, then he is reading a magazine about computers.
10. **Look for a Pattern** Tanya likes to burn candles. She has found that, once a candle has burned, she can melt 3 candle stubs, add a new wick, and have one more candle to burn. How many total candles can she burn from a box of 15 candles?

Practice

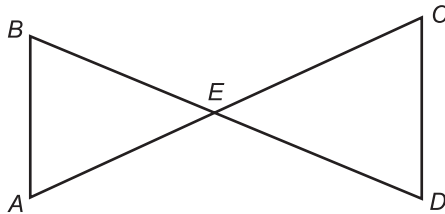
Paragraph Proofs

Write a paragraph proof for each conjecture.

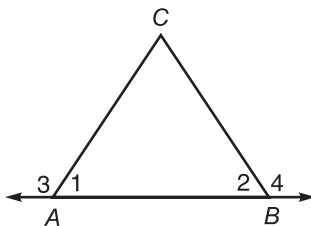
- If $p \parallel q$ and p and q are cut by a transversal t , then $\angle 1$ and $\angle 3$ are supplementary.



- If E bisects \overline{BD} and \overline{AC} , then $\overrightarrow{BA} \parallel \overrightarrow{CD}$.



- If $\angle 3 \cong \angle 4$, then $\triangle ABC$ is isosceles.



Preparing for Two-Column Proofs**Name the property or equality that justifies each statement.**

1. If $m\angle A = m\angle B$, then $m\angle B = m\angle A$.
2. If $x + 3 = 17$, then $x = 14$.
3. $xy = xy$
4. If $7x = 42$, then $x = 6$.
5. If $XY - YZ = XM$, then $XM + YZ = XY$.
6. $2(x + 4) = 2x + 8$
7. If $m\angle A + m\angle B = 90$, and $m\angle A = 30$,
then $30 + m\angle B = 90$.
8. If $x = y + 3$ and $y + 3 = 10$, then
 $x = 10$.

Complete each proof by naming the property that justifies each statement.

9. Prove that if $2(x - 3) = 8$, then $x = 7$.

Given: $2(x - 3) = 8$ **Prove:** $x = 7$ **Proof:**

Statements	Reasons
a. $2(x - 3) = 8$	a. _____
b. $2x - 6 = 8$	b. _____
c. $2x = 14$	c. _____
d. $x = 7$	d. _____

10. Prove that if $3x - 4 = \frac{1}{2}x + 6$, then $x = 4$.

Given: $3x - 4 = \frac{1}{2}x + 6$ **Prove:** $x = 4$ **Proof:**

Statements	Reasons
a. $3x - 4 = \frac{1}{2}x + 6$	a. _____
b. $\frac{5}{2}x - 4 = 6$	b. _____
c. $\frac{5}{2}x = 10$	c. _____
d. $x = 4$	d. _____

Practice

Two-Column Proofs

Write a two-column proof.

1. **Given:** B is the midpoint of \overline{AC} .

Prove: $AB + CD = BD$

Proof:

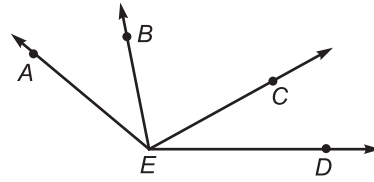


Statements	Reasons

2. **Given:** $\angle AEC \cong \angle DEB$

Prove: $\angle AEB \cong \angle DEC$

Proof:

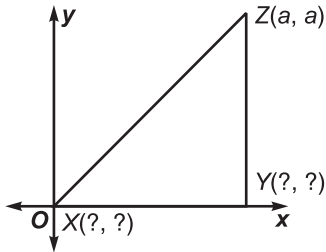


Statements	Reasons

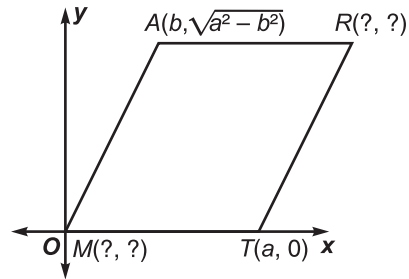
Coordinate Proofs

Name the missing coordinates in terms of the given variables.

