3. (a) $\frac{10a+20}{a^2}$ (b) $\frac{4b-7}{(b-3)^2}$

(c) $-\frac{2c+2}{(c+4)^2}$ (d) $\frac{23d-16d^2}{(7-4d)^2}$

(e) $-\frac{13f+9}{(2f+1)^2}$ (f) $\frac{4h-8}{(h-8)^2}$

(g) $\frac{3k-14}{(k+5)(k-5)}$

(h) $\frac{m-9n+6}{(m-9n)^2}$

(i) $\frac{2p+5}{(7p+4)(p+1)}$

(j) $\frac{7q+20r}{(3q-8r)(2q+5r)}$

(k) $\frac{17-x}{(x+1)(x+2)(x+3)}$

(l) $\frac{y^2+5y-30}{2(y-3)(y+4)(y-5)}$

4. $\frac{2y^2z^2-2yz^3+y-5z}{z(y-z)}$

5. $A = h - 48, B = k - 6$

6. $\frac{xy}{4(x-y)}$

7. $A = 6, B = 3, C = -2$

Worksheet 6D: Equations involving algebraic fractions

1. (a) $a = 1\frac{7}{15}$ (b) $b = 40$

(c) $c = 3\frac{4}{5}$ (d) $d = \frac{1}{6}$

(e) $h = -3\frac{1}{5}$ (f) $k = \frac{5}{67}$

(g) $m = -\frac{4}{11}$ (h) $n = -4\frac{1}{5}$

(i) $p = \frac{31}{32}$ (j) $q = 10\frac{5}{6}$

(k) $x = -1\frac{5}{12}$ (l) $y = 4$

2. (a) $a = 2\frac{2}{3}$ or $a = -4$

(b) $b = -4$ or $b = 3$

(c) $h = 10$ or $h = -1$

(d) $k = 1\frac{1}{4}$ or $k = 3$

(e) $m = \pm\frac{3}{7}$

(f) $n = -1\frac{1}{2}$

(g) $p = -6$ or $p = 2$

(h) $q = -1\frac{4}{7}$

(i) $x = -9$ or $x = 4$

(j) $y = \pm\frac{1}{2}$ or $y = \pm 4$

3. (a) $a = -1\frac{2}{5}$ (b) No real solutions

(c) $h = \frac{1}{7}$ (d) $k = \frac{2}{3}$

(e) $m = 6$ or $m = -1$

(f) $n = 7\frac{1}{2}$ or $n = 10$

(g) $p = 9\frac{1}{3}$ or $p = -1\frac{1}{3}$

(h) $q = \pm 2.74$

(i) $x = \frac{5}{6}$ or $x = 5$

(j) $y = 1\frac{17}{21}$

4. (i) $(3x + 4)(x - 2)$

(ii) $-1\frac{11}{17}$

5. OPEN $A = 200, B = 4$

6. $\frac{5}{3}$ and $\frac{3}{5}$

7. (i) 100 (ii) 7 h 9 min

Worksheet 6E: Manipulation of algebraic formulae

1. (a) $p = \frac{y-4q}{7}$ (b) $y = \frac{c-ax}{b}$

(c) $b = \frac{hk}{ac}$ (d) $m = \frac{4pq^3}{3n}$

(e) $p = \frac{5q+8x}{4}$ (f) $x = c + \frac{ab}{y}$

(g) $l = \frac{2S}{n} - 2a$ (h) $a = \frac{b^2-D}{4c}$

(i) $u = \pm\sqrt{v^2 - 2gs}$

(j) $T = \pm\sqrt{\frac{4\pi^2 L}{g}}$

(k) $a = \frac{y^2-b}{x^2}$ (l) $p = \frac{(x+y)^3-q}{6}$

