

GCSE ONLINE TUTORING

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AQA GCSE (9-1) MATHEMATICS 8300

AQA 8300 FORMULA, METHODS & EXACT VALUES HANDBOOK

Foundation + Higher | current 2026/27+ formula-sheet policy | original worked
examples

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How to use this document

This is a study handbook rather than a single formula sheet. Each formula has its purpose, notation, conditions, a worked original example, a common trap and its AQA specification reference. Formula selection and rearrangement are included because access to a formula sheet does not remove the need to recognise the correct mathematics.

Section	What it gives you
Policy	Current AQA/Ofqual position on formula sheets.
Formula cards	Arithmetic, rates, algebra, mensuration, trigonometry, probability and statistics.
Exact values	Trig exact values and exact-form habits.
Method guides	Selection, rearrangement and unit conversion.
References	AQA specification, appendix and 2026 policy announcement.

Source tags such as [SPEC-N4] or [ER23-H3] are defined in the References section. They are there so a tutor, student or editor can audit where each factual statement came from.

Current formula-sheet policy

What changed for 2027 and beyond

AQA announcement: AQA stated on 1 September 2026 that the full GCSE Maths formula sheet used in 2026 continues unchanged for the 2027 exams.

From 2028: AQA states that Ofqual requires formula/equation sheets for the lifetime of the current qualification from 2028 onwards.

Revision implication: Students should still know what each formula means, when it applies, how to rearrange it and how to use units correctly. A supplied formula is not a substitute for method selection.

Source: [FORM26]

Formula and relationship cards

01. Percentage multiplier

Area: Arithmetic

Tier: Foundation & Higher

Formula / relationship: $\text{new} = \text{original} \times (1 \pm r)$

Symbols / conditions: r is decimal rate; + for increase, – for decrease

When to select it: Use this when the question structure matches percentage multiplier and the given quantities satisfy the conditions stated above.

Worked original example: £240 increased by 7.5% $\rightarrow 240 \times 1.075 = \text{£}258$

Common trap: Using 7.5 instead of 0.075; adding 7.5 rather than 7.5% of original

Verification check: Estimate the magnitude, check units/dimensions, and substitute back or compare with a simpler case where possible.

AQA mapping: R9

Source: [SPEC-R9] and, where applicable, [FORM]

02. Compound growth/decay

Area: Arithmetic

Tier: Foundation & Higher

Formula / relationship: $\text{final} = \text{initial} \times \text{multiplier}^n$

Symbols / conditions: n = number of equal periods

When to select it: Use this when the question structure matches compound growth/decay and the given quantities satisfy the conditions stated above.

Worked original example: £800 at 3% for 4 years $\rightarrow 800 \times 1.03^4$

Common trap: Using simple interest; rounding each year

Verification check: Estimate the magnitude, check units/dimensions, and substitute back or compare with a simpler case where possible.

AQA mapping: R16

Source: [SPEC-R16] and, where applicable, [FORM]

03. Speed

Area: Ratio/rates

Tier: Foundation & Higher

Formula / relationship: speed = distance $\div$ time

Symbols / conditions: Use compatible units

When to select it: Use this when the question structure matches speed and the given quantities satisfy the conditions stated above.

Worked original example: 150 km in 2.5 h $\rightarrow$ 60 km/h

Common trap: Mixing minutes and hours

Verification check: Estimate the magnitude, check units/dimensions, and substitute back or compare with a simpler case where possible.

AQA mapping: R11

Source: [SPEC-R11] and, where applicable, [FORM]

04. Density

Area: Ratio/rates

Tier: Foundation & Higher

Formula / relationship: density = mass $\div$ volume

Symbols / conditions: Use consistent mass/volume units

When to select it: Use this when the question structure matches density and the given quantities satisfy the conditions stated above.

Worked original example: 540 g $\div$ 200 cm³ = 2.7 g/cm³

Common trap: Converting only one quantity

Verification check: Estimate the magnitude, check units/dimensions, and substitute back or compare with a simpler case where possible.

