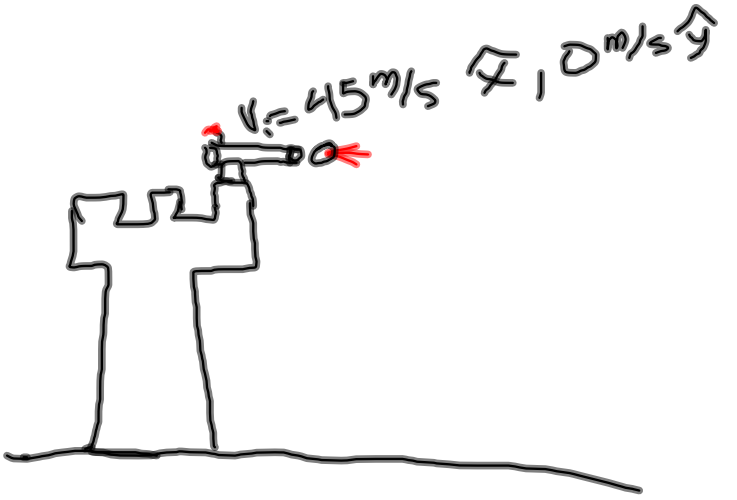


gravity pulls down

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

No force in $\hat{x}$, so $a_x = 0\ m/s^2\ \hat{x}$

Accelleration for projetiles:

$a = 0\ m/s^2\ \hat{x}, -9.8\ m/s^2\ \hat{x}$

Range: horizontal displacement
→ how far it travels.

$\hat{x}$

we know
$V_i = 45\ m/s$
$a = 0\ m/s$
$t_x = t = ?$

$\Delta x = ?$

$\Delta x = V_i t + \frac{1}{2} a t^2$ ($a = 0$)

$\Delta x = V_i t$

$\Delta x = 45(4.95)$

$\boxed{\Delta x = 222.7\ m}$

the same →

$\hat{y}$

we know
$V_i = 0\ m/s$
$a = -9.8\ m/s^2$
$t_y = t = ?$
$\Delta y = -120\ m$

solve for time in y.

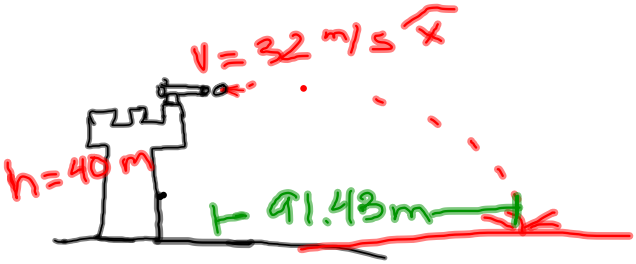
$\Delta y = V_i t + \frac{1}{2} a t^2$ ($V_i = 0$)

$-120 = \frac{1}{2}(-9.8) t^2$

$\frac{-120}{-4.9} = \frac{-4.9 t^2}{-4.9}$

$t^2 = 24.5$

$\boxed{t = 4.95\ s}$



$\Delta y = \cancel{v_0 t} + \frac{1}{2}at^2$

$\Delta Y = \frac{1}{2}at^2$

$-40 = \frac{1}{2}(-9.8)t^2$

$-40 = -4.9t^2$

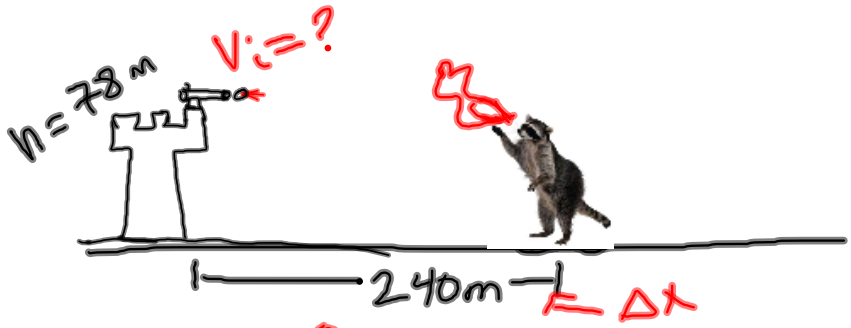
$t^2 = 8.16$

$t = 2.86\ s$

$\Delta x = v_0 t + \cancel{\frac{1}{2}at}^{\,0}$

$\Delta x = 32(2.86)$

$\Delta x = 91.43\ m$



$$\Delta y = \cancel{v_0 t}^{0} + \frac{1}{2}at^2$$

$$-78 = \frac{1}{2}(-9.8)t^2$$

$$-78 = -4.9t^2$$

$$t^2 = 15.9$$

$$t = 4.00\ s$$

$$\Delta x = v_0 t + \cancel{\frac{1}{2}at^2}^{0}$$

$$\Delta x = v_0 t$$

$$\frac{240 = v_0(4)}{4}$$

$$v_0 = 60\ m/s$$