

Number

Cambridge IGCSE Maths (0580) · Knowledge organiser

KEY DEFINITIONS

Prime number

A whole number with exactly two factors, 1 and itself (1 is not prime).

Significant figures

Count from the first non-zero digit:
0.04056 to 2 s.f. is 0.041.

Standard form

$A \times 10^n$ with $1 \leq A < 10$ and n an integer.

Bounds

A value rounded to the nearest u lies between half a unit below and half a unit above it.

YOU SHOULD BE ABLE TO...

- Complete a short baseline check on number and algebra from earlier years so the teacher can see what each student already knows and plan the first unit.
- Add, subtract, multiply and divide decimals without a calculator, such as $0.48 \div 0.012$, using written methods and place value.
- Round numbers to a given number of decimal places or significant figures, and choose an accuracy suited to the context.
- Use rates such as density, pressure and population density, rearranging the formulas and stating the correct units.
- Use the 24-hour clock, read timetables and solve problems involving time zones and journey times.
- Practise standard form and estimation without a calculator, such as dividing numbers in standard form and estimating by rounding.

COMMON MISTAKES

- ✗ Rounding in the middle of a calculation
- ✗ Ignoring the 3 s.f. (1 d.p. for angles) accuracy rule
- ✗ Standard form answers not in the form $A \times 10^n$
- ✗ Set notation: counting the overlap twice

KEY FORMULAS

Indices $a^m \times a^n = a^{m+n}$, $a^m \div a^n = a^{m-n}$,
 $(a^m)^n = a^{mn}$, $a^0 = 1$, $a^{-n} = \frac{1}{a^n}$

Fractional indices $a^{\frac{1}{n}} = \sqrt[n]{a}$, $a^{\frac{m}{n}} = (\sqrt[n]{a})^m$

Standard form $A \times 10^n$, $1 \leq A < 10$, $n \in \mathbb{Z}$

Sets $n(A \cup B) = n(A) + n(B) - n(A \cap B)$

Percentage change $\frac{\text{new} - \text{original}}{\text{original}} \times 100\%$

Reverse percentage $\text{original} = \frac{\text{new}}{1 \pm \frac{r}{100}}$

Simple interest
(rate $r\%$ a year, n years) $I = \frac{Prn}{100}$

Compound interest $A = P\left(1 + \frac{r}{100}\right)^n$

Growth and decay $y = a \times k^n$: $k > 1$ growth, $k < 1$ decay

Surds $\sqrt{ab} = \sqrt{a}\sqrt{b}$, $\frac{a}{\sqrt{b}} = \frac{a\sqrt{b}}{b}$, $\frac{1}{c \pm \sqrt{b}} = \frac{c \mp \sqrt{b}}{c^2 - b}$

Recurring decimal: $x = 0.4\dot{5}$, so $100x - x = 45$ and $x = \frac{45}{99} = \frac{5}{11}$

Bounds: a value to the nearest u lies in $\left[x - \frac{u}{2}, x + \frac{u}{2}\right)$

Bounds in calculations: for the largest $a - b$ or $a \div b$ use the upper bound of a with the lower bound of b

Rates $\text{speed} = \frac{\text{distance}}{\text{time}}$, $\text{density} = \frac{\text{mass}}{\text{volume}}$,
 $\text{pressure} = \frac{\text{force}}{\text{area}}$

WORKED EXAMPLE

A price of \$80 is increased by 15%, then the new price is decreased by 15%. Find the final price.

1. Increase: $80 \times 1.15 = 92$

2. Decrease: $92 \times 0.85 = 78.2$

Answer: \$78.20 (not back to \$80)