

Y9 Maths Knowledge Organiser Topic 2: Algebraic Manipulation

<p>What must I be able to do?</p> <p>You may need to revise the following:</p> <ul style="list-style-type: none"> • Year 8 Topic 5: Solving Equations 2 • Year 7 Topic 7: Algebra Essentials <p>New content:</p> <ul style="list-style-type: none"> □ Know the meaning of the words variable, expression, equation, formula and identity <ul style="list-style-type: none"> ➤ Sparx M330 □ Write an algebraic expression 	<p>Key vocabulary</p> <p>Variable Usually represented by a <u>letter</u>, it can take a <u>range</u> of values.</p> <p>Formula A fact or rule which has <u>2 or more variables</u>, connected by an <u>equals sign</u>. If you know all but one of the variables you can use the formula to find the value of the final one.</p>
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Identify equations, expressions, formulae and identities

	Collection of terms with no equals sign		More than one variable and an equals sign	
	Expression	Equation	Formula	Identity
$3x + 4$	✓			
$3x + 4 = 12$		✓		
$P = 4x$			✓	
$3x + 12 \equiv 3(x + 4)$				✓

Has an equals sign and only one unknown. Can be solved.

Use of the identity symbol. Both sides are always true: no matter what value is chosen for the variable..

Recap of key skills from Y7 & 8

Collecting like terms

Collect terms with the same letter together by adding or subtracting them as appropriate

e.g. $x^2 + 3x + 5 - 2x^2 + 8x - 7$

$$x^2 - 2x^2 = -x^2$$

$$3x + 8x = 11x$$

$$+5 - 7 = -2$$

So we end with $-x^2 + 11x - 2$

Expanding/multiplying out brackets

Multiply all terms inside the bracket by the term in front of the bracket being careful with any negative numbers

e.g. $4(3a - 6) = 12a - 24$

as $4 \times 3a = 12a$ and $4 \times -6 = -24$

Factorising linear expressions

Factorising is the opposite of expanding a bracket. Look for the largest common factors of all terms and divide by these. The factors are put in front of the bracket.

e.g. $12x + 4 = 4(3x + 1)$
 12 and 4 have a HCF of 4

$$25x + 15 = 5(5x + 3)$$

25 and 15 have a HCF of 5

$$18a - 4y = 2(9a - 2y)$$

18 and -4 have a HCF of 2

Writing algebraic expressions

e.g. Jack buys n metres of ribbon. The ribbon costs £3 per metre.

(a) Write down an expression in terms of n for the cost, in pounds, of n metres of ribbon.

Sarah orders 5 pairs of trousers costing £ t each and 6 jumpers costing £ j each. The total cost of the order is £108

(b) Write down an equation in terms of t and j for the total cost of the order.

a) £3 for each metre of ribbon and n metres means the cost will be £3 x n . So the cost is just $3n$.

↑
The question asks for an expression so there is no = sign.

b) 5 pairs of trousers at £ t each is $5t$
 6 jumpers at £ j each is $6j$
 We know the total cost is £108, so

$$5t + 6j = £108$$

←
The question asks for an equation so there is an = sign.