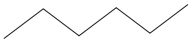
Lines

Have you ever thought about lines? You can draw a line or you can make a line with a string. Some lines are straight, like a jet trail in the sky, the edge of a piece of paper, or a piece of uncooked spaghetti.

Some lines are curvy, like a winding road or the letter "S".

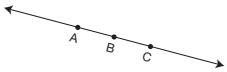
Some lines are jagged like a mountain range or a zigzag decoration on a shirt.



In geometry, if we talk about a **line,** we mean a straight line. For the rest of this unit, we will always mean straight line when we say line.

A line in geometry goes on forever in both directions. It has no beginning or end. We cannot draw a picture of a whole line so we put arrows at the ends to show that the line keeps going on infinitely (forever).

Lines are often named by two points on the line. This is line AC.



We write $\overline{AC}$. We can also call it $\overline{AB}$ or $\overline{BC}$.

A **line segment** is a part of a line with two **end points**. Line segment AB is the part of the line between the end points marked A and B. We write $\overline{AB}$ to show that we mean only this segment and not any other part of the line.

1. Name two other line segments that are part of $\overline{AC}$.

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2. This is line RT ($\overleftrightarrow{RT}$).

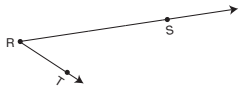
   A. What are two other names for this line?

   B. Name at least 2 line segments that are part of $\overleftrightarrow{RT}$.

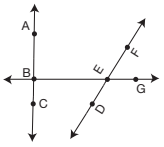
A **ray** is part of a line. It starts at one point and then goes on forever in only one direction.

3. This is ray XY. We can write ray XY like this: $\overrightarrow{XY}$. A ray is named by its endpoint first, followed by another point on the ray. What is another name for this ray?

4. Name the two rays that make up ∠R below.



Use the figure below to answer Questions 5–11.



5. Name two lines segments in the picture.
6. Name two lines.
7. Name two rays.
8. At what point do you see a right angle?
9. At what point do you see an acute angle?
10. Which two lines meet to make an acute angle?
11. Which two lines meet to make a right angle?

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Questions 1–18 (SG pp. 373–376)

Note: Some line names will vary.

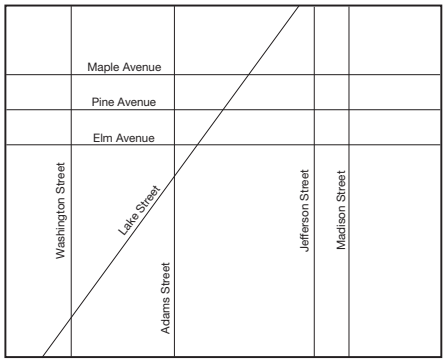
1. $\overline{BC}$ and $\overline{AC}$
2. **A.** $\overleftrightarrow{RS}$ and $\overleftrightarrow{ST}$

   B. Possible answers: $\overline{RS}$, $\overline{ST}$, $\overline{RT}$
3. $\overrightarrow{XZ}$
4. $\overrightarrow{RS}$ and $\overrightarrow{RT}$
5. Possible answers: $\overline{AB}$, $\overline{AC}$, $\overline{BC}$, $\overline{BE}$, $\overline{BG}$, $\overline{EG}$, $\overline{EF}$, $\overline{DE}$, $\overline{DF}$
6. Possible answers: $\overleftrightarrow{AC}$, $\overleftrightarrow{BG}$, $\overleftrightarrow{DF}$
7. Possible answers: $\overrightarrow{AB}$, $\overrightarrow{AC}$, $\overrightarrow{BC}$, $\overrightarrow{CB}$, $\overrightarrow{BA}$, $\overrightarrow{CA}$, $\overrightarrow{BE}$, $\overrightarrow{EB}$, $\overrightarrow{BG}$, $\overrightarrow{GB}$, $\overrightarrow{EG}$, $\overrightarrow{GE}$, $\overrightarrow{EF}$, $\overrightarrow{FE}$, $\overrightarrow{FD}$, $\overrightarrow{DE}$, $\overrightarrow{ED}$, $\overrightarrow{DF}$, $\overrightarrow{FD}$
8. Point B
9. Point E
10. $\overleftrightarrow{DF}$ and $\overleftrightarrow{BG}$
11. $\overleftrightarrow{AC}$ and $\overleftrightarrow{BG}$

12. Pine Ave. or Maple Ave.
13. Jefferson St., Adams St., or Washington St.
14. Washington St., Adams St., Jefferson St., or Madison St.
15. Maple Ave., Pine Ave., or Elm Ave.
16. Students name two of the following: Washington St., Adams St., Elm Ave., Pine Ave., or Maple Ave. If Lake, Jefferson, and Madison Streets continue, Lake will intersect both Jefferson and Madison.
17. **A.** $\overline{AB}$, $\overline{BC}$, $\overline{CD}$, and $\overline{DA}$
    B. $\overleftrightarrow{AD}$
    C. $\overleftrightarrow{DC}$
    D. $\overline{AB}$ & $\overline{CD}$, $\overline{DA}$ & $\overline{BC}$
    E. $\overline{DA}$ or $\overline{BC}$
    F. $\overline{DA}$ or $\overline{BC}$
18. Examples will vary. Examples of perpendicular lines might include the lines forming the corner of square tiles on the floor or the lines forming the corners of a rectangular piece of paper.

    Examples of parallel lines might include the parallel lines painted in a parking lot or the parallel lines formed on opposite sides of a windowpane.

