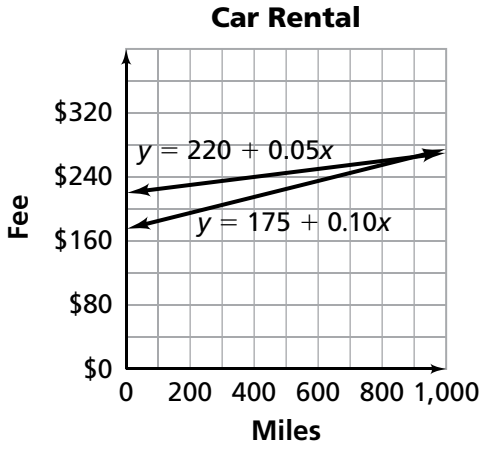
Applications

1. a. A+ Rental: $175 + 0.10x = c$;
Zippy: $220 + 0.05x = c$

b.



c. 900 miles, $265

d. Zippy will be cheaper for distances greater than 900 miles.

e. If the car is driven 225 miles, A+ Rental will charge $197.50.

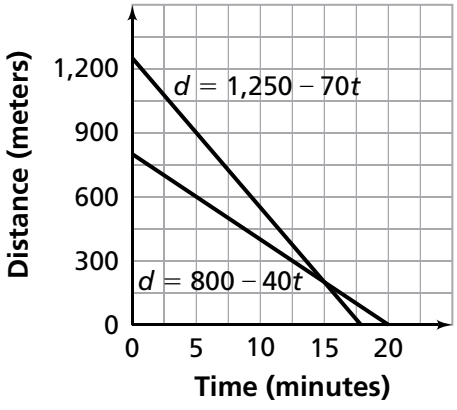
2. a. Mariana: $d = 1{,}250 - 70t$

Ming: $d = 800 - 40t$

b. $1{,}250 - 70t = 800 - 40t$; solution $t = 15$ minutes

c. less than 15 minutes

d. Answers will vary. If we use a graph of the functions in part (a), we have this graph.



We know that the intersection point is at $t = 15$ min. Checking other values:

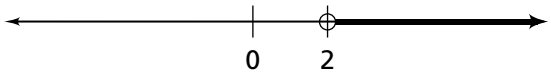
Time (minutes)	Distance Between Girls (meters)
14	270 − 240 = 30
14.5	235 − 220 = 15
15	200 − 200 = 0
15.5	180 − 165 = 15
16	160 − 130 = 30

We can say that between $t = 14.5$ and $t = 15.5$, the distance is less than 20 meters.

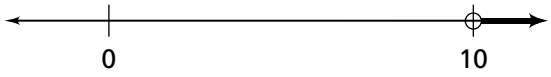
3. a. T **b.** T **c.** F **d.** F **e.** T

f. can't tell

4. $2 < x$

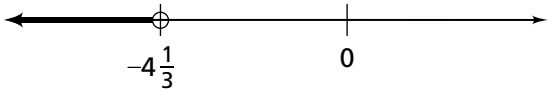


5. $x > 10$



6. $x \leq 12$

7. $x < -4\frac{1}{3}$



8. Symbolic reasoning will vary.

a. $x > 7.5$ **b.** $x > -5$

c. $x < \frac{2}{3}$ **d.** $x > 4$

e. $x = \frac{40}{19}$ or approximately $x = 2.11$

f. $x < \frac{40}{19}$ or approximately $x < 2.11$

9. a. $-16t^2 + 32t = 0$ when $t = 2$ (also when $t = 0$)

b. $-16t^2 + 32t = 12$ when $t = 0.5$ and $t = 1.5$

c. $-16t^2 + 32t \geq 12$ when $0.5 \leq t \leq 1.5$

d. $-16t^2 + 32t \leq 12$ when $t \leq 0.5$ and when $1.5 \leq t$. **Note:** The ball hits the ground at $t = 2$ and presumably stays there, so the equation for the height is not valid for $t > 2$.

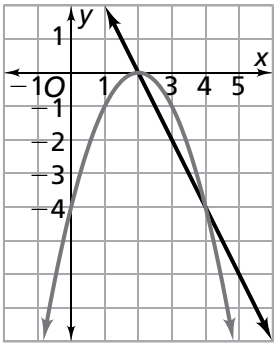
e. $-16t^2 + 32t = 16$ when $t = 1$

10. The relevant graph for parts (a)–(c) is below.

a. $x = 2$ and $x = 4$. Find the intersection points of $y = -x^2 + 4x - 4$ and $y = -2x + 4$. The solutions are the x-coordinates of those points.

b. $x < 2$ and $x > 4$. Find the intersection points of $y = -x^2 + 4x - 4$ and $y = -2x + 4$. On the x-axis, the solutions are the x-values to the left of and to the right of the x-coordinates of those points.

c. $2 < x < 4$. Find the intersection points of $y = -x^2 + 4x - 4$ and $y = -2x + 4$. On the x-axis, the solutions are the x-values between the x-coordinates of those points.

