1.2 Use Segments and Congruence

**Key Vocabulary**
- postulate, axiom
- coordinate
- distance
- between
- congruent segments

In Geometry, a rule that is accepted without proof is called a postulate or axiom. A rule that can be proved is called a theorem, as you will see later. Postulate 1 shows how to find the distance between two points on a line.

**POSTULATE**

**POSTULATE 1 Ruler Postulate**
The points on a line can be matched one to one with the real numbers. The real number that corresponds to a point is the coordinate of the point.

The distance between points $A$ and $B$, written as $AB$, is the absolute value of the difference of the coordinates of $A$ and $B$.

$$AB = |x_2 - x_1|$$

In the diagrams above, the small numbers in the coordinates $x_1$ and $x_2$ are called subscripts. The coordinates are read as “$x$ sub one” and “$x$ sub two.”

The distance between points $A$ and $B$, or $AB$, is also called the length of $AB$.

**EXAMPLE 1 Apply the Ruler Postulate**

Measure the length of $ST$ to the nearest tenth of a centimeter.

**Solution**

Align one mark of a metric ruler with $S$. Then estimate the coordinate of $T$. For example, if you align $S$ with 2, $T$ appears to align with 5.4.

$$ST = |5.4 - 2| = 3.4$$  **Use Ruler Postulate.**

The length of $ST$ is about 3.4 centimeters.
Adding Segment Lengths  When three points are collinear, you can say that one point is between the other two.

Point B is between points A and C.  Point E is not between points D and F.

Example 2  Apply the Segment Addition Postulate

Maps  The cities shown on the map lie approximately in a straight line. Use the given distances to find the distance from Lubbock, Texas, to St. Louis, Missouri.

Solution

Because Tulsa, Oklahoma, lies between Lubbock and St. Louis, you can apply the Segment Addition Postulate.

$LS = LT + TS = 380 + 360 = 740$

The distance from Lubbock to St. Louis is about 740 miles.

Guided Practice  for Examples 1 and 2

Use a ruler to measure the length of the segment to the nearest $\frac{1}{8}$ inch.

1.  

2.  

In Exercises 3 and 4, use the diagram shown.

3.  Use the Segment Addition Postulate to find $XZ$.

4.  In the diagram, $WY = 30$. Can you use the Segment Addition Postulate to find the distance between points $W$ and $Z$? Explain your reasoning.
1.2 Use Segments and Congruence

CONGRUENT SEGMENTS Line segments that have the same length are called **congruent segments**. In the diagram below, you can say “the length of \(AB\) is equal to the length of \(CD\),” or you can say “\(AB\) is congruent to \(CD\).” The symbol \(\equiv\) means “is congruent to.”

**Example 3** Find a length

Use the diagram to find \(GH\).

**Solution**

Use the Segment Addition Postulate to write an equation. Then solve the equation to find \(GH\).

\[
\begin{align*}
FH &= FG + GH & \text{Segment Addition Postulate} \\
36 &= 21 + GH & \text{Substitute 36 for } FH \text{ and 21 for } FG. \\
15 &= GH & \text{Subtract 21 from each side.}
\end{align*}
\]

**Example 4** Compare segments for congruence

Plot \(J(-3, 4), K(2, 4), L(1, 3),\) and \(M(1, -2)\) in a coordinate plane. Then determine whether \(JK\) and \(LM\) are congruent.

**Solution**

To find the length of a horizontal segment, find the absolute value of the difference of the \(x\)-coordinates of the endpoints.

\[
JK = |2 - (-3)| = 5 \quad \text{Use Ruler Postulate.}
\]

To find the length of a vertical segment, find the absolute value of the difference of the \(y\)-coordinates of the endpoints.

\[
LM = |-2 - 3| = 5 \quad \text{Use Ruler Postulate.}
\]

\(JK\) and \(LM\) have the same length. So, \(JK \equiv LM\).

**Guided Practice** for Examples 3 and 4

5. Use the diagram at the right to find \(WX\).

6. Plot the points \(A(-2, 4), B(3, 4), C(0, 2),\) and \(D(0, -2)\) in a coordinate plane. Then determine whether \(AB\) and \(CD\) are congruent.
1.2 EXERCISES

1. VOCABULARY  Explain what MN means and what PN means.

2. ★ WRITING  Explain how you can find PN if you know PQ and QN. How can you find PN if you know MP and MN?

