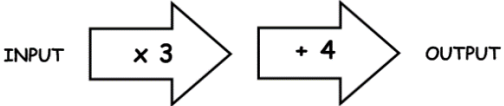


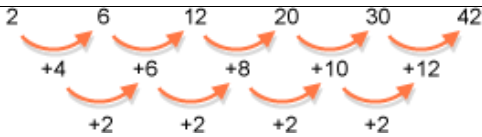
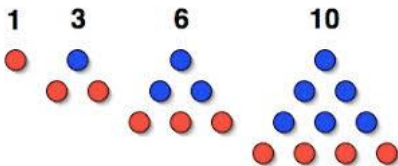
Topic: Algebra 1

Topic/Skill	Definition/Tips	Example
Key Vocabulary:		
Term	Either a single number or variable, or numbers and variables multiplied together	$4x$ or 7
Variable	A symbol , usually a letter , which represents a number which is usually unknown.	In the equation $x + 2 = 5$, x is the variable.
Expression	A mathematical statement written using symbols, numbers or letters	$3x + 2$ or $5y^2$
Equation	A statement showing that two expressions are equal	$2y - 17 = 15$
Identity	An equation that is true for all values of the variables An identity uses the symbol: $\equiv$	$2x \equiv x+x$
Formula	Shows the relationship between two or more variables	Area of a rectangle = length x width $A = L \times W$
Function	A special relationship where each input has a single output . It is often written as " f(x) " where x is the input value.	$f(x) = \frac{x}{2}$ ("f of x equals x divided by 2")
Square Terms	A term that is produced by multiply another term by itself.	If n is an integer: n^2, m^2 etc. are square integers
Sum	The sum of two or more numbers is the value you get when you add them together.	The sum of 4 and 6 is 10
Product	The product of two or more numbers is the value you get when you multiply them together.	The product of 4 and 6 is 24
Coefficient	A number used to multiply a variable . It is the number that comes before/in front of a letter.	$6z$ 6 is the coefficient z is the variable
Odds and Evens	An even number is a multiple of 2 An odd number is an integer which is not a multiple of 2 .	If n is an integer (whole number): An even number can be represented by $2n$ or $2m$ etc. An odd number can be represented by $2n-1$ or $2n+1$ or $2m+1$ etc.
Consecutive Integers	Whole numbers that follow each other in order.	If n is an integer: $n, n+1, n+2$ etc. are consecutive integers.
Algebra 1		

Simplifying Expressions	Collect 'like terms'. Be careful with negatives. x^2 and x are not like terms. x times x The answer is x^2 not $2x$. $p \times p \times p$ The answer is p^3 not $3p$ $p + p + p$ $4p^2 \times 3p^4$ The answer is $3p$ not p^3 Multiply the integers together, then use index laws for the powers: $4 \times 3 = 12$ $p^2 \times p^4 = p^6$	$2x + 3y + 4x - 5y + 3 = 6x - 2y + 3$ $3x + 4 - x^2 + 2x - 1 = 5x - x^2 + 3$ Squaring is multiplying by itself, not by 2. If $p=2$, then $p^3=2 \times 2 \times 2=8$, not $2 \times 3=6$ If $p=2$, then $2+2+2=6$, not $2^3 = 8$ $= 12p^6$
Expand	To expand a bracket, multiply each term in the bracket by the expression outside the bracket. If there is more than one bracket which are added /subtracted together, expand them separately and then simplify. Watch out for negatives here. -2×-2 becomes $+8$ when expanding the second bracket	$3(m + 7) = 3m + 21$ $3(m+7) - 2(m-4)$ $= 3m + 21 - 2m + 8$ Now collect like terms: $= 5m + 29$
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. $3x^2 - 12x$ Divide both terms by $3x$ to become: $3x (x - 4)$
Function Machine	Takes an input value, performs some operations and produces an output value.	
Function	A relationship between two sets of values.	$f(x) = 3x^2 - 5$ 'For any input value, square the term, then multiply by 3, then subtract 5'.
Function notation	$f(x)$ x is the input value $f(x)$ is the output value.	$f(x) = 3x + 11$ Suppose the input value is $x = 5$ The output value is $f(5) = 3 \times 5 + 11 = 26$
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. Golden Rules: Always do the same to one side of the $=$ as you do to the other Use the opposite operation to eliminate	Solve $2x - 3 = 7$ Add 3 on both sides $2x = 10$ Divide by 2 on both sides $x = 5$ Solve $2x^2 - 3 = 47$ Add 3 to both sides $2x^2 = 50$

