

Ayush's Problem

Student's Name: _____ Due Date: ___ Oct. 19, 2017 ___

The Challenge: Ayush is sitting in his magical box and is desperately trying to save his friend Nick from annihilation – which would make the world a sad place. The anvil if it falls to the ground will trigger the annihilation sequence!! His friends come to the rescue, but not the wind – it is angry.

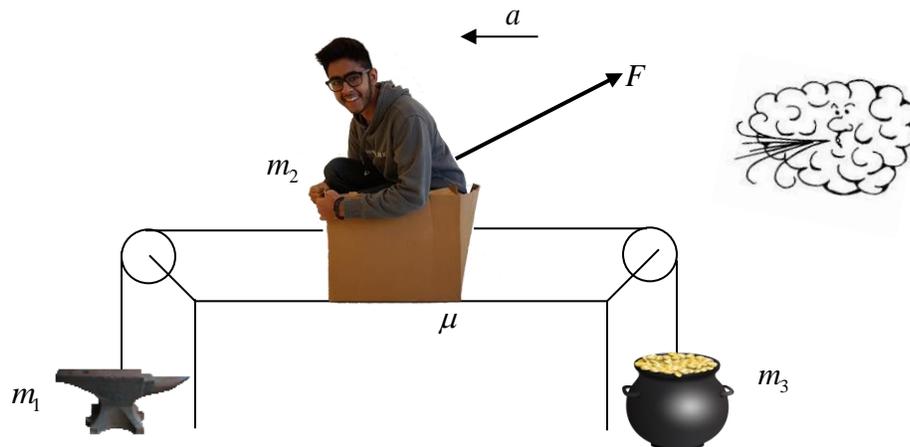
Problem Specifications:

Ayush and the box have a combined mass of 80 kg. The coefficient of friction was found to be 0.20 between the box and the ground. The anvil has a mass of 80 kg. Jovan is pulling up and to the right on the box with a force of 25 N at an angle of 37° to the horizontal. To aid in the demise of Nick, Nathan summons the winds to blow with a steady force of 20N against the box to the left. Weirdly a pot of gold is helping too...it's mass is 50kg.

Part 1: Determine the acceleration of the system in general terms and then numerically.

Part 2: How many 0.2 kg funnel cakes would Ayush have to eat in order to save Nick?

Part 3: State any and all assumptions made in this question and discuss the effects on the results.



Solutions:

Acceleration of the System (general solution):

$a =$



<< Numerical Answer

Number of Funnel Cakes (general solution – below):



<< Numerical Answer

Ayush’s Problem – Marking Rubric

Criteria	Level 1	Level 2	Level 3	Level 4
FBDs	Missing more than two key elements	Missing two key elements	Missing one key element	FBDs are clear, well drawn, well labelled and completely correct.
Equation Development	Missing more than two key steps or multiple steps are unclear or incorrect.	Missing two key steps or some of the steps are unclear. Mathematical notation is used correctly some of the time.	Missing one key step or one step is unclear. Mathematical notation is used correctly most of the time.	All work is show, equations are labelled and correct mathematical notation is used correctly all of the time.
Equation for the Acceleration	NA	NA	Equation is not in general terms, the correct numerical result is stated including correct units.	Equation is correct and stated in general terms, well presented and the numerical value is correct and units included
Number of Funnel Cakes Calculation	NA	NA	The correct numerical result is stated, but no general equation is given.	A unique equation is given, well presented and the numerical value is correct and units included
Discussion regarding assumptions made	Discussion was limited and/or incorrect.	Discussion was ok and mostly correct or no references were made to the relevant equations.	Discussion was insightful and correct. Reference was made to the relevant equations.	Discussion was extremely insightful and correct. Reference was made to the relevant equations. Expert understanding was evident through the discussion.