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Problem 20, 55, 81  
Reading 88, 89, 91

6

(1)

### Problems

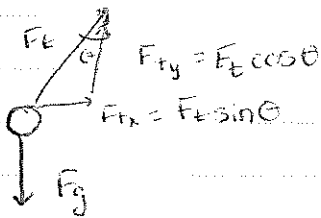
20)



$$\theta = 5^\circ$$

$$m = 10g = .01 \text{ kg}$$

$$a = ?$$



$$\textcircled{1} \quad \sum F = 0 \text{ N}$$

$$F_{ty} - F_g = 0 \text{ N}$$

$$F_t \cos \theta = mg$$

$$F_t = \frac{mg}{\cos \theta} = \frac{(0.01 \text{ kg})(9.81 \text{ m/s}^2)}{\cos 5^\circ}$$

$$F_t = .098 \text{ N}$$

(2)

$$\textcircled{2} \quad \sum F = ma$$

$$F_{tx} = ma$$

$$F_t \sin \theta = ma$$

$$a = \frac{F_t \sin \theta}{m} = \frac{(.098 \text{ N}) \sin 5^\circ}{.01 \text{ kg}}$$

$$a = .85 \text{ m/s}^2$$

or  $\sum F = 0 \text{ N}$

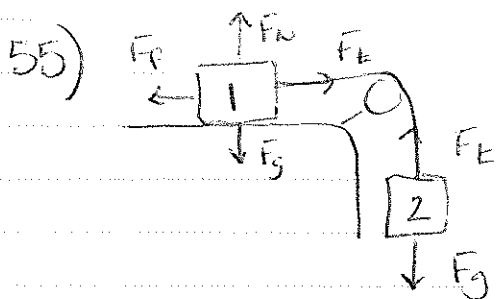
$$F_t = \frac{mg}{\cos \theta}$$

$$\sum F = ma$$

$$a = \frac{F_t \sin \theta}{m} = \frac{mg \sin \theta}{m \cos \theta}$$

$$a = g \tan \theta$$

6



m block 2 in terms of  $m_1$   
to get constant v

$$\mu = .29$$

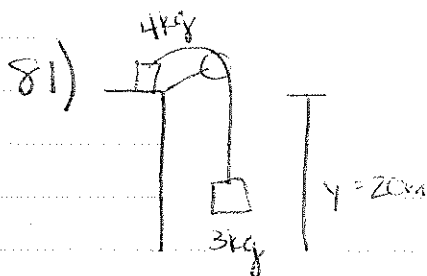
1)

$$\sum F = 0 \text{ N}$$

$$F_{g2} - F_T = 0 \text{ N}$$

$$m_2 g = \mu m_1 g$$

$$m_2 = \mu m_1$$



paint can connect to nails  
paint can falls, time to catch  
before smash

1)

①  $a = ?$

$$\sum F = ma$$

$$F_{g1} - F_{g2} = (m_1 + m_2)a$$

$$m_1 g - m_2 g = m_1 + m_2 a$$

$$a = \frac{m_1 g - m_2 g}{m_1 + m_2} = \frac{(4 \text{ kg})(9.81 \text{ m/s}^2) - (3 \text{ kg})(9.81 \text{ m/s}^2)}{4 \text{ kg} + 3 \text{ kg}}$$

$$a = 1.4 \text{ m/s}^2$$

②  $y = v_0 t + \frac{1}{2} a t^2$

$$t = \sqrt{\frac{2y}{a}} = \sqrt{\frac{2(20 \text{ cm})}{1.4 \text{ m/s}^2}} = 5.4 \text{ s}$$

## - Reading

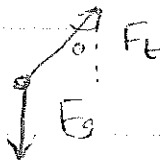
claim  $v = 232 \text{ km/hr}$   
takeoff



- record angle at 5s intervals
- determined  $a > g/4$
- $V = 201 \text{ km/hr}$  w/ ~~speed~~ wind 15-20 km/hr came close to pilot

88) FBD pendulum

(3)



89)

$$\textcircled{1} \sum F_y = 0 \text{ N}$$

$$F_t \cos \theta = mg$$

$$F_t = \frac{mg}{\cos \theta}$$

$$\textcircled{2} \sum F_x = ma$$

$$F_t \sin \theta = ma$$

$$mg \frac{\sin \theta}{\cos \theta} = ma$$

$$a = g \tan \theta$$

91) Peak speed?

25 s

• lowest  $\theta$ , so least  $a$ ,  
most speed

• most time accelerating

so most speed