

Problem Set #2 Newton's Laws

Due Thursday Sept. 12 (A/B)/Friday Sept. 13 (C/D)

Name: _____

I worked with:

Equations:

Force: $F = ma$
Acceleration due to gravity: 9.8 m/s^2

1. Draw Free Body Diagrams for the Following:
 - a. A book on a table that is at rest
 - b. A plane flying straight at a constant speed
 - c. A pie hitting someone in the face
 - d. A car speeding up
 - e. An object of your choice in a situation of your choice

2. A passenger sitting in the rear of a bus claims that he was injured when the driver slammed on the brakes, causing a suitcase to come flying toward the passenger from the front of the bus. If you were the judge on the case, what would your response be? Draw a diagram AND explain your response.

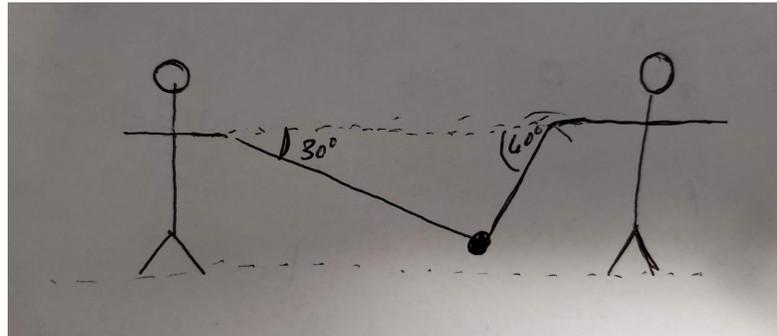
3. Long ago, it was thought that space travel was impossible, because space was effectively a vacuum with nothing to push against. How can you explain the fact that rockets work and that space travel is possible, using one of Newton's Laws?

4. Please answer the following
 - a. An object has an acceleration of 12.0 m/s^2 . If the net force acting upon this object were tripled, what would its new acceleration be?

 - b. An object has an acceleration of 18.0 m/s^2 . If the mass of this object were doubled (with no change in its net force), what would its new acceleration be?

 - c. An object has an acceleration of 6.0 m/s^2 . If the net force acting upon this object were one-third of the original net force, what would its new acceleration be?

5. You and a friend have entered a reality show contest where one of the challenges is to suspend a 20 kg mass between the two of you and hold it for the longest amount of time. The mass must stay just above the ground. Your friend and you hold your rope at different angles (see picture below). How much force must you and your friend each exert to hold the weight up.



(Your answer should include at least one free body diagram)