Year 10 – Developing Algebra
Representing solutions of equations & inequalities

Essential knowledge

- Form and solve equations and inequalities
- Represent inequalities on a number line
- Draw straight line graphs
- Form and solve equations and inequalities with unknowns on both sides

Key Vocabulary

Solution: a value 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
Expression: numbers, symbols etc grouped together to show a value
Linear: an equation or function that is the equation of a straight line
Identity: An equation that is true no matter what values are chosen
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.

Prior learning links

Understand & use algebraic notation (Y7)
Brackets, equations & inequalities (Y8)
Straight line graphs (Y9)
Forming & solving equations (Y9)

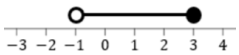
Form and solve inequalities

"Two more than treble my number is greater than 11"

Form: $x \rightarrow \times 3 \rightarrow +2 \rightarrow 11$ $\quad 3x + 2 > 11$
Solve: $x \leftarrow \div 3 \leftarrow -2 \leftarrow 11$ $\quad x > 3$

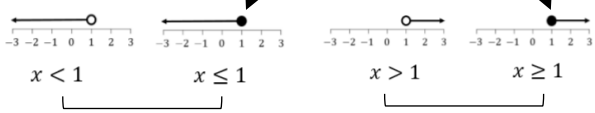
Solutions on a number line line

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



$-1 < x \leq 3$

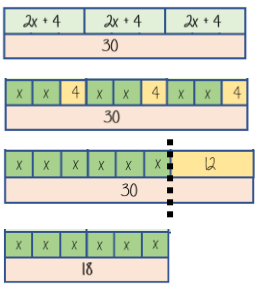
Includes the value 1



Both represent values less than 1

Both represent values more than 1

Solve equations



3 (2x + 4) = 30

6x + 12 = 30
-12 -12

6x = 18
÷ 6 ÷ 6

x
3

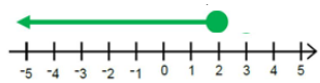
x = 3

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

Inequalities: unknown on both sides

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

$8x + 5 \leq 4x + 13$
$-4x \quad -4x$
$4x + 5 \leq 13$
$-5 \quad -5$
$4x \leq 8$
$\div 4 \quad \div 4$
$x \leq 2$



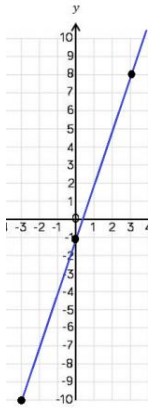
Any value of **2 or less** will satisfy this inequality

Plotting straight line graphs

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

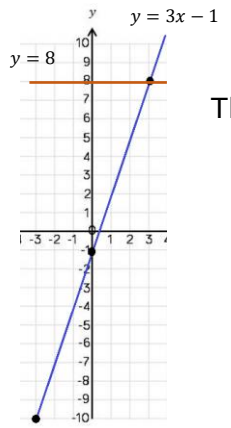
Draw a table to display the information

x	−3	0	3
y	-10	-1	8



You only need two points to form a straight line, but plotting more helps you decide if your calculations are correct (if they make a straight line).

Find solutions using straight line graphs



$x = 3$
$y = 8$

These two lines will cross at (3,8)

$3x - 1 = 8$

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

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

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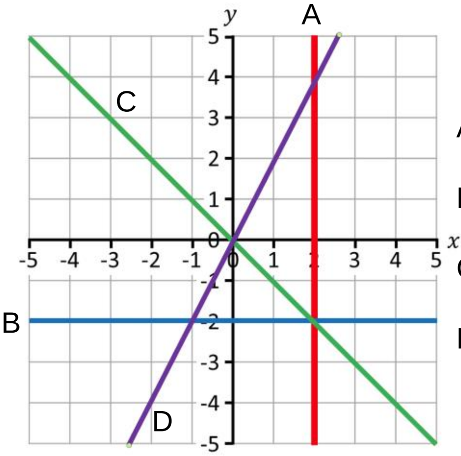
Prior learning links

State the equation of each line:



A) _______

B) _______

C) _______

D) _______

Key Vocabulary

Use cover, look, write, check to write the definitions …

Solution:

Variable:

Equation:

Expression:

Linear:

Identity:

Intersection:

Inequality:

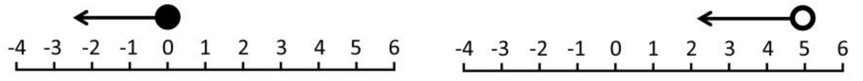
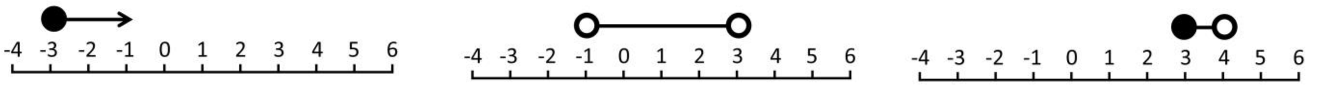
Form and solve inequalities

Form expressions for the following inequalities:

1. 5 more than double my number is greater than 11.
2. 3 less than half my number is less than 21.
3. Double my number plus three is less than 30.

Solutions on a number line

What inequalities do these diagrams represent?

Solve equations

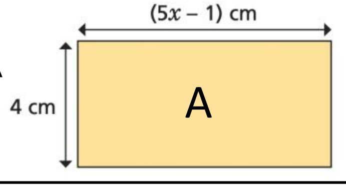
Solve the following one-step equations:

- $x - 4 = 5$
- $2x = 48$
- $\frac{w}{2} = 6$

Solve the following two-step equations:

- $2x + 3 = 9$
- $9x - 24 = 84$
- $\frac{n}{9} - 8 = 1$

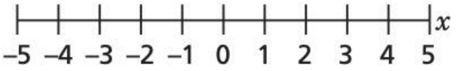
The area of rectangle A is 100cm^2. Work out the value of x



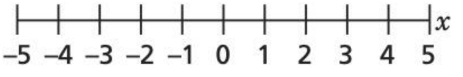
Inequalities: unknown on both sides

Solve the inequalities and represent your answers on the number lines.

$8x + 12 < 3x + 32$



$7m - 1 < 4m - 10$



Plotting straight line graphs

Complete the table of values for the equation:

$y = 2x + 5$

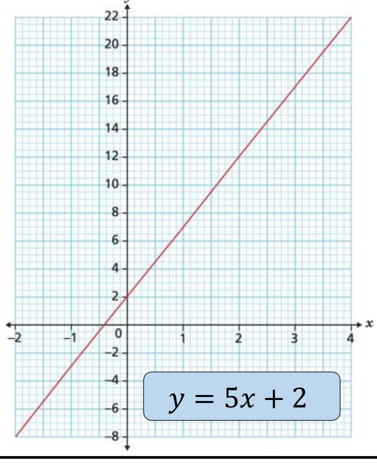
x	−3	−2	−1	0	1	2	3
y							

Complete the table of values for the equation:

$y = \frac{1}{2}x + 1$

x	−4	−3	−2	−1	0	1	2	3	4
y									

Find solutions using straight line graphs



Explain how this graph could be used to solve $5x + 2 = 11$

Use the graph to estimate the solution to $5x + 2 = 11$

Solve $5x + 2 = 11$ algebraically