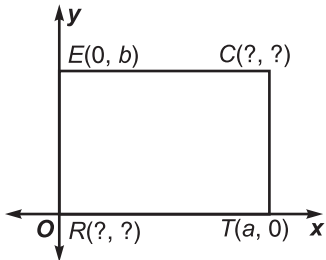
- 1.
- $\triangle XYZ$
- is a right isosceles triangle.



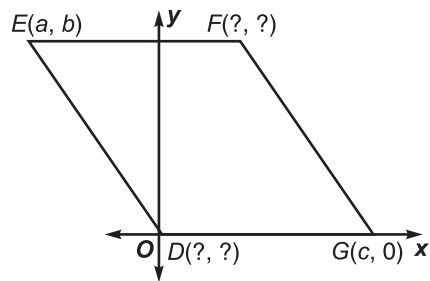
- 2.
- $MART$
- is a rhombus.



- 3.
- $RECT$
- is a rectangle.



- 4.
- $DEFG$
- is a parallelogram.



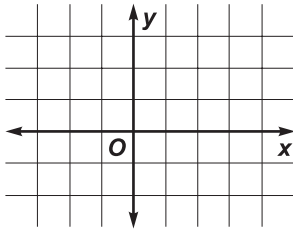
5. Use a coordinate proof to prove that the diagonals of a rhombus are perpendicular. Draw the diagram at the right.

Practice

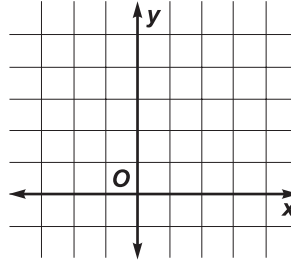
Solving Systems of Equations by Graphing

Solve each system of equations by graphing.

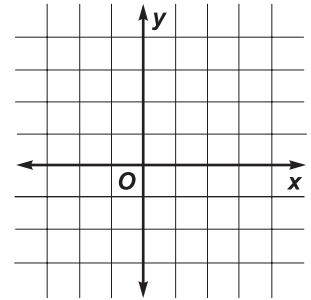
1. $x + y = 3$
 $x - y = 1$



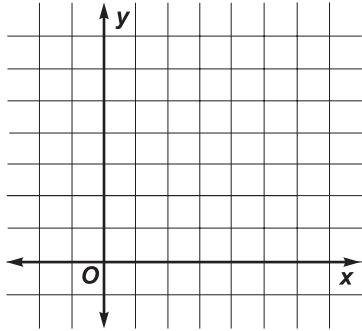
2. $y = 3 + x$
 $x + y = 5$



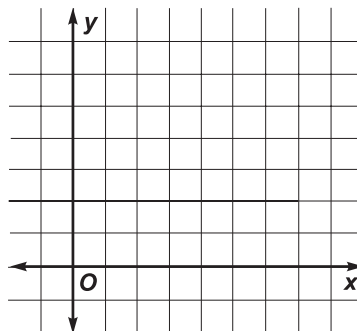
3. $y = 2x$
 $x + y = 3$



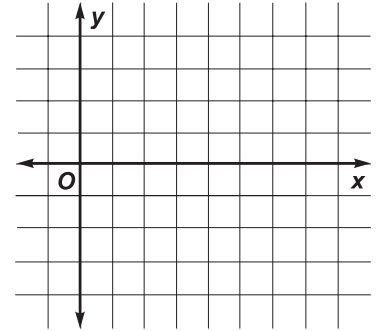
4. $x + y = 6$
 $x + y = 5$



5. $y = 2x$
 $2x + 2y = 18$



6. $x + y = 3$
 $y = x - 5$



State the letter of the ordered pair that is a solution of both equations.

