

YEAR 10 — DEVELOPING ALGEBRA...

Representing solutions of equations and inequalities

What do I need to be able to do?

By the end of this unit you should be able to:

- Form and solve equations and inequalities
- Represent and interpret solutions on a number line as inequalities
- Draw straight line graphs and find solutions to equations
- Form and solve equations and inequalities with unknowns on both sides

Keywords

Solution: a value we can put in place of a variable that makes the equation true

Variable: a symbol for a number we don't know yet

Equation: an equation says that two things are equal — it will have an equals sign =

Expression: numbers, symbols and operators grouped together to show the value of something

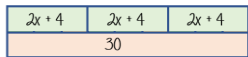
Identity: An equation where both sides have variables that cause the same answer includes \equiv

Linear: an equation or function that is the equation of a straight line

Intersection: the point that two lines meet

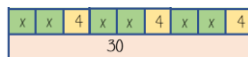
Inequality: an inequality compares two values showing if one is greater than, less than or equal to another.

Solve equations R



$$3(2x + 4) = 30$$

Expand the brackets



$$6x + 12 = 30$$

$$-12 \quad -12$$



$$6x = 18$$

$$-6 \quad -6$$



x
3

 $x = 3$

Substitute to check your answer.
This could be negative or a fraction or decimal

Form and solve inequalities R



Two more than treble my number is greater than 11

Form

$$x \rightarrow x3 \rightarrow +2 \rightarrow 11$$

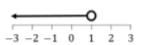
$$3x + 2 > 11$$

Solve

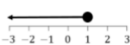
$$x \leftarrow -3 \leftarrow -2 \leftarrow 11$$

$$x > 3$$

Solutions on a number line



$x < 1$



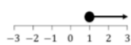
$x \leq 1$

Both represent values less than 1

Includes the value 1



$x > 1$



$x \geq 1$

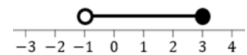
Both represent values more than 1

Includes the value 1

● Includes the value it sits above

○ Does NOT include the value it sits above

Values less than or equal to 3 but also more than -1



$$-1 < x \leq 3$$

This includes the integer values 0, 1, 2, 3

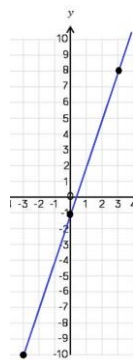
Plotting straight line graphs R

$$y = 3x - 1$$

Draw a table to display this information

x	-3	0	3
y	-10	-1	8

This represents a coordinate pair (-3, -10)



You only need two points to form a straight line

Plotting more points helps you decide if your calculations are correct (if they do make a straight line)

Remember to join the points to make a line

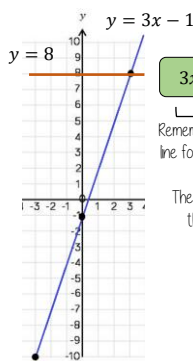
Find solutions graphically

For linear equations there is only one point the graph meets the x value

$$x = 2$$

$$y = 4$$

These two lines will cross at (2,4) because they are just x and y — they are parallel to axes and meet in one place



$$3x - 1 = 8$$

Remember equation of a line format is $y = mx + c$

The solution is the point the two lines meet **(3, 8)**

Equations: unknown on both sides R

$$8x + 5 = 4x + 13$$



$$8x + 5 = 4x + 13$$

$$-4x \quad -4x$$

$$4x + 5 = 13$$

$$-5 \quad -5$$

$$4x = 8$$

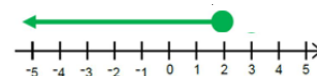
$$\div 4 \quad \div 4$$

$$x = 2$$

Inequalities: unknown on both sides

$$8x + 5 \leq 4x + 13$$

$$x \leq 2$$



Only value 2 or less will satisfy this inequality