LESSON 1.1 Practice
For use with pages 2–8

Use the diagram to decide whether the given statement is true or false.

1. Points H, I, and G are collinear.
2. Points H, I, and J are coplanar.
3. \( \overrightarrow{EG} \) and \( \overrightarrow{FG} \) are opposite rays.
4. All points on \( \overrightarrow{GI} \) and \( \overrightarrow{GF} \) are coplanar.
5. The intersection of \( \overrightarrow{EF} \) and plane \( JKH \) is \( \overrightarrow{HI} \).
6. The intersection of \( \overrightarrow{EF}, \overrightarrow{HI}, \) and \( \overrightarrow{JG} \) is point G.
7. The intersection of plane \( EGH \) and plane \( JGI \) is point G.
8. The intersection of plane \( EFI \) and plane \( JKG \) is \( \overrightarrow{HG} \).

Sketch the figure described.

9. Two rays that do not intersect
10. Three planes that intersect in one line
11. Three lines that intersect in three points
12. A ray that intersects a plane in one point

In Exercises 13–15, use the diagram.

13. Name 12 different rays.
14. Name a pair of opposite rays.
15. Name 3 lines that intersect at point C.

16. Sketch four noncollinear points \( A, B, C, \) and \( D \). Then sketch \( \overrightarrow{AB}, \overrightarrow{BC}, \) and \( \overrightarrow{AD} \).
17. Sketch plane \( M \) intersecting plane \( N \). Then sketch plane \( O \) so that it intersects plane \( N \), but not plane \( M \).
You are given an equation of a line and a point. Use substitution to determine whether the point is on the line.

18. \( y = 5x + 3; A(1, 8) \)
19. \( y = -x + 3; A(6, 3) \)
20. \( y = -3x - 6; A(2, 0) \)
21. \( 2x - y = 7; A(3, -1) \)
22. \( x + 6y = 40; A(-10, 5) \)
23. \( -x - 4y = -14; A(-6, 2) \)

Graph the inequality on a number line. Tell whether the graph is a segment, a ray or rays, a point, or a line.

24. \( x \geq 2 \)

25. \( 2 \leq x \leq 5 \)

26. \( x \leq 0 \) or \( x \geq 8 \)

27. \( |x| \leq 0 \)

28. **Counter Stools** Two different types of stools are shown below.
   a. One stool rocks slightly from side to side on your kitchen floor. Which of the two stools could this possibly be? *Explain* why this might occur.
   b. Suppose that each stool is placed on a flat surface that is slightly sloped. Do you expect either of the stools to rock from side to side? *Explain* why or why not.

29. **Perspective Drawings** Recall from the text, that a perspective drawing is drawn using vanishing points.
   a. Does the drawing at the right represent a perspective drawing? *Explain* why or why not.
   b. Using heavy dashed lines, draw the hidden lines of the prism.
   c. Redraw the prism so that it uses two vanishing points.
LESSON 1.2 Practice
For use with pages 9–14

Use a ruler to measure the length of the segment to the nearest tenth of a centimeter. Then draw a segment with the same length.

1. \( AB \)
2. \( MN \)
3. \( EF \)

Use the Segment Addition Postulate to find the indicated length.

4. Find \( RT \).
5. Find \( BC \).
6. Find \( MN \).

Plot the given points in a coordinate plane. Then determine whether the line segments named are congruent.

7. \( A(2, 2), B(4, 2), C(-1, -1), D(-1, 1); \overline{AB} \) and \( \overline{CD} \)
8. \( M(1, -3), N(4, -3), O(3, 4), P(4, 4); \overline{MN} \) and \( \overline{OP} \)

9. \( E(-3, 4), F(-1, 4), G(2, 4), H(-1, 1); \overline{EG} \) and \( \overline{FH} \)

10. \( R(3, 5), S(10, 5), T(-4, -3), U(-11, -3); \overline{RS} \) and \( \overline{TU} \)

Use the number line to find the indicated distance.

11. \( AB \)
12. \( AD \)
13. \( CD \)
14. \( BD \)
15. \( CE \)
16. \( AE \)
17. \( BE \)
18. \( DE \)
In the diagram, points $A$, $B$, $C$, and $D$ are collinear, points $C$, $X$, $Y$, and $Z$ are collinear, $AB = BC = CX = YZ$, $AD = 54$, $XY = 22$, and $XZ = 33$. Find the indicated length.

