

Sep 5 Block 5

Quiz Pretend Dr Song runs three laps around a track.

The track is 400 m long

calculate his displacement.

Show your work! Mind units and sig figs

### Uniformly Accelerated Motion

acceleration is constant

$$\bar{v} = \frac{\Delta x}{\Delta t} \quad \text{average velocity}$$

$$\bar{v} = \frac{v_f + v_i}{2}$$

Pretend Dr Song starts at  $\frac{5 \text{ miles}}{\text{hr}}$   $v_i$   
and uniformly accelerates to  $\frac{15 \text{ miles}}{\text{hour}}$   $v_f$

in 10 sec.  $\Delta t$   
calc. avg vel.  $\bar{v}$

MBRI

$$\bar{v} = \frac{v_f + v_i}{2} = \frac{\left(\frac{15 \text{ mi}}{\text{hr}} + \frac{5 \text{ mi}}{\text{hr}}\right)}{2}$$

$$= \left(\frac{15 \text{ mi}}{\text{hr}} + \frac{5 \text{ mi}}{\text{hr}}\right) \frac{1}{2}$$

$$= \frac{20 \text{ mi}}{\text{hr}} \frac{1}{2} = \frac{10 \text{ mi}}{\text{hr}}$$

acceleration,  $a = \frac{\Delta v}{\Delta t}$        $\frac{\text{change in vel.}}{\text{change in time}}$

$$\Delta v = v_f - v_i$$

Pretend Dr Song slows down  
from  $\frac{15 \text{ mi}^{v_i}}{\text{hr}}$  to  $\frac{5 \text{ mi}^{v_f}}{\text{hr}}$  in 5 sec  $\Delta t$

calc acceleration =  $a$

$$\begin{aligned} a &= \frac{\Delta v}{\Delta t} & \Delta v &= v_f - v_i \\ &= \Delta v \cdot \frac{1}{\Delta t} & &= \frac{5 \text{ mi}}{\text{hr}} - \frac{15 \text{ mi}}{\text{hr}} \\ &= -\frac{10 \text{ mi}}{\text{hr}} \cdot \frac{1}{5 \text{ sec}} = -\frac{2 \text{ mi}}{\text{hr sec}} & &= -\frac{10 \text{ mi}}{\text{hr}} \end{aligned}$$

### Free Fall

we drop object and it falls  
due to the force of gravity (only)

$a = g$       acc. due to gravity

$$g = \frac{9.8 \text{ m}}{\text{sec}^2} = \frac{32 \text{ ft}}{\text{sec}^2}$$