MEASUREMENT  Measure the length of the segment to the nearest tenth of a centimeter.

3. A B

4. C D

5. E F

SEGMENT ADDITION POSTULATE  Find the indicated length.

6. Find MP.

7. Find RT.

8. Find UW.

9. Find XY.

10. Find BC.

11. Find DE.

12. ERROR ANALYSIS  In the figure at the right, AC = 14 and AB = 9. Describe and correct the error made in finding BC.

CONGRUENCE  In Exercises 13–15, plot the given points in a coordinate plane. Then determine whether the line segments named are congruent.

13. A(0, 1), B(4, 1), C(1, 2), D(1, 6); \( \overline{AB} \) and \( \overline{CD} \)

14. J(−6, −8), K(−6, 2), L(−2, −4), M(−6, −4); \( \overline{JK} \) and \( \overline{LM} \)

15. R(−200, 300), S(200, 300), T(300, −200), U(300, 100); \( \overline{RS} \) and \( \overline{TU} \)

ALGEBRA  Use the number line to find the indicated distance.

16. JK

17. JL

18. JM

19. KM

20. ★ SHORT RESPONSE  Use the diagram. Is it possible to use the Segment Addition Postulate to show that \( FB > CB \) or that \( AC > DB \)? Explain.
1.2  Use Segments and Congruence

PROBLEM SOLVING

32. **SCIENCE** The photograph shows an insect called a walkingstick. Use the ruler to estimate the length of the abdomen and the length of the thorax to the nearest $\frac{1}{4}$ inch. About how much longer is the walkingstick’s abdomen than its thorax?

33. **MODEL AIRPLANE** In 2003, a remote-controlled model airplane became the first ever to fly nonstop across the Atlantic Ocean. The map shows the airplane’s position at three different points during its flight.

a. Find the total distance the model airplane flew.

b. The model airplane’s flight lasted nearly 38 hours. Estimate the airplane’s average speed in miles per hour.
34. ★ SHORT RESPONSE The bar graph shows the win-loss record for a lacrosse team over a period of three years.

a. Use the scale to find the length of the yellow bar for each year. What does the length represent?

b. For each year, find the percent of games lost by the team.

c. Explain how you are applying the Segment Addition Postulate when you find information from a stacked bar graph like the one shown.

35. MULTI-STEP PROBLEM A climber uses a rope to descend a vertical cliff.

Let \( A \) represent the point where the rope is secured at the top of the cliff, let \( B \) represent the climber’s position, and let \( C \) represent the point where the rope is secured at the bottom of the cliff.

a. Model Draw and label a line segment that represents the situation.

b. Calculate If \( AC \) is 52 feet and \( AB \) is 31 feet, how much farther must the climber descend to reach the bottom of the cliff?

36. CHALLENGE Four cities lie along a straight highway in this order: City A, City B, City C, and City D. The distance from City A to City B is 5 times the distance from City B to City C. The distance from City A to City D is 2 times the distance from City A to City B. Copy and complete the mileage chart.

<table>
<thead>
<tr>
<th>City A</th>
<th>City B</th>
<th>City C</th>
<th>City D</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>?</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>City B</td>
<td>?</td>
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<td>?</td>
</tr>
<tr>
<td>City C</td>
<td>?</td>
<td>?</td>
<td>10 mi</td>
</tr>
<tr>
<td>City D</td>
<td>?</td>
<td>?</td>
<td>?</td>
</tr>
</tbody>
</table>

37. \( \sqrt{45} + 99 \)  
38. \( \sqrt{14} + 36 \)  
39. \( \sqrt{42} + (-2)^2 \)

Solve the equation. (p. 875)

40. \( 4m + 5 = 7 + 6m \)  
41. \( 13 - 4h = 3h - 8 \)  
42. \( 17 + 3x = 18x - 28 \)

Use the diagram to decide whether the statement is true or false. (p. 2)

43. Points \( A \), \( C \), \( E \), and \( G \) are coplanar.
44. \( \overrightarrow{DF} \) and \( \overrightarrow{AG} \) intersect at point \( E \).
45. \( \overrightarrow{AE} \) and \( \overrightarrow{EG} \) are opposite rays.
1.3 Use Midpoint and Distance Formulas

**Before** You found lengths of segments.

**Now** You will find lengths of segments in the coordinate plane.

**Why?** So you can find an unknown length, as in Example 1.

**Key Vocabulary**
- midpoint
- segment bisector

**ACTIVITY FOLD A SEGMENT BISECTOR**

**STEP 1** Draw \( \overline{AB} \) on a piece of paper.

**STEP 2** Fold the paper so that \( B \) is on top of \( A \).

**STEP 3** Label point \( M \). Compare \( AM, MB, \) and \( AB \).

**MIDPOINTS AND BISECTORS** The **midpoint** of a segment is the point that divides the segment into two congruent segments. A **segment bisector** is a point, ray, line, line segment, or plane that intersects the segment at its midpoint. A midpoint or a segment bisector **bisects** a segment.

