Review of Kinematic Equations

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When velocity is constant (*a* = 0):

$$\Delta x = \upsilon t$$

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When acceleration is constant:

$$\upsilon = \upsilon_o + at$$

$$\Delta x = x - x_o = \bar{\upsilon} t = \left(\frac{\upsilon + \upsilon_o}{2} \right) t$$

$$x = x_o + \upsilon_o t + \frac{1}{2} a t^2$$

$$\upsilon^2 = \upsilon_o^2 + 2a \left(x - x_o \right)$$

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This acceleration is called the "acceleration due to gravity", and indicated by *g*.

Near the surface of the earth:

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If air resistance can be ignored

and

the vertical displacement is small compared to the radius of the earth.

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The *change of velocity* ($\Delta \upsilon$) is in the direction of the acceleration.

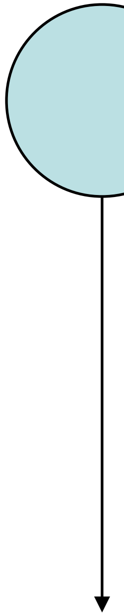
Free fall for an object initially at rest

If the origin is at the object's initial position, the kinematic equations are

$$\upsilon = \upsilon_o - gt$$

$$y = -\frac{1}{2}gt^2 \quad (y_o = 0)$$

$$\upsilon^2 = -2gy$$



$\boldsymbol{\upsilon_o = 0}$

$\boldsymbol{a = -g}$