7. $2x = 10$
 $3x + 2y = 25$

a. (10, -5)

b. (5, 5)

c. (5, 20)

d. $(8, \frac{1}{2})$

8. $x + y = 6$
 $2x + y = 11$

a. (6, 11)

b. (3, 3)

c. (2, 4)

d. (5, 1)

9. $2x + 3y = 10$
 $5x + 3y = 16$

a. (2, 2)

b. (2, 7)

c. $(\frac{1}{5}, 5)$

d. (2, 3)

Solving Systems of Equations by Using Algebra

Use either substitution or elimination to solve each system of equations.

1. $x + y = 7$
 $x - y = 9$

2. $x + y = 3$
 $3x - 5y = 17$

3. $y = 2x$
 $3x + y = 5$

4. $4x - 3y = -1$
 $x + 1 = y$

5. $2x + 3y = -1$
 $3x + 5y = -2$

6. $3y = 2 - x$
 $2x = 7 - 3y$

7. $3x + 2y = 10$
 $6x - 3y = 6$

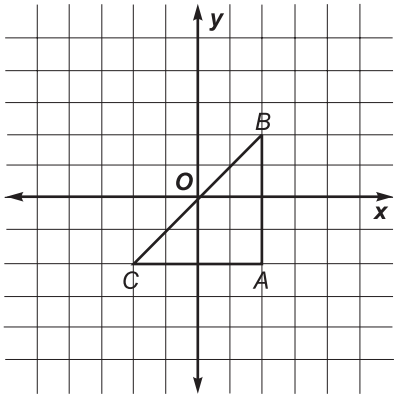
8. $x = 4$
 $y = 3x - 5$

Practice

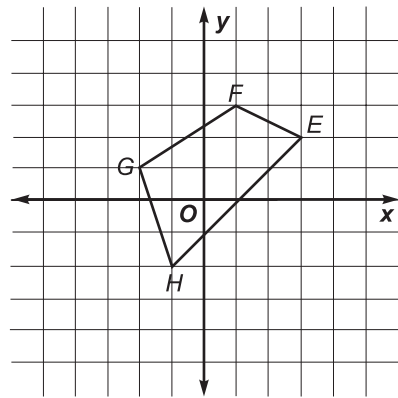
Translations

Find the coordinates of the vertices of each figure after the given translation. Then graph the translation image.

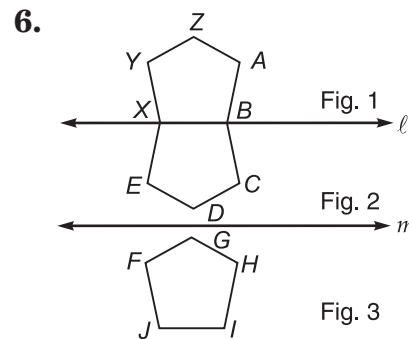
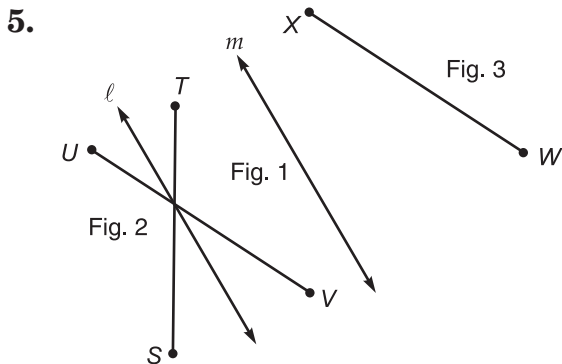
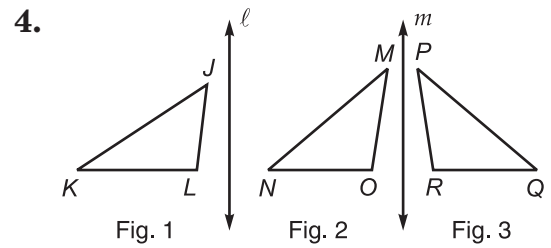
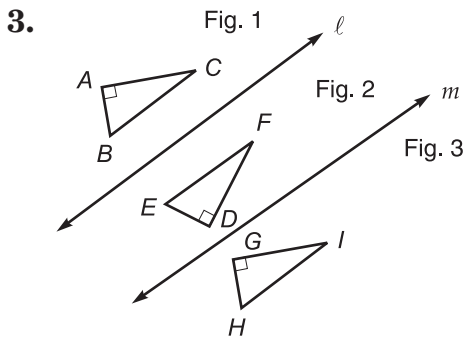
1. $(-1, 2)$



2. $(-2, -2)$



For each of the following, lines ℓ and m are parallel. Determine whether Figure 3 is a translation image of Figure 1. Write yes or no. Explain your answer.

