

The extended paper prints a short list of formulae for the volumes and surface areas of a cone, sphere and pyramid, plus the sine and cosine rules – and nothing else. Everything below has to be recalled, and questions are set assuming it is instant. 考卷只给出少量立体几何与三角公式, 其余全部需要背诵。

Given on the paper

Curved surface area and volume of a cone, sphere and cylinder; volume of a pyramid.

The sine rule, the cosine rule, and the area of a triangle as $\frac{1}{2}ab \sin C$.

The quadratic formula. Nothing else – not Pythagoras, not the circle area, not compound interest.

Number

Percentage change 百分比变化 — $\text{change} \div \text{original} \times 100$. The original is the value BEFORE the change, and choosing the wrong denominator is the commonest error in the topic.

Reverse percentage 逆推百分比 — Divide by the multiplier: after a 20 per cent increase, divide by 1.2 to recover the original. Never subtract 20 per cent.

Compound interest 复利 — $A = P(1 + r/100)^n$; for depreciation the sign inside the bracket flips.

Standard form 科学记数法 — $a \times 10^n$ with $1 \leq a < 10$. Multiply the numbers and add the indices.

Speed, density, pressure 速度、密度、压强 — $\text{speed} = \text{distance} \div \text{time}$; $\text{density} = \text{mass} \div \text{volume}$; $\text{pressure} = \text{force} \div \text{area}$. Watch units: km/h to m/s divides by 3.6.

Algebra

Straight line 直线方程 — $y = mx + c$, with $m = (y_2 - y_1)/(x_2 - x_1)$; parallel lines share m , perpendicular ones have $m_1 m_2 = -1$.

Index laws 指数律 — $a^m \times a^n = a^{m+n}$, $a^m \div a^n = a^{m-n}$, $(a^m)^n = a^{mn}$, $a^0 = 1$, $a^{-n} = 1/a^n$, $a^{1/2} = \sqrt{a}$

Difference of two squares 平方差 — $a^2 - b^2 = (a + b)(a - b)$ – the factorisation the exam expects you to spot instantly

Direct and inverse proportion 正比与反比 — $y = kx$ or $y = k/x$ (also with squares and roots). Find k from the given pair first, then answer the question.

Geometry and trigonometry

Pythagoras 勾股定理 — $a^2 + b^2 = c^2$, right angle opposite c

Right-angled trigonometry 直角三角函数 — $\sin \theta = \text{opp}/\text{hyp}$, $\cos \theta = \text{adj}/\text{hyp}$, $\tan \theta = \text{opp}/\text{adj}$

Circle 圆 — $\text{Area} = \pi r^2$, $\text{circumference} = 2\pi r$; an arc is that fraction $\theta/360$ of the circumference, and a sector the same fraction of the area.

Angles 角 — Interior angles of an n -sided polygon sum to $(n - 2) \times 180$; each exterior angle of a regular polygon is $360/n$.

Similar shapes 相似图形 — If lengths scale by k , areas scale by k^2 and volumes by k^3 . This is examined every session and almost always as a two-step question.

Bearings 方位角 — Measured clockwise from north, always written with three figures: 072 degrees, not 72.

Statistics and probability

Mean from a frequency table 频数表求平均数 — $\sum fx \div \sum f$, using the midpoint of each class for grouped data

Probability rules 概率法则 — AND means multiply along a branch; OR means add across branches. Without replacement, the second denominator drops by one.

Losing fewer marks

Write the formula before substituting. On a two-mark question the formula usually carries one of the marks by itself.

Do not round intermediate values. Keep the full display in the calculator and round only the final answer, to three significant figures unless told otherwise.

Answer the question asked: if it says “give your answer in cm”, convert. Correct arithmetic in the wrong unit scores zero.