

## LEVEL 1 — EQUATIONS

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

	Page
<p>Q1. What must be done to the following expressions to make them equal to <math>m</math>?</p> <p>(a) <math>m + 5</math>      (b) <math>\frac{m}{7}</math>      (c) <math>2m</math>      (d) <math>2m - 3</math></p> <p>(e) <math>\frac{m + 3}{6}</math>      (f) <math>8 - \frac{m}{4}</math>      (g) <math>5m + 9</math>      (h) <math>9m + 8</math></p>	46
<p>Q2. Solve these equations:</p> <p>(a) <math>5x = 2.5</math>      (b) <math>\frac{x}{3} = 3.3</math>      (c) <math>x - 6 = 3.6</math></p> <p>(d) <math>4 + x = -3</math>      (e) <math>2 - x = -2.1</math>      (f) <math>\frac{2x}{3} = 1.8</math></p>	47
<p>Q3. Solve these (answers may be fractions):</p> <p>(a) <math>7x + 2 = 30</math>      (b) <math>6x - 1 = 2</math>      (c) <math>6 + 5x = 1</math></p> <p>(d) <math>5 - 3x = -4</math>      (e) <math>15x + 13 = -17</math>      (f) <math>9 - 4x = 6</math></p>	48
<p>Q4. Expand and solve:</p> <p>(a) <math>2(3x + 2) = 28</math>      (b) <math>4(2 + 5x) = 18</math>      (c) <math>3(5 - 4x) = 39</math></p> <p>(d) <math>9(2x - 1) = -3</math>      (e) <math>3(3x - 4) = 33</math>      (f) <math>-2(9 - 2x) = 28</math></p>	49
<p>Q5. Solve:</p> <p>(a) <math>\frac{x}{3} - 2 = 10</math>      (b) <math>\frac{x + 4}{2} = 6</math>      (c) <math>5 + \frac{x}{2} = -8</math></p> <p>(d) <math>7 - \frac{x}{3} = 1</math>      (e) <math>\frac{6 - x}{5} = -3</math>      (f) <math>\frac{12 + x}{9} = -2</math></p>	50
<p>Q6. Solve the following inequations:</p> <p>(a) <math>4(x - 3) &gt; 8</math>      (b) <math>3(5x - 2) \leq -1</math>      (c) <math>2(4x + 3) &gt; 10</math></p> <p>(d) <math>\frac{2x}{5} \geq 4</math>      (e) <math>\frac{x}{3} + 1 &lt; 2</math>      (f) <math>\frac{x + 3}{6} &gt; -2</math></p>	52, 53
<p>Q7. (a) The angles of a quadrilateral are <math>3x^\circ</math>, <math>5x^\circ</math>, <math>8x^\circ</math> and <math>4x^\circ</math>. Find the size of each angle.</p> <p>(b) The perimeter of a rectangle is 32 cm. Find its dimensions if the breadth is 4 cm shorter than the length.</p>	54, 55
<p>Q8. Given the formula <math>T = a + (n - 1)d</math> find:</p> <p>(a) <math>T</math> when <math>a = 5</math>, <math>n = 12</math>, <math>d = 3</math>      (b) <math>a</math> when <math>T = 130</math>, <math>n = 25</math>, <math>d = 5</math></p> <p>(c) <math>d</math> when <math>T = 153</math>, <math>a = 9</math>, <math>n = 19</math>      (d) <math>n</math> when <math>T = 62</math>, <math>a = 6</math>, <math>d = 4</math></p>	56, 57

