UNIT #1 KINEMATICS

Speed and Velocity

Speed

- average speed = $\frac{\text{total distance}}{\text{total time}}$ (m/s)

- SCALAR quantity (has ONLY **magnitude**)

- example: speedometer

Velocity

- average velocity = $\frac{\text{total displacement}}{\text{total time}}$ (m/s)

- VECTOR quantity (has **magnitude** and **direction**)

- $\vec{v}$

$$\vec{v} = \frac{\Delta \vec{d}}{t}$$

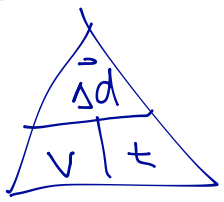
$$\vec{v}t = \frac{\Delta \vec{d}}{t}\,t$$

$$\vec{v}t = \Delta \vec{d}$$

$$\frac{\vec{v}t}{\vec{v}} = \frac{\Delta \vec{d}}{\vec{v}}$$

$$t = \frac{\Delta \vec{d}}{\vec{v}}$$

Solve for t



Kinematics Graphs

3 types (d-t) p-t

(v-t) s-t $\vec{v}$-t, v-t

(a-t)

3 important questions

- what type of graph is it
- what do the numbers tell you
- what does the slope tell you

Scalars and vectors

direction

distance – d (scalar)

position – $\vec{d}$ (vector)

displacement – $\Delta\vec{d} = \vec{d}_2 - \vec{d}_1$ (vector)

Speed and velocity

speed – v (scalar)

$$v = \frac{d}{t}$$

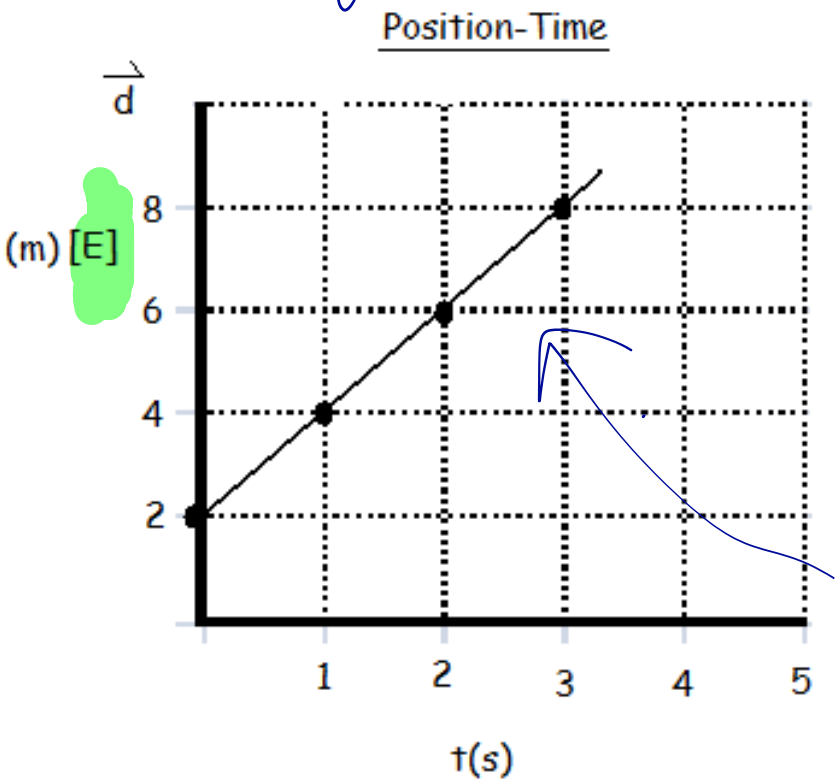
velocity – $\vec{v}$ (vector)

