BLM Answers

Get Ready

1. a)

b)

c)

d)

2. a)

b)

c)

d)
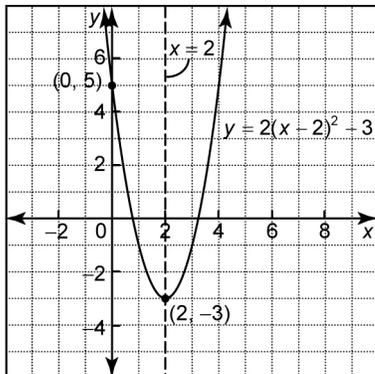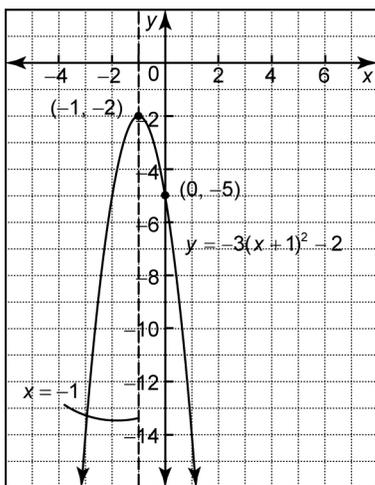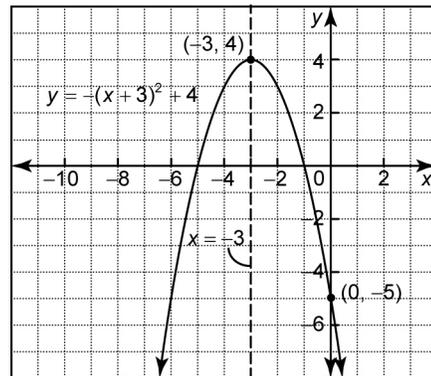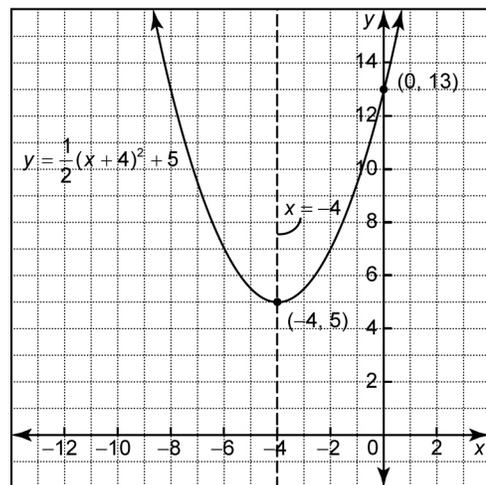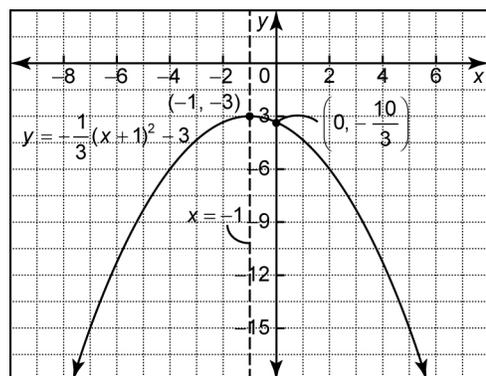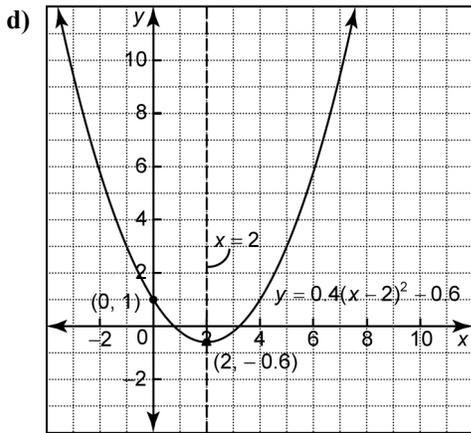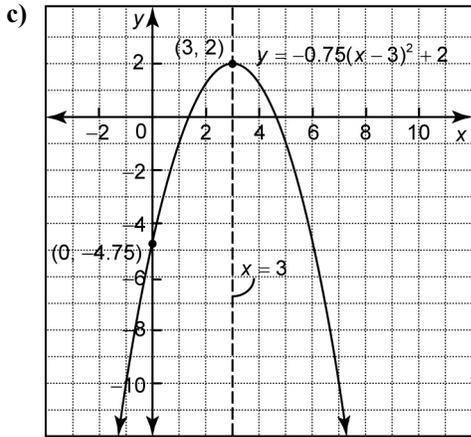
3. a) 15, −15 **b)** 7, −7
c) not possible **d)** 6.3, −6.3
4. a) ±9 **b)** ±8 **c)** ±10 **d)** ±5
5. a) $(x + 3)(x − 6)$ **b)** $(2x − 1)(2x + 1)$
c) $3(3x + 2)(x − 4)$ **d)** $(5x + 7y)^2$
e) $(6x + 1)(3x − 2)$ **f)** $−2(x + 4)(x − 7)$
g) $−5(x − 9)(x − 5)$ **h)** $(5x − 1)(5x + 1)$
6. a) $(x + 3)(2x + 1)$
b) $(2t − 3)(3t + 1)$
c) $(y − 1)(2y − 5)$
d) $(2x − 1)(5x + 2)$
e) not possible
f) $(2x − 3)(2x + 3)$
g) $(2x − 3)^2$
h) $(2w + 5)(w + 2)$
7. a) Let x represent the number: $5x + 3$.
b) $x − y$
c) Let x represent the number: $x(x + 1)$.
d) $\dfrac{x + y}{2}$
e) Let x represent the first even number:
$x + x + 2 + x + 4$.

8. a) Let x represent the first number and
y represent the second number: $x = 2y$.
b) Let r represent Ray's age and t represent
Toni's age: $r + t = 54$.
c) Let h represent the price of a hamburger and
d represent the price of a hot dog:
$h = \dfrac{1}{2}d + 3$.
d) Let w represent the width and l represent the
length: $w = l − 5$.

