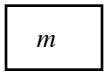
AP Physics 1
Force Practice Problems Test 5

1.) Two forces act upon an object with a mass of 25 kg which is on a smooth flat surface. The first force has a magnitude of 120 N and is directed towards the east. The second force has a magnitude of 70 N and is directed towards the west.

a.) Draw a force diagram for this situation.



b.) Write net force equations for the force diagram.

c.) Find the acceleration of the object..

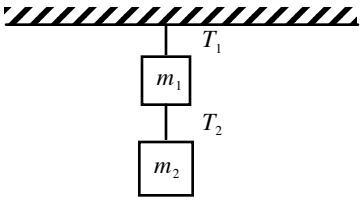
2.) Trouble has a mass of 6.5 kg.

a.) What is her weight on Earth?

b.) What is her weight on Mars, where the acceleration due to gravity is 3.8 m/s^2?

3.) The acceleration due to gravity on the moon is 1.62 m/s^2. If a person weighs 735 N on earth, what will the person's weight be on the moon?

4.)



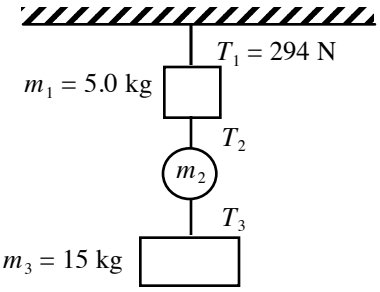
Two masses are suspended from the ceiling with pieces of cord of negligible mass.

a.) On the figures below show all forces acting on m_1 and m_2.

b.) Write net force equations for each mass.

c.) If m_1 = 5.0 kg and m_2 = 8.0 kg, find the tensions in the cords.

5.)



Three objects are hanging from the ceiling with pieces of cord of negligible mass. The tension in the top cord is 294 N.

a.) On the figures below show all forces acting on m_1, m_2, and m_3.

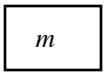
b.) Write net force equations for each object.

c.) Find the tensions T_2 and T_3, and the mass m_2.

6.) Rat stands on a scale in an elevator at rest on the 13th floor of a downtown Austin building. The scale reads 54.0 N.

a.) What is Rat's mass?

b.) On the figure below show all forces acting on Rat.



c.) Write net force equation(s) if the elevator is accelerating upward.

d.) As the elevator moves up, the scale reading increases to 60.0 N, then decreases back to 54.0 N. Find the acceleration of the elevator.

e.) As the elevator approaches the 22nd floor, the scale reading drops as low as 43.0 N. What is the acceleration of the elevator?

f.) What does the scale read if the elevator is accelerating upward at 3.0 m/s^2?

g.) What does the scale read if the elevator is accelerating downward at 2.5 m/s^2?

h.) Before Rat gets out of the elevator the cable breaks (Rat is still on the scale) and the elevator begins to fall freely. What does the scale read during the free fall of the elevator?

7.) A sled of mass 50 kg is pulled with a force horizontal to the ground along snow covered, flat ground. The static friction coefficient is 0.30, and the kinetic friction coefficient is 0.10.

a.) On the figure below show all of the forces acting on the sled.

b.) Write net force equations for the sled.

c.) What force is needed to start the sled moving?

d.) What force is needed to keep the sled moving at a constant velocity of 2.0 m/s?

e.) Once moving, what total force must be applied to the sled to accelerate it 3.0 m/s^2

8.) A horizontal force of 40 N accelerates a 5.0 kg block at 6.0 m/s^2 along a horizontal surface.

a.) On the figure below show all of the forces acting on the block.

b.) Write net force equations for the block.

c.) How large is the frictional force?

d.) What is the coefficient of kinetic friction?

9.) Rat uses a horizontal force of 30.0 N to slide a 12.0 kg wooden crate across the floor.

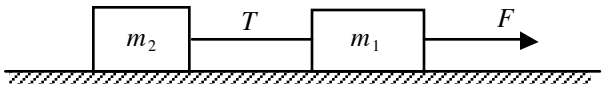
a.) On the figure below show all of the forces acting on the crate.

b.) Write net force equations for the block.

c.) How large is the frictional force if the crate moves with a constant velocity of 1.2 m/s?

d.) What is the acceleration of the crate if Rat increases her force to 48 N?

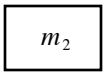
For Problems 10 through 12 refer to figure below;

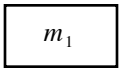


$m_1 = 8.0$ kg
$m_2 = 4.0$ kg

10.) A 48 N force is applied to two boxes that are connected by a cord of negligible mass. The blocks are sliding on a frictionless surface.

a.) On the figures below show all of the forces acting on each box.



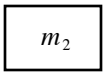


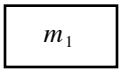
b.) Write net force equations for each box.

c.) Find the acceleration of each box and the tension *T* in the cord connecting the two boxes.

11.) The coefficient kinetic friction between the boxes and the floor is 0.25 and a force of 48 N is applied to the 8.0 kg mass.

a.) On the figures below show all of the forces acting on each box.

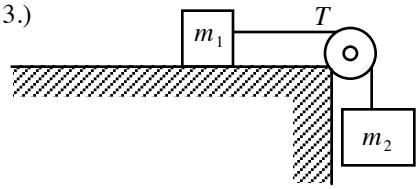




b.) Write net force equations for each box.

c.) Find the acceleration of each box and the tension *T* in the cord connecting the two boxes.

12.) If the coefficient static friction between the boxes and the floor is 0.35. What is the minimum force F required to just cause the boxes to move?

13.) 

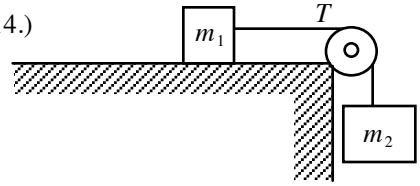
In the figure to the left, m_1 = 15 kg and m_2 = 10 kg. Assume that the pulley and cord have negligible mass and all surfaces are frictionless.

a.) Draw force diagrams for m_1 and m_2.

b.) Write net force equations for both masses.

m_1 m_2

c.) Find the acceleration of the system and the tension T in the cord.

14.) 