$$\vec{v} = \frac{\Delta\vec{d}}{t}$$

Position-Time

distance
d - t
slope = speed

$\vec{d}$

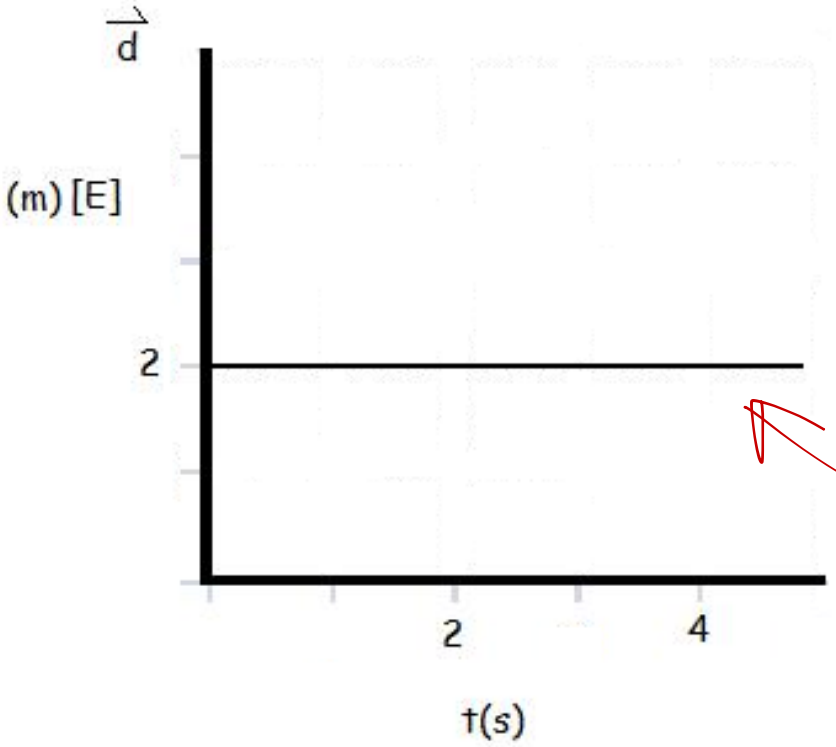


slope = velocity

Uniform Motion

no acceleration

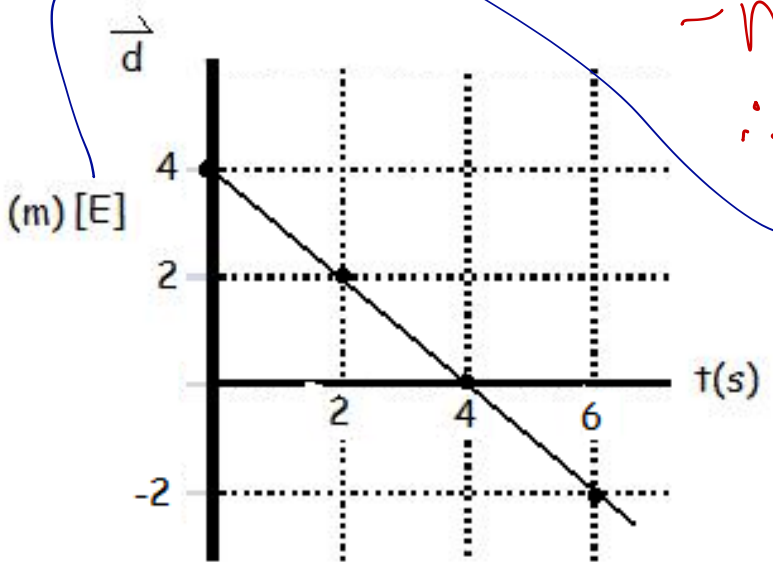
Position-Time



No Motion

slope = 0

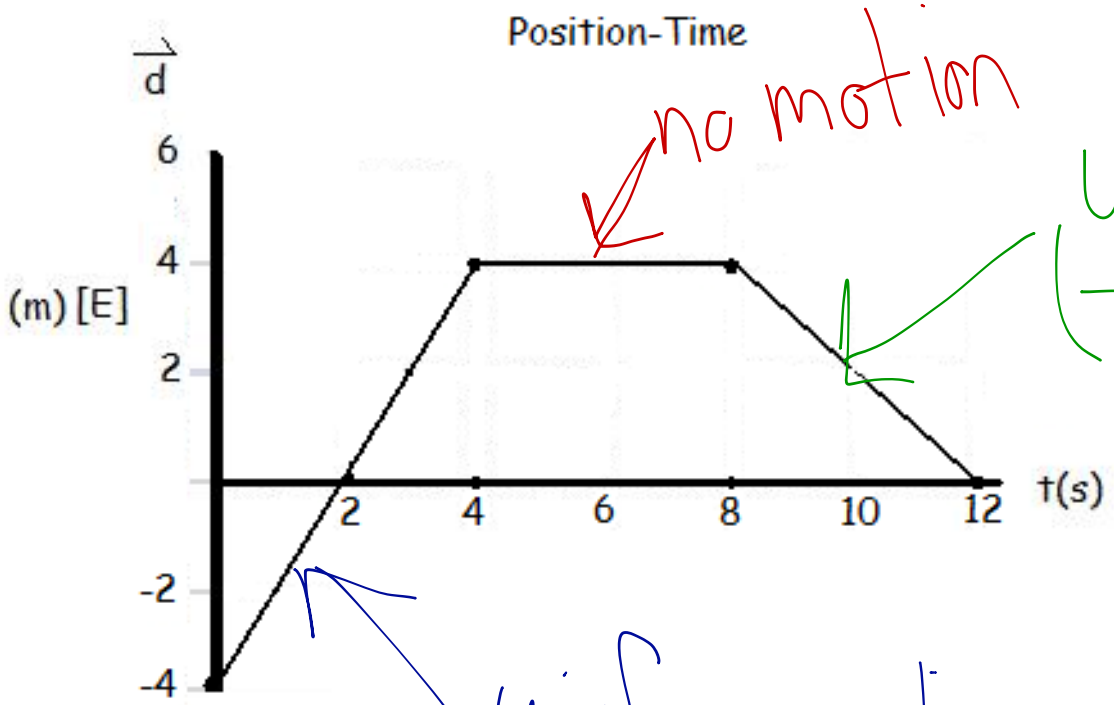
Position-Time



- negative slope
∴ moving [W]

Uniform Motion