TIMSville



The map of TIMSville shows Maple Avenue and Pine Avenue as lines that go in the same direction. We say Maple Avenue and Pine Avenue are **parallel.** These streets always stay the same distance apart. They will never **intersect** (meet) even if they went on, in the same direction, forever.

Lake Street and Madison Street are not parallel. If they continued going straight, they would intersect.

Pine Avenue and Jefferson Street are **perpendicular.** This means they form right angles where they intersect. Washington Street and Lake Street intersect. However, they are not perpendicular.

12. Name a street parallel to Elm Avenue.
13. Name a street parallel to Madison Street.
14. Name a street perpendicular to Maple Avenue.
15. Name a street perpendicular to Washington Street.
16. Name two streets that Lake Street intersects.

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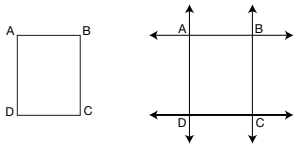
Line Segments and Rectangles

ABCD is a rectangle. Each of the four line segments in rectangle ABCD is part of a line. For example, $\overline{AB}$ is part of $\overleftrightarrow{AB}$.



17. A. Name the 4 line segments that make up rectangle ABCD.
B. $\overline{AD}$ is part of what line?
C. $\overline{DC}$ is part of what line?
D. There appear to be two pairs of parallel line segments. Name them.
E. The angles of a rectangle are right angles. Name a line segment that is perpendicular to $\overline{AB}$.
F. Name a line segment that is perpendicular to $\overline{CD}$.

18. Think about lines in your classroom or school. Make a table like the one shown below. List two examples of lines that appear parallel and of lines that appear perpendicular. Make sketches of the lines.

Parallel Lines	Perpendicular Lines

Complete the *Lines and Intersections* pages of the *Student Activity Book*.

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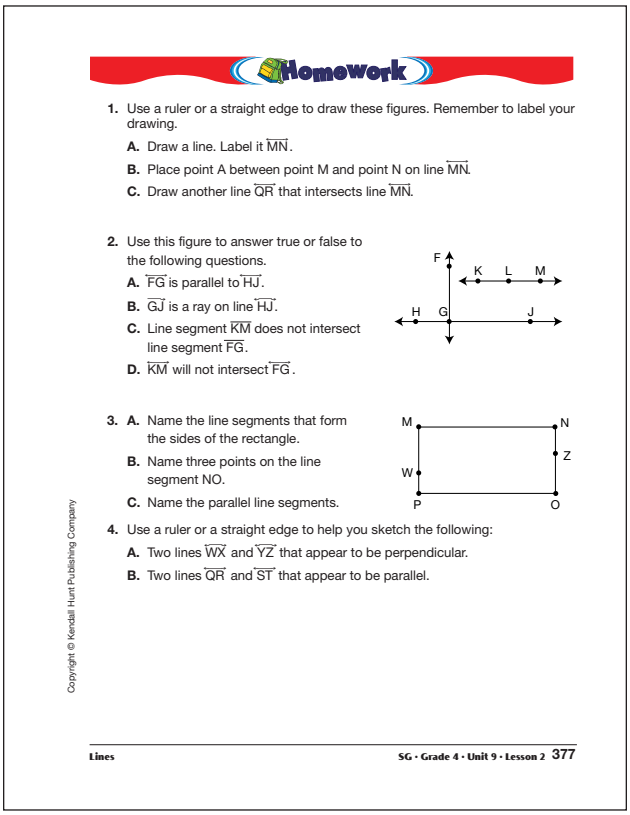

Homework

1. Use a ruler or a straight edge to draw these figures. Remember to label your drawing.
   - A. Draw a line. Label it $\overleftrightarrow{MN}$.
   - B. Place point A between point M and point N on line $\overleftrightarrow{MN}$.
   - C. Draw another line $\overleftrightarrow{QR}$ that intersects line $\overleftrightarrow{MN}$.

2. Use this figure to answer true or false to the following questions.
   - A. $\overleftrightarrow{FG}$ is parallel to $\overleftrightarrow{HJ}$.
   - B. $\overrightarrow{GJ}$ is a ray on line $\overleftrightarrow{HJ}$.
   - C. Line segment $\overline{KM}$ does not intersect line segment $\overline{FG}$.
   - D. $\overline{KM}$ will not intersect $\overleftrightarrow{FG}$.

3. A. Name the line segments that form the sides of the rectangle.
   - B. Name three points on the line segment NO.
   - C. Name the parallel line segments.

4. Use a ruler or a straight edge to help you sketch the following:
   - A. Two lines $\overleftrightarrow{WX}$ and $\overleftrightarrow{YZ}$ that appear to be perpendicular.
   - B. Two lines $\overleftrightarrow{QR}$ and $\overleftrightarrow{ST}$ that appear to be parallel.

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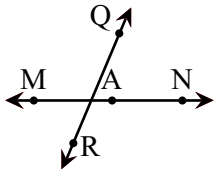
Homework (SG p. 377)

Questions 1–4

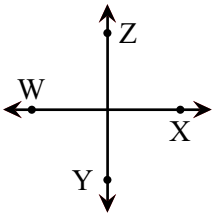
1. Drawings will vary.



2. A. F
   - B. T
   - C. T
   - D. F

3. A. $\overline{MN}$, $\overline{NO}$, $\overline{OP}$, $\overline{PM}$
   - B. Point N, Point Z, Point O
   - C. $\overline{MN}$ is parallel to $\overline{OP}$; $\overline{MW}$, $\overline{WP}$, and $\overline{MP}$ are parallel to $\overline{NZ}$, $\overline{ZO}$, and $\overline{NO}$.

4. Drawings will vary.
   - A.



   - B.