Your notes

GCSE Maths: revision notes

Inequalities

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Inequality symbols

- < less than; > greater than; ≤ less than or equal to; ≥ greater than or equal to.
- $x > 3$ means x can be any number bigger than 3, but not 3 itself.

Number lines

- An open (empty) circle means the number is not included (for < and >).
- A filled (solid) circle means the number is included (for ≤ and ≥).
- For $-2 < x \leq 3$, draw an **open circle** at –2, a filled circle at 3, and a line between them.



Solving inequalities

- Solve like an equation: $2x + 1 > 7 \rightarrow 2x > 6 \rightarrow x > 3$.
- If you multiply or divide by a negative number, reverse the sign: $-2x < 6 \rightarrow x > -3$.
- Double inequalities: do the same to all three parts: $5 < x + 2 \leq 9 \rightarrow 3 < x \leq 7$.

Integer solutions

- **Integers** are whole numbers. The **integers** with $-2 < n \leq 3$ are –1, 0, 1, 2 and 3.
- The largest **integer** with $4x < 22$ is 5, because $x < 5.5$.
- (Higher) Quadratic inequalities: $x^2 < 16$ means $-4 < x < 4$; $x^2 > 16$ means $x < -4$ or $x > 4$. Sketch the graph to check.

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Worked examples

Solve $3x - 4 < 11$

Add 4 to both sides. **$3x < 15$**

Divide both sides by 3. **$x < 5$**

Answer: $x < 5$

List the integers n such that $-3 < 2n + 1 \leq 7$

Subtract 1 from every part. **$-4 < 2n \leq 6$**

Divide every part by 2. **$-2 < n \leq 3$**

List the whole numbers: –2 is not included (<), but 3 is (≤). **–1, 0, 1, 2, 3**

Answer: –1, 0, 1, 2, 3

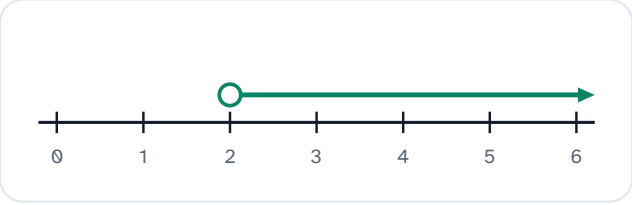
Key terms

Inequality	A statement that one quantity is greater or less than another.
Integer	A whole number: positive, negative or zero.
Open circle	Shows a value is not included on a number line.
Closed circle	Shows a value is included on a number line.
Solution set	All the values that make an inequality true.

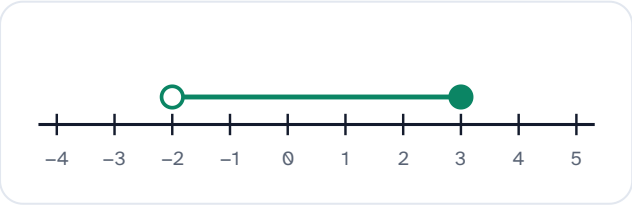
Quick questions

Cover the answers and test yourself: remembering is what makes it stick.

1. Solve $2x + 1 > 7$.
2. Solve $3x - 2 \leq 10$.
3. What does an open circle on a number line mean?



4. Which integers satisfy $-2 < n \leq 3$?



5. Solve $-2x < 6$.
6. What is the largest integer that satisfies $4x < 22$?
7. Which integers satisfy $5 < x + 2 \leq 9$?

Your notes

8. What does the symbol ≥ mean?

Answers

1. x is greater than 3
2. x is less than or equal to 4
3. The number is not included
4. –1, 0, 1, 2, 3
5. x is greater than –3
6. 5
7. 4, 5, 6, 7
8. Greater than or equal to

What to do next

Practise 12 questions on this topic

Try 6 exam questions, with mark schemes

Read the lesson, one step at a time

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