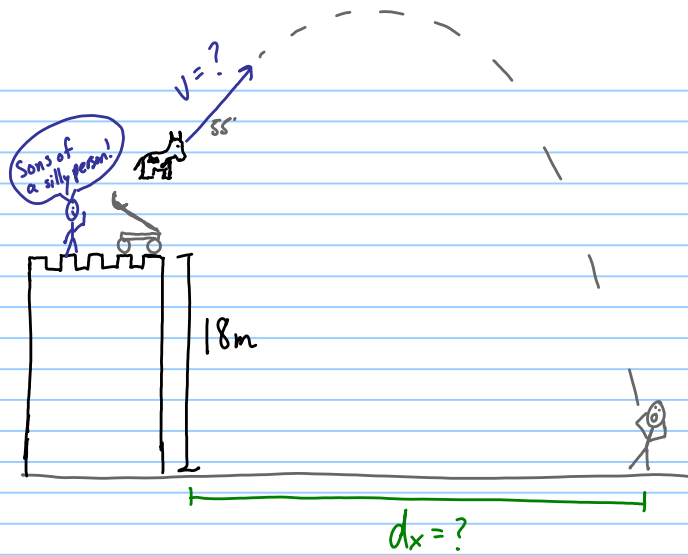


A catapult is mounted on the top of a castle wall, 18 m above the ground. It launches a cow at a 55° angle above the horizontal. The cow lands on Sir Arthur's squire 4.56 s later.

a) At what initial speed was the cow launched?

b) What horizontal distance did the cow travel?



a.)

x	y
$V_x =$	$V_y =$
$d_x =$	$V_{y0} = ?$
$t = 4.56s$	$a_y = -9.8 m/s^2$
	$d_y = -18m$
	$t = 4.56s$

a) $d = V_0 t + \frac{1}{2} a t^2$

$$V_0 = \frac{d - \frac{1}{2} a t^2}{t} = \frac{-18 - \frac{1}{2}(-9.8)(4.56)^2}{4.56}$$

$$= 18.40 m/s \quad \checkmark$$

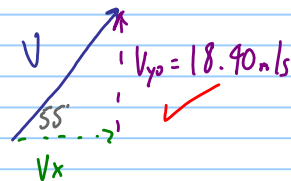
b) $\tan 55 = \frac{V_{y0}}{V_x}$

$$V_x = \frac{V_{y0}}{\tan 55} = 12.88 m/s \quad \checkmark$$

$$d_x = V_x \cdot t$$

$$= (12.88 m/s)(4.56 s)$$

$$= \boxed{58.8 m} \quad \checkmark$$



$$\sin 55 = \frac{V_{y0}}{V}$$

$$V = \frac{V_{y0}}{\sin 55} = \frac{18.40}{\sin 55}$$

$$= \boxed{22.5 m/s} \quad \checkmark$$