AQA mapping: R1/R11

Source: [SPEC-R1/R11] and, where applicable, [FORM]

05. Pressure

Area: Ratio/rates

Tier: Foundation & Higher

Formula / relationship: pressure = force $\div$ area

Symbols / conditions: Usually N/m^2 when SI

When to select it: Use this when the question structure matches pressure and the given quantities satisfy the conditions stated above.

Worked original example: 600 N over $0.30 \text{ m}^2 \rightarrow 2000 \text{ Pa}$

Common trap: Using length instead of area

Verification check: Estimate the magnitude, check units/dimensions, and substitute back or compare with a simpler case where possible.

AQA mapping: R1/R11

Source: [SPEC-R1/R11] and, where applicable, [FORM]

06. Straight line

Area: Algebra

Tier: Foundation & Higher

Formula / relationship: $y = mx + c$

Symbols / conditions: m gradient, c y-intercept

When to select it: Use this when the question structure matches straight line and the given quantities satisfy the conditions stated above.

Worked original example: Through $(0, -2)$, gradient 3 $\rightarrow y = 3x - 2$

Common trap: Confusing x-intercept with c

Verification check: Estimate the magnitude, check units/dimensions, and substitute back or compare with a simpler case where possible.

AQA mapping: A9/A10

Source: [SPEC-A9/A10] and, where applicable, [FORM]

07. Gradient

Area: Algebra

Tier: Foundation & Higher

Formula / relationship: $m = (y_2 - y_1) / (x_2 - x_1)$

Symbols / conditions: Choose two points on the line

When to select it: Use this when the question structure matches gradient and the given quantities satisfy the conditions stated above.

Worked original example: $(1,4), (5,12) \rightarrow m = 8/4 = 2$

Common trap: Subtracting coordinates in different orders

Verification check: Estimate the magnitude, check units/dimensions, and substitute back or compare with a simpler case where possible.

AQA mapping: A9/A10

Source: [SPEC-A9/A10] and, where applicable, [FORM]

08. Quadratic formula

Area: Algebra

Tier: Higher

Formula / relationship: $x = (-b \pm \sqrt{b^2 - 4ac}) / (2a)$

Symbols / conditions: For $ax^2 + bx + c = 0$

When to select it: Use this when the question structure matches quadratic formula and the given quantities satisfy the conditions stated above.

Worked original example: $2x^2 - 3x - 2 = 0 \rightarrow x = (3 \pm 5) / 4 \rightarrow 2, -1/2$

Common trap: Missing $\pm$; wrong sign for b

Verification check: Estimate the magnitude, check units/dimensions, and substitute back or compare with a simpler case where possible.

AQA mapping: A18

Source: [SPEC-A18] and, where applicable, [FORM]

09. Triangle area

Area: Geometry

Tier: Foundation & Higher

Formula / relationship: $A = \frac{1}{2}bh$

Symbols / conditions: b and h perpendicular

When to select it: Use this when the question structure matches triangle area and the given quantities satisfy the conditions stated above.

Worked original example: $b=9, h=6 \rightarrow A=27$

Common trap: Using sloping side as height

Verification check: Estimate the magnitude, check units/dimensions, and substitute back or compare with a simpler case where possible.

AQA mapping: G16

Source: [SPEC-G16] and, where applicable, [FORM]

10. Parallelogram area

Area: Geometry

Tier: Foundation & Higher

Formula / relationship: $A = bh$

Symbols / conditions: Perpendicular height

When to select it: Use this when the question structure matches parallelogram area and the given quantities satisfy the conditions stated above.

Worked original example: $b=8, h=5 \rightarrow 40$

Common trap: Using sloping side for h

Verification check: Estimate the magnitude, check units/dimensions, and substitute back or compare with a simpler case where possible.

AQA mapping: G16

Source: [SPEC-G16] and, where applicable, [FORM]

11. Trapezium area

Area: Geometry

Tier: Foundation & Higher

Formula / relationship: $A = \frac{1}{2}(a+b)h$

Symbols / conditions: a,b parallel sides

When to select it: Use this when the question structure matches trapezium area and the given quantities satisfy the conditions stated above.

