LEVEL 1 — EQUATIONS

Note: Only turn back to page number if you have difficulty	Page

Q1. What must be done to the following expressions to make them equal to m?

(a) $m + 5$ (b) $\dfrac{m}{7}$ (c) $2m$ (d) $2m - 3$

(e) $\dfrac{m+3}{6}$ (f) $8 - \dfrac{m}{4}$ (g) $5m + 9$ (h) $9m + 8$

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Q2. Solve these equations:

(a) $5x = 2.5$ (b) $\dfrac{x}{3} = 3.3$ (c) $x - 6 = 3.6$

(d) $4 + x = -3$ (e) $2 - x = -2.1$ (f) $\dfrac{2x}{3} = 1.8$

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Q3. Solve these (answers may be fractions):

(a) $7x + 2 = 30$ (b) $6x - 1 = 2$ (c) $6 + 5x = 1$
(d) $5 - 3x = -4$ (e) $15x + 13 = -17$ (f) $9 - 4x = 6$

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Q4. Expand and solve:

(a) $2(3x + 2) = 28$ (b) $4(2 + 5x) = 18$ (c) $3(5 - 4x) = 39$
(d) $9(2x - 1) = -3$ (e) $3(3x - 4) = 33$ (f) $-2(9 - 2x) = 28$

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Q5. Solve:

(a) $\dfrac{x}{3} - 2 = 10$ (b) $\dfrac{x+4}{2} = 6$ (c) $5 + \dfrac{x}{2} = -8$

(d) $7 - \dfrac{x}{3} = 1$ (e) $\dfrac{6-x}{5} = -3$ (f) $\dfrac{12+x}{9} = -2$

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Q6. Solve the following inequations:

(a) $4(x - 3) > 8$ (b) $3(5x - 2) \leq -1$ (c) $2(4x + 3) > 10$

(d) $\dfrac{2x}{5} \geq 4$ (e) $\dfrac{x}{3} + 1 < 2$ (f) $\dfrac{x+3}{6} > -2$

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Q7. (a) The angles of a quadrilateral are $3x°$, $5x°$, $8x°$ and $4x°$. Find the size of each angle.

(b) The perimeter of a rectangle is 32 cm. Find its dimensions if the breadth is 4 cm shorter than the length.

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Q8. Given the formula $T = a + (n - 1)d$ find:

(a) T when $a = 5$, $n = 12$, $d = 3$ (b) a when $T = 130$, $n = 25$, $d = 5$
(c) d when $T = 153$, $a = 9$, $n = 19$ (d) n when $T = 62$, $a = 6$, $d = 4$

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LEVEL 2 — EQUATIONS

Note: Only turn back to page number if you have difficulty	Page

Q1. Solve these equations:

(a) $3x - 8 = 6x + 4$ (b) $4p + 7 = 6p - 11$ (c) $9 + 10x = 15x + 7$

(d) $12 - 5a = 3a + 2$ (e) $4b - 9 = -2b - 5$ (f) $16 - 3a = 8 - 5a$

(g) $2(5 - 2x) = -1(7x + 5)$ (h) $5(3m - 8) = 4(3m - 4)$

(i) $6(3 - 2y) = 2(3y + 4)$

Q2. Solve for x:

(a) $\dfrac{x}{3} - \dfrac{x}{4} = 2$ (b) $\dfrac{2x}{5} + \dfrac{x}{2} = 3$ (c) $\dfrac{3x + 1}{2} - 3 = -7$

(d) $\dfrac{6}{2x} + \dfrac{5}{x} = 2$ (e) $\dfrac{4}{3x - 2} = -2$ (f) $\dfrac{6}{5x + 3} + 4 = 8$

Q3. Solve these inequations and graph them on a number line:

(a) $\dfrac{x}{9} + \dfrac{x}{6} < 5$ (b) $x - \dfrac{x}{3} > 4$ (c) $2x + \dfrac{2x}{3} \le 2$

(d) $\dfrac{x - 1}{2} < \dfrac{x + 5}{5}$ (e) $\dfrac{x + 2}{3} > \dfrac{2x + 3}{4}$ (f) $\dfrac{4 - 3x}{3} \ge \dfrac{3x + 4}{2}$

Q4. (a) A woman is twice as old as her daughter. Five years ago the sum of their ages was 62. What are their present ages?

