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 ≡

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)

$3(2x + 4) = 30$

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Expand the brackets

$6x + 12 = 30$
$-12 \qquad -12$

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

$6x = 18$
$\div 6 \qquad \div 6$

$x = 3$

Form and solve inequalities (R)

Two more than treble my number is greater than 11

Form

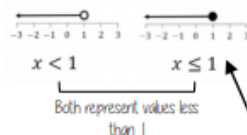$x \rightarrow \times 3 \rightarrow +2 \rightarrow 11$

$3x + 2 > 11$

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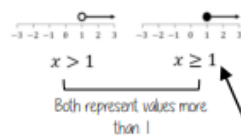
$x \leftarrow -3 \leftarrow -2 \leftarrow 11$

$x > 3$

Solutions on a number line

$x < 1$ $x \leq 1$

Both represent values less than 1
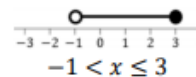
Includes the value 1

$x > 1$ $x \geq 1$

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

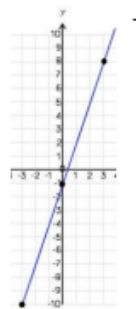$-1 < x \leq 3$

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

Plotting straight line graphs (R)

$y = 3x - 1$ → 3 × the x coordinate then – 1

x	–3	0	3
y	–10	–1	8

Draw a table to display this information

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)

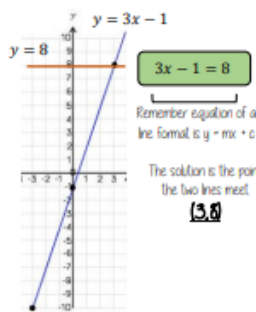Remember to join the points to make a line

Find solutions graphically

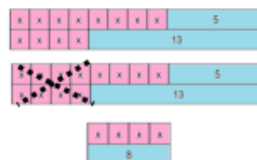For linear equations there is only one point the graph meets the x value

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

$x = 2$
$y = 4$

$y = 3x - 1$

$y = 8$

$3x - 1 = 8$

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)

$8x + 5 = 4x + 13$

$8x + 5 = 4x + 13$
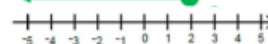$-4x \qquad -4x$
$4x + 5 = 13$
$-5 \qquad -5$
$4x = 8$
$\div 4 \qquad \div 4$
$x = 2$

Inequalities: unknown on both sides

$8x + 5 \leq 4x + 13 \rightarrow x \leq 2$

Only value 2 or less will satisfy this inequality