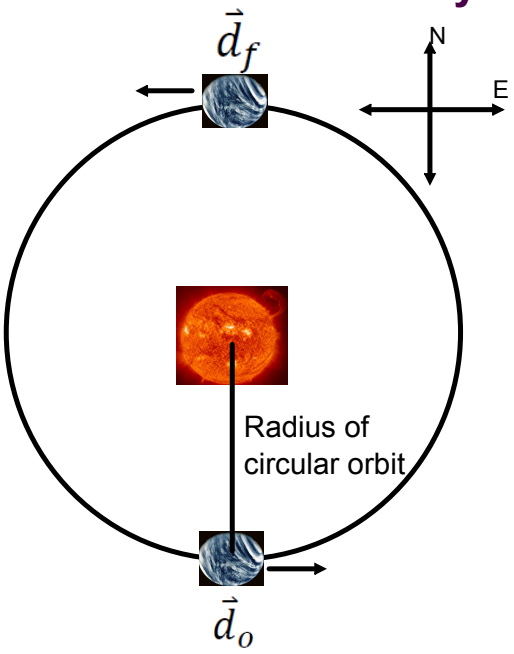
Guided Displacement and Velocity Problems

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 → ***Determine quantities needed***
Create a coordinate system



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

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

Use learned & prior knowledge

$\vec{d}$ = change in position

$\vec{d}$ = diameter of circle

t = time to change position

t = ½ 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 x 10^6 km [N] → (x 10^3 m/km) $\vec{d}$ = 216 x 10^9 m [N]

t = ½ x 225 days x 24 h/day x 60 min/h x 60 s/min

t = 9.72 x 10^6 s

Complete Problem

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

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

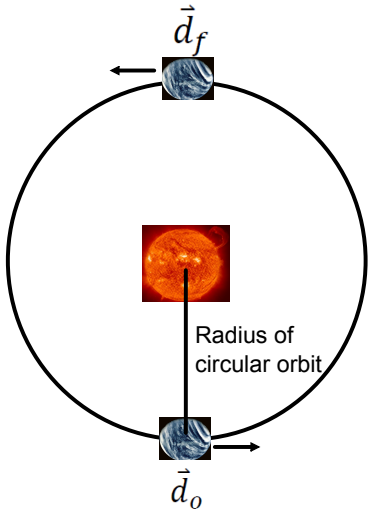
$$\vec{v}_{avg} = 2.22 \times 10^4 \text{ m/s [N]}$$

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 ⟶ ***Determine quantities needed***



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

d = ? t = ?

Use learned & prior knowledge

d = length of path

d = ½ circumference of circle

t = time to travel distance

t = ½ a Venus year (seconds)

Obtain values from handbook

Venus distance from Sun, the radius = 108 million km

d = ½ x 2πr, where r = 108 x 10^6 km x 10^3 m/km = 108 x 10^9 m

d = (3.14)(108 x 10^9 m)

d = 3.39 x 10^{11} m

t = ½ x 225 days x 24 h/day x 60 min/h x 60 s/min

t = 9.72 x 10^6 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

moving-man_en.jnlp