(b) A bottle is half full. After adding 275 mL to the bottle it is three quarters full. How much does the bottle hold when full?

Q5. Given the equation $X = \dfrac{1}{x^2} - \dfrac{1}{y^2}$ find:

(a) X when $x = \dfrac{1}{5}$, $y = \dfrac{1}{4}$ (b) x when $X = 11\dfrac{1}{4}$, $y = -\dfrac{1}{3}$

(c) y when $X = 1\dfrac{3}{4}$, $x = \dfrac{1}{2}$

Q6. In the following equations make the letter shown in brackets the subject of the equation:

(a) $x = y - z$ $[z]$ (b) $V = \dfrac{Ah}{3}$ $[A]$ (c) $x = \dfrac{x_1 + x_2}{2}$ $[x_2]$

(d) $v^2 = u^2 + 2aS$ $[a]$ (e) $A = \dfrac{1}{2}h(x + y)$ $[x]$ (f) $A = 4\pi r^2$ $[r]$

Q7. Find a formula for M in terms of m for each table:

(a)

m	0	1	2	3
M	4.2	10.2	16.2	22.2

(b)

m	0	1	2	3	4
M	0.5	2	3.5	5	6.5

LEVEL 3 — EQUATIONS

Q1. Solve for x:

(a) $\dfrac{1}{2}(8x-1)=\dfrac{1}{3}(6x+9)$

(b) $\dfrac{5x-3}{6}=x+2$

(c) $\dfrac{x-1}{x+6}-3=5$

(d) $\dfrac{x+2}{4-x}+2=\dfrac{2}{3}$

(e) $4-\dfrac{2x+3}{3-2x}=\dfrac{1}{2}$

(f) $\dfrac{x-2}{3}+\dfrac{x+3}{2}=x$

(g) $\dfrac{3(4x-3)}{4}-\dfrac{2(3x+1)}{3}=\dfrac{5x}{4}$

(h) $\dfrac{3x-1}{5}-\dfrac{2x+3}{4}=x-3$

(i) $\dfrac{5}{x}+x=\dfrac{9}{x}$

Q2. Solve these inequations:

(a) $\dfrac{x-6}{3}+\dfrac{2x}{5}>1\dfrac{2}{3}$

(b) $1+\dfrac{x+3}{3}<\dfrac{2x+5}{4}$

(c) $\dfrac{2x+1}{2}\geq\dfrac{3x+4}{5}-3$

(d) $\dfrac{5-3x}{3}\geq\dfrac{x}{4}$ for $\{x>-2\}$

(e) $\dfrac{2(2x+5)}{5}-2<1$ for $\{x\leq1\}$

Q3. (a) If $a=\dfrac{b+6}{b-8}$ find b when $a=0.125$

(b) If $x=\dfrac{-b-\sqrt{b^2-4ac}}{2a}$ find c when $x=-\dfrac{2}{3},\ a=6,\ b=1$.

**Q4.** Solve each of these equations for the letter shown in brackets:

(a) $T=\dfrac{n}{2}[2a+(n-1)d]$ $[d]$

(b) $z=\dfrac{1}{x}+\dfrac{1}{y}$ $[x]$

(c) $\dfrac{a+b}{4}=\dfrac{b+c}{3}$ $[b]$

(d) $X=\sqrt{\dfrac{x+y}{z}}$ $[y]$

(e) $\dfrac{b}{a}=\dfrac{a+b}{c+2}$ $[b]$

(f) $y=\dfrac{x}{x-a}$ $[x]$

Q5. (a) A rectangular lawn, with length x m and width y m in the ratio $8:3$, is surrounded on all sides by a path 80 cm wide. The outer perimeter of the path is 50.4 m. Find the area of the lawn.
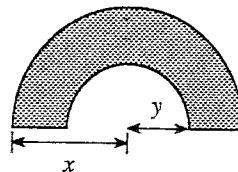
(b) An inheritance of \$191 576 is to be shared between three charities, X, Y and Z, in the ratio $x:2:5$ respectively. If Z receives \$41 052 more than Y, find the amount that X receives.

