

Velocity Prob # 3

7) $v = 3 \text{ cm/y}$
 $d = 500 \text{ km}$
 $t = ?$

$$v = d/t$$

$$t = d/v$$

$$\frac{500 \text{ km} \left| \frac{1000 \text{ m}}{1 \text{ km}} \right| \frac{100 \text{ cm}}{1 \text{ m}}}{1} = 500 \times 10^5 \text{ cm}$$

$$t = \frac{500 \times 10^5 \text{ cm}}{3 \text{ cm/y}} = 1.67 \times 10^7 \text{ years}$$

(or 167,000 centuries!)

b) $d_2 = 1 \text{ mile}$
 $t_2 = ?$

$$\frac{1 \text{ mile} \left| \frac{5280 \text{ ft}}{1 \text{ mile}} \right| \frac{12 \text{ in}}{1 \text{ ft}} \left| \frac{1 \text{ cm}}{0.394 \text{ in}} \right|}{1} = 1.608 \times 10^5 \text{ cm}$$

$$t_2 = \frac{1.608 \times 10^5 \text{ cm}}{3 \text{ cm/yr}} = 5.36 \times 10^4 \text{ yr}$$

(or 536 centuries!)

8)

$$\vec{v} = 6 \text{ cm/y NW}$$

$$t = d/v$$

$$\vec{d} = 590 \text{ km, NW} = ~~590 \text{ km}~~ 590 \times 10^5 \text{ cm, NW}$$

$$t = ?$$

direction is the same, \therefore motion is linear

$$t = \frac{590 \times 10^5 \text{ cm}}{6 \text{ cm/y}} = \underline{9.83 \times 10^6 \text{ yr}}$$

$$b) v_2 = 4 \text{ in/yr}$$

$$t_2 = ?$$

$$\frac{4 \text{ in}}{\text{yr}} \left| \frac{1 \text{ cm}}{0.394 \text{ in}} \right. = 10.15 \frac{\text{cm}}{\text{yr}}$$

$$t_2 = \frac{590 \times 10^5 \text{ cm}}{10.15 \frac{\text{cm}}{\text{yr}}} = \underline{5.81 \times 10^6 \text{ yr}}$$

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9) $t = 13 \text{ hr} : 4 \text{ min} : 58 \text{ s} = 13.083 \text{ hr} = 47098 \text{ s}$

$d = 1633.8 \text{ km} = 1633.8 \times 10^3 \text{ m} \quad v = d/t$

$v = ? \text{ (km/h, m/s)}$

$$\frac{4 \text{ min}}{60 \text{ min}} = \frac{1 \text{ hr}}{60 \text{ min}}$$

$$\frac{58 \text{ s}}{60 \text{ s}} \cdot \frac{1 \text{ min}}{60 \text{ min}} = .016 \text{ hr}$$

$= .0667 \text{ hr}$

$$v_1 = \frac{1633.8 \text{ km}}{13.083 \text{ hr}} = \underline{124.88 \text{ km/hr}}$$

$$v_2 = \frac{1633.8 \times 10^3 \text{ m}}{47098 \text{ s}} = \underline{34.69 \text{ m/s}}$$

b) $v_3 = ? \text{ (mph)}$

$$\frac{1633.8 \times 10^3 \text{ m}}{1 \text{ m}} \cdot \frac{100 \text{ cm}}{1 \text{ m}} \cdot \frac{0.394 \text{ in}}{1 \text{ cm}} \cdot \frac{1 \text{ ft}}{12 \text{ in}} \cdot \frac{1 \text{ mile}}{5280 \text{ ft}}$$

$= 1015.97 \text{ mile}$

$$v_3 = \frac{1015.97 \text{ mile}}{13.083 \text{ hr}} = \underline{77.66 \text{ mph}}$$

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$$10) \quad v = 4 \text{ cm/y}$$

$$v = d/t$$

$$t = ? \text{ (yr)}$$

$$t = d/v$$

$$\Delta d = 3.84 \times 10^6 \text{ m} = 3.84 \times 10^4 \text{ cm}$$

$$t = \frac{3.84 \times 10^4 \text{ cm}}{4 \text{ cm/y}} = 9,600 \text{ yr}$$

or $9.6 \times 10^3 \text{ yr}$

$$b) \quad t_2 = ?$$

$$\text{for } d_2 = 1 \text{ mile}$$

$$\begin{array}{c} | \text{ 1 mile} | \text{ 5280 ft} | \text{ 12 in} | \text{ 1 cm} \\ | \text{ 1 mile} | \text{ 1 ft} | \text{ 4 in} \\ | \text{ 0.394 in} \end{array} =$$

$$= 1.608 \times 10^5 \text{ cm}$$

$$t_2 = \frac{1.608 \times 10^5 \text{ cm}}{4 \text{ cm/y}} = 4.02 \times 10^4 \text{ yr}$$

