Paper Reference(s)   4PH1 / 1P   4SD0 / 1P
Pearson Edexcel International GCSE (9–1)

Physics

UNIT: 4PH1
Science (Double Award) 4SD0
PAPER: 1P

May–June 2022 Assessment Window

Equation Booklet

These equations may be required for both International GCSE Physics (4PH1) and International GCSE Combined Science (4SD0) papers.

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1. Forces and Motion

$$\text{average speed} = \frac{\text{distance moved}}{\text{time taken}}$$

$$\text{acceleration} = \frac{\text{change in velocity}}{\text{time taken}}$$

$$a = \frac{(v - u)}{t}$$

(final speed)^2 = (initial speed)^2 + (2 ✕ acceleration ✕ distance moved)

$$v^2 = u^2 + (2 \times a \times s)$$

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force = mass ✕ acceleration

$$F = m \times a$$

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weight = mass ✕ gravitational field strength

$$W = m \times g$$

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2. Electricity

power = current ✕ voltage

$$P = I \times V$$

(continued on the next page)   **Turn over**

energy transferred = current × voltage × time

$E = I \times V \times t$

voltage = current × resistance

$V = I \times R$

charge = current × time

$Q = I \times t$

energy transferred = charge × voltage

$E = Q \times V$

3. Waves

wave speed = frequency × wavelength

$v = f \times \lambda$

frequency = $\dfrac{1}{\text{time period}}$

$f = \dfrac{1}{T}$

refractive index = $\dfrac{\sin(\text{angle of incidence})}{\sin(\text{angle of refraction})}$

$n = \dfrac{\sin i}{\sin r}$

(continued on the next page)

Turn over

$$\sin(\text{critical angle}) = \frac{1}{\text{refractive index}}$$

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

4. Energy resources and energy transfers

$$\text{efficiency} = \frac{\text{useful energy output}}{\text{total energy output}} \times 100\%$$

work done = force × distance moved

$$W = F \times d$$

gravitational potential energy = mass × gravitational field strength × height

$$GPE = m \times g \times h$$

$$\text{kinetic energy} = \frac{1}{2} \times \text{mass} \times \text{speed}^2$$

$$KE = \frac{1}{2} \times m \times v^2$$

$$\text{power} = \frac{\text{work done}}{\text{time taken}}$$

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

Turn over

5. Solids, liquids and gases

density = $\dfrac{\text{mass}}{\text{volume}}$

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

pressure = $\dfrac{\text{force}}{\text{area}}$

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

pressure difference = height × density × gravitational field strength

$p = h \times \rho \times g$

$\dfrac{\text{pressure}}{\text{temperature}}$ = constant

$\dfrac{p_1}{T_1} = \dfrac{p_2}{T_2}$

pressure × volume = constant

$p_1 \times V_1 = p_2 \times V_2$

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8. Astrophysics

$$\text{orbital speed} = \frac{2 \times \pi \times \text{orbital radius}}{\text{time period}}$$

$$v = \frac{2 \times \pi \times r}{T}$$

The equations on the following pages will only be required for International GCSE Physics.

These additional equations may be required in International GCSE Physics papers 2P and 2PR.

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1. Forces and Motion

momentum = mass × velocity

$p = m × v$

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force = $\dfrac{\text{change in momentum}}{\text{time taken}}$

$F = \dfrac{(mv - mu)}{t}$

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moment = force × perpendicular distance from the pivot

5. Solids, liquids and gases

change in thermal energy = mass × specific heat capacity × change in temperature

$\Delta Q = m × c × \Delta T$

6. Magnetism and electromagnetism

relationship between input and output voltages for a transformer

$\dfrac{\text{input (primary) voltage}}{\text{output (secondary) voltage}} = \dfrac{\text{primary turns}}{\text{secondary turns}}$

(continued on the next page)

input power = output power

$V_p\ I_p = V_s\ I_s$

for 100% efficiency

8. Astrophysics

$$\frac{\text{change in wavelength}}{\text{reference wavelength}} = \frac{\text{velocity of a galaxy}}{\text{speed of light}}$$

$$\frac{\lambda - \lambda_0}{\lambda_0} = \frac{\Delta\lambda}{\lambda_0} = \frac{v}{c}$$

END OF EQUATION LIST