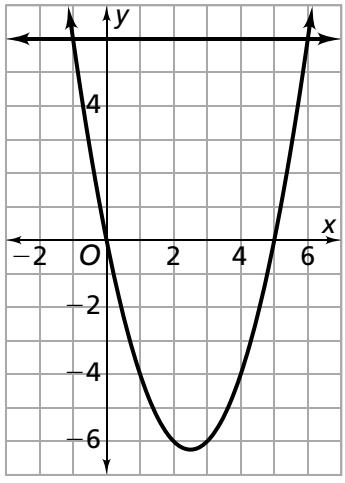


The relevant graph for parts (d)–(f) is below.

d. $x = -1$ and $x = 6$. Find the intersection points of $y = x^2 - 5x$ and $y = 6$. The solutions are the x-coordinates of those points.

e. $-1 < x < 6$. Find the intersection points of $y = x^2 - 5x$ and $y = 6$. On the x-axis, the solutions are the x-values between the x-coordinates of those points.

f. $x < -1$ and $x > 6$. Find the intersection points of $y = x^2 - 5x$ and $y = 6$. On the x-axis, the solutions are the x-values to the left of and to the right of the x-coordinates of those points.



11. **a.** $x = y = 2\sqrt{2}$ which is approximately 2.8; $x = y = -2\sqrt{2}$

b. $x = -2\sqrt{2}$ and $y = 2\sqrt{2}$; $x = 2\sqrt{2}$ and $y = -2\sqrt{2}$

Connections

12. -4

13. -23

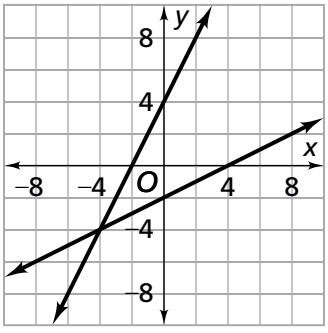
14. 8

15. -8

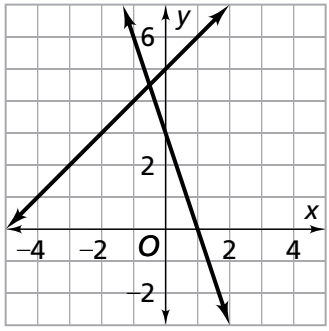
16. -24

17. $\frac{3}{4}$

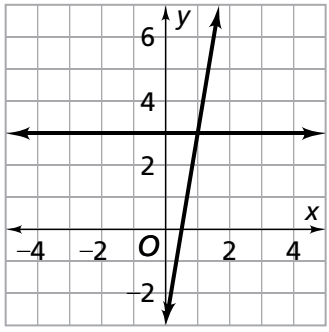
18. Solution is $(x, y) = (-4, -4)$.



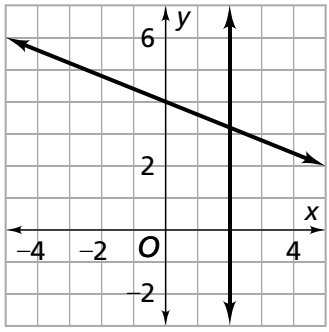
19. Solution is $(x, y) = \left(-\frac{1}{2}, \frac{9}{2}\right)$.



20. Solution is $(x, y) = (1, 3)$.



21. Solution is $(x, y) = (2, 3.2)$.



22. $y = 2x - 3$

23. $y = -4x + 1.5$

24. $y = -\frac{2}{3}x - \frac{1}{3}$

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

26. slope = 7; y-intercept = $(0, -3)$; x-intercept = $\left(\frac{3}{7}, 0\right)$

27. slope = -3; y-intercept = $(0, 4)$; x-intercept = $\left(\frac{4}{3}, 0\right)$

28. slope = $\frac{2}{3}$; y-intercept = $(0, 12)$; x-intercept = $(-18, 0)$

29. slope = $-\frac{1}{4}$; y-intercept = $(0, -5)$; x-intercept = $(-20, 0)$

30. slope = -17; y-intercept = $\left(0, \frac{3}{4}\right)$; x-intercept = $\left(\frac{3}{68}, 0\right)$

