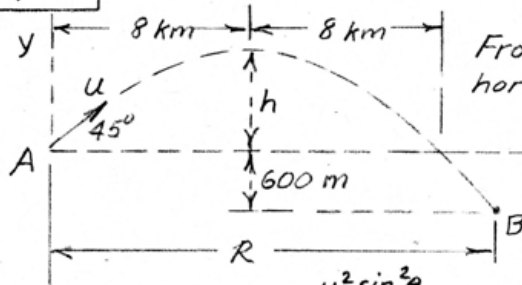


2/81



From Sample Prob. 2/6  
horiz. range is  $2s = \frac{u^2 \sin 2\theta}{g}$

so  $16(10^3) = \frac{u^2 \sin 90^\circ}{9.81}$

$u = \sqrt{157000} = 396 \text{ m/s}$

Max. altitude  $h = \frac{u^2 \sin^2 \theta}{2g}$ ,  $H = h + 600 = \frac{(396)^2 \sin^2 45^\circ}{2(9.81)} + 600$   
 $= 4000 + 600 = 4600 \text{ m}$

$y = ut \sin \theta - \frac{1}{2} g t^2$ ,  $-600 = 396(0.7071)t - \frac{1}{2}(9.81)t^2$

$t^2 - 57.11t - 122.3 = 0$ ,  $t = \frac{57.11}{2} \pm \frac{1}{2} \sqrt{3262 + 489}$

$= 59.18 \text{ s (or } -2.07 \text{ s)}$

$x = ut \cos \theta$ ,  $R = 396(59.18) \cos 45^\circ = 16579 \text{ m.}$

or  $R = 16.58 \text{ km}$