

**SPECTRUM**<sup>®</sup>

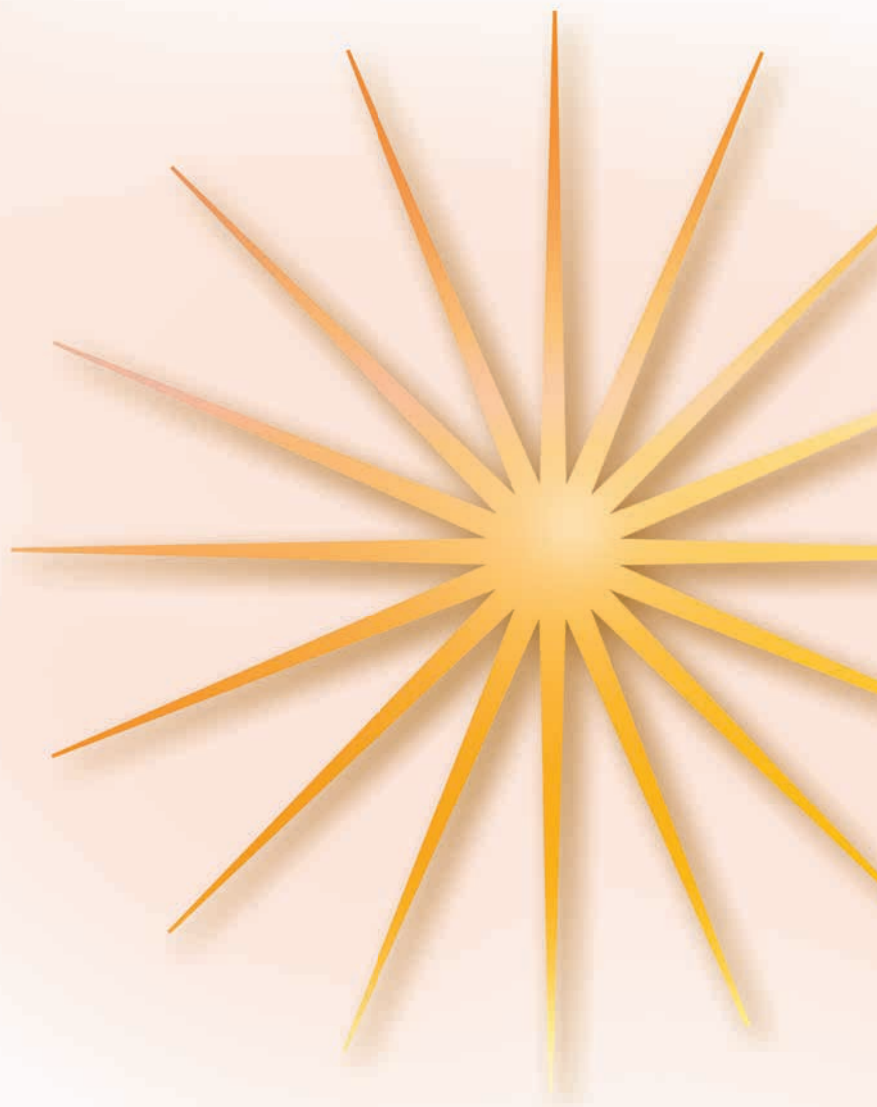
# Geometry

GRADES  
**6-8**



## Focused Practice for Geometry Mastery

- Points, lines, rays, and angles
- Triangles and polygons
- Perimeter and area
- Answer key



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# Check What You Know

## Points, Lines, Rays, and Angles

1. Under each of the following items, write *line*, *line segment*, or *ray*. Then, circle the correct names. Each has more than one correct name.

