

1 Using Formulae

1. (a) $A = 8, P = 12$ (b) $A = 30, P = 26$ (c) $A = 22, P = 26$
 (d) $A = 20, P = 18$
2. (a) 16 (b) 12 (c) 15 (d) 20
3. (a) 30 (b) 400
4. (a) 30 (b) 12 (c) 17
5. (a) 60 (b) 105 (c) 144
6. (a) 26 (b) 14 (c) 19 (d) 46
 (e) 18 (f) 12 (g) 4 (h) 2
 (i) 26 (j) 50 (k) 30 (l) 40
 (m) 6 (n) 10
7. £380
8. 17.4 cm

2 Construct and Use Simple Formulae

1. (a) $P = 2a + b, P = 16$ cm (b) $P = 4a, P = 20$ cm
 (c) $P = 5a + b, P = 40$ cm (d) $P = a + 2b + c, P = 27$ cm
 (e) $P = 6a, P = 60$ cm (f) $P = 2a + 2b + 2c, P = 36$ cm
 (g) $P = 2a + 2b + c, P = 520$ cm (h) $P = 3a + b, P = 21$ cm
2. (a) $A = ab, A = 60$ cm² (b) $A = a^2, A = 9$ cm²
 (c) $A = a^2 + ab, A = 20$ cm² (d) $A = ab + bc, A = 48$ cm²
 (e) $A = \frac{1}{2}ab, A = 10$ cm² (f) $A = \frac{1}{2}ab + b^2, A = 45000$ cm²
3. (a) $(x + 1)$ and $(x + 2)$ (b) $T = 3x + 3$
4. (a) $M = \frac{x + y}{2}$ (b) $M = \frac{p + q + r + s + t}{5}$
5. (a) $T = 6p + 4q$ (b) £380
6. (a) $P = 2x + 2(x + 3) = 4x + 6$ (b) $A = x(x + 3)$
7. (a) $x + 1$ (b) $x - 3$ (c) $3x - 2$
8. (a) $C = 8 + 4n$ (b) £40

Formulae

Answers

2

9. (a) $C = 5 + 4x$ (b) £17
 10. (a) $2n$ (b) $2n + 6$
 11. (a) $100 - 8x$ (b) $(20 - 2x)(30 - 2x)$
 12. $C = 27np$
 13. (a) $C = 80l$ (b) $C = xl$
 14. Total cost = £ $(8x + 2y)$
 15. (i) £640 (ii) £780

3 Substitution into Formulae

1. (a) 50 (b) 68 (c) 14 (d) 23 (e) -4 (f) 59
 2. (a) 10 (b) 40 (c) 11.25 (d) 4 (e) -10 (f) 7.04
 3. (a) 19.6 (b) 18.4 (c) 18.08 (d) 18.8
 4. (a) -280 (b) -40 (c) 80 (d) 800; 4
 5. (a) 80 (b) 51 (c) ± 4 (d) ± 3 (e) -3 (f) ± 5
 (g) 0 (h) $\frac{3}{4}$ (i) 1 (j) 10 (k) -2 (l) -10
 (m) ± 10 (n) 0.18 (o) 0.38 (p) ± 5 (q) ± 8 (r) ± 15
 6. (a) 3.8 (b) 0.225 (c) 2.6 (d) 7.5 (e) 9.7 (f) 2.4
 7. (a) 20 (b) -3
 8. -20 °C
 9. (i) 14 (ii) 1
 10. (a) $-\frac{13}{8}$ (b) $-\frac{5}{8}$

4 More Complex Formulae

1. (a) $\frac{12}{7}$ (b) -30 (c) $-\frac{21}{4}$ (d) $-\frac{20}{3}$
 2. (a) ± 1.3 (b) ± 8 (c) ± 3.4
 3. (a) $-\frac{3}{2}$ (b) $\frac{12}{25}$ (c) -10 (d) $\frac{10}{4} \left(= \frac{5}{2} \right)$
 (e) -4 (f) $-\frac{1}{3}$ (g) $-\frac{17}{7}$ (h) $\frac{7}{9}$ (i) 1

Formulae

Answers

4

4. (a) ± 5 (b) ± 12 (c) ± 7
 (d) ± 11 (e) ± 2 (f) ± 13
5. (a) $\frac{60}{11}$ (b) 588.24 (2 d.p.) (c) 572.67 (2 d.p.)
6. 33.5 (1 d.p.)
7. (a) -32.3 (3 s.f.) (b) -30

5 Changing the Subject

1. (a) $x = \frac{y}{4}$ (b) $x = \frac{y-3}{2}$ (c) $x = \frac{y+8}{4}$
 (d) $x = 4y - 2$ (e) $x = 5y + 2$ (f) $x = y - a$
 (g) $x = ya + b$ (h) $x = \frac{y-c}{a}$ (i) $x = \frac{yc-b}{a}$
 (j) $x = \frac{yb+c}{a}$ (k) $x = y - a - b$ (l) $x = yc + a - b$
 (m) $x = \frac{y}{ab}$ (n) $x = \frac{y-c}{ab}$ (o) $x = \frac{3cy+b}{4a}$
 (p) $x = \frac{pd+bc}{a}$ (q) $x = \frac{y}{b} - a$ (r) $x = \frac{4y}{a} - 3$
 (s) $x = \frac{2q}{3} + 4$ (t) $x = \frac{4v}{5} - y$ (u) $x = 4(z - a) + 3$

2. $I = \frac{V}{R}$; $R = \frac{V}{I}$

3. $m = \frac{F}{a}$; $a = \frac{F}{m}$

4. $r = \frac{C}{2\pi}$

5. (a) $t = \frac{v-u}{a}$ (b) $a = \frac{v-u}{t}$

6. $z = 3m - x - y$

7. (a) $a = \frac{v^2 - u^2}{2s}$ (b) $a = \frac{s}{(t + \frac{1}{2}t^2)}$

8. (a) $r = +\sqrt{\frac{V}{\pi h}}$ (only a positive value because r is radius) (b) 2.82 cm

9. (a) $h = \frac{V}{x^2}$; $h = \frac{A-2x^2}{4x}$ (b) 2 cm (c) 2.5 cm

*Formulae*Answers

5

10 (a) $a = \frac{2A}{h} - b$

(b) $A = \frac{1}{2} \times 3a \times h = \frac{3ah}{2}$; $a = \frac{2A}{3h}$

11. (a) $v = \frac{d}{t}$

(b) (i) 10.32 m s^{-1} (ii) 10.36 m s^{-1} (iii) 10.78 m s^{-1}

The average speed for the 200 m is faster than the 100 m as the slowest part of both races is the 'standing' start. So for 200 m, more of the race is run at top speed.

The average speed for the 4×100 m is even higher as only *one* of the runners has a 'standing' start; the others are already running at pace when the baton is passed to them.