

Knowledge Organiser - Forming and Solving Equations

What does forming equation mean?

Forming equation means to set up an equality (equation) by using the information provided to us in the question.

How do you solve a one-sided equation?

For example, solve:

$$3x = 12 \quad x=4$$

$$X + 4 = 6$$

$$X - 5 = 10$$

$$x / 5 = 6$$

How do you solve a two-step equation?

For example, solve:

$$2x + 4 = 16$$

$$3x - 2 = 16$$

$$20 = 4 - 2x$$

Give some examples of forming and solving equations where you have used bar modelling?

What does solving equation mean?

Solving equations means to work out the value of the variable (unknown) in the equation.

How do you use inverse operations to solve an equation?

How do you solve an equation with unknown on both sides or equations with brackets?

For example,
solve: $5x + 4 = 2x - 5$
 $5(x + 4) = 3(x + 2)$

Give an example of using a function machine to solve equations.

Key Words

Equality
Equation
Solve
Inverse
Unknown
Term
Form
Variable
Identity

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Unknown: A letter which represents a number we do not know the value of.
Terms: The numbers and letters in the expression or equation.

Solve: Find a numerical value that satisfies the equation

Inverse operation: The operation that reverses the effect of another operation e.g. subtraction in the inverse of addition

Inverse Operations

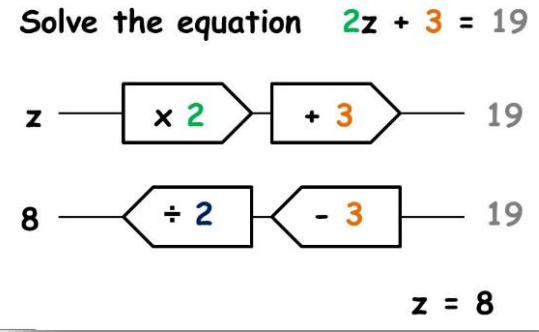
Operation	Inverse
+	-
-	+
x	÷
÷	x
x^2	\sqrt{x}

Tip

Answers can be:

- Integers
- Decimals
- Fractions
- negatives

Equations can be solved using FUNCTION MACHINES



Set up equations from word problems

Jenny, Kenny, and Penny together have 51 marbles. Kenny has double as many marbles as Jenny has, and Penny has 12. How many does Jenny have?

Set up an equation then solve

Jenny's + Kenny's + Penny's = 51

$$n + 2n + 12 = 51$$

$$3n + 12 = 51$$

-12

$$3n = 39$$

÷3

$$n = 13$$

An inverse operation is an operation that reverses the effect of another operation.

Examples:

The inverse of addition is subtraction.
 Start with 5 and add 2: we get 7. Subtract 2 and we get back to 5.

$$5 + 2 = 7$$

Inverse: $7 - 2 = 5$

The inverse of subtraction is addition.

$$9 - 6 = 3$$

Inverse: $3 + 6 = 9$

The inverse of multiplication is division.

$$5 \times 3 = 15$$

Inverse: $15 \div 3 = 5$

The inverse of division is multiplication.

$$30 \div 5 = 6$$

Inverse: $6 \times 5 = 30$

To solve a linear equation you find the value of the unknown by isolating it on one side of the equals sign (making it the subject).

To solve equations you use inverse operations.

Example Solve $x + 5 = 18$

$$\begin{array}{r} x + 5 = 18 \\ -5 \quad -5 \\ \hline x = 13 \end{array}$$

To solve we need to do the inverse of +5 which is -5.

Example Solve $x - 10 = -2$

$$\begin{array}{r} x - 10 = -2 \\ +10 \quad +10 \\ \hline x = 8 \end{array}$$

The inverse of -10 is +10

Example Solve $4x = 24$

$$\begin{array}{r} 4x = 24 \\ \div 4 \quad \div 4 \\ \hline x = 6 \end{array}$$

The inverse of multiplying by 4 is dividing by 4

Example Solve $\frac{x}{5} = 4$

$$\begin{array}{r} \frac{x}{5} = 4 \\ \times 5 \quad \times 5 \\ \hline x = 20 \end{array}$$

The inverse of dividing by 5 is multiplying by 5

Example Solve $3(2c - 7) = 9$

$$6c - 21 = 9$$

+21 +21

$$6c = 30$$

÷6 ÷6

$$c = 5$$

Expand any brackets first

Example Solve $7x - 6 = 2x + 19$

$$5x - 6 = 19$$

+6 +6

$$5x = 25$$

÷5 ÷5

$$x = 5$$

Rearrange by subtracting 2x. Always chose to resolve unknowns on both sides by 'eliminating' the 'smaller' one

