

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.

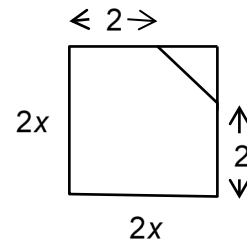
$$4x^4y^2 \div 2x^3y^2$$

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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