



30 - Inequalities

$>$ means 'Greater than' \geq means 'Greater than or equal to'
 $<$ means 'Less than' \leq means 'Less than or equal to'

REMEMBER — the one at the **BIG** end is **BIGGEST** so $x > 4$ and $4 < x$ both say: ' x is greater than 4'.

EXAMPLE: x is an integer such that $-4 < x \leq 3$. Write down all possible values of x .

Work out what each bit of the inequality is telling you:

$-4 < x$ means ' x is greater than -4 ',
 and $x \leq 3$ means ' x is less than or equal to 3'.

Now just write down all the values that x can take:

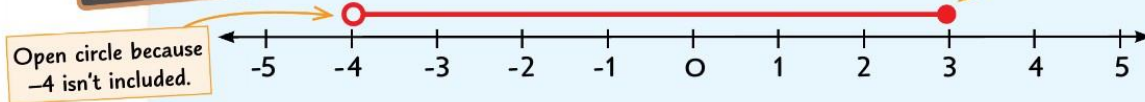
$-3, -2, -1, 0, 1, 2, 3$

Remember, integers are just whole numbers (+ve and -ve, including 0).

You Can Show Inequalities on Number Lines

Drawing inequalities on a **number line** is dead easy — all you have to remember is that you use an **open circle** (○) for $>$ or $<$ and a **coloured-in circle** (●) for \geq or \leq .

EXAMPLE: Show the inequality $-4 < x \leq 3$ on a number line.



Solving Inequalities

To solve inequalities you must follow the same rules that you follow for solving equations. (Instead of an equals sign you keep the inequalities sign)

EXAMPLES: 1. Solve $3x - 2 \leq 13$.

Just solve it like an equation — but leave the inequality sign in your answer:

$$\begin{aligned}
 (+2) \quad 3x - 2 + 2 &\leq 13 + 2 \\
 3x &\leq 15 \\
 (\div 3) \quad 3x \div 3 &\leq 15 \div 3 \\
 x &\leq 5
 \end{aligned}$$

2. Solve $2x + 7 > x + 11$.

Again, solve it like an equation:

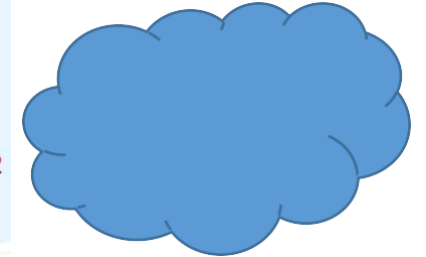
$$\begin{aligned}
 (-7) \quad 2x + 7 - 7 &> x + 11 - 7 \\
 \text{sign if } 2x &> x + 4 \\
 (-x) \quad 2x - x &> x + 4 - x \\
 \text{num } x &> 4
 \end{aligned}$$

3. Solve $9 - 2x > 15$.

Watch out for the sign change:

$$\begin{aligned}
 (-9) \quad 9 - 2x - 9 &> 15 - 9 \\
 -2x &> 6 \\
 (\div -2) \quad -2x \div -2 &< 6 \div -2 \\
 x &< -3
 \end{aligned}$$

The $>$ has turned into a $<$, because we divided by a **negative number**.



Linked Prior Topics

Solving equations.
Ordering numbers.

Vocabulary

- Inequality - Greater than
 - Less than - Equal too
 - Solve - Sign

Linked Future Topics

Graphical inequalities