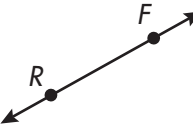
**a**



\_\_\_\_\_

$\overline{JK}$   $\overline{KJ}$   $\overleftrightarrow{JK}$   $\overleftrightarrow{KJ}$


**b**



\_\_\_\_\_

$\overline{FR}$   $\overline{RF}$   $\angle RF$   $\overleftrightarrow{FR}$

**c**

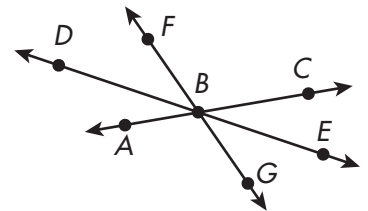


\_\_\_\_\_

$\overline{QP}$   $\overline{PQ}$   $\overleftrightarrow{QP}$   $\overleftrightarrow{PQ}$

2. In the list below, circle the collinear points in the lines on the right.

$ABG$   $ABC$   $FBG$   $ABE$   
 $DBE$   $CBG$   $GBF$   $CBF$

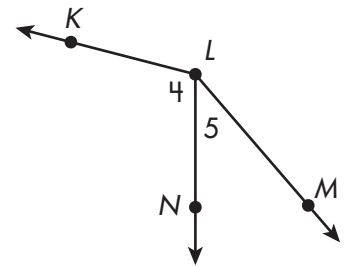


3. Name the angles that have  $L$  as their vertex.

\_\_\_\_\_

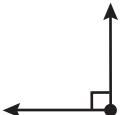
4. Name  $\angle 5$  in two different ways.

\_\_\_\_\_



5. Use a protractor to find the measure of each angle. Then, circle the type of angle.


**a**



angle: \_\_\_\_\_

right, acute, obtuse

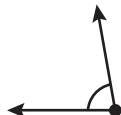
**b**



angle: \_\_\_\_\_

right, acute, obtuse

**c**



angle: \_\_\_\_\_

right, acute, obtuse

# Lesson 1.1 Points and Lines

A **point** has no dimensions but defines a location in space.



Point  $R$  is shown at right.

A **line** extends infinitely in both directions.






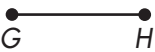

Line  $ST$  is the same as line  $TS$  and can also be named  $\overleftrightarrow{ST}$  or  $\overleftrightarrow{TS}$ .

A **line segment** is the part of the line between two **end points**.



Segment  $UV$  is the same as segment  $VU$  and can also be named  $\overline{UV}$  or  $\overline{VU}$ .

Name the following figures. The first answer is given.

- |  |                            |  |
|--|----------------------------|--|
|  | <b>a</b>                   | <b>b</b>   |
| 1.    | line $AB$ or $BA$          | $\overleftrightarrow{AB}$ or $\overleftrightarrow{BA}$ |
| 2.    | line _____ or _____        | _____ or _____   |
| 3.   | line _____ or _____        | _____ or _____   |
|  | <b>a</b>                   | <b>b</b>   |
| 4.  | line segment $GH$ or _____ | $\overline{GH}$ or _____                               |
|  |                            | <b>c</b>   |
| 5.  | line segment $JK$ or _____ | endpoints _____ and _____                              |

Draw the following figures.

- |                    |          |                           |
|--------------------|----------|---------------------------|
|                    | <b>a</b> | <b>b</b>                  |
| 6. line $LM$       |          | $\overleftrightarrow{PQ}$ |
| 7. $\overline{RS}$ |          | $\overline{TU}$           |

# Lesson 1.1 Points and Lines

**Collinear points** are three or more points on the same straight line.

Points that do not appear on the same straight line are **noncollinear**.



A **midpoint** is the point halfway between the end points on a line segment. On the line  $WY$  at right, the midpoint is  $X$ .

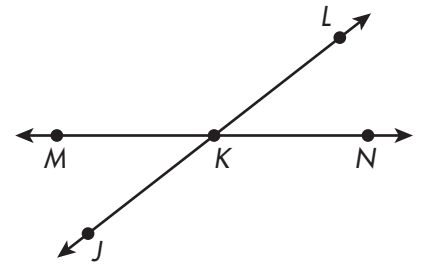
1. In the list below, circle the collinear points in the lines on the right. (There is more than one correct answer.)