![Diagram of midpoint and segment bisector]

**EXAMPLE 1 Find segment lengths**

**SKATEBOARD** In the skateboard design, \( \overline{VW} \) bisects \( \overline{XY} \) at point \( T \), and \( XT = 39.9 \) cm. Find \( XY \).

**Solution**

Point \( T \) is the midpoint of \( \overline{XY} \). So, \( XT = TY = 39.9 \) cm.

\[
XY = XT + TY \quad \text{Segment Addition Postulate}
\]

\[
= 39.9 + 39.9 \quad \text{Substitute.}
\]

\[
= 79.8 \text{ cm} \quad \text{Add.}
\]
**Example 2** Use algebra with segment lengths

**ALGEBRA** Point $M$ is the midpoint of $VW$. Find the length of $VM$.

**Solution**

**STEP 1** Write and solve an equation. Use the fact that $VM = MW$.

- $VM = MW$ Write equation.
- $4x - 1 = 3x + 3$ Substitute.
- $x - 1 = 3$ Subtract $3x$ from each side.
- $x = 4$ Add 1 to each side.

**STEP 2** Evaluate the expression for $VM$ when $x = 4$.

- $VM = 4x - 1 = 4(4) - 1 = 15$

So, the length of $VM$ is 15.

**CHECK** Because $VM = MW$, the length of $MW$ should be 15. If you evaluate the expression for $MW$, you should find that $MW = 15$.

$MW = 3x + 3 = 3(4) + 3 = 15$ ✓

**Guided Practice** for Examples 1 and 2

In Exercises 1 and 2, identify the segment bisector of $PQ$. Then find $PQ$.

1. In Exercises 1 and 2, identify the segment bisector of $PQ$. Then find $PQ$.

**Coordinate Plane** You can use the coordinates of the endpoints of a segment to find the coordinates of the midpoint.

**Key Concept**

**The Midpoint Formula**

The coordinates of the midpoint of a segment are the averages of the $x$-coordinates and of the $y$-coordinates of the endpoints.

If $A(x_1, y_1)$ and $B(x_2, y_2)$ are points in a coordinate plane, then the midpoint $M$ of $AB$ has coordinates

$$
M = \left( \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right).
$$
### Example 3 Use the Midpoint Formula

**a. Find Midpoint** The endpoints of \( RS \) are \( R(1, -3) \) and \( S(4, 2) \). Find the coordinates of the midpoint \( M \).

**b. Find Endpoint** The midpoint of \( JK \) is \( M(2, 1) \). One endpoint is \( J(1, 4) \). Find the coordinates of endpoint \( K \).

**Solution**

**a. Find Midpoint** Use the Midpoint Formula.

\[
M \left( \frac{1 + 4}{2}, \frac{-3 + 2}{2} \right) = M \left( \frac{5}{2}, -\frac{1}{2} \right)
\]

The coordinates of the midpoint \( M \) are \( \left( \frac{5}{2}, -\frac{1}{2} \right) \).

**b. Find Endpoint** Let \((x, y)\) be the coordinates of endpoint \( K \). Use the Midpoint Formula.

**Step 1** Find \( x \).

\[
\frac{1 + x}{2} = 2 \quad \Rightarrow \quad 1 + x = 4 \quad \Rightarrow \quad x = 3
\]

**Step 2** Find \( y \).

\[
\frac{4 + y}{2} = 1 \quad \Rightarrow \quad 4 + y = 2 \quad \Rightarrow \quad y = -2
\]

The coordinates of endpoint \( K \) are \((3, -2)\).

### Guided Practice for Example 3

3. The endpoints of \( AB \) are \( A(1, 2) \) and \( B(7, 8) \). Find the coordinates of the midpoint \( M \).

4. The midpoint of \( VW \) is \( M(-1, -2) \). One endpoint is \( W(4, 4) \). Find the coordinates of endpoint \( V \).

### Distance Formula

The Distance Formula is a formula for computing the distance between two points in a coordinate plane.

