

GCSE Mathematics

Revision Pack

AQA GCSE Mathematics (8300)

Foundation & Higher tier · Version 1

Top-10 most frequently examined topics, ranked from
past-paper frequency analysis (2018–2024 series):
key facts · 30 original practice questions
fully worked solutions

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All questions and solutions are original Apex materials.

How to use this pack

This pack covers the **ten most frequently examined topics** on the AQA GCSE Maths specification, ranked from an analysis of Ofqual strand weightings and published past-paper frequency studies of recent exam series (2018–2024). It supports both **Foundation** and **Higher** tier students; every question is labelled with the tier it suits.

- 1. Diagnose first.** Attempt the three questions in each section before reading the worked solutions. Mark honestly.
- 2. Target your gaps.** The frequency table overleaf shows the ranking: 'revise-first' topics appear on virtually every paper — master these before rarer topics.
- 3. Learn the facts box.** Each section opens with the key facts and formulas the examiners expect you to recall instantly.
- 4. Study the solutions.** Worked solutions show the method marks — write your answers the same way, with reasons and checks.
- 5. Repeat.** Return to any section you found difficult after one week. Spaced practice is what moves grades.

Board guidance: AQA papers are known for multi-step, context-heavy questions that chain topics together (e.g. ratio embedded in a probability or area problem), and for a strong problem-solving emphasis on the non-calculator Paper 1. Number fluency and clear written methods pick up method marks even when a final answer slips.

Questions marked F suit both tiers; H questions are Higher-only content or difficulty. All content in this pack is original to Apex Academic Consultancy.

AQA topic frequency — top 15

Ranked from Ofqual strand weightings and past-paper frequency analysis. Exact counts vary slightly by series; use the priority column to plan revision.

#	Topic	Tier	Marks	Priority
1	Solving linear equations ★	F & H	4–8	revise-first
2	Fractions, decimals and percentages ★	F & H	5–10	revise-first
3	Ratio and proportion ★	F & H	4–8	revise-first
4	Area and perimeter ★	F & H	4–6	revise-first
5	Sequences and the nth term ★	F & H	3–5	revise-first
6	Probability and tree diagrams ★	F & H	4–7	high
7	Straight-line and quadratic graphs ★	F & H	4–6	high
8	Percentage change, compound growth and reverse percentages ★	F & H	3–6	high
9	Angles in lines and polygons ★	F & H	3–5	high
10	Simultaneous equations ★	F & H	3–5	high
11	Pythagoras' theorem	F & H	3–5	high
12	Trigonometry (SOH CAH TOA)	H	3–5	high
13	Quadratic equations and graphs	H	4–8	high
14	Standard form	F & H	2–4	medium
15	Bounds and error intervals	H	2–4	medium

★ = covered in detail in this pack (top 10). Ranks 11–15 are covered in the full Apex revision series.

1. Solving linear equations

Frequency rank 1 of 15 · Strand: Algebra · Typical marks per paper: 4–8 · Priority: revise-first

KEY FACTS & FORMULAS

- Keep the equation balanced: do the same operation to both sides.
- Expand brackets first, then collect like terms.
- Unknown on both sides: collect all x terms on one side, numbers on the other.
- Fractions: multiply every term by the denominator to clear them.
- Always check by substituting your answer back into the original equation.

Practice questions — original Apex material, with worked solutions

Q1 [F · Core] Solve $3x + 7 = 22$.

Worked solution. $3x = 22 - 7 = 15$, so $x = 15 \div 3 = 5$. Check: $3(5) + 7 = 22$ ✓

Q2 [F/H · Standard] Solve $5(x - 2) = 3x + 8$.

Worked solution. Expand: $5x - 10 = 3x + 8$. Subtract $3x$: $2x - 10 = 8$. Add 10: $2x = 18$, so $x = 9$. Check: $5(9) = 45$ and $27 + 8 = 35$ ✓

Q3 [H · Challenge] Solve $(2x + 1)/3 = x - 2$.

Worked solution. Multiply both sides by 3: $2x + 1 = 3x - 6$. Subtract $2x$: $1 = x - 6$, so $x = 7$. Check: $(14+1)/3 = 5$ and $7 - 2 = 5$ ✓

2. Fractions, decimals and percentages

Frequency rank 2 of 15 · Strand: Number · Typical marks per paper: 5–10 · Priority: revise-first

KEY FACTS & FORMULAS

- Add/subtract fractions with a common denominator; multiply tops and bottoms for multiplication.
- Divide by a fraction: multiply by its reciprocal (keep-change-flip).
- Percentage of an amount: convert to a decimal multiplier (e.g. 45% → 0.45) and multiply.
- Fraction → decimal: divide numerator by denominator; decimal → percentage: $\times 100$.
- Recurring decimals and exact fractions keep answers accurate — avoid premature rounding.