Q6. Construct a formula for the shaded area in each case:

(a)
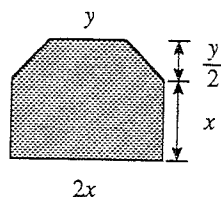
(b)

Level 2 — Measurement

Q1. (a) 26.6 cm   (b) 40.4 cm   (c) 64.6 cm

Q2. (a) 124.71 cm^2 (b) 245.66 cm^2 (c) 56.58 cm^2

Q3. (a) 237.8 cm^3 (b) 268.1 cm^3 (c) 1000 cm^3

Q4. Minute hand 935 cm/day; Hour hand 72 cm/day.

Q5. 5.34 m

Q6. (a) $19.96   (b) 921.47 L

Q7. 32.2 L

Level 1 — Consumer arithmetic

Q1. (a) Jeremy, $2.14   (b) $618.44   (c) Salary pays $2242.50 more   (d) $528.94

Q2. $229.29

Q3. (a) $210.56   (b) $5295.17   (c) $10 799.46   (d) $14 632.78

Q4. (a) $360   (b) $1000 deposit and $210/month is better by $131.20

Q5. (a) Chocolate ice cream $4.99/L   (b) Store 1 is $22.09 cheaper.

Level 2 — Consumer arithmetic

Q1. (a) $1074.15   (b) $40.06

Q2. (a) $463   (b) 7.5 hours

Q3. (a) $9938.17   (b) 32 hours

Q4. (a) Payments: $20 088.96; Lump sum: $17 326.71 interest   (b) 13.4% p.a.

Q5. (a) (i) $1692.75   (ii) $1964   (iii) $2192.25   (b) No, worse off by $10.88.

Level 1 — Equations

Q1. (a) -5 (b) $\times 7$ (c) $\div 2$ (d) $+3, \div 2$ (e) $\times 6, -3$
     (f) $-8, \times -4$ (g) $-9, \div 5$ (h) $-8, \div 9$

Q2. (a) $x = 0.5$ (b) $x = 9.9$ (c) $x = 9.6$ (d) $x = -7$ (e) $x = 4.1$ (f) $x = 2.7$

Q3. (a) $x = 4$ (b) $x = \dfrac{1}{2}$ (c) $x = -1$ (d) $x = 3$ (e) $x = -2$ (f) $x = \dfrac{3}{4}$

Q4. (a) $x = 4$ (b) $x = \dfrac{1}{2}$ (c) $x = -2$ (d) $x = \dfrac{1}{3}$ (e) $x = 5$ (f) $x = 11\dfrac{1}{2}$

Q5. (a) $x = 36$ (b) $x = 8$ (c) $x = -26$ (d) $x = 18$ (e) $x = 21$ (f) $x = -30$

Q6. (a) $x > 5$ (b) $x \le \dfrac{1}{3}$ (c) $x > \dfrac{1}{2}$ (d) $x \ge 10$ (e) $x < 3$ (f) $x > -15$

Q7. (a) 54°, 90°, 144°, 72°   (b) 10 cm $\times$ 6 cm

Q8. (a) $T = 38$ (b) $a = 10$ (c) $d = 8$ (d) $n = 15$

Level 2 — Equations

Q1. (a) $x = -4$ (b) $p = 9$ (c) $x = \dfrac{2}{5}$ (d) $a = 1\dfrac{1}{4}$ (e) $b = \dfrac{2}{3}$ (f) $a = -4$

(g) $x = -5$ (h) $m = 8$ (i) $y = \dfrac{5}{9}$

Q2. (a) $x = 24$ (b) $x = 3\dfrac{1}{3}$ (c) $x = -3$ (d) $x = 4$ (e) $x = 0$ (f) $x = -\dfrac{3}{10}$

Q3. (a) $x < 18$ (b) $x > 6$ (c) $x \le \dfrac{3}{4}$ (d) $x < 5$ (e) $x < -\dfrac{1}{2}$ (f) $x \le -\dfrac{4}{15}$

Q4. (a) 24 years and 48 years (b) 1100 mL

Q5. (a) $X = 9$ (b) $x = \pm\dfrac{2}{9}$ (c) $y = \dfrac{2}{3}$

Q6. (a) $z = y - x$ (b) $A = \dfrac{3V}{h}$ (c) $x_2 = 2x - x_1$ (d) $a = \dfrac{v^2 - u^2}{2S}$

