Name _____

Parallel Lines and Perpendicular Lines

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

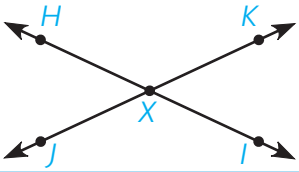
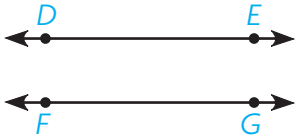
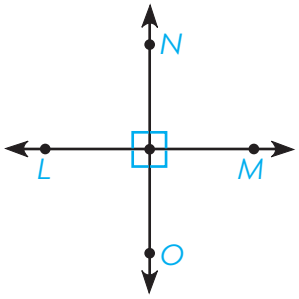
Common Core **Geometry—4.G.A.1**

MATHEMATICAL PRACTICES
MP4, MP5, MP6

Unlock the Problem

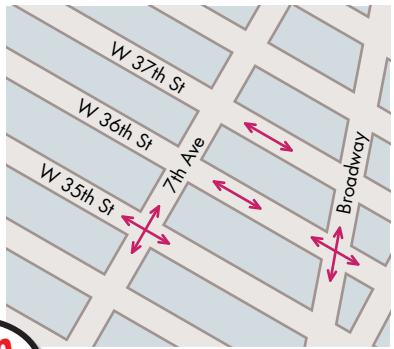
You can find models of lines in the world around you. For example, two streets that cross each other model intersecting lines. Metal rails on a train track that never cross model parallel lines.

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

Term and Definition	Draw It	Read It	Write It
Intersecting lines are lines in a plane that cross at exactly one point. Intersecting lines form four angles.		Line *HI* intersects line *JK* at point *X*.	$\overleftrightarrow{HI}$ and $\overleftrightarrow{JK}$ intersect at point *X*
Parallel lines are lines in a plane that are always the same distance apart. Parallel lines never intersect.		Line *DE* is parallel to line *FG*.	$\overleftrightarrow{DE} \parallel \overleftrightarrow{FG}$ The symbol ∥ means "is parallel to."
Perpendicular lines are lines in a plane that intersect to form four right angles.		Line *LM* is perpendicular to line *NO*.	$\overleftrightarrow{LM} \perp \overleftrightarrow{NO}$ The symbol ⊥ 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 MATH BOARD

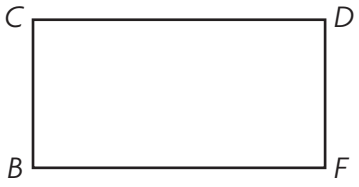
1. Draw and label $\overline{QR} \parallel \overline{ST}$.

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.



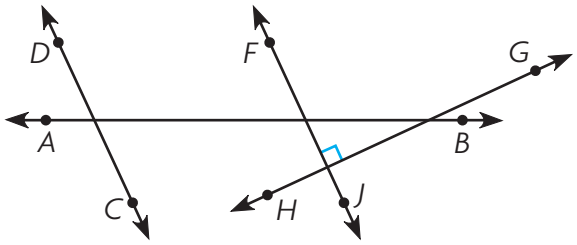
Math Talk MATHEMATICAL PRACTICES 4

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. $\overrightarrow{KL}$ and $\overrightarrow{KM}$

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

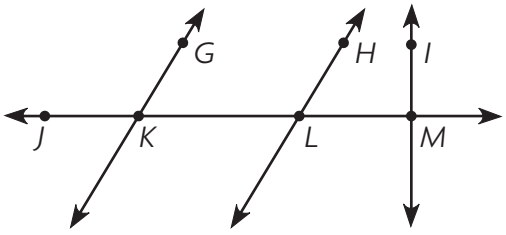
9. $\overleftrightarrow{JK} \perp \overleftrightarrow{LM}$

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

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

Problem Solving • Applications

Use the figure for 12–13.



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

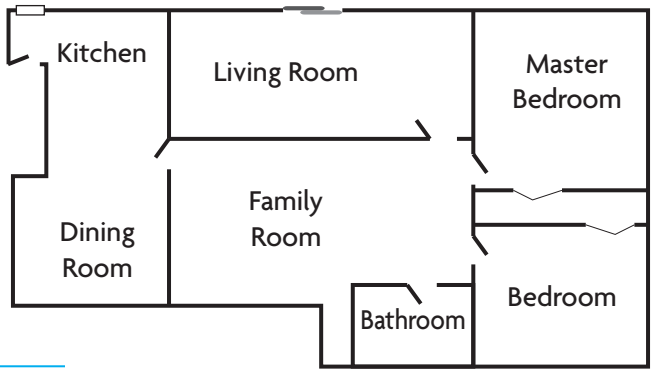
_____

_____

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?

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

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

Use the map at the right for 17–19.

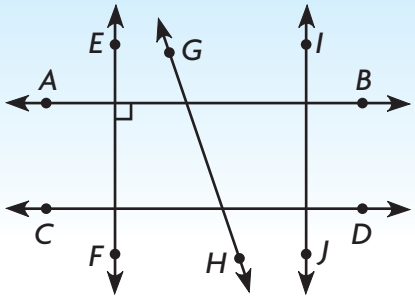
17. Name a street that appears to be parallel to S 17th Street.

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

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

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

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

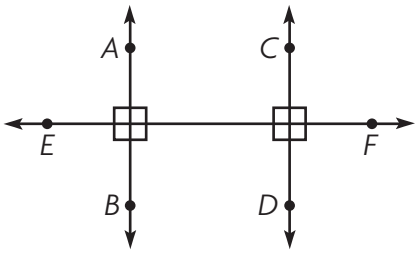


Name _____

Parallel Lines and Perpendicular Lines

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

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.

_____

Draw and label the figure described.

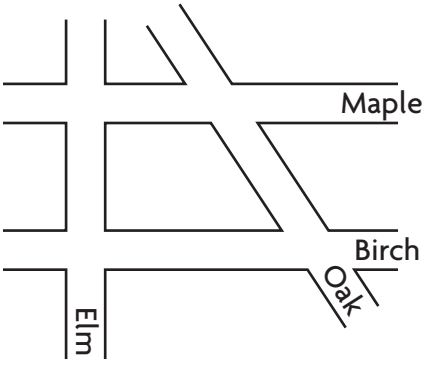
3. $\overleftrightarrow{MN}$ and $\overleftrightarrow{PQ}$ intersecting at point R

4. $\overleftrightarrow{WX} \parallel \overleftrightarrow{YZ}$

5. $\overleftrightarrow{FH} \perp \overleftrightarrow{JK}$

Problem Solving Real World

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.

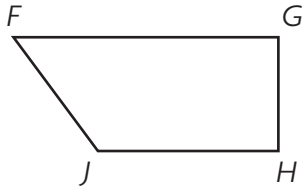
_____

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?



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?

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?