

Name \_\_\_\_\_

# Parallel Lines and Perpendicular Lines

**Essential Question** How can you identify and draw parallel lines and perpendicular lines?

Common Core Geometry—  
4.G.A.1

**MATHEMATICAL PRACTICES**  
MP4, MP5, MP6

## Unlock the Problem

You can find models of lines in the world around you. For example, two streets that cross each other model intersecting lines. Metal rails on a train track that never cross model parallel lines.

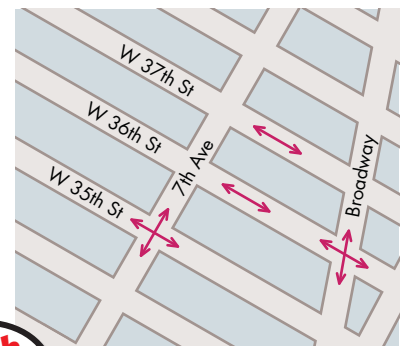


▲ Maglev trains use magnets to lift them above the tracks while moving.

| Term and Definition  | Draw It | Read It                                       | Write It  |
|--|---------|---|---|
| <b>Intersecting lines</b> are lines in a plane that cross at exactly one point. Intersecting lines form four angles. |         | Line $HI$ intersects line $JK$ at point $X$ . | $\vec{HI}$ and $\vec{JK}$ intersect at point $X$                                |
| <b>Parallel lines</b> are lines in a plane that are always the same distance apart. Parallel lines never intersect.  |         | Line $DE$ is parallel to line $FG$ .          | $\vec{DE} \parallel \vec{FG}$<br>The symbol $\parallel$ means “is parallel to.” |
| <b>Perpendicular lines</b> are lines in a plane that intersect to form four right angles.                            |         | Line $LM$ is perpendicular to line $NO$ .     | $\vec{LM} \perp \vec{NO}$<br>The symbol $\perp$ means “is perpendicular to.”    |

**Try This!** Tell how the streets appear to be related. Write *perpendicular*, *parallel*, or *intersecting*.

- W 36th St and Broadway \_\_\_\_\_
- W 35th St and 7th Ave \_\_\_\_\_
- W 37th St and W 36th St \_\_\_\_\_



**Math Talk**

**MATHEMATICAL PRACTICES 6**

**Use Math Vocabulary**  
Can two rays be parallel? Explain.

**Activity** Draw and label  $\overrightarrow{YX} \perp \overrightarrow{YZ}$  intersecting at point  $Y$ .

**Materials** ■ straightedge

**STEP 1:** Draw and label  $\overrightarrow{YX}$ .

**STEP 2:** Then draw and label  $\overrightarrow{YZ}$ .



**STEP 3:** Make sure  $\overrightarrow{YX}$  and  $\overrightarrow{YZ}$  intersect at point  $Y$ .

**STEP 4:** Make sure the rays are perpendicular.

- How can you check if two rays are perpendicular?

1. Name the figure you drew.

\_\_\_\_\_

2. Can you classify the figure? Explain.

\_\_\_\_\_  
\_\_\_\_\_

## Share and Show



1. Draw and label  $\overline{QR} \parallel \overline{ST}$ .

**Think:** Parallel lines never intersect. Parallel line segments are parts of parallel lines.

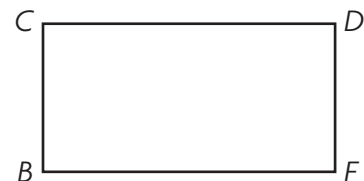
**Use the figure for 2 and 3.**

2. Name two line segments that appear to be parallel.

\_\_\_\_\_

3. Name two line segments that appear to be perpendicular.

\_\_\_\_\_



**Math Talk**

### MATHEMATICAL PRACTICES 4

**Use Symbols** How could the symbols  $\perp$  and  $\parallel$  help you remember which relationships they describe?

Name \_\_\_\_\_

## On Your Own

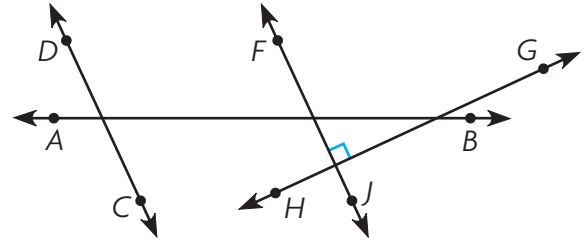
Use the figure for 4–5.

