

Q1. a) Simplify fully:  $\frac{2x^2}{4x^3}$

b) Expand and simplify:  $(x - 5)(x - 6)$

c) Simplify fully:  $\frac{5x(x - 2)}{10x^2 + 20x}$

d) Simplify:  $\sqrt{81x^8}$

e) Make  $k$  the subject of the equation:  $x = \frac{7}{\sqrt{k+5}}$

f) The pattern 5, 10, 17, 26, ... is given by the rule  $t_n = (n + 1)^2 + 1$ . Show that the difference between one term and the next is given by: difference =  $2n + 3$

Q2. a) Factorise fully:  $x^2 - 2x - 15$

b) Solve:  $(x - 4)(x + 5) = 0$

c) Simplify fully:  $\frac{x^2 - 36}{x + 6}$

d) Solve:  $\frac{x + 11}{x + 5} = x + 1$

e)  $x^2 - 50x + 625 = 0$  has only one solution, at  $x = 25$ . Explain what that means in terms of graphing the relationship of  $y = x^2 - 50x + 625$ .

f) If  $ab^2 = 90$  and  $ab = 15$ , what is  $a$ ?

Q3. a) Solve:  $10x - 5 = 2x - 21$

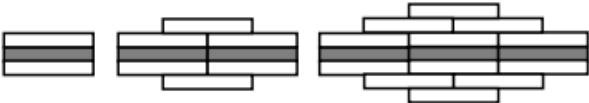
b) Expand and simplify:  $5(x + 3) - x(x - 2)$

c) Solve:  $2x - 3 < 6x + 5$

d) Solve:  $\frac{x + 4}{3} > x + 2$

e) Define  $k$  so that both these following statements are true:  
 $k$  plus 3 is greater than 8 **and** 9 minus  $k$  is greater than zero.

f) Find a number such that a third of it added to a fifth of it equals 8.

- 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.

- b) Expand and simplify:  $4(x + 3) - 7(x - 2)$
- c) Solve:  $4x - 7 < 9x + 4$
- d) Solve:  $\frac{x+1}{x+3} = 5$
- e) Solve the simultaneous equations:  $y = 2x - 8$  and  $y = 2 - 6x$
- f) Find two numbers ten apart, so the one divided by the other is equal to one-fifth.

Q3. a) Factorise fully:  $x^2 - 12x + 35$

b) Solve:  $(x + 3)(x - 2) = 0$

c) Simplify fully:  $\frac{x^2 + 3x - 10}{x^2 + 7x + 10}$

d) Solve:  $x^2 = 5x + 50$

e) What is the lowest possible value of  $y$  if  $y = x^2 + 4x - 32$ ?

- f) A rectangle has one side 6 cm longer than the other.  
If the area (in  $\text{cm}^2$ ) is twice its perimeter (in cm), how long is the longer side?

**1** Solve the following using 'factorisation':

**a**  $4x^2 + 7x = 0$

**b**  $6x^2 + 2x = 0$

**c**  $3x^2 - 7x = 0$

**d**  $2x^2 - 11x = 0$

**e**  $3x^2 = 8x$

**f**  $9x = 6x^2$

- 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?

### 3 Solve for $x$ :

**a**  $(x+1)^2 = 2x^2 - 5x + 11$

**b**  $(x+2)(1-x) = -4$

**c**  $5 - 4x^2 = 3(2x+1) + 2$

**d**  $x + \frac{2}{x} = 3$

**e**  $2x - \frac{1}{x} = -1$

**f**  $\frac{x+3}{1-x} = -\frac{9}{x}$

### 2 Solve the following using factorisation:

**a**  $9x^2 - 12x + 4 = 0$

**b**  $2x^2 - 13x - 7 = 0$

**c**  $3x^2 = 16x + 12$

**d**  $3x^2 + 5x = 2$

**e**  $2x^2 + 3 = 5x$

**f**  $3x^2 = 4x + 4$

**a** Factorise:  $6x^2y - 3xy$

**b** Solve:  $2^x = 16$

**c** Simplify fully:  $\frac{x+5}{x^2+3x-10}$

**d** Simplify fully:  $\frac{7x}{25} - \frac{9}{0x+25}$

**e** Simplify fully:  $\frac{12x+4}{12x+4}$

**c**  $4x^2 - 10x$

**f**  $16x^2 - 1$

**i**  $4x^2 - 20$

**l**  $2x^2 - 8x + 8$

**o**  $x^2 - 22x + 121$


Q3. **a** Simplify:  $10x \cdot 2y^2 \div 5x^2y$

**b** Expand:  $(3-x)(4-x)$

**c** Simplify to one fraction:  $\frac{3}{x} + \frac{1}{2x}$

**d** Make  $k$  the subject:  $y = (k-2)^2$

**e** Steve is two years older than Bill. If their ages multiplied is 440, how old is Steve?

- Q1. a) Solve:  $10x + 13 = 3x - 8$
- b) Solve:  $x^5 = 100,000$
- c) Solve:  $3x + 7 \geq 7x - 11$
- d) Solve:  $x(x + 2) = 5(x + 2)$
- e) Solve:  $\frac{2}{x} + x = 3$
- f)  Three equal sized rectangular fields are made with 120m of fencing. If their total area is  $400 \text{ m}^2$ , what are the dimensions of the fields?
- Q2. a) Factorise:  $x^2 - 8x + 16$
- b) Find  $P = \frac{2a+b}{a+2b}$  if  $a = 5$  and  $b = -2$ :
- c) Simplify fully:  $\frac{2x^2 + 10x}{4x}$
- d)  $x^2 + ax + 10 = (x + b)(x + c)$  where  $b$  and  $c$  are integers. What values can  $a$  have?
- e) An adult ticket and a child ticket cost \$22.50 and two adult tickets and three child tickets cost \$52.50. How much is a child ticket?
- Q3. a) Simplify:  $10x \cdot 2y^2 \div 5x^2y$
- b) Expand:  $(3 - x)(4 - x)$
- c) Simplify to one fraction:  $\frac{3}{x} + \frac{1}{2x}$
- d) Make  $k$  the subject:  $y = (k - 2)^2$
- e) Steve is two years older than Bill. If their ages multiplied is 440, how old is Steve?

1 Fully factorise:

**a**  $3x^2 + 9x$

**d**  $6x^2 - 15x$

**g**  $2x^2 - 8$

**j**  $x^2 - 8x + 16$

**m**  $16x^2 + 40x + 25$

**b**  $2x^2 + 7x$

**e**  $9x^2 - 25$

**h**  $3x^2 - 9$

**k**  $x^2 - 10x + 25$

**n**  $9x^2 + 12x + 4$

**c**  $4x^2 - 10x$

**f**  $16x^2 - 1$

**i**  $4x^2 - 20$

**l**  $2x^2 - 8x + 8$

**o**  $x^2 - 22x + 121$