Worked original example: $a=7, b=11, h=4 \rightarrow 36$

Common trap: Forgetting brackets or $\frac{1}{2}$

Verification check: Estimate the magnitude, check units/dimensions, and substitute back or compare with a simpler case where possible.

AQA mapping: G16

Source: [SPEC-G16] and, where applicable, [FORM]

12. Prism volume

Area: Geometry

Tier: Foundation & Higher

Formula / relationship: $V = \text{cross-sectional area} \times \text{length}$

Symbols / conditions: Constant cross-section

When to select it: Use this when the question structure matches prism volume and the given quantities satisfy the conditions stated above.

Worked original example: area 12 cm^2 , length $9 \text{ cm} \rightarrow 108 \text{ cm}^3$

Common trap: Using perimeter of cross-section

Verification check: Estimate the magnitude, check units/dimensions, and substitute back or compare with a simpler case where possible.

AQA mapping: G16

Source: [SPEC-G16] and, where applicable, [FORM]

13. Cylinder volume

Area: Geometry

Tier: Foundation & Higher

Formula / relationship: $V = \pi r^2 h$

Symbols / conditions: r is radius

When to select it: Use this when the question structure matches cylinder volume and the given quantities satisfy the conditions stated above.

Worked original example: $r=3, h=10 \rightarrow 90\pi$

Common trap: Using diameter as radius

Verification check: Estimate the magnitude, check units/dimensions, and substitute back or compare with a simpler case where possible.

AQA mapping: G16/G17

Source: [SPEC-G16/G17] and, where applicable, [FORM]

14. Circle circumference

Area: Geometry

Tier: Foundation & Higher

Formula / relationship: $C = 2\pi r = \pi d$

Symbols / conditions: $d=2r$

When to select it: Use this when the question structure matches circle circumference and the given quantities satisfy the conditions stated above.

Worked original example: $r=4 \rightarrow 8\pi$

Common trap: Confusing area and circumference

Verification check: Estimate the magnitude, check units/dimensions, and substitute back or compare with a simpler case where possible.

AQA mapping: G17

Source: [SPEC-G17] and, where applicable, [FORM]

15. Circle area

Area: Geometry

Tier: Foundation & Higher

Formula / relationship: $A = \pi r^2$

Symbols / conditions: Square radius only

When to select it: Use this when the question structure matches circle area and the given quantities satisfy the conditions stated above.

Worked original example: $r=5 \rightarrow 25\pi$

Common trap: Using πd^2

Verification check: Estimate the magnitude, check units/dimensions, and substitute back or compare with a simpler case where possible.

AQA mapping: G17

Source: [SPEC-G17] and, where applicable, [FORM]

16. Arc length

Area: Geometry

Tier: Foundation & Higher

Formula / relationship: $\text{arc} = (\theta/360) \times 2\pi r$

Symbols / conditions: θ in degrees

When to select it: Use this when the question structure matches arc length and the given quantities satisfy the conditions stated above.

Worked original example: $\theta=60, r=6 \rightarrow 2\pi$

Common trap: Using area formula

Verification check: Estimate the magnitude, check units/dimensions, and substitute back or compare with a simpler case where possible.

AQA mapping: G18

Source: [SPEC-G18] and, where applicable, [FORM]

17. Sector area

Area: Geometry

Tier: Foundation & Higher

Formula / relationship: sector = $(\theta/360) \times \pi r^2$

Symbols / conditions: θ in degrees

When to select it: Use this when the question structure matches sector area and the given quantities satisfy the conditions stated above.

Worked original example: $\theta=72, r=5 \rightarrow 5\pi$

Common trap: Using circumference formula

Verification check: Estimate the magnitude, check units/dimensions, and substitute back or compare with a simpler case where possible.

AQA mapping: G18

Source: [SPEC-G18] and, where applicable, [FORM]

18. Pythagoras

Area: Geometry

Tier: Foundation & Higher

Formula / relationship: $a^2+b^2=c^2$

Symbols / conditions: c is hypotenuse

When to select it: Use this when the question structure matches pythagoras and the given quantities satisfy the conditions stated above.

