

WORKSHEET 2C SOL'NS

①  $\vec{AB} = \langle 2, 2, 3 \rangle$

$$\begin{cases} x = 3 + 2t \\ y = 4 + 2t \\ z = 25 + 3t \end{cases}$$

↑ ↑  
Front of the broom direction

when  $t=0 \Rightarrow (x, y, z) = (3, 4, 25)$

$t=1 \Rightarrow (x, y, z) = (5, 6, 28)$

DIST IN =  $\sqrt{2^2 + 2^2 + 3^2}$

1 SECOND =  $\sqrt{17} \approx 4.123$  ft

IN THIS PARAMETERIZATION, GARY IS TRAVELING A CONSTANT SPEED OF  $\sqrt{17}$  ft/sec.

② UNIT DIRECTION VECTOR =  $\frac{1}{\sqrt{4+4+9}} \langle 2, 2, 3 \rangle = \langle \frac{2}{\sqrt{17}}, \frac{2}{\sqrt{17}}, \frac{3}{\sqrt{17}} \rangle$

$$\begin{cases} x = 3 + \frac{2}{\sqrt{17}}t \\ y = 4 + \frac{2}{\sqrt{17}}t \\ z = 25 + \frac{3}{\sqrt{17}}t \end{cases}$$

↑ ↑  
Front of broom unit direction vector

$t=0 \Rightarrow (x, y, z) = (3, 4, 25)$

$t=1 \Rightarrow (x, y, z) = (3 + \frac{2}{\sqrt{17}}, 4 + \frac{2}{\sqrt{17}}, 25 + \frac{3}{\sqrt{17}})$

DIST IN =  $\sqrt{(\frac{2}{\sqrt{17}})^2 + (\frac{2}{\sqrt{17}})^2 + (\frac{3}{\sqrt{17}})^2}$

1 SEC =  $\sqrt{\frac{17}{17}} = 1$  ft

IN THIS PARAMETERIZATION, GARY IS TRAVELING 1 ft/sec.  
so  $t = \text{distance} = d$

$$\begin{cases} x = 3 + \frac{2}{\sqrt{17}}d \\ y = 4 + \frac{2}{\sqrt{17}}d \\ z = 25 + \frac{3}{\sqrt{17}}d \end{cases}$$

③  $v(t) = 24 \Rightarrow d(t) = 24t$

$$\begin{cases} x = 3 + \frac{48}{\sqrt{17}}t \\ y = 4 + \frac{48}{\sqrt{17}}t \\ z = 25 + \frac{72}{\sqrt{17}}t \end{cases}$$

$z = 500 \Rightarrow 500 = 25 + \frac{72}{\sqrt{17}}t$

$\Rightarrow \frac{72}{\sqrt{17}}t = 475$

$t = \frac{475}{(72/\sqrt{17})} \approx 27.20104 \text{ sec}$

④  $a(t) = 3 \Rightarrow v(t) = 3t + 0 \Rightarrow d(t) = \frac{3}{2}t^2$

$$\begin{cases} x = 3 + \frac{3}{\sqrt{17}}t^2 \\ y = 4 + \frac{3}{\sqrt{17}}t^2 \\ z = 25 + \frac{9}{2\sqrt{17}}t^2 \end{cases}$$

$z = 500 \Rightarrow 500 = 25 + \frac{9}{2\sqrt{17}}t^2$

$t^2 = \frac{475}{9/(2\sqrt{17})}$

$t \approx 20.8616 \text{ sec}$