

Answer on Question #63949 – Math – Calculus

Question

An airplane at an altitude of 4400 feet is flying horizontally away from an observer. At the instant when the angle of elevation is 45 degrees, the angle is decreasing at the rate of 0.5 rad/sec. How fast is the airplane flying at that instant?

Solution

$$\tan(\alpha) = \frac{h}{x} \Rightarrow x = \frac{h}{\tan(\alpha)} = h \cot(\alpha);$$

$$v = \frac{dx}{dt} = \frac{d}{dt}(h \cot(\alpha)) = -\frac{h}{\sin^2 \alpha} \frac{d\alpha}{dt} = -\frac{4400}{\frac{2}{4}} 0.5 = -4400 \frac{feet}{sec}.$$

Answer: $-4400 \frac{feet}{sec}$.