Engineering Physics I
PHYS 1210

Name _____
Spring 2015

Discussion 4 – More Forces

Equations

$$\sum \vec{F} = m\vec{a}$$

$$F_g = mg$$

$$f_{s,k} = \mu_{s,k} N$$

$$a_c = \frac{v^2}{r}$$

My Problem Solving Approach (for Forces)

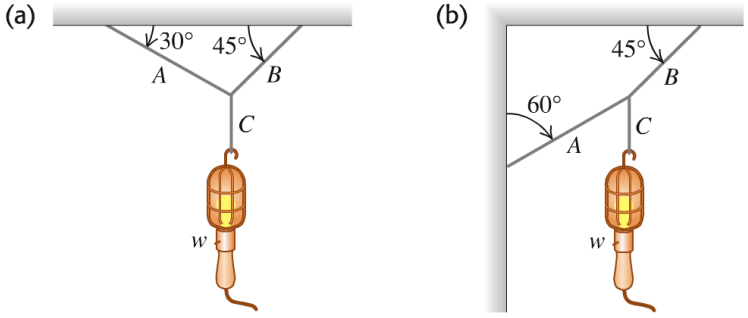
1. FBD
2. $\sum \vec{F} = m\vec{a}$
   a. Components components!
   b. Remember, N2 means "Force *causes* acceleration."
3. Do Math
4. Sanity Check

Problems

Young & Freedman, 13e

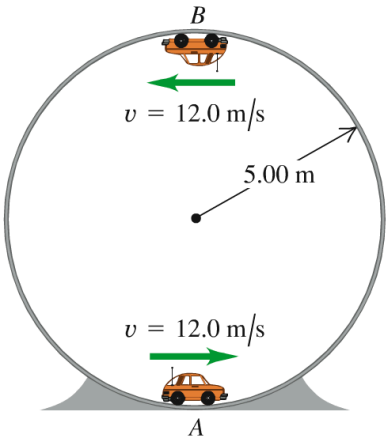
5.7 •• Find the tension in each cord in Fig. E5.7 if the weight of the suspended object is w.

Figure **E5.7**



Find T_{aA}, T_{aB}, T_{aC}, T_{bA}, T_{bB}, T_{bC}.

Figure **E5.42**

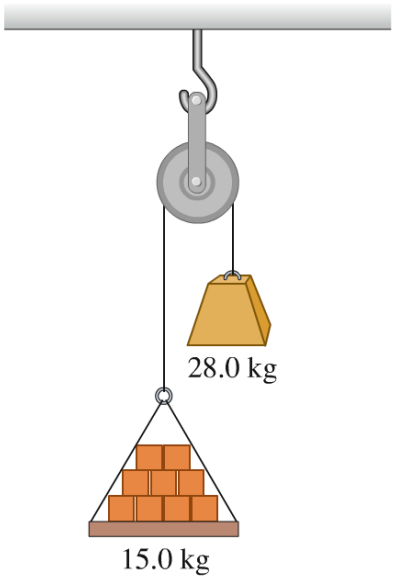


Based on 5.42

A small car with mass 0.800kg travels at a constant speed inside of a track that is a vertical circle with radius 5.00m. Find (a) the car's centripetal acceleration at points A and B, (b) the net force exerted on the car at points A and B, (c) the normal force exerted by the track on the car at point B, (d) the normal force exerted by the track on the car at point A.

5.15 •• Atwood's Machine. A 15.0-kg load of bricks hangs from one end of a rope that passes over a small, frictionless pulley. A 28.0-kg counterweight is suspended from the other end of the rope, as shown in Fig. E5.15. The system is released from rest. (a) Draw two free-body diagrams, one for the load of bricks and one for the counterweight. (b) What is the magnitude of the upward acceleration of the load of bricks? (c) What is the tension in the rope while the load is moving? How does the tension compare to the weight of the load of bricks? To the weight of the counterweight?

Figure **E5.15**



Find an algebraic expression for the (d) acceleration and the (e) tension in the rope in terms of m_1, m_2, and g. (f) Sanity check: Do the units work out in the acceleration and tension? What happens when $m_1 >> m_2$, or $m_1 = m_2$?