

Exercises ON YOUR OWN

Graph each point in the same coordinate plane.

1. $A(5, -3)$ 2. $B(-3, 0)$ 3. $C(6, 2)$ 4. $D(-6, 2)$ 5. $E(-4, 3)$ 6. $F(0, 5)$

Choose Use mental math, pencil and paper, or a calculator to find the distance between the points to the nearest tenth.

7. $J(2, -1), K(2, 5)$ 8. $L(10, 14), M(-8, 14)$ 9. $N(-11, -11), P(-11, -3)$
 10. $A(0, 3), B(0, 12)$ 11. $C(12, 6), D(-8, 18)$ 12. $E(6, -2), F(-2, 4)$
 13. $Q(12, -12), T(5, 12)$ 14. $R(0, 5), S(12, 3)$ 15. $X(-3, -4), Y(5, 5)$

Find the coordinates of the midpoint of \overline{HX} .

16. $H(0, 0), X(8, 4)$ 17. $H(-1, 3), X(7, -1)$ 18. $H(13, 8), X(-6, -6)$
 19. $H(7, 10), X(5, -8)$ 20. $H(-6.3, 5.2), X(1.8, -1)$ 21. $H(5\frac{1}{2}, -4\frac{3}{4}), X(2\frac{1}{4}, -1\frac{1}{4})$

22. The midpoint of \overline{QS} is the origin. Point Q is located in Quadrant II. What quadrant contains point S ?

23. $M(5, 12)$ is the midpoint of \overline{AB} . The coordinates of point A are $(2, 6)$. What are the coordinates of point B ?

24. The midpoint of \overline{QT} has coordinates $(3, -4)$. The coordinates of point Q are $(2, 3)$. What are the coordinates of point T ?

25. The coordinates of A, B, C , and D are given at the right. Graph the points and draw the segments connecting them in order. Are the lengths of the sides of $ABCD$ the same? Explain.

$$\begin{array}{ll} A(-6, 2) & B(-3, 5) \\ C(-6, 6) & D(-9, 5) \end{array}$$

26. **Open-ended** Graph $A(-2, 1)$ and $B(2, 3)$. Draw \overrightarrow{AB} . For each point described, give two sets of possible coordinates if they exist. Otherwise write "exactly one point" and give the coordinates.

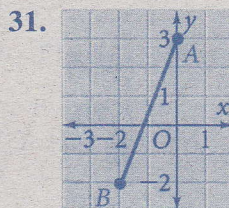
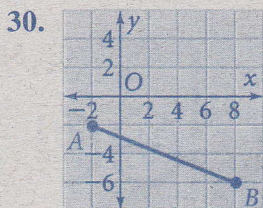
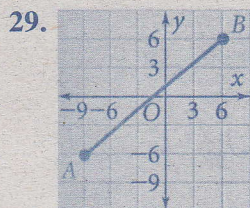
a. point D so that \overrightarrow{CD} contains $C(-1, 4)$ and is parallel to \overrightarrow{AB}

b. point E so that \overrightarrow{AE} is parallel to \overrightarrow{BC} , \overrightarrow{BE} contains $C(-1, 4)$, and \overrightarrow{EC} is parallel to \overrightarrow{AB}

- c. point G so that \overline{FG} contains $F(0, 2)$ and is perpendicular to \overline{AB}
- d. point H so that \overline{HJ} contains $J(4, 2)$ and is perpendicular to \overline{AB}

27. **Writing** Why do you think that some cities are designed with a rectangular grid instead of a triangular grid or some other shape?
28. Graph the points $A(2, 1)$, $B(6, -1)$, $C(8, 7)$, and $D(4, 9)$. Draw quadrilateral $ABCD$. Use the Midpoint Formula to determine the midpoints of \overline{AC} and \overline{BD} . What do you notice?

For each graph, find (a) the length of \overline{AB} to the nearest tenth and (b) the coordinates of the midpoint of \overline{AB} .



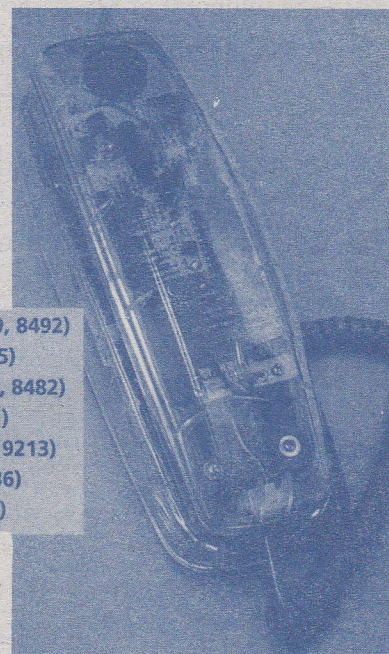
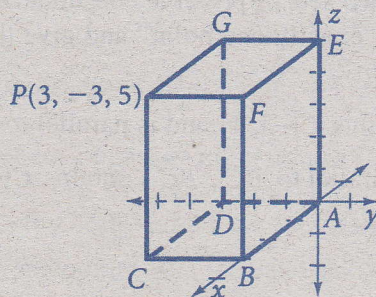
32. **Communications** Long-distance rates for telephone calls are determined mainly by the distance between the two ends of the call. To determine these distances, long-distance telephone companies have divided North America into a grid, with each unit equaling $\sqrt{0.1}$ mile. The distance between two customers is then determined by using the Distance Formula. The coordinates for certain customers in several cities are listed. Find the distance between customers in the following cities:

- Boston and San Francisco
- Houston and Chicago
- Denver and New Orleans

33. **Geometry in 3 Dimensions**

You can use three coordinates (x, y, z) to locate points in three dimensions. Point P has coordinates $(3, -3, 5)$.

- Give the coordinates of points, $A, B, C, D, E, F,$ and G .
- Draw three axes like those shown. Then graph $R(4, 5, 9)$.



San Francisco (8719, 8492)
 Chicago (3439, 5985)
 New Orleans (2637, 8482)
 Denver (5899, 7501)
 Los Angeles (7878, 9213)
 Houston (3537, 8936)
 Boston (1248, 4422)