Section 6.1 Practice Master

1. a) $y = (x + 2)^2 + 1$
b) $y = (x − 5)^2 − 18$
c) $y = (x + 1)^2 + 5$
2. a) 16 **b)** 36 **c)** 100 **d)** 225
3. a) D **b)** B **c)** A **d)** C
4. Labelled points may vary. Examples are
shown on the graphs.
**a)** $y = 2(x − 3)^2 + 4$
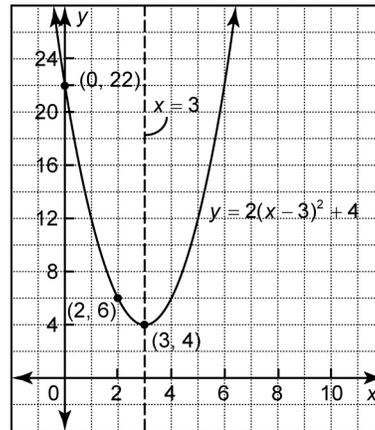
b) $y = −(x − 1)^2 + 5$
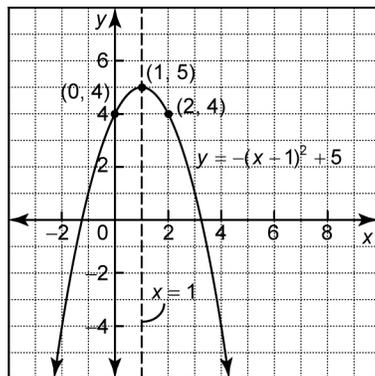
c) $y = \frac{1}{2}(x+3)^2 - 2$
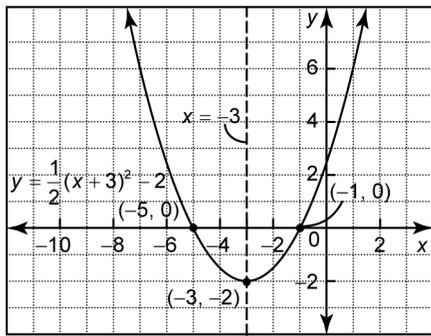
d) $y = -1.5(x-2)^2 + 1$
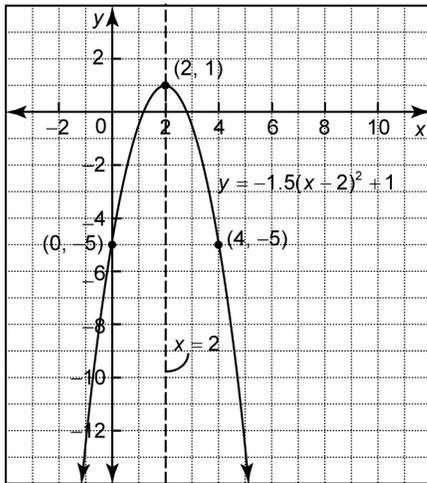
5. a) maximum point: (2, 4)
  b) minimum point: (−3, −1)
  c) maximum point: (−4, 1)
  d) minimum point: (5, −2)
6. The maximum height of 5 m occurs at a horizontal distance of 3 m.
7. a) $R = (20 + 2x)(1200 - 60x)$, which simplifies to $R = -120x^2 + 1200x + 24\,000$.
 **b)** $30   **c)** 900   **d)** $27 000

Section 6.2 Practice Master

1. a) −1, −6   **b)** −7, 4   **c)** 0, 9
  d) $-\frac{1}{3}, \frac{1}{2}$ **e)** $-\frac{6}{5}, -\frac{3}{4}$ **f)** $\frac{1}{3}, \frac{3}{10}$
2. a) −7, 3   **b)** −1, 6   **c)** $-\frac{1}{2}, \frac{1}{3}$
  d) $-\frac{1}{5}, 4$ **e)** $0, -\frac{2}{3}$ **f)** $-\frac{4}{3}, \frac{4}{3}$
3. a) −4, −1   **b)** $-\frac{7}{3}, \frac{7}{3}$ **c)** $-\frac{3}{2}$
  d) 0, 2   **e)** $-\frac{1}{2}, -5$ **f)** $-2, -\frac{1}{2}$
**4.** 2 cm

5. 9 cm by 4 cm
6. Answers may vary. For example:
  a) $(x-3)(x+4)=0$ **b)** $(2x-1)(x+5)=0$
7. $x^2 + 2x - 8 = 0$
8. Answers may vary. For example: $15x^2 + 7x - 2 = 0$
9. 2.5 cm
10. 11
11. a) $-\frac{1}{2}, \frac{1}{2}$ **b)** −2, 6   **c)** −10, −2
  d) −3, 6   **e)** $-\frac{7}{2}, 0$ **f)** $-\frac{2}{3}, 2$
12. a) −6, 6   **b)** −4, 4   **c)** −1, 1   **d)** −5, 5

Section 6.3 Practice Master

1. a) −3, −2   **b)** $-\frac{3}{2}$ **c)** 0, 8
  d) 6, −2   **e)** $-\frac{2}{3}, \frac{7}{2}$ **f)** $0, \frac{5}{3}$
2. a) 4, −4; (0, −16)

  b) −7, 1; (−3, 16)

c) $1, -5; (-2, -27)$

$y = 3x^2 + 12x - 15$

(−5, 0) (1, 0)

(−2, −27)

d) $5, -5; (0, 25)$

(0, 25)

$y = 25 - x^2$

(−5, 0) (5, 0)

3. a) $-\dfrac{1}{2}, \dfrac{9}{2}; (2, -25)$

$\left(-\dfrac{1}{2}, 0\right)$ $\left(\dfrac{9}{2}, 0\right)$

$y = 4x^2 - 16x - 9$

(2, −25)

b) $\dfrac{2}{5}, -6; \left(\dfrac{16}{5}, -\dfrac{196}{5}\right)$

(0.4, 0) (6, 0)

