Year 7 Autumn 2

Unit 3 Expressions, Functions and Formulae

Topic/Skill	Definition/Tips	Example
1. Expression	A mathematical statement written using **symbols**, **numbers** or **letters**,	$3x + 2$ or $5y^2$
2. Equation	A statement showing that **two expressions are equal**	$2y - 17 = 15$
3. Identity	An equation that is **true for all values** of the variables An identity uses the symbol: $\equiv$	$2x \equiv x + x$
4. Formula	Shows the **relationship** between **two or more variables**	Area of a rectangle = length x width or $A = L \times W$
5. Simplifying Expressions	**Collect 'like terms'.** Be careful with negatives. x^2 and x are not like terms.	$2x + 3y + 4x - 5y + 3 = 6x - 2y + 3$ $3x + 4 - x^2 + 2x - 1 = 5x - x^2 + 3$
6. x times x	The answer is x^2 not $2x$.	Squaring is multiplying by itself, not by 2.
7. $p \times p \times p$	The answer is p^3 not $3p$	If p=2, then p^3=2x2x2=8, not 2x3=6
8. $p + p + p$	The answer is 3p not p^3	If p=2, then 2+2+2=6, not $2^3 = 8$
9. Expand	To expand a bracket, **multiply** each term **in the bracket** by the expression **outside** the bracket.	$3(m + 7) = 3x + 21$
10. Factorise	The **reverse** of **expanding**. Factorising is writing an expression as a product of terms by **'taking out' a common factor**.	$6x - 15 = 3(2x - 5)$, where 3 is the common factor.
11. Solve	To find the **answer**/value of something **Use inverse operations** on both sides of the equation (balancing method) until you find the value for the letter.	Solve $2x - 3 = 7$ Add 3 on both sides $$2x = 10$$ Divide by 2 on both sides $$x = 5$$
12. Inverse	**Opposite**	The inverse of addition is subtraction. The inverse of multiplication is division.

13. Writing Formulae	**Substitute letters for words** in the question.	Bob charges £3 per window and a £5 call out charge. $$C = 3N + 5$$ Where N=number of windows and C=cost
14. Substitution	**Replace letters with numbers.** Be careful of $5x^2$. You need to square first, then multiply by 5.	$a = 3, b = 2$ and $c = 5$. Find: 1. $2a = 2 \times 3 = 6$ 2. $3a - 2b = 3 \times 3 - 2 \times 2 = 5$ 3. $7b^2 - 5 = 7 \times 2^2 - 5 = 23$

Try these

1 Complete the function machine.

a

input   output

4 →

? → +5 → 15

x →
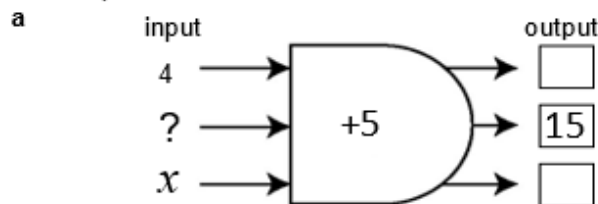
2 Jim thinks of a number. He adds 4 and then multiplies by 2. His answer is 24.
What number did Jim think of?

3 Simplify

a $4x + 3x$ ....

b $5y - y$ ....

c $2 \times 6n$ ....

4 Simplify $4t - 6t + 3t$

5 Tahir is h cm tall. Sienna is 4 cm shorter than Tahir.
Write an expression in terms of h for Sienna's height in centimetres.

6 A bag of sugar has a mass of 2 kg.
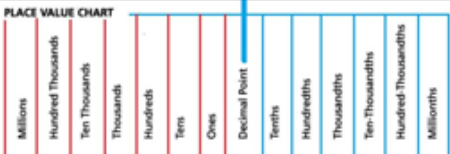Write an expression in terms of n for the total mass in kilograms of n bags of sugar.
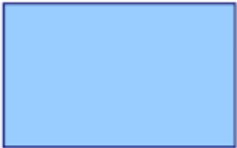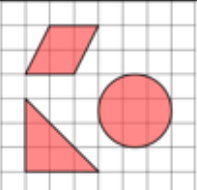
7 Multiply out the brackets.

a $6(x + 2)$

b $2(y - 3)$

8 Expand the brackets and simplify.

a $4(y + 1) + 3(y + 2)$

Unit 4 Decimal and measures

Topic/Skill	Definition/Tips	Example
1. Place Value	The **value** of where a **digit** is within a number.	In 726, the value of the 2 is 20, as it is in the 'tens' column.
2. Place Value Columns	The names of the columns that **determine the value of each digit**. The 'ones' column is also known as the 'units' column.	
3. Rounding	To make a number simpler but keep its value close to what it was. If the **digit to the right** of the rounding digit is **less than 5, round down**. If the **digit to the right** of the rounding digit is **5 or more, round up**.	74 rounded to the nearest ten is 70, because 74 is closer to 70 than 80. 152,879 rounded to the nearest thousand is 153,000.
4. Decimal Place	The **position** of a digit to the **right of a decimal point**.	In the number 0.372, the 7 is in the second decimal place. 0.372 rounded to two decimal places is 0.37, because the 2 tells us to round down. Careful with money - don't write £27.4, instead write £27.40
5. Metric System	A system of measures based on: - the metre for length - the kilogram for mass - the second for time **Length: mm, cm, m, km** **Mass: mg, g, kg** **Volume: ml, cl, l**	$1 kilometres = 1000\ metres$ $1\ metre = 100\ centimetres$ $1\ centimetre = 10\ millimetres$ $1\ kilogram = 1000\ grams$
6. Imperial System	A system of weights and measures originally developed in England, usually based on human quantities **Length: inch, foot, yard, miles** **Mass: lb, ounce, stone** **Volume: pint, gallon**	$1 lb = 16\ ounces$ $1\ foot = 12\ inches$ $1\ gallon = 8\ pints$
7. Metric and Imperial Units	Use the **unitary method** to convert between metric and imperial units.	$5\ miles \approx 8\ kilometres$ $1\ gallon \approx 4.5\ litres$ $2.2\ pounds \approx 1\ kilogram$ $1\ inch = 2.5\ centimetres$

1. Perimeter	The **total distance** around the **outside** of a shape. Units include: mm, cm, m etc.	 $P = 8 + 5 + 8 + 5 = 26cm$
2. Area	The amount of **space inside** a shape. Units include: mm^2, cm^2, m^2	
3. Area of a Rectangle	**Length x Width**	 $A = 36cm^2$

Try these

1 Round each of these numbers correct to 1 decimal place.
a 6.47 ....
b 4.849 ....
c 3.060 ....
2 a Change 4 metres to centimetres.
b Change 6.3 kilometres to metres.
c Change 7030 grams to kilograms
3 This shape is made from five identical square cards.
The side of each card has length 6 cm.
Work out
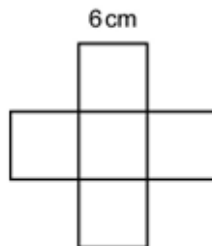
a the perimeter of the shape
b the area of the shape.

6 cm

4 In July, the mass of a rabbit was 1.9 kg.
The mass of the rabbit increased by 280 grams in August.
Work out the mass of the rabbit by the end of August.