Answers

Build-up Exercise 4A (page 4.15)

1. (a) Lowest point: $(-3, 2)$ (b) Highest point: $(-1, 2)$
   (c) Lowest point: $(2, -3)$ (d) Highest point: $(-1, \frac{1}{4})$

2. (a) Upwards (b) Downwards
   (c) Upwards (d) Downwards

3. (a) Lowest point: $(1, 1)$; 2
   (b) Lowest point: $(-3, -1)$; 17
   (c) Highest point: $(2, 3)$; -13
   (d) Highest point: $(-2, -2)$; -4

4. (a) Upwards (b) Lowest point: $(4, 3)$
   (c) 11

6. a: negative, h: positive, k: positive

7. a: positive, h: positive, $k = 0$

8. $h = 5$, $k = 7$, $a = \frac{1}{5}$

9. $h = -1$, $k = 5$, $a = -2$

10. $h = 1$, $k = -2$, $a = \frac{1}{2}$

11. $h = 3$, $k = 1$, $a = -\frac{1}{9}$

12. $-\frac{1}{3}$

13. 6

14. (a) $(-1, 0)$ (b) $h = -1$, $k = 8$
    (c) 6

15. $h = -2$, $a = 2$

16. (a) 1 (b) $\frac{3}{8}$

17. (a) 6 (b) $\frac{9}{2}$

18. (a) -2 (b) $a = 1$, $k = -16$
    (c) -12

19. 3

20. $a = -2$, $b = 2$

21. $k = -1$, $m = 7$

Build-up Exercise 4B (page 4.19)

22. (a) $-\frac{5}{4}$ (b) $-\frac{15}{2}$
    (c) $-\frac{5}{4}$ (d) $\frac{5}{2}$

23. (a) 5 (b) $-\frac{2}{3}$
    (c) $-\frac{15}{16}$ (d) 6

24. (a) $y = (x + 4)^2 - 9$ (b) $y = 2(x - 1)^2 - 1$
    (c) $y = -(x - 2)^2 + 1$ (d) $y = -3(x + \frac{1}{3})^2 + \frac{19}{3}$

25. (a) $y = (x + \frac{3}{2})^2 + \frac{7}{4}$ (b) $y = -2(x + \frac{1}{4})^2 + \frac{9}{8}$

26. $\frac{1}{4}$

27. -9

28. (a) -1 (b) 3

29. ± 4

30. $\frac{25}{2}$

31. -1

32. a: positive, b: negative, c: positive

33. a: negative, $b = 0$, c: negative

34. (a) $a = -2$, $c = 40$ (b) 40
    (c) 72

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

36. (a) $a = 2$, $b = 8$, $c = -10$ (b) $(-2, -18)$, lowest point

37. (a) $a = -1$, $b = 6$, $c = -5$ (b) $(3, 4)$, highest point

Build-up Exercise 4C (page 4.21)

38. 3

39. -1.3, 2.3

40. (a) -1, 4 (b) 2, 7
    (c) -3, -1 (d) -3, 1

41. (a) 2 (b) 2
    (c) 0 (d) 1

43. $a > \frac{1}{9}$

44. $c > -8$

45. $k < -\frac{1}{12}$

46. (a) $k < \frac{25}{8}$ (b) $-\frac{1}{8}$

47. (a) -4 (b) 0

48. $0 < k < \frac{9}{4}$

49. (a) ± 1
    (b) (i) $-1 - \sqrt{2}$, $-1 + \sqrt{2}$ (ii) $1 - \sqrt{2}$, $1 + \sqrt{2}$

50. (a) $A(1, 0)$, $B(5, 0)$ (b) $(3, 0)$
    (c) -12

51. (a) $a = 2$, $b = -2$ (b) -1
    (c) $y = (x + 1)(x - 2)$

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Build-up Exercise 4D *(page 4.24)*

53. $1 800; 120

54. 500 m; 3 hours

55. 16 cm^2; 3

56. (a) $-x^2 + 20x$ **(b)** 10, 10

57. (a) $x^2 - 8x$ **(b)** -4, 4

58. (b) 30

59. (a) $P = -100x^2 + 3\ 000x$ **(b)** $22 500

60. (a) (i) $y = 46 - 7x$ **(ii)** $(-46x^2 + 276x)$ cm^2
    (b) 414 cm^2

61. $\dfrac{25}{8}$ m^2

62. (a) (i) $h = \dfrac{8 - (\pi + 2)r}{2}$
    (b) No

63. (a) $A = -5x^2 + 100x$ **(b)** Yes

64. (a) Maximum height = 25 m; horizontal distance = 5 m
    (b) (i) Yes   **(ii)** No