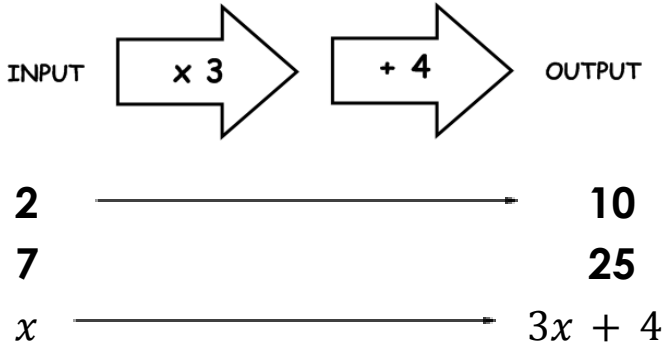
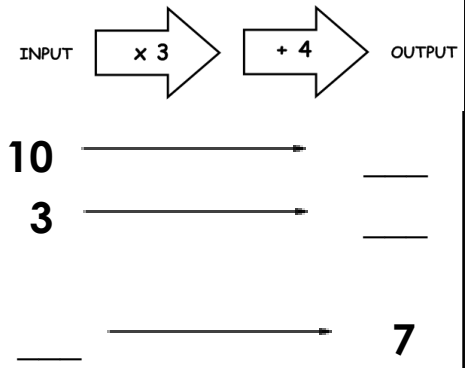
GCSE Mathematics - Unit 2: Expressions, Functions and Formulae **Name:……..**

Topic / Skill	Definition/Tips	Example	Your turn
Notation	**Variable-** A letter in an algebraic expression is called a **variable** because its value can change (vary) **Co-efficient** How many of the variable you have/a number multiplied by the variable **Power** How many times the variable is multiplied by itself	$3x = 3 \times x = x + x + x$ $3x^2$ **Co-efficient** **Variable** **Power** Remember that in **BIDMAS** powers come before multiplication: $3x^2 = 3 \times x \times x$	$3x^2 = 3 \times x \times x$ $2m =$ $2x^3 =$
Variables	You can multiply two variables together	$a \times b = ab$	$xy =$ $5x^2y =$
Expression	A mathematical statement written using **symbols**, **numbers** or **letters, no equal sign**	$3x + 2$ $5y2$ $a + b$	Tick the expressions $2m$ $3m2 + y$ $2x + y = 4$

Writing expressions	An algebraic expression is written using letters to stand for numbers	12 more than m: $m + 12$ The difference between 9 and f: $9 - f$	3 less than x : 4 lots of y :
Simplifying expressions			
Adding and Subtracting	**Collect 'like terms'.** **They are only like terms if they have the same letter and the same power.** If they are not like terms you can't simplify. Be careful with negatives.	$2x + x = 3x$ $2x - x = x$ $3x - x + 2x = 4x$ $a + b \quad Not\ like\ terms$ $a + a^2 \quad Not\ like\ terms$	Simplify if you can: $3y + y =$ $2x + y =$ $4m - m =$ $2x^2 + 3x^2 =$ $2x^2 + 2x =$ $4x - x - 3x$
Multiply and Divide Terms	Multiply: Put the numbers together, put each letter together	$a \times a \times a = a^3$ $2 \times 3 \times a \times a \times a \times b \times b = 6a^3b^2$	$a \times 3a =$ $3a^2 \times 2b =$ $9ab \times 2ab^2 =$

	Divide: Divide the number and cancel out the variables	$10a \div 2a = \frac{10 \times a}{2 \times a} = 5$ $\frac{6a^2b^3}{2a^2b} = \frac{6 \times a \times a \times b \times b \times b}{2 \times a \times a \times b} = 3b^2$	$3a \div a =$ $12a^3 \div 2a =$ $\frac{12a^4b^3}{2a^2b} =$
Function	A **function** is a relationship between 2 numbers The numbers that go into a function machine are called the **inputs**. The numbers that come out are called the **outputs**.		
Formula	Shows the **relationship** between **two or more variables**	Area of a rectangle = length × width $A = l \times w$	What does this formula stand for? (Clue: mph) $S = \frac{D}{T}$
Substitution	**Replace letters with numbers**.	$a = 3,\ b = 2\ and\ c = 5$ $3a - 2b + c = 3 \times 3 - 2 \times 2 + 5 = 10$	$a = 3,\ b = 2\ and\ c = 5$ $ab + c =$ $2bc - a^2 =$

Writing formulae	**Substitute letters for words** in the question.	Aisha is paid £8 per hour. Write a formula connecting the total he is paid P, with the number of hours worked, h. P = 8 × h	A taxi company charges £2 plus £10 per mile. Write a formula connecting the total price, P, with the number of miles m.
Expand Brackets	Multiply what is on the outside of the brackets by **everything on the inside.** Careful with negatives	$3(a + 2)$ $3 \times a \quad + \quad 3 \times 2$ $3a + 6$ --- $-2(a - b)$ $-2 \times a \quad - \quad -2 \times b$ $-2a + b$	$2(m + 1) =$ $a(b + 1) =$ $x(x + 2) =$ $2m(m + 3) =$ $3(-m + 2) =$
Factorise an Expression	Divide an expression by its **highest common factor** and put it into brackets. Make sure you divide **everything** on the inside	$3a + 6$ $3a = 3 \times a \qquad 6 = 2 \times 3$ 3 *is the HCF* $3(a + 2)$	$2m + 2 =$ $2m^2 + 2 =$ $2m^2 + 2m =$

	If you write each term into its prime factors this becomes much easier! $4a^2 = 2 \times 2 \times a \times a$ Then cross off all the common factors to get the HCF. What's left goes inside the bracket.	---------- $30a^2 + 12ab$ $30a^2 = 2 \times 3 \times 5 \times a \times a$ $12ab = 2 \times 2 \times 3 \times a \times b$ $6a \; is \; the \; HCF$ $6a(5a + 2b)$	$4m + 2a =$ $4m^2 + 2mb =$ $2m - 2 =$ $-2m + 2 =$ $-2m - 2 =$