

**Paper Reference(s) 4PH1/2P**  
**Pearson Edexcel International GCSE (9–1)**

**Physics**

**UNIT: 4PH1**

**PAPER: 2P**

**May–June 2022 Assessment Window**

**Equation Booklet**

**DO NOT RETURN THIS BOOKLET  
WITH THE QUESTION PAPER.**

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

## 1. Forces and Motion

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

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

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

$$(\text{final speed})^2 = (\text{initial speed})^2 + (2 \times \text{acceleration} \times \text{distance moved})$$

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

$$\text{force} = \text{mass} \times \text{acceleration}$$

$$F = m \times a$$

$$\text{weight} = \text{mass} \times \text{gravitational field strength}$$

$$W = m \times g$$

## 2. Electricity

$$\text{power} = \text{current} \times \text{voltage}$$

$$P = I \times V$$

energy transferred = current  $\times$  voltage  $\times$  time

$$E = I \times V \times t$$

voltage = current  $\times$  resistance

$$V = I \times R$$

charge = current  $\times$  time

$$Q = I \times t$$

energy transferred = charge  $\times$  voltage

$$E = Q \times V$$

### 3. Waves

wave speed = frequency  $\times$  wavelength

$$v = f \times \lambda$$

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

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

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

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

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

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

#### 4. Energy resources and energy transfers

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

work done = force  $\times$  distance moved

$$W = F \times d$$

gravitational potential energy =  
mass  $\times$  gravitational field strength  $\times$  height

$$\text{GPE} = m \times g \times h$$

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

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

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

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

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Turn over

## 5. Solids, liquids and gases

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

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

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

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

pressure difference =  
height  $\times$  density  $\times$  gravitational field strength

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

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

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

pressure  $\times$  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.

## 1. Forces and Motion

momentum = mass  $\times$  velocity

$$p = m \times v$$

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

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

moment = force  $\times$  perpendicular distance from the pivot

## 5. Solids, liquids and gases

change in thermal energy =  
mass  $\times$  specific heat capacity  $\times$  change in temperature

$$\Delta Q = m \times c \times \Delta T$$

## 6. Magnetism and electromagnetism

relationship between input and output voltages for a transformer

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

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Turn over

**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**