

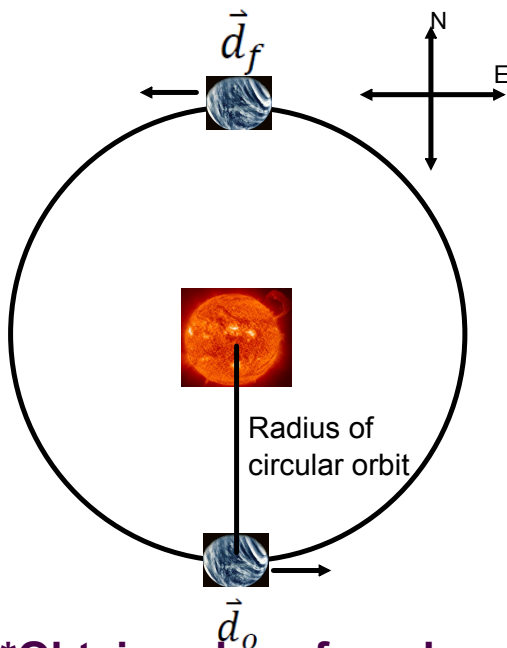
## Guided Displacement and Velocity Problems

\*\*\*Note how we approach physics problems using the handbook\*\*\*

2 a) Calculate the average velocity, in m/s, of Venus the instant it has traveled half of its circular orbit around the Sun.

**\*Sketch a diagram\***  $\longrightarrow$  **\*Determine quantities needed\***

**\*Create a coordinate system\***



$$\vec{v}_{avg} = \frac{\vec{d}}{t} \text{ required}$$

$$\vec{d} = ? \quad t = ?$$

**\*Use learned & prior knowledge\***

$$\vec{d} = \text{change in position}$$

$$\vec{d} = \text{diameter of circle}$$

$$t = \text{time to change position}$$

$$t = \frac{1}{2} \text{ a Venus year (seconds)}$$

**\*Obtain values from handbook\***

Venus distance from Sun, the radius = 108 million km, so diameter is 216 million km.

$$\vec{d} = 216 \times 10^6 \text{ km [N]} \xrightarrow{\times 10^3 \text{ m/km}} \vec{d} = 216 \times 10^9 \text{ m [N]}$$

$$t = \frac{1}{2} \times 225 \text{ days} \times 24 \text{ h/day} \times 60 \text{ min/h} \times 60 \text{ s/min}$$

$$t = 9.72 \times 10^6 \text{ s}$$

**\*Complete Problem\***

$$\vec{v}_{avg} = \frac{\vec{d}}{t}$$

$$\vec{v}_{avg} = \frac{216 \times 10^9 \text{ m [N]}}{9.72 \times 10^6 \text{ s}}$$

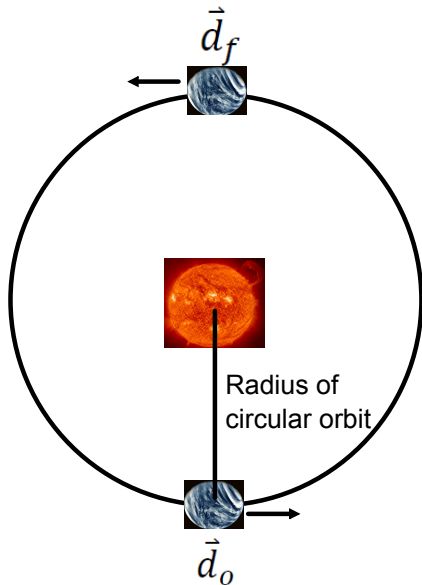
$$\vec{v}_{avg} = 2.22 \times 10^4 \text{ m/s [N]}$$

## Guided Displacement and Velocity Problems

\*\*\*Note how we approach physics problems using the handbook\*\*\*

2 b) Calculate the average speed, in m/s, of Venus the instant it has traveled half of its circular orbit around the Sun.

**\*Sketch a diagram\***  $\longrightarrow$  **\*Determine quantities needed\***



$$v_{sp} = \frac{d}{t} \left. \begin{array}{l} \text{required} \\ \end{array} \right\}$$

$$d = ? \quad t = ?$$

**\*Use learned & prior knowledge\***

$d$  = length of path

$d = \frac{1}{2}$  circumference of circle

$t$  = time to travel distance

$t = \frac{1}{2}$  a Venus year (seconds)

**\*Obtain values from handbook\***

Venus distance from Sun, the radius = 108 million km

$$d = \frac{1}{2} \times 2\pi r, \text{ where } r = 108 \times 10^6 \text{ km} \xrightarrow{\times 10^3 \text{ m/km}} = 108 \times 10^9 \text{ m}$$

$$d = (3.14)(108 \times 10^9 \text{ m})$$

$$d = 3.39 \times 10^{11} \text{ m}$$

$$t = \frac{1}{2} \times 225 \text{ days} \times 24 \text{ h/day} \times 60 \text{ min/h} \times 60 \text{ s/min}$$

$$t = 9.72 \times 10^6 \text{ s}$$

**\*Complete Problem\***

$$v_{sp} = \frac{d}{t}$$

$$v_{sp} = \frac{3.39 \times 10^{11} \text{ m}}{9.72 \times 10^6 \text{ s}}$$

$$v_{sp} = 3.49 \times 10^4 \text{ m/s}$$

## Attachments

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