

INEQUALITIES

Key Concepts

Inequalities show the **range** of numbers that satisfy a rule.

$x < 2$ means x is less than 2

$x \leq 2$ means x is less than or equal to 2

$x > 2$ means x is greater than 2

$x \geq 2$ means x is greater than or equal to 2

On a **number line** we use circles to highlight the key values:

○ is used for less/greater than
● is used for less/greater than or equal to

Examples

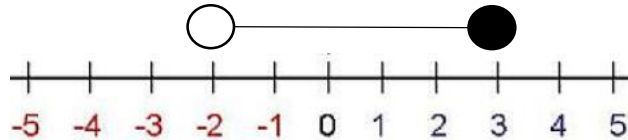
a) State the values of n that satisfy:

$$-2 < n \leq 3$$

Cannot be equal to 2 Can be equal to 3

-1, 0, 1, 2, 3

b) Show this inequality on a number line:



Solve this inequality and represent your answer on a **number line**:

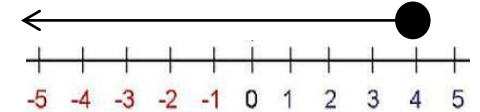
$$5x - 6 \leq 14$$

$$+6 \quad +6$$

$$5x \leq 20$$

$$\div 5 \quad \div 5$$

$$x \leq 4$$



Solve this inequality and represent your answer on a **number line**:

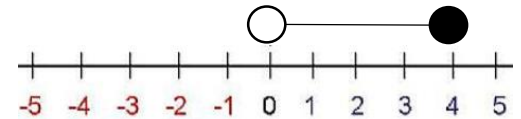
$$4 < 3x + 1 \leq 13$$

$$-1 \quad -1$$

$$3 < 3x \leq 12$$

$$\div 3 \quad \div 3$$

$$1 < x \leq 4$$



sparx

M384

M118

M732

Key Words

Inequality
Greater than
Less than
Represent
Number line

1) State the values of n that satisfy: $-3 \leq n < 2$

2) Solve $4x - 2 \leq 6$ and represent your answer on a number line

3) Solve $5 < 2x + 3 \leq 9$ and represent your answer on a number line

REARRANGE AND SOLVE EQUATIONS

Key Concepts

Solving equations:

Working with inverse operations to find the value of a variable.

Rearranging an equation:

Working with inverse operations to isolate a highlighted variable.

In solving and rearranging we **undo the operations** starting from the last one.

For each step in solving an equation we must do the **inverse** operation

Solve:

$$5(x - 3) = 20$$

Expand

$$5x - 15 = 20$$

$$+15 \quad 5x = 35 \quad +15$$

$$5x = 35$$

$$\div 5 \quad x = 7 \quad \div 5$$

$$x = 7$$

Solve:

$$12 = 3x - 18$$

$$+18 \quad 30 = 3x \quad +18$$

$$30 = 3x$$

$$\div 3 \quad x = 10 \quad \div 3$$

$$x = 10$$

Solve:

$$7p - 5 = 3p + 3$$

$$-3p \quad 4p - 5 = 3 \quad -3p$$

$$4p - 5 = 3$$

$$+5 \quad 4p = 8 \quad +5$$

$$4p = 8$$

$$\div 2 \quad p = 2 \quad \div 2$$

$$p = 2$$

Examples

Rearrange to make r the subject of the formulae :

$$Q = \frac{2r - 7}{3}$$

$$\times 3 \quad 3Q = 2r - 7 \quad \times 3$$

$$3Q = 2r - 7$$

$$+7 \quad 3Q + 7 = 2r \quad +7$$

$$3Q + 7 = 2r$$

$$\div 2 \quad \frac{3Q + 7}{2} = r \quad \div 2$$

$$\frac{3Q + 7}{2} = r$$

Key Words

Solve
Rearrange
Term
Inverse
operation

1) Solve $7(x + 2) = 35$

2) Solve $4x - 12 = 28$

3) Solve $4x - 12 = 2x + 20$

4) Rearrange to make x the subject:

$$y = \frac{3x + 4}{2}$$

SIMULTANEOUS EQUATIONS

Key Concepts

Simultaneous equations are when **more than one equation** are given, which involve **more than one variable**. The variables have the **same value** in each equation.

Example

We need to make the y coefficients the same

$$\begin{array}{r} 3x + 2y = 18 \\ 3x - y = 9 \quad \times 2 \\ \hline 3x + 2y = 18 \\ 6x - 2y = 18 \quad + \\ \hline 9x = 36 \\ x = 4 \end{array}$$

↑

SSS – Same Sign Subtract
DSA – Different Sign Add

Substitute $x = 4$ into an original equation:

$$\begin{aligned} 3x + 2y &= 18 \\ (3 \times 4) + 2y &= 18 \\ 12 + 2y &= 18 \\ 2y &= 6 \\ y &= 3 \end{aligned}$$

Check in the other equation:

$$\begin{aligned} (3 \times 4) - 3 &= 9 \\ 12 - 3 &= 9 \end{aligned}$$

This is true therefore $x = 4$ and $y = 3$

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U760, U757,
U137

Key Words

Simultaneous
Substitution
Elimination
Linear

Solve each set of simultaneous equations:

1) $3x + 2y = 36$
 $5x + 4y = 64$

2) $3x + 2y = 4$
 $4x + 5y = 17$