4. Name a pair of lines that are perpendicular.

\_\_\_\_\_

5. Name a pair of lines that appear to be parallel.

\_\_\_\_\_



Draw and label the figure described.

6.  $\overline{RS} \parallel \overline{TU}$

7.  $\overline{KL}$  and  $\overline{KM}$

8.  $\overline{CD} \perp \overline{DE}$

9.  $\overleftrightarrow{JK} \perp \overleftrightarrow{LM}$

10.  $\overleftrightarrow{ST}$  intersecting  $\overleftrightarrow{UV}$  at point X

11.  $\overleftrightarrow{AB} \parallel \overleftrightarrow{FG}$

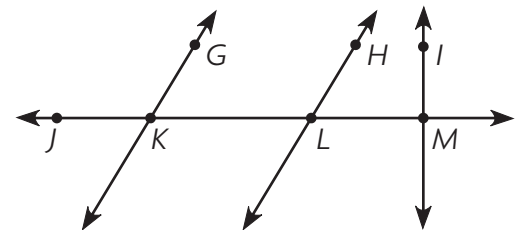
## Problem Solving • Applications Real World

Use the figure for 12–13.

12. **THINK SMARTER** Dan says that  $\overleftrightarrow{HL}$  is parallel to  $\overleftrightarrow{IM}$ . Is Dan correct? Explain.

\_\_\_\_\_

\_\_\_\_\_



13. **GO DEEPER** Name two intersecting line segments that are not perpendicular.

\_\_\_\_\_

Use the house plan at the right for 14–16.

14. What geometric term describes a corner of the living room?

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15. Name three parts of the plan that show line segments.

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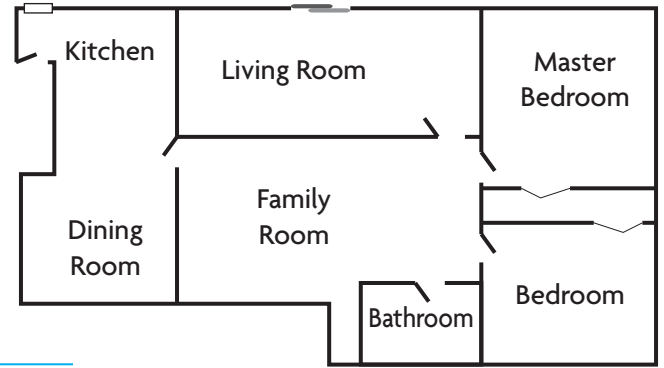
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16. **THINK SMARTER** Name a pair of line segments that appear to be parallel.

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Use the map at the right for 17–19.

17. Name a street that appears to be parallel to S 17th Street.

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18. **MATHEMATICAL PRACTICE 4** Use Diagrams Name a street that appears to be parallel to Vernon Street.

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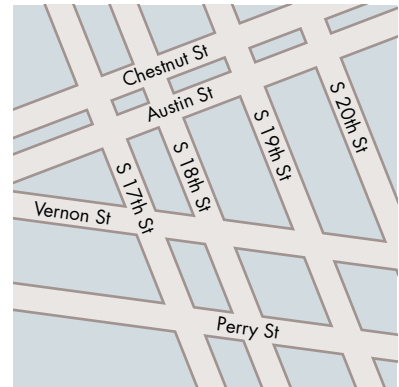
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19. Name a street that appears to be perpendicular to S 19th Street.

