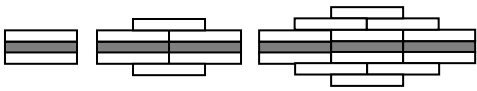


## L1 Algebra Trial #2

- Q1. a) Simplify:  $(3x^3)^3$
- b) Expand:  $2x(6y - x)$
- c) Simplify fully:  $(8x^2 + 4x) \div (4x^3 + 12x)$
- d) Simplify:  $\sqrt{16/x^2}$
- e) If a one two-scoop and one three-scoop ice-cream cost \$5, and two two-scoop and three three-scoop ice-creams cost \$12.75, how much does a two-scoop cost?
- f)  Write an equation for  $w$ , the number of white blocks, in terms of  $g$ , the number of grey blocks.

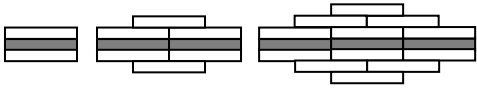
- Q2. a) Solve:  $\sqrt{x+2} = 5$
- b) Solve:  $x^3 - 7 = 20$
- c) Solve:  $4(x - 2) < 6(x + 4)$
- d) Write  $k$  in terms of  $x$ :  $\frac{8x^3}{k} = 2x$
- e) The parabola  $y = x^2 - 12x + 20$  has what as its minimum  $y$  value?
- f) Bill sat two tests and scored an average of 16. If he doubled his score in the second test his average would have gone up to 19.5. What did he score in the first test?

- Q3. a) Factorise:  $6x^2y - 3xy$
- b) Solve:  $2^x = 16$
- c) Simplify fully:  $\frac{x+5}{x^2+3x-10}$
- d) Solve:  $9x = x^2 - 22$
- e) Solve:  $\frac{1}{5} + \frac{x}{3} = \frac{x}{4}$
- f) A right angle triangle has a hypotenuse of 17.  
If the shortest side is 7 less than the other side, how long is the shortest side?

# L1 Algebra Trial #2 : Answers

In general terms: a) & b) are Achieved, c) & d) are Merit, e) & f) are Excellence

- Q1. a) Simplify:  $(3x^3)^3 = 3x^3 \times 3x^3 \times 3x^3 = 27x^9$
- b) Expand:  $2x(6y - x) = 12xy - 2x^2$
- c) Simplify fully:  $(8x^2 + 4x) \div (4x^3 + 12x) = \frac{4x \times (2x + 1)}{4x \times (x^2 + 3)} = \frac{2x + 1}{x^2 + 3}$
- d) Simplify:  $\sqrt{16/x^2} = \sqrt{16}/\sqrt{x^2} = \pm \frac{4}{x} \text{ or } \pm 4x^{-1}$
- e) If a one two-scoop and one three-scoop ice-cream cost \$5, and two two-scoop and three three-scoop ice-creams cost \$12.75, how much does a two-scoop cost?
- $2\textcircled{2} + 3\textcircled{3} = 5$  so  $3\textcircled{3} = 5 - 2\textcircled{2}$  and  $2\textcircled{2} + 3\textcircled{3} = 12.75$  (need to use equations)  
 So  $2\textcircled{2} + 3(5 - 2\textcircled{2}) = 12.75$   $-1\textcircled{2} + 15 = 12.75$   $\textcircled{2} = \$2.25$

- f)  Write an equation for  $w$ , the number of white blocks, in terms of  $g$ , the number of grey blocks.
- Pattern 2, 6, 12, 20, so increases by +4, +6, +8 so it is a quadratic pattern  
 $g^2$  is 1, 4, 9, 16 so off by 1, 2, 3 etc, =  $g$ . so  $w = g^2 + g$  or  $w = g(g + 1)$

- Q2. a) Solve:  $\sqrt{x+2} = 5$   $x + 2 = 25$   $x = 23$
- b) Solve:  $x^3 - 7 = 20$   $x^3 = 27$   $x = 3$
- c) Solve:  $4(x - 2) < 6(x + 4)$   $4x - 8 < 6x + 24$   
 $-8 - 24 < 6x - 4x$   $-32 < 2x$   $x > -16$
- d) Write  $k$  in terms of  $x$ :  $\frac{8x^3}{k} = 2x$   $k = 4x^2$
- e) The parabola  $y = x^2 - 12x + 20$  has what as its minimum  $y$  value?  
 $y = (x - 2)(x - 10)$  so intercepts at  $x = 2$  and  $10$ . min in middle at  $x = 6$   
 $y = 6^2 - 12 \times 6 + 20$   $y = -16$
- f) Bill sat two tests and scored an average of 16. If he doubled his score in the second test his average would have gone up to 19.5. What did he score in the first test?

$$\frac{a+b}{2} = 16 \text{ and } \frac{a+2b}{2} = 19.5 \text{ so } \textcircled{1} a + b = 32 \text{ and } \textcircled{2} a + 2b = 39$$

$$\textcircled{2} - \textcircled{1} \text{ gives } b = 7 \text{ so first test} = 25 \text{ (must have, and use, equations)}$$

- Q3. a) Factorise:  $6x^2y - 3xy = 3xy(2x + 1)$
- b) Solve:  $2^x = 16$   $x = 4$
- c) Simplify fully:  $\frac{x+5}{x^2+3x-10} = \frac{(x+5)}{(x-2)(x+5)} = \frac{1}{x-2}$
- d) Solve:  $9x = x^2 - 22$   $x^2 - 9x - 22 = 0$   $(x - 11)(x + 1) = 0$   $x = 11 \text{ or } -2$
- e) Solve:  $\frac{1}{5} + \frac{x}{3} = \frac{x}{4}$  multiply through by 60  $\frac{60}{5} + \frac{60x}{3} = \frac{60x}{4}$   
 $12 + 20x = 15x$   $12 = -5x$   $x = -2.4$

- f) A right angle triangle has a hypotenuse of 17. If the shortest side is 7 less than the other side, how long is the shortest side?

$$\text{Pythagoras gives } 17^2 = x^2 + (x + 7)^2 \quad 289 = x^2 + x^2 + 14x + 49$$

$$2x^2 + 14x - 240 = 0 \text{ (} \div 2 \text{ all through)} \quad x^2 + 7x - 120 = 0 \quad (x + 15)(x - 8) = 0$$

$$x = -15 \text{ or } 8, \text{ but } -15 \text{ not possible}$$

$$\text{short side} = 8$$