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FORMULA, METHODS & EXACT VALUES HANDBOOK

Current OCR formula-sheet regime plus method selection, checks and independently written examples

Cambridge OCR GCSE (9-1) Mathematics J560 | Foundation and Higher | Website reference edition | 2026

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Evidence standard

Official curriculum statements, exam arrangements, formula-sheet policy and grade/result figures are sourced to Cambridge OCR publications. Worked examples, explanations, diagnostic prompts and revision advice are independently authored. Historical grade boundaries describe completed series only and must not be treated as predictions.

Current formula-sheet regime

OCR provides a clean tier-specific formulae sheet with every J560 paper. The Higher sheet contains additional formulae. OCR/Ofqual have confirmed formula sheets will continue for the lifetime of the current specification. OCR also states that some formulae, including cone/sphere and kinematics formulae, continue to be supplied within questions when required. [OCR-FORM27] [OCR-FORM-LIFE]

What appears on the current sheets

Foundation: trapezium area, prism volume, circle circumference/area, Pythagoras, right-angle trigonometry, compound interest and the probability addition law. Higher includes those plus the quadratic formula, sine rule, cosine rule, area = 1/2 ab sin C and the conditional multiplication law of probability. [OCR-FS-F] [OCR-FS-H]

01 | Trapezium area

Tier	Relationship
Both	$A = 1/2(a+b)h$

Meaning / conditions: a and b are parallel sides; h is perpendicular separation

Selection method: Identify the two parallel sides, add them, halve, then multiply by perpendicular height.

Common trap: Using a sloping side instead of perpendicular height.

Independent worked example: Parallel sides 8 cm and 14 cm, height 5 cm: $A = 1/2(8+14)\times5 = 55$ cm².

Check: units/dimensions sensible? exact or rounded form requested? calculator angle mode correct? has rounding been delayed until the end?

02 | Prism volume

Tier	Relationship
Both	V = area of cross-section × length

Meaning / conditions: Cross-section must be constant along the prism

Selection method: Calculate cross-section area first, then multiply by prism length.

Common trap: Using surface area instead of cross-section area.

Independent worked example: Cross-section area 18 cm² and length 7 cm: $V = 18\times7 = 126$ cm³.

Check: units/dimensions sensible? exact or rounded form requested? calculator angle mode correct? has rounding been delayed until the end?

03 | Circle circumference

Tier	Relationship
Both	$C = 2\pi r = \pi d$

Meaning / conditions: r radius; d diameter

Selection method: Use the version matching the quantity given.

Common trap: Substituting diameter for r.

Independent worked example: Radius 6 cm: $C = 12\pi$ cm ≈ 37.7 cm.

Check: units/dimensions sensible? exact or rounded form requested? calculator angle mode correct? has rounding been delayed until the end?

04 | Circle area

Tier	Relationship
Both	$A = \pi r^2$

Meaning / conditions: r radius

Selection method: Square radius before multiplying by π.

Common trap: Squaring πr rather than r only.

Independent worked example: Radius 4 cm: $A = 16\pi$ cm^2 ≈ 50.3 cm^2.

Check: units/dimensions sensible? exact or rounded form requested? calculator angle mode correct? has rounding been delayed until the end?

05 | Pythagoras

Tier	Relationship
Both	$a^2+b^2=c^2$

Meaning / conditions: c is hypotenuse in right-angled triangle

Selection method: Identify hypotenuse before substitution.

Common trap: Using it in a non-right-angled triangle.

Independent worked example: Legs 6 and 8: $c=\sqrt{(36+64)}=10$.

Check: units/dimensions sensible? exact or rounded form requested? calculator angle mode correct? has rounding been delayed until the end?

06 | Right-angle trig

Tier	Relationship
Both	sin A=opp/hyp; cos A=adj/hyp; tan A=opp/adj

Meaning / conditions: Right-angled triangle; sides relative to chosen angle

Selection method: Label O/A/H relative to the target angle.

