Exercises [A-1]

In exercises 1–6 find the slope, x-intercept, y-intercept for each line. Use the intercepts to make a rough sketch of each graph. Check the slope.

1. $4x - y = 4$
2. $3x + 5y = 15$
3. $y = \frac{1}{2}x + \frac{5}{2}$
4. $2x + y + 8 = 0$
5. $3x + 2y = 6$
6. $3x - 2y - 12 = 0$

7. Find the equation of the line with slope 3 and y-intercept 4.
8. Find the equation of the line with slope $-\frac{1}{2}$ and y-intercept 3.
9. Find the equation of the line through $(0, -3)$ with slope 2.
10. Find the equation of the line through $(0, 0)$ with slope 1.5.
11. Consider the equations $y = 2.5x$ and $y = 2.5x + 5$.
    (a) In which equation does y vary directly as x?
    (b) Which equation has a graph passing through the origin?
12. If $y = mx$, where m is a positive constant, y varies directly as x. Draw graphs illustrating this relationship when (a) $m = \frac{1}{2}$, (b) $m = 1$, (c) $m = 5$.
13. What point lies on the graph of every equation representing a direct-variation relationship between y and x?
14. The graph of a direct-variation relationship between y and x has slope 4.2. Find the value of y when $x = 15$.

Find the equations of the straight lines determined by the given conditions in exercises 15–25.

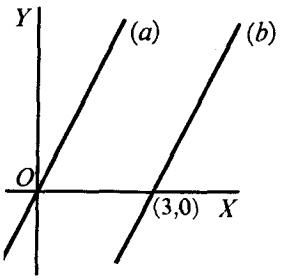
15. The line through $(1, 3)$ with slope 1.
16. The line through $(5, -10)$ with slope -2.
17. The line through $(-2, 0)$ with slope $\frac{5}{2}$.
18. The line through $(0, 0)$ with slope $-\frac{2}{3}$.
19. The line through $(-6, 2)$ and $(10, 10)$.
20. The line through $(0, -4)$ and $(6, 0)$.
21. The line through $(3, 6)$ parallel to the x-axis.
22. The line through $(-2, 3)$ parallel to $2x - y = 6$.
23. The line through $(3, -2)$ perpendicular to $x + 2y - 12 = 0$.
24. The line through $(6, 4)$ perpendicular to $y = 3x - 5$.
25. The line through $(-2, -1)$ parallel to $3x - 2y + 2 = 0$.
26. A, B have coordinates $(1, 6)$, $(3, 0)$. (a) Find the coordinates of M the midpoint of AB. (b) Find the equation of the line through M perpendicular to AB.
27. (a) Find the equation of the perpendicular bisector of the line segment joining $A(3, 8)$ and $B(-1, 2)$.
    (b) If the perpendicular bisector meets the x-axis at P, find the lengths PA and PB.
28. (a) Find the equation of the perpendicular bisector of the line segment joining $A(1, -3)$ and $B(5, 5)$.
    (b) If the perpendicular bisector meets the y-axis at P, find the lengths PA and PB.

Exercises [A-2]

In exercises 1–6 find the slope, x-intercept, y-intercept for each line. Use the intercepts to make a rough sketch of each graph. Check the slope.

1. $y = 2x - 8$
2. $x + 3y = 9$
3. $5x - 2y + 20 = 0$
4. $x + y = 6$
5. $y = \frac{2}{3}x + 2$
6. $3x + 2y - 4 = 0$

7. Find the equation of the line with slope 2 and y-intercept -3.
8. Find the equation of the line with slope $-\frac{2}{3}$ and y-intercept 2.
9. Find the equation of the line with slope $-\frac{1}{2}$ and y-intercept 0.
10. Which of the graphs (a) and (b) represents a direct-variation relationship between y and x? Find the equations of the graphs if the slope of each is 2.



11. The graph of a direct-variation relationship between y and x passes through the points (x_1, y_1), (x_2, y_2). Show that

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

Find the equations of the straight lines determined by the given conditions in exercises 12–24.