$MKL$

$MKJ$

$MKN$

$JKL$



2. In the list below, circle the collinear points in the lines on the right. (There is more than one correct answer.)

$ABC$

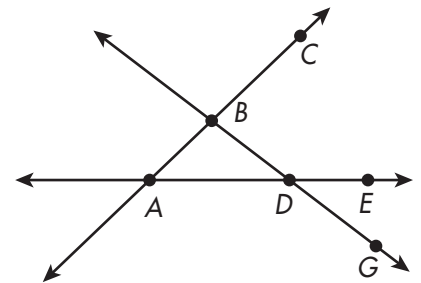
$BDG$

$ABD$

$DBC$

$EDG$

$ADE$



3. In the list below, circle the correct names for the item on the right.

$\overline{LM}$   $ML$   $\overline{ML}$   $LM$



4. Draw a line segment using the points on the right, and then name it in the space below.

$N$

$O$

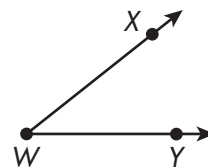
\_\_\_\_\_

# Lesson 1.2 Rays and Angles

A **ray** is a part of a line. It has one endpoint but extends infinitely in one direction. See ray  $WX$  or  $\overrightarrow{WX}$ . It is *not* ray  $XW$ .

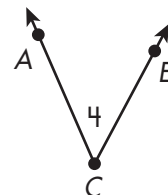


See angle  $YWX$ . An **angle** is the union of two rays that share a common endpoint. The two rays that make up the angle are called the **sides**. The endpoint ( $W$ ) is called a **vertex**.



See angle  $YWX$ . It is the union of  $\overrightarrow{WX}$  and  $\overrightarrow{WY}$ . Angle  $YWX$  can be written as  $\angle XWY$ ,  $\angle YWX$ , or  $\angle W$ . The vertex ( $\angle W$ ) stands for the angle.

At right is an angle formed by the union of  $\overrightarrow{CA}$  and  $\overrightarrow{CE}$ . It can be written as  $\angle ACE$ ,  $\angle ECA$ , or  $\angle C$ . It could also be called angle 4.

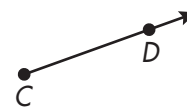


Complete the following. The first answer is given.

**a**

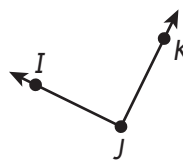
**b**

1. ray  $CD$   $\overrightarrow{CD}$  endpoint C
2. ray \_\_\_\_\_ endpoint \_\_\_\_\_
3. ray \_\_\_\_\_ endpoint \_\_\_\_\_

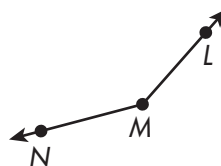


Name each figure using letters. Name each figure in more than one way, if you can.

4. \_\_\_\_\_



5. \_\_\_\_\_



# Lesson 1.3 Measuring Angles

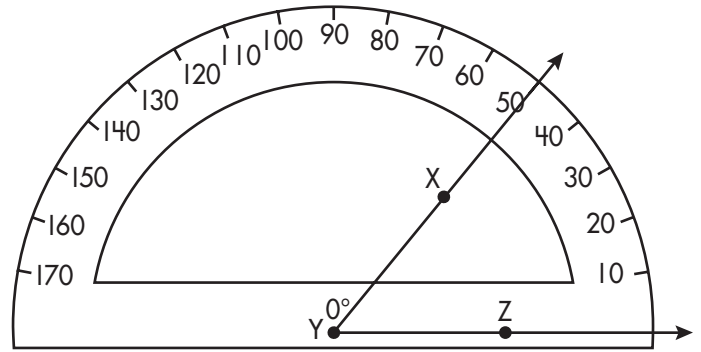
Use a protractor to measure angles. Place the center point of the protractor on the vertex of the angle you want to measure.