$y = 5x^2 - 32x + 12$

(3.2, −39.2)
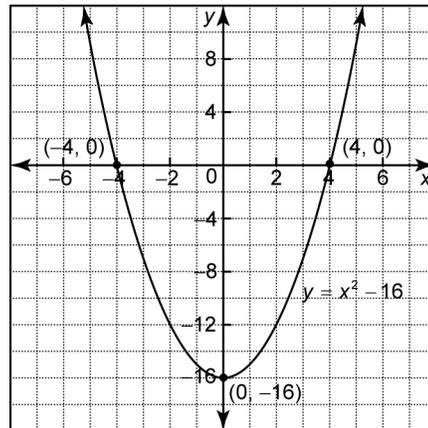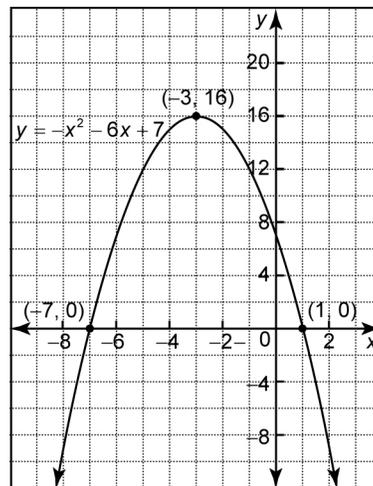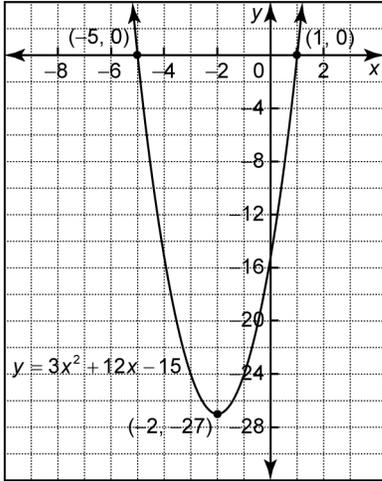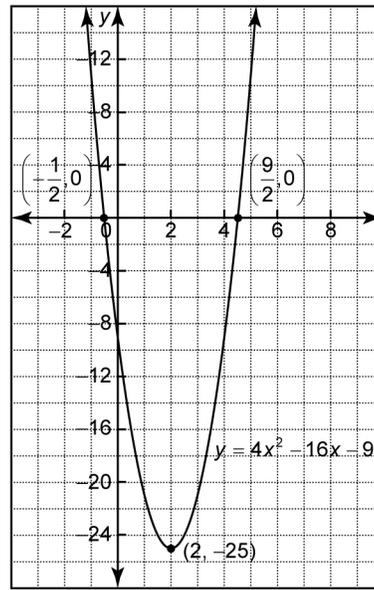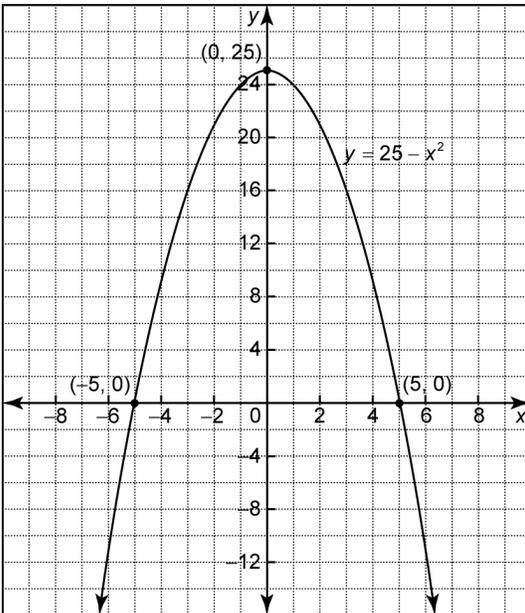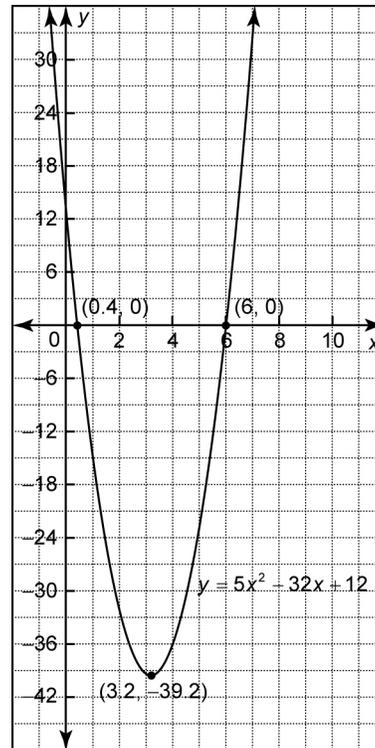
c) $-\dfrac{3}{4}, -8; \left(-\dfrac{35}{8}, \dfrac{841}{16}\right)$
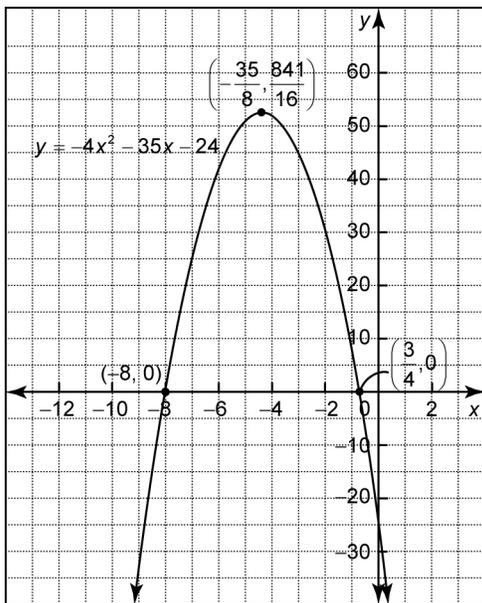
4. a) $y = 2x^2 - 12x + 16$ **b)** $y = -3x^2 + 75$

