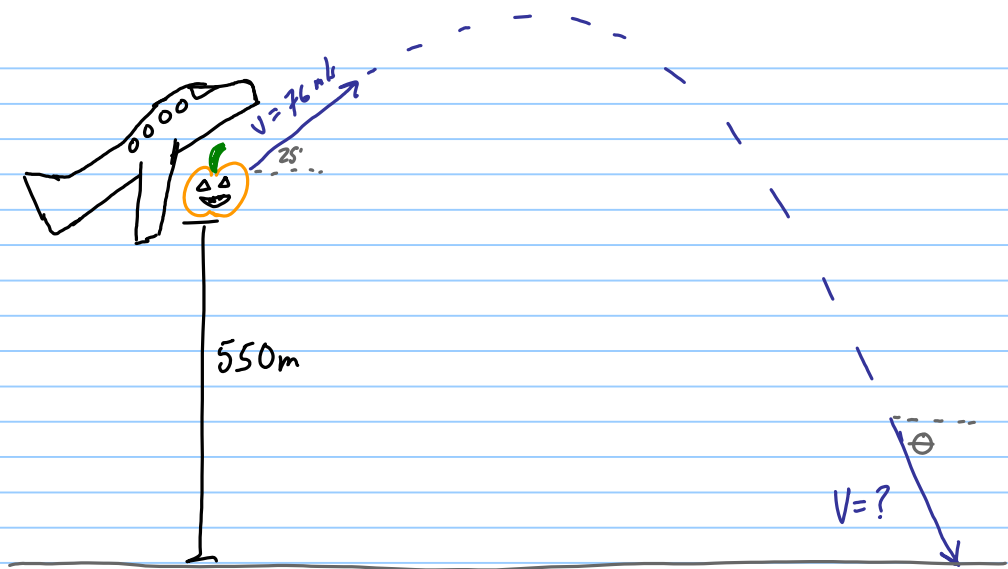


While taking off, a plane is flying at a 76 m/s at 25° above the horizontal. When it reaches an altitude of 550 m it releases a surprisingly aerodynamic pumpkin which falls to the ground.

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°	$V_x = 76 \cos 25^\circ$ $= 68.88 \text{ m/s}$	$V_y = 76 \sin 25^\circ$ $= 32.12 \text{ m/s}$
	d_x	$d_y = -550 \text{ m}$
	t	$t =$
		a) $V^2 = V_0^2 + 2ad$
		$V = \pm \sqrt{(32.12)^2 + 2(-9.8)(-550)}$
		$= -108.7 \text{ m/s} \checkmark$
		$V = V_0 + at$
		$t = \frac{V - V_0}{a} = \frac{-108.7 - 32.12}{-9.8}$

b.)

$V_x = 68.88 \text{ m/s}$

$V_y = -108.7 \text{ m/s}$

$V =$

$$V = \sqrt{V_x^2 + V_y^2}$$

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

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

$$= 57.6^\circ$$

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

$t = 14.37 \text{ s}$

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