

AP[®] PHYSICS 1 TABLE OF INFORMATION

CONSTANTS AND CONVERSION FACTORS

Proton mass, $m_p = 1.67 \times 10^{-27}$ kg Neutron mass, $m_n = 1.67 \times 10^{-27}$ kg Electron mass, $m_e = 9.11 \times 10^{-31}$ kg Speed of light, $c = 3.00 \times 10^8$ m/s	Electron charge magnitude, $e = 1.60 \times 10^{-19}$ C Coulomb's law constant, $k = 1/4\pi\epsilon_0 = 9.0 \times 10^9$ N·m ² /C ² Universal gravitational constant, $G = 6.67 \times 10^{-11}$ m ³ /kg·s ² Acceleration due to gravity at Earth's surface, $g = 9.8$ m/s ²
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UNIT SYMBOLS	meter, m	kelvin, K	watt, W	degree Celsius, °C
	kilogram, kg	hertz, Hz	coulomb, C	
	second, s	newton, N	volt, V	
	ampere, A	joule, J	ohm, Ω	

PREFIXES		
Factor	Prefix	Symbol
10^{12}	tera	T
10^9	giga	G
10^6	mega	M
10^3	kilo	k
10^{-2}	centi	c
10^{-3}	milli	m
10^{-6}	micro	μ
10^{-9}	nano	n
10^{-12}	pico	p

VALUES OF TRIGONOMETRIC FUNCTIONS FOR COMMON ANGLES							
θ	0°	30°	37°	45°	53°	60°	90°
$\sin \theta$	0	1/2	3/5	$\sqrt{2}/2$	4/5	$\sqrt{3}/2$	1
$\cos \theta$	1	$\sqrt{3}/2$	4/5	$\sqrt{2}/2$	3/5	1/2	0
$\tan \theta$	0	$\sqrt{3}/3$	3/4	1	4/3	$\sqrt{3}$	∞

The following conventions are used in this exam.

- I. The frame of reference of any problem is assumed to be inertial unless otherwise stated.
- II. Assume air resistance is negligible unless otherwise stated.
- III. In all situations, positive work is defined as work done on a system.
- IV. The direction of current is conventional current: the direction in which positive charge would drift.
- V. Assume all batteries and meters are ideal unless otherwise stated.

AP[®] PHYSICS 1 EQUATIONS

MECHANICS

$v_x = v_{x0} + a_x t$ $x = x_0 + v_{x0} t + \frac{1}{2} a_x t^2$ $v_x^2 = v_{x0}^2 + 2a_x(x - x_0)$ $\vec{a} = \frac{\sum \vec{F}}{m} = \frac{\vec{F}_{net}}{m}$ $ \vec{F}_f \leq \mu \vec{F}_n $ $a_c = \frac{v^2}{r}$ $\vec{p} = m\vec{v}$ $\Delta\vec{p} = \vec{F} \Delta t$ $K = \frac{1}{2} m v^2$ $\Delta E = W = F_{\parallel} d = F d \cos \theta$ $P = \frac{\Delta E}{\Delta t}$ $\theta = \theta_0 + \omega_0 t + \frac{1}{2} \alpha t^2$ $\omega = \omega_0 + \alpha t$ $x = A \cos(2\pi f t)$ $\vec{\alpha} = \frac{\sum \vec{\tau}}{I} = \frac{\vec{\tau}_{net}}{I}$ $\tau = r_{\perp} F = r F \sin \theta$ $L = I \omega$ $\Delta L = \tau \Delta t$ $K = \frac{1}{2} I \omega^2$ $ \vec{F}_s = k \vec{x} $ $U_s = \frac{1}{2} k x^2$ $\rho = \frac{m}{V}$	<p>a = acceleration A = amplitude d = distance E = energy f = frequency F = force I = rotational inertia K = kinetic energy k = spring constant L = angular momentum ℓ = length m = mass P = power p = momentum r = radius or separation T = period t = time U = potential energy V = volume v = speed W = work done on a system x = position y = height α = angular acceleration μ = coefficient of friction θ = angle ρ = density τ = torque ω = angular speed</p> $\Delta U_g = m g \Delta y$ $T = \frac{2\pi}{\omega} = \frac{1}{f}$ $T_s = 2\pi \sqrt{\frac{m}{k}}$ $T_p = 2\pi \sqrt{\frac{\ell}{g}}$ $ \vec{F}_g = G \frac{m_1 m_2}{r^2}$ $\vec{g} = \frac{\vec{F}_g}{m}$ $U_G = -\frac{G m_1 m_2}{r}$
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ELECTRICITY

$ \vec{F}_E = k \left \frac{q_1 q_2}{r^2} \right $ $I = \frac{\Delta q}{\Delta t}$ $R = \frac{\rho \ell}{A}$ $I = \frac{\Delta V}{R}$ $P = I \Delta V$ $R_s = \sum_i R_i$ $\frac{1}{R_p} = \sum_i \frac{1}{R_i}$	<p>A = area F = force I = current ℓ = length P = power q = charge R = resistance r = separation t = time V = electric potential ρ = resistivity</p>
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WAVES

$\lambda = \frac{v}{f}$	<p>f = frequency v = speed λ = wavelength</p>
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GEOMETRY AND TRIGONOMETRY

<p>Rectangle $A = bh$</p> <p>Triangle $A = \frac{1}{2} bh$</p> <p>Circle $A = \pi r^2$ $C = 2\pi r$</p> <p>Rectangular solid $V = \ell wh$</p> <p>Cylinder $V = \pi r^2 \ell$ $S = 2\pi r \ell + 2\pi r^2$</p> <p>Sphere $V = \frac{4}{3} \pi r^3$ $S = 4\pi r^2$</p>	<p>A = area C = circumference V = volume S = surface area b = base h = height ℓ = length w = width r = radius</p> <p>Right triangle $c^2 = a^2 + b^2$ $\sin \theta = \frac{a}{c}$ $\cos \theta = \frac{b}{c}$ $\tan \theta = \frac{a}{b}$</p>
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