

# Draw Points, Lines, and Rays

## Lesson 1

### ESSENTIAL QUESTION

How are different ideas about geometry connected?

A **point** is an exact location that is represented by a dot. A **line** is a straight set of points that extends in opposite directions without ending.



## Math in My World



### Example 1

Molly drew the figure shown. Identify the figure she drew.

The figure extends in opposite directions. The arrows indicate that it extends without ending. It is a line.

This line is labeled with point  $X$  and point  $Y$ . There are different ways to represent this line, such as line  $XY$  or  $\overleftrightarrow{XY}$ .

So, Molly drew \_\_\_\_\_.



## Key Concept Lines, Rays, Line Segments

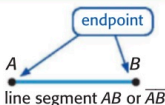
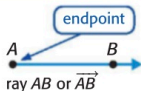
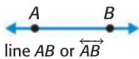
### Words

A **line** is a straight set of points that extends in opposite directions without ending.

A **ray** is a part of a line that has one **endpoint** and extends in one direction without ending.

A **line segment** is a part of a line between two endpoints.

### Models



## Example 2



Draw a figure that could be represented by  $\overline{CD}$ .

$\overline{CD}$  represents a line segment with endpoints  $C$  and  $D$ .

My Drawing!

## Example 3

Identify the figure at the right.



The figure has one endpoint and extends in one direction without ending. It is a ray.

The endpoint is  $A$ . The ray extends in the direction of point  $B$ .

So, the figure is \_\_\_\_\_.

## Guided Practice



Identify each figure.



Talk MATH

How are lines and line segments alike? How are they different?



Name \_\_\_\_\_

# Independent Practice

Identify each figure.



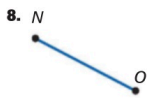
\_\_\_\_\_



\_\_\_\_\_



\_\_\_\_\_



\_\_\_\_\_

Draw each figure.

9. point  $T$

10.  $\overleftrightarrow{YZ}$

11.  $\overrightarrow{CR}$

12.  $\overline{AW}$

13.  $\overleftarrow{SN}$

14.  $\overrightarrow{TJ}$

# Draw Parallel and Perpendicular Lines

## Lesson 2

### ESSENTIAL QUESTION ?

How are different ideas about geometry connected?

You can describe lines, rays, and line segments by the way they cross each other or do not cross each other.



## Math in My World



### Example 1

Oliver was riding in the car and saw this sign. Describe how the outlined line segments cross each other or do not cross each other.

**Parallel** lines are always the same distance apart. They do not meet or cross each other.

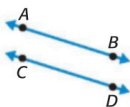
So, Oliver saw a figure with \_\_\_\_\_ line segments.



## Key Concept Types of Lines

**Words** Parallel lines are always the same distance apart. They do not meet.

**Model**



line  $AB$  is parallel to line  $CD$

$$\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$$

The symbol  $\parallel$  means parallel.



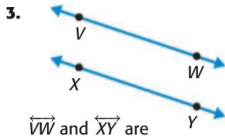
## Independent Practice

Describe each figure. Use *parallel*, *perpendicular*, or *intersecting*. Use the most specific term.



$\overleftrightarrow{LM}$  and  $\overleftrightarrow{JK}$  are

\_\_\_\_\_.



$\overleftrightarrow{VW}$  and  $\overleftrightarrow{XY}$  are

\_\_\_\_\_.

Draw an example of each figure.

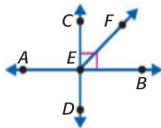
4.  $\overleftrightarrow{DE} \parallel \overleftrightarrow{FG}$

5.  $\overleftrightarrow{RS}$  intersects  $\overleftrightarrow{TU}$

6.  $\overleftrightarrow{NO} \perp \overleftrightarrow{PQ}$

7.  $\overleftrightarrow{JK} \parallel \overleftrightarrow{LM}$

8. Circle the statement that is true about the figure below.



Line  $AB$  is parallel to ray  $EF$ .

Line  $AB$  is perpendicular to line  $CD$ .

Line  $CD$  is parallel to ray  $EF$ .

Line  $CD$  is parallel to line  $AB$ .



# Problem Solving

## Mathematical PRACTICE 4



**Model Math** On a map, streets can be represented by line segments. Use the map to answer Exercises 9–11.

9. Identify two streets that appear to be parallel to Washington Avenue.

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10. Tell whether Hayes Avenue and Capital Lane appear to be parallel, intersecting, or perpendicular lines. Explain.

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11. Are there any streets that are intersecting but not perpendicular? Explain.

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## HOT Problems

## Mathematical PRACTICE 2



**Stop and Reflect** Tell whether each statement is *true* or *false*.

- If two lines are parallel, they are always the same distance apart. \_\_\_\_\_
- If two lines are parallel, they are also perpendicular. \_\_\_\_\_

13. **Building on the Essential Question** Describe a real-world example of when it is necessary that line segments are parallel.

