Constant velocity (no acceleration)

$d = vt$

Accelerated motion

Average velocity and acceleration

$$a_{avg} = \frac{(v_f - v_0)}{t}$$

$$d = \frac{1}{2}(v_f + v_0)\,t$$

Fundamentals

$$d_f = d_0 + v_0 t + \frac{1}{2}at^2$$

$$v_f{}^2 = v_0{}^2 + 2a(d_f - d_0)$$

$$v_f = v_0 + at$$

Abbreviated versions

These may be used if $v_0 = 0$ and $d_0 = 0$.
Use positive values for a, t, and d.

$$d = \frac{1}{2}at^2$$

$$v_f{}^2 = 2ad$$

Symbols

On this page:

- a acceleration
- v Constant velocity
- v_0 original velocity
- v_f final velocity
- t time
- d Distance, $d_f - d_0$
- d_0 Initial position
- d_f Final position

Falling objects:

Use acceleration due to gravity:

$$g = -9.8 \text{ m/s}^2$$

Vector Quantities

Velocity, acceleration, and displacement are vector quantities. By convention, up and right are positive and down and left are negative.