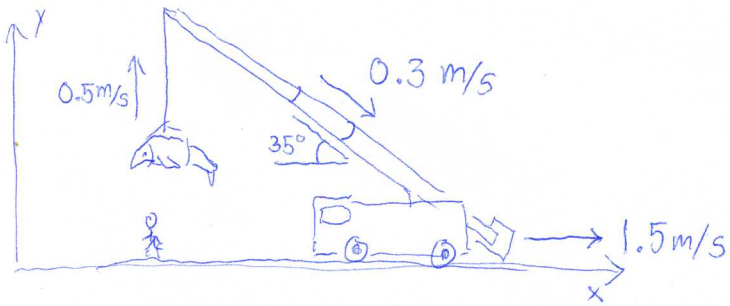
Dolphin Rescue

• Solution:



We want to know the magnitude and direction of motion relative to someone on the ground:

$$\vec{V}_D = \vec{V}_{arm} + \vec{V}_{truck} + \vec{V}_{rope}$$

* Separate into components:

$$\begin{cases} V_{D,x} = V_{arm,x} + V_{truck,x} + \cancel{V_{rope,x}}^{=0} \\ V_{D,y} = V_{arm,y} + \cancel{V_{truck,y}}^{=0} + V_{rope,y} \end{cases}$$

$V_{truck,x} = 1.5\ m/s$

$V_{rope,y} = 0.5\ m/s$

$$\begin{cases} V_{arm,x} = (0.3\ m/s)\cos(35°) \\ V_{arm,y} = -(0.3\ m/s)\sin(35°) \end{cases}$$

or $V_{arm,x} \approx 0.25\ m/s$

$V_{arm,y} = -0.17\ m/s$

$$V_{D,x} = (0.25\ m/s) + (1.5\ m/s) \approx \boxed{1.75\ m/s}$$

$$V_{D,y} = (-0.17\ m/s) + (0.5\ m/s) \approx \boxed{0.33\ m/s}$$

convert to magnitude and angle →

$$|\vec{V}_D| = \sqrt{(1.75\ m/s)^2 + (0.33\ m/s)^2}$$

$$= \boxed{1.78\ m/s}$$

$$\theta = \arctan\left(\frac{0.33\ m/s}{1.75\ m/s}\right) \approx \boxed{10.6°}$$