

Physics 101-Rec
Quiz #3

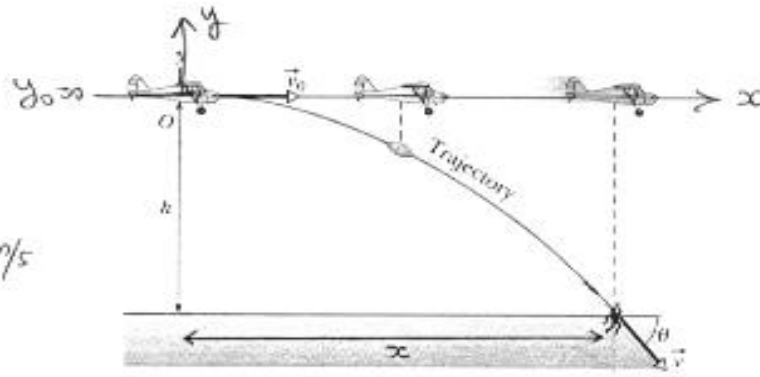
Instructor: Dr. Mekki

Name: _____

Key

Id#: _____

Sect.#: _____



$$v_0 = 300 \frac{\text{km}}{\text{h}} = 300 \times \frac{10}{36} = 83.3 \text{ m/s}$$

The plane shown in the figure moves with constant velocity of 300 km/h at an elevation $h = 600$ m. The pilot drops an object toward a person in the sea as shown.

(a) Find the distance x shown in the figure.

y -axis:

$$y - y_0 = v_{0y} t - \frac{1}{2} g t^2 = -\frac{1}{2} g t^2$$

$$v_0 \sin \theta_0 = 0 \quad (\text{because } \theta_0 = 0)$$

$$-600 = -4.9 t^2 \Rightarrow t = \pm \sqrt{\frac{600}{4.9}} = \pm 11 \text{ sec}$$

take $t = 11 \text{ sec}$

x -axis:

$$x - x_0 = v_{0x} t = v_0 \cos \theta_0 t$$

$$= 1 \quad (\text{because } \theta_0 = 0)$$

$$x = 83.3 \times 11 = \boxed{917 \text{ m}}$$

(b) What is the velocity of the object 2 sec after dropping it from the airplane.

$$v_x = v_{0x} = v_0 \cos \theta_0 = 83.3 \text{ m/s} \quad (\text{constant})$$

$$v_y = v_{0y} - g t = -g t = -9.8 \times 2 = -19.6 \text{ m/s}$$

$$v_0 \sin \theta_0 = 0$$

$$\boxed{\vec{v} = 83.3 \hat{i} - 19.6 \hat{j}} \text{ m/s}$$