

State the formula/equation for each of the following. Identify each part of the equation.

1. Slope

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

2. Point-slope form

$$y - y_1 = m(x - x_1)$$

3. Slope-intercept form

$$y = mx + b$$

4. Distance

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

5. Equation of a circle

$$(x - a)^2 + (y - b)^2 = r^2$$

6. Midpoint

$$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

Find each of the following for each pair of points. a) Slope, b) Midpoint, and c) Distance.

7. (0, 0) and (3, 4)

a.) $m = \frac{4 - 0}{3 - 0} = \boxed{\frac{4}{3}}$

b.) $M = \left(\frac{0 + 3}{2}, \frac{0 + 4}{2} \right) = \boxed{\left(\frac{3}{2}, 2 \right)}$

c.) $d = \sqrt{(4)^2 + (3)^2} = \boxed{5}$

8. (2, 5) and (6, 3)

a.) $m = \frac{3 - 5}{6 - 2} = \frac{-2}{4} = \boxed{-\frac{1}{2}}$

b.) $M = \left(\frac{2 + 6}{2}, \frac{5 + 3}{2} \right) = \boxed{(4, 4)}$

c.) $d = \sqrt{(2 - 6)^2 + (5 - 3)^2} = \sqrt{(-4)^2 + (2)^2} = \boxed{2\sqrt{5}}$

9. (0, 8) and (12, 3)

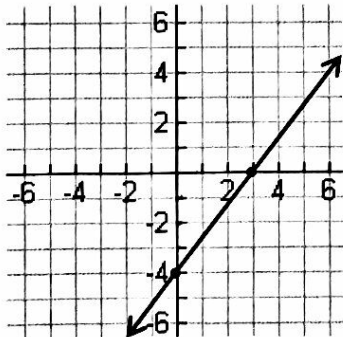
a.) $m = \frac{3 - 8}{12 - 0} = \boxed{-\frac{5}{12}}$

b.) $M = \left(\frac{0 + 12}{2}, \frac{8 + 3}{2} \right) = \boxed{\left(6, \frac{11}{2} \right)}$

c.) $d = \sqrt{(0 - 12)^2 + (8 - 3)^2} = \sqrt{(-12)^2 + (5)^2} = \boxed{13}$

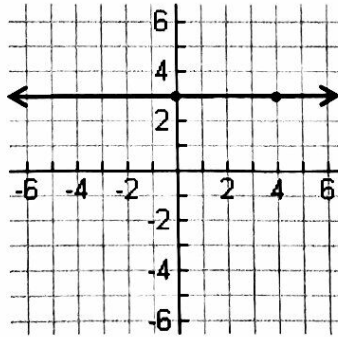
Write the equation of each graphed line in slope-intercept form.

10.



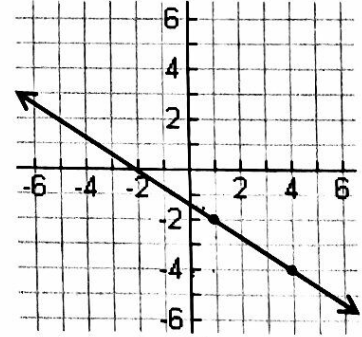
Eq. = $y = \frac{4}{3}x - 4$

11.



Eq. = $y = 3$

12.



Eq. = $y = -\frac{2}{3}x - 1.5$

Identify the slope of the line that is a) parallel and b) perpendicular to the given line.

13. $y = -2x - 1$

a) $m_{\parallel} = -2$

b) $m_{\perp} = \frac{1}{2}$

14. $y = \frac{3}{2}x - 2$

a) $m_{\parallel} = \frac{3}{2}$

b) $m_{\perp} = -\frac{2}{3}$

Identify the center and radius for each of the following.

15. $(x - 9)^2 + (y + 1)^2 = 36$

ctr. = $(9, -1)$ $r = 6$

16. $(x + 5)^2 + y^2 = 18$

ctr. = $(-5, 0)$ $r = 3\sqrt{2}$

Write the equation of each line in slope-intercept form using the given information.

17. $m = -2; (1, -4)$
 $y + 4 = -2(x - 1)$
 $y + 4 = -2x + 2$
 $y = -2x - 2$

18. $(3, -1)$ and $(-6, -4)$
 $m = \frac{-4 - (-1)}{-6 - 3} = \frac{-3}{-9} = \frac{1}{3}$
 $y + 1 = \frac{1}{3}(x - 3)$
 $y = \frac{1}{3}x - 2$

19. $(0, 4)$ and $(2, 3)$
 $m = \frac{3 - 4}{2 - 0} = -\frac{1}{2}$
 $y = -\frac{1}{2}x + 4$

20. $m = -\frac{3}{2}; (2, 0)$
 $y = -\frac{3}{2}(x - 2)$
 $y = -\frac{3}{2}x + 3$

21. Horizontal line through $(6, 8)$
 $y = 8$

22. Vertical line through $(7, 10)$
 $x = 7$

23. Parallel to $y = 4x + 2$
 3) through $(2, 3)$ $m_{||} = 4$
 $y - 3 = 4(x - 2)$
 $y - 3 = 4x - 8$
 $y = 4x - 5$

24. Perpendicular to $y = \frac{1}{2}x$
 through $(0, 5)$ $m_{\perp} = -2$
 $y = -2x + 5$

25. Parallel to $y + 1 = -3(x - 3)$
 through $(4, -4)$ $m_{||} = -3$
 $y + 4 = -3(x - 4)$
 $y + 4 = -3x + 12$
 $y = -3x + 8$

Write the equation of the described circle.

26. Center $(0, 0)$, radius 1
 $x^2 + y^2 = 1$

27. Center $(-3, 2)$, radius 4
 $(x + 3)^2 + (y - 2)^2 = 16$

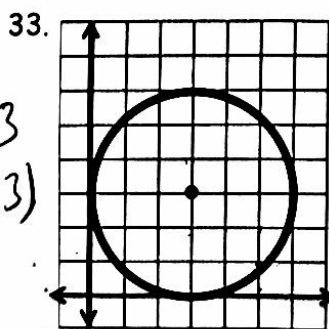
28. Center $(0, 5)$, diameter 10, $r = 5$
 $x^2 + (y - 5)^2 = 25$

29. Center $(-6, 0)$, diameter 14, $r = 7$
 $(x + 6)^2 + y^2 = 49$

30. Tangent to the y-axis with center $(3, 5)$ $r = 3$
 $(x - 3)^2 + (y - 5)^2 = 9$

31. Tangent to the x-axis with center $(5, 2)$
 $r = 2$; $(x - 5)^2 + (y - 2)^2 = 4$

32. Center $(-1, 3)$, point on the circle $(-5, 11)$
 $r = \sqrt{(-1 - (-5))^2 + (3 - 11)^2} = \sqrt{(4)^2 + (-8)^2}$
 $r = \sqrt{16 + 64} = \sqrt{80} = 4\sqrt{5}$
 $(x + 1)^2 + (y - 3)^2 = 80$



$r = 3$
 $C: (3, 3)$

$(x - 3)^2 + (y - 3)^2 = 9$

34. Diameter with endpoints $(4, 6)$ and $(12, 12)$

$C: \left(\frac{4+12}{2}, \frac{6+12}{2}\right) = (8, 9)$

$r: r = \frac{\sqrt{(12-4)^2 + (12-6)^2}}{2} = \frac{\sqrt{(8)^2 + (6)^2}}{2} = \frac{10}{2}$

Eq: $(x - 8)^2 + (y - 9)^2 = 25$