

~~1) a~~

Ans: to: que: no: 1

~~2) a) The time takes~~

2) a) Given that,  $v_0 = 600 \text{ ft s}^{-1}$

$$\theta = 60^\circ$$

$$g = 32 \text{ ft s}^{-2}$$

The flight time is  $T = \frac{2v_0 \sin \theta}{g}$

$$= \frac{2 \times 600 \times \sin 60^\circ}{32}$$
$$= 32.47 \text{ sec}$$

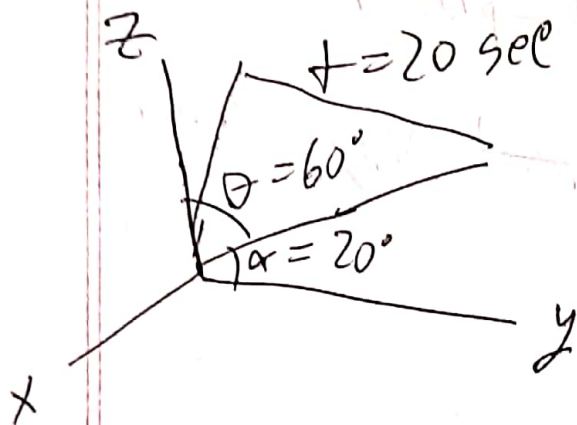
(Ans)

Given

b)  $V_0 = 600 \text{ ft s}^{-1}$

$g = 32$

b) Given,  $V_0 = 600 \text{ ft s}^{-1}$   
 $g = 32 \text{ ft s}^{-2}$



For x,

$V_x = V_0 \cos 60^\circ (-\sin 20^\circ)$  in x direction

$V_y = V_0 \cos 60^\circ \cos 20^\circ$  in y direction

$V_z = V_0 \sin 60^\circ$  in z direction

$\therefore V_x = -102.60 \text{ ft s}^{-1}$

$V_y = 281.90 \text{ ft s}^{-1}$

$$V_z = 519.61 \text{ ft s}^{-1}$$

Given  $T = 20 \text{ sec}$ .

$\therefore$  towards  $u$ ,

$$u = \cancel{102.60} \times 20$$

$$= -2052 \text{ ft}$$

towards  $y$ ,

$$y = 281.9 \times 20$$

$$= 5638 \text{ ft}$$

$\odot$  towards  $z$ ,

$\odot$  we know,

$$V_z^2 = u_z^2 - 2gh$$

$$V_z = u_z - gt$$

$$= -120.39 \text{ ft s}^{-1}$$

$$v_z^2 = u_z^2 = 2gh$$

$$\therefore h = \frac{-v_z^2 + u_z^2}{2g}$$

$$= 3992.2 \text{ ft}$$

$$\therefore u = -2092 \text{ ft}$$

$$y = 5638 \text{ ft}$$

$$z = 3992.2 \text{ ft}$$

(Ans)

b) We know,

Velocity towards  $x$ -axis

$$\begin{aligned}V_{ny} &= V_0 \cos \theta \\&= 600 \cos(60^\circ) \\&= 300 \text{ ft s}^{-1}\end{aligned}$$

Velocity towards  $z$ -axis

$$\begin{aligned}V_z &= V_0 \sin \theta - g t \\&= (600 \sin 60^\circ) - 32 \times 20 \\&= -120.3847 \text{ ft s}^{-1}\end{aligned}$$

$$V = \sqrt{(V_{ny})^2 + (-120.3847)^2}$$

$$\begin{aligned}V &= \sqrt{(V_{ny})^2 + (V_z)^2} \\&= \sqrt{(300)^2 + (-120.3847)^2} \\&= 323.252 \text{ ft s}^{-1}\end{aligned}$$

The velocity after 20 seconds is  $323.292 \text{ ft s}^{-1}$

d) we get total flight time from question

(a) that  $32.47 \text{ sec}$

From question (c) we get ~~displacement~~  
velocity towards  $y$   ~~$300 \text{ m s}^{-1}$~~   $V_{ny} = 300 \text{ m s}^{-1}$

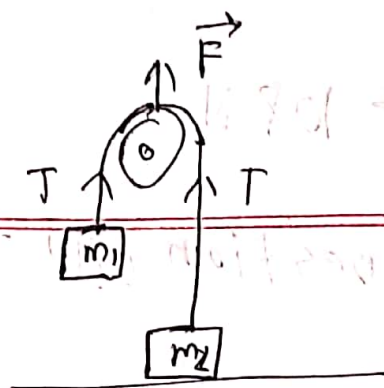
$$\begin{aligned}\therefore \text{Displacement} &= V_{ny} \times T \\ &= 300 \times 32.47 \\ &= 9741 \text{ ft}\end{aligned}$$

The displacement when it hits the ground is

$9741 \text{ ft}$ .  
(Ans)



2) a]



Ans: to : que: no: 2

The force  $\vec{F}$  will feel will be the twice the tension on the string.

$$F = 2T$$

As we are told to use the value of  $m_2$

$$\therefore T = m_2 g$$

$$\text{For } \therefore F = 2 m_2 g$$

$$= 2 \times 1.8 \times 9.81$$

$$= 35.316 \text{ N}$$

For value of  $F = 35.316 \text{ N}$   $m_2$  will remain rest on the floor.

b) Given that  $F = \text{How } 108 \text{ N}$

We know that from question (a) that

$$F = 2T$$

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~~$$F = 2T$$~~

$$\therefore 2T = F$$

$$\therefore T = \frac{F}{2}$$

$$= \frac{108}{2}$$

$$= 54 \text{ N}$$



c) For  $m_1$  block

$$T - m_1 g = m_1 a_1$$

$$\Rightarrow 54 - 1.3 \times 9.81 = 1.3 a_1$$

$$\therefore a_1 = 31.728 \text{ m s}^{-2}$$

For  $m_2$  block,

~~$$T - m_2 g =$$~~

$$m_2 g - T = m_2 a_2$$

$$a_2 = \frac{m_2 g - T}{m_2}$$

$$= -20.2 \text{ m s}^{-2}$$

$$\therefore m_1 \text{ acceleration } 31.728 \text{ m s}^{-2}$$

$$m_2 \text{ acceleration } -20.2 \text{ m s}^{-2}$$