### Key Concept

The Distance Formula

If \( A(x_1, y_1) \) and \( B(x_2, y_2) \) are points in a coordinate plane, then the distance between \( A \) and \( B \) is

\[
AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}.
\]
The Distance Formula is based on the Pythagorean Theorem, which you will see again when you work with right triangles in Chapter 7.

**Distance Formula**
\[ (AB)^2 = (x_2 - x_1)^2 + (y_2 - y_1)^2 \]

**Pythagorean Theorem**
\[ c^2 = a^2 + b^2 \]

---

**Example 4 Standardized Test Practice**

**Question:** What is the approximate length of \( RS \) with endpoints \( R(2, 3) \) and \( S(4, -1) \)?

**Answers:**
- A 1.4 units
- B 4.0 units
- C 4.5 units
- D 6 units

**Solution**

Use the Distance Formula. You may find it helpful to draw a diagram.

\[
RS = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \\
= \sqrt{(4 - 2)^2 + (-1 - 3)^2} \\
= \sqrt{2^2 + (-4)^2} \\
= \sqrt{4 + 16} \\
= \sqrt{20} \\
\approx 4.47
\]

The correct answer is C. A B C D

---

**Guided Practice** for Example 4

5. In Example 4, does it matter which ordered pair you choose to substitute for \((x_1, y_1)\) and which ordered pair you choose to substitute for \((x_2, y_2)\)? *Explain.*

6. What is the approximate length of \( AB \), with endpoints \( A(-3, 2) \) and \( B(1, -4) \)?

- A 6.1 units
- B 7.2 units
- C 8.5 units
- D 10.0 units
1.3 EXERCISES

1. **VOCABULARY** Copy and complete: To find the length of $AB$, with endpoints $A(-7, 5)$ and $B(4, -6)$, you can use the ___.

2. ★ **WRITING** Explain what it means to bisect a segment. Why is it impossible to bisect a line?

**FINDING LENGTHS** Line $l$ bisects the segment. Find the indicated length.

3. Find $RT$ if $RS = \frac{5}{8}$ in.  

4. Find $UW$ if $VW = \frac{5}{8}$ in.  

5. Find $EG$ if $EF = 13$ cm.

6. Find $BC$ if $AC = 19$ cm.  

7. Find $QR$ if $PR = 9\frac{1}{2}$ in.  

8. Find $LM$ if $LN = 137$ mm.

9. **SEGMENT BISECTOR** Line $RS$ bisects $PQ$ at point $R$. Find $RQ$ if $PQ = 4\frac{3}{4}$ inches.

10. **SEGMENT BISECTOR** Point $T$ bisects $UV$. Find $UV$ if $UT = 2\frac{7}{8}$ inches.

**ALGEBRA** In each diagram, $M$ is the midpoint of the segment. Find the indicated length.

11. Find $AM$.  

12. Find $EM$.  

13. Find $JM$.

14. Find $PR$.  

15. Find $SU$.

16. Find $XZ$.

**FINDING MIDPOINTS** Find the coordinates of the midpoint of the segment with the given endpoints.

17. $C(3, 5)$ and $D(7, 5)$  

18. $E(0, 4)$ and $F(4, 3)$  

19. $G(-4, 4)$ and $H(6, 4)$

20. $J(-7, -5)$ and $K(-3, 7)$  

21. $P(-8, -7)$ and $Q(11, 5)$  

22. $S(-3, 3)$ and $T(-8, 6)$

23. ★ **WRITING** Develop a formula for finding the midpoint of a segment with endpoints $A(0, 0)$ and $B(m, n)$. Explain your thinking.
24. **ERROR ANALYSIS** Describe the error made in finding the coordinates of the midpoint of a segment with endpoints \(S(8, 3)\) and \(T(2, -1)\).

**EXAMPLE 4** for Exs. 31-34

**FINDING ENDPOINTS** Use the given endpoint \(R\) and midpoint \(M\) of \(\overline{RS}\) to find the coordinates of the other endpoint \(S\).