Practice questions — original Apex material, with worked solutions

Q1 [F · Core] Work out $\frac{3}{4} + \frac{2}{5}$, giving your answer as a mixed number.

Worked solution. Common denominator 20: $\frac{15}{20} + \frac{8}{20} = \frac{23}{20} = 1 \frac{3}{20}$.

Q2 [F · Standard] Increase £240 by 15%.

Worked solution. Multiplier = 1.15. $240 \times 1.15 = £276$.

Q3 [H · Challenge] A jacket priced £80 is reduced by 20% in a sale, then a further 10% is taken off the sale price. Find the final price and the single equivalent percentage reduction.

Worked solution. $80 \times 0.8 = £64$; $64 \times 0.9 = £57.60$. Combined multiplier $0.8 \times 0.9 = 0.72$, so the single equivalent reduction is 28%.

3. Ratio and proportion

Frequency rank 3 of 15 · Strand: Ratio · Typical marks per paper: 4–8 · Priority: revise-first

KEY FACTS & FORMULAS

- Simplify ratios by dividing both parts by their highest common factor.
- To share in a ratio $a:b$, divide the total into $(a+b)$ equal parts.
- Direct proportion: if one quantity doubles, so does the other (use the unitary method).
- Write ratios as fractions to link with equations in harder problems.
- Recipes, maps (scale) and best-value questions are all ratio in disguise.

Practice questions — original Apex material, with worked solutions

Q1 [F · Core] Share £84 between Amara and Ben in the ratio 3 : 4.

Worked solution. Total parts = 7, so each part is $£84 \div 7 = £12$. Amara gets $3 \times 12 = £36$; Ben gets $4 \times 12 = £48$.

Q2 [F · Standard] A recipe for 4 people uses 300 g of flour. How much flour is needed for 10 people?

Worked solution. Per person: $300 \div 4 = 75$ g. For 10 people: $75 \times 10 = 750$ g.

Q3 [H · Challenge] A bag contains red and blue counters in the ratio 2 : 5. After 12 more blue counters are added, the ratio becomes 1 : 4. How many red counters are in the bag?

Worked solution. Let red = $2k$ and blue = $5k$. Then $2k / (5k + 12) = 1/4$, so $8k = 5k + 12$ and $k = 4$. Red counters = $2 \times 4 = 8$. (Blue ends as $20 + 12 = 32$, and $8 : 32 = 1 : 4$ ✓)

4. Area and perimeter

Frequency rank 4 of 15 · Strand: Geometry · Typical marks per paper: 4–6 · Priority: revise-first

KEY FACTS & FORMULAS

- Rectangle: $A = l \times w$; triangle: $A = \frac{1}{2} \times b \times h$; parallelogram: $A = b \times h$.
- Trapezium: $A = \frac{1}{2}(a + b)h$ where a and b are the parallel sides.
- Circle: $A = \pi r^2$, circumference = $2\pi r = \pi d$.
- Compound shapes: split into simple shapes, then add or subtract areas.
- Perimeter is a length (units); area is measured in square units.

Practice questions — original Apex material, with worked solutions

Q1 [F · Core] A rectangle measures 12 cm by 7.5 cm. Find its area and perimeter.

Worked solution. Area = $12 \times 7.5 = 90 \text{ cm}^2$. Perimeter = $2(12 + 7.5) = 39 \text{ cm}$.

Q2 [F/H · Standard] Find the area and circumference of a circle of radius 5 cm, giving your answers to 1 decimal place.

Worked solution. Area = $\pi \times 5^2 = 25\pi \approx 78.5 \text{ cm}^2$. Circumference = $2\pi \times 5 = 10\pi \approx 31.4 \text{ cm}$.

Q3 [F/H · Challenge] A trapezium has parallel sides 8 cm and 14 cm and height 6 cm. Find its area.

Worked solution. $A = \frac{1}{2}(8 + 14) \times 6 = \frac{1}{2} \times 22 \times 6 = 66 \text{ cm}^2$.

5. Sequences and the nth term

Frequency rank 5 of 15 · Strand: Algebra · Typical marks per paper: 3–5 · Priority: revise-first

KEY FACTS & FORMULAS

- Linear sequence: constant first difference d ; n th term = $dn + (\text{first term} - d)$.
- Geometric sequence: multiply by a constant ratio each time.
- Quadratic sequence: constant second difference of 2 means an n^2 term; compare with n^2 .
- To test whether a value is in a sequence, set the n th term equal to it — n must be a positive whole number.
- Triangular, square and Fibonacci-type sequences appear regularly in context questions.