**c)** $y = \dfrac{1}{2}x^2 - 2x + 16$ **d)** $y = 4x^2 - 24x + 32$

5. a) $y = -2(x-1)^2 + 8$ **b)** -1 **c)** 6

6. a) $0, 40$
b)
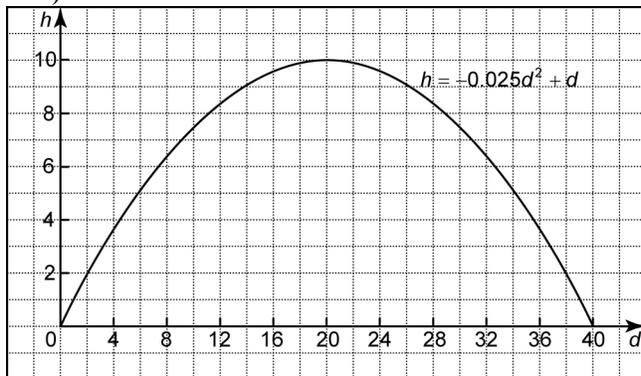
c) The relation is invalid for $d < 0$ and $d > 40$, because negative heights have no meaning in this context.
d) 10 m **e)** 20 m

7. a)
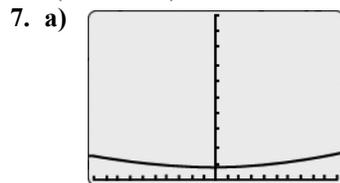
b) minimum value: 4 m; (0, 4) **c)** $x = 0$
d) 4; no x-intercepts

Section 6.4 Practice Master

1. a) $\dfrac{-7 \pm \sqrt{29}}{2}$ **b)** $3 \pm \sqrt{6}$ **c)** $\dfrac{3 \pm \sqrt{5}}{2}$

d) $0, \dfrac{5}{2}$ **e)** $\dfrac{-1 \pm \sqrt{41}}{4}$

2. a) $\dfrac{-5 \pm \sqrt{17}}{2}$; $-0.44, -4.56$

b) $\dfrac{3 \pm \sqrt{13}}{2}$; $3.30, -0.30$

c) $\dfrac{1 \pm \sqrt{13}}{2}$; $2.30, -1.30$

**d)** $\dfrac{-7 \pm \sqrt{41}}{2}$; $-0.30, -6.70$

e) $\dfrac{5 \pm \sqrt{33}}{2}$; $5.37, -0.37$

**f)** $\dfrac{1 \pm \sqrt{17}}{2}$; $2.56, -1.56$

g) $\dfrac{-1 \pm \sqrt{29}}{2}$; $2.19, -3.19$

h) $\dfrac{1 \pm \sqrt{21}}{2}$; $2.79, -1.79$

3. a) no x-intercepts; $(-1, 1)$; $x = -1$
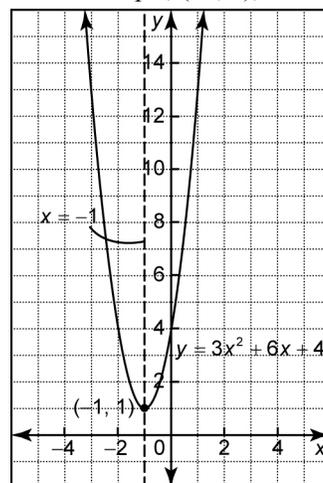
**b)** $\dfrac{2 \pm 3\sqrt{2}}{2}$; $(1, 9)$; $x = 1$
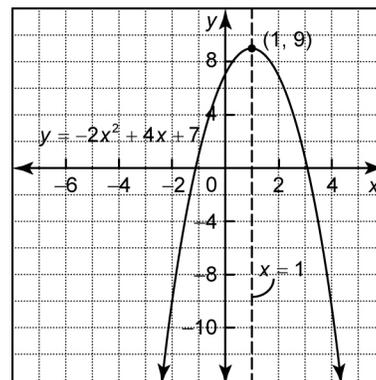
4. a) (2, 3), upward, none   **b)** (−5, 4), downward, two
5. Answers will vary.
6. a) $\dfrac{3 \pm \sqrt{23}}{2}$ **b)** $\dfrac{3 \pm \sqrt{65}}{4}$
   c) $4 \pm 3\sqrt{2}$ **d)** $\dfrac{13}{7}$ or 0

7. 16 cm and 12 cm
8. 5 m on each side
9. a) 2.25 m   **b)** 3.8 s
10. a) 7.5 cm   **b)** 6562.5 cm^3
11. 82 m

Section 6.5 Practice Master

1. a) 15 m   **b)** 195 m   **c)** 515 m
   d) 10 s   **e)** 16 s   **f)** 20 s
2. a) $0.20   **b)** $2.20   **c)** $484 000
3. 5 m
4. 12 cm and 5 cm
5. base 44 cm, height 14 cm
6. 11, 12, 13, 14 or −14, −13, −12, −11
7. width 11 m, length 19 m
**8.** 16 m

