

22. Suppose E is on \overline{PQ} and $PE = \frac{1}{4}PQ$. If $P = (x_1, y_1)$ and $Q = (x_2, y_2)$, where $x_1 < x_2$, show that $E = \left(\frac{3}{4}x_1 + \frac{1}{4}x_2, \frac{3}{4}y_1 + \frac{1}{4}y_2\right)$.
- C** 23. Suppose F is on \overline{PQ} and $PF = \frac{3}{8}PQ$. If $P = (x_1, y_1)$ and $Q = (x_2, y_2)$, where $x_1 < x_2$, find the coordinates of F . (*Hint*: See Exercise 22.)
24. Given points $P(2, 1)$ and $D(7, 11)$, find the coordinates of a point T on \overline{PD} such that $\frac{PT}{TD} = \frac{2}{3}$.

Self-Test 1

For each pair of points find (a) the distance between the two points and (b) the midpoint of the segment that joins the two points.

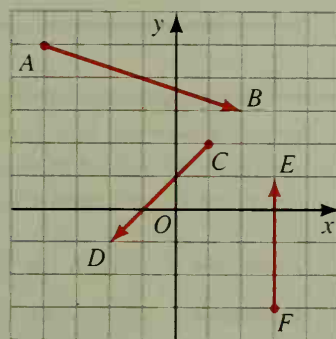
1. $(5, 1)$ and $(3, 1)$
2. $(8, -6)$ and $(0, 0)$
3. $(-2, 7)$ and $(8, -3)$
4. $(-3, 2)$ and $(-5, 7)$

Write an equation of the circle described.

5. Center at the origin; radius 9
6. Center $(-1, 2)$; radius 5
7. Find the center and the radius of the circle $(x + 2)^2 + (y - 3)^2 = 36$.

Find the slope of the line through the points named.

8. $(0, 0)$ and $(7, 4)$
9. $(-4, 2)$ and $(1, -1)$
10. For which is slope *not* defined, a horizontal line or a vertical line?
11. Given $P(3, -2)$ and $Q(5, 2)$, find:
 - a. the slope of any line parallel to \overleftrightarrow{PQ}
 - b. the slope of any line perpendicular to \overleftrightarrow{PQ}
12. Name each vector as an ordered pair.
 - a. \overrightarrow{AB}
 - b. \overrightarrow{CD}
 - c. \overrightarrow{FE}
13. Find the magnitude of each vector in Exercise 12.
14. Complete.
 - a. $(-3, 2) + (7, -11) = \underline{\quad ? \quad}$
 - b. $3(4, -1) + (-2)(-5, 3) = \underline{\quad ? \quad}$
15. If $M(-3, 7)$ is the midpoint of \overline{PQ} , where P has coordinates $(9, -4)$, find the coordinates of Q .



Exs. 12, 13