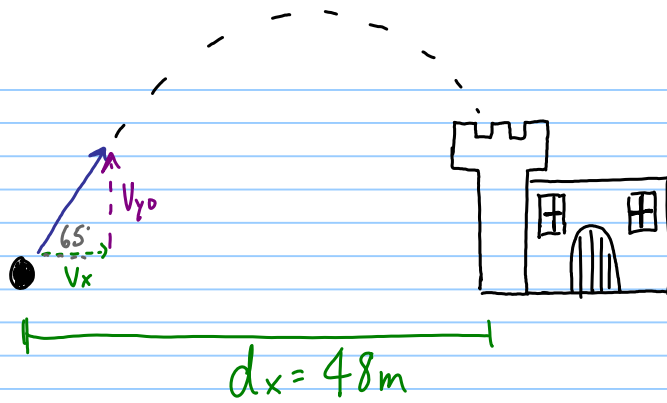


A catapult fires a rock at a castle wall which is 48 m in front

of it. The rock is launched at 65° above horizontal and strikes the wall after 4.4 s.

- a. At what total speed was the rock initially launched?
- b. At what height does the rock hit the wall?

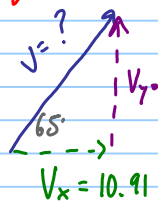


a.)

X	Y
$V_x =$	$V_y =$
$d_x = 48\text{m}$	$V_{y0} =$
$t = 4.4\text{s}$	$a_y =$
	$d_y =$
	$t = 4.4\text{s}$

$$V_x = \frac{d_x}{t} = \frac{48\text{m}}{4.4\text{s}}$$

$$= 10.91\text{ m/s} \quad \checkmark$$



$$\cos 65 = \frac{V_x}{V} \quad \checkmark \quad V = \frac{V_x}{\cos 65} = \frac{10.91}{\cos 65} = 25.81\text{ m/s}$$

$$= \boxed{26\text{ m/s}} \quad \checkmark$$

b.) $\sin 65 = \frac{V_{y0}}{V} \quad V_{y0} = V \sin 65 = 25.81 \sin 65$

$$= 23.39\text{ m/s} \quad \checkmark$$

X	Y
	$V_y =$
	$V_{y0} = 23.39\text{ m/s}$
	$a_y = -9.8\text{ m/s}^2$
	$d_y = ?$
	$t = 4.4\text{s}$

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

$$= (23.39)(4.4) + \frac{1}{2}(-9.8)(4.4)^2$$

$$= 8.05\text{ m}$$

$$= \boxed{8.1\text{ m}} \quad \checkmark$$