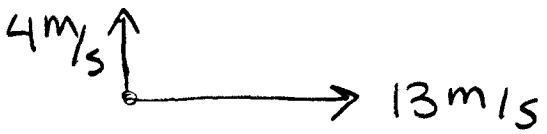
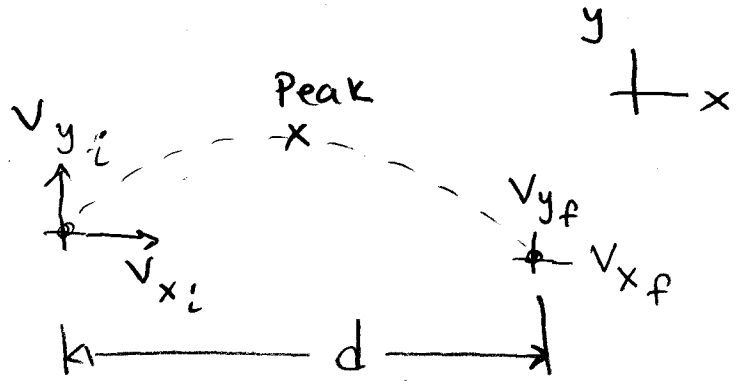
Given:





Find: d

Solution:

$$v_{x_f} = v_{x_i} = 13\ m/s$$

$$v_{y_f} = v_{y_i} - gt \leftarrow t \text{ is unknown}$$

$$d = x_f - x_0 \leftarrow \text{want to find } d$$

$$d = v_x t \leftarrow \text{still too many unknowns!}$$

At the peak, $v_y = 0$ and $d = \frac{1}{2}$ (total dist. travelled)

so how long does it take to fall from peak height to the ground?

$$\cancel{v_{y_f}^2}^{\,0} - v_{y_i}^2 = -2gh \leftarrow \text{negative signs cancel}$$

$$h = \frac{v_{y_i}^2}{2g} = \frac{(4\ m/s)^2}{2(9.81\ m/s^2)} = 0.815\ m$$

That is how high the skier gets. How long does it take to come back down?

$$h = \cancel{y_f}^{\,0} - y_i = \cancel{v_{y_i} t}^{\,0} - \tfrac{1}{2} g t^2 \quad \leftarrow v_{y_i} = 0 \text{ at peak}$$

$$h = t^2\left(-\tfrac{1}{2} g\right)$$

$$\frac{-0.815\ m}{-\frac{1}{2}\left(9.81 \frac{m}{s^2}\right)} = t^2 \quad \leftarrow \text{take the sq. root to get } t$$

$$\therefore t = 0.401 \text{ sec}$$

Remember: it's twice the time!

So he was airborne for $2 \times t = 0.80$ sec.

How far did he travel in 0.80 sec?

$$v_x t = d$$

$$d = \left(13 \frac{m}{s}\right)(0.80 \text{ sec}) = \underline{10.6 \text{ m}}$$

Answer