Worked original example: legs 6,8 $\rightarrow c=10$

Common trap: Using non-hypotenuse as c

Verification check: Estimate the magnitude, check units/dimensions, and substitute back or compare with a simpler case where possible.

AQA mapping: G20

Source: [SPEC-G20] and, where applicable, [FORM]

19. Right-triangle sine

Area: Geometry

Tier: Foundation & Higher

Formula / relationship: $\sin \theta = \text{opposite/hypotenuse}$

Symbols / conditions: Relative to chosen θ

When to select it: Use this when the question structure matches right-triangle sine and the given quantities satisfy the conditions stated above.

Worked original example: $\text{opp}=5, \text{hyp}=10 \rightarrow \theta=30^\circ$

Common trap: Mis-labelling sides

Verification check: Estimate the magnitude, check units/dimensions, and substitute back or compare with a simpler case where possible.

AQA mapping: G20

Source: [SPEC-G20] and, where applicable, [FORM]

20. Right-triangle cosine

Area: Geometry

Tier: Foundation & Higher

Formula / relationship: $\cos \theta = \text{adjacent/hypotenuse}$

Symbols / conditions: Relative to chosen θ

When to select it: Use this when the question structure matches right-triangle cosine and the given quantities satisfy the conditions stated above.

Worked original example: $\text{adj}=6, \text{hyp}=10 \rightarrow \theta \approx 53.1^\circ$

Common trap: Using opposite as adjacent

Verification check: Estimate the magnitude, check units/dimensions, and substitute back or compare with a simpler case where possible.

AQA mapping: G20

Source: [SPEC-G20] and, where applicable, [FORM]

21. Right-triangle tangent

Area: Geometry

Tier: Foundation & Higher

Formula / relationship: $\tan \theta = \text{opposite/adjacent}$

Symbols / conditions: Relative to chosen θ

When to select it: Use this when the question structure matches right-triangle tangent and the given quantities satisfy the conditions stated above.

Worked original example: $\text{opp}=3, \text{adj}=4 \rightarrow \theta \approx 36.9^\circ$

Common trap: Calculator not in degrees

Verification check: Estimate the magnitude, check units/dimensions, and substitute back or compare with a simpler case where possible.

AQA mapping: G20

Source: [SPEC-G20] and, where applicable, [FORM]

22. Sine rule

Area: Geometry

Tier: Higher

Formula / relationship: $a/\sin A = b/\sin B = c/\sin C$

Symbols / conditions: Side and opposite angle paired

When to select it: Use this when the question structure matches sine rule and the given quantities satisfy the conditions stated above.

Worked original example: $a=8, A=40^\circ, B=65^\circ \rightarrow b=8 \sin 65 / \sin 40$

Common trap: Pairing side with wrong angle

Verification check: Estimate the magnitude, check units/dimensions, and substitute back or compare with a simpler case where possible.

AQA mapping: G22

Source: [SPEC-G22] and, where applicable, [FORM]

23. Cosine rule

Area: Geometry

Tier: Higher

Formula / relationship: $a^2 = b^2 + c^2 - 2bc \cos A$

Symbols / conditions: A opposite a

When to select it: Use this when the question structure matches cosine rule and the given quantities satisfy the conditions stated above.

Worked original example: $b=7, c=9, A=60^\circ \rightarrow a^2=49+81-63=67$

Common trap: Wrong included angle/sign

Verification check: Estimate the magnitude, check units/dimensions, and substitute back or compare with a simpler case where possible.

AQA mapping: G22

Source: [SPEC-G22] and, where applicable, [FORM]

24. Any triangle area

Area: Geometry

Tier: Higher

Formula / relationship: $A = \frac{1}{2} ab \sin C$

Symbols / conditions: C included angle between a,b

When to select it: Use this when the question structure matches any triangle area and the given quantities satisfy the conditions stated above.

Worked original example: $a=8, b=11, C=30^\circ \rightarrow 22$

Common trap: Using non-included angle

Verification check: Estimate the magnitude, check units/dimensions, and substitute back or compare with a simpler case where possible.

