

# 2nd Law Part II

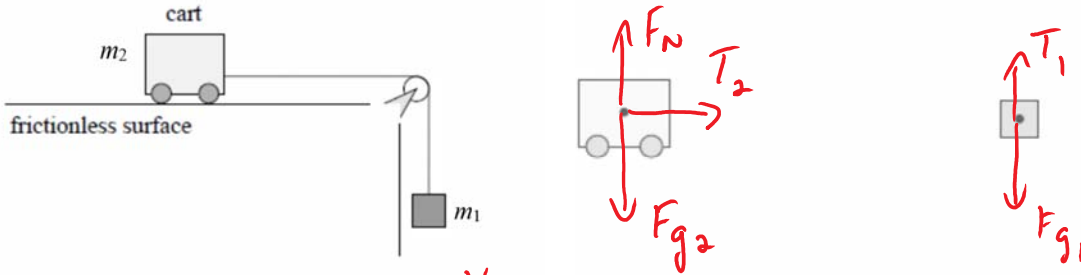
Tuesday, April 18, 2017 8:57 AM



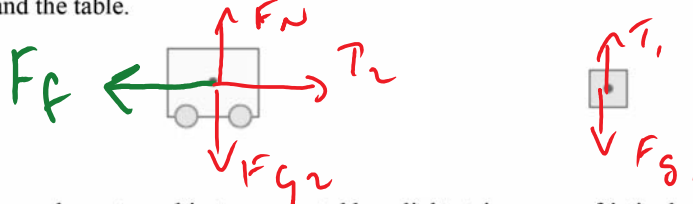
## Newton's 2nd Law Part II 2015

Newton's 2<sup>nd</sup> Law Part II

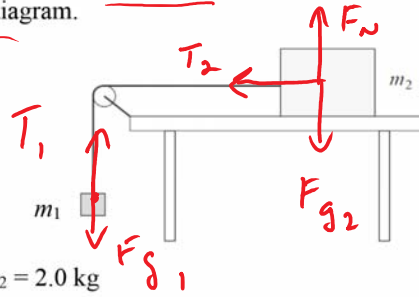
1. For the diagram shown draw and label a free body diagram for the cart and the hanging mass.



2. Will the tension values be the same? Yes Will the tension values cancel out when we consider the Fnet equation? ~~Hummm!!!?~~ Yes!!!
3. Draw and label a free body diagram for the cart and the hanging mass assuming there is friction between the cart and the table.



4. The diagram shows two objects connected by a light string over a frictionless pulley. Object  $m_2$  is on a frictionless horizontal table. Draw and label a free body diagram.



5. Find the acceleration of the system if  $m_1 = 0.50 \text{ kg}$  and  $m_2 = 2.0 \text{ kg}$

$$F_{\text{net}} = F_{g_1} - \cancel{T_1} + \cancel{T_2}$$

$$m a = m_1 g = (0.5)(9.8)$$

$$(2.5 \text{ kg}) a = 4.9 \text{ N}$$

$$a = \frac{4.9}{2.5} = 1.96 \text{ m/s}^2$$

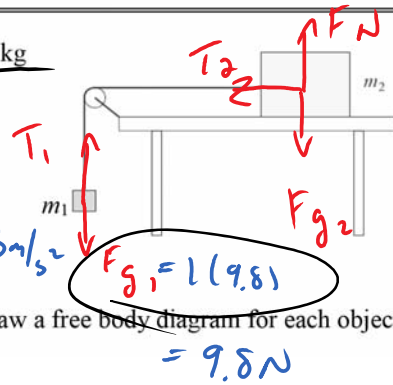
6. Find the acceleration of the system if  $m_1 = 1.00 \text{ kg}$  and  $m_2 = 5.0 \text{ kg}$

$$F_{\text{net}} = F_{g_1} - T_1 + T_2$$

$$ma = 9.8 \text{ N}$$

$$6a = 9.8 \text{ N}$$

$$a = \frac{9.8}{6} = 1.63 \text{ m/s}^2$$



7. Suppose there is friction between the cart and the table in #6. Draw a free body diagram for each object. Find the acceleration of the system if  $\mu = 0.15$