Practice questions — original Apex material, with worked solutions

Q1 [F · Core] A sequence begins 5, 9, 13, 17, ... Find the n th term and the 50th term.

Worked solution. Difference = 4, so n th term = $4n + c$. When $n = 1$, $4 + c = 5$ gives $c = 1$: n th term = $4n + 1$. 50th term = $4(50) + 1 = 201$.

Q2 [H · Standard] Find the n th term of the sequence 3, 8, 15, 24, ...

Worked solution. Second difference is constant (5, 7, 9 → differences +2), so quadratic. Comparing with n^2 (1, 4, 9, 16): each term is $2n$ more, so n th term = $n^2 + 2n$. Check: $n=4 \rightarrow 16 + 8 = 24$ ✓

Q3 [F/H · Challenge] Is 150 a term of the sequence with n th term $7n - 3$? Justify your answer.

Worked solution. Set $7n - 3 = 150$, so $7n = 153$ and $n = 153/7 = 21.857\dots$, which is not a whole number. So 150 is NOT in the sequence.

6. Probability and tree diagrams

Frequency rank 6 of 15 · Strand: Probability · Typical marks per paper: 4–7 · Priority: high

KEY FACTS & FORMULAS

- Probabilities lie between 0 and 1; all outcomes sum to 1.
- $P(\text{not } A) = 1 - P(A)$.
- Tree diagrams: multiply along branches (AND), add between branches (OR).
- Independent events: $P(A \text{ and } B) = P(A) \times P(B)$.
- Without replacement, the denominators change on the second branch — a classic Higher trap.

Practice questions — original Apex material, with worked solutions

Q1 [F · Core] A bag holds 3 red, 5 blue and 2 green counters. One counter is picked at random. Find $P(\text{red})$ and $P(\text{not blue})$.

Worked solution. Total = 10. $P(\text{red}) = 3/10$. $P(\text{not blue}) = (3 + 2)/10 = 5/10 = 1/2$.

Q2 [F/H · Standard] The probability a player wins a game is 0.3. She plays two independent games. Find the probability she wins exactly once.

Worked solution. Win then lose: $0.3 \times 0.7 = 0.21$. Lose then win: $0.7 \times 0.3 = 0.21$. Total = $0.21 + 0.21 = 0.42$.

Q3 [H · Challenge] A bag has 4 red and 6 blue counters. Two counters are taken without replacement. Find the probability both are red.

Worked solution. $P(\text{first red}) = 4/10$; $P(\text{second red} \mid \text{first red}) = 3/9$. $P(\text{both red}) = 4/10 \times 3/9 = 12/90 = 2/15$.

7. Straight-line and quadratic graphs

Frequency rank 7 of 15 · Strand: Algebra · Typical marks per paper: 4–6 · Priority: high

KEY FACTS & FORMULAS

- $y = mx + c$: m is the gradient, c is the y-intercept.
- Gradient between two points = change in $y \div$ change in x .
- Parallel lines have equal gradients; perpendicular gradients multiply to -1 (Higher).
- Quadratic $y = ax^2 + bx + c$: parabola; roots where $y = 0$; vertex on the line of symmetry $x = -b/(2a)$.
- Read real-world graphs carefully: gradient often means a rate (e.g. speed).

Practice questions — original Apex material, with worked solutions

Q1 [F · Core] Write down the gradient and y-intercept of the line $y = 3x - 2$.

Worked solution. Comparing with $y = mx + c$: gradient $m = 3$, y-intercept $c = -2$ (the line crosses the y-axis at $(0, -2)$).

Q2 [F/H · Standard] Find the equation of the straight line through $(1, 4)$ and $(3, 10)$.

Worked solution. Gradient = $(10 - 4)/(3 - 1) = 6/2 = 3$. Using $y = 3x + c$ with $(1, 4)$: $4 = 3 + c$, so $c = 1$. Equation: $y = 3x + 1$. Check with $(3, 10)$: $3(3) + 1 = 10$ ✓

Q3 [H · Challenge] For the graph of $y = x^2 - 4x + 3$, find the coordinates where it crosses the x-axis and the coordinates of the turning point.

Worked solution. Factorise: $(x - 1)(x - 3) = 0$, so it crosses at $(1, 0)$ and $(3, 0)$. Line of symmetry $x = 2$; $y = 4 - 8 + 3 = -1$, so the turning point is $(2, -1)$.

8. Percentage change, compound growth and reverse percentages

Frequency rank 8 of 15 · Strand: Number · Typical marks per paper: 3–6 · Priority: high

KEY FACTS & FORMULAS

- Percentage change: use a multiplier — increase 12% → $\times 1.12$; decrease 12% → $\times 0.88$.
- Compound interest/depreciation: amount = start $\times$ multiplier^{years}. Never work year-by-year if you can use the power.
- Reverse percentage: divide by the multiplier to return to the original (the original is 100%, not the new value).
- Percentage profit/change = $(\text{change} \div \text{original}) \times 100\%$.
- Two successive changes are NOT additive: multiply the multipliers.

