



1

Factorise

a. $8x - 12$

b. $14 + 21y$

(2 marks)

a)

HCF of 8 and 12 is 4

$$8x \div 4 = 2x \quad 12 \div 4 = 3$$

$$\boxed{4(2x - 3)}$$

b)

HCF of 14 and 21 is 7

$$14 \div 7 = 2 \quad 21y \div 7 = 3y$$

$$\boxed{7(2 + 3y)}$$

2

Factorise fully

a. $x^2 + 7x$

b. $5p^2 - 5p$

(2 marks)

a)

Common factor: x

$$\boxed{x(x + 7)}$$

b)

Common factor: $5p$

$$5p^2 \div 5p = p \quad 5p \div 5p = 1$$

$$\boxed{5p(p - 1)}$$

3

a. Expand $4(2x - 5)$ b. Factorise $6y + 15$

(2 marks)

a) 4 times $2x = 8x$ and 4 times $-5 = -20$, so $8x - 20$ b) The highest common factor of $6y$ and 15 is 3

$$6y + 15 = 3(2y + 5)$$

Factorising reverses expanding: divide every term by the common factor to find what belongs inside the bracket, then expand again to check

4

Mia says that $12x - 18 = 3(4x - 6)$.a. Expand $3(4x - 6)$ to check that she is right.b. Mia has not factorised fully. Write $12x - 18$ fully factorised.

(3 marks)

a)

$$3 \times 4x = 12x$$

$$3 \times (-6) = -18$$

$$3(4x - 6) = 12x - 18 \checkmark$$

b)

 $4x - 6$ has a factor 2 leftHCF of 12 and 18 is 6

$$\boxed{6(2x - 3)}$$

5

Factorise $6x - 15$. Hence, or otherwise, solve $6x - 15 = 3$.

(3 marks)

$$6x - 15 = 3(2x - 5)$$

$$\begin{array}{rcl}
 3(2x - 5) & = & 3 \\
 \div 3 & & \div 3 \\
 2x - 5 & = & 1 \\
 +5 & & +5 \\
 2x & = & 6 \\
 \div 2 & & \div 2 \\
 x & = & 3
 \end{array}$$

$$\boxed{x = 3}$$

6

- a. Expand and simplify $3(x + 4) + 2(x - 1)$.
 b. Factorise your answer to part (a).
 c. Solve $3(x + 4) + 2(x - 1) = 30$.

(4 marks)

a)

$$= 3x + 12 + 2x - 2$$

$$5x + 10$$

b)

HCF of 5 and 10 is 5

$$5(x + 2)$$

c)

$$\begin{array}{rcl} 5x + 10 & = & 30 \\ -10 & & \\ \hline 5x & = & 20 \\ \div 5 & & \div 5 \\ \hline x & = & 4 \end{array}$$

$$x = 4$$

7

- a. Factorise $5x + 20$
 b. Factorise $x^2 - 9x$

(2 marks)

a) The highest common factor of $5x$ and 20 is 5 , so $5x + 20 = 5(x + 4)$

b) Both terms contain x , so $x^2 - 9x = x(x - 9)$

8

Factorise $4x + 12$. Hence, or otherwise, solve $\frac{4x + 12}{8} = 5$.

(3 marks)

$$4x + 12 = 4(x + 3)$$

$$\begin{array}{rcl} \frac{4(x + 3)}{8} & = & 5 \\ \hline x + 3 & = & 5 \\ \hline \times 2 & & \times 2 \\ x + 3 & = & 10 \\ -3 & & -3 \\ \hline x & = & 7 \end{array}$$

Check: $(28 + 12) \div 8 = 5 \checkmark$

$$x = 7$$

- 9 Factorise fully $10x - 25$. Hence solve the inequality $10x - 25 < 15$. Describe how you would show your answer on a number line.

