

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 |

| 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 | |

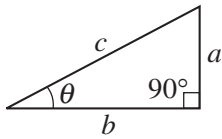
| PREFIXES | | |
|------------|--------|--------|
| Factor | Prefix | Symbol |
| 10^{12} | tera | T |
| 10^9 | giga | G |
| 10^6 | mega | M |
| 10^3 | kilo | k |
| 10^{-2} | centi | c |
| 10^{-3} | milli | m |
| 10^{-6} | micro | μ |
| 10^{-9} | nano | n |
| 10^{-12} | pico | p |

| 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 | ELECTRICITY |
|---|---|
| $v_x = v_{x0} + a_x t$ $x = x_0 + v_{x0} t + \frac{1}{2} a_x t^2$ $v_x^2 = v_{x0}^2 + 2a_x(x - x_0)$ $\vec{a} = \frac{\sum \vec{F}}{m} = \frac{\vec{F}_{net}}{m}$ $ \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} $ $U_s = \frac{1}{2} k x^2$ $\rho = \frac{m}{V}$ | $a = \text{acceleration}$ $A = \text{amplitude}$ $d = \text{distance}$ $E = \text{energy}$ $f = \text{frequency}$ $F = \text{force}$ $I = \text{rotational inertia}$ $K = \text{kinetic energy}$ $k = \text{spring constant}$ $L = \text{angular momentum}$ $\ell = \text{length}$ $m = \text{mass}$ $P = \text{power}$ $p = \text{momentum}$ $r = \text{radius or separation}$ $T = \text{period}$ $t = \text{time}$ $U = \text{potential energy}$ $V = \text{volume}$ $v = \text{speed}$ $W = \text{work done on a system}$ $x = \text{position}$ $y = \text{height}$ $\alpha = \text{angular acceleration}$ $\mu = \text{coefficient of friction}$ $\theta = \text{angle}$ $\rho = \text{density}$ $\tau = \text{torque}$ $\omega = \text{angular speed}$ $\Delta U_g = m g \Delta y$ $T = \frac{2\pi}{\omega} = \frac{1}{f}$ $T_s = 2\pi \sqrt{\frac{m}{k}}$ $T_p = 2\pi \sqrt{\frac{\ell}{g}}$ $ \vec{F}_g = G \frac{m_1 m_2}{r^2}$ $\vec{g} = \frac{\vec{F}_g}{m}$ $U_G = -\frac{G m_1 m_2}{r}$ |
| | $ \vec{F}_E = k \left \frac{q_1 q_2}{r^2} \right $ $I = \frac{\Delta q}{\Delta t}$ $R = \frac{\rho \ell}{A}$ $I = \frac{\Delta V}{R}$ $P = I \Delta V$ $R_s = \sum_i R_i$ $\frac{1}{R_p} = \sum_i \frac{1}{R_i}$ $A = \text{area}$ $F = \text{force}$ $I = \text{current}$ $\ell = \text{length}$ $P = \text{power}$ $q = \text{charge}$ $R = \text{resistance}$ $r = \text{separation}$ $t = \text{time}$ $V = \text{electric potential}$ $\rho = \text{resistivity!}$ |
| | WAVES $\lambda = \frac{v}{f}$ $f = \text{frequency}$ $v = \text{speed}$ $\lambda = \text{wavelength}$ |
| | GEOMETRY AND TRIGONOMETRY <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <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> </div> <div style="width: 45%;"> <p>$A = \text{area}$ $C = \text{circumference}$ $V = \text{volume}$ $S = \text{surface area}$ $b = \text{base}$ $h = \text{height}$ $\ell = \text{length}$ $w = \text{width}$ $r = \text{radius}$</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> </div> </div> <div style="text-align: right; margin-top: 10px;">  </div> |