Common trap: Labelling adjacent/hypotenuse from the wrong angle.

Independent worked example: If opposite=7 and hypotenuse=10, sin A=0.7, so $A=\sin^{-1}(0.7)$.

Check: units/dimensions sensible? exact or rounded form requested? calculator angle mode correct? has rounding been delayed until the end?

07 | Compound interest/growth

Tier	Relationship
Both	Total = P(1+r/100)^n

Meaning / conditions: P principal; r percentage rate per period; n number of periods

Selection method: Convert percentage to multiplier once, then apply exponent.

Common trap: Using simple interest or adding the same percentage amount each time.

Independent worked example: £800 at 3% for 4 years: 800(1.03)^4 ≈ £900.41.

Check: units/dimensions sensible? exact or rounded form requested? calculator angle mode correct? has rounding been delayed until the end?

08 | Probability addition law

Tier	Relationship
Both	P(A or B)=P(A)+P(B)-P(A and B)

Meaning / conditions: General addition law

Selection method: Subtract overlap once to avoid double counting.

Common trap: Adding without subtracting overlap when events can occur together.

Independent worked example: If P(A)=0.55, P(B)=0.40 and P(A and B)=0.20, then P(A or B)=0.75.

Check: units/dimensions sensible? exact or rounded form requested? calculator angle mode correct? has rounding been delayed until the end?

09 | Quadratic formula

Tier	Relationship
Higher	$x=(-b \pm \sqrt{(b^2-4ac)})/(2a)$

Meaning / conditions: Equation written as $ax^2+bx+c=0$

Selection method: Identify a,b,c including signs; substitute with brackets.

Common trap: Losing the negative sign on b or forgetting ±.

Independent worked example: For $2x^2-3x-2=0$, a=2,b=-3,c=-2; substitution gives x=2 or -0.5.

Check: units/dimensions sensible? exact or rounded form requested? calculator angle mode correct? has rounding been delayed until the end?

10 | Sine rule

Tier	Relationship
Higher	$a/\sin A=b/\sin B=c/\sin C$

Meaning / conditions: Opposite side-angle pairs

Selection method: Match every side with its opposite angle.

Common trap: Pairing a side with an adjacent angle.

Independent worked example: If a=8, A=40°, B=65°, then $b=8 \sin 65°/\sin 40°$.

Check: units/dimensions sensible? exact or rounded form requested? calculator angle mode correct? has rounding been delayed until the end?

11 | Cosine rule

Tier	Relationship
Higher	$a^2=b^2+c^2-2bc \cos A$

Meaning / conditions: A is angle opposite side a

Selection method: Use when three sides are involved or two sides plus included angle.

Common trap: Forgetting cos A or square root.

Independent worked example: Sides b=7,c=9 with included A=60°: $a^2=49+81-126\times0.5=67$, so $a=\sqrt{67}$.

Check: units/dimensions sensible? exact or rounded form requested? calculator angle mode correct? has rounding been delayed until the end?

12 | Triangle area

Tier	Relationship
Higher	$A=1/2\ ab \sin C$

Meaning / conditions: C is included angle between sides a and b

Selection method: Use two sides and their included angle.

Common trap: Using a non-included angle.

Independent worked example: a=8,b=11,C=35°: area=0.5×8×11×sin35°.

Check: units/dimensions sensible? exact or rounded form requested? calculator angle mode correct? has rounding been delayed until the end?

13 | Probability multiplication law

Tier	Relationship
Higher	P(A and B)=P(A given B)P(B)

Meaning / conditions: Conditional form

Selection method: Read conditional probability carefully; order events deliberately.

Common trap: Assuming independence and multiplying P(A)P(B).

Independent worked example: If P(B)=0.4 and P(A|B)=0.7, P(A and B)=0.28.

Check: units/dimensions sensible? exact or rounded form requested? calculator angle mode correct? has rounding been delayed until the end?