(m) $x = \frac{c}{h-k}$ (n) $r = \sqrt[3]{\frac{3V}{4\pi+3}}$

(o) $x = \frac{6a}{a-y}$ (p) $b = \frac{\pi ack}{1-\pi ck}$

(q) $b = \frac{3a+3x}{a-x}$ (r) $k = \pm\sqrt{\frac{h^2}{h+2}}$

(s) $n = \pm\sqrt{\frac{m^2}{a+b}}$

(t) $q = \frac{8pr}{5(12p-r)}$

(u) $x = \left(\frac{q-b}{a-p}\right)^2$

(v) $a = \frac{m^3(m-b^3n)}{n^4}$

(w) $y = -x \pm 1$

(x) $b = \frac{a^2x^2 \pm \sqrt{9ac}}{3y}$

2. $b = \frac{A}{3\pi a} - 6a$

3. (i) 35 (ii) $b = \pm\sqrt{a^2 - \frac{4h}{k}}$

4. (i) -1 (ii) $g = \frac{2tu-2s}{t^2}$

5. $x = \pm\sqrt{\frac{a+by}{y-1}}$

6. $b = \pm\sqrt{\frac{a^2c^2}{a^2-c^2}}$

7. $L = \frac{gT^2}{4\pi^2} - r$

8. (i) $x^2 + y^2 = 36$

(ii) $y = b \pm \sqrt{r^2 - (x-a)^2}$

9. (i) \$6499.59

(ii) $P = \frac{I}{\left(1+\frac{R}{100}\right)^n - 1}$

(iii) \$28 800

10. (i) $m = \frac{y-c}{x}$

Review Exercise 6

1. (a) $\frac{3a^4}{10b^3}$ (b) $\frac{6y}{2x-3y}$

2. (a) $(2x - 1)(x - 4)$

(b) (i) $x = \frac{1}{2}$ or $x = 4$

(ii) $\frac{2x-1}{x+4}$

3. (a) $\frac{9x}{(x+4)(x-5)}$

(b) $x = 0$ or $x = 7$

4. $\frac{5x-2}{6x+1}$

5. $\frac{x+1}{x}$

6. (i) 61.6 (ii) $r = \sqrt[3]{R^3 - \frac{3V}{\pi}}$

8. 3

Chapter 7 Direct and Inverse Proportions

Worksheet 7A: Direct proportion

1. (i) 1.6 cm (ii) 56 cm

2. 150

3. \$9.60

4. $\$\frac{Cy}{x}$

5. \$14.40

6. 487.5 km

7. 52.7 g of carbohydrate, 6.67 g of protein, 5.61 g of fat, 162.45 mg of sodium

8. \$802

9. (i) No (ii) \$200

Worksheet 7B: Algebraic and graphical representations of direct proportion

1. (a) No (b) Yes

2. (a) No (b) No

4. (a) Yes (b) No

(c) No (d) Yes

5. $p = 6.4, q = 12$

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6. (a) $y = 7x$ (b) 21
(c) $2\frac{6}{7}$

7. $2\frac{2}{3}$

8. (a) (i) 81 (ii) 0.05

9. 2

10. (a) $x = 1.5f$ (b) 2.5 cm

11. \$1140

13. (b) $C = 24.8n$ (c) \$892.80

14. Lydia is correct; Howard is incorrect.

Worksheet 7C: Other forms of direct proportion

1. No

3. (a) x^3 and y (b) x and y
(c) $\sqrt{x}$ and y^3 (d) $\frac{1}{x}$ and $\sqrt[3]{y}$

