

## Acceleration II

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### Displacement

$$d = v \cdot t$$

$$= v_{\text{ave}} t$$

↑ if acc. then use ave velocity,

$$= \left( \frac{v_1 + v_2}{2} \right) t$$

$$v_f = v_0 + at$$

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

$$= \frac{1}{2} (v_0 + at + v_0) t$$

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

Ex A skateboarder takes 25 s to acc from 5 m/s to 13 m/s.  
How far does she travel during this time.

$$v_0 = 5 \text{ m/s}$$

$$v_f = 13 \text{ m/s}$$

$$a =$$

$$t = 25 \text{ s}$$

$$d = ?$$

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

$$= \frac{1}{2} (13 + 5)(25)$$

$$= \frac{1}{2} (18) 25$$

$$= 225 \text{ m}$$

Ex A car acc. from rest at  $2.5 \text{ m/s}^2$  for 6.0 s. How far does it travel?

$$v_0 = 0 \text{ m/s}$$

$$v_f =$$

$$a = 2.5 \text{ m/s}^2$$

$$t = 6.0 \text{ s}$$

$$d =$$

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

$$= \frac{1}{2} (2.5)(6)^2$$

$$= 45 \text{ m}$$

Ex: How long will it take a motorcycle to travel 400m if it acc from rest at  $8.2 \text{ m/s}^2$

Ex A tire rolling a hill at  $6.0 \text{ m/s}$ , acc at  $1.5 \text{ m/s}^2$  for  $10.0 \text{ s}$ .

a) How far does it travel?

b) How fast at  $10 \text{ s}$ ?