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# MY Homework

## Lesson 2

### Draw Parallel and Perpendicular Lines

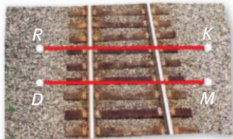
## Homework Helper



Need help? [connectED.mcgraw-hill.com](http://connectED.mcgraw-hill.com)

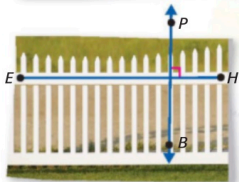
**Describe each figure. Use *parallel*, *perpendicular*, or *intersecting*. Use the most specific term.**

Lines or line segments that are always the same distance apart and do not meet are parallel. So,  $\overline{RK} \parallel \overline{DM}$ .



Lines or line segments that meet to form square corners are perpendicular.

So,  $\overrightarrow{PB} \perp \overline{EH}$ .



Lines or line segments that meet or cross are intersecting. So,  $\overleftrightarrow{XY}$  intersects  $\overleftrightarrow{CF}$ .



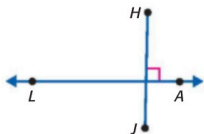
### Helpful Hint

The symbol  $\parallel$  means parallel.

The symbol  $\perp$  means perpendicular.

## Practice

- Describe the figure. Use *parallel*, *perpendicular*, or *intersecting*. Use the most specific term.





**Mathematical PRACTICE** 2

**Use Symbols** Draw an example of each figure.

2.  $\vec{GP} \parallel \vec{ND}$

3.  $\vec{HY}$  intersects  $\vec{QA}$



## Problem Solving

**Mathematical PRACTICE** 4

**Model Math** Martin is washing windows.

First he must raise the blinds. Describe the kind of line segments formed by the horizontal blinds.



## Vocabulary Check



Draw a line to match each vocabulary term to its example.

5. intersecting, but not perpendicular



6. parallel



7. perpendicular



## Test Practice

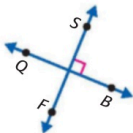
8. Which is the correct description of the figure?

(A)  $\vec{QB} \parallel \vec{SF}$

(C)  $\vec{QS} \perp \vec{BF}$

(B)  $\vec{QB} \perp \vec{SF}$

(D)  $\vec{QS} \parallel \vec{BF}$



# Check My Progress

## Vocabulary Check



Use the word bank to complete each sentence.

**endpoint**

**line**

**line segment**

**point**

**ray**

1. A \_\_\_\_\_ is part of a line between two endpoints.
2. A \_\_\_\_\_ is a part of a line that has one \_\_\_\_\_ and extends in one direction without ending.
3. A \_\_\_\_\_ is a straight set of points that extends in opposite directions without ending.
4. A \_\_\_\_\_ is an exact location that is represented by a dot.

Match each vocabulary word to its definition.

5. **intersecting**
  - lines that meet or cross each other to form square corners
6. **parallel**
  - lines that meet or cross each other, but do not necessarily form square corners
7. **perpendicular**
  - lines that are always the same distance apart and do not meet

## Concept Check



Circle the correct description of each figure.

8.



line  
line segment  
ray

9.



line  
line segment  
ray

10.

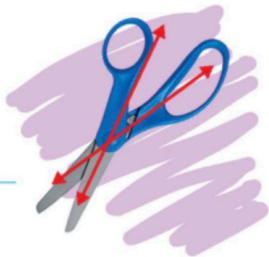


line  
line segment  
ray



## Problem Solving

11. Identify the lines outlined on the pair of scissors as parallel, perpendicular, or intersecting. Choose the most specific term.



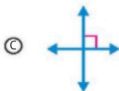
12. Sandy is driving on Broadway Avenue. Which street appears to be perpendicular to Broadway Avenue?



13. Nathan practiced his handwriting by writing the alphabet in capital letters. He stopped at the first letter that contains parallel line segments. At which letter did Nathan stop writing?

## Test Practice

14. Which figure shows parallel lines?



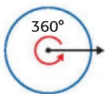
# Classify Angles

## Lesson 4

### ESSENTIAL QUESTION

How are different ideas about geometry connected?

Angles can be measured in a more precise way than turns. The unit used to measure an angle is called a **degree (°)**. A circle is made up of  $360^\circ$ .



An angle that turns through  $\frac{1}{360}$  of a circle is called a **one-degree angle**. That means that 360 one-degree angles sharing the same endpoint make a circle. The angle below turns through 3 one-degree angles. So, it measures  $3^\circ$ .



## Math in My World



### Example 1

David waits by the crosswalk sign on his way to school. The angle outlined on the sign turns through 50 one-degree angles. Find the measure of the angle.

The angle turns through 50 one-degree angles.

That means that 50 one-degree angles sharing the same endpoint make the angle.

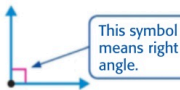
So, the angle has a measure of \_\_\_\_\_°.



Angles can be classified as *right*, *acute*, or *obtuse*.

## Key Concept Types of Angles

A **right angle** measures  $90^\circ$ .



