PP/543

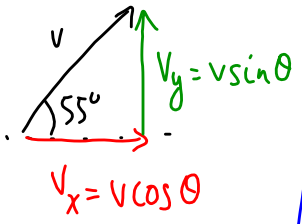
12.

$\theta = 55°$

$\Delta d(\text{horiz}) = 75\text{cm}$

$\Delta d(\text{vert}) = 0$

$V = ?$



Vertically

$\Delta d = v_i t + \frac{1}{2}at^2$

$0 = v\sin\theta\, t - \frac{g}{2}t^2$

$0 = (v\sin 55°)t - \frac{g}{2}t^2$ ← 2 unknows (v + t)

Horizontally

$\Delta d = vt$

$0.75\text{m} = (v\cos 55°)t$ ← 2 unknowns (v + t)

solve for t: $0 = t\left(v\sin 55° - \frac{g}{2}t\right)$

So $t = 0$ OR $v\sin 55° - \frac{g}{2}t = 0$

$v\sin 55° = \frac{g}{2}t$

$t = \frac{2v\sin 55°}{g}$

Sub into horizontal equation:

$0.75\text{m} = (v\cos 55°)t$

$0.75\text{m} = v\cos 55° \frac{2v\sin 55°}{g}$

$0.75\text{m} = \frac{v^2 \sin 2(55°)}{g}$

Recall: $\sin 2\theta = 2\cos\theta\sin\theta$

$v^2 = \frac{(0.75\text{m})g}{\sin 110°}$

$v = 2.8\text{ m/s}$