AQA mapping: G23

Source: [SPEC-G23] and, where applicable, [FORM]

25. Sphere surface area

Area: Geometry

Tier: Higher

Formula / relationship: $A = 4\pi r^2$

Symbols / conditions: r radius

When to select it: Use this when the question structure matches sphere surface area and the given quantities satisfy the conditions stated above.

Worked original example: $r=3 \rightarrow 36\pi$

Common trap: Using volume formula

Verification check: Estimate the magnitude, check units/dimensions, and substitute back or compare with a simpler case where possible.

AQA mapping: G17

Source: [SPEC-G17] and, where applicable, [FORM]

26. Sphere volume

Area: Geometry

Tier: Higher

Formula / relationship: $V = \frac{4}{3} \pi r^3$

Symbols / conditions: r radius

When to select it: Use this when the question structure matches sphere volume and the given quantities satisfy the conditions stated above.

Worked original example: $r=3 \rightarrow 36\pi$

Common trap: Forgetting cube or $1/3$

Verification check: Estimate the magnitude, check units/dimensions, and substitute back or compare with a simpler case where possible.

AQA mapping: G17

Source: [SPEC-G17] and, where applicable, [FORM]

27. Cone curved surface area

Area: Geometry

Tier: Higher

Formula / relationship: $A = \pi r l$

Symbols / conditions: l slant height

When to select it: Use this when the question structure matches cone curved surface area and the given quantities satisfy the conditions stated above.

Worked original example: $r=4, l=7 \rightarrow 28\pi$

Common trap: Using vertical height for l

Verification check: Estimate the magnitude, check units/dimensions, and substitute back or compare with a simpler case where possible.

AQA mapping: G17

Source: [SPEC-G17] and, where applicable, [FORM]

28. Cone volume

Area: Geometry

Tier: Higher

Formula / relationship: $V = \frac{1}{3} \pi r^2 h$

Symbols / conditions: h perpendicular height

When to select it: Use this when the question structure matches cone volume and the given quantities satisfy the conditions stated above.

Worked original example: $r=3, h=8 \rightarrow 24\pi$

Common trap: Forgetting $\frac{1}{3}$

Verification check: Estimate the magnitude, check units/dimensions, and substitute back or compare with a simpler case where possible.

AQA mapping: G17

Source: [SPEC-G17] and, where applicable, [FORM]

29. Area scale factor

Area: Similarity

Tier: Foundation & Higher

Formula / relationship: area factor = k^2

Symbols / conditions: k is linear scale factor

When to select it: Use this when the question structure matches area scale factor and the given quantities satisfy the conditions stated above.

Worked original example: length factor 3 → area factor 9

Common trap: Using k instead of k^2

Verification check: Estimate the magnitude, check units/dimensions, and substitute back or compare with a simpler case where possible.

AQA mapping: G19/R12

Source: [SPEC-G19/R12] and, where applicable, [FORM]

30. Volume scale factor

Area: Similarity

Tier: Higher emphasis

Formula / relationship: volume factor = k^3

Symbols / conditions: k is linear scale factor

When to select it: Use this when the question structure matches volume scale factor and the given quantities satisfy the conditions stated above.

Worked original example: length factor 2 → volume factor 8

Common trap: Using k^2

Verification check: Estimate the magnitude, check units/dimensions, and substitute back or compare with a simpler case where possible.

AQA mapping: G19/R12

Source: [SPEC-G19/R12] and, where applicable, [FORM]

31. Mean

Area: Statistics

Tier: Foundation & Higher

Formula / relationship: mean = sum of values $\div$ number of values

Symbols / conditions: For frequency table use $\Sigma fx / \Sigma f$

When to select it: Use this when the question structure matches mean and the given quantities satisfy the conditions stated above.

Worked original example: 3,5,8 $\rightarrow$ 16/3

Common trap: Dividing by wrong count

Verification check: Estimate the magnitude, check units/dimensions, and substitute back or compare with a simpler case where possible.

AQA mapping: S4

Source: [SPEC-S4] and, where applicable, [FORM]

32. Frequency density

Area: Statistics

Tier: Higher

Formula / relationship: density = frequency $\div$ class width

Symbols / conditions: Histogram bar area represents frequency

When to select it: Use this when the question structure matches frequency density and the given quantities satisfy the conditions stated above.