The measure of a **right angle** is  $90^\circ$ .

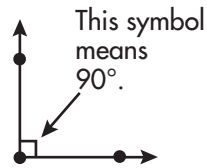
The measure of an **acute angle** is less than  $90^\circ$ .

The measure of an **obtuse angle** is greater than  $90^\circ$ .

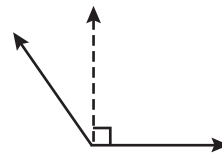
The measure of  $\angle XYZ$  is  $50^\circ$ .



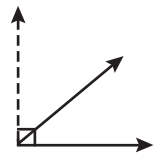
right angle



obtuse angle



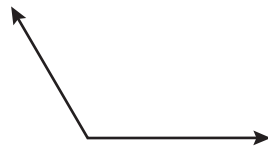
acute angle



Find the measure of each angle. Write whether the angle is *right*, *acute*, or *obtuse*.

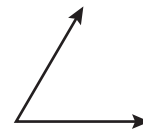
1.

a



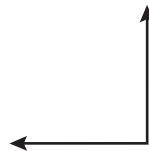
\_\_\_\_\_ °

b

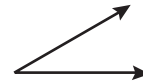


\_\_\_\_\_ °

2.



\_\_\_\_\_ °



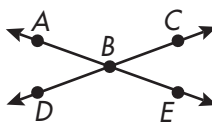
\_\_\_\_\_ °



# Lesson 1.4 Angle Relationships

When two lines intersect, they form angles that have special relationships.

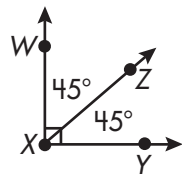
**Vertical** angles are opposite angles that have the same measure.



$\angle ABC$  and  $\angle DBE$  are vertical.

$\angle ABD$  and  $\angle DBE$  are supplementary.

**Supplementary** angles are two angles whose measures have a sum of  $180^\circ$ .



$\angle WXZ$  and  $\angle ZXY$  are complementary.

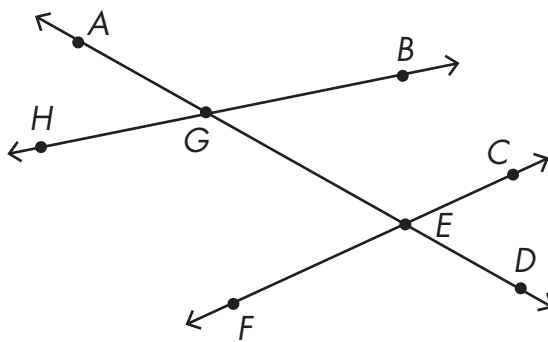
$\overline{XZ}$  is the bisector of  $\angle WXY$ .

**Complementary** angles are two angles whose measures have a sum of  $90^\circ$ .

A **bisector** divides an angle into two angles of equal measure.

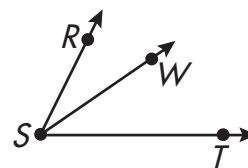
Identify each pair of angles as *supplementary* or *vertical*.

1.  $\angle AGB$  and  $\angle HGE$  \_\_\_\_\_
2.  $\angle BGE$  and  $\angle HGE$  \_\_\_\_\_
3.  $\angle GEC$  and  $\angle CED$  \_\_\_\_\_
4.  $\angle GEC$  and  $\angle DEF$  \_\_\_\_\_
5.  $\angle AGH$  and  $\angle BGE$  \_\_\_\_\_
6.  $\angle GEF$  and  $\angle DEF$  \_\_\_\_\_



Solve each problem.