19. $AB$
20. $BD$
21. $CY$
22. $CD$
23. $XC$
24. $CZ$

Find the indicated length.

25. Find $ST$.
26. Find $AC$.
27. Find $NP$.

Point $J$ is between $H$ and $K$ on $HK$. Use the given information to write an equation in terms of $x$. Solve the equation. Then find $HJ$ and $JK$.

28. $HJ = 2x$
   $JK = 3x$
   $KH = 25$

29. $HJ = \frac{x}{4}$
   $JK = 3x - 4$
   $KH = 22$

30. $HJ = 5x - 4$
    $JK = 8x - 10$
    $KH = 38$

31. $HJ = 5x - 3$
    $JK = x - 9$
    $KH = 5x$

32. Hiking On the map, $AB$ represents a trail that you are hiking. You start from the beginning of the trail and hike for 90 minutes at a rate of 1.4 miles per hour. How much farther do you need to hike to reach the end of the trail?

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**Distance (mi)**

Rest Area

A(3, 2) 

B(8.2, 2)

Ranger Station

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LEsson 1.3 Practice
For use with pages 15–22

1. Line RS bisects $PQ$ at point $R$. Find $RQ$ if $PQ = 14$ centimeters.

2. Line $JK$ bisects $MN$ at point $J$. Find $MN$ if $JM = 6 \frac{3}{4}$ feet.

3. Point $T$ bisects $UV$. Find $UV$ if $UT = 4 \frac{1}{2}$ yards.

4. Point $C$ bisects $AB$. Find $CB$ if $AB = 14.8$ meters.

In the diagram, $M$ is the midpoint of the segment. Find the indicated length.

5. Find $LN$.

6. Find $AM$.

7. Find $MR$.

Find the coordinates of the midpoint of the segment with the given endpoints.

8. $S(4, -1)$ and $T(6, 0)$

9. $L(4, 2)$ and $P(0, 2)$

10. $H(-5, 5)$ and $I(7, 3)$

11. $G(-2, -8)$ and $H(-3, -12)$

Use the given endpoint $R$ and midpoint $M$ of $RS$ to find the coordinates of the other endpoint $S$.

12. $R(6, 0), M(0, 2)$

13. $R(3, 4), M(3, -2)$

14. $R(-3, -2), M(-1, -8)$

15. $R(11, -5), M(-4, -4)$

Find the length of the segment. Round to the nearest tenth of a unit. Use the diagram to check that your answer is reasonable.

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

17. $S(4, 4)$ and $R(2, -1)$

18. $Q(-2, 3)$ and $P(2, 1)$

19. $A(10, 5)$ and $B(2, -3)$
Find the length of the segment. Then find the coordinates of the midpoint of the segment.

20. 

\[ \text{The endpoints of two segments are given. Find each segment length. Tell whether the segments are congruent.} \]

22. \( \overline{AB} \): \( A(2, 6), B(0, 3) \)
   \( \overline{CD} \): \( C(-1, 0), D(1, 3) \)

23. \( \overline{RS} \): \( R(5, 4), S(0, 4) \)
   \( \overline{TU} \): \( T(-4, -3), U(-1, 1) \)

24. \( \overline{KL} \): \( K(-4, 13), L(-10, 6) \)
   \( \overline{MN} \): \( M(-1, -2), N(-1, -11) \)

25. \( \overline{OP} \): \( O(6, -2), P(3, -2) \)
   \( \overline{QR} \): \( Q(5, 2), R(1, 5) \)

26. \textbf{Distances} Your house and the mall are 9.6 miles apart on the same straight road. The movie theater is halfway between your house and the mall, on the same road.
   \( a. \) Make and label a sketch to represent this situation. How far is your house from the movie theater?
   \( b. \) You walk at an average speed of 3.2 miles per hour. About how long would it take you to walk to the movie theater from your house?

In Exercises 27–29, use the map. The locations of the towns on the map are: Dunkirk \((0, 0)\), Clearfield \((10, 2)\), Lake City \((5, 7)\), and Allentown \((1, 4)\). The coordinates are given in miles.

