Paper Reference(s) **8PH0/02**

Pearson Edexcel Level 3 GCE

Physics
Advanced Subsidiary
Paper 2: Core Physics II

DATA, FORMULAE AND RELATIONSHIPS BOOKLET

DO NOT RETURN THIS DATA, FORMULAE AND RELATIONSHIPS BOOKLET WITH THE QUESTION PAPER.

Acceleration of free fall	$g = 9{\cdot}81\ \text{m s}^{-2}$ (close to Earth's surface)
Electron charge	$e = -1{\cdot}60 \times 10^{-19}\ \text{C}$
Electron mass	$m_e = 9{\cdot}11 \times 10^{-31}\ \text{kg}$
Electronvolt	$1\ \text{eV} = 1{\cdot}60 \times 10^{-19}\ \text{J}$
Gravitational field strength	$g = 9{\cdot}81\ \text{N kg}^{-1}$ (close to Earth's surface)
Planck constant	$h = 6{\cdot}63 \times 10^{-34}\ \text{J s}$
Speed of light in a vacuum	$c = 3{\cdot}00 \times 10^{8}\ \text{m s}^{-1}$

MECHANICS

Kinematic equations of motion

$$s = \frac{(u + v)t}{2}$$

$$v = u + at$$

$$s = ut + \tfrac{1}{2}at^2$$

$$v^2 = u^2 + 2as$$

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Forces

$\Sigma F = ma$

$g = \frac{F}{m}$

$W = mg$

moment of force $= Fx$

Momentum

$p = mv$

Work, energy and power

$\Delta W = F\Delta s$

$E_k = \frac{1}{2}mv^2$

$\Delta E_{grav} = mg\Delta h$

$P = \frac{E}{t}$

$P = \frac{W}{t}$

$\text{efficiency} = \frac{\text{useful energy output}}{\text{total energy input}}$

$\text{efficiency} = \frac{\text{useful power output}}{\text{total power input}}$

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ELECTRIC CIRCUITS

Potential difference

$$V = \frac{W}{Q}$$

Resistance

$$R = \frac{V}{I}$$

Electrical power and energy

$$P = VI$$

$$P = I^2R$$

$$P = \frac{V^2}{R}$$

$$W = VIt$$

Resistivity

$$R = \frac{\rho l}{A}$$

Current

$$I = \frac{\Delta Q}{\Delta t}$$

$$I = nqvA$$

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MATERIALS

Density

$$\rho = \frac{m}{V}$$

Stokes' law

$$F = 6\pi\eta rv$$

Hooke's law

$$F = k\Delta x$$

Pressure

$$p = \frac{F}{A}$$

Young modulus

$$\text{Stress } \sigma = \frac{F}{A}$$

$$\text{Strain } \varepsilon = \frac{\Delta x}{x}$$

$$E = \frac{\sigma}{\varepsilon}$$

Elastic strain energy

$$\Delta E_{el} = \tfrac{1}{2} F \Delta x$$

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WAVES AND PARTICLE NATURE OF LIGHT

Wave speed

$$v = f\lambda$$

Speed of a transverse wave on a string

$$v = \sqrt{\frac{T}{\mu}}$$

Intensity of radiation

$$I = \frac{P}{A}$$

Power of a lens

$$P = \frac{1}{f}$$

$$P = P_1 + P_2 + P_3 + \ldots$$

Thin lens equation

$$\frac{1}{u} + \frac{1}{v} = \frac{1}{f}$$

Magnification for a lens

$$m = \frac{\text{image height}}{\text{object height}} = \frac{v}{u}$$

Diffraction grating

$$n\lambda = d \sin \theta$$

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Refractive index

$$n_1 \sin \theta_1 = n_2 \sin \theta_2$$

$$n = \frac{c}{v}$$

Critical angle

$$\sin C = \frac{1}{n}$$

Photon model

$$E = hf$$

Einstein's photoelectric equation

$$hf = \phi + \tfrac{1}{2}mv^2_{max}$$

de Broglie wavelength

$$\lambda = \frac{h}{p}$$