12. The line through $(-4, 2)$ with slope 1.
13. The line through $(-3, 2)$ with slope $-\frac{2}{3}$.
14. The line through $(0, 6)$ with slope $\frac{3}{2}$.
15. The line through $(-\frac{1}{2}, -2)$ with slope 2.
16. The line through $(-2, 1)$ and $(8, 6)$.
17. The line through $(3, 0)$ and $(0, 2)$.
18. The line through the origin with slope -2.
19. The line through $(0, -4)$ and $(6, -4)$.
20. The line through $(5, 0)$ and $(5, 8)$.
21. The line through $(-3, 2)$ parallel to $x + 3y = 0$.
22. The line through $(-2, -1)$ perpendicular to $x + 4y = 0$.
23. The line through $(4, 3)$ perpendicular to $2x + 3y + 6 = 0$.
24. The line through $(3, -1.5)$ perpendicular to $2x - 5y - 14 = 0$.
25. (a) Find the equation of the perpendicular bisector of the line segment joining $A(1, 3)$ and $B(-3, 5)$.
    (b) If the perpendicular bisector meets the y-axis at P, find the lengths PA and PB.
26. (a) Find the equation of the perpendicular bisector of the line segment joining $A(2, 3)$ and $B(4, -5)$.
    (b) If the perpendicular bisector meets the x-axis at P, find the lengths PA and PB.

Answers

Pages 282-283

1. Slope = 4
   x-intercept = 1
   y-intercept = -4
2. Slope = $-\frac{3}{5}$
   x-intercept = 5
   y-intercept = 3
3. Slope = $\frac{1}{2}$
   x-intercept = -5
   y-intercept = $\frac{5}{2}$
4. Slope = -2
   x-intercept = -4
   y-intercept = -8
5. Slope = $-\frac{3}{2}$
   x-intercept = 2
   y-intercept = 3
6. Slope = $\frac{3}{2}$
   x-intercept = 4
   y-intercept = -6
7. $y = 3x + 4$
8. $y = -\frac{1}{2}x + 3$
9. $y = 2x - 3$
10. $y = 1.5x$
11. a. $y = 2.5x$
    b. $y = 2.5x$
13. The point (0,0)
14. $y = 63$
15. $x - y + 2 = 0$
16. $2x + y = 0$
17. $5x - 2y + 10 = 0$
18. $2x + 3y = 0$
19. $x - 2y + 10 = 0$
20. $2x - 3y - 12 = 0$
21. $y = 6$
22. $2x - y + 7 = 0$
23. $2x - y - 8 = 0$
24. $x + 3y - 18 = 0$
25. $3x - 2y + 4 = 0$
26. a. M = (2,3)
    b. $x - 3y + 7 = 0$
27. a. $2x + 3y - 17 = 0$
    b. PA = PB = $\frac{1}{2}\sqrt{377}$ units
28. a. $x + 2y - 5 = 0$
    b. PA = PB = $\frac{5}{2}\sqrt{5}$ units

Pages 283-284

1. Slope = 2

   x-intercept = 4

   y-intercept = -8

2. Slope = $-\frac{1}{3}$

   x-intercept = 9

   y-intercept = 3

3. Slope = $\frac{5}{2}$

   x-intercept = -4

   y-intercept = 10

4. Slope = -1

   x-intercept = 6

   y-intercept = 6

5. Slope = $\frac{2}{3}$

   x-intercept = -3

   y-intercept = 2

6. Slope = $-\frac{3}{2}$

   x-intercept = $\frac{4}{3}$

   y-intercept = 2

7. $y = 2x - 3$

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

9. $y = -\frac{1}{2}x$

10. Graph (a)

    Equation of (a): $y = 2x$

    Equation of (b): $y = 2x - 6$

12. $x - y + 6 = 0$

13. $2x + 3y = 0$

14. $3x - 2y + 12 = 0$

15. $2x - y - 1 = 0$

16. $x - 2y + 4 = 0$

17. $2x + 3y - 6 = 0$

18. $2x + y = 0$

19. $y + 4 = 0$

20. $x - 5 = 0$

21. $x + 3y - 3 = 0$

22. $4x - y + 7 = 0$

23. $3x - 2y - 6 = 0$

24. $5x + 2y - 12 = 0$

25. a. $2x - y + 6 = 0$

    b. $PA = \sqrt{10} = PB$

26. a. $x - 4y - 7 = 0$

    b. $PA = \sqrt{34} = PB$