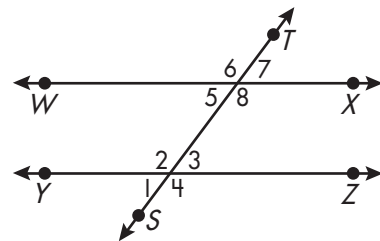
7.  $\angle A$  and  $\angle G$  are vertical angles. The measure of  $\angle A$  is  $72^\circ$ .  
What is the measure of  $\angle G$ ? \_\_\_\_\_
8.  $\angle Y$  and  $\angle Z$  are supplementary angles. The measure of  $\angle Y$  is  $112^\circ$ .  
What is the measure of  $\angle Z$ ? \_\_\_\_\_
9.  $\angle A$  and  $\angle B$  are complementary angles. The measure of  $\angle A$  is  $53^\circ$ .  
What is the measure of  $\angle B$ ? \_\_\_\_\_
10.  $\angle RST$  is bisected by ray  $SW$ . The measure of  $\angle WST$  is  $30^\circ$ .  
What is the measure of  $\angle RST$ ? \_\_\_\_\_



# Lesson 1.5 Transversals

**Parallel lines** are two lines that will never meet. In the figure,  $\overline{WX}$  and  $\overline{YZ}$  are parallel lines.

A **transversal** is a line that intersects two parallel lines.  $\overline{ST}$  is a transversal of  $\overline{YZ}$  and  $\overline{WX}$ .

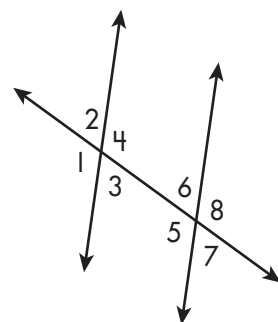


**Corresponding angles** are formed when a transversal intersects parallel lines. Corresponding angles are angles  $\angle 1$  and  $\angle 5$ ,  $\angle 2$  and  $\angle 6$ ,  $\angle 3$  and  $\angle 7$ , and  $\angle 4$  and  $\angle 8$ .

**Adjacent angles** are any two angles that are next to one another, such as  $\angle 1/\angle 2$  and  $\angle 2/\angle 3$ . Adjacent angles share a ray. They form supplementary angles ( $180^\circ$ ).

1. Name the pairs of adjacent angles in the figure.

$\angle \underline{\quad} / \angle \underline{\quad}$ ,  $\angle \underline{\quad} / \angle \underline{\quad}$ ,  $\angle \underline{\quad} / \angle \underline{\quad}$ ,  $\angle \underline{\quad} / \angle \underline{\quad}$ ,  
 $\angle \underline{\quad} / \angle \underline{\quad}$ ,  $\angle \underline{\quad} / \angle \underline{\quad}$ ,  $\angle \underline{\quad} / \angle \underline{\quad}$ ,  $\angle \underline{\quad} / \angle \underline{\quad}$ ,



**Alternate interior angles** are those that are inside the parallel lines and opposite one another.  $\angle 3$  and  $\angle 6$  are alternate interior angles. They are congruent.

2. Name another pair of alternate interior angles in the figure.  $\angle \underline{\quad} / \angle \underline{\quad}$

**Alternate exterior angles** are those that are outside the parallel lines and opposite one another.  $\angle 1$  and  $\angle 8$  are alternate exterior angles. They are congruent.

3. Name another pair of alternate exterior angles in the figure.  $\angle \underline{\quad} / \angle \underline{\quad}$

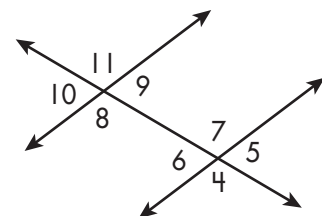
List the following pairs of angles in the figure.