Practice questions — original Apex material, with worked solutions

Q1 [F · Core] Decrease £350 by 12%.

Worked solution. Multiplier = 0.88. $350 \times 0.88 = £308$.

Q2 [F/H · Standard] £2,000 is invested at 4% per year compound interest. Find the value after 3 years, to the nearest penny.

Worked solution. $2000 \times 1.04^3 = 2000 \times 1.124864 = £2,249.73$.

Q3 [H · Challenge] After a 15% increase, a season ticket costs £92. What was the original price?

Worked solution. $92 \div 1.15 = £80$. (Not 92×0.85 — the 15% was added to the original, not to £92.)

9. Angles in lines and polygons

Frequency rank 9 of 15 · Strand: Geometry · Typical marks per paper: 3–5 · Priority: high

KEY FACTS & FORMULAS

- Angles on a straight line sum to 180° ; around a point, 360° ; vertically opposite angles are equal.
- Parallel lines: corresponding angles equal; alternate angles equal; co-interior (allied) angles sum to 180° .
- Sum of interior angles of an n -sided polygon = $(n - 2) \times 180^\circ$.
- Exterior angles of any polygon sum to 360° ; regular polygon exterior angle = $360^\circ \div n$.
- Always give a REASON for each step in angle problems — marks are awarded for reasons.

Practice questions — original Apex material, with worked solutions

Q1 [F · Core] Two parallel lines are cut by a transversal. One corresponding angle is 65° . Write down the size of the angle that corresponds to it, and the size of its co-interior partner.

Worked solution. Corresponding angle = 65° (corresponding angles are equal). Co-interior partner = $180^\circ - 65^\circ = 115^\circ$ (co-interior angles sum to 180°).

Q2 [F/H · Standard] Find the size of one interior angle of a regular octagon.

Worked solution. Sum of interior angles = $(8 - 2) \times 180^\circ = 1080^\circ$. Each interior angle = $1080^\circ \div 8 = 135^\circ$. (Or exterior angle $360^\circ \div 8 = 45^\circ$, so interior = $180^\circ - 45^\circ = 135^\circ$.)

Q3 [F/H · Challenge] The angles of a quadrilateral are $3x^\circ$, $(2x + 10)^\circ$, 90° and $(x + 50)^\circ$. Find x and all four angles.

Worked solution. Angles sum to 360° : $3x + 2x + 10 + 90 + x + 50 = 360$, so $6x + 150 = 360$ and $x = 35$. Angles: 105° , 80° , 90° , 85° . Check: $105 + 80 + 90 + 85 = 360$ ✓

10. Simultaneous equations

Frequency rank 10 of 15 · Strand: Algebra · Typical marks per paper: 3–5 · Priority: high

KEY FACTS & FORMULAS

- Elimination: match the coefficients of one variable (multiply equations if needed), then add or subtract.
- Substitution: rearrange the simpler equation and substitute into the other.
- Check BOTH original equations with your solution.
- Worded problems: define two variables, translate each sentence into an equation.
- Graphically, the solution is the intersection point of the two lines.

Practice questions — original Apex material, with worked solutions

Q1 [F/H · Core] Solve $x + y = 10$ and $x - y = 4$.

Worked solution. Add the equations: $2x = 14$, so $x = 7$. Then $y = 10 - 7 = 3$. Check: $7 - 3 = 4$ ✓

Q2 [F/H · Standard] Solve $3x + 2y = 16$ and $x + y = 6$.

Worked solution. Double the second equation: $2x + 2y = 12$. Subtract from the first: $x = 4$. Then $y = 6 - 4 = 2$. Check: $3(4) + 2(2) = 12 + 4 = 16$ ✓

Q3 [H · Challenge] 2 adult tickets and 3 child tickets cost £27. 1 adult ticket and 4 child tickets cost £26. Find the price of each type of ticket.

Worked solution. $2a + 3c = 27$ and $a + 4c = 26$. Double the second: $2a + 8c = 52$. Subtract the first: $5c = 25$, so $c = 5$. Then $a = 26 - 20 = 6$. Adult £6, child £5. Check: $2(6) + 3(5) = 27$ ✓

What's next

This is Pack v1, covering the ten highest-frequency topics. The full Apex revision series adds ranks 11–15 and beyond, additional question sets at every difficulty, and board-specific mock papers. Contact Apex Academic Consultancy for tutoring and the complete series.

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