$$F_{\text{net}} = F_{g_1} - T_1 + T_2 - F_f$$

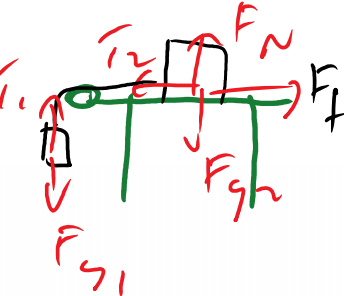
$$ma = 9.8 \text{ N} - 7.35 \text{ N}$$

$$6a = 2.45 \text{ N} \quad a = .41 \text{ m/s}^2$$

$$F_f = \mu FN$$

$$= (.15)(49 \text{ N}) = 7.35 \text{ N}$$

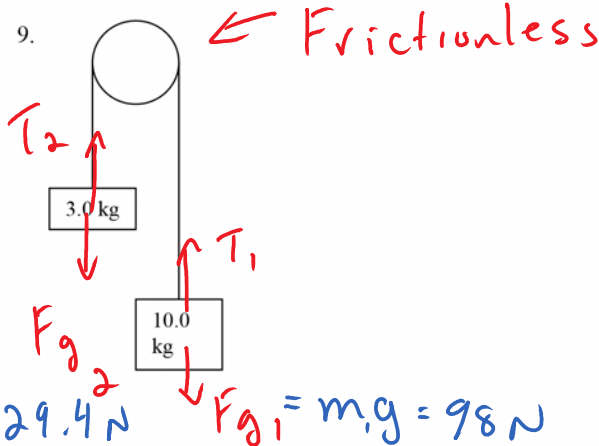
$$= 7.35 \text{ N}$$



8. What would happen if  $\mu$  was increased to 0.3?

HW # 4

9.



$$F_{\text{net}} = F_{g_1} - T_1 + T_2 - F_{g_2}$$

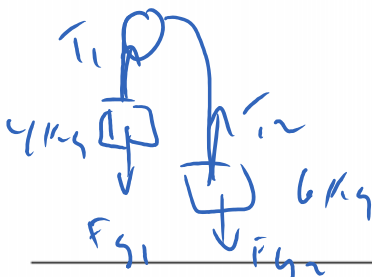
$$ma = 98 \text{ N} - 29.4 \text{ N}$$

$$(13 \text{ kg})a = 68.6 \text{ N}$$

$$a = \frac{68.6}{13} =$$

$$= 5.28 \text{ m/s}^2$$

10. Repeat #9 using a 4.0 kg mass and a 6.0 kg mass.



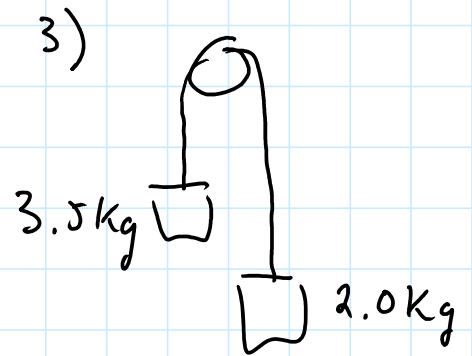
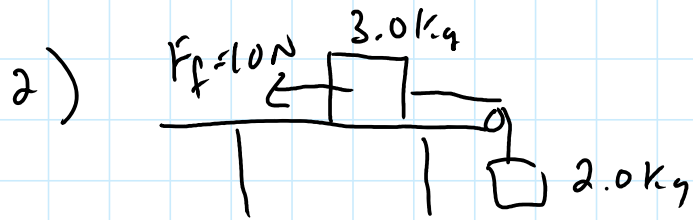
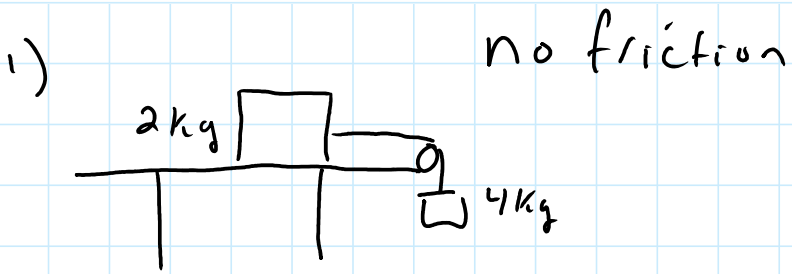
$$F_{\text{net}} = F_{g_2} - T_2 + T_1 - F_{g_1}$$

$$10a = 58.8 \text{ N} - 39.2 \text{ N}$$

$$a = \frac{19.6 \text{ N}}{10} = 1.96 \text{ m/s}^2$$

HW. Find acc.

1)          no friction 3)



4) #8 from sheet