4. Adjacent:

$\angle \underline{\quad} / \angle \underline{\quad}$ ,  $\angle \underline{\quad} / \angle \underline{\quad}$ ,  $\angle \underline{\quad} / \angle \underline{\quad}$ ,  $\angle \underline{\quad} / \angle \underline{\quad}$ ,  
 $\angle \underline{\quad} / \angle \underline{\quad}$ ,  $\angle \underline{\quad} / \angle \underline{\quad}$ ,  $\angle \underline{\quad} / \angle \underline{\quad}$ ,  $\angle \underline{\quad} / \angle \underline{\quad}$ ,

5. Alternate interior:  $\angle \underline{\quad} / \angle \underline{\quad}$ ,  $\angle \underline{\quad} / \angle \underline{\quad}$

6. Alternate exterior:  $\angle \underline{\quad} / \angle \underline{\quad}$ ,  $\angle \underline{\quad} / \angle \underline{\quad}$

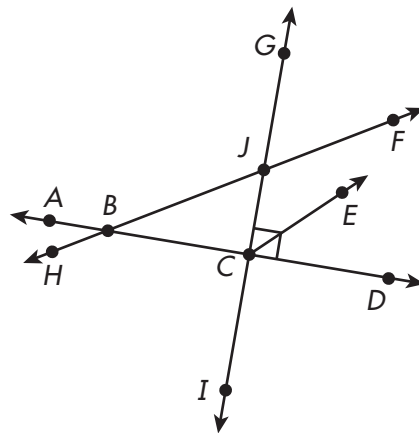




# Check What You Learned

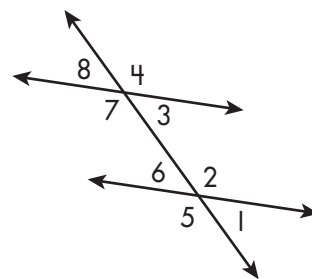
## Points, Lines, Rays, and Angles

Use the figure to answer the following.



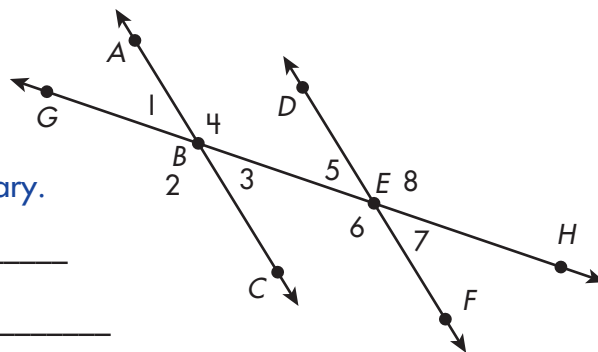
1. Name an angle that is vertical to  $\angle BJC$ . \_\_\_\_\_
2. Name an angle that is vertical to  $\angle ACG$ . \_\_\_\_\_
3. Name an angle that is supplementary to  $\angle JCD$ . \_\_\_\_\_
4.  $\angle DCJ$  is  $90^\circ$ .  $\overline{CE}$  bisects  $\angle DCJ$ .  
What is the angle measure of  $\angle DCE$ ? \_\_\_\_\_
5. Name an angle that is complementary to  $\angle DCE$ . \_\_\_\_\_

Use the figure to answer the following.



6. Name the alternate interior angles.  
 $\angle$  \_\_\_\_\_ /  $\angle$  \_\_\_\_\_     $\angle$  \_\_\_\_\_ /  $\angle$  \_\_\_\_\_
7. Name the alternate exterior angles.  
 $\angle$  \_\_\_\_\_ /  $\angle$  \_\_\_\_\_     $\angle$  \_\_\_\_\_ /  $\angle$  \_\_\_\_\_
8. Assume  $\angle 8$  is  $40^\circ$ . What is the measure of  $\angle 1$ ? \_\_\_\_\_

Use the figure to answer the following.



9. Name the transversal of  $\overline{AC}$  and  $\overline{DF}$ .  
\_\_\_\_\_

$\angle 1$  and  $\angle 4$  are adjacent angles. They are supplementary.

