

4.22.20

# Motion Equations: All 6 Equations

## Today's Objectives:

- Recap Problem Solving Process
- Practice using equations
- Use real data from real cars



What are the three steps to solving physics word problems?

1. Make a List of the given information

2. Identify the Missing Variable

3. Pick an equation that has 1 unknown



A car starts at 5m/s, moves 100m in 4.3s.  
What is its acceleration?

$$v_0 = 5$$

$$d = 100$$

$$t = 4.3$$

$$a = ?$$

$$d = v_0 t + \frac{1}{2} a t^2$$

$$100 = 5(4.3) + \frac{1}{2}(a)(4.3^2)$$

$$100 = 21.5 + 9.245 a$$

$$78.5 = 9.245 a$$

$$a = 8.49 \text{ m/s}^2$$

1.  ~~$v = d/t$  (CV Only!)~~

2.  ~~$v_f = v_0 + at$~~

3.  ~~$a = (v_f - v_0) / t$~~

4.  $d = v_0 t + \frac{1}{2} a t^2$

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

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

A drag racer slows down from 85 to 45 m/s ,  
using a parachute that has an acceleration of  $-11\text{m/s}^2$ .

How far did the car move while braking?

$$v_0 = 85$$

$$v_f = 45$$

$$a = -11$$

$$d = ?$$

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

$$45^2 = 85^2 + 2(-11)d$$

$$2025 = 7225 - 22d$$

$$-5200 = -22d$$

$$d = 236.36\text{m}$$

~~1.  $v = d/t$  (CV Only!)~~

~~2.  $v_f = v_0 + at$~~

~~3.  $a = (v_f - v_0)/t$~~

~~4.  $d = v_0t + \frac{1}{2}at^2$~~

~~5.  $d = \frac{1}{2}(v_0 + v_f)t$~~

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