## LEVEL 2 — EQUATIONS

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

	Page																						
<p>Q1. Solve these equations:</p> <p>(a) <math>3x - 8 = 6x + 4</math>    (b) <math>4p + 7 = 6p - 11</math>    (c) <math>9 + 10x = 15x + 7</math>                      (d) <math>12 - 5a = 3a + 2</math>    (e) <math>4b - 9 = -2b - 5</math>    (f) <math>16 - 3a = 8 - 5a</math>                      (g) <math>2(5 - 2x) = -1(7x + 5)</math>    (h) <math>5(3m - 8) = 4(3m - 4)</math>                      (i) <math>6(3 - 2y) = 2(3y + 4)</math></p>	48, 49																						
<p>Q2. Solve for <math>x</math>:</p> <p>(a) <math>\frac{x}{3} - \frac{x}{4} = 2</math>    (b) <math>\frac{2x}{5} + \frac{x}{2} = 3</math>    (c) <math>\frac{3x+1}{2} - 3 = -7</math>                      (d) <math>\frac{6}{2x} + \frac{5}{x} = 2</math>    (e) <math>\frac{4}{3x-2} = -2</math>    (f) <math>\frac{6}{5x+3} + 4 = 8</math></p>	50																						
<p>Q3. Solve these inequations and graph them on a number line:</p> <p>(a) <math>\frac{x}{9} + \frac{x}{6} &lt; 5</math>    (b) <math>x - \frac{x}{3} &gt; 4</math>    (c) <math>2x + \frac{2x}{3} \leq 2</math>                      (d) <math>\frac{x-1}{2} &lt; \frac{x+5}{5}</math>    (e) <math>\frac{x+2}{3} &gt; \frac{2x+3}{4}</math>    (f) <math>\frac{4-3x}{3} \geq \frac{3x+4}{2}</math></p>	52, 53																						
<p>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?</p>	54, 55																						
<p>Q5. Given the equation <math>X = \frac{1}{x^2} - \frac{1}{y^2}</math> find:</p> <p>(a) <math>X</math> when <math>x = \frac{1}{5}</math>, <math>y = \frac{1}{4}</math>    (b) <math>x</math> when <math>X = 11\frac{1}{4}</math>, <math>y = -\frac{1}{3}</math>                      (c) <math>y</math> when <math>X = 1\frac{3}{4}</math>, <math>x = \frac{1}{2}</math></p>	56, 57																						
<p>Q6. In the following equations make the letter shown in brackets the subject of the equation:</p> <p>(a) <math>x = y - z</math> [<math>z</math>]    (b) <math>V = \frac{Ah}{3}</math> [<math>A</math>]    (c) <math>x = \frac{x_1 + x_2}{2}</math> [<math>x_2</math>]                      (d) <math>v^2 = u^2 + 2aS</math> [<math>a</math>]    (e) <math>A = \frac{1}{2}h(x+y)</math> [<math>x</math>]    (f) <math>A = 4\pi r^2</math> [<math>r</math>]</p>	57																						
<p>Q7. Find a formula for <math>M</math> in terms of <math>m</math> for each table:</p> <p>(a) <table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td><math>m</math></td><td>0</td><td>1</td><td>2</td><td>3</td></tr> <tr><td><math>M</math></td><td>4.2</td><td>10.2</td><td>16.2</td><td>22.2</td></tr> </table>    (b) <table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td><math>m</math></td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td></tr> <tr><td><math>M</math></td><td>0.5</td><td>2</td><td>3.5</td><td>5</td><td>6.5</td></tr> </table></p>	$m$	0	1	2	3	$M$	4.2	10.2	16.2	22.2	$m$	0	1	2	3	4	$M$	0.5	2	3.5	5	6.5	59
$m$	0	1	2	3																			
$M$	4.2	10.2	16.2	22.2																			
$m$	0	1	2	3	4																		
$M$	0.5	2	3.5	5	6.5																		

## LEVEL 3 — EQUATIONS

Q1. Solve for  $x$ :

$$\begin{array}{lll}
 \text{(a)} \quad \frac{1}{2}(8x-1) = \frac{1}{3}(6x+9) & \text{(b)} \quad \frac{5x-3}{6} = x+2 & \text{(c)} \quad \frac{x-1}{x+6} - 3 = 5 \\
 \text{(d)} \quad \frac{x+2}{4-x} + 2 = \frac{2}{3} & \text{(e)} \quad 4 - \frac{2x+3}{3-2x} = \frac{1}{2} & \text{(f)} \quad \frac{x-2}{3} + \frac{x+3}{2} = x \\
 \text{(g)} \quad \frac{3(4x-3)}{4} - \frac{2(3x+1)}{3} = \frac{5x}{4} & \text{(h)} \quad \frac{3x-1}{5} - \frac{2x+3}{4} = x-3 & \text{(i)} \quad \frac{5}{x} + x = \frac{9}{x}
 \end{array}$$

