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

Physics

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

May–June 2022 Assessment Window

Equation Booklet

DO NOT RETURN THIS BOOKLET WITH THE QUESTION PAPER.

Pearson

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

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

$$P = I \times V$$

(continued on the next page)

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 $v = f \times \lambda$
$\text{frequency} = \frac{1}{\text{time period}}$ $f = \frac{1}{T}$
$\text{refractive index} = \frac{\sin(\text{angle of incidence})}{\sin(\text{angle of refraction})}$ $n = \frac{\sin i}{\sin r}$

(continued on the next page)

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

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

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

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

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

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

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

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

(continued on the next page)

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 × density × 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 × 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 × velocity

$p = m \times v$

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

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

moment = force × perpendicular distance from the pivot

5. Solids, liquids and gases

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

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

6. Magnetism and electromagnetism

relationship between input and output voltages for a transformer

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

(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