

AP Physics 1 Equation Sheet

1. Kinematics (Motion in One Dimension)

- $v = v_0 + at$ (Final velocity)
 - $x = x_0 + v_0 t + \frac{1}{2}at^2$ (Position with acceleration)
 - $v^2 = v_0^2 + 2a(x - x_0)$ (Velocity-position relationship)
 - $x = x_0 + \frac{1}{2}(v + v_0)t$ (Average velocity equation)
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2. Newton's Laws of Motion

- $F = ma$ (Newton's Second Law)
 - $F_f = \mu N$ (Friction force)
 - $W = mg$ (Weight due to gravity)
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3. Work, Energy, and Power

- $W = Fd\cos\theta$ (Work done by a force)
 - $KE = \frac{1}{2}mv^2$ (Kinetic energy)
 - $PE = mgh$ (Gravitational potential energy)
 - $P = \frac{W}{t}$ (Power)
 - $W_{net} = \Delta KE$ (Work-energy theorem)
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4. Momentum and Collisions

- $p = mv$ (Momentum)
 - $F = \frac{\Delta p}{\Delta t}$ (Impulse-Momentum Theorem)
 - $m_1 v_1 + m_2 v_2 = m_1 v_1' + m_2 v_2'$ (Conservation of momentum)
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5. Circular Motion and Gravitation

- $a_c = \frac{v^2}{r}$ (Centripetal acceleration)
 - $F_c = \frac{mv^2}{r}$ (Centripetal force)
 - $F_g = G \frac{m_1 m_2}{r^2}$ (Newton's Law of Universal Gravitation)
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6. Simple Harmonic Motion

- $T = 2\pi\sqrt{\frac{m}{k}}$ (Period of a mass-spring system)
 - $T = 2\pi\sqrt{\frac{L}{g}}$ (Period of a simple pendulum)
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7. Electricity and Circuits

- $V = IR$ (Ohm's Law)
 - $P = IV$ (Power in circuits)
 - $R_{eq} = R_1 + R_2 + R_3 + \dots$ (Series circuit resistance)
 - $\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \dots$ (Parallel circuit resistance)
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