4. $a = 8, b = \pm 16$

5. $k = 4, p = 16, q = 24$

6. (a) $y = \frac{1}{8}x^3$ (b) $\frac{1}{64}$

7. 10

8. (a) (i) $y = 3\sqrt[3]{x}$
(ii) 30
(iii) $\frac{8}{27}$

9. (a) (i) $y = \frac{1}{7}(2x+1)^3$
(ii) $1\frac{1}{7}$
(iii) 24

10. ± 32

11. 28

12. 27

13. (a) $m = \frac{220}{7}r^3$ (b) 16.1 g

14. (a) $s = 5t^2$ (b) 80

15. (a) $T = 2\sqrt{L}$ (b) 0.3025 m
(c) 9 : 4

16. (a) False (b) True
(c) False (d) False

Worksheet 7D: Inverse proportion

1. 10

2. 3.2 days

3. 2 h

4. (i) 1000 min (ii) 2 h 5 min

5. Yes

6. 7.5 h

7. (i) 3

8. \$930

Worksheet 7E: Algebraic and graphical representations of inverse proportion

1. (a) Yes (b) No

2. (a) Yes (b) No

4. (a) Yes (b) No
(c) Yes (d) No

5. $p = 5, q = 16$

6. (a) $y = \frac{50}{x}$ (b) 12.5
(c) 2.5

7. 24

8. (a) (i) $\frac{9}{20}$ (ii) $\frac{3}{7}$

9. $\frac{4}{15}$

10. (a) $N = \frac{600}{x}$ (b) 5 days
(c) 85

11. (a) 3.33 m^3 (b) 171 pascals

12. (a) $F = \frac{54}{5d}$ (b) 3.375 newtons
(c) 2.16 m

13. (b) $T = \frac{15}{2x}$ (c) 1.25 h
(d) 31.25 h

14. Patricia: \$160, Queenie: \$60, Rosa: \$80

Worksheet 7F: Other forms of inverse proportion

1. No

3. (a) x^3 and y (b) $\sqrt{x}$ and y
(c) x and y^3 (d) $\frac{1}{x}$ and $\sqrt[3]{y}$

4. $a = 1.125, b = 1000$

5. $k = 6, p = \frac{6}{25}, q = \frac{11}{20}$ or $\frac{9}{20}$

6. $1\frac{13}{27}$

7. (a) $y = \frac{81}{x^2}$ (b) $2\frac{1}{4}$
(c) $\pm\frac{9}{10}$

8. (a) (i) $y = \frac{2}{\sqrt{x}}$
(ii) $\frac{1}{8}$
(iii) $\frac{4}{81}$

9. (a) (i) $p^2 = \frac{36}{q+1}$
(ii) ± 3
(iii) 899

10. (a) (i) 22 (ii) 292
(b) No

11. $\frac{1}{16}k$

12. $\frac{2}{3}$

13. $\frac{4}{9}$

14. (a) $P = 100$, $d = 4$ and $k = 200$

15. 36%, decrease

16. $p = 3\frac{1}{8}, q = 2\frac{1}{4}$

Review Exercise 7

1. (i) 9 h

2. (a) $p = \frac{3}{5}\sqrt[3]{q}$ (b) $\frac{1}{27}$

3. 51

4. (b) Yes (c) 324 g

5.
(a) $y = 4x$ (b) $y = 5\sqrt{x}$
(c) $y = \frac{3}{\sqrt[3]{x}}$ (d) $y = 6x$

6. 1.125 h

7. (a) (i) $y = \frac{12}{\sqrt[3]{x}}$ (ii) $1\frac{5}{7}$
(iii) $13\frac{103}{125}$

8. (i) Decrease

Secondary 2 Express Mid-year Checkpoint A

1. 3.14, π, $3\frac{14}{25}$, $\left(-3\frac{14}{25}\right)^2$

2. (a) -18 (b) $1\frac{1}{2}$

3. $x^3 + 5x^2 - 6x - 30$

4. $\frac{32p}{3q^2r}$

5. $\frac{63-18x}{14}$

6. $\frac{2x-3}{2x+3}$

7. \$3910

8. (a) 70° (b) 20°

9. 193

10. $3y - b$ and $a + 4$

11. (b) 6.6 cm

13. 27

14. (a) $y = -1.4$

15. (a) $A(-4, 0), B(5, 0), C(0, -20)$
(b) $(0.5, -20.25)$

16. 72

17. (a) $25p^2 - 80p + 64$
(b) $a = \frac{2s-2ut}{t^2}$
(c) $\frac{33}{(2x+1)(x-5)}$
(d) $1\frac{17}{35}$

18. (a) 716 mm; 31 080 mm^2
(b) (ii) 1270 cm^2

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