An **acute angle** measures greater than  $0^\circ$  and less than  $90^\circ$ .



An **obtuse angle** measures greater than  $90^\circ$  but less than  $180^\circ$ .



### Example 2



Classify the angle as *right*, *acute*, or *obtuse*.

The angle is  $90^\circ$ .

So, it is a \_\_\_\_\_ angle.



### Example 3



Classify the angle as *right*, *acute*, or *obtuse*.

The angle is greater than  $90^\circ$  and less than  $180^\circ$ .

So, it is a(n) \_\_\_\_\_ angle.



## Guided Practice



1. The angle shown turns through 94 one-degree angles. Find the measure of the angle.  
\_\_\_\_\_

2. Classify the angle shown as *right*, *acute*, or *obtuse*.  
\_\_\_\_\_



### Talk MATH

How many one-degree angles does a right angle turn through?





# Hands On

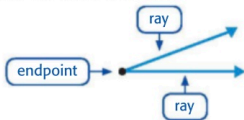
## Model Angles

### Lesson 3

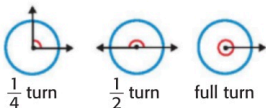
#### ESSENTIAL QUESTION

How are different ideas about geometry connected?

An **angle** is a geometric shape that is formed when two rays have the same endpoint.



Angles are measured by the amount of rotation, or turning, from one ray to another.



## Draw It

Trace the lines to draw an angle that measures  $\frac{1}{4}$  turn.  
Then draw an angle that measures less than  $\frac{1}{4}$  turn.

**1** Draw an angle that measures  $\frac{1}{4}$  turn.

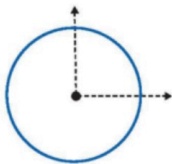
Trace the lines to draw two rays with a common endpoint. The two rays form an angle.

The center of the circle is at the same point as the endpoint of the two rays. The angle you drew measures  $\frac{1}{4}$  turn.

**2** Draw an angle that measures less than  $\frac{1}{4}$  turn.

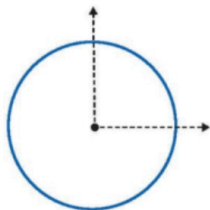
Using the center of the circle as an endpoint, draw a ray that is inside the angle you drew in Step 1.

The ray you drew and the horizontal ray form an angle. This angle measures less than  $\frac{1}{4}$  turn.



## Try It

Trace the lines to draw an angle that measures  $\frac{1}{4}$  turn. Then draw an angle that measures greater than  $\frac{1}{4}$  turn.



### 1 Draw an angle that measures $\frac{1}{4}$ turn.

Trace the lines to draw two rays with a common endpoint. The two rays form an angle.

The center of the circle is at the same point as the endpoint of the two rays.

The angle you drew measures  $\frac{1}{4}$  turn.

### 2 Draw an angle that measures greater than $\frac{1}{4}$ turn.

Using the center of the circle as an endpoint, draw a ray that is outside the angle you drew in Step 1.

The ray you drew and the horizontal ray form an angle.

This angle measures greater than  $\frac{1}{4}$  turn.



## Talk About It

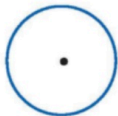
1. **Mathematical PRACTICE** **3** **Draw a Conclusion** Without drawing a circle, determine whether the angle at the right has a measure that is greater than, less than, or equal to  $\frac{1}{2}$  turn. Explain.



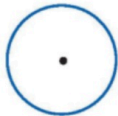
2. **Mathematical PRACTICE** **6** **Explain to a Friend** Refer to the angle you drew in the activity above. State whether the angle's measure is greater than, less than, or equal to  $\frac{1}{2}$  turn. Explain.

## Practice It

3. Draw an angle with a measure less than  $\frac{1}{4}$  turn.

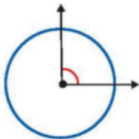


4. Draw an angle with a measure greater than  $\frac{1}{4}$  turn.



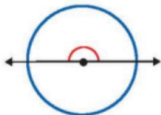
Draw lines to match each figure to its description.

5.



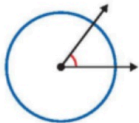
- An angle with a measure greater than  $\frac{1}{4}$  turn, but less than  $\frac{1}{2}$  turn.

6.



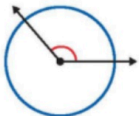
- An angle with a measure less than  $\frac{1}{4}$  turn.

7.



- An angle with a measure of  $\frac{1}{4}$  turn.

8.



- An angle with a measure of  $\frac{1}{2}$  turn.





## Apply It

9. Draw the hands on the clock below to show 5:00.




Describe the measure of the angle formed by the hands of the clock.

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10. Draw a real-world object that shows an angle with a measure of  $\frac{1}{4}$  turn.

11. **Mathematical PRACTICE**  **Model Math** Draw two angles that share a common endpoint and a common ray. Together, they should form an angle with a measure of  $\frac{1}{4}$  turn.



My Drawing!



## Write About It

12. How can I describe an angle's measure?

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