		Now divide by 2 $x^2 = 25$ Now Square root $x = 5$
Inverse	Opposite	The inverse of addition is subtraction. The inverse of multiplication is division.
Solving equations from words	Fred Mary is 2 years older than Fred. Pete is twice as old as Mary. x $x + 2$ $2(x + 2)$ The sum of their ages is 38. How old is Fred? x $x + 2$ $2x + 4$ $x + x + 2 + 2x + 4 = 38$ $4x + 6 = 38$ $4x = 32$ $x = 8$	
Inequality	An inequality says that two values are not equal. $a \neq b$ means that a is not equal to b.	$7 \neq 3$ $x \neq 0$
Inequality symbols	$x > 2$ means x is greater than 2 $x < 3$ means x is less than 3 $x \geq 1$ means x is greater than or equal to 1 $x \leq 6$ means x is less than or equal to 6	State the integers that satisfy $-2 < x \leq 4$. -1, 0, 1, 2, 3, 4
Inequalities on a Number Line	Inequalities can be shown on a number line. Open circles are used for numbers that are less than or greater than ($<$ or $>$) Closed circles are used for numbers that are less than or equal or greater than or equal ($\leq$ or $\geq$)	
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: $2a = 2 \times 3 = 6$ $3a - 2b = 3 \times 3 - 2 \times 2 = 5$ $7b^2 - 5 = 7 \times 2^2 - 5 = 23$
Change the subject of an equation	Use inverse operations on both sides of the formula (balancing method) until you find the expression for the letter.	Make x the subject of $y = \frac{2x-1}{z}$ Multiply both sides by z $yz = 2x - 1$ Add 1 to both sides $yz + 1 = 2x$

		Divide by 2 on both sides $\frac{yz + 1}{2} = x$ We now have x as the subject.
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
<u>Sequences</u>		
Linear Sequence	A number pattern with a common difference .	2, 5, 8, 11... is a linear sequence
Term	Each value in a sequence is called a term.	In the sequence 2, 5, 8, 11..., 8 is the third term of the sequence.
Term-to-term rule	A rule which allows you to find the next term in a sequence if you know the previous term .	First term is 2. Term-to-term rule is 'add 3' Sequence is: 2, 5, 8, 11...
nth term	A rule which allows you to calculate the term that is in the nth position of the sequence. Also known as the 'position-to-term' rule. n refers to the position of a term in a sequence.	nth term is $3n - 1$ The 100 th term is $3 \times 100 - 1 = 299$
Finding the nth term of a linear sequence	1. Find the difference . 2. Multiply that by n . 3. Substitute $n = 1$ to find out what number you need to add or subtract to get the first number in the sequence .	Find the nth term of: 3, 7, 11, 15... 1. Difference is +4 2. Start with $4n$ 3. $4 \times 1 = 4$, so we need to subtract 1 to get 3. nth term = $4n - 1$
Fibonacci type sequences	A sequence where the next number is found by adding up the previous two terms	The Fibonacci sequence is: 1,1,2,3,5,8,13,21,34 ... An example of a Fibonacci-type sequence is: 4, 7, 11, 18, 29 ...

Geometric Sequence	A sequence of numbers where each term is found by multiplying the previous one by a number called the common ratio, r .	An example of a geometric sequence is: $2, 10, 50, 250 \dots$ The common ratio is 5 Another example of a geometric sequence is: $81, -27, 9, -3, 1 \dots$ The common ratio is $-\frac{1}{3}$
Quadratic Sequence	A sequence of numbers where the second difference is constant. A quadratic sequence will have a n^2 term.	
Triangular numbers	The sequence which comes from a pattern of dots that form a triangle. $1, 3, 6, 10, 15, 21 \dots$	
Where else is the Algebra topic used: Graphs Angles Measures Number Transformations		Links to other subjects: Computer programming Science DT