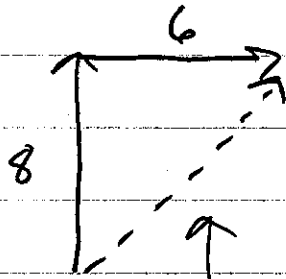


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a)



$$a^2 + b^2 = c^2$$

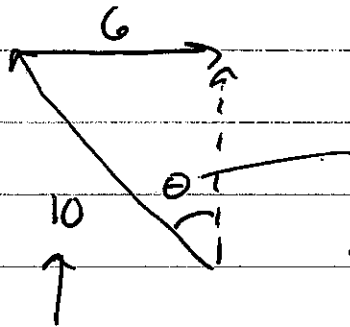
$$8^2 + 6^2 = c^2$$

$$64 + 36 = c^2$$

$$100 = c^2$$

$$10 \text{ km/h} = c$$

b)



$$\sin \theta = \frac{6}{10}$$

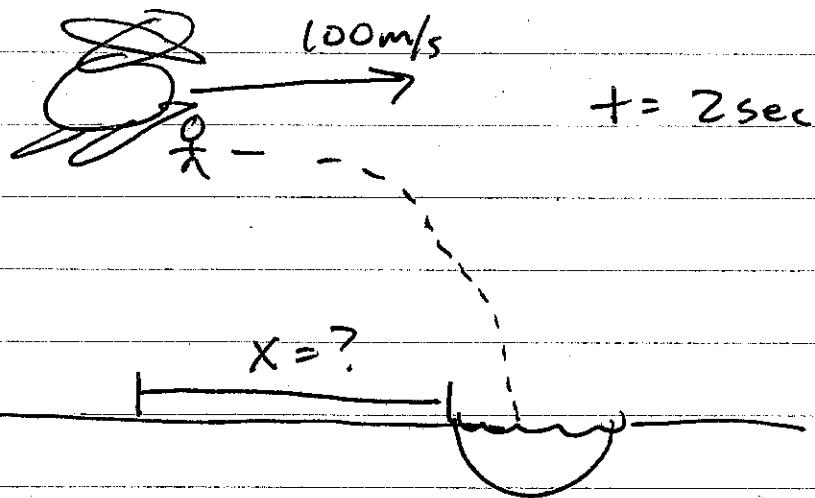
$$\sin \theta = \frac{6}{10}$$

$$\sin^{-1} \sin \theta = \sin^{-1} (.6)$$

$$\theta = 36.87^\circ$$

has to be 10 to go straight across  
based on answer in part a

(41)



$$x_1 = 0$$

$$x_2 = ?$$

$$v_{1x} = 100 \text{ m/s}$$

$$v_{2x} = 100 \text{ m/s}$$

$$a_x = 0 \text{ m/s}^2$$

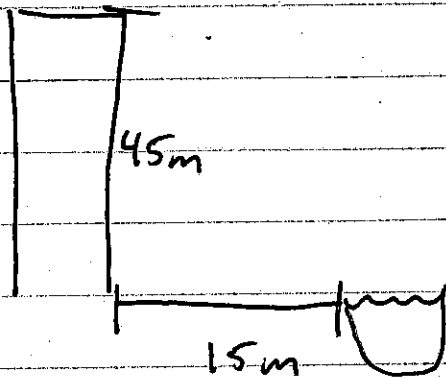
$$t = 2 \text{ sec}$$

$$x_2 = x_1 + v_{1x}t + \frac{1}{2}a_x t^2$$

$$x_2 = 0 + 100(2) + \frac{1}{2}(0)(2)^2$$

$$\boxed{x_2 = 200 \text{ m}}$$

(42)



$$y_2 = y_1 + v_{y1}t + \frac{1}{2}a_y t^2$$

$$\begin{aligned} y_1 &= 0 & -45 &= 0 + (0)t + \frac{1}{2}(-9.8)t^2 \\ y_2 &= -45 & -45 &= -4.9t^2 \\ v_{y1} &= 0 & 9.18 &= t^2 \\ v_{y2} &= ? \\ a_y &= -9.8 \text{ m/s}^2 & \boxed{3.03 \text{ sec} = t} \\ t &= ? \end{aligned}$$

$$\begin{aligned} x_1 &= 0 \text{ m} & x_2 &= x_1 + v_{ix}t + \frac{1}{2}a_x t^2 \\ x_2 &= 15 \text{ m} & 15 &= 0 + v_{ix}(3.03) + \frac{1}{2}(0)(3.03)^2 \\ v_{ix} &= ? & 15 &= 3.03 v_{ix} \\ v_{iy} &= ? \\ a_x &= 0 \text{ m/s}^2 & \boxed{4.95 \text{ m/s} = v_{ix}} \\ t &= 3.03 \text{ sec} \end{aligned}$$

