

b) Maximum height of ball?

At max. ht, the velocity is only horizontal, so $v_{fy} = 0$ at that instant. Remember free fall?

moment: max. ht.

$\Delta x =$	$\Delta y =$
$v_x = 15 \text{ m/s}$	$v_{iy} = 26 \text{ m/s}$
$\Delta t =$	$v_{fy} = 0$
	$a_y = -9.8 \text{ m/s}^2$
	$\Delta t =$

$$v_{fy}^2 = v_{iy}^2 + 2a_y \Delta y$$

$$0 = (26 \text{ m/s})^2 + 2(-9.8 \text{ m/s}^2) \Delta y$$

$$\boxed{34.5 \text{ m}} = \Delta y$$

a) How high is the cliff?

moment: Landing

<u>Horiz</u>	<u>Vertical</u>
$\Delta x =$	$\Delta y = h$
$v_x = 15 \text{ m/s}$	$v_{iy} = 26 \text{ m/s}$
$\Delta t = 4.0 \text{ s}$	$v_{fy} =$
	$a_y = -9.8 \text{ m/s}^2$
	$\Delta t = 4.0 \text{ s}$

$$\Delta y = v_{iy} \Delta t + \frac{1}{2} a_y \Delta t^2$$

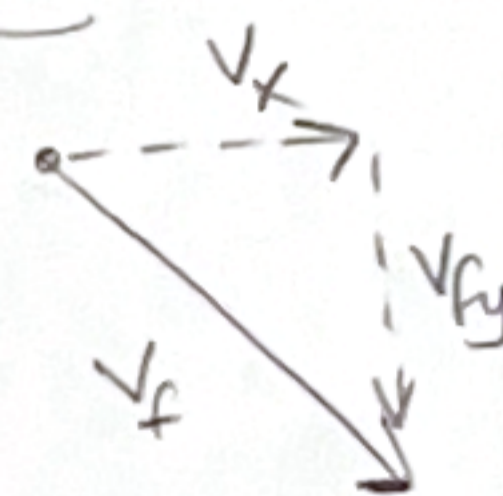
$$h = (26 \text{ m/s})(4.0 \text{ s}) + \frac{1}{2}(-9.8 \text{ m/s}^2)(4.0 \text{ s})^2$$

$$h = \boxed{25.6 \text{ m}}$$

c) Impact speed?

moment: Landing

List of variables is here.



I need to know v_x and v_{fy} . Then I can combine them to find v_f , the impact speed.

$$v_{fy} = v_{iy} + a \Delta t$$

$$= (26 \text{ m/s}) - 9.8(4.0 \text{ s})$$

$$= -13.2 \text{ m/s}$$

$$v_{fy}^2 + v_x^2 = v_f^2$$

$$(-13.2 \text{ m/s})^2 + (15 \text{ m/s})^2 = v_f^2$$

$$\boxed{20 \text{ m/s}} = v_f$$