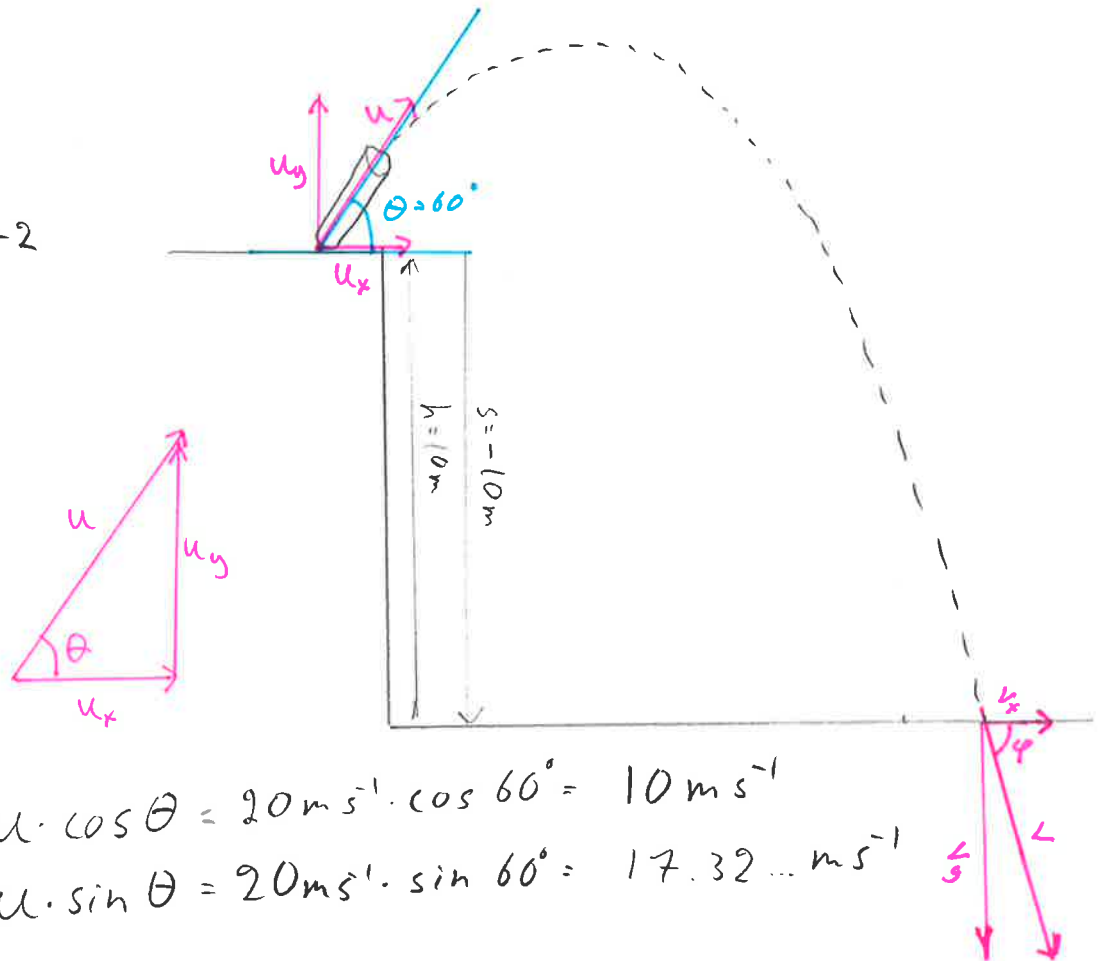


$$h = 10\text{m}$$

$$u = 20\text{ms}^{-1}$$

$$\theta = 60^\circ$$

$$g = 9.82\text{ms}^{-2}$$



$$u_x = u \cdot \cos \theta = 20\text{ms}^{-1} \cdot \cos 60^\circ = 10\text{ms}^{-1}$$

$$u_y = u \cdot \sin \theta = 20\text{ms}^{-1} \cdot \sin 60^\circ = 17.32 \dots \text{ms}^{-1}$$

a) When?

$$s_y = u_y t - \frac{1}{2} g t^2$$

$$-10\text{m} = 17.32 \dots \text{ms}^{-1} \cdot t - \frac{1}{2} \cdot 9.82\text{ms}^{-2} \cdot t^2$$

$$-4.91 \cdot t^2 + 17.32 \cdot t + 10 = 0$$

Solve on calculator:

$$t_1 = 4.036 \dots \text{s} \approx \underline{\underline{4.0\text{s}}}$$

$$(t_2 = -0.505 \dots \text{s})$$

b) Where?

$$s_y = -10\text{m} \quad (10\text{m below starting point})$$

$$s_x = u_x t = 10\text{ms}^{-1} \cdot 4.036 \dots \text{s} = 40.36\text{m} \approx \underline{\underline{40\text{m}}}$$

c) Velocity?

$$V_x = 10\text{ms}^{-1}$$

$$V_y = u_y - g t = 17.32 \dots \text{ms}^{-1} - 9.82\text{ms}^{-2} \cdot 4.036\text{s}$$

$$= -22.27 \dots \text{ms}^{-1}$$

$$V = \sqrt{V_x^2 + V_y^2} = \sqrt{10^2 + (-22.27 \dots)^2} \approx \underline{\underline{24\text{ms}^{-1}}}$$

$$\tan \phi = \frac{V_y}{V_x} \quad \underline{\underline{\phi \approx 66^\circ}}$$