IGCSE Mathematics

Revision Sheet · 考前速记

Learn these by heart before the exam. 考试前把这些内容背熟。

Number

Order of operations (BIDMAS): Brackets, Indices, Division/Multiplication, Addition/Subtraction.

$\text{percentage change} = \dfrac{\text{new} - \text{old}}{\text{old}} \times 100\%$ 百分比变化

compound: $A = P\left(1 + \frac{r}{100}\right)^n$ 复利

$a^m \times a^n = a^{m+n}, \quad (a^m)^n = a^{mn}, \quad a^{-n} = \frac{1}{a^n}$ 指数律

Standard form 标准型: $a \times 10^n$ with $1 \le a < 10$; used for very large or small numbers

Ratio: divide a quantity in ratio $a : b$ by sharing it into $a + b$ equal parts.

Algebra

$x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ 求根公式

$(a+b)(a-b) = a^2 - b^2$ 平方差

Direct and inverse proportion 正比与反比: direct $y = kx$; inverse $y = \dfrac{k}{x}$ – find k from a given pair

nth term (linear) $= a + (n-1)d$ d = common difference between terms 数列通项

Inequalities: reverse the sign when multiplying or dividing by a negative number.

Coordinate geometry and graphs

gradient $m = \dfrac{y_2 - y_1}{x_2 - x_1}$ 斜率

$y = mx + c$ straight line; c = y-intercept

midpoint $= \left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$ 中点

length $= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Parallel lines have equal gradients; perpendicular gradients multiply to -1.

Kinematics graphs: gradient of distance-time = speed; area under speed-time = distance.

Geometry and mensuration

$a^2 + b^2 = c^2$ Pythagoras; right-angled triangles only 勾股定理

circle: $C = 2\pi r, \quad A = \pi r^2$ 圆

sector: arc $= \frac{\theta}{360} \times 2\pi r$, area $= \frac{\theta}{360} \times \pi r^2$ 扇形

cylinder $V = \pi r^2 h$, sphere $V = \frac{4}{3}\pi r^3$

cone $V = \frac{1}{3}\pi r^2 h$

Angles: sum in a triangle 180°*, on a straight line* 180°*, round a point* 360°*.*

Circle theorems: angle at the centre = twice the angle at the circumference; angle in a semicircle = 90°*.*

Trigonometry

$\sin\theta = \frac{O}{H}$, $\cos\theta = \frac{A}{H}$, $\tan\theta = \frac{O}{A}$ SOH CAH TOA; right-angled triangles 三角比

$\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$ 正弦定理

$a^2 = b^2 + c^2 - 2bc\cos A$ 余弦定理

area $= \frac{1}{2}ab\sin C$ area of a triangle from two sides and the included angle

Statistics and probability

$\text{mean} = \dfrac{\sum fx}{\sum f}$ 平均数

Averages 平均量: mean = total ÷ count; median = middle value in order; mode = most common; range = highest − lowest

$P(\text{event}) = \dfrac{\text{favourable outcomes}}{\text{total outcomes}}$ 概率

$P(A \text{ or } B) = P(A) + P(B)$ for mutually exclusive events

$P(A \text{ and } B) = P(A) \times P(B)$ for independent events; use a tree diagram