

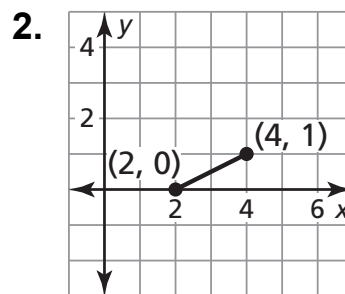
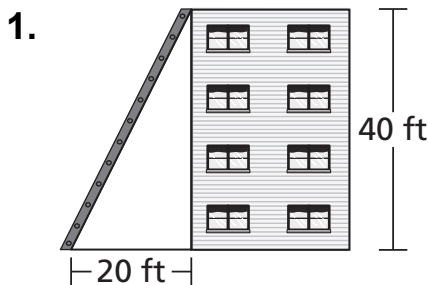
1.3 Start Thinking

Many cities are set up like a coordinate plane with the origin at the center of the city, or where two important streets intersect.

Suppose you have a building located at $(-3, 4)$ and a second building located at $(2, 3)$. How can you find the distance between the two buildings if each unit is the length of a block?

1.3 Warm Up

Find the slope.



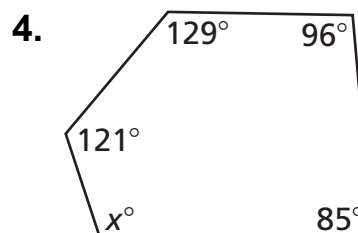
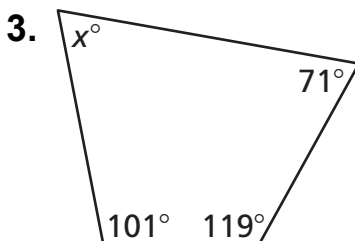
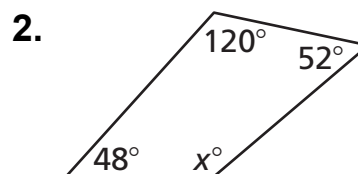
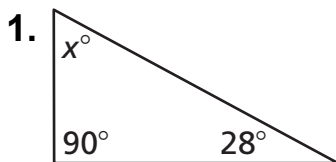
3. $(4, -4), (1, 2)$

4.

x	-5	-1	5	7
y	-3	-1	2	3

1.3 Cumulative Review Warm Up

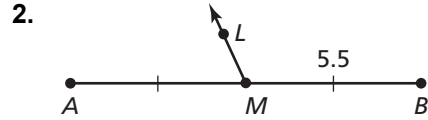
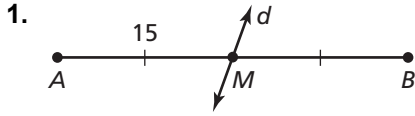
Find the missing angle measure.



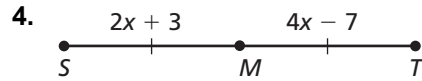
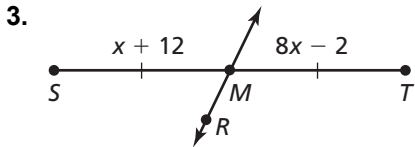
1.3

Practice A

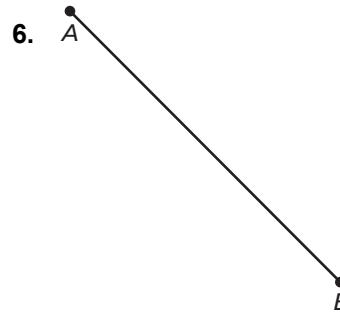
In Exercises 1 and 2, identify the segment bisector of \overline{AB} . Then find AB .



In Exercises 3 and 4, identify the segment bisector of \overline{ST} . Then find ST .



In Exercises 5 and 6, copy the segment and construct a segment bisector by paper folding. Then label the midpoint M .



In Exercises 7 and 8, the endpoints of \overline{JK} are given. Find the coordinates of the midpoint M .

7. $J(-3, 2)$ and $K(9, 2)$

8. $J(1, 3)$ and $K(7, 5)$

In Exercises 9 and 10, the midpoint M and one endpoint of \overline{AB} are given. Find the coordinates of the other endpoint.

9. $M(2, 5)$ and $A(2, 3)$

10. $M(-4, -4)$ and $B(-1, -1)$

In Exercises 11 and 12, find the distance between the two points.

11. $Q(5, 6)$ and $P(1, 3)$

12. $G(2, 5)$ and $H(4, -1)$

13. A square has a side length of 4 centimeters. What is the length of the diagonal of the square? What is the length from the corner to the center of the square? Explain.

14. During a soccer game, Player A is 87 feet from the goal but chooses to pass the ball to Player B who is 63 feet away from Player A. How far away is Player B from the goal?



1.3

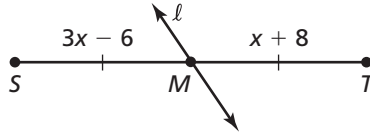
Practice B

In Exercises 1 and 2, identify the bisector of \overline{ST} . Then find ST .

1.



2.



Copy the segment and construct a segment bisector by paper folding. Then label the midpoint M .

3.



In Exercises 4 and 5, the endpoints of \overline{LN} are given. Find the coordinates of the midpoint M .

4. $L(2, 1)$ and $N(2, 13)$

5. $L(-6, 0)$ and $N(6, 6)$

In Exercises 6 and 7, the midpoint M and one endpoint of \overline{CD} are given. Find the coordinates of the other endpoint.