(43.)

$$y_1 = 0$$

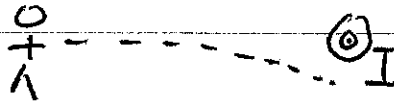
$$y_2 = ?$$

$$v_{1x} = 0 \text{ m/s}$$

$$v_{1y} =$$

$$a_{1y} = -9.8 \text{ m/s}^2$$

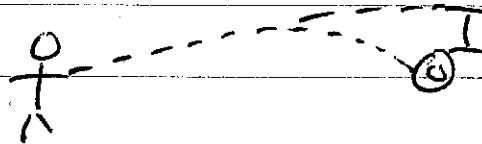
$$t = .5 \text{ sec}$$



$$y_2 = y_1 + v_{1y}t + \frac{1}{2}a_{1y}t^2$$

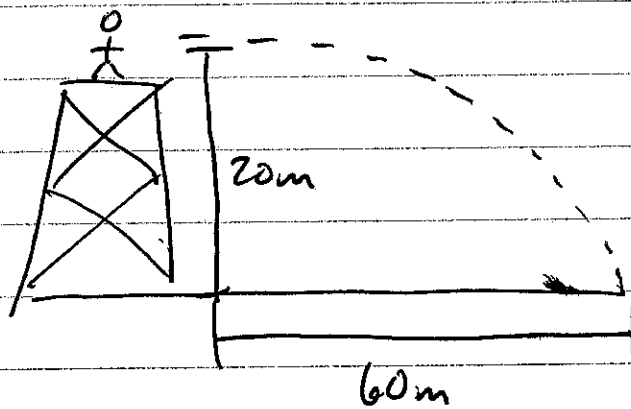
$$y_2 = 0 + (0)(.5) + \frac{1}{2}(-9.8)(.5)^2$$

$$y_2 = -1.225 \text{ m}$$



she wants to aim 1.225 m above the target because it will fall that distance in the .5 sec it takes for it to get there.

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$$y_1 = 0 \text{ m}$$

$$y_2 = -20 \text{ m}$$

$$v_{y1} = 0 \text{ m/s}$$

$$v_{y2} = ?$$

$$a_y = -9.8 \text{ m/s}^2$$

$$t = ?$$

$$y_2 = y_1 + v_{y1}t + \frac{1}{2}a_y t^2$$

$$-20 = 0 + (0)t + \frac{1}{2}(-9.8)t^2$$

$$-20 = -4.9t^2$$

$$4.08 = t^2$$

$$2.02 \text{ sec} = t$$

$$x_1 = 0$$

$$x_2 = 60$$

$$v_{1x} = ?$$

$$v_{2x} = ?$$

$$a_x = 0 \text{ m/s}^2$$

$$t = 2.02 \text{ sec}$$

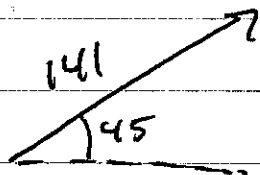
$$x_2 = x_1 + v_{1x}t + \frac{1}{2}a_x t^2$$

$$60 = 0 + v_{1x}(2.02) + \frac{1}{2}(0)(2.02)^2$$

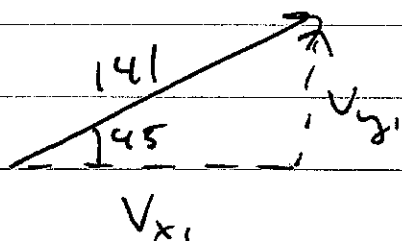
$$60 = 2.02 v_{1x}$$

$$29.7 \text{ m/s} = v_{1x}$$

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only has a velocity  
in the x direction



$$\cos \theta = \frac{a}{h}$$

$$\cos 45 = \frac{V_x}{141}$$

$$99.7 \text{ m/s} = V_x$$

The acceleration in the x direction is  $0 \text{ m/s}^2$  but the acceleration in the y direction is  $-9.8 \text{ m/s}^2$  even though its y velocity is zero at the peak.