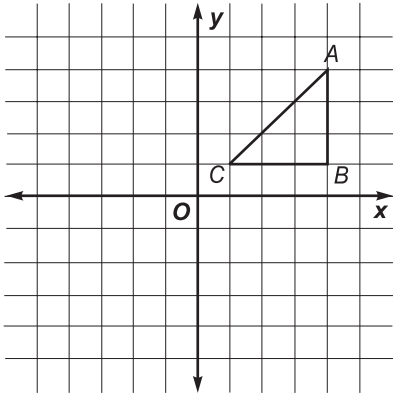


Practice

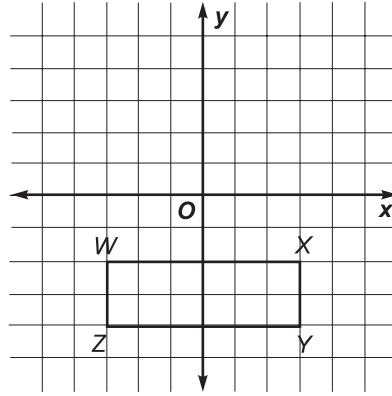
Reflections

Find the coordinates of the vertices of each figure after a reflection over the given axis. Then graph the reflection image.

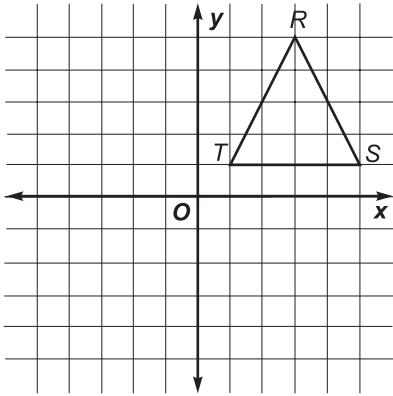
1. x -axis



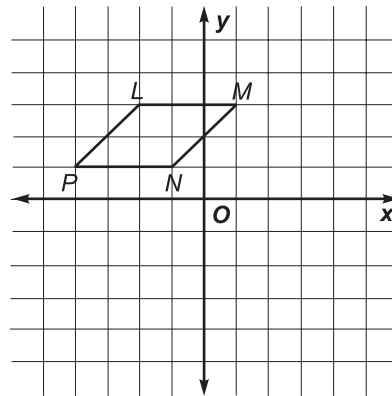
2. x -axis



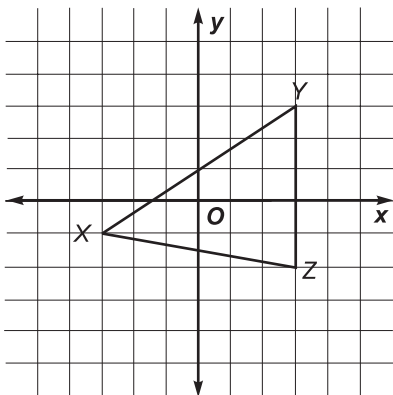
3. y -axis



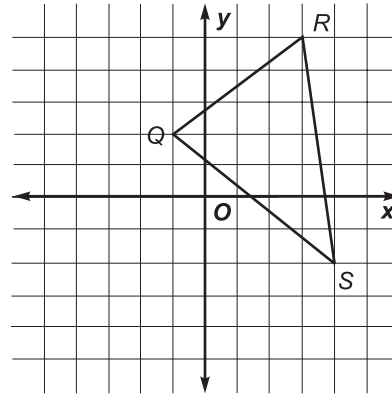
4. y -axis



5. x -axis



6. y -axis

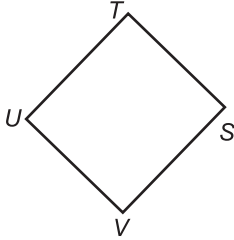


Practice

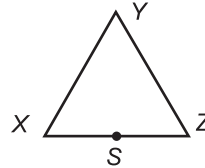
Rotations

Rotate each figure about point *S* by tracing the figure.
Use the given angle of rotation.

