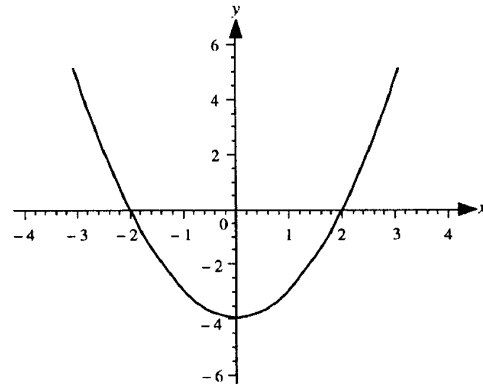
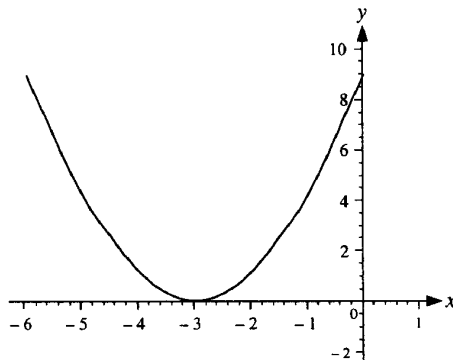


Student Text UNIT 24 Solving Quadratic Equations Answers

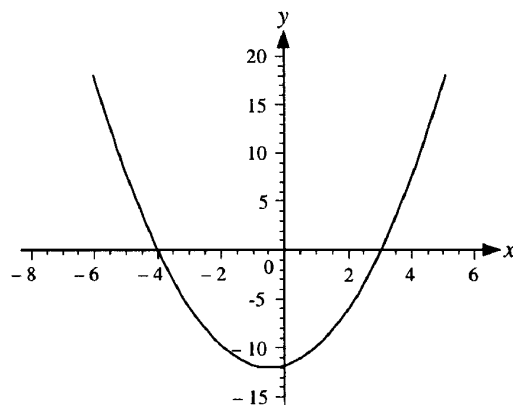
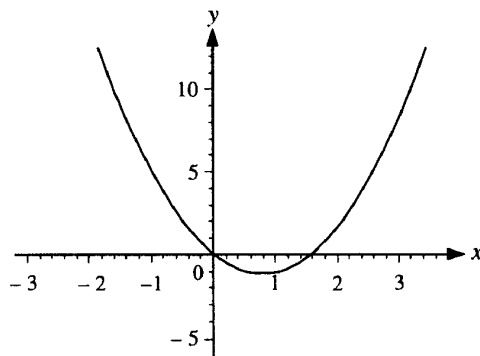
24.1 Solving Quadratic Equations by Factorisation

1. (a) $x = -4$ or 3 (b) $x = 5$ or -3 (c) $x = -6$ or 2 (d) $x = -6$ or 0
 (e) $x = 0$ or $\frac{4}{3}$ (f) $x = 0$ or $\frac{9}{4}$ (g) $x = 3$ or -3 (h) $x = 7$ or -7
 (i) $x = \frac{8}{3}$ or $-\frac{8}{3}$ (j) $x = 4$ (both answers) (k) $x = -5$ (both answers)
 (l) $x = 6$ or -3 (m) $x = 4$ or 7 (n) $x = 5$ or -6 (o) $x = 10$ or 4
 (p) $x = -3$ or $-\frac{1}{2}$ (q) $x = \frac{3}{2}$ or -4 (r) $x = 1$ or $\frac{4}{3}$
 (s) $x = \frac{3}{4}$ or -1 (t) $x = \frac{1}{2}$ or -3 (u) $x = 7$ or $\frac{5}{2}$

2. (a)



(c)



The curve cuts the x -axis at the points where $x = 0$ and $x = \frac{3}{2}$.

The curve cuts the x -axis at the points where $x = 3$ and $x = -4$.

