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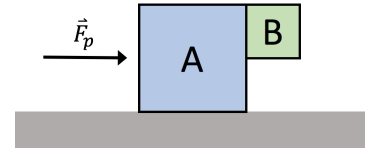
PH211 General Physics with Calculus

Homework 5

Instructor: MacKenzie Lenz
Due 7/25/19 @ 11:59 pm

1. Problem 1: 3rd Law Pair

Two blocks are pushed to the right so that they move together with increasing speed. Block B remains at the height shown. Ignore friction between the ground and block A but not between block A and block B. The mass of block A is 10kg and the mass of block B is 2kg . System S consists of both blocks A and B. (Use $g = 10\text{m/s}^2$.)



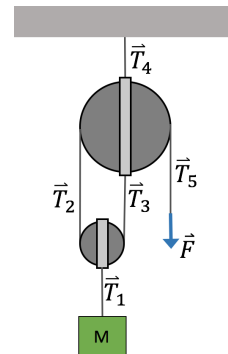
- (a) Draw and label a free body diagram for each block. Mark all forces that are Newton's 3rd Law pairs.
- (b) Calculate the magnitude of the force exerted on block A by the ground. Show all steps in your problem-solving process.

Suppose the friction between the two blocks is reduced so that block B slides down as the blocks move to the right. The downward component of the acceleration of block B is 1m/s^2 .

- (c) Draw and label a free body diagram for each block. Mark all forces that are Newton's 3rd Law pairs.
- (d) *Sensemaking*: Is the magnitude of the force exerted on block A by the ground in this case greater than, less than, or equal to the force exerted on block A by the ground in part B? Explain your reasoning.
- (e) Calculate the magnitude of the force exerted on block A by the ground. Show all steps in your problem-solving process.

2. Problem 2: Pulleys

The 10.2kg block in the figure below is held in place by a force applied to a rope passing over two massless, frictionless pulleys. Find the tensions T_1 to T_5 and the magnitude of force F .



- (a) Draw a Free Body Diagram for the block, the small pulley, and the large pulley.
- (b) Find T_1 .
- (c) Find T_5 .
- (d) Find F .
- (e) Do some *Sensemaking* about your answers.



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