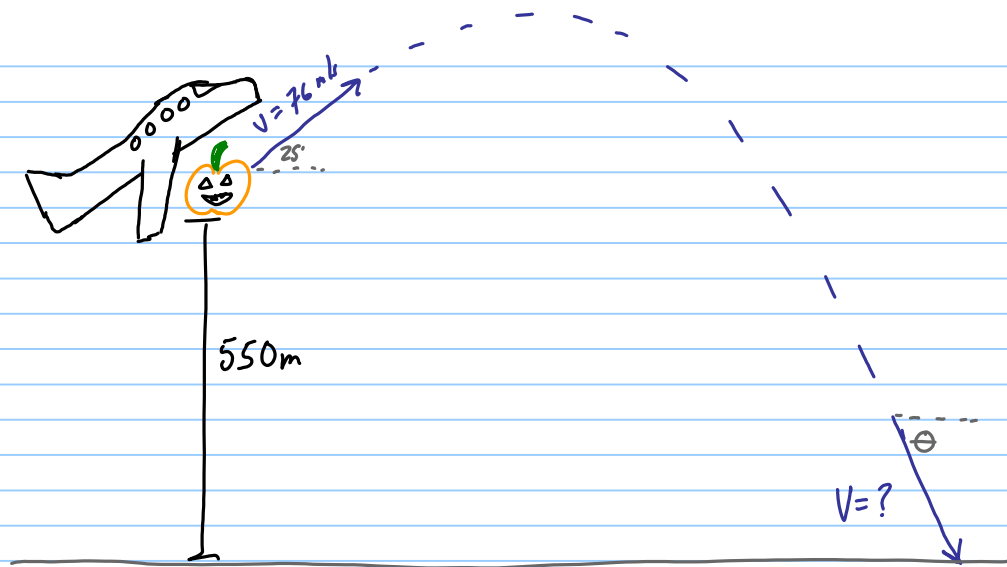


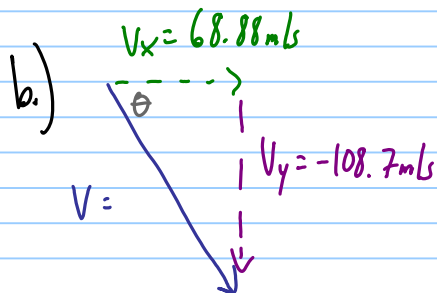
# Quiz 5b

While taking off, a plane is flying at a  $76 \text{ m/s}$  at  $25^\circ$  above the horizontal. When it reaches an altitude of  $550 \text{ m}$  it releases a surprisingly aerodynamic pumpkin which falls to the ground.

- a) How long does it take to hit the ground?
- b) What is its total final impact velocity?



	X	Y
$v = 76 \text{ m/s}$ $25^\circ$	$v_x = 76 \cos 25^\circ$ $= 68.88 \text{ m/s}$	$v_y =$
$v_{y0} = 76 \sin 25^\circ$ $= 32.12 \text{ m/s}$	$dx$	$v_{y0} = 32.12 \text{ m/s}$
	$t$	$a_y = -9.8 \text{ m/s}^2$
		$dy = -550 \text{ m}$
		$t =$
		a) $v^2 = v_0^2 + 2ad$
		$v = \pm \sqrt{(32.12)^2 + 2(-9.8)(-550)}$
		$= -108.7 \text{ m/s}$ ✓
		$v = v_0 + at$
		$t = \frac{v - v_0}{a} = \frac{-108.7 - 32.12}{-9.8}$



$$v = \sqrt{v_x^2 + v_y^2}$$

$$= 128.7 \text{ m/s}$$

$$\theta = \tan^{-1}\left(\frac{108.7}{68.88}\right)$$

$$= 57.6^\circ$$

$$= \boxed{130 \text{ m/s } 58^\circ \text{ (below horizontal)}}$$

$$t = 14.37 \text{ s}$$

$$= \boxed{14 \text{ s}} \checkmark$$