Foundation Check In - 6.01 Algebraic expressions

1. Express the following as a simplified single expression.

(2*x* + 3) – (*x* – 2)

1. Simplify the following algebraic expression.

*x*2 × 2*x*5 × *x*

1. Multiply out and simplify the following expression.

(*x* + 2)(3*x* – 1)

1. Factorise the following expression.

*x*2 – 7*x* + 10

1. Express the following as a simplified single expression.

4*x*4 *y*2 ÷ 2*x*3 *y*2

1. Explain why *x*2 – 6*x* + 9  (*x* – 3)2 is an identity but *x*2 – 5*x* + 10 = (*x* – 3)2 is an equation.
2. The area of a rectangle is given as *x*2 + 5*x* + 4. Show that the perimeter of the rectangle is 2(2*x* + 5).
3. Show that *a*% of *b* is the same as *b*% of *a.*



 





1. The diagram on the right shows a square with sides of length 2*x*. Write down an expression for the area of the triangle marked on one corner.
2. The area of a chessboard is given as 64*x*2 – 256*x* + 256 cm2. 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(5*a* + 8*b*) where a and *b* are the first 2 terms.

Answers

1. *x* + 5
2. 2*x*8
3. 3*x*2 + 5*x* – 2
4. (*x* – 2)(*x* – 5)
5. 2*x*
6. *x*2 – 6*x* + 9  (*x* – 3)2 is an identity because it is true for all values of *x*, but

*x*2 – 5*x* + 10 = (*x* – 3)2 is an equation because it is only true when *x* = -1.

1. *x*2 + 5*x* + 4 = (*x* + 4)(*x* + 1) so the length is *x* + 4 and the width is *x* + 1, giving a perimeter of 4x + 10 = 2(2*x* + 5).
2. 
3. Area = (2*x* – 2)(2*x* – 2) = 2*x*2 – 4*x* + 2
4. Factorising by the number of squares gives 64(*x*2 – 4*x* + 4), then factorising again to find the length of the side of each square gives *x*2 – 4*x* + 4 = (*x* – 2)(*x* – 2). Side length is *x* – 2 cm.

**Extension**

*a*, *b*, *a + b*, *a + 2b*, 2*a* + 3*b*, 3*a* + 5*b*, 5*a* + 8*b*, 8*a* + 13*b*, 13a *+* 21*b*, 21*a +* 34*b*.

Sum of the first ten terms is 55*a* + 88*b* = 11(5*a +* 8*b*).

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| **Assessment Objective** | **Qu.** | **Topic** | **R** | **A** | **G** |  | **Assessment Objective** | **Qu.** | **Topic** | **R** | **A** | **G** |
| AO1 | 1 | Simplify an algebraic expression by collecting like terms |  |  |  |  | AO1 | 1 | Simplify an algebraic expression by collecting like terms |  |  |  |
| AO1 | 2 | Simplify algebraic products using the laws of indices |  |  |  |  | AO1 | 2 | Simplify algebraic products using the laws of indices |  |  |  |
| AO1 | 3 | Expand and simplify a binomial product |  |  |  |  | AO1 | 3 | Expand and simplify a binomial product |  |  |  |
| AO1 | 4 | Factorise a quadratic expression into brackets |  |  |  |  | AO1 | 4 | Factorise a quadratic expression into brackets |  |  |  |
| AO1 | 5 | Simplify algebraic quotients using the laws of indices |  |  |  |  | AO1 | 5 | Simplify algebraic quotients using the laws of indices |  |  |  |
| AO2 | 6 | Understand the difference between an equation and an identity |  |  |  |  | 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 | 7 | Factorise and collect like terms to derive a length from an area |  |  |  |
| AO2 | 8 | Use algebra to generalise a mathematical concept |  |  |  |  | AO2 | 8 | Use algebra to generalise a mathematical concept |  |  |  |
| AO3 | 9 | Use algebra to solve a geometric problem |  |  |  |  | AO3 | 9 | Use algebra to solve a geometric problem |  |  |  |
| AO3 | 10 | Use algebra to solve a contextual geometric problem |  |  |  |  | AO3 | 10 | Use algebra to solve a contextual geometric problem |  |  |  |
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