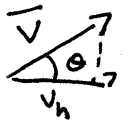
a) We can calculate horizontal velocity

$\boxed{V_h t = d}$ $\quad V_h = \frac{105\,m}{4.2\,s} = 25\,m/s$



$|\vec{V}|\cos\theta = V_h \quad |\vec{V}| = \frac{V_h}{\cos\theta} = \frac{25}{\cos 25^\circ} = \boxed{27.6\,m/s}$

$\vec{V} = 27.6\,m/s$ @ 25° angle

b) the stone was Falling For 4.2 s.

the vertical component of velocity is $|\vec{V}|\sin\theta = 27.6\,m/s \sin 25^\circ = \boxed{11.7\,m/s}$ (11.7)

$\boxed{\Delta y = v_i t - \frac{1}{2} g t^2} = 11.7\frac{m}{s}(4.25) - 4.9\frac{m}{s^2}(4.25)^2 = \boxed{37.5\,m}$

C) Maximum height when $V_y(t) = V_i - gt = 0$

$t = \frac{V_i}{g} = 1.2\,sec$

Maximum $h = 37.5 + \Delta y(t = 1.2\,sec) = 37.5 + 7.0 = \boxed{44.5}$

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2) see Fig 5.13 For FBD

$N_y = N\cos 3^\circ \quad N_x = N\sin 3^\circ$

From Newtons Law

$\Sigma F_y = 0 \quad \Sigma F_x = ma_r = \frac{mv^2}{r}$

$N_x = \frac{mv^2}{r}$

$N_y - mg = 0$

$N_y = mg$ divide ☒ equation by ☐ eq

$\frac{N_x}{N_y} = \frac{\frac{mv^2}{r}}{mg} \Rightarrow \tan 3^\circ = \frac{v^2}{rg} \quad v^2 = rg\tan\theta \quad \boxed{7.9\,m/s}$

$v = \sqrt{rg\tan\theta}$