MATHEMATICS Unit 3: Solving equations and inequalities I and II	Year Group: 9 set 1-3

Key Vocabulary

Equation 5x + 2 = 17	An equation has an equals sign and means two things are equal to each-other. You solve an equation to find the unknown
Inequality 6x – 3 ≤ 18	An inequality is like an equation but has an inequality symbol rather than an equals. You solve the inequality to find an unknown.
Solve	Solve an equation or inequality means find the value of the unknown. Solve 4x-2=12, means find the value of x.
Simultaneous equations	Two equations with two unknowns to be solved.
Solution set	The set of values that solve an inequality. For example, x>5 is the set of numbers 6, 7, 8, 9,….
Integer	Positive and negative whole numbers For example, -12, 7, 32
Eliminate	The method used to solve a pair of simultaneous equations.

Key facts / Diagrams

Simultaneous equations

$7x + 3y = 22$ ①
$11x + 6y = 41$ ②

① × 2 $14x + 6y = 44$ ③
③ – ② $3x = 3$ ④
$x = 1$

$7 \times 1 + 3y = 22$
$3y = 22 - 7$
$3y = 15$
$y = 5$

Label the equations.

Make x or y the same , here y is made the same.

Add or subtract the equations to eliminate the variable that is the same and find the other variable, in this case x.

Substitute the variable found and solve to find the other variable, in this case y.

Inequalities

$2x - 4 < 18$
$+4 \quad +4$

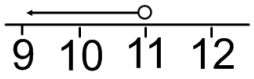
You solve inequalities just like you would solve equations.

$2x < 22$
$x < 11$

Here you add 4 to each side and then divide each side by 2.

The answer x<11 means x must be lesson than 11 (it cannot include 11).
Therefore the largest integer solution that x can be is 10.

The solution on a number line



The circle is clear for < and >
The circle is coloured in for ≤ and ≥

Common misconceptions

- Some pupils may not multiply all coefficients, or the constant, when multiplying an equation
- Some pupils may think that it is always right to eliminate the first variable (but you can eliminate either)
  Some pupils may struggle to deal with negative numbers correctly when adding or subtracting the equations
- Some pupils may think that it is possible to multiply or divide both sides of an inequality by a negative number with no impact on the inequality

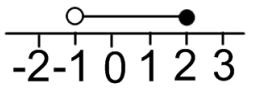
Worked examples

1. Use inequality notation to represent the following

   a) x is less than or equal to 5

   $x \leq 5$

   b)

   $-1 < x \leq 2$

2. Solve 5(2x – 3) ≥ 10 and state the smallest possible integer solution

   $10x - 15 \geq 10$
   $10x \geq 25$
   $x \geq 2.5$
   Smallest possible integer = 3