AQA Physics Formula Sheet

gcsepod
education on demand

The Association for Science Education
Promoting Excellence in Science Teaching and Learning

Introduction

As of January 2021, these are the formulas that students are expected to recall and use in the exam. There are other formulas which students may be expected to use but these are provided in the exam.

In formula lists, those which are shaded are required only for Physics, not Double Science.

Contents

Click to jump straight to the relevant section

Energy

Variable	Symbol	Unit (abbreviation)
time	t	second (s)
velocity	v	metres per second (m/s)
gravitational field strength	g	newtons per kilogram (N/kg) (on Earth, g = 10 N/kg)
mass	m	kilogram (kg)
height	h	metre (m)
force	F	newton (N)
weight	W	newton (N)
kinetic energy	E_K	joule (J)
gravitational potential energy	E_P	joule (J)
work	W	joule (J)
energy	E	joule (J)
power	P	joules per second (J/s), or watt (W)

KE		$E_K = ½\ mv^2$
GPE		$E_P = mgh$
power	$\text{power (W)} = \frac{\text{energy transferred (J)}}{\text{time (s)}}$	$P = E / t$
	$\text{power (W)} = \frac{\text{work done (J)}}{\text{time (s)}}$	$P = W / t$
efficiency	$\text{efficiency} = \frac{\text{useful energy output (J)}}{\text{total energy input (J)}}$	
	$\text{efficiency} = \frac{\text{useful power output (W)}}{\text{total power input (W)}}$	

Electricity

Variable	Symbol	Unit (abbreviation)
charge	Q	coulomb (C)
time	t	second (s)
current	I	ampere or amp (A)
potential difference (p.d.)	V	volt (V)
resistance	R	ohm (Ω)
power	P	joule per second (J/s) or watt (W)
energy	E	joule (J)

Charge	charge (C) = current (A) × time (s)	$Q = It$
Ohm's Law	potential difference (V) = current (A) × resistance (R)	$V = IR$
Resistors in series		$R_{total} = R_1 + R_2$
Power	power (W) = potential difference (V) × current (A)	$P = VI$
	power (W) = current (A^2) × resistance (Ω)	$P = I^2R$
Energy transferred	energy transferred (J) = power (W) × time (s)	$E = Pt$
	energy transferred (J) = charge (C) × potential difference (V)	$E = QV$

Particles

Variable	Symbol	Unit (abbreviation)
mass	m	kilogram (kg)
volume	V	metres cubed (m^3)
density	ρ (rho)	kilograms per metre cubed (kg/m^3)
pressure	p	newtons per metre squared (N/m^2) or pascals (Pa)

density	$\text{density (kg/m}^3\text{)} = \frac{\text{mass (kg)}}{\text{volume (m}^3\text{)}}$	$\rho = m / V$
gas properties	pressure (Pa) × volume (m^3) = constant	pV = constant

Forces and Motion

Variable	Symbol	Unit (abbreviation)
displacement	*s*	metre (m)
distance	*d*	metre (m)
time	*t*	second (s)
velocity	*v*	metres per second (m/s)
acceleration	*a*	metres per second squared (m/s^2)
gravitational field strength	*g*	newtons per kilogram (N/kg)
(on Earth, g = 10 N/kg)	*E*	joule (J)
mass	*m*	kilogram (kg)
force	*F*	newton (N)
weight	*W*	newton (N)
volume	*V*	metres cubed (m^3)
stiffness	*k*	newtons per metre (N/m)
extension or compression	*e*	metre (m)
moment	*M*	newton-metre (Nm)
momentum	*p*	kilogram metres per second (kgm/s)
initial velocity	*u*	metres per second (m/s)
kinetic energy	*KE*	joule (J)
gravitational potential energy	*GPE*	joule (J)
work	*W*	joule (J)
pressure	*p*	newtons per metre squared (N/m^2) or pascals (Pa)

Forces and Motion (continued)

weight	weight (N) =mass (kg) × grav. field strength (N/kg)	$W = mg$
work done	work done (N/m) = force (N) × distance (m)	$W = Fs$
Hooke's Law	force (N) = stiffness (N/m) × extension (m)	$F = ke$
moments	moment of a force (Nm) = force (N) × distance (m)	$M = Fd$
pressure	pressure (Pa) = $\frac{\text{force normal to a surface (N)}}{\text{area of that surface (m}^2\text{)}}$	$p = F / A$
pressure in a fluid	pressure due to a column of liquid (Pa) = height of column (m) × density of liquid (kg/m^3) × gravitational field strength (N/kg)	$p = h \rho g$
displacement	distance travelled (m) = speed (m/s) × time (s)	$s = vt$
acceleration	acceleration (m/s^2) = $\frac{\text{change in velocity (m/s)}}{\text{time (s)}}$	$a = \Delta v / t$
Newton's 2nd Law	force (N) = mass (m) × acceleration (m/s^2)	$F = ma$
momentum (only HT)	momentum (kgm/s) = mass (kg) × velocity (m/s)	$p = mv$

Waves

Variable	Symbol	Unit (abbreviation)
period	t	second (s)
velocity	v	metres per second (m/s)
frequency	f	hertz (Hz)
wavelength	λ (lambda)	metre (m)
speed of light	c	3×10^8 m/s in a vacuum

period	$\text{period (s)} = \frac{1}{\text{frequency (Hz)}}$	$T = 1 / f$
wave equation	velocity (m/s) = frequency (Hz) × wavelength	$v = f\lambda$
magnification	$\text{magnification} = \frac{\text{image height}}{\text{object height}}$	

Source: https://filestore.aqa.org.uk/resources/physics/specifications/AQA-8463-SP-2016.PDF