Worked original example: frequency 24,width 6 $\rightarrow$ density 4

Common trap: Using frequency as height

Verification check: Estimate the magnitude, check units/dimensions, and substitute back or compare with a simpler case where possible.

AQA mapping: S3

Source: [SPEC-S3] and, where applicable, [FORM]

33. Complement

Area: Probability

Tier: Foundation & Higher

Formula / relationship: $P(\text{not } A) = 1 - P(A)$

Symbols / conditions: Probabilities total 1

When to select it: Use this when the question structure matches complement and the given quantities satisfy the conditions stated above.

Worked original example: $P(A) = 0.37 \rightarrow$ complement 0.63

Common trap: Subtracting from 100 without % conversion

Verification check: Estimate the magnitude, check units/dimensions, and substitute back or compare with a simpler case where possible.

AQA mapping: P4

Source: [SPEC-P4] and, where applicable, [FORM]

34. Independent intersection

Area: Probability

Tier: Foundation & Higher

Formula / relationship: $P(A \text{ and } B) = P(A)P(B)$

Symbols / conditions: Only when events independent / appropriate tree branches

When to select it: Use this when the question structure matches independent intersection and the given quantities satisfy the conditions stated above.

Worked original example: $0.4 \times 0.7 = 0.28$

Common trap: Adding instead of multiplying

Verification check: Estimate the magnitude, check units/dimensions, and substitute back or compare with a simpler case where possible.

AQA mapping: P8

Source: [SPEC-P8] and, where applicable, [FORM]

35. Mutually exclusive union

Area: Probability

Tier: Foundation & Higher

Formula / relationship: $P(A \text{ or } B) = P(A) + P(B)$

Symbols / conditions: When A and B cannot occur together

When to select it: Use this when the question structure matches mutually exclusive union and the given quantities satisfy the conditions stated above.

Worked original example: $0.2 + 0.35 = 0.55$

Common trap: Adding overlapping events without adjustment

Verification check: Estimate the magnitude, check units/dimensions, and substitute back or compare with a simpler case where possible.

AQA mapping: P4/P8

Source: [SPEC-P4/P8] and, where applicable, [FORM]

Exact trigonometric values

Exact value	Result
$\sin 0^\circ$	0
$\sin 30^\circ$	$\frac{1}{2}$
$\sin 45^\circ$	$\frac{\sqrt{2}}{2}$
$\sin 60^\circ$	$\frac{\sqrt{3}}{2}$
$\sin 90^\circ$	1
$\cos 0^\circ$	1
$\cos 30^\circ$	$\frac{\sqrt{3}}{2}$
$\cos 45^\circ$	$\frac{\sqrt{2}}{2}$
$\cos 60^\circ$	$\frac{1}{2}$
$\cos 90^\circ$	0
$\tan 0^\circ$	0
$\tan 30^\circ$	$\frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$
$\tan 45^\circ$	1
$\tan 60^\circ$	$\sqrt{3}$

Formula selection guide

Right triangle

Decision rule: Known/missing sides only → Pythagoras. Side/angle relationship → SOHCAHTOA. Label O/A/H relative to the chosen angle before choosing.

Self-check: Can I explain in one sentence why this formula/rule matches the information given?

Non-right triangle

Decision rule: Matching side-opposite-angle pair → sine rule. SAS or SSS → cosine rule. Two sides plus included angle for area → $\frac{1}{2} ab \sin C$.

Self-check: Can I explain in one sentence why this formula/rule matches the information given?

Circle

Decision rule: Whole boundary → circumference. Whole region → area. Fraction of circle → multiply the whole formula by $\theta/360$.

Self-check: Can I explain in one sentence why this formula/rule matches the information given?

Similarity

Decision rule: Find linear scale factor k first. Use k for lengths, k^2 for areas and k^3 for volumes.

Self-check: Can I explain in one sentence why this formula/rule matches the information given?

Percentage change

Decision rule: One change → multiply by one multiplier. Repeated change → multiplier^n . Reverse change → divide by the multiplier.

