Your notes

GCSE Maths: revision notes

Standard form

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What standard form is

- **Standard form** writes a number as $A \times 10^n$, where A is at least 1 and less than 10, and n is an **integer**.
- Large numbers have a positive power: $35\,000 = 3.5 \times 10^4$.
- Small numbers have a negative power: $0.0042 = 4.2 \times 10^{-3}$.

Converting

- To write in **standard form**, place the decimal point after the first non-zero digit and count how many places it moved.
- To convert back, multiply by the **power of 10**: $6 \times 10^5 = 600\,000$ and $2.1 \times 10^{-2} = 0.021$.
- 45×10^3 is not in **standard form** because 45 is not between 1 and 10; it is 4.5×10^4.

Multiplying and dividing

- Multiply the numbers and add the powers: $(2 \times 10^3) \times (3 \times 10^4) = 6 \times 10^7$.
- Divide the numbers and subtract the powers: $(8 \times 10^6) \div (2 \times 10^2) = 4 \times 10^4$.
- If the number part is 10 or more, adjust: $20 \times 10^5 = 2 \times 10^6$.

Adding and subtracting

- Convert to **ordinary numbers** (or the same **power of 10**) first: $4.5 \times 10^3 + 2 \times 10^2 = 4500 + 200 = 4700 = 4.7 \times 10^3$.
- On a calculator, use the $\times 10^x$ (or EXP) button.

Worked examples

Write 0.00045 in standard form

Move the decimal point to get a number between 1 and 10. **4.5**

The point moved 4 places, and the number is small, so the power is negative. **$\times 10^{-4}$**

Answer: 4.5×10^{-4}

Work out $(3 \times 10^5) \times (4 \times 10^3)$

Multiply the numbers. **$3 \times 4 = 12$**

Add the powers of 10. **$10^5 \times 10^3 = 10^8$**

12 isn't between 1 and 10, so write it as 1.2×10. **$1.2 \times 10 \times 10^8$**

Answer: 1.2×10^9

Key terms

Standard form	A way of writing numbers as $A \times 10^n$, where $1 \leq A < 10$ and n is an integer.
Ordinary number	A number written without powers of 10.
Integer	A whole number: positive, negative or zero.
Power of 10	A number such as $10^3 = 1000$ or $10^{-2} = 0.01$.

Quick questions

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

1. What is 35 000 in standard form?
2. What is 0.0042 in standard form?
3. What is 6×10^5 as an ordinary number?
4. What is 2.1×10^{-2} as an ordinary number?
5. Which number is correctly written in standard form?
6. Work out $(2 \times 10^3) \times (3 \times 10^4)$.
7. Work out $(8 \times 10^6) \div (2 \times 10^2)$.
8. Work out $(5 \times 10^3) \times (4 \times 10^2)$ in standard form.

Answers

1. 3.5×10^4
2. 4.2×10^{-3}
3. 600 000
4. 0.021
5. 3.2×10^6
6. 6×10^7
7. 4×10^4
8. 2×10^6

Your notes

What to do next

Practise 12 questions on this topic

Try 4 exam questions, with mark schemes

Read the lesson, one step at a time

Free revision for GCSE and KS3 at lycolearn.co.uk. Some notes are for one exam board only, and say so in brackets.

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