Chapter 6 Review

1. a) $y = (x + 3)^2 - 6$ **b)** $y = (x + 2)^2 - 5$
   c) $y = (x + 4)^2 - 9$ **d)** $y = (x + 5)^2 - 30$
**2.** Labelled points may vary. Examples are shown on the graphs.
   **a)** (−7, −56)
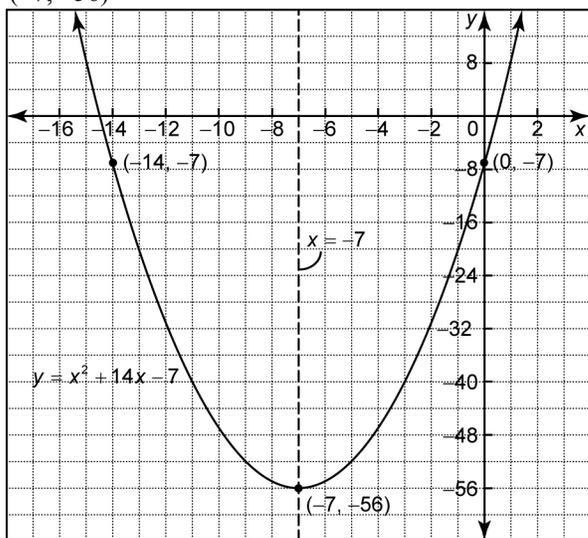
b) (3, 10)
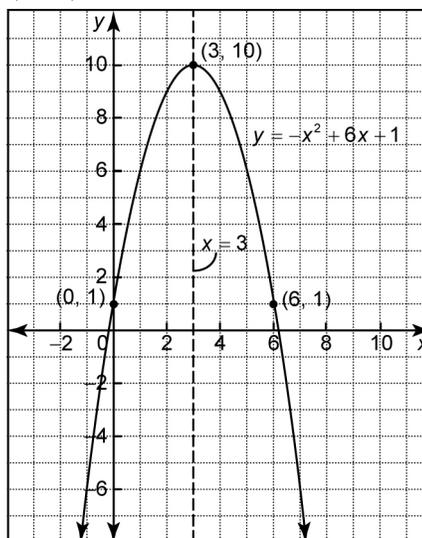
c) (−3, −14)
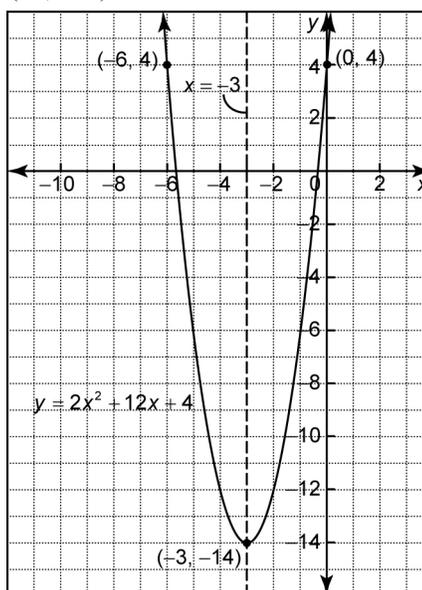
d) $(8, 67)$
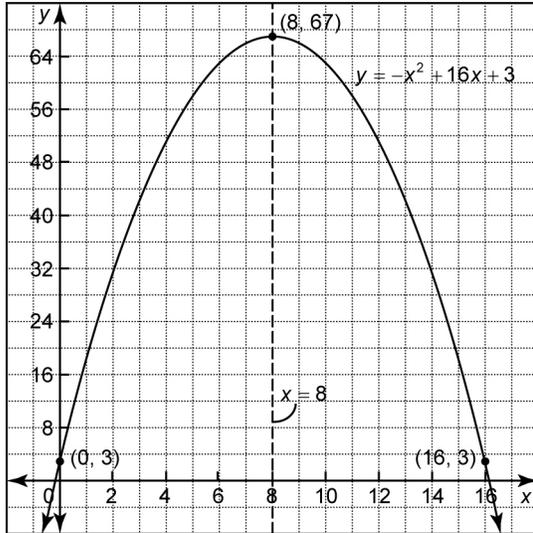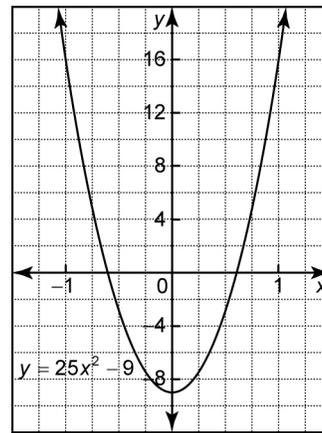
3. a) minimum: 3.9 **b)** minimum: 8.3
c) minimum: 0.2 **d)** maximum: 13

4. a) 4.5 m **b)** 5 m

5. a) $-5, 3$ **b)** $4, 9$ **c)** $-\dfrac{1}{2}, \dfrac{5}{2}$ **d)** $-\dfrac{2}{3}, \dfrac{6}{5}$

6. a) $-4, 2$ **b)** $-\dfrac{3}{5}, -1$ **c)** $-\dfrac{1}{2}, \dfrac{1}{2}$

d) $0, 4$ **e)** $-\dfrac{5}{4}, 4$ **f)** $-\dfrac{1}{3}, \dfrac{5}{2}$

7. Answers may vary. For example:
a) $x^2 - 2x - 15 = 0$ **b)** $15x^2 - x - 2 = 0$

8. a) $-3; (-3, 0)$

b) $\dfrac{3}{5}, -\dfrac{3}{5}; (0, -9)$

c) $-3, 7; (2, 25)$

d) $-4, -8; (-6, -4)$

e) −4, 6; (1, 50)