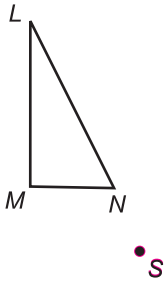
1. 90° clockwise



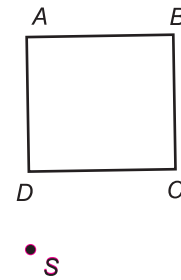
2. 180° counterclockwise



3. 60° clockwise

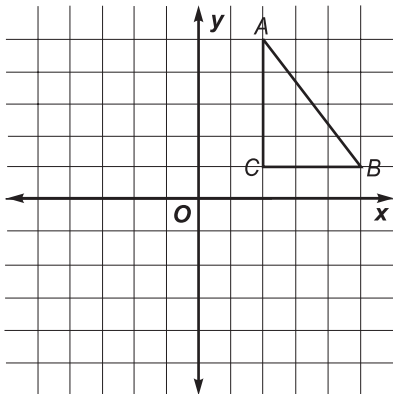


4. 45° counterclockwise

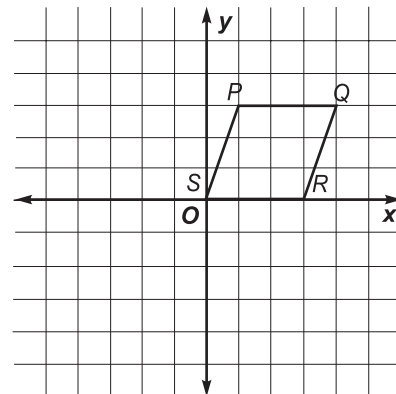


Find the coordinates of the vertices of each figure after the given rotation about the origin. Then graph the rotation image.

5. 90° counterclockwise



6. 180° clockwise



Practice

Dilations

A dilation with center C and a scale factor k maps X onto Y . Find the scale factor for each dilation. Then determine whether each dilation is an enlargement or a reduction.

1. $CY = 15, CX = 10$

2. $CY = 1, CX = 2$

3. $CY = 5, CX = 2$

4. $CY = 20, CX = \frac{1}{2}$

Find the measure of the dilation image of \overline{AB} with the given scale factor.

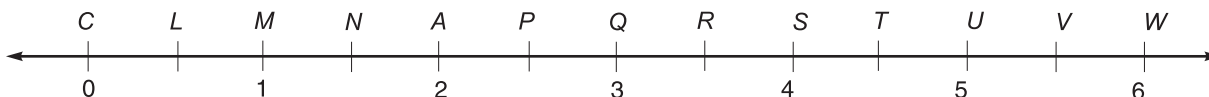
5. $AB = 6$ in., $k = \frac{2}{3}$

6. $AB = 4$ in., $k = 1$

7. $AB = 1\frac{1}{2}$ in., $k = \frac{1}{2}$

8. $AB = 20$ in., $k = 2\frac{1}{2}$

For each scale factor, find the image of A with respect to a dilation with center C .



9. 3

10. $\frac{1}{4}$

11. $2\frac{1}{4}$

12. $\frac{3}{4}$

Graph each set of ordered pairs. Then connect the points in order. Using $(0, 0)$ as the center of dilation and a scale factor of 2, draw the dilation image. Repeat this using a scale factor of $\frac{1}{2}$.

13. $(2, 2), (4, 6), (6, -2)$

14. $(0, 2), (-4, 2), (-4, -2)$

