



$$u = 63 \text{ m/s}$$

$$u_x = 63 \cos 22.5$$

$$u_y = 63 \sin 22.5$$

$$a_y = -9.81 \text{ m/s}^2$$

b) $s_y = u_y t + \frac{1}{2} a_y t^2$ $s_y = -1.0 \text{ m}$

$$-1 = 63 \sin 22.5 t - \frac{9.81}{2} t^2$$

$$0 = -4.905 t^2 + 24.109 t + 1$$

$$t = 4.956 \text{ s}$$

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

$$\frac{-24.109 \pm \sqrt{581.25 - 4(-4.905)(1)}}{2(-4.905)}$$

$$\frac{-24.109 - 24.5125}{-9.81} = \boxed{t = 5.05}$$

a) $t = 4.956$

$$s = u t = (63 \cos 22.5)(4.956) = 288 \text{ m} = \boxed{290 \text{ m}}$$

c) peak ht.
 $\frac{v_y - u_y}{a_y} = t$

$$\frac{0 - 63 \sin 22.5 \text{ m/s}}{-9.81 \text{ m/s}^2} = t$$

$$t = 2.4576 \text{ s}$$

$$s_y = u_y t + \frac{1}{2} a_y t^2$$

$$s_y = 63 \sin 22.5 \text{ m/s} (2.4576 \text{ s}) + \frac{1}{2} (-9.81 \text{ m/s}^2) (2.4576 \text{ s})^2$$

$$s_y = 29.625 + 1.0 \text{ m} = \boxed{31 \text{ m}}$$