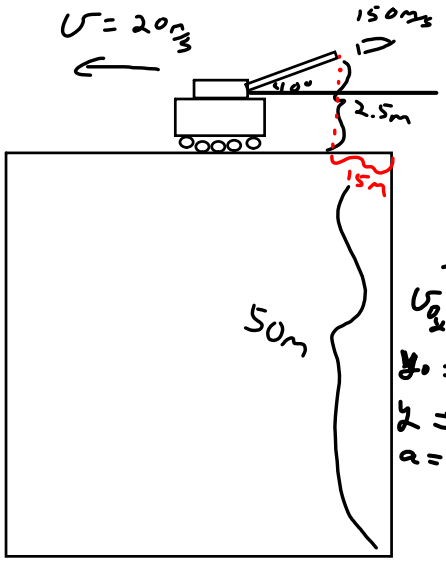
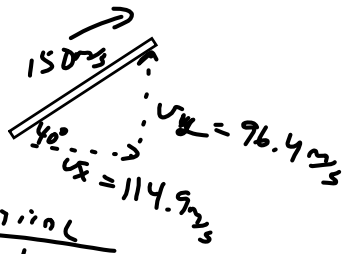
A tank traveling with a constant velocity of 20 m/s to the left fires a mortar shell with a velocity of 150m/s at an angle of 40 degrees above the horizontal. The barrel is 2.5 meters from the top of the cliff. Find where the mortar lands from the base of the cliff if it is fired 15 meters from the edge of the cliff





Vertical

Given:	Unknown
$v_{0y} = 96.4$ m/s	$t = ?$
$y_0 = 0$	
$y = -52.5$ m	
$a = -9.8$ m/s²	

$$y = y_0 + v_{0y}t + \frac{1}{2}at^2$$

$$-52.5\text{m} = 0 + (96.4\text{m/s})t + \frac{1}{2}(-9.81\text{m/s}^2)t^2$$

$$0 = -4.905t^2 + 96.4t + 52.5\text{m}$$

$a = -4.905$

$b = 96.4$

$c = 52.5$

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\frac{-96.4 \pm \sqrt{(96.4)^2 - 4(4.905)(52.5)}}{-9.8}$$

$$\frac{-96.4 \pm 101.6}{-9.8}$$

$$\frac{-96.4 - 101.6}{-9.8} = 20.2\text{s}$$

$$v = \frac{x}{t}$$

$$94.9\text{m/s} = \frac{x}{20.2\text{s}}$$

$$x = 1916.78\text{m}$$

$$-15\text{m}$$

$$x = 1901.98\text{m}$$