1 Fractions, Decimals & Percentages

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DECIMALS ↔ PERCENTAGES

- **Decimal → %:** × 100. 0.35 = 35%.
- **% → decimal:** ÷ 100. 35% = 0.35.
- "Per cent" means **out of 100**.

PERCENTAGES ↔ FRACTIONS

- **% → fraction:** put over 100, then simplify. $35\% = \frac{35}{100} = \frac{7}{20}$.
- **Fraction → %:** make an equivalent hundredth, or × 100. $\frac{3}{4} = 75\%$.

DECIMALS ↔ FRACTIONS

- **Decimal → fraction:** use place value, then simplify. $0.35 = \frac{35}{100} = \frac{7}{20}$.
- **Fraction → decimal:** divide top by bottom. $\frac{3}{4} = 3 \div 4 = 0.75$.

HANDY ONES TO KNOW

$\frac{1}{2}$	0.5	50%
$\frac{1}{4}$	0.25	25%
$\frac{3}{4}$	0.75	75%
$\frac{1}{5}$	0.2	20%
$\frac{2}{5}$	0.4	40%
$\frac{1}{10}$	0.1	10%
$\frac{1}{8}$	0.125	12.5%
$\frac{1}{3}$	$0.\dot{3}$	33.3%

WORKED CONVERSIONS

$0.6 \rightarrow 60\% \rightarrow \frac{60}{100} = \frac{3}{5}$

$\frac{7}{8} = 7 \div 8 = 0.875 = \mathbf{87.5\%}$

$8\% = 0.08 = \frac{8}{100} = \frac{2}{25}$

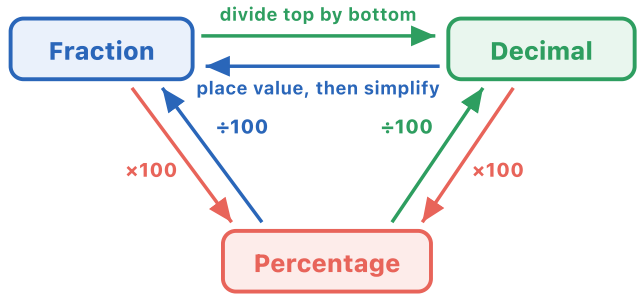
RECURRING DECIMALS

- A digit (or block) that repeats forever is shown with a **dot** over it.
- $\frac{1}{3} = 0.\dot{3} = 0.333...$
- $\frac{1}{7} = 0.\dot{1}42857\dot{}$ — dots over the **first and last** digits of the block.

TERMINATING VS RECURRING

- **Terminating:** stops, e.g. 0.75.
- **Recurring:** repeats forever, e.g. $0.\dot{3}$.
- $\frac{1}{3}, \frac{1}{6}, \frac{1}{7}, \frac{1}{9}$ recur — $\frac{1}{2}, \frac{1}{4}, \frac{1}{5}, \frac{1}{8}$ terminate.

THE CONVERSION MAP



⚠ COMMON EXAM MISTAKES (recurring errors flagged in examiners' reports)

- ✕ Moving the point the **wrong way**: 0.35 = 3.5% instead of 35%.
- ✕ Forgetting to **simplify** a fraction from a percentage.
- ✕ Not using **dot notation** for a recurring decimal (writing 0.33 instead).
- ✕ Thinking ¼ = 0.14 or ⅛ = 0.15.

2 Ordering Numbers

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NEGATIVES & DECIMALS

- **Negatives:** further **left** on the number line is smaller. $-7 < -2 < 0 < 3$.
- **Decimals:** give them the **same number of decimal places**, then compare from the left.
- 0.4, 0.35, 0.409 → **0.35, 0.4, 0.409**.

INEQUALITY SYMBOLS

<	less than
>	greater than
≤	less than or equal to
≥	greater than or equal to

ORDERING FRACTIONS

- Write them over a **common denominator**, then compare the numerators.
- $\frac{2}{3}, \frac{3}{4} \rightarrow \frac{8}{12}, \frac{9}{12} \rightarrow \frac{2}{3} < \frac{3}{4}$.

ORDERING FDP TOGETHER

- **Convert them all to the same form** — usually **decimals** — then compare.
- 60%, $\frac{1}{2}$, 0.55 → 0.6, 0.5, 0.55 → **$\frac{1}{2}$, 0.55, 60%**.

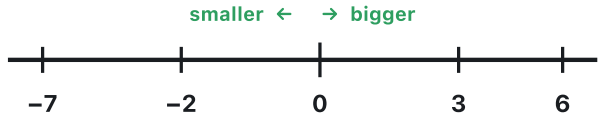
READING INEQUALITIES

- The symbol always "opens" towards the **bigger** number: $3 < 5$, $5 > 3$.
- $x \geq 4$ means x is 4 **or more**.

ASCENDING VS DESCENDING

- **Ascending** = smallest first.
- **Descending** = largest first.
- Re-read the question — marks are lost for the **wrong direction**.

FURTHER LEFT IS SMALLER



$-7 < -2 < 0 < 3 < 6$ — **−7** is the smallest.

WORKED ORDERING

Order 0.6, $\frac{1}{2}$, 55%, $\frac{3}{5}$ (smallest first).

Make them all decimals: 0.6, 0.5, 0.55, 0.6.

