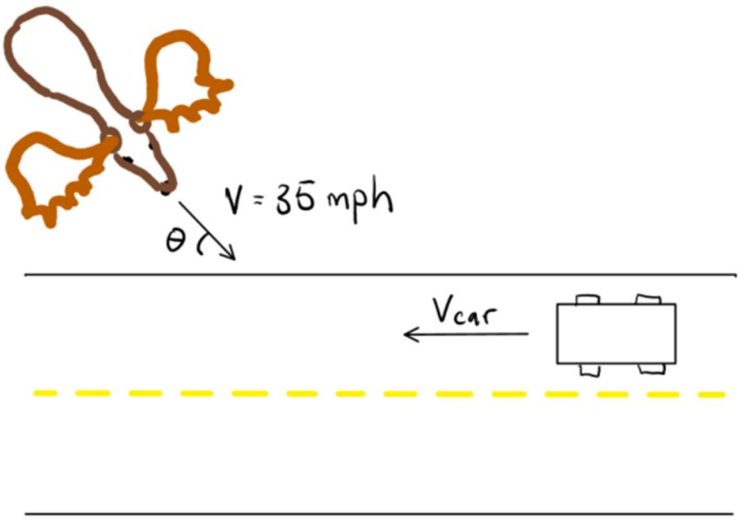
21-P-FA-AG-012



You are a professional engineer, coming home late at night from your on-site work in a mine. You are travelling at V km/hr on the highway. Suddenly, you spot a moose running towards you at an angle of θ degrees from the highway. Moose run at a speed of 35 miles per hour. How fast are you seeing the moose approaching in meters per second?

Hint: to convert from miles to kilometers, multiply by 1.609

ANSWER:

The moose is running at a speed of $35\frac{miles}{hour} \times 1.609\frac{km}{mile} \times 1000\frac{m}{km} \times \frac{1\ hour}{3600\ seconds} = 15.643\frac{m}{s}$. This speed is split into x and y components. The moose is running $15.643\frac{m}{s} \times \sin(\theta)$ in the negative x-direction and $15.643\frac{m}{s} \times \cos(\theta)$ in the negative y-direction. Meanwhile, you are driving at $V\frac{km}{hour} \times 1000\frac{m}{km} \times \frac{1\ hour}{3600\ seconds} = \frac{V}{3.6}\frac{m}{s}$ in the positive x direction.

You see the moose approaching at $\left(\frac{V}{3.6} - 15.643 \times \sin(\theta)\right)\frac{m}{s}$ in the x-direction and $-15.643\frac{m}{s} \times \cos(\theta)$ in the y-direction.

In total, the moose is approaching at $\sqrt{\left(\frac{V}{3.6} + 15.643 \times \sin(\theta)\right)^2 + \left(-15.643\frac{m}{s} \times \cos(\theta)\right)^2}\frac{m}{s}$.