27. Find the distance between each pair of towns. Round to the nearest tenth of a mile.

28. Which two towns are closest together?
Which two towns are farthest apart?

29. The map is being used to plan a 26-mile marathon. Which of the following plans is the best route for the marathon? \textit{Explain}.
   \( A. \) Dunkirk to Clearfield to Allentown to Dunkirk
   \( B. \) Dunkirk to Clearfield to Lake City to Allentown to Dunkirk
   \( C. \) Dunkirk to Lake City to Clearfield to Dunkirk
   \( D. \) Dunkirk to Lake City to Allentown to Dunkirk
LESSON 1.4 Practice
For use with pages 24–32

Use a protractor to measure the angle to the nearest degree. Write two names for the angle. Then name the vertex and the sides of the angle.

1. \[ \angle BAC \]
2. \[ \angle MOP \]
3. \[ \angle EFG \]

Give another name for the angle in the diagram. Tell whether the angle appears to be acute, obtuse, right, or straight.

4. \[ \angle JKN \]
5. \[ \angle KMN \]
6. \[ \angle PQM \]
7. \[ \angle JML \]
8. \[ \angle QPN \]
9. \[ \angle PLK \]

Use the given information to find the indicated angle measure.

10. Given \( m\angle ABC = 94^\circ \), find \( m\angle CBD \).

11. Given \( m\angle QST = 135^\circ \), find \( m\angle QSR \).

Find the indicated angle measure.

12. \( a^\circ \)
13. \( b^\circ \)
14. \( c^\circ \)
15. \( d^\circ \)

In the diagram, \( \overline{BD} \) bisects \( \angle ABC \). Find \( m\angle ABC \).

16.
17.
18.
Plot the points in a coordinate plane and draw $\angle ABC$. Classify the angle. Then give the coordinates of a point that lies in the interior of the angle.

19. $A(2, 3), B(3, 0), C(2, 6)$

20. $A(6, 2), B(-1, -2), C(2, 3)$

21. $A(-4, -3), B(-1, 3), C(4, 4)$

22. $A(-2, -4), B(-2, -1), C(3, -1)$

23. Let $(3x + 24)^\circ$ represent the measure of an obtuse angle. What are the possible values of $x$?

24. Streets The diagram shows the intersection of four streets. In the diagram, $\angle AEB = 60^\circ$, $\angle BEC = \angle CED$, and $\angle AED$ is a right angle. What is the measure of $\angle CED$?

25. Flags In the flag shown, $\angle MNP$ is a straight angle and $NR$ bisects $\angle MNP$ and $\angle QNS$. Use only the labeled angles in the diagram.
   a. Which angles are acute? obtuse? right?
   b. Identify the congruent angles.
   c. If $\angle QNR = 30^\circ$, find $\angle MNR$, $\angle RNS$, $\angle QNS$, and $\angle QNP$. 

LESSON 1.4 Practice continued
For use with pages 24-32

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LESSON 1.5 Practice

For use with pages 35–41

\( \angle 1 \) and \( \angle 2 \) are complementary angles and \( \angle 2 \) and \( \angle 3 \) are supplementary angles. Given the measure of \( \angle 1 \), find \( m \angle 2 \) and \( m \angle 3 \).

1. \( m \angle 1 = 80^\circ \)  
2. \( m \angle 1 = 33^\circ \)  
3. \( m \angle 1 = 72^\circ \)  
4. \( m \angle 1 = 7^\circ \)

Find \( m \angle ABC \) and \( m \angle CBD \).

5. 

6. 

7. 

In Exercises 8–12, use the diagram. Tell whether the angles are vertical angles, a linear pair, or neither.

8. \( \angle 1 \) and \( \angle 3 \)  
9. \( \angle 2 \) and \( \angle 3 \)  
10. \( \angle 4 \) and \( \angle 5 \)  
11. \( \angle 5 \) and \( \angle 8 \)  
12. \( \angle 4 \) and \( \angle 9 \)

13. The measure of one angle is three times the measure of its complement. Find the measure of each angle.

14. Two angles form a linear pair. The measure of one angle is 8 times the measure of the other angle. Find the measure of each angle.