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24.1

3. (a) $(x^2 + 4)(x + 2)(x - 2) = 0$, so $x = -2$ or 2
 (b) $(x^2 + 25)(x + 5)(x - 5) = 0$, so $x = -5$ or 5
4. (a) $x = 5$ (b) $x = 4$ (c) $x = 4$ (d) $x = 8$
5. $t = 0.8$
6. (a) $L = \frac{2V}{W(E + R)}$ (c) $L = 5$ or $L = 10$

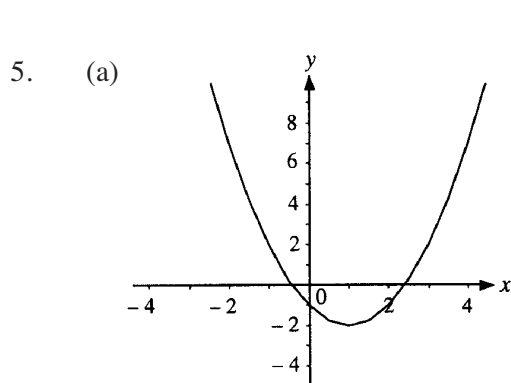
24.2 Solving Quadratic Equations Using the Formula

1. (a) 1 or 0.75 (b) 2 or -2.5 (c) 1.49 or -0.82 (2 d.p.)
 (d) 2.57 or -0.91 (2 d.p.) (e) 2.37 or -3.37 (2 d.p.)
 (f) 2.43 or -0.93 (g) 0.5 or -9 (h) 14 or 0
 (i) 2.32 or -4.32 (2 d.p.) (j) 0.12 or -2.79
 (k) $\sqrt{-6}$ is involved so we can give no answers. (l) 3.58 or 0.42
 (m) 1.69 or -0.44 (2 d.p.)
 (n) $\sqrt{-224}$ is involved so we can give no answers. (o) 6.74 or -0.74
2. (a) Area = $x(x + 2)$
 (b) The ticket is 2.32 cm wide and 4.32 cm long, both measures correct to 2 d.p.
3. The height is 1.69 m and the width is 1.19 m.
4. (a) The stone hits the ground after 2.04 seconds (correct to 2 d.p.)
 (b) 1.46 seconds, correct to 2 d.p.
 (c) The stone never reaches a height of 12 m above the ground level.
 (d) $m = 20t - 9.8t^2$. The maximum height is 10.20 m, correct to 2 d.p.
5. (a) The maximum stretch is 16.18 metres.
 (b) The rope would stretch by 18.11 metres, an increase of 1.93 m.
6. $x = 6.14$ or -1.14 , both answers correct to 3 s.f.

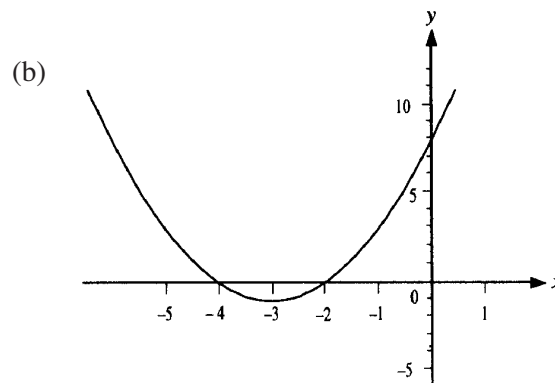
Student Text UNIT 24 Solving Quadratic Equations Answers

24.3 Completing the Square

1. (a) $(x + 2)^2 - 9$ (b) $(x + 3)^2 - 10$ (c) $(x + 5)^2 - 27$
 (d) $(x - 4)^2 - 14$ (e) $(x + 6)^2 - 33$ (f) $(x - 10)^2 - 90$
 (g) $\left(x + \frac{3}{2}\right)^2 - \frac{13}{4}$ (h) $\left(x - \frac{5}{2}\right)^2 - \frac{17}{4}$ (i) $\left(x - \frac{1}{2}\right)^2 + \frac{15}{4}$
2. (a) 1 and 3 (b) $3 + \sqrt{13}$ and $3 - \sqrt{13}$ (c) $-5 + \sqrt{33}$ and $-5 - \sqrt{33}$
 (d) $\frac{-5}{2} + \frac{\sqrt{21}}{2}$ and $\frac{-5}{2} - \frac{\sqrt{21}}{2}$ (e) $-\frac{1}{2} + \frac{\sqrt{5}}{2}$ and $-\frac{1}{2} - \frac{\sqrt{5}}{2}$
 (f) $-1 + \sqrt{5}$ and $-1 - \sqrt{5}$ (g) $-2 + \sqrt{12}$ and $-2 - \sqrt{12}$
 (h) $-\frac{5}{2} + \frac{\sqrt{33}}{2}$ and $-\frac{5}{2} - \frac{\sqrt{33}}{2}$ (i) $-\frac{7}{2} + \frac{\sqrt{45}}{2}$ and $-\frac{7}{2} - \frac{\sqrt{45}}{2}$
3. (a) $2(x + 2)^2 - 32$ (b) $2\left(x + \frac{5}{2}\right)^2 - \frac{31}{2}$ (c) $2\left(x + \frac{1}{2}\right)^2 + \frac{1}{2}$
 (d) $3(x + 1)^2 - 5$ (e) $5\left(x + \frac{3}{2}\right)^2 - \frac{61}{4}$ (f) $7(x - 1)^2 - 5$
 (g) $3(x + 2)^2 - 16$ (h) $4\left(x + \frac{5}{2}\right)^2 - 28$ (i) $2(x - 3)^2 - 15$
4. (a) $x = -1 \pm \sqrt{\frac{7}{2}}$ (b) $x = -4 \pm \sqrt{\frac{35}{2}}$ (c) $x = -2 \pm \sqrt{\frac{20}{3}}$
 (d) $x = -\frac{1}{4} \pm \frac{\sqrt{5}}{4}$ (e) $x = \frac{3}{2}$ and -2 (f) $x = 2 \pm \sqrt{\frac{19}{5}}$