25. \(R(3, 0), M(0, 5)\)  
26. \(R(5, 1), M(1, 4)\)  
27. \(R(6, -2), M(5, 3)\)

28. \(R(-7, 11), M(2, 1)\)  
29. \(R(5, 2), M(2, 8)\)  
30. \(R(-4, -6), M(3, -4)\)

**DISTANCE FORMULA** Find the length of the segment. Round to the nearest tenth of a unit.

31. \(P(1, 2), Q(5, 4)\)  
32. \(R(-3, 5), Q(2, 3)\)  
33. \(S(-1, 2), T(3, -2)\)

34. ★ **MULTIPLE CHOICE** The endpoints of \(\overline{MN}\) are \(M(-3, -9)\) and \(N(4, 8)\). What is the approximate length of \(\overline{MN}\)?
   - (A) 1.4 units  
   - (B) 7.2 units  
   - (C) 13 units  
   - (D) 18.4 units

**NUMBER LINE** Find the length of the segment. Then find the coordinate of the midpoint of the segment.

35. \(\overline{PQ}\) with endpoints at \(P(-4, 0)\) and \(Q(2, 4)\)  
36. \(\overline{RQ}\) with endpoints at \(R(-8, 1)\) and \(Q(-3, 5)\)  
37. \(\overline{ST}\) with endpoints at \(S(-2, 3)\) and \(T(3, 2)\)

38. \(\overline{PQ}\) with endpoints at \(P(-30, 0)\) and \(Q(-20, 1)\)  
39. \(\overline{SR}\) with endpoints at \(S(-8, 6)\) and \(R(-4, 2)\)  
40. \(\overline{LM}\) with endpoints at \(L(-20, 0)\) and \(M(10, 20)\)

41. ★ **MULTIPLE CHOICE** The endpoints of \(\overline{LF}\) are \(L(-2, 2)\) and \(F(3, 1)\). The endpoints of \(\overline{JR}\) are \(J(1, -1)\) and \(R(2, -3)\). What is the approximate difference in the lengths of the two segments?
   - (A) 2.24  
   - (B) 2.86  
   - (C) 5.10  
   - (D) 7.96

42. ★ **SHORT RESPONSE** One endpoint of \(\overline{PQ}\) is \(P(-2, 4)\). The midpoint of \(\overline{PQ}\) is \(M(1, 0)\). Explain how to find \(PQ\).

**COMPARING LENGTHS** The endpoints of two segments are given. Find each segment length. Tell whether the segments are congruent.

43. \(\overline{AB}: A(0, 2), B(-3, 8)\)  
44. \(\overline{EF}: E(1, 4), F(5, 1)\)  
45. \(\overline{JK}: J(-4, 0), K(4, 8)\)

46. ★ **ALGEBRA** Points \(S, T,\) and \(P\) lie on a number line. Their coordinates are \(0, 1,\) and \(x,\) respectively. Given \(SP = PT\), what is the value of \(x\)?

47. ★ **CHALLENGE** \(M\) is the midpoint of \(\overline{JK}\). If \(\overline{JM} = \frac{x}{8}\) and \(\overline{JK} = \frac{3x}{4} - 6\). Find \(MK\).
48. **WINDMILL** In the photograph of a windmill, \( \overline{ST} \) bisects \( QR \) at point \( M \). The length of \( QM \) is \( 18 \frac{1}{2} \) feet. Find \( QR \) and \( MR \).

49. **DISTANCES** A house and a school are 5.7 kilometers apart on the same straight road. The library is on the same road, halfway between the house and the school. Draw a sketch to represent this situation. Mark the locations of the house, school, and library. How far is the library from the house?

**ARCHAEOLOGY** The points on the diagram show the positions of objects at an underwater archaeological site. Use the diagram for Exercises 50 and 51.

50. Find the distance between each pair of objects. Round to the nearest tenth of a meter if necessary.
   a. \( A \) and \( B \)  
   b. \( B \) and \( C \)  
   c. \( C \) and \( D \)  
   d. \( A \) and \( D \)  
   e. \( B \) and \( D \)  
   f. \( A \) and \( C \)  

51. Which two objects are closest to each other? Which two are farthest apart?

52. **WATER POLO** The diagram shows the positions of three players during part of a water polo match. Player \( A \) throws the ball to Player \( B \), who then throws it to Player \( C \). How far did Player \( A \) throw the ball? How far did Player \( B \) throw the ball? How far would Player \( A \) have thrown the ball if he had thrown it directly to Player \( C \)? Round all answers to the nearest tenth of a meter.
53. **EXTENDED RESPONSE** As shown, a path goes around a triangular park.

a. Find the distance around the park to the nearest yard.

b. A new path and a bridge are constructed from point Q to the midpoint M of PR. Find QM to the nearest yard.

c. A man jogs from P to Q to M to R to Q and back to P at an average speed of 150 yards per minute. About how many minutes does it take? *Explain.*

54. **CHALLENGE** \( AB \) bisects \( CD \) at point M, \( CD \) bisects \( AB \) at point M, and \( AB = 4 \cdot CM \). Describe the relationship between \( AM \) and \( CD \).