Q2. Solve these inequations:

$$\begin{array}{lll}
 \text{(a)} \quad \frac{x-6}{3} + \frac{2x}{5} > 1\frac{2}{3} & \text{(b)} \quad 1 + \frac{x+3}{3} < \frac{2x+5}{4} & \text{(c)} \quad \frac{2x+1}{2} \geq \frac{3x+4}{5} - 3 \\
 \text{(d)} \quad \frac{5-3x}{3} \geq \frac{x}{4} \text{ for } \{x > -2\} & \text{(e)} \quad \frac{2(2x+5)}{5} - 2 < 1 \text{ for } \{x \leq 1\}
 \end{array}$$

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

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

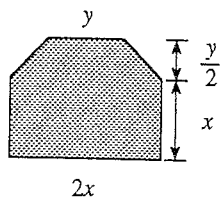
Q4. Solve each of these equations for the letter shown in brackets:

$$\begin{array}{lll}
 \text{(a)} \quad T = \frac{n}{2}[2a + (n-1)d] \quad [d] & \text{(b)} \quad z = \frac{1}{x} + \frac{1}{y} \quad [x] & \text{(c)} \quad \frac{a+b}{4} = \frac{b+c}{3} \quad [b] \\
 \text{(d)} \quad X = \sqrt{\frac{x+y}{z}} \quad [y] & \text{(e)} \quad \frac{b}{a} = \frac{a+b}{c+2} \quad [b] & \text{(f)} \quad y = \frac{x}{x-a} \quad [x]
 \end{array}$$

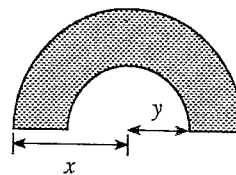
- Q5. (a) A rectangular lawn, with length  $x$  m and width  $y$  m in the ratio  $8 : 3$ , is surrounded on all sides by a path 80 cm wide. The outer perimeter of the path is 50.4 m. Find the area of the lawn.
- (b) An inheritance of \$191 576 is to be shared between three charities, X, Y and Z, in 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)  $124.71 \text{ cm}^2$  (b)  $245.66 \text{ cm}^2$  (c)  $56.58 \text{ cm}^2$   
Q3. (a)  $237.8 \text{ cm}^3$  (b)  $268.1 \text{ cm}^3$  (c)  $1000 \text{ cm}^3$   
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)  $+3, +2$  (e)  $\times 6, -3$   
(f)  $-8, \times -4$  (g)  $-9, +5$  (h)  $-8, +9$   
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)  $x = \frac{1}{2}$  (c)  $x = -1$  (d)  $x = 3$  (e)  $x = -2$  (f)  $x = \frac{3}{4}$   
Q4. (a)  $x = 4$  (b)  $x = \frac{1}{2}$  (c)  $x = -2$  (d)  $x = \frac{1}{3}$  (e)  $x = 5$  (f)  $x = 11\frac{1}{2}$   
Q5. (a)  $x = 36$  (b)  $x = 8$  (c)  $x = -26$  (d)  $x = 18$  (e)  $x = 21$  (f)  $x = -30$   
Q6. (a)  $x > 5$  (b)  $x \leq \frac{1}{3}$  (c)  $x > \frac{1}{2}$  (d)  $x \geq 10$  (e)  $x < 3$  (f)  $x > -15$   
Q7. (a)  $54^\circ, 90^\circ, 144^\circ, 72^\circ$  (b)  $10 \text{ cm} \times 6 \text{ cm}$   
Q8. (a)  $T = 38$  (b)  $a = 10$  (c)  $d = 8$  (d)  $n = 15$



## Level 2 — Equations

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

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

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

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

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

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

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

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

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

## Level 3 — Equations

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

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

Q2. (a)  $x > 5$  (b)  $x > 4\frac{1}{2}$  (c)  $x \geq -6\frac{3}{4}$  (d)  $-2 < x \leq 1\frac{1}{3}$  (e)  $x \leq 1$

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

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

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

Q5. (a)  $x = 16, y = 6 \therefore \text{Area} = 96 \text{ m}^2$  (b)  $x = 7, \$95\ 788$

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

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

Q7. (a)  $\sqrt{2} - 1$  (b)  $\frac{30 + 5\sqrt{3}}{33}$  (c)  $\frac{3\sqrt{5} - \sqrt{15}}{6}$  (d)  $\frac{21\sqrt{6} - 14}{52 - 50}$

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