AP Physics 1 Equations

Contents

1 Kinematics

Variables in this Section

In this section, a variable with subscript f indicates the final value, and a variable with subscript i indicates the initial value. The exam does not use the f subscript (i.e., there is no subscript on a final quantity), and instead of an i subscript it uses a 0 (zero/naught) subscript.

The arrow above a variable indicates a vector quantity. The exam does not use this notation. Instead, it uses a x or a y subscript to indicate if the object is moving from side to side or up and down.

$\vec{a}$ is acceleration. Given as a_x or a_y on the exam depending on the dimension of travel.

$\vec{a}_g$ is acceleration due to gravity at Earth's surface, and is equal to $-9.8\,\frac{\mathrm{m}}{\mathrm{s}^2}$. On the exam this is given as $g = 9.8\,\frac{\mathrm{m}}{\mathrm{s}^2}$.

$\Delta\vec{d}$ is displacement. The exam uses x and y variables, so $x - x_0$ will be used instead of $\Delta\vec{d}$ on the exam.

t is time. Thus, Δt is change in time and is equal to $t_\mathrm{f} - t_\mathrm{i}$. The Δ is optional and is not used on the exam.

$\vec{v}$ is velocity. Thus, $\Delta\vec{v}$ is change in velocity and is equal to $\vec{v}_\mathrm{f} - \vec{v}_\mathrm{i}$. Given as v_x or v_y on the exam depending on the dimension of travel.

Equations

Definition of acceleration as the rate of change of velocity. *Not given on the exam.*

$$\vec{a} = \frac{\Delta\vec{v}}{\Delta t} \tag{1.1}$$

Velocity equation for an object with constant acceleration. Given as $v_x = v_{x0} + a_x t$ on the exam.

$$\vec{v}_\mathrm{f} = \vec{v}_\mathrm{i} + \vec{a}\Delta t \tag{1.2}$$

Position equation for an object with constant acceleration. Given as $x = x_0 + v_{x0}t + \frac{1}{2}a_x t^2$ on the exam. Note that moving x_0 to LHS will give $x - x_0$, which is equal to $\Delta\vec{d}$.

$$\Delta\vec{d} = \vec{v}_\mathrm{i}\Delta t + \frac{1}{2}\vec{a}\Delta t^2 \tag{1.3}$$

Equation relating velocity and displacement for constant-acceleration motion. Given as $v_x^2 = v_{x0}^2 + 2a_x(x - x_0)$ on the exam.

$$\vec{v}_\mathrm{f}^2 = \vec{v}_\mathrm{i}^2 + 2\vec{a}\Delta\vec{d} \tag{1.4}$$