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**MIXED REVIEW**

The graph shows data about the number of children in the families of students in a math class. *(p. 888)*

55. What percent of the students in the class belong to families with two or more children?

56. If there are 25 students in the class, how many students belong to families with two children?

Solve the equation. *(p. 875)*

57. \( 3x + 12 + x = 20 \)  
58. \( 9x + 2x + 6 - x = 10 \)  
59. \( 5x - 22 - 7x + 2 = 40 \)

In Exercises 60–64, use the diagram at the right. *(p. 2)*

60. Name all rays with endpoint \( B \).

61. Name all the rays that contain point \( C \).

62. Name a pair of opposite rays.

63. Name the intersection of \( \overline{AB} \) and \( \overline{BC} \).

64. Name the intersection of \( \overline{BC} \) and plane \( P \).

---

**QUIZ for Lessons 1.1–1.3**

1. Sketch two lines that intersect the same plane at two different points. The lines intersect each other at a point not in the plane. *(p. 2)*

In the diagram of collinear points, \( AE = 26 \), \( AD = 15 \), and \( AB = BC = CD \). Find the indicated length. *(p. 9)*

2. \( DE \)  
3. \( AB \)  
4. \( AC \)

5. \( BD \)  
6. \( CE \)  
7. \( BE \)

8. The endpoints of \( \overline{RS} \) are \( R(-2, -1) \) and \( S(2, 3) \). Find the coordinates of the midpoint of \( RS \). Then find the distance between \( R \) and \( S \). *(p. 15)*

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**EXTRA PRACTICE** for Lesson 1.3, p. 896  
**ONLINE QUIZ** at classzone.com
1. **MULTI-STEP PROBLEM** The diagram shows existing roads (BD and DE) and a new road (CE) under construction.

   a. If you drive from point B to point E on existing roads, how far do you travel?
   b. If you use the new road as you drive from B to E, about how far do you travel? Round to the nearest tenth of a mile if necessary.
   c. About how much shorter is the trip from B to E if you use the new road?

2. **GRIDDED ANSWER** Point M is the midpoint of PQ. If PM = 23x + 5 and MQ = 25x - 4, find the length of PQ.

3. **GRIDDED ANSWER** You are hiking on a trail that lies along a straight railroad track. The total length of the trail is 5.4 kilometers. You have been hiking for 45 minutes at an average speed of 2.4 kilometers per hour. How much farther (in kilometers) do you need to hike to reach the end of the trail?

4. **SHORT RESPONSE** The diagram below shows the frame for a wall. FH represents a vertical board, and EG represents a brace. If FG = 143 cm, does the brace bisect FH? If not, how long should FG be so that the brace does bisect FH? Explain.

5. **SHORT RESPONSE** Point E is the midpoint of AB and the midpoint of CD. The endpoints of AB are A(-4, 5) and B(6, -5). The coordinates of point C are (2, 8). Find the coordinates of point D. Explain how you got your answer.

6. **OPEN-ENDED** The distance around a figure is its perimeter. Choose four points in a coordinate plane that can be connected to form a rectangle with a perimeter of 16 units. Then choose four other points and draw a different rectangle that has a perimeter of 16 units. Show how you determined that each rectangle has a perimeter of 16 units.

7. **SHORT RESPONSE** Use the diagram of a box. What are all the names that can be used to describe the plane that contains points B, F, and C? Name the intersection of planes ABC and BFE. Explain.

8. **EXTENDED RESPONSE** Jill is a salesperson who needs to visit towns A, B, and C. On the map below, AB = 18.7 km and BC = 2AB. Assume Jill travels along the road shown.

   a. Find the distance Jill travels if she starts at Town A, visits Towns B and C, and then returns to Town A.
   b. About how much time does Jill spend driving if her average driving speed is 70 kilometers per hour?
   c. Jill needs to spend 2.5 hours in each town. Can she visit all three towns and return to Town A in an 8 hour workday? Explain.