Knowledge Organiser: Equations and Inequalities

What you need to know:

Reading and Writing Inequalities

The list of integers for $-2 < x \leq 1$ is -1, 0, 1.

Check the symbols carefully, if they have the line underneath they include the end value.

Greater than $>$ | Greater than or equal to $\geq$

Less than $<$ | Less than or equal to $\leq$

Not equal to $\neq$

The arrow points in the same direction as the inequality.

An open circle means that the value is not included:

$x > 2$ — x is greater than 2

A filled in circle means that the value is included:

$x \geq 3$ — x is greater than or equal to 2

If x is between two values, use two circles:

$1 < x \leq 6$

x is greater than 1, but less than or equal to 6.

Solving one step equations/inequalities

To solve any equation or inequality we need to do the inverse of the operation that we see.

$t + 4 = 10$

$-4 \quad -4$

$t = 6$

The inverse of add is subtract and vice versa.

$c - 3 > 6$

$+3 \quad +3$

$c > 9$

$6y < 30$

$\div 6 \quad \div 6$

$y < 5$

The inverse of multiply is divide and vice versa.

$\frac{m}{7} = 4$

$\times 7 \quad \times 7$

$m = 28$

Key Terms:

Inverse: This is another word for opposite. We complete the opposite operation to the one shown in the question.
Integer: A whole number.
Equation: A mathematical statement that shows that two expressions are equal.
Inequality: They compare two values, showing if one is less than or greater than another value.
Solve: To get the solution or answer to a question.

Mathswatch clip numbers

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You need to be able to:

- Read an inequality.
- Represent an inequality on a number line.
- Solve one step equations and inequalities.
- Solve two step equations and inequalities.
- Solve equations and inequalities with brackets.
- Solve equations and inequalities with unknowns on both sides.

Knowledge Organiser: Equations and Inequalities

What you need to know:

Solving two step equations/inequalities

To solve a two step equation or inequality we need to complete 2 inverse calculations in a specific order.

$6y + 2 = 32$
$-2 \quad -2$
$6y = 30$
$\div 6 \quad \div 6$
$y = 5$

Subtract first because the 2 is separate from the y.

Divide because it is the inverse of multiplying.

$\frac{w-5}{3} \geq 4$
$x3 \quad x3$
$w - 5 \geq 12$
$+5 \quad +5$
$w \geq 17$

Multiply first because the entire expression is divided by 3.

Add because it is the inverse of subtracting.

Solving equations with brackets

We must expand the bracket first and then solve by doing the inverse of the operations. We use the same method for inequalities.

$3(2x + 5) = 39$

Expand brackets first.

$6x + 15 = 39$
$-15 \quad -15$
$6x = 24$
$\div 6 \quad \div 6$
$x = 4$

The inverse of +15 is -15.

The inverse of x 6 is ÷6.

Solving with unknowns on both sides

To solve an equation or inequality with unknowns on both sides we need to collect all of the same terms together, still by looking at the inverse.

$5x - 20 \leq 3x + 4$
$-3x \quad -3x$
$2x - 20 \leq 4$
$+20 \quad +20$
$2x \leq 24$
$\div 2 \quad \div 2$
$x \leq 12$

We subtract 3x from both sides because it is the smaller term of x.

Then solve like a normal two step equation.

$2x - 10 = 5x + 2$
$-2x \quad -2x$
$-10 = 3x + 2$
$-2 \quad -2$
$-12 = 3x$
$\div 3 \quad \div 3$
$-4 = x$

We subtract 2x from both sides because it is the smaller term of x.

Then solve like a normal two step equation.

Top tip: Always subtract/add the smaller number of terms to avoid getting a negative term at the end.