

A definition question is marked against fixed wording: the quantities named, and the relationship between them. These are written the way a mark scheme accepts them. Learn the italicised relationship – that is where the mark sits. 定义题按固定表述给分。

Quantities and units

Scalar 标量 — a quantity with magnitude only

Vector 矢量 — a quantity with magnitude and direction

Precision 精密度 — how close repeated readings are to each other; it is unrelated to whether they are correct

Accuracy 准确度 — how close a reading is to the true value

Systematic error 系统误差 — an error that shifts every reading by the same amount or proportion, and which repeating cannot reduce

Random error 随机误差 — an error that varies unpredictably between readings, reduced by repeating and averaging

Mechanics

Displacement 位移 — the distance moved in a stated direction

Velocity 速度 — the rate of change of displacement

Acceleration 加速度 — the rate of change of velocity

Force 力 — the rate of change of momentum

Newton’s first law 牛顿第一定律 — a body remains at rest or in uniform motion in a straight line unless acted on by a resultant force

Newton’s third law 牛顿第三定律 — when two bodies interact, the forces they exert on each other are equal in magnitude, opposite in direction, and of the same type

Momentum 动量 — the product of mass and velocity

Principle of conservation of momentum 动量守恒 — the total momentum of a system is constant provided no resultant external force acts

Elastic collision 弹性碰撞 — a collision in which total kinetic energy is conserved; relative speed of approach equals relative speed of separation

Work done 功 — the product of the force and the distance moved in the direction of the force

Power 功率 — the rate of doing work, or the rate of energy transfer

Centre of gravity 重心 — the point at which the entire weight of a body may be considered to act

Moment of a force 力矩 — the product of the force and the perpendicular distance from the pivot to the line of action of the force

Couple 力偶 — a pair of equal and opposite forces whose lines of action do not coincide

Principle of moments 力矩原理 — for a body in equilibrium, the sum of clockwise moments about any point equals the sum of anticlockwise moments about that point

Pressure 压强 — force per unit area, acting normal to the surface

Upthrust 浮力 — the upward force on a body in a fluid, equal to the weight of fluid displaced

Deformation and materials

Hooke’s law 胡克定律 — the extension is proportional to the applied force, provided the limit of proportionality is not exceeded

Stress 应力 — force per unit cross-sectional area

Strain 应变 — extension divided by original length; it has no unit

Young modulus 杨氏模量 — the ratio of stress to strain, for a material obeying Hooke’s law

Elastic deformation 弹性形变 — deformation from which the body returns to its original length when the load is removed

Plastic deformation 塑性形变 — deformation which is permanent when the load is removed

Waves

Displacement (wave) 位移 — the distance of a point on the wave from its equilibrium position

Amplitude 振幅 — the maximum displacement from the equilibrium position

Frequency 频率 — the number of complete oscillations per unit time

Wavelength 波长 — the distance between two adjacent points on a wave that are in phase

Phase difference 相位差 — the fraction of a cycle, expressed as an angle, by which one oscillation leads or lags another

Intensity 强度 — power per unit area, proportional to the square of the amplitude

Progressive wave 行波 — a wave that transfers energy from one place to another without transferring matter

Transverse wave 横波 — a wave in which the oscillations are perpendicular to the direction of energy transfer

Longitudinal wave 纵波 — a wave in which the oscillations are parallel to the direction of energy transfer

Polarisation 偏振 — restriction of the oscillations of a transverse wave to a single plane containing the direction of travel

Principle of superposition 叠加原理 — when two waves meet at a point, the resultant displacement is the vector sum of the individual displacements

Coherence 相干性 — a constant phase difference between two waves, which requires the same frequency

Node / antinode 波节与波腹 — a node is a point of permanently zero displacement; an antinode is a point of maximum displacement

Electricity

Electric current 电流 — the rate of flow of charge

Potential difference 电势差 — the energy transferred from electrical to other forms per unit charge passing between two points

