# Acceleration

# Too much acceleration???

# Definition

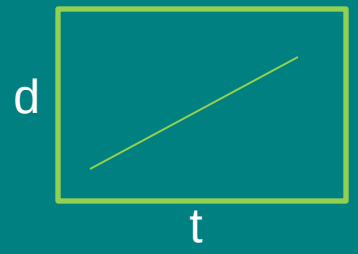
- Acceleration = a measure of how fast the velocity is changing

The greater an object’s change in velocity, the greater the acceleration.

No change, no acceleration

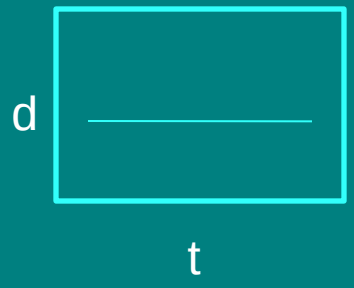
**Straight line = constant velocity**

***NO ACCELERATION***



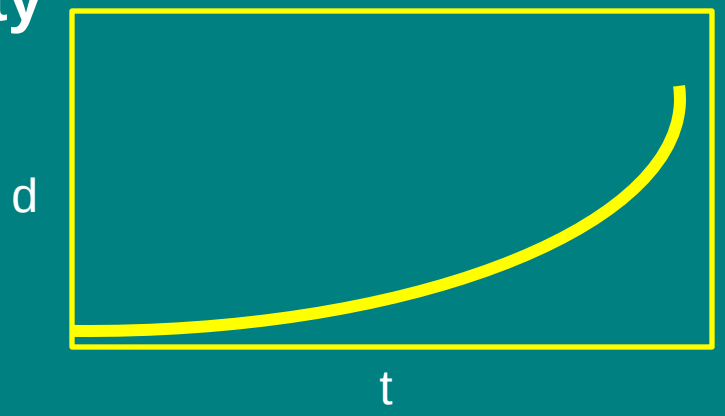

**Flat line = zero velocity**

***NO ACCELERATION***




**Curved line = changing velocity**

**= ACCELERATION**



# Equation

$$a = \frac{\Delta v}{\Delta t} \quad \frac{(m/s)}{(s)}$$

$$a = \frac{v_f - v_i}{t} \quad (m/s^2)$$

# Units for Acceleration

$$\frac{\text{Unit for speed}}{\text{Unit for time}}$$

Examples: m/s/s

$m/s^2$

Km/hr/s

# SAMPLE PROBLEM

- If a car proceeds from rest to a speed of 60 mph in 4 seconds, what is the acceleration?

$$a = \frac{v_f - v_i}{t} \ (m/s^2)$$

$$a = \frac{60 \text{ mi/hr} - 0 \text{ mi/hr}}{4 \text{ sec}} = 15 \frac{\text{mi/hr}}{\text{sec}}$$

- Read as “15 miles per hour per second”

- This means: every second the speed increases by 15 mi/hr

- Acceleration is INCREASE in the rate of change (+)

- Deceleration is DECREASE in the rate of change (-)

# REMEMBER

- Acceleration is not a measure of how fast you are going (that's speed)…it is a measure of the **change** in velocity.

# REMEMBER

- Velocity includes SPEED and DIRECTION.

- The speed can change or direction can change.

- Three ways to accelerate:
  - Speed up, Slow down, or Turn (change directions)