10. If  $\angle 4$  is  $150^\circ$ , what is the measure of  $\angle 1$ ? \_\_\_\_\_
11. If  $\angle 4$  is  $150^\circ$ , what is the measure of  $\angle DEH$ ? \_\_\_\_\_



# Check What You Know

## Triangle Properties and Relationships

Identify the square root of each perfect square.

1.  $\sqrt{225} =$  **a** \_\_\_\_\_       $\sqrt{64} =$  **b** \_\_\_\_\_       $\sqrt{484} =$  **c** \_\_\_\_\_

Estimate the following square roots. Example:  $\sqrt{37}$  is between 6 and 7 but closer to 6.

2.  $\sqrt{66}$  is between \_\_\_\_\_ and \_\_\_\_\_ but closer to \_\_\_\_\_.

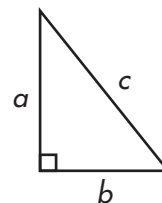
3.  $\sqrt{19}$  is between \_\_\_\_\_ and \_\_\_\_\_ but closer to \_\_\_\_\_.

Use the Pythagorean Theorem to determine the length of  $a$ ,  $b$ , or  $c$ .

4. If  $a = 36$  and  $b = 48$ ,  $c = \sqrt{\quad}$  or \_\_\_\_\_.

5. If  $a = 98$  and  $c = 170$ ,  $b = \sqrt{\quad}$  or \_\_\_\_\_.

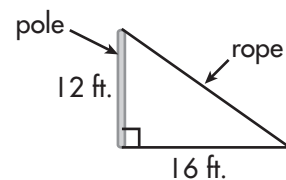
6. If  $b = 77$  and  $c = 122$ ,  $a = \sqrt{\quad}$  or \_\_\_\_\_.



Solve.

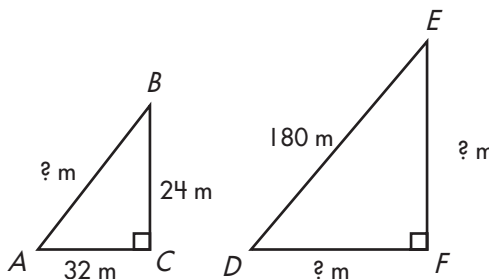
7. Campers attached a rope to a pole 12 ft. high. They pulled it tight and staked it to the ground 16 ft. from the pole.

How long is the rope? \_\_\_\_\_



Find the lengths of the missing sides for the similar right triangles.

8. **a**  $AB =$  \_\_\_\_\_ m      **b**  $DF =$  \_\_\_\_\_ m      **c**  $EF =$  \_\_\_\_\_ m





# Geometry Answers

## Chapter 1

### Check What You Know, page 1

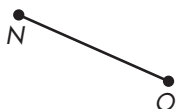
- |    | a  | b   | c   |
|----|--|---|---|
| 1. | line segment;<br>$\overline{KJ}, \overline{JK}, \overline{KJ}$         | line; $\overline{\quad}$<br>$\overline{FR}, \overline{RF}, \overline{FR}$ | ray; $\overrightarrow{\quad}$<br>$\overrightarrow{PQ}, \overrightarrow{PQ}$ |
| 2. | $ABC, FBG, DBE, GBF$   |   |   |
| 3. | $\angle 4$ ( $\angle KLM$ ), $\angle 5$ ( $\angle NLM$ ), $\angle KLM$ |   |   |
| 4. | $\angle NLM, \angle MLN$   |   |   |
| 5. | $90^\circ$ , right   | $130^\circ$ , obtuse  | $80^\circ$ , acute  |

### Lesson 1.1, page 2

- |    | a   | b                              | c      |
|----|---|--------------------------------|--------|
| 1. | $AB; BA$  | $\overline{AB}; \overline{BA}$ |        |
| 2. | $CD; DC$  | $\overline{CD}; \overline{DC}$ |        |
| 3. | $EF; FE$  | $\overline{EF}; \overline{FE}$ |        |
| 4. | $HG$  | $\overline{HG};$               | $G; H$ |
| 5. | $KJ$  | $\overline{KJ};$               | $J; K$ |
| 6. |  |                                |        |
| 7. |  |                                |        |

