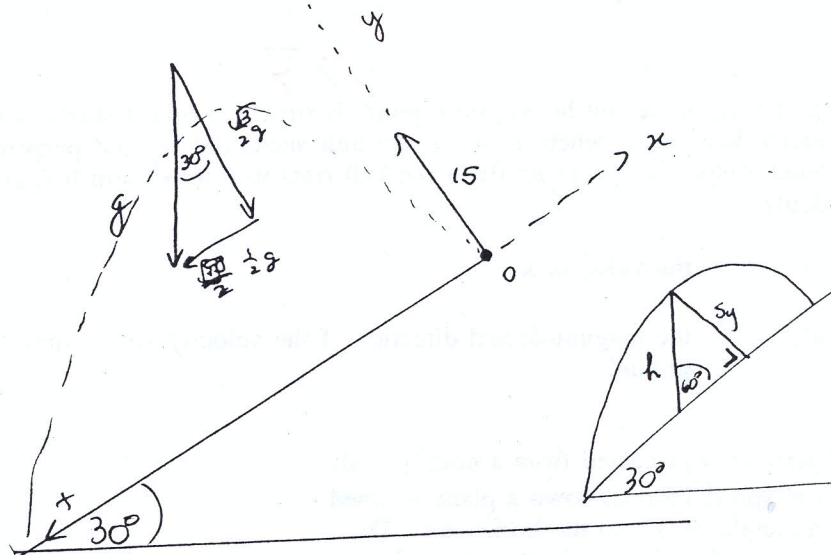


(b)

1997

3(b)

(i) $\frac{x}{y}$

$$u = 0$$

$$a = \frac{1}{2}g$$

$$S_x = 0 + \frac{1}{4}gt^2$$

$$\therefore S_x = \frac{1}{4}gt^2$$

 $\frac{y}{x}$

$$u = 15$$

$$a = -\frac{\sqrt{3}}{2}g$$

$$S_y = 15t - \frac{\sqrt{3}}{4}gt^2 = \perp \text{ height}$$

$$\frac{S_y}{S_x} \cdot \sin 60^\circ = \frac{S_y}{h} \therefore h = \frac{S_y}{\sin 60^\circ} = \frac{2S_y}{\sqrt{3}}$$

$$\therefore h = \frac{2}{\sqrt{3}} \left(15t - \frac{\sqrt{3}}{4}gt^2 \right)$$

$$= \frac{30}{\sqrt{3}}t - \frac{2\sqrt{3}}{4\sqrt{3}}gt^2$$

$$h = 10\sqrt{3}t - \frac{1}{2}gt^2$$

$$h = 10\sqrt{3}t - 4.9t^2$$

$$(ii) \frac{dh}{dt} = 0 \Rightarrow 10\sqrt{3} - 9.8t = 0$$

$$\Rightarrow 100\sqrt{3} - 98t = 0$$

$$\Rightarrow t = \frac{100\sqrt{3}}{98} = \frac{50\sqrt{3}}{49}$$

$$\text{at this time, } h = 10\sqrt{3} \left(\frac{50\sqrt{3}}{49} \right) - 4.9 \left(\frac{2500(3)}{2401} \right)$$

$$= \frac{500\sqrt{3}}{49} - \frac{2500(3)}{490}$$

$$= \frac{1500}{49} - \frac{750}{49} = \frac{750}{49} = 15.31 \text{ m.}$$