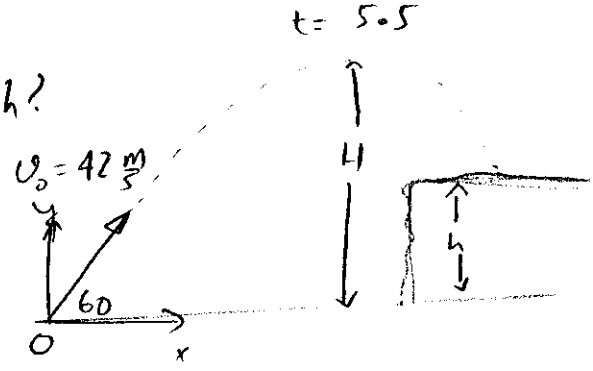
Cliff

a) Find the height of the cliff h?



$y_0 = 0$

$\Rightarrow \Delta y = (v_0 \sin\theta_0)t - \frac{1}{2}gt^2$

$\Rightarrow h = (42 \times \sin 60)(5.5) - 4.9(5.5)^2$

$= 51.8 \text{ m}$

b) The speed of the stone just before impact?

v_x is constant $= v_0 \cos\theta_0 = 42 \times \cos 60 = 21 \frac{m}{s}$

$v_y = (v_0 \sin\theta_0) - gt$

$= 42 \times \sin\theta_0 - 9.8 \times 5.5 = -17.5 \frac{m}{s}$

$\Rightarrow v = \sqrt{v_x^2 + v_y^2} = \sqrt{(21)^2 + (17.5)^2} = 27.3 \frac{m}{s}$

c) the maximum height H?

$v_y^2 = (v_0 \sin\theta_0)^2 - 2g\Delta y$

When $v_y = 0$, $\Delta y = H$

$\Rightarrow H = \frac{(v_0 \sin\theta_0)^2}{2g} = \frac{(42 \sin 60)^2}{2g} = 67.5 \text{ m}$