

Number

Edexcel IGCSE Maths (4MA1) · Knowledge organiser

KEY DEFINITIONS

Prime Factor Decomposition

'Prime factor decomposition' means writing a number as a product of prime numbers using powers.

Standard Form

Standard form writes a number as $A \times 10^n$ where $1 \leq A < 10$.

Upper and Lower Bounds

A rounded measurement has a lower and upper bound — the range of true values it could really be.

Surd Operations

A surd is a root that can't simplify to an integer (e.g. $\sqrt{2}$). Rationalising means removing surds from a fraction's denominator.

YOU SHOULD BE ABLE TO...

- Identify factors, multiples and primes, and recognise square and cube numbers and their roots, such as finding all factors of 36 or the cube root of 64.
- Solve problems in context with fractions, such as finding a fraction of an amount or the original amount after a fraction has been spent.
- Convert between ordinary numbers and standard form, including very large and very small numbers, and order numbers written in standard form.
- Solve harder ratio problems, such as using a given difference between shares or combining two ratios into one.
- Convert between metric units of length, area, volume and capacity, such as cm^2 to m^2 and cm^3 to litres, using scale factors correctly.
- Use Venn diagrams to count members of sets, find $n(A \cup B)$ and work out missing numbers in regions from given totals.

COMMON MISTAKES

- ✗ Reverse percentages: finding a percentage of the new amount
- ✗ Compound interest and depreciation done as simple interest
- ✗ Listing multiples when HCF is asked (and vice versa)
- ✗ Rounding to significant figures by counting from the decimal point

KEY FORMULAS

Indices	$a^m \times a^n = a^{m+n}, a^m \div a^n = a^{m-n}, (a^m)^n = a^{mn},$ $a^0 = 1, a^{-n} = \frac{1}{a^n}, a^{\frac{m}{n}} = (\sqrt[n]{a})^m$
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Standard form	$A \times 10^n, 1 \leq A < 10, n \in \mathbb{Z}$
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Surds	$\sqrt{ab} = \sqrt{a}\sqrt{b}, \frac{a}{\sqrt{b}} = \frac{a\sqrt{b}}{b}, \frac{1}{c+\sqrt{b}} = \frac{c-\sqrt{b}}{c^2-b}$
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Percentage change	$\frac{\text{new} - \text{original}}{\text{original}} \times 100\%$
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Reverse percentage	$\text{original} = \frac{\text{new}}{1 \pm \frac{r}{100}}$
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Compound growth / decay	$A = P\left(1 \pm \frac{r}{100}\right)^n$
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Recurring decimal: $x = 0.\dot{2}7$, then $100x - x = 27$, so $x = \frac{27}{99} = \frac{3}{11}$	
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Bounds: a value to the nearest u lies in $\left[x - \frac{u}{2}, x + \frac{u}{2}\right)$; for $a - b$ and $a \div b$ use max with min

Compound measures	$\text{speed} = \frac{\text{distance}}{\text{time}}, \text{density} = \frac{\text{mass}}{\text{volume}},$ $\text{pressure} = \frac{\text{force}}{\text{area}}$
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Sets	$n(A \cup B) = n(A) + n(B) - n(A \cap B)$
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WORKED EXAMPLE

£4000 invested at 3.5% compound interest for 3 years — total value?

1. $4000 \times 1.035^3 = £4434.87$.