31. slope = $-\frac{2}{3}$; y-intercept = $\left(0, -\frac{20}{3}\right)$; x-intercept = $(-10, 0)$

32. $-18 \div (-3) = -24 \div (-4)$

33. $1{,}750(-12) < (1{,}749)(-12)$

34. $5(18 - 24) < 90 - (-120)$

35. $-8(-5) > (-7)(-5)$

36. $4[-3 - (-7)] = 4(-3) - 4(-7)$

37. $-5(-4)^2 > -4(-5)^2$

38. **a.** on the circle since $6^2 + 8^2 = 10^2$

b. inside the circle since $7^2 + 7^2 < 10^2$

c. inside the circle since $(-7)^2 + (-7)^2 < 10^2$

d. on the circle since $(-6)^2 + 8^2 = 10^2$

e. outside the circle since $(-7)^2 + 8^2 > 10^2$

f. outside the circle since $(-7)^2 + (-8)^2 > 10^2$

39. $\frac{6}{8} > \frac{-18}{24}$

40. $\frac{6}{8} < \frac{7}{9}$

41. $\frac{6}{8} > \frac{-7}{9}$

42. $\frac{6}{8} = \frac{-18}{-24}$

43. $\frac{6}{8} < \frac{-7}{-9}$

44. $\frac{8}{6} > \frac{-9}{7}$

45. **a.** perimeter of square = perimeter of rectangle

b. area of square > area of rectangle

c. perimeter of square > circumference of circle

d. area of square < area of circle

e. perimeter of rectangle > circumference of circle

f. area of rectangle < area of circle

46. **a.** *P*(*all* boys) = *P*(*all* girls)

b. *P*(*exactly* one boy) = *P*(*exactly* 2 girls)

c. *P*(BGB) = *P*(BBG)

d. P(two boys and one girl) > *P*(*all* girls)

47. B

48. Answers will vary. Some examples are:

a. $\frac{-1}{2} < \frac{5}{6}$ and $\frac{-2}{1} < \frac{6}{5}$

b. $\frac{1}{2} < \frac{3}{4}$ and $\frac{2}{1} > \frac{4}{3}$

49. C; -0.4 is the opposite reciprocal of 2.5.

50. The solution is approximately $x > 7.64$.

51. $y = x^2 + 4x$ is equivalent to $y = x(x + 4)$; x-intercepts (0, 0) and $(-4, 0)$; y-intercept (0, 0)

52. $y = x^2 + 4x + 4$ is equivalent to $y = (x + 2)^2$; x-intercept $(-2, 0)$; y-intercept (0, 4)

53. $y = x^2 + 3x - 10$ is equivalent to $y = (x - 2)(x + 5)$; x-intercepts (2, 0) and $(-5, 0)$; y-intercept $(0, -10)$

54. $y = x^2 - 8x + 16$ is equivalent to $y = (x - 4)^2$; x-intercept (4, 0); y-intercept (0, 16)

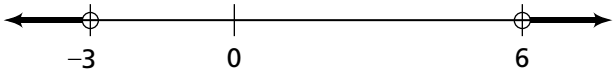
55. $y = x^2 - 4$ is equivalent to $y = (x + 2)(x - 2)$; x-intercepts (2, 0) and $(-2, 0)$; y-intercept $(0, -4)$

56. $y = x^2 + 4x + 3$ is equivalent to $y = (x + 1)(x + 3)$; x-intercepts $(-1, 0)$ and $(-3, 0)$; y-intercept (0, 3)

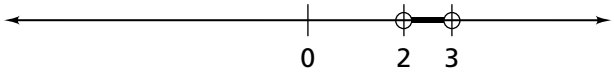
57. H

Extensions

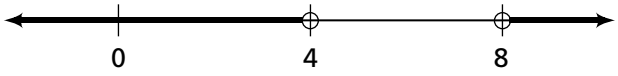
58. **a.** $x < -3$ or $x > 6$ has number line graph:



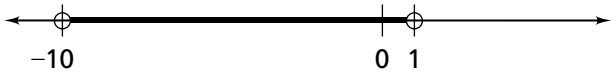
b. $x < 3$ and $x > 2$ has number line graph:



c. $x > 8$ or $x < 4$ has number line graph:



d. $x > -10$ and $x < 1$ has number line graph:



59. **a.** T **b.** T **c.** F **d.** F

60. **a.** $-4 \leq x \leq 4$

b. $x < -4$ or $x > 4$

61. **a.** $x < 3$

b. $x > 2$