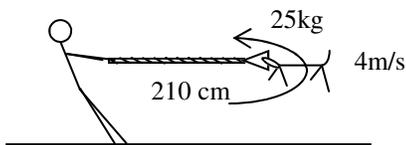


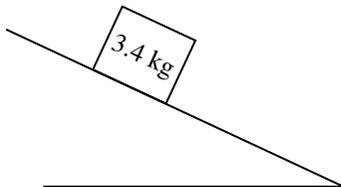
2009 PreAP Forces 8

- What is Newton's First Law?
- What is Newton's Second Law?
- What is Newton's Third Law?
- Which of Newton's Laws applies?
 - _____ To walk forward your foot has to push backwards.
 - _____ Your car will accelerate faster if you don't have extra weight in the trunk.
 - _____ Without a seat belt, you would be launched forward if your car stops suddenly.
- At the right, write the equations for finding the weight of an object and the equation for gravity. Fw equation: Gravity equation:
 - Change m_1 to m_o for mass of object.
 - When an object is on a planet, what is m_2 in the gravity equation?
 - Since these are both equations for the amount of weight, set the two equations equal to each other.
 - Notice what cancels and solve for "g" (the acceleration due to gravity on any planet).
- If the mass of Jupiter is 1.9×10^{27} kg and its radius is 7.15×10^7 m. Calculate the acceleration due to gravity on Jupiter.
- A 50 kg object is on Mercury (3.18×10^{23} kg; $r = 2.43 \times 10^6$ m).
 - What is its mass on Mercury?
 - What is its mass on the earth?
 - What is its weight on the earth?
 - At the right, calculate the object's weight on Mercury.

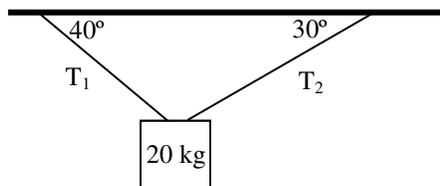


- Slim Jim's dog Bim has an amazing bite force. While biting onto a rope, Jim twirls him around in a circle.
 - Which direction does the acceleration point?
 - Which direction does Bim's velocity point?
 - What is this kind of acceleration called?
 - Calculate the Bim's acceleration.
 - Calculate the force keeping Bim in the circle.

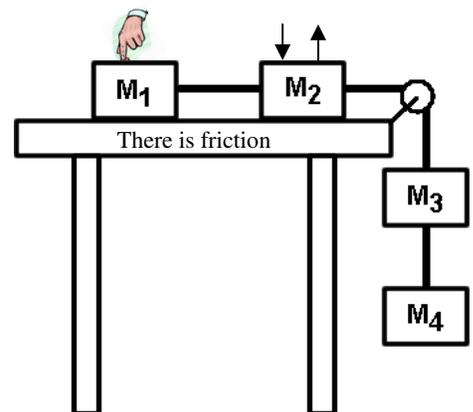
- Give the Newton's 2nd Law equations and force diagram for the following.



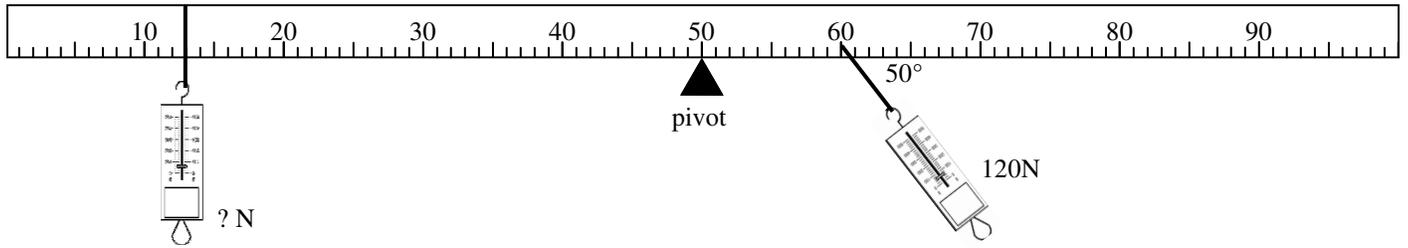
For the mass (there is friction):
x-direction: y-direction:



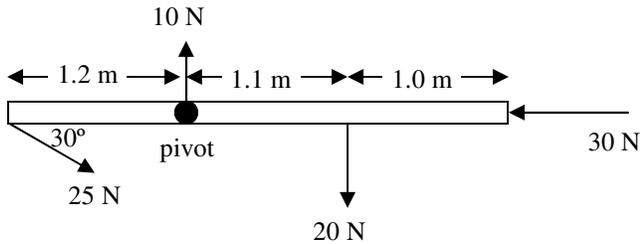
For the mass:
x-direction: y-direction:



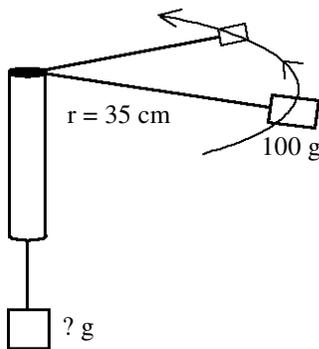
For M_2 (there is friction):
x-direction: y-direction:



10. Two forces pull on a meter stick at different places, causing the meter stick stays level.
- Which force is greater: left or right?
 - Which force is at the greater distance?
 - Which force gives the greater torque?
 - Where are all distances measured from?
 - Which force gives a negative torque?
 - As the right force tilts more, would its force have to increase or decrease to keep the meter stick level?
 - Calculate the force pulling on the left side of the meter stick.
11. Give three things or situations in which you use a torque around the house. (*No not use the car, bolts, or screws.*)
12. 30 Nm is a torque. Give two ways to create this amount of torque.



13. Calculate the net torque on the bar at the left.



14. A 100g mass is spun around a circle on the end of a string. At the other end of the string is an unknown mass.
- Convert all numbers to standard units.
 - The mass completes 15 circles in 7.2 seconds. Calculate the speed of the 100 g mass.
 - Calculate the acceleration of the 100g mass.
 - Calculate the tension in the rope.
 - What is the mass of the object at the bottom of the rope?