$y = 0$ when $x = -0.41$ and $x = 2.41$;
 the minimum value of y is -2 .

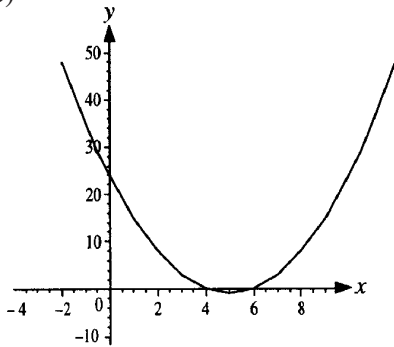


$y = 0$ when $x = -2$ and $x = -4$;
 the minimum value of y is -1 .

Student Text UNIT 24 Solving Quadratic Equations Answers

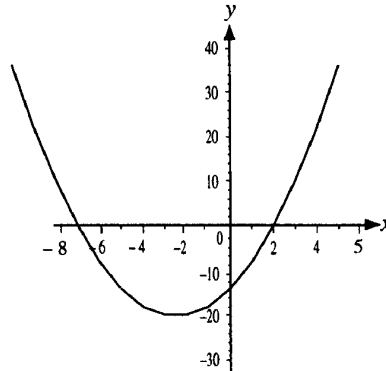
24.3

(c)



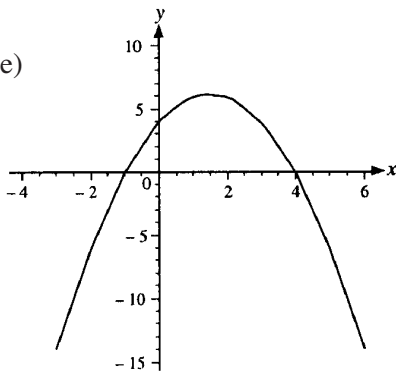
$y = 0$ when $x = 4$ and 6 ;
the minimum value of y is -1 .

(d)



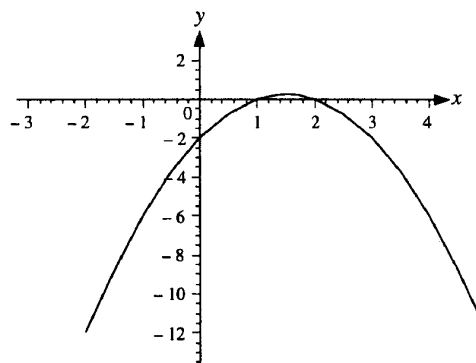
$y = 0$ when $x = 2$ and -7 ;
the minimum value of y is -20.25

(e)



$y = 0$ when $x = 4$ and -1 ;
the minimum value of y is 6.25 .

(f)



$y = 0$ when $x = 1$ and 2 ;
the minimum value of y is 0.25 .

6. The maximum height of the ball is 11.

7. (a) $a = -2$, $b = -2$; the minimum value is -2 .

(b) $x = 3.41$ and $x = 0.59$

8. (a) $(x + 3)(x - 1)$

(b) $(x + 1)^2 - 4$

(c)

9. (a) $2(x - 1)^2 - 15$

(b) $x = 1 \pm \sqrt{\frac{15}{2}}$

(c) $x - \sqrt{\frac{15}{2}} < x < 1 + \sqrt{\frac{15}{2}}$

(d) -15

(e) 1

10. (a) $\frac{9}{16}$

(b) 1.29, 0.310 to 3 significant figures