6. $M(1, 2)$ and $C(-1, 4)$

7. $M(3, 7)$ and $D(1, 1)$

In Exercises 8 and 9, find the distance between the two points.

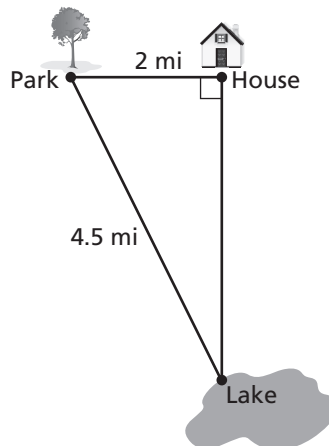
8. $A(1, 7)$ and $B(4, 6)$

9. $G(-1, -5)$ and $H(3, -8)$

10. Your friend draws a square and one diagonal connecting its opposite vertices. Your friend believes that the diagonal is the same length as one side of the square. Do you agree? Explain your reasoning.

11. Is it possible for a segment to have more than one bisector? Explain your reasoning.

12. You walk 2 miles from your house to the park and 4.5 miles from the park to the lake. Then you return home along a straight path from the lake. How many miles do you walk from the lake back to your house? What is the total distance you walk?



1.3 Enrichment and Extension

Using the Midpoint and Distance Formulas

- Use the Midpoint Formula three times to find the three points that divide AB , with endpoints $A(x_1, y_1)$ and $B(x_2, y_2)$, into four equal parts.
- Given the following endpoints, find the points that divide AB into four equal parts.
 - $A(-4, 2), B(0, 8)$
 - $A(-10, 4), B(8, 8)$
- What number is the midpoint between $13 - \sqrt{27}$ and $13 + \sqrt{27}$? What expression represents the midpoint between $\frac{-b - \sqrt{b^2 - 4ac}}{2a}$ and $\frac{-b + \sqrt{b^2 - 4ac}}{2a}$?
- There are two different points on the line $y = -3$ that are exactly 10 units from the point $(4, 3)$. Find the coordinates of the points.
- Your friend claims that a hexagon with the vertices $A(-2, 1), B(-4, 0), C(-5, -2), D(-4, -4), E(-2, -3)$, and $F(-1, -1)$ is equilateral. Is your friend correct? Explain your reasoning.

In Exercises 6–8, use the information to find the midpoint between points A and B .

In a three-dimensional coordinate system, the midpoint between $A(x_1, y_1, z_1)$ and $B(x_2, y_2, z_2)$ is $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}, \frac{z_1 + z_2}{2}\right)$.

- | | | |
|------------------|------------------|------------------|
| 6. $A(-3, 0, 4)$ | 7. $A(5, 8, -7)$ | 8. $A(2, 10, 0)$ |
| $B(7, 2, 8)$ | $B(-10, 4, 2)$ | $B(5, -1, 3)$ |

In Exercises 9–11, use the information to find the distance between points A and B .

In a three-dimensional coordinate system, the distance between the two points $A(x_1, y_1, z_1)$ and $B(x_2, y_2, z_2)$ is $AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2}$.

- | | | |
|------------------|-------------------|-------------------|
| 9. $A(-2, 1, 2)$ | 10. $A(0, 0, -2)$ | 11. $A(7, 2, -4)$ |
| $B(2, -3, 4)$ | $B(-1, 5, 7)$ | $B(5, 8, 3)$ |



Puzzle Time

Why Did The Fraction Jump Into Boiling Water?

Write the letter of each answer in the box containing the exercise number.

The endpoints of \overline{AB} are given. Find the coordinates of the midpoint M .

1. $A(-1, 3), B(7, -1)$ 2. $A(\frac{1}{2}, 4), B(3, \frac{1}{4})$
 3. $A(4.6, -2.2), B(-2.4, 2)$ 4. $A(7, 10), B(5, -8)$
 5. $A(-15, 10), B(20, 10)$ 6. $A(-15, -10), B(15, 15)$

The midpoint M and one endpoint A are given. Find the coordinates of the other endpoint.

7. $A(2, 16)$ and $M(4, 8)$
 8. $A(4, -2)$ and $M(\frac{1}{2}, 0)$
 9. $A(-3, -2)$ and $M(2, 6)$

Find the distance between the two points. Round your answer to the nearest tenth.

10. $A(-3, 0), B(2, 0)$ 11. $A(0, 3), B(6, 0)$
 12. $A(-3, 3), B(3, -3)$ 13. $A(-2, -6), B(-2, -2)$
 14. $A(2.5, 3.5), B(-4, 0.5)$ 15. $A(-1\frac{1}{2}, 2), B(3, -1\frac{1}{2})$
 16. $A(-10, -5), B(9, 14)$ 17. $A(7, -4), B(1, 6)$
 18. $A(3, 14), B(3, 2)$ 19. $A(-4, 1), B(4, 1)$

Answers

D. $M(1\frac{3}{4}, 2\frac{1}{8})$ E. $B(7, 14)$
 A. $M(6, 1)$ C. 8
 I. 7.6 D. $B(6, 0)$
 B. $M(0, 2.5)$ R. 6.7
 I. 5.7 D. 4
 V. $B(3, 8)$ N. $M(3, 1)$
 E. 26.9 T. $M(2.5, 10)$
 U. 5 K. 14
 E. 7.2 S. $M(5, -6)$
 T. 12 N. 9.2
 E. $M(1.1, -0.1)$ T. 11.7
 W. $B(-3, 2)$ O. 8.5
 M. 5.3

15	17		8	4	1	18	9	7		5	12		6	16		11	3	13	10	19	14	2
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