b. $2x-2=3$

$$x=\frac{5}{2}$$

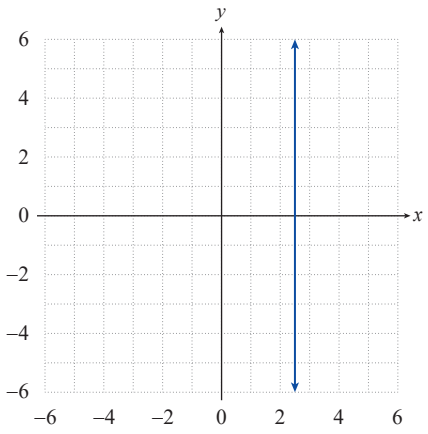


FIGURE 9

Upon simplifying, note that this equation also represents a vertical line, this time passing through $\frac{5}{2}$ on the x-axis.

c. $3x+2(x+7)-2y=5x$

$$y=7$$

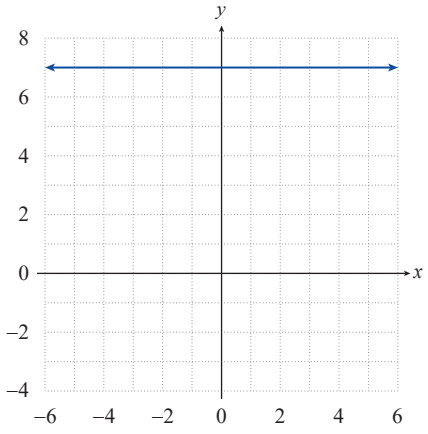


FIGURE 10

We encountered this equation in Example 1b and have already written it in standard form as shown.

The graph of this equation is the horizontal line consisting of all those ordered pairs whose y-coordinate is 7.

3.3 EXERCISES

PRACTICE

Determine if the following equations are linear. See Example 1.

1. $3x+2(x-4y)=2x-y$

2. $9x+4(y-x)=3$

3. $9x^2-(x+1)^2=y-3$

4. $3x+xy=2y$

5. $8-4xy=x-2y$

6. $\frac{x-y}{2}+\frac{7y}{3}=5$

7. $\frac{6}{x}-\frac{5}{y}=2$

8. $3x-3(x-2y)=y+1$

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

10. $(3-y)^2-y^2=x+2$

11. $x^2-(x-1)^2=y$

12. $(x+y)^2-(x-y)^2=1$

13. $x(y+1)=16-y(1-x)$

14. $\frac{x-3}{2}=\frac{4+y}{5}$

15. $x-2x^2+3=\frac{x-7}{2}$

16. $x-3=\frac{4x+17}{5}$

17. $13x-17y=y(7-2x)$

18. $y^2-3y=(1+y)^2-2x$

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

20. $3x-4=89(x-y)-y$

21. $x-x(1+x)=y-3x$

22. $x^2-2x=3-x^2+y$

23. $\frac{2y-5}{14}=\frac{x-3}{9}$

24. $16x=y(4+(x-3))-xy$

Find the *x*- and *y*-intercepts of the given equations, if possible, and then sketch their graphs. See Examples 2 and 3.

25. $4x-3y=12$

26. $y-3x=9$

27. $5-y=10x$

28. $y-2x=y-4$

29. $3y=9$

30. $2x-(x+y)=x+1$

31. $x+2y=7$

32. $y-x=x-y$

33. $y=-x$

34. $2x-3=1-4y$

35. $3y+7x=7(3+x)$

36. $4-2y=-2-6x$

37. $x+y=1+2y$

38. $3y+x=2x+3y+4$

39. $3(x+y)+1=x-5$

Match each equation to the correct graph.

40. $y=2x+3$

41. $2x+3y=4$

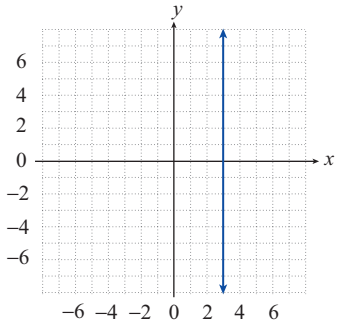
42. $2x-1=5$

43. $y+3-x=3$

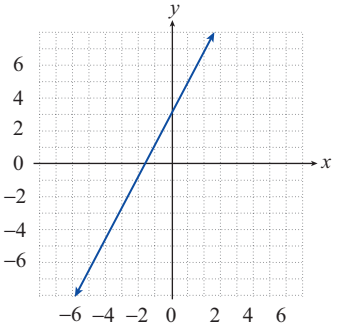
44. $4y+3=11$

45. $5y-x-1=4y+3x+5$

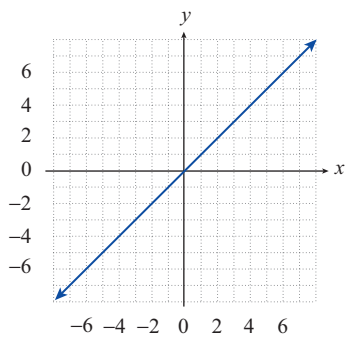
a.



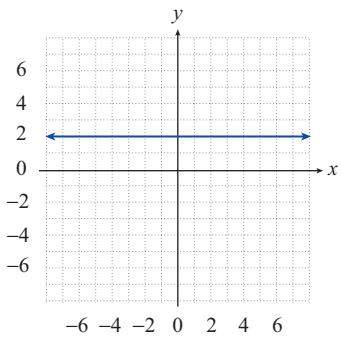
b.



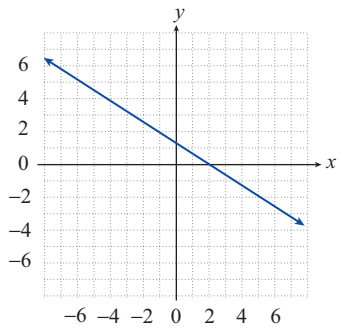
c.



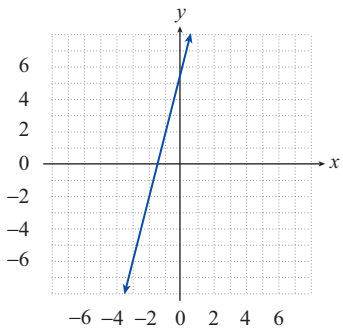
d.



e.



f.



Solve each equation for the specified variable.

46. Standard form of a line: $ax + by = c$; solve for y

47. Perimeter of a triangle: $P = a + b + c$; solve for a

48. Surface area of a rectangular solid: $S = 2lw + 2wh + 2lh$; solve for w

APPLICATIONS

49. In your history class, you were told that the current population of Jamaica is approximately 24,000 more than 9 times the population of the Bahamas. Using j to represent the population of Jamaica and b to represent the population of the Bahamas, write this in the form of an equation. Then solve your equation for b to find an equation representing the population of the Bahamas. Are these equations linear?

50. The lowest point in the ocean, the bottom of the Mariana Trench, is about 1100 feet deeper than 26 times the depth of the lowest point on land, the Dead Sea. Find an equation to express the depth of the Mariana Trench, m, in terms of the depth of the Dead Sea, d. Then solve your equation for d to find the depth of the Dead Sea in terms of the depth of the Mariana Trench. Are these equations linear?