Accelerated Motion

Definitions

Average velocity

$v_{avg} = d/t$

Average acceleration

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

Symbols

On this page:

- a acceleration
- v velocity
- t time
- v_f final velocity
- s_0 original position
- s final position
- v_0 original velocity
- d Displacement

Equations

Fundamental equations

Position, s

$$s = s_0 + v_0 t + \tfrac{1}{2}at^2$$

Velocity vs time

$$v_f = v_0 + at$$

Derived Equations

Displacement from velocity & time

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

Displacement vs time:

$$d = v_0 t + \tfrac{1}{2}at^2$$

Constant velocity

If acceleration is zero, then:

$d = vt$

Distance Equations (not vector)

Velocity vs Distance

$$v_f^2 = v_0^2 + 2ad$$

Distance starting from rest

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

Acceleration should always be positive for these equations (because they aren't vector relationships).

Falling objects:

Use acceleration due to gravity:

$g = -9.8\ m/s^2$