15. The measure of one angle is 38° less than the measure of its supplement. Find the measure of each angle.

Find the values of \( x \) and \( y \). Check that your answer is reasonable.

16. 

17. 

18. 

19. 

20. 

21.
Tell whether the statement is always, sometimes, or never true.

22. Two complementary angles form a linear pair.

23. The supplement of an obtuse angle is an acute angle.

24. An angle that has a supplement also has a complement.

\( \angle A \) and \( \angle B \) are complementary angles. Find \( m \angle A \) and \( m \angle B \).

25. \( m \angle A = x^\circ \)
   \( m \angle B = (2x - 75)^\circ \)

26. \( m \angle A = (4x + 34)^\circ \)
   \( m \angle B = (x + 36)^\circ \)

27. \( m \angle A = (4x - 18)^\circ \)
   \( m \angle B = (6x - 18)^\circ \)

28. \( m \angle A = (2x + 10)^\circ \)
   \( m \angle B = (-x + 55)^\circ \)

\( \angle A \) and \( \angle B \) are supplementary angles. Find \( m \angle A \) and \( m \angle B \).

29. \( m \angle A = (x + 50)^\circ \)
   \( m \angle B = (x + 100)^\circ \)

30. \( m \angle A = 6x^\circ \)
   \( m \angle B = (x + 5)^\circ \)

31. \( m \angle A = (2x + 3)^\circ \)
   \( m \angle B = (3x - 223)^\circ \)

32. \( m \angle A = (-4x + 40)^\circ \)
   \( m \angle B = (x + 50)^\circ \)

Roof trusses can have several different layouts. The diagram below shows one type of roof truss made out of beams of wood. Use the diagram to identify two different examples of the indicated type of angle pair. In the diagram, \( \angle HBC \) and \( \angle BCE \) are right angles.

33. Supplementary angles

34. Complementary angles

35. Vertical angles

36. Linear pair angles

37. Adjacent angles

38. Angle of elevation  An angle of elevation is the angle between the horizontal line and the line of sight of an object above the horizontal. In the diagram, a plane is flying horizontally across the sky and \( \angle RST \) represents the angle of elevation. How is the angle of elevation affected as the plane flies closer to the person? Explain.
Tell whether the figure is a polygon. If it is not, explain why. If it is a polygon, tell whether it is **convex** or **concave**.

1.  
2.  
3.  

Classify the polygon by the number of sides. Tell which terms apply to the polygon: **equilateral**, **equiangular**, **regular**, or **not regular**. Explain your reasoning.

4.  
5.  
6.  
7.  

8. The lengths (in feet) of two sides of a regular quadrilateral are represented by the expressions $8x - 6$ and $4x + 22$. Find the length of a side of the quadrilateral.

9. The expressions $(3x + 63)^\circ$ and $(7x - 45)^\circ$ represent the measures of two angles of a regular decagon. Find the measure of an angle of the decagon.

10. The expressions $-2x + 41$ and $7x - 40$ represent the lengths (in kilometers) of two sides of an equilateral pentagon. Find the length of a side of the pentagon.

Tell whether the statement is **always**, **sometimes**, or **never** true.

11. A quadrilateral is convex.  
12. An octagon is regular.  
13. A triangle is concave.  
14. A regular polygon is equilateral.  

Draw a figure that fits the description.

15. A quadrilateral that is not regular  
16. A convex heptagon  
17. A concave pentagon  
18. An equiangular hexagon that is not equilateral
Each figure is a regular polygon. Find the value of $x$.

19. \[
\begin{align*}
(2x)^\circ + (x + 30)^\circ & = 180^\circ \\
\end{align*}
\]

20. \[
\begin{align*}
13x + 27 & = 3x + 32 \\
\end{align*}
\]

21. \[
\begin{align*}
x^2 - 12 & = 2x^2 - 61 \\
\end{align*}
\]

22. \[
\begin{align*}
9x^2 + x - 1 & = x^2 + x + 7 \\
\end{align*}
\]

23. \[
\begin{align*}
x^2 - 2x + 8 & = x^2 + 8x - 52 \\
\end{align*}
\]

24. \[
\begin{align*}
(4x^2 + 8)^\circ & = (4x^2 + 2x - 2)^\circ \\
\end{align*}
\]

25. The vertices of a figure are given below. Plot and connect the points so that they form a convex polygon. Classify the figure. Then show that the figure is equilateral using algebra.

