

**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.

<b>1. Forces and Motion</b>
$\text{average speed} = \frac{\text{distance moved}}{\text{time taken}}$
$\text{acceleration} = \frac{\text{change in velocity}}{\text{time taken}}$ $a = \frac{(v - u)}{t}$
$(\text{final speed})^2 = (\text{initial speed})^2 + (2 \times \text{acceleration} \times \text{distance moved})$ $v^2 = u^2 + (2 \times a \times s)$
$\text{force} = \text{mass} \times \text{acceleration}$ $F = m \times a$
$\text{weight} = \text{mass} \times \text{gravitational field strength}$ $W = m \times g$

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Turn over

## 2. Electricity

**power = current  $\times$  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**

$$v = f \times \lambda$$

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

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

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

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

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

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

#### **4. Energy resources and energy transfers**

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

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**Turn over**

**work done = force × distance moved**

$$\mathbf{W = F \times d}$$

**gravitational potential energy = mass ×  
gravitational field strength × height**

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

**kinetic energy =  $\frac{1}{2}$  × mass × speed<sup>2</sup>**

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

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

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

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## 5. Solids, liquids and gases

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

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

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

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

$$\text{pressure difference} = \text{height} \times \text{density} \times \text{gravitational field strength}$$

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

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

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

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Turn over

**pressure  $\times$  volume = constant**

$$p_1 \times V_1 = p_2 \times V_2$$

## **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 × velocity**

$$\mathbf{p = m \times v}$$

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

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

**moment = force ×  
perpendicular distance from the pivot**

## **5. Solids, liquids and gases**

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

$$\mathbf{\Delta Q = m \times c \times \Delta T}$$

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**Turn over**



## 6. Magnetism and electromagnetism

relationship between input and output voltages for a transformer

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

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**