**Deciphering Forces Problems**

**Gravity Problems**

1. Jess is golfing on Io (a moon of Jupiter). What is the acceleration if she slices a shot directly upward with a 15N force? Golf balls have a mass of 46g. Io has a mass of 8.93\*1022 kg and a 1822 km radius.

Steps to help solve the problem

* 1. Draw a **Free Body Diagram**.
  2. Is this problem on the Earth’s surface? Which formula do you use for gravity on the Earth’s surface?
  3. Is this problem anywhere else? Which formula do you use for gravity for any location?
  4. Calculate values for all labeled forces on your FBD. Remember to be careful with **UNITS**, use **kg**, **m**, **s** only!
  5. Use Net Force to find the value you are looking for.

**Friction Problems**

1. Jim is pushing a 3.2kg book into a wall. The coefficient of friction between the book and the wall is µ=0.22. How hard should Jim push to keep the book from sliding?

Steps to help solve the problem

* 1. Draw a **Free Body Diagram**. This is always the **first** and **most** **important** thing you can do. If you can, label the forces with any values you know.
  2. What force makes the book slide? Do we know its value?
  3. The question asks us what keeps the book from sliding. Which force stops the book from sliding? What hint helps us? How is this force calculated?
  4. How should the forces from (b) and (c) be related? Use the idea of Net Force to help you get an exact value.
  5. Find how Jim’s pushing relates to how the book will (or won’t) slide. Calculate the force he needs to exert.

**Elastic Problems**

1. A 13kg mass is attached to the wall by some elastic bands. A horizontal applied force of 41N pulls the mass slightly above the floor, and ends up 22cm from its equilibrium position. If the mass is placed on the floor and the floor has a coefficient of friction of µ=0.11, what is the acceleration of the mass when it is released and slides along the floor?

Steps to help solve the problem

* 1. Draw a **Free Body Diagram** when the mass is held in place. What does it mean when the mass was pulled above the floor?
  2. Draw a **Free Body Diagram** when the mass is released.
  3. Use Net Force to find the acceleration.

3. **PART 2** - How far away from the equilibrium position does the mass start slowing down?

a. What does slowing down mean? What does it mean for the forces just

before slowing down occurs?

b. What information do you need to find this point? Use information

provided early in the problem to get what you need.