MATHEMATICS Unit 13: Solving equations and inequalities	Year Group: 7 set 4-5

Key Vocabulary

Unknown or variable	The value we are trying to find. This is typically represented by a letter of the alphabet, often *x*.
Equation	A piece of algebra with an equals sign and variables. These can often be solved. E.g. 2x + 3 = 7
Operations	Things that can be done to values, e.g. +, -, x, ÷, square and square root.
Solve	Find the value of the unknown variable(s).
Solution	The answer. The value for each unknown variable. E.g. in 2x + 3 = 7, x = 2.
Brackets	(and). In order to solve an equation, you might need to start by expanding brackets. E.g. 2(x + 3) = 9 2x + 6 =9 2x = 3 X = 1 ½
Substitute	Put the given value of the unknown into an equation. This can be used to check an answer. E.g. 2(x + 3) = 9, check the answer x = 1 ½ 2(1 ½ +3) = 2 x 4 ½ = 9, so x = 1 ½ is a correct solution.
Inequalities	>, <, ≥ and ≤

Key facts / Diagrams

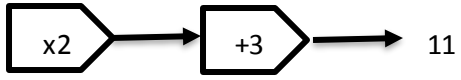
In order to solve an equation you must:

1. Do the same to BOTH sides of the equals sign
2. Remember the correct order of operations and work backwards to remove elements
3. Use the inverse of operations. To "remove" +2, you must -2 to each side

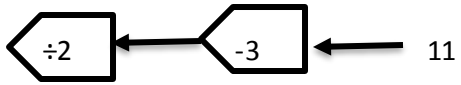
Remember that if algebraic methods are used correctly, problems can be solved in different ways:

2(x + 3) = 10 2x + 6 = 10
2x = 4 x = 2
OR
Start by dividing each side by 2
2(x + 3) = 10 x + 3 = 5
X = 2

Function Machines:
A method you can use to solve equations is to use function machines.
2a + 3 = 11



To solve, reverse the order and use the opposite function.



11-3 = 8 8÷2 = 4 answer a=4

Common misconceptions

- Assuming a=1, b=2, etc.
- Overlooking that the solution could be that the unknown is negative or a fraction
- Having problems with negative numbers, especially when the variable is preceded by a minus sign. E.g. 10 – 2x = 20
  Subtracting 10 from each side gives
  -2x = 10 NOT 2x =10

Worked examples

When the unknown appears on both sides, deal with the "lower" one first. E.g.:
5x + 3 = 2x + 15 (subtract 2 x from BOTH sides)
3x + 3 = 15 (subtract 3 from BOTH sides)
3x = 12 (divide by 3)
X = 4

With negatives more care is needed:
2x – 5 = 25 – 3x (-3x is "lower" than 2x, so start by adding 3x to BOTH sides)
5x – 5 = 25 (add 5 to BOTH sides)
5x = 30 (divide by 5)
X = 6