Graph shows $y = -2x^2 + 4x + 48$
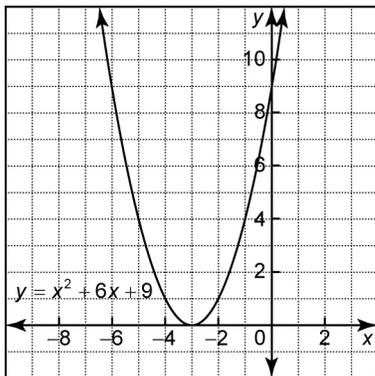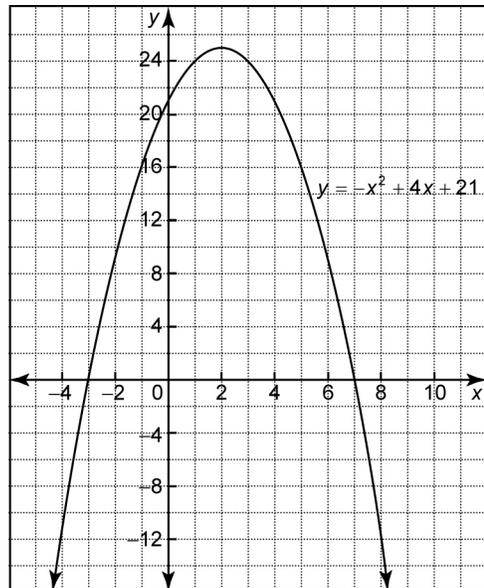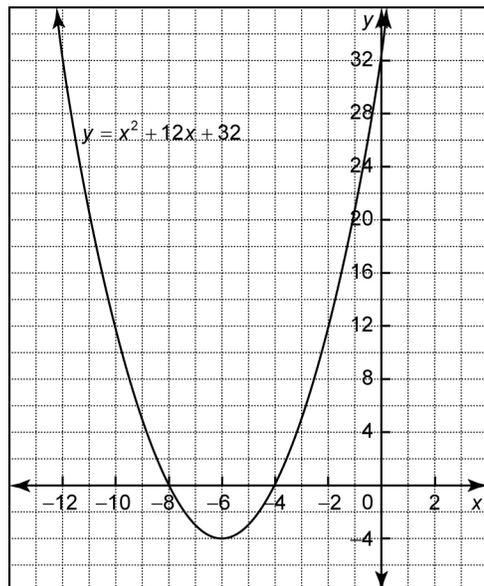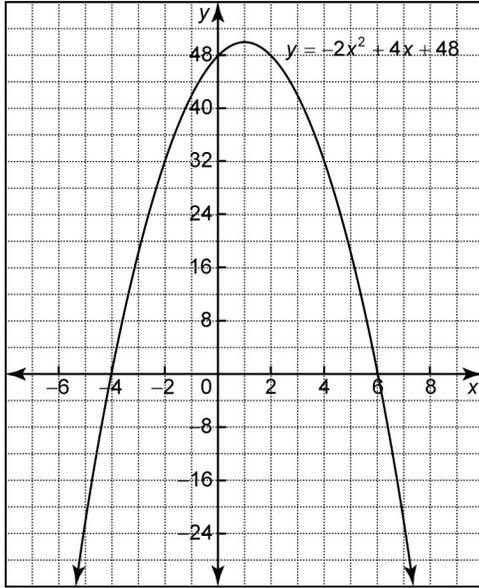
f) $-\dfrac{1}{2}, \dfrac{1}{2}$; (0, −5)

Graph shows $y = 20x^2 - 5$
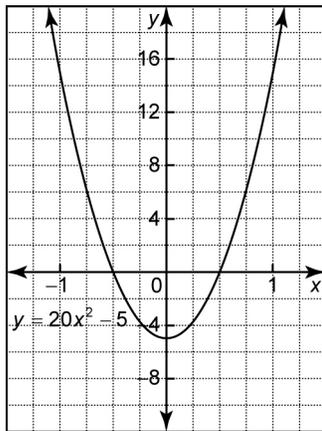
9. a) $y = -x^2 + 6x$ **b)** $y = 3x^2 + 6x - 15$

c) $y = \dfrac{1}{2}x^2 - 8$ **d)** $y = x^2 - 12x + 36$

10. −5; −5

11. a) $\dfrac{-5 \pm \sqrt{17}}{2}$ **b)** $\dfrac{-1 \pm \sqrt{13}}{6}$ **c)** $-3 \pm \sqrt{13}$

d) $\dfrac{3 \pm \sqrt{89}}{10}$ **e)** $\dfrac{-3 \pm \sqrt{65}}{4}$ **f)** $\dfrac{1 \pm \sqrt{13}}{6}$

g) $\dfrac{-1 \pm \sqrt{41}}{4}$ **h)** $\dfrac{3 \pm \sqrt{21}}{6}$

12. a) (−1, 1), upward, none **b)** (−2, 3), downward, two

c) (−3, 0), upward, one   **d)** (−4, −2), downward, none

13. a) 0.5 s **b)** 3.1 s **c)** 1.8 s, 17.4 m

14. 92 and 94 or −94 and −92

15. 84 m by 168 m

16. 13 cm by 8 cm

17. a) 11   **b)** No.

18. a) $h = -4.9t^2 + 25t + 0.7$ **b)** 27.2 m **c)** 32.6 m; 2.6 s

19. a) $R = (400 - 8x)(80 + 2x)$ or $R = -16(x - 5)^2 + 32\,400$

b) \$32 400   **c)** 360; \$90

Chapter 6 Practice Test

1. Points graphed may vary. Examples are shown on the graphs.

a) $y = (x - 4)^2 + 6$

Graph shows $y = x^2 - 8x + 22$, $x = 4$, points (2, 10), (6, 10), (4, 6)

b) $y = -(x + 2)^2 - 7$

Graph shows $y = -x^2 - 4x - 11$, $x = -2$, points (−2, −7), (−4, −11), (0, −11)