(4 marks)

$$10x - 25 = 5(2x - 5)$$

$$\begin{array}{lcl} & = & 5(2x - 5) < 15 \\ \div 5 & = & 2x - 5 < 3 \\ + 5 & = & 2x < 8 \\ \div 2 & = & x < 4 \end{array}$$

Open circle at 4, arrow to the left

$$x < 4$$

- 10 a. Sam expands $3(2x + 4)$ and gets the answer $6x + 4$.
Explain the mistake Sam has made.

b. Factorise fully $12x^2 + 18x$

(3 marks)

a) Every term inside the bracket must be multiplied by 3

$$3(2x + 4) = 6x + 12, \text{ not } 6x + 4$$

b) The highest common factor of $12x^2$ and $18x$ is $6x$

$$12x^2 + 18x = 6x(2x + 3)$$

- 11 The area of a rectangle is $(12x^2 + 18x) \text{ cm}^2$. The width of the rectangle is $6x \text{ cm}$.
Factorise $12x^2 + 18x$ fully and use it to find an expression for the length of the rectangle.

(4 marks)

HCF of $12x^2$ and $18x$ is $6x$

$$12x^2 \div 6x = 2x \quad 18x \div 6x = 3$$

$$12x^2 + 18x = 6x(2x + 3)$$

Area = width $\times$ length, width = $6x$

$$\text{Length} = (2x + 3) \text{ cm}$$

- 12 a. Expand and simplify $(y - 3)(y - 8)$
b. Factorise fully $4a^2b + 6ab^2$

(4 marks)

$$a) (y - 3)(y - 8) = y^2 - 8y - 3y + 24$$

Collect like terms: $y^2 - 11y + 24$

b) The highest common factor of $4a^2b$ and $6ab^2$ is $2ab$

$$4a^2b + 6ab^2 = 2ab(2a + 3b)$$

13

- a. Expand and simplify $5(2x + 1) - 3(x - 4)$
 b. Factorise fully $18x^2 - 27x$
 c. Simplify $(p^2)^5$

(5 marks)

$$a) 5(2x + 1) = 10x + 5 \text{ and } -3(x - 4) = -3x + 12$$

$$10x + 5 - 3x + 12 = 7x + 17$$

b) The highest common factor of $18x^2$ and $27x$ is $9x$

$$18x^2 - 27x = 9x(2x - 3)$$

c) Multiply the indices

$$p^{(2 \times 5)} = p^{10}$$

14

- a. Solve $2(3x + 4) = 5x + 17$
 b. Factorise fully $6y^2 + 9y$

(4 marks)

a) Expand

$$\begin{array}{rcl} 6x + 8 & = & 5x + 17 \\ -5x & & \\ \hline x + 8 & = & 17, \text{ so } x = 9 \end{array}$$

Check

$$2(27 + 4) = 62 \text{ and } 5(9) + 17 = 62$$

b) The highest common factor of $6y$ squared and $9y$ is $3y$

$$6y^2 + 9y = 3y(2y + 3)$$

15

- a. Expand $3x(2x - 5)$
 b. Factorise fully $20a^2b - 8ab$
 c. Make x the subject of $y = 4x - 7$

(6 marks)

$$a) 3x \text{ times } 2x = 6x^2 \text{ and } 3x \text{ times } -5 = -15x, \text{ so } 6x^2 - 15x$$

b) The highest common factor of $20a^2b$ and $8ab$ is $4ab$

$$20a^2b - 8ab = 4ab(5a - 2)$$

c) Add 7 to both sides

$$\begin{array}{rcl} y + 7 & = & 4x \\ \div 4 & & \\ \hline x & = & \frac{y + 7}{4} \end{array}$$

16

- a. Expand and simplify $(2x + 3)(x + 4)$
b. Factorise fully $10y^2 - 15y$
c. Solve $4(2x - 1) = 3x + 16$

(6 marks)

$$a) (2x + 3)(x + 4) = 2x^2 + 8x + 3x + 12$$

Collect like terms: $2x^2 + 11x + 12$

b) The highest common factor of $10y^2$ and $15y$ is $5y$

$$10y^2 - 15y = 5y(2y - 3)$$

c) Expand

$$8x - 4 = 3x + 16$$

Subtract $3x$

$$5x - 4 = 16$$

Add 4

$$5x = 20, \text{ so } x = 4$$

Check

$$4(8 - 1) = 28 \text{ and } 3(4) + 16 = 28$$