(constant slope)
acceleration = 0

Position-Time



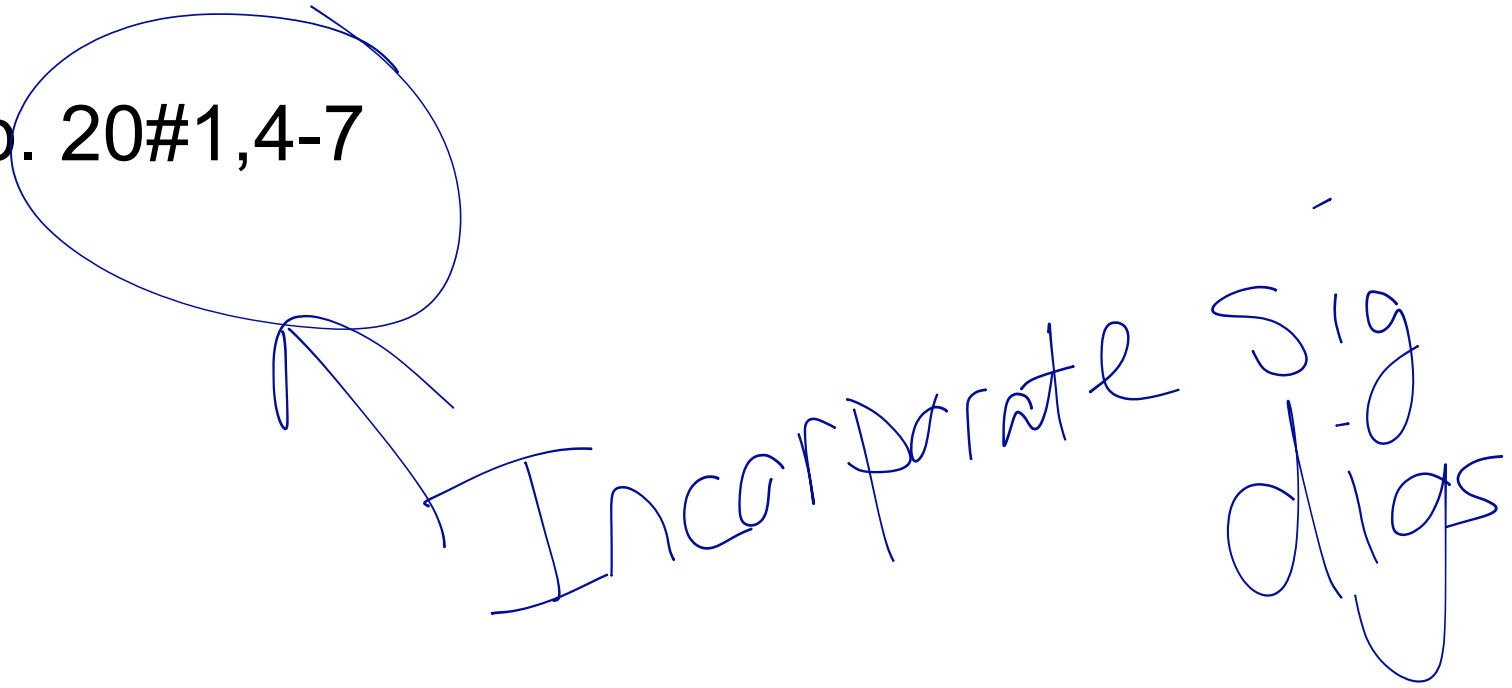
no motion

uniform motion
(−) slope
moving [W]

uniform motion
(+) slope moving [E]

Homework

- p. 20#1,4-7



$1000\,m = 1\,km$

$1\,min = 60\,s$

$1\,h = 60\,min$

$$100\,\frac{km}{h} \times \frac{1000\,m}{1\,km} \times \frac{1\,h}{60\,min} \times \frac{1\,min}{60\,s}$$