Practice Book *UNIT 12 Formulae* Answers

12.1 Substitution 1

1. (a) 7 (b) 11 (c) 14 (d) 4 (e) 3
   (f) 7 (g) 16 (h) 12 (i) 6

2. (a) 14 (b) 12 (c) 10 (d) 35 (e) 18
   (f) 4 (g) 21 (h) 70 (i) 24

3. (a) 21 (b) 26 (c) 34 (d) 53
   (e) 36 (f) 94 (g) 11 (h) 6
   (i) 18 (j) 4 (j) 9 (l) 17

4. (a) 5 (b) 4 (c) 3 (d) 2 (e) 10
   (f) 5 (g) 2 (h) 1 (i) 15

5. (a) 50 (b) 20 (c) 200 (d) 40 (e) 2
   (f) 5 (g) 4 (h) 2 (i) 2 (j) 1000
   (k) 1000 (l) 1000 (m) 200 (n) 1 (o) 10

6. (a) 70 (b) 160 (c) 150 (d) 220 (e) 320 (f) 130

7. (a) 6 units (b) 20 units (c) 38 units (d) 26 units

8. (a) 18 units (b) 9 units (c) 47 units (d) 38 units

9. (a) £26 (b) £39 (c) £25 (d) £22 (e) £47 (f) £170

10. (a) 2 hours (b) 2 hours (c) 6 hours (d) 0.5 hours

12.2 Substitution 2

1. (a) 4 (b) 2 (c) – 6 (d) – 2 (e) 5 (f) – 3 (g) – 12
   (h) – 50 (i) 48 (j) – 2 (k) – 2 (l) 5 (m) 9 (n) – 50
   (o) 18 (p) 2 (q) 17 (r) – 2 (s) 25 (t) – 135 (u) 61

2. (a) 18 (b) 10 (c) 1 (d) 54 (e) 22 (f) 22
   (g) 126 (h) – 3 (i) 84 (j) 9 (k) 27 (l) – 4

3. (a) 20 (b) – 8 (c) 20 (d) 6 (e) – 1 (f) – 4
   (g) 24 (h) – 2 (i) 2

4. 3

5. $7\frac{1}{2}$ cm

12.2 Answers

6. 7.26 cm^2

7. 5 cm

8. (a) 212 (b) 68 (c) 14 (d) – 4

9. (a) 45 (b) 2 (c) – 24 (d) – 90

10. (i) (a) $\frac{3}{10}$ (b) $\frac{7}{10}$ (c) $\frac{3}{20}$
    (ii) Confirmed – the first formula is a rearrangement of the second.

11. A and D

12.3 Linear Equations 1

1. (a) 4 (b) 1 (c) 2 (d) 15 (e) 8 (f) 12
   (g) 11 (h) 11 (i) – 3 (j) 14 (k) – 5 (l) – 4

2. (a) 6 (b) 6 (c) 4 (d) 3 (e) 4
   (f) 0 (g) 8 (h) 10 (i) 18 (j) 36
   (k) 44 (l) 28 (m) $\frac{1}{2}$ (n) 12 (o) 0

3. (a) 2 (b) 14 (c) 11 (d) 10 (e) 11 (f) 7
   (g) 11 (h) 16 (i) 7 (j) 810 (k) – 2 (l) – 32

4. (a) $6x = 18$ (b) $x = 3$ cm (c) 3 cm

5. (a) $x + 14 = 17$, $x = 3$ cm (b) $x = 3$ cm

12.4 Linear Equations 2

1. (a) 5 (b) 3 (c) 2 (d) 6 (e) 3
   (f) 2 (g) 6 (h) – 1 (i) 4 (j) 3
   (k) $\frac{1}{2}$ (l) $1\frac{1}{2}$ (m) 12 (n) 0 (o) – 2

2. (a) 8 (b) 66 (c) 35 (d) – 20 (e) 52 (f) 13
   (g) 50 (h) – 1 (i) 4 (j) 34 (k) 12 (l) 8

3. (a) 7 (b) $4\frac{1}{2}$ (c) 3 (d) $1\frac{2}{3}$
   (e) 3 (f) 11 (g) 77 (h) $2\frac{1}{6}$

12.4 Answers

4. (a) $54 = \frac{9C}{5}, \quad 270 = 9C, \quad 30 = C, \quad C = 30$

   (b) 5 (c) -5

5. $50 = 2(x + 8)$

   $25 = x + 8$ [Dividing both sides by 2]

   $17 = x$ [Subtracting 8 from both sides]

   $x = 17$ units

6. (a) $10 = 3 + 5a$

   $7 = 5a$ [Subtracting 3 from both sides]

   $\frac{7}{5} = a$ [Dividing both sides by 5]

   $a = \frac{7}{5}$

   (b) $2 = 5 + 3a$

   $-3 = 3a$ [Subtracting 5 from both sides]

   $-1 = a$ [Dividing both sides by 3]

   $a = -1$

7. 2 cm

8. 7 cm

9. 4.5 cm

10. (a) $x = 4$ cm (b) 12 cm and 8 cm

12.5 Non-Linear Equations

1. (a) 3.9 (1 d.p.) (b) 4.8 (1 d.p.) (c) 2.9 (1 d.p.) (d) 7.7 (1 d.p.)

2. (a) $x = 1 \quad x^3 - x^2 = 0 \quad < 2$

   $x = 2 \quad 8 - 4 = 4 \quad > 2$, so solution lies between 1 and 2.

   (b) 1.70

3. (a) $x = 2 \quad x^2 + 2x + 3 = 11 \quad < 15$

   $x = 3 \quad x^2 + 2x + 3 = 36 \quad > 15$, so solution lies between 2 and 3.

   (b) 2.61

4. $2.33 < x < 2.335$ so $x = 2.33$ (2 d.p.)

12.6 Changing the Subject of a Formula

1. (a) $x = y + 2$ (b) $x = y - 7$ (c) $x = \frac{y}{4}$ (d) $x = 3y$

   (e) $x = \frac{y-1}{2}$ (f) $x = \frac{y+3}{4}$ (g) $x = \frac{y}{2} - 3$ or $x = \frac{y-6}{2}$

   (h) $x = \frac{y}{3} + 4$ or $x = \frac{y+12}{3}$ (i) $x = \frac{y}{m}$ (j) $x = y - a$

   (k) $x = \frac{y+c}{k}$ (l) $x = \frac{y-b}{a}$

2. (a) $a = \frac{y-b}{x}$ (b) $b = y - ax$

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

4. $C = \frac{5(F-32)}{9}$

5. (a) $a = p - b - c$ (b) $c = p - a - b$

6. (a) $p = 2w + 2l$ (b) $w = \frac{p-2l}{2}$ (c) $A = wl$ (d) $l = \frac{A}{w}$

7. (a) $p = 2l + 2x + b$ (b) $x = \frac{p-2l-b}{2}$ (c) $l = \frac{p-2x-b}{2}$

   (d) $b = p - 2l - 2x$

8. (a) $h = \frac{2A}{a+b}$ (b) $a = \frac{2A}{h} - b$

9. (a) $p = 10x$ (b) $x = \frac{p}{10}$

10. (a) $A = 2y^2 - 4x^2$ (b) $x = \sqrt{\frac{2y^2 - A}{4}}$ (c) $y = \sqrt{\frac{A + 4x^2}{2}}$