Answer: **$\frac{1}{2}$, 55%, 0.6 = $\frac{3}{5}$**

⚠ COMMON EXAM MISTAKES (recurring errors flagged in examiners' reports)

- ✕ Thinking **more digits = bigger** for decimals (0.45 > 0.5 is wrong).
- ✕ Ordering fractions **without a common denominator**.
- ✕ Comparing FDP **without converting** to one form first.
- ✕ Treating negatives like positives: thinking $-7 > -2$.
- ✕ Reading the inequality symbol the **wrong way round**.

3 Percentages

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PERCENTAGE OF AN AMOUNT

Build up from easy pieces (non-calculator):

10% = ÷10, 1% = ÷100, 50% = ÷2, 25% = ÷4.

30% of 160 = 3 × 16 = **48**

35% of 160 = 25% + 10% = 40 + 16 = **56**

THE BUILDING BLOCKS

Find	How	Example of 240
50%	÷ 2	120
25%	÷ 4	60
10%	÷ 10	24
5%	half of 10%	12
1%	÷ 100	2.4

Add these together to build **any** percentage.

MORE PERCENTAGES OF AMOUNTS

15% of 60 = 10% + 5% = 6 + 3 = **9**

75% of 48 = 50% + 25% = 24 + 12 = **36**

5% of 240 = 10% ÷ 2 = 24 ÷ 2 = **12**

17.5% of 80 = 8 + 4 + 2 = **14**

INCREASE & DECREASE

Find the percentage first, then add or subtract it.

Increase £400 by 20%:

20% of 400 = 80 → 400 + 80 = **£480**

Decrease £400 by 20%:

400 − 80 = **£320**

PERCENTAGE CHANGE

$$\frac{\text{change}}{\text{original}} \times 100$$

£40 → £50: change = 10, $\frac{10}{40} \times 100$ = **25% increase**

REVERSE PERCENTAGES

Given the **result**, find the **original**. Work back to **1%**, then up to **100%**.

A 10% increase gives £440.

£440 is 110%

1% = 440 ÷ 110 = 4

100% = 4 × 100 = **£400**

SPOTTING A REVERSE PROBLEM

- You are told the amount **after** the change and asked for the **original**.
- **Do not** just take the % off the new amount — work back to 100%.

⚠ COMMON EXAM MISTAKES (recurring errors flagged in examiners' reports)

- ✕ **Reverse percentages:** taking the % off the **new** value instead of working back to 100%.
- ✕ Percentage change: dividing by the **new** value instead of the **original**.
- ✕ Halving for 20% — 20% is **two lots of 10%**, not ÷20.
- ✕ Adding a % increase then subtracting the **same** % and expecting the original back.
- ✕ Forgetting "per cent" means **out of 100**.

4 Angle Basics

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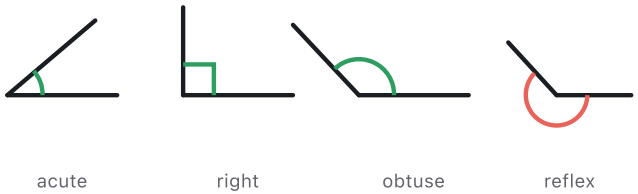
TYPES OF ANGLE

Type	Size
Acute	0° < θ < 90°
Right	θ = 90°
Obtuse	90° < θ < 180°
Straight	θ = 180°
Reflex	180° < θ < 360°
Full turn	θ = 360°

TURNS

- ¼ turn = 90°, ½ turn = 180°, ¾ turn = 270°, full turn = 360°.

WHAT THEY LOOK LIKE



acute right obtuse reflex

Reflex is the angle going the **long way round**.

MEASURING & LABELLING

- Angles are measured in **degrees** (°) with a **protractor**.
- Name an angle with **three letters**, vertex in the **middle**: angle ABC is at point B.
- Estimate first, so you spot a silly reading (e.g. 40° vs 140°).

READING A PROTRACTOR

- Line up the **centre** on the vertex and **0°** on one arm.
- Use the scale that starts at **0°** on your arm — there are two.

ANGLE FACTS

- Angles on a **straight line** add to 180°.
- Angles **around a point** add to 360°.
- **Vertically opposite** angles are **equal**.
- Angles in a **triangle** add to 180°.
- Angles in a **quadrilateral** add to 360°.

THE ANGLE FACTS

= 180° on a line

= 360° around a point

equal vertically opposite

Always give a **reason** with your answer in an exam.

FINDING A MISSING ANGLE

On a line: angles are 115° and x.

x = 180 − 115 = **65°**

Around a point: 90°, 140° and y.

y = 360 − 230 = **130°**

In a triangle: 40°, 75° and z.

z = 180 − 115 = **65°**

NAMING ANGLES

- Three letters, **vertex in the middle**: angle ABC is the angle at B.
- It can also be written ∠ABC or $A\hat{B}C$.
- Angle ABC and angle CBA are the **same** angle.

⚠ COMMON EXAM MISTAKES (recurring errors flagged in examiners' reports)

- ✕ Reading the **wrong protractor scale** (getting 140° instead of 40°).
- ✕ Mixing up **acute / obtuse / reflex**.
- ✕ Assuming angles are equal or sum to 180° **without a reason**.
- ✕ Forgetting a **reflex** angle when going "around a point".
- ✕ Not giving the correct **angle fact** as the reason.