Acceleration

Acceleration

$$v_f - v_i = at$$

- Acceleration is the change in velocity over time
- Objects can accelerate by speeding up, slowing down, or changing direction
- The variable for acceleration is a
- The unit for acceleration is m/s^2 or m/s/s
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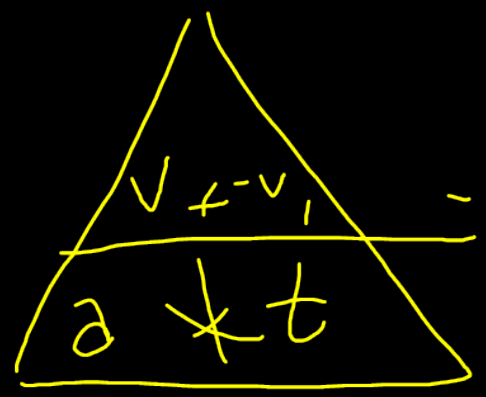
$$t = \frac{v_f - v_i}{a}$$



Acceleration

1. What is the deceleration of a car that was going 20m/s and came to a complete stop in 5s?

$$a = \frac{v_f - v_i}{t} = \frac{0\ m/s - 20\ m/s}{5\ s} = \frac{-20\ m/s}{5\ s} = -4\ m/s/s$$

Acceleration

2. How long will it take to decelerate from 29m/s to 26m/s if the rate of deceleration is -2m/s/s?

t v_i v_f a

$$t = \frac{v_f - v_i}{a} = \frac{26\,m/s - 29\,m/s}{-2\,m/s/s} = \frac{-3\,m/s}{-2\,m/s/s}$$

1.5 s

Acceleration

3. What will the final velocity be of someone who was sitting at a stop light and accelerated at a rate of 3m/s/s for 10s?

V_f

$V_1 = 0 m/s$

a t

$V_f = 30 m/s$

$V_f - V_1 = a t$

$V_f - 0 m/s = (3 m/s/s)(10 s)$

Acceleration

4. What is the initial speed of a person who took 2s to achieve a speed of 2.5m/s if he accelerated at a rate of 0.5m/s/s?

v_1 t a v_f

$v_f - v_1 = at$

$2.5\ m/s - v_1 = (0.5\ m/s/s)(2\ s)$

$2.5\ m/s - v_1 = 1\ m/s$

$-2.5\ m/s \quad -2.5\ m/s$

$-v_1 = -1.5\ m/s$

$-1 \quad -1$

$v_1 = 1.5\ m/s$