c) $y = \dfrac{1}{2}(x - 6)^2 + 3$
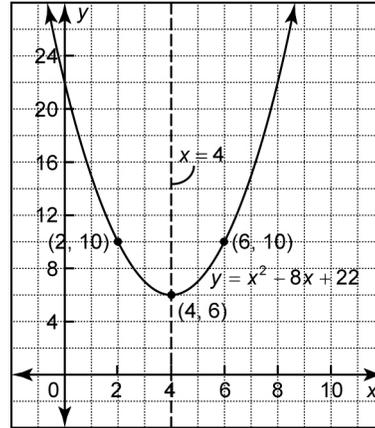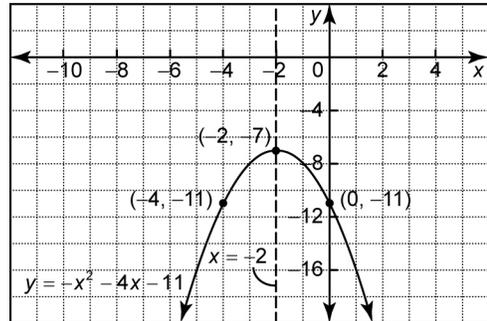
Graph shows $y = \dfrac{1}{2}x^2 - 6x + 21$, $x = 6$, points (4, 5), (8, 5), (6, 3)
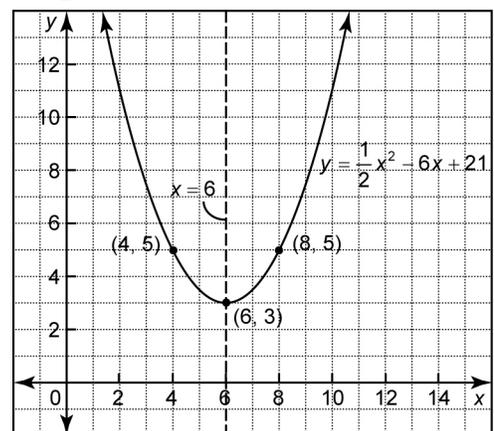
2. Answers may vary. For example: For the quadratic relation $y = ax^2 + bx + c$, complete the square to rewrite the relation as $y = a(x - h)^2 + k$. The vertex of the relation is (h, k).

3. a) $-3, 2$ **b)** $-\dfrac{1}{2}, \dfrac{1}{2}$ **c)** $-\dfrac{2}{3}$ **d)** $0, 3$

 e) $-7, 9$ **f)** $-\dfrac{2}{3}, \dfrac{5}{2}$ **g)** $-\dfrac{3}{2}, 5$ **h)** $-\dfrac{5}{4}, \dfrac{5}{4}$

4. a)

b)

c)
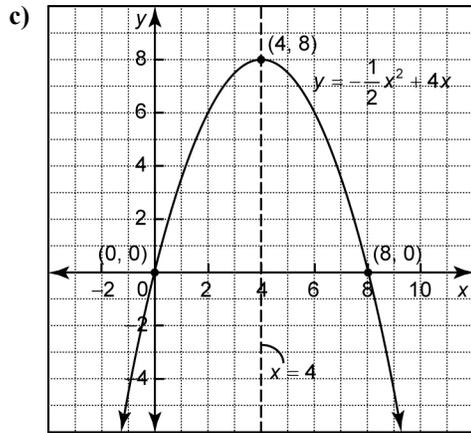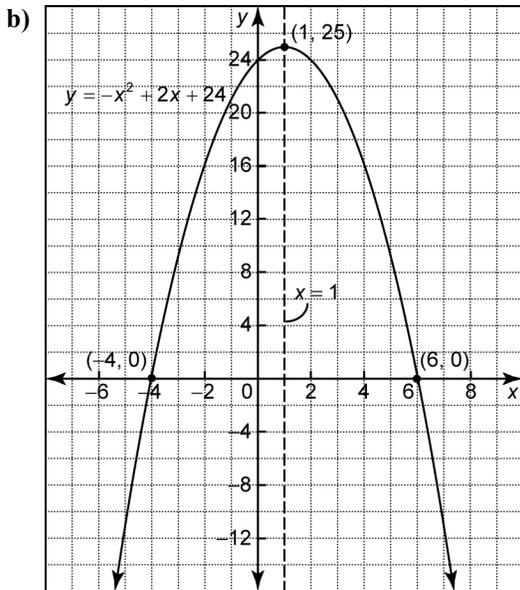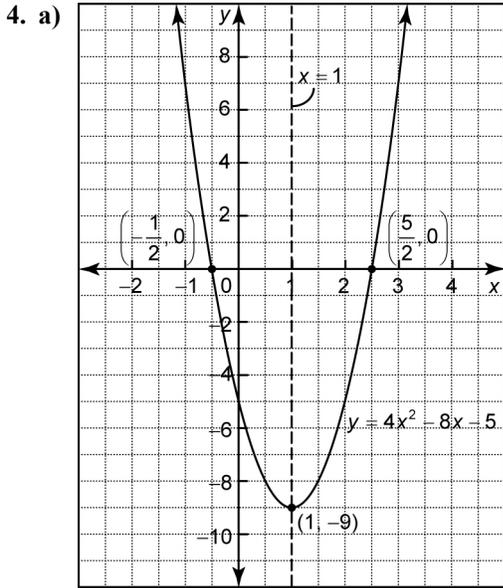
5. a) $y = -x^2 - 6x - 11$ **b)** $y = 2x^2 - 16x + 37$

6. a) not possible **b)** $-1, -\dfrac{5}{2}$ **c)** $\dfrac{3 \pm 2\sqrt{6}}{3}$

 d) $1, \dfrac{1}{4}$ **e)** $\dfrac{1 \pm \sqrt{22}}{3}$ **f)** $\dfrac{-3 \pm 2\sqrt{11}}{5}$