Electromotive force 电动势 — the energy transferred from other forms to electrical per unit charge driven round the circuit

Resistance 电阻 — the ratio of potential difference across a component to the current through it

Ohm's law 欧姆定律 — the current in a metallic conductor is proportional to the potential difference across it, provided physical conditions such as temperature stay constant

Resistivity 电阻率 — the resistance of a sample of unit length and unit cross-sectional area, a property of the material

Kirchhoff's first law 基尔霍夫第一定律 — the sum of currents into a junction equals the sum of currents out – a statement of conservation of charge

Kirchhoff's second law 基尔霍夫第二定律 — round any closed loop, the sum of the e.m.f.s equals the sum of the p.d.s – a statement of conservation of energy

Fields

Gravitational field strength 引力场强度 — the gravitational force per unit mass

Gravitational potential 引力势 — the work done per unit mass in bringing a small mass from infinity to that point; it is always negative

Newton's law of gravitation 万有引力定律 — two point masses attract with a force proportional to the product of their masses and inversely proportional to the square of their separation

Electric field strength 电场强度 — the electric force per unit positive charge

Electric potential 电势 — the work done per unit positive charge in bringing a small charge from infinity to that point

Coulomb's law 库仑定律 — two point charges exert a force proportional to the product of the charges and inversely proportional to the square of their separation

Capacitance 电容 — the charge stored per unit potential difference

Magnetic flux density 磁通密度 — the force per unit length per unit current on a straight conductor placed at right angles to the field

Magnetic flux 磁通量 — the product of magnetic flux density and the area normal to the field

Faraday's law 法拉第定律 — the magnitude of the induced e.m.f. is proportional to the rate of change of magnetic flux linkage

Lenz's law 楞次定律 — the direction of the induced e.m.f. is such as to oppose the change producing it

Thermal physics and oscillations

Internal energy 内能 — the sum of the random distribution of kinetic and potential energies of the molecules of a system

Specific heat capacity 比热容 — the energy required per unit mass to raise the temperature by one kelvin

Specific latent heat of fusion 比熔化热 — the energy required per unit mass to change state from solid to liquid without a change of temperature

First law of thermodynamics 热力学第一定律 — the increase in internal energy equals the heat supplied to the system plus the work done on the system

Thermal equilibrium 热平衡 — two bodies are in thermal equilibrium when there is no net flow of thermal energy between them, which means they are at the same temperature

Simple harmonic motion 简谐运动 — motion in which the acceleration is proportional to the displacement from a fixed point and always directed towards that point

Damping 阻尼 — the loss of energy, and hence amplitude, from an oscillating system because of resistive forces

Resonance 共振 — the large-amplitude response when a system is driven at its natural frequency, so energy transfer to the system is a maximum

Quantum and nuclear

Photon 光子 — a quantum of electromagnetic energy, of energy equal to Planck's constant times the frequency

Work function 功函数 — the minimum energy required to remove an electron from the surface of a metal

Threshold frequency 极限频率 — the minimum frequency of incident radiation that will cause photo-electric emission from a given surface

de Broglie wavelength 德布罗意波长 — the wavelength associated with a moving particle, equal to Planck's constant divided by its momentum

Nucleon number / proton number 核子数与质子数 — the number of nucleons in a nucleus; the number of protons in a nucleus

Isotope 同位素 — nuclei of the same element with the same proton number but different numbers of neutrons

Radioactive decay 放射性衰变 — the spontaneous and random emission of radiation from an unstable nucleus

Activity 放射性活度 — the number of nuclear decays per unit time

Decay constant 衰变常数 — the probability of decay of a nucleus per unit time

Half-life 半衰期 — the mean time taken for the number of undecayed nuclei, or the activity, to fall to half its initial value

Mass defect 质量亏损 — the difference between the mass of a nucleus and the total mass of its separate nucleons

Binding energy 结合能 — the energy required to separate a nucleus completely into its individual nucleons