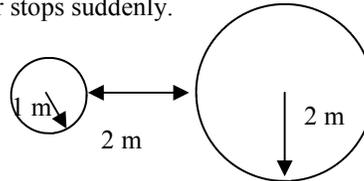


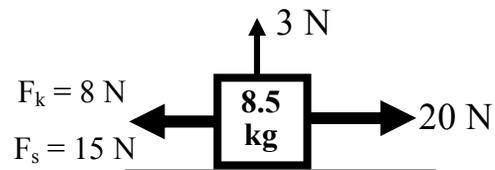
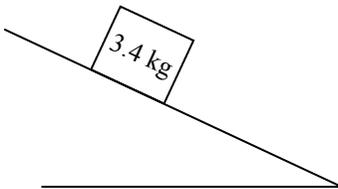
## 2009 Forces 7

1. What is Newton's First Law?
2. What is Newton's Second Law?
3. What is Newton's Third Law?
4. Which of Newton's Laws applies?
  - A. \_\_\_ To walk forward your foot has to push backwards.
  - B. \_\_\_ Your car will accelerate faster if you don't have extra weight in the trunk.
  - C. \_\_\_ Without a seat belt, you would be launched forward if your car stops suddenly.

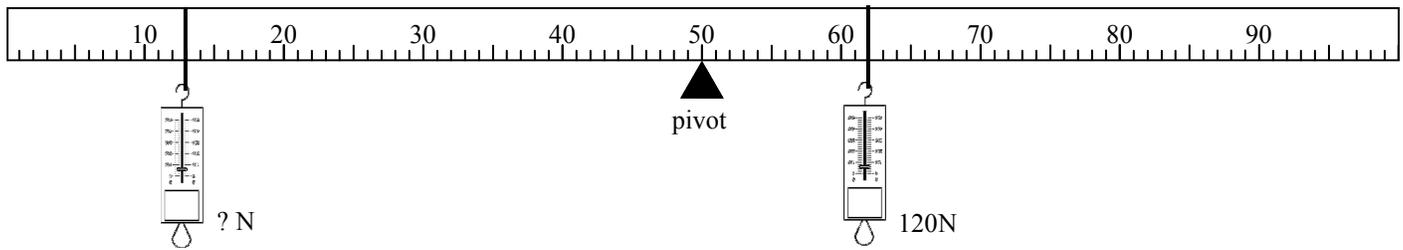
From the "Gravity" notes:



5. For the two objects at the left, what would be "r" in the gravity equation?
6. A 50 kg object is on Mercury ( $3.18 \times 10^{23}$  kg;  $r = 2.43 \times 10^6$  m).
  - A. What is its mass on Mercury?
  - B. What is its mass on the earth?
  - C. What is its weight on the earth?
  - D. At the right, calculate the object's weight on Mercury.
7. Does the force of gravity increase or decrease?
  - A. \_\_\_ If you increase the distance between the objects?
  - B. \_\_\_ If you decrease one of the masses?
8. If you need more help with the following, look at the table on the back of "Forces 5".
  - A. If you double the distance, by how much does the gravity change?
  - B. If you triple one of the masses, by how much does the gravity change?
  - C. If you cut the distance to 1/3, by how much does the gravity change?

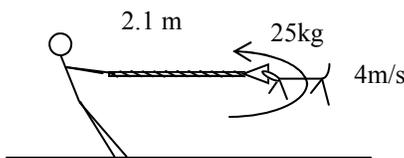


9. A mass is on a ramp. The force of friction is exactly the same as the force of gravity pulling it down the ramp.
  - A. Draw the force diagram for the block on the dot.
  - B. Since the forces are the same, it is at e \_\_\_\_\_.
  - C. Can the mass be accelerating?
  - D. Is the mass at rest?
10.
  - A. What is the normal force acting on the object?
  - B. How do static and kinetic friction compare?
  - C. Will this object start to move?
  - D. Why?
  - E. Calculate its acceleration.
11.
  - A. What is inertia?
  - B. What affects an object's inertia?
12. (From the bottom of the normal force notes) Why do we lighter as an elevator accelerates down?



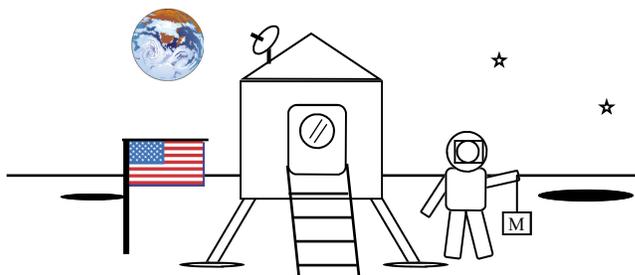
13. Two forces pull on a meter stick at different places, causing the meter stick stays level.
- Which force is greater: left or right?
  - Which force is at the greater distance?
  - Which force gives the greater torque?
  - Where are all distances measured from?
  - Calculate the force pulling on the left.
14. Give three things or situations in which you use a torque around the house. (*No not use the car, bolts, or screws.*)

15. 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.

- E. Calculate the force keeping Bim in the circle.



16. Slim Jim is also an astronaut. The acceleration due to gravity on the moon is  $1.63 \text{ m/s}^2$ . Jim is lifting a 18 kg object from the ground with a rope.

- What is the weight of the object on the moon?
- Draw a force body diagram (FBD) for the mass (below the picture).
- If Jim can pull upward with a force of 450N, calculate the acceleration of the mass.