Velocity Prob 3

12.)

$$d = 1.1 \text{ m}$$

$$v = 18 \text{ m/s}$$

$$t = ?$$

$$v = d/t$$

$$t = d/v$$

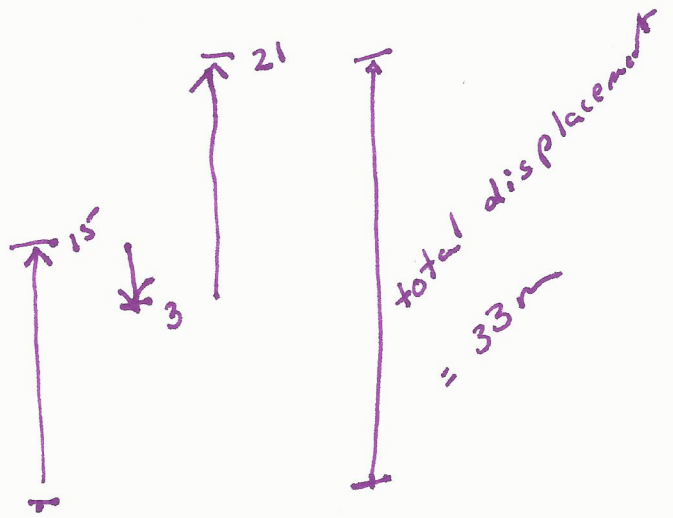
$$t = \frac{1.1 \text{ m}}{18 \text{ m/s}} = 0.061 \text{ s}$$

Vel Prob 3

14)

$$\begin{array}{l} \vec{d}_1 = 15\text{ m} \\ t_1 = 2.5\text{ s} \\ \hline \vec{d}_2 = -3\text{ m} \\ t_2 = 1.75\text{ s} \\ \hline \vec{d}_3 = 21\text{ m} \\ t_3 = 5.25\text{ s} \\ \hline \end{array}$$

$$v = d/t$$



a) average vel. for each time period.

$$\vec{v}_1 = \frac{15\text{ m}}{2.5\text{ s}} = 6\text{ m/s}$$

$$\vec{v}_2 = \frac{-3\text{ m}}{1.75\text{ s}} = -1.71\text{ m/s}$$

$$\vec{v}_3 = \frac{21\text{ m}}{5.25\text{ s}} = 4.04\text{ m/s}$$

b) average vel for entire time period

$$\vec{d} = 33\text{ m} \quad t_1 + t_2 + t_3 = 2.5 + 1.75 + 5.2 = 9.45\text{ s}$$

$$\vec{v} = \frac{33\text{ m}}{9.45\text{ s}} = 3.49\text{ m/s}$$

3.49 m/s

14)

c) \vec{v} in mph

$$\vec{v}_1 = \frac{6 \text{ m} \mid 100 \text{ cm} \mid 0.394 \text{ in} \mid 1 \text{ ft} \mid 1 \text{ mile} \mid 3600 \text{ s}}{\text{s} \mid 1 \text{ m} \mid 1 \text{ cm} \mid 12 \text{ in} \mid 5280 \text{ ft} \mid 1 \text{ hr}}$$

$$= \underline{13.43 \text{ mph}}$$

$$\vec{v}_2 = \frac{1.71 \text{ m} \mid 100 \text{ cm} \mid 0.394 \text{ in} \mid 1 \text{ ft} \mid 1 \text{ mile} \mid 3600 \text{ s}}{\text{s} \mid 1 \text{ m} \mid 1 \text{ cm} \mid 12 \text{ in} \mid 5280 \text{ ft} \mid 1 \text{ hr}} = \underline{3.83 \text{ mph}}$$

↓ ditto

$$\vec{v}_3 = \frac{3.49 \text{ m}}{\text{s}} = \underline{7.81 \text{ mph}}$$

$$v_{\text{ave}} = \frac{d}{t} = \frac{39 \text{ m}}{9.45 \text{ s}} = \underline{4.13 \text{ m/s}}$$

$$d_{\text{traveled}} = 15 + 3 + 21 = 39 \text{ m}$$