Self-check: Can I explain in one sentence why this formula/rule matches the information given?

Rates

Decision rule: Write target unit first. Convert quantities to compatible units before using distance/time, density or pressure.

Self-check: Can I explain in one sentence why this formula/rule matches the information given?

Probability

Decision rule: Along a tree route usually multiply; separate mutually exclusive routes usually add. Conditions can change denominators.

Self-check: Can I explain in one sentence why this formula/rule matches the information given?

Histogram

Decision rule: When class widths differ, use frequency density; bar area, not height alone, represents frequency.

Self-check: Can I explain in one sentence why this formula/rule matches the information given?

Rearrangement clinic

$\rho = m/V$, find m

Method: Multiply by V : $\rho V = m$, therefore $m = \rho V$.

Common trap: Do not “move V ” without stating the inverse operation.

Check: Substitute a simple numerical example into both original and rearranged forms.

$v = s/t$, find t

Method: Multiply by t : $vt = s$. Divide by v : $t = s/v$.

Common trap: If $v = 0$ the rearrangement is not meaningful for travel time; interpret context.

Check: Substitute a simple numerical example into both original and rearranged forms.

$A = \pi r^2$, find r

Method: Divide by π : $r^2 = A/\pi$. Square root: $r = \sqrt{A/\pi}$.

Common trap: Radius is non-negative in this context.

Check: Substitute a simple numerical example into both original and rearranged forms.

$P = F/A$, find A

Method: $PA = F$, so $A = F/P$.

Common trap: Keep force/pressure units compatible.

Check: Substitute a simple numerical example into both original and rearranged forms.

$y = (3x - 5)/4$, find x **Method:** $4y = 3x - 5 \rightarrow 4y + 5 = 3x \rightarrow x = (4y + 5)/3$.**Common trap:** Treat the entire numerator as one grouped expression.**Check:** Substitute a simple numerical example into both original and rearranged forms. **$a^2 = b^2 + c^2 - 2bc \cos A$, find $\cos A$** **Method:** $2bc \cos A = b^2 + c^2 - a^2$, so $\cos A = (b^2 + c^2 - a^2)/(2bc)$.**Common trap:** Use the angle opposite side a .**Check:** Substitute a simple numerical example into both original and rearranged forms.

Unit and dimension reference

Length

Reference: 1 m = 100 cm = 1000 mm; 1 km = 1000 m**Method reminder:** Linear conversion factor once.

Area

Reference: 1 m² = 10,000 cm²**Method reminder:** Square the linear factor.

Volume

Reference: 1 m³ = 1,000,000 cm³; 1 cm³ = 1 mL; 1000 cm³ = 1 L**Method reminder:** Cube the linear factor where converting cubic length units.

Time

Reference: 1 h = 60 min = 3600 s**Method reminder:** 1 h 30 min = 1.5 h, not 1.30 h.

Speed

Reference: Common: m/s or km/h

Method reminder: Convert distance and time together.

Density

Reference: Common: g/cm³ or kg/m³

Method reminder: Mass and volume units must match the target density unit.

Pressure

Reference: Pa=N/m²

Method reminder: Area must be in m² for pascals when force is N.

Formula mastery audit

Family	Recognise	Select	Substitute	Rearrange	Check units/result
Percentages/ growth	☐	☐	☐	☐	☐
Rates/compound units	☐	☐	☐	☐	☐
Straight lines	☐	☐	☐	☐	☐
Areas/perimeters	☐	☐	☐	☐	☐
Volumes/surface area	☐	☐	☐	☐	☐
Pythagoras/right trig	☐	☐	☐	☐	☐
Sine/cosine rule	☐	☐	☐	☐	☐
Similarity	☐	☐	☐	☐	☐
Probability	☐	☐	☐	☐	☐
Statistics	☐	☐	☐	☐	☐

References and source register

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[COPY] AQA assessment-material copyright guidance / All About Maths. Public-facing resources should not reproduce AQA copyrighted past-paper questions or mark schemes. <https://www.aqa.org.uk/subjects/mathematics/gcse/mathematics-8300/assessment-resources>

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