### Lesson 1.1, page 3

- $MKN; JKL$
- $\overline{ABC}; \overline{BDG}, \overline{ADE}$
- $\overline{LM}; \overline{ML}$
- Any of the following:  $\overline{ON}; \overline{NO}$



### Lesson 1.2, page 4

- |    | a                                  | b |
|----|------------------------------------|---|
| 1. | $CD, \overline{CD}$                | C |
| 2. | $EF, \overline{EF}$                | E |
| 3. | $GH, \overline{GH}$                | G |
| 4. | $\angle IJK, \angle KJI, \angle J$ |   |
| 5. | $\angle LMN, \angle NML, \angle M$ |   |

### Lesson 1.3, page 5

- |    | a                    | b                  |
|----|----------------------|--------------------|
| 1. | $120^\circ$ ; obtuse | $60^\circ$ ; acute |
| 2. | $90^\circ$ ; right   | $30^\circ$ ; acute |

### Lesson 1.4, page 6

- vertical
- supplementary
- supplementary
- vertical
- vertical
- supplementary
- $72^\circ$
- $68^\circ$
- $37^\circ$
- $60^\circ$

### Lesson 1.5, page 7

- $\angle 1/\angle 2, \angle 3/\angle 4, \angle 5/\angle 6, \angle 7/\angle 8$   
 $\angle 1/\angle 3, \angle 2/\angle 4, \angle 5/\angle 7, \angle 6/\angle 8$
- $\angle 4/\angle 5$
- $\angle 2/\angle 7$
- $\angle 4/\angle 5, \angle 6/\angle 7, \angle 8/\angle 9, \angle 10/\angle 11$   
 $\angle 5/\angle 7, \angle 4/\angle 6, \angle 9/\angle 11, \angle 8/\angle 10$
- $\angle 9/\angle 6, \angle 7/\angle 8$
- $\angle 11/\angle 4, \angle 5/\angle 10$

### Check What You Learned, page 8

- $\angle GJF$
- $\angle ICD$
- $\angle ACG$  or  $\angle BCJ$  or  $\angle DCI$
- $45^\circ$
- $\angle ECJ$
- $\angle 2/\angle 7; \angle 3/\angle 6$
- $\angle 1/\angle 8; \angle 4/\angle 5$
- $40^\circ$
- $\overline{GH}$
- $30^\circ$
- $150^\circ$

## Chapter 2

### Check What You Know, page 9

- |    | a                       | b   | c   |
|----|-------------------------|-----|-----|
| 1. | 15                      | 8   | 22  |
| 2. | 8                       | 9   | 8   |
| 3. | 4                       | 5   | 4   |
| 4. | $\sqrt{3,600}; 60$      |     |     |
| 5. | $\sqrt{19,296}; 138.91$ |     |     |
| 6. | $\sqrt{8,955}; 94.63$   |     |     |
| 7. | 20 ft.                  |     |     |
| 8. | 40                      | 144 | 108 |

### Lesson 2.1, page 10

- |    | a                   | b                  | c                            |
|----|---------------------|--------------------|------------------------------|
| 1. | acute               | obtuse             | right                        |
| 2. | $40^\circ$ ; obtuse | $40^\circ$ ; acute | $90^\circ, 35^\circ$ ; right |

### Lesson 2.2, page 11

- |    | a           | b         | c           |
|----|-------------|-----------|-------------|
| 1. | equilateral | scalene   | isosceles   |
| 2. | equilateral | isosceles | equilateral |

### Lesson 2.3, page 12

Use a protractor and ruler to check the accuracy of the drawings.

### Lesson 2.3, page 13

Use a protractor and ruler to check the accuracy of the drawings.