$A(3, 0), B(3, 6), C(2, 3), D(4, 3)$

26. **Picture frames** A picture frame with a wooden border is a regular triangle, as shown. You want to decorate the frame by wrapping a ribbon around it. How many feet of ribbon are needed to wrap the ribbon around the border one time? Check that your answer is reasonable.

27. **Parachutes** The canopy of a parachute is shown in the diagram.

**a.** Is the shape of the canopy a convex or concave polygon?

**b.** Classify the polygon by the number of sides. Then use a ruler and a protractor to determine whether the figure is equilateral, equiangular, regular, or not regular.

**c.** Determine the number of lines of symmetry in the canopy. How does this differ from a regular octagon?
LESSON 1.7 Practice
For use with pages 49–56

Find the perimeter and area of the figure.

1. \[\text{9 ft} \quad \text{14 ft} \quad \text{9 ft}\]

2. \[\text{13 in.} \quad \text{12 in.} \quad \text{5 in.}\]

3. \[\text{9.5 m}\]

Find the circumference and area of the circle. Round to the nearest tenth.

4. \[\text{32 cm}\]

5. \[\text{15 yd}\]

6. \[\text{5.8 km}\]

7. A triangle has a base of 6 miles and a height of 2 miles. Sketch the triangle and find its area.

8. A circle has a radius of 25 inches. Sketch the circle and find its area. Round your answer to the nearest tenth.

Find the perimeter of the figure. Round to the nearest tenth of a unit.

9. \[x \quad y \quad 1 \quad 1 \quad A \quad D \quad C \quad B\]

10. \[x \quad y \quad 1 \quad 1 \quad R \quad S \quad T \quad U\]

11. \[x \quad y \quad 1 \quad 1 \quad F \quad G \quad E\]

12. The area of a triangle is 48 square inches, and its height is 16 inches. Find the base of the triangle.

13. The area of a rectangle is 365.2 square meters, and its length is 22 meters. Find the width of the rectangle.

Copy and complete the statement.

14. \[72 \text{ cm}^2 = \_ \_ \text{ m}^2\]

15. \[22 \text{ m}^2 = \_ \_ \text{ km}^2\]

16. \[18 \text{ in.}^2 = \_ \_ \text{ ft}^2\]

17. \[14 \text{ yd}^2 = \_ \_ \text{ ft}^2\]

18. \[13 \text{ cm}^2 = \_ \_ \text{ mm}^2\]

19. \[1.5 \text{ km}^2 = \_ \_ \text{ m}^2\]

20. \[585 \text{ ft}^2 = \_ \_ \text{ yd}^2\]

21. \[12 \text{ ft}^2 = \_ \_ \text{ in.}^2\]

22. \[100 \text{ mm}^2 = \_ \_ \text{ cm}^2\]
Use the information about the figure to find the indicated measure.

23. Area = 504 in.²
   Find the height $h$.

24. Area = 55.5 m²
   Find the base $b$.

25. Perimeter = 112.5 m
   Find the length $l$.

26. The perimeter of a rectangle 28.8 centimeters. The length of the rectangle is twice as long as its width. Find the length and width of the rectangle.

27. The area of a triangle is 338 square yards. The height of the triangle is four times its base. Find the height and base of the triangle.

28. In the figure, the radius of the large circle is three times the radius of the small circle. About what percent of the large circle is covered by the small circle?

29. Land You are planting grass on a square plot of land. You are also building a fence around the edge of the plot. The side length of the plot is 54 yards. How much area do you need to cover with grass seed? How many feet of fencing do you need?

30. Windows You make a window out of a rectangular pane of glass by surrounding it with a wooden frame that is $x$ inches wide. The pane of glass is 20 inches long and 24 inches wide. The perimeter of the window is 8 2/3 feet. What is the value of $x$?

31. Looms A triangular loom used for knitting covers an area of 12.25 square feet. It has a base that is twice as long as its height.
   a. Sketch and label a diagram for the situation.
   b. Find the base and the height of the loom.
   c. Suppose the base of the loom was increased by 6 inches while the height remained the same. The area that the loom covers increased by how many square inches? square feet?