

## Foundation Check In - 6.01 Algebraic expressions

1. Express the following as a simplified single expression.

$$(2x + 3) - (x - 2)$$

2. Simplify the following algebraic expression.

$$x^2 \times 2x^5 \times x$$

3. Multiply out and simplify the following expression.

$$(x + 2)(3x - 1)$$

4. Factorise the following expression.

$$x^2 - 7x + 10$$

5. Express the following as a simplified single expression.

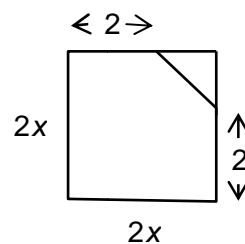
$$4x^4y^2 \div 2x^3y^2$$

6. Explain why  $x^2 - 6x + 9 \equiv (x - 3)^2$  is an identity but  $x^2 - 5x + 10 = (x - 3)^2$  is an equation.

7. The area of a rectangle is given as  $x^2 + 5x + 4$ . Show that the perimeter of the rectangle is  $2(2x + 5)$ .

8. Show that  $a\%$  of  $b$  is the same as  $b\%$  of  $a$ .

9. The diagram on the right shows a square with sides of length  $2x$ . Write down an expression for the area of the triangle marked on one corner.



10. The area of a chessboard is given as  $64x^2 - 256x + 256 \text{ cm}^2$ . Find an expression for the length of a single square on the board.

### Extension

- 1, 1, 2, 3, 5... and 2, 5, 7, 12, 19... are examples of Fibonacci sequences. Show that the sum of the first ten terms of any Fibonacci sequence is always  $11(5a + 8b)$  where  $a$  and  $b$  are the first 2 terms.



# GCSE (9–1) MATHEMATICS

## Answers

1.  $x + 5$
2.  $2x^8$
3.  $3x^2 + 5x - 2$
4.  $(x - 2)(x - 5)$
5.  $2x$
6.  $x^2 - 6x + 9 \equiv (x - 3)^2$  is an identity because it is true for all values of  $x$ , but  $x^2 - 5x + 10 = (x - 3)^2$  is an equation because it is only true when  $x = -1$ .
7.  $x^2 + 5x + 4 = (x + 4)(x + 1)$  so the length is  $x + 4$  and the width is  $x + 1$ , giving a perimeter of  $4x + 10 = 2(2x + 5)$ .
8.  $\frac{a}{100} \times b = \frac{ab}{100} = \frac{b}{100} \times a$
9. Area =  $\frac{1}{2}(2x - 2)(2x - 2) = 2x^2 - 4x + 2$
10. Factorising by the number of squares gives  $64(x^2 - 4x + 4)$ , then factorising again to find the length of the side of each square gives  $x^2 - 4x + 4 = (x - 2)(x - 2)$ . Side length is  $x - 2$  cm.

## Extension

$a, b, a + b, a + 2b, 2a + 3b, 3a + 5b, 5a + 8b, 8a + 13b, 13a + 21b, 21a + 34b$ .  
Sum of the first ten terms is  $55a + 88b = 11(5a + 8b)$ .

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Assessment Objective	Qu.	Topic	R	A	G
AO1	1	Simplify an algebraic expression by collecting like terms			
AO1	2	Simplify algebraic products using the laws of indices			
AO1	3	Expand and simplify a binomial product			
AO1	4	Factorise a quadratic expression into brackets			
AO1	5	Simplify algebraic quotients using the laws of indices			
AO2	6	Understand the difference between an equation and an identity			
AO2	7	Factorise and collect like terms to derive a length from an area			
AO2	8	Use algebra to generalise a mathematical concept			
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