(e) $x = \dfrac{2A}{h} - y$ (f) $r = \pm\sqrt{\dfrac{A}{4\pi}}$

Q7. (a) $M = 6m + 4.2$ (b) $M = \dfrac{3m + 1}{2}$

Level 3 — Equations

Q1. (a) $x = 1\dfrac{3}{4}$ (b) $x = -15$ (c) $x = -7$ (d) $x = 22$ (e) $x = \dfrac{5}{6}$ (f) $x = 5$

(g) $x = -11\dfrac{2}{3}$ (h) $x = 2\dfrac{5}{18}$ (i) $x = \pm 2$

Q2. (a) $x > 5$ (b) $x > 4\dfrac{1}{2}$ (c) $x \ge -6\dfrac{3}{4}$ (d) $-2 < x \le 1\dfrac{1}{3}$ (e) $x \le 1$

Q3. (a) $b = -8$ (b) $c = -2$

Q4. (a) $d = \dfrac{2(T - an)}{n(n-1)}$ (b) $x = \dfrac{y}{zy - 1}$ (c) $b = 3a - 4c$ (d) $y = X^2 z - x$

(e) $b = \dfrac{a^2}{c - a + 2}$ (f) $x = \dfrac{ya}{y - 1}$

Q5. (a) $x = 16, y = 6$ ∴ Area = 96 m² (b) $x = 7$, \$95 788

Q6. (a) $A = 2x^2 + \dfrac{y}{4}(2x + y)$ (b) $A = \dfrac{\pi}{2}\left(x^2 - y^2\right)$

Level 1 — Surds

Q1. (a) $\sqrt{18}$ (b) $\sqrt{5}$ (c) $2\sqrt{56}$ (d) 6 (e) $12\sqrt{6}$ (f) 4

Q2. (a) $5\sqrt{2}$ (b) $3\sqrt{2}$ (c) $3\sqrt{5}$ (d) $6\sqrt{2}$ (e) $2\sqrt{3}$ (f) $2\sqrt{5}$ (g) $8\sqrt{6}$ (h) $9\sqrt{3}$

Q3. (a) $2\sqrt{2}$ (b) $\sqrt{5} + 3\sqrt{3}$ (c) $3\sqrt{10} - 4\sqrt{5}$ (d) $8\sqrt{3}$ (e) $8\sqrt{3}$ (f) $45\sqrt{5}$

Q4. (a) $5\sqrt{6} + 15$ (b) $\sqrt{6} - \sqrt{2}$ (c) $4\sqrt{10} - 10\sqrt{2}$ (d) $2\sqrt{10} + 10\sqrt{2}$ (e) $14 + 3\sqrt{7}$ (f) $14\sqrt{6} - 36$

Q5. (a) $6 - 2\sqrt{5} + 3\sqrt{7} - \sqrt{35}$ (b) -1 (c) $2\sqrt{6} - 2\sqrt{2} + 3\sqrt{3} - 3$
(d) $22 - 8\sqrt{6}$ (e) $8 + 4\sqrt{3} - 4\sqrt{5} - 2\sqrt{15}$ (f) 14

Q6. (a) $\dfrac{\sqrt{2}}{2}$ (b) $\sqrt{5}$ (c) $\dfrac{5\sqrt{3}}{3}$ (d) $\dfrac{\sqrt{3}}{3}$ (e) $\dfrac{\sqrt{7}}{2}$ (f) $\dfrac{\sqrt{30}}{15}$ (g) $\dfrac{3\sqrt{2} - 2}{2}$ (h) $\dfrac{\sqrt{15} + 4\sqrt{3}}{6}$

Q7. (a) $\sqrt{2} - 1$ (b) $\dfrac{30 + 5\sqrt{3}}{33}$ (c) $\dfrac{3\sqrt{5} - \sqrt{15}}{6}$ (d) $\dfrac{21\sqrt{6} - 14}{50}$

(e) $\dfrac{-9 - 5\sqrt{3}}{2}$ (f) $\sqrt{5} + \sqrt{3}$ (g) $5\sqrt{3} + 5\sqrt{2}$ (h) $\dfrac{14 + 5\sqrt{3}}{11}$