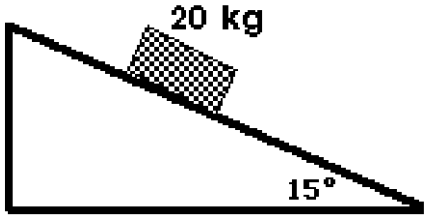
Name_____

Date _____ **Pd**____

UNIT III: Worksheet 3

1. A 20 kg mass is allowed to accelerate down a *frictionless* 15° ramp.

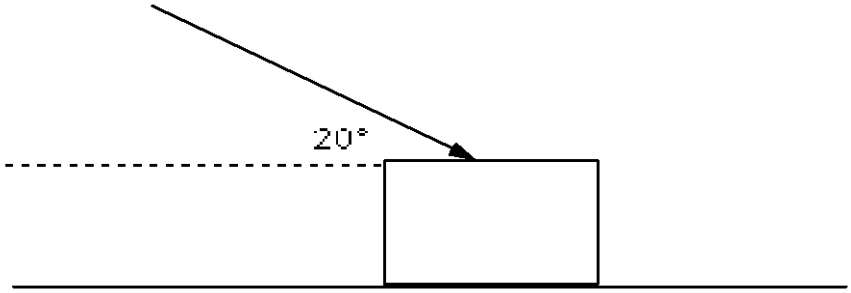


   a. Draw a force diagram for the block.
   b. Determine the value of the x-component of the force of gravity.

   c. Calculate the acceleration of the block.

   d. Calculate how long will it take for the block to slide 30.0m.

2. An applied 25 N force pushes on a 5.0 kg block resting on a *frictionless* horizontal surface. The force is directed downwards at an angle of 20°.



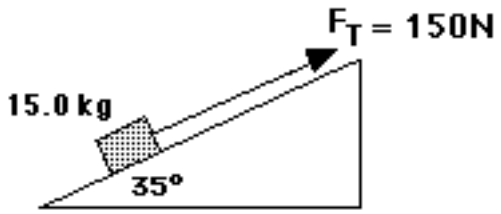
   a. Draw a force diagram for the block.

   b. Determine the x-component of the applied force.

   c. Calculate the acceleration of the block.

   d. Calculate the normal force on the block.

3. A block is being pulled up a ramp as shown in the diagram below. Assume that the ramp is *frictionless*.

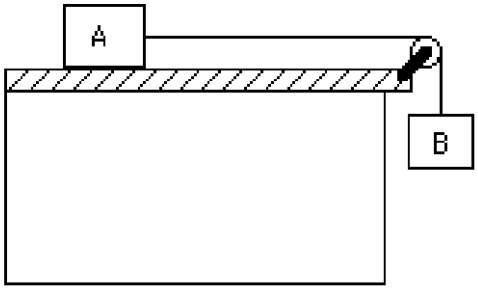


   a. Draw the force diagram for the block on the ramp.
   b. What is the x-component of the force of gravity acting on the block on the ramp?

   c. Calculate the acceleration of the block.

4. Repeat problem 3, except now, assume that the frictional force acting on the block on the ramp is 25.0 N.

5. A 20 kg block (A) rests on a frictionless table; a cord attached to the block extends horizontally to a pulley at the edge of the table. A 10 kg mass (B) hangs at the end of the cord.

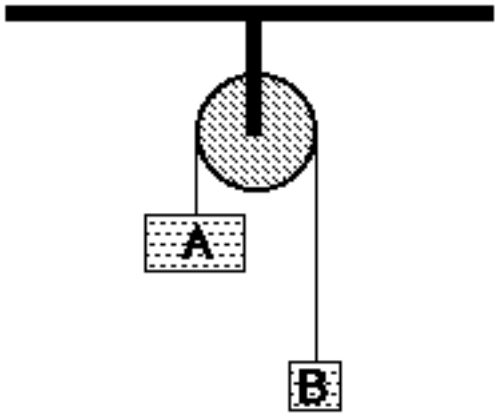


   a. Clearly draw and label the force vectors acting on each object.

   b. Calculate the acceleration of the block and mass.

   c. Calculate the tension in the cord.

6. Below is a picture of an Atwood's Machine: two masses attached to a frictionless, massless pulley. The mass of block A is 5.0 kg, and the mass of B is 2.0 kg.



a. Calculate the acceleration of the system when the blocks are released.

b. Calculate how long will it take for block A to fall 2.0 m.

c. The system is run, and the acceleration is measured with photogates. When measured, the acceleration is 5% less than calculated earlier. Student 1 states "Mass *B* must really be more than 2.0 kg based on these results." Student 2 states "No, I put Mass *B* on a balance, and it was exactly 2.0 kg. It must be a problem with mass *A*."

Which student(s) are talking about inertial mass and which student(s) are talking about gravitational mass? Explain.