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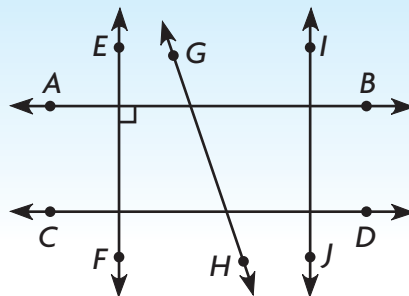


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20. **THINK SMARTER** Choose the labels to make a true statement.

|                           |                     |                           |
|---------------------------|---------------------|---------------------------|
| $\overleftrightarrow{GH}$ | is perpendicular to | $\overleftrightarrow{EF}$ |
| $\overleftrightarrow{IJ}$ |                     | $\overleftrightarrow{AE}$ |
| $\overleftrightarrow{AB}$ |                     | $\overleftrightarrow{GH}$ |



Name \_\_\_\_\_

## Parallel Lines and Perpendicular Lines

Use the figure for 1–2.

1. Name a pair of lines that appear to be perpendicular.

**Think:** Perpendicular lines form right angles.  
 $\overleftrightarrow{AB}$  and  $\overleftrightarrow{EF}$  appear to form right angles.

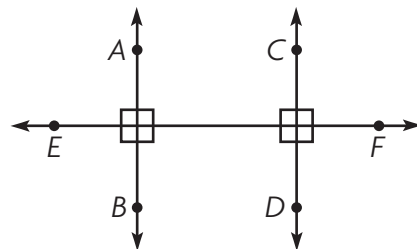
$\overleftrightarrow{AB}$  and  $\overleftrightarrow{EF}$   
 \_\_\_\_\_

2. Name a pair of lines that appear to be parallel.

\_\_\_\_\_



**COMMON CORE STANDARD—4.G.A.1**  
 Draw and identify lines and angles, and classify shapes by properties of their lines and angles.



Draw and label the figure described.

3.  $\overleftrightarrow{MN}$  and  $\overleftrightarrow{PQ}$  intersecting at point  $R$
4.  $\overleftrightarrow{WX} \parallel \overleftrightarrow{YZ}$
5.  $\overleftrightarrow{FH} \perp \overleftrightarrow{JK}$

## Problem Solving



Use the street map for 6–7.

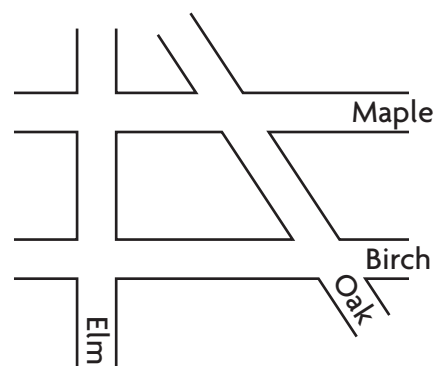
6. Name two streets that intersect but do not appear to be perpendicular.

\_\_\_\_\_  
 \_\_\_\_\_

7. Name two streets that appear to be parallel to each other.

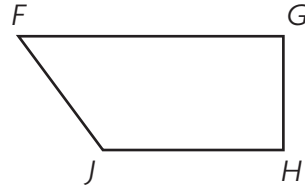
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8. **WRITE** *Math* Draw and label an example of two parallel lines that are perpendicular to a third line.



## Lesson Check (4.G.A.1)

1. Write a capital letter that appears to have perpendicular line segments?
2. In the figure, which pair of line segments appear to be parallel?



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## Spiral Review (4.NBT.B.5, 4.NBT.B.6, 4.NF.A.2, 4.G.A.2)

3. Nolan drew a right triangle. How many acute angles did he draw?
4. Mike drank more than half the juice in his glass. What fraction of the juice could Mike have drunk?

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5. A school principal ordered 1,000 pencils. He gave an equal number to each of 7 teachers until he had given out as many as possible. How many pencils were left?
6. A carton of juice contains 64 ounces. Ms. Wilson bought 6 cartons of juice. How many ounces of juice did she buy?

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