7. a) $\dfrac{1}{3}, -\dfrac{1}{2}$ **b)** not possible **c)** $-2, 2$

 d) not possible **e)** $\dfrac{-5 \pm \sqrt{37}}{2}$ **f)** $1, \dfrac{2}{7}$

8. a)
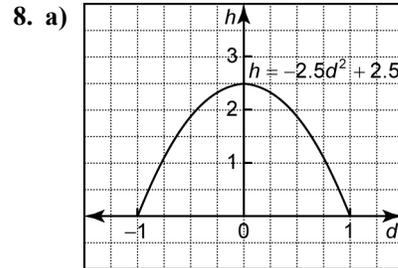
 b) 2.5 m **c)** $h = -3d^2 + 3$

9. a) 40 ft **b)** 10 ft **c)** 25 ft

10. a) $P = -x^2 + 19x + 150$ **b)** $-6, 25$
 c) 950 items **d)** \$240 250

11. a) $-0.01, 5.32$ **b)** 2.65 s **c)** 34.74 m

12. 24 m by 10 m

13. 21 cm by 13 cm

14. 3.5 m

15. 3.58 cm

16. 23.7 cm by 29.7 cm

Chapter 6 Test

1. a) $y = (x + 4)^2 - 21$

$x = -4$

$y = x^2 + 8x - 5$

$(-4, -21)$

b) $y = 3(x - 2)^2 - 4$

$x = 2$

$y = 3x^2 - 12x + 8$

$(2, -4)$

c) $y = 5(x + 1)^2 - 6$

$x = -1$

$y = 5x^2 + 10x - 1$

$(-1, -6)$

d) $y = \dfrac{1}{2}(x + 6)^2 - 15$

$x = -6$

$y = \dfrac{1}{2}x^2 + 6x + 3$
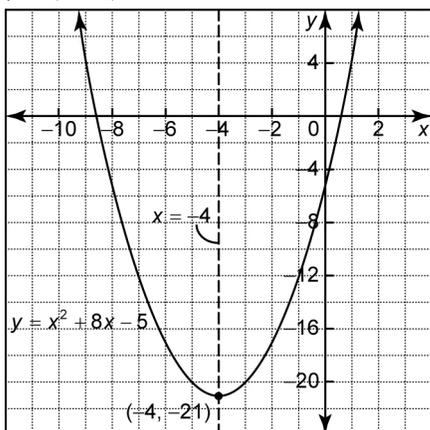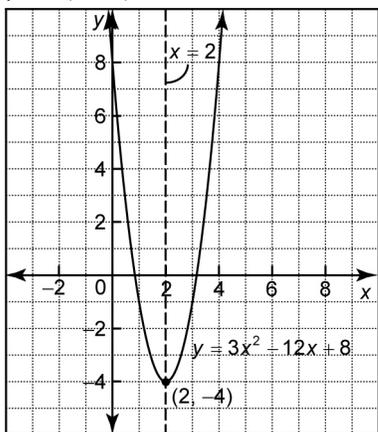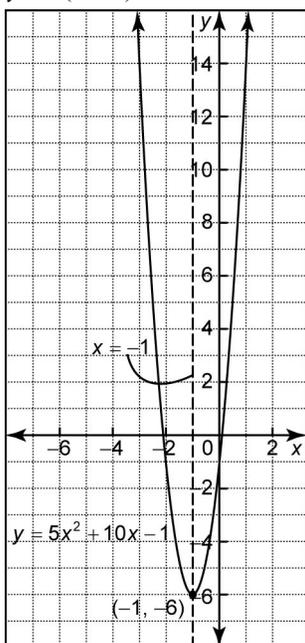
$(-6, -15)$
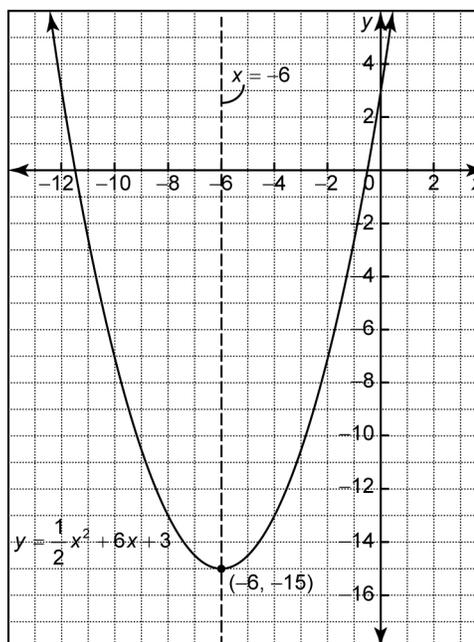
2. a) $x = 3$ **b)** $x = 3$ **c)** $x = 3$

3. All three relations have the same axis of symmetry of $x = 3$.

4. a) $3, -5$ **b)** $\dfrac{1}{2}, -3$ **c)** $\dfrac{1}{3}, -\dfrac{5}{2}$ **d)** $\dfrac{1}{2}, 7$

5. a) $\dfrac{7 \pm \sqrt{17}}{4}$; $2.78, 0.72$ **b)** $\dfrac{-5 \pm \sqrt{37}}{6}$; $0.18, -1.85$

c) $\dfrac{3 \pm \sqrt{37}}{2}$; $4.54, -1.54$ **d)** $\dfrac{-1 \pm \sqrt{31}}{5}$; $-1.31, 0.91$

e) not possible **f)** $\dfrac{-3 \pm \sqrt{41}}{12}$; $0.28, -0.78$

g) $\dfrac{5 \pm \sqrt{217}}{24}$; $0.82, -0.41$ **h)** not possible

6. a) $y = -3x^2 + 6x + 9$ **b)** $y = x^2 - x - 2$

7. 40 cm and 42 cm

8. Answers may vary. For example:
a) $4x^2 + 21x - 18 = 0$ **b)** $6x^2 - x - 2 = 0$

9. a) two, as the vertex is below the *x*-axis and the parabola points upward
b) zero, as the vertex is below the *x*-axis and the parabola points downward
c) two, as the vertex is above the *x*-axis and the parabola points downward
d) one, as the vertex is on the *x*-axis

10. a) $1.6, -2.3$ **b)** $-1.2, 1.7$
c) $1.8, -0.6$ **d)** $3.2, -2.2$

11. a)
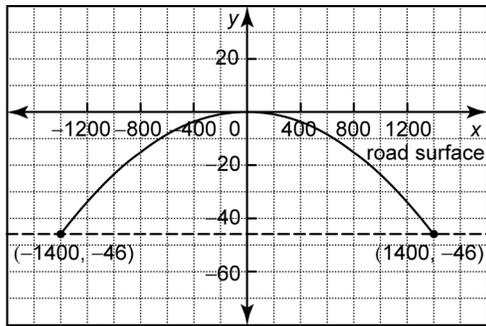
b) $y = -\dfrac{23}{980\,000} x^2$ **c)** 826 m

12. a) 50 m   **b)** 25 m   **c)** 12.5 m
    d) yes   **e)** 46.8 m away
13. a) 15   **b)** No.   **c)** 35   **d)** No.