14 | Speed

Tier	Relationship
Both	speed = distance/time

Meaning / conditions: Use consistent units

Selection method: Convert units first where necessary.

Common trap: Mixing minutes with hours.

Independent worked example: 150 km in 2.5 h gives 60 km/h.

Check: units/dimensions sensible? exact or rounded form requested? calculator angle mode correct? has rounding been delayed until the end?

15 | Density

Tier	Relationship
Both	density = mass/volume

Meaning / conditions: Use compatible mass/volume units

Selection method: Write units with the substitution.

Common trap: Inverting the relationship.

Independent worked example: Mass 540 g, volume 200 cm^3 gives 2.7 g/cm^3.

Check: units/dimensions sensible? exact or rounded form requested? calculator angle mode correct? has rounding been delayed until the end?

16 | Pressure

Tier	Relationship
Both	pressure = force/area

Meaning / conditions: Use consistent force and area units

Selection method: Check whether area conversion is squared.

Common trap: Converting cm to m but not squaring conversion for area.

Independent worked example: Force 480 N over 0.12 m^2 gives 4000 Pa.

Check: units/dimensions sensible? exact or rounded form requested? calculator angle mode correct? has rounding been delayed until the end?

17 | Percentage multiplier

Tier	Relationship
Both	increase ×(1+p/100); decrease ×(1-p/100)

Meaning / conditions: p is percentage change

Selection method: Translate percentage into a multiplier.

Common trap: Using p/100 as the final multiplier for an increase.

Independent worked example: Decrease £250 by 12%: 250×0.88=£220.

Check: units/dimensions sensible? exact or rounded form requested? calculator angle mode correct? has rounding been delayed until the end?

18 | Direct proportion

Tier	Relationship
Both	$y=kx$ (or specified power form)

Meaning / conditions: k constant of proportionality

Selection method: Use one data pair to find k, then build equation.

Common trap: Assuming any linear relation is proportional.

Independent worked example: $y \propto x$ and $y=18$ when $x=6$, so $k=3$ and $y=3x$.

Check: units/dimensions sensible? exact or rounded form requested? calculator angle mode correct? has rounding been delayed until the end?

19 | Inverse proportion

Tier	Relationship
Higher	$y=k/x$ (or specified power form)

Meaning / conditions: Product/appropriate power relationship is constant

Selection method: Find k from given pair then substitute.

Common trap: Treating inverse proportion as $y=-kx$.

Independent worked example: $y \propto 1/x$ and $y=5$ when $x=4$, so $k=20$ and $y=20/x$.

Check: units/dimensions sensible? exact or rounded form requested? calculator angle mode correct? has rounding been delayed until the end?

20 | Kinematics/solid formulae supplied in questions

Tier	Relationship
Higher/when provided	Use the formula exactly as supplied

Meaning / conditions: OCR states certain formulae such as cone/sphere and kinematics formulae continue to be supplied when required

Selection method: Write formula, substitute with units, calculate, then interpret.

Common trap: Trying to memorise a variant and using it instead of the supplied expression.

Independent worked example: If a question supplies $V=(1/3)\pi r^2 h$, copy it accurately, substitute the stated r and h, and preserve π until the final rounding step.

Check: units/dimensions sensible? exact or rounded form requested? calculator angle mode correct? has rounding been delayed until the end?

Exact values and non-calculator discipline

Students should be comfortable with exact values involving fractions, roots and π, and with exact trigonometric values where required by the specification. On Paper 02/05, plan arithmetic before writing decimals; simplify fractions and surds exactly where possible. On calculator papers, use the calculator but keep written structure visible.

Formula-selection flow

1. What is the target quantity? 2. What values are known? 3. Is the diagram right-angled? 4. Are quantities opposite/adjacent/included correctly paired? 5. Is there a direct formula or a two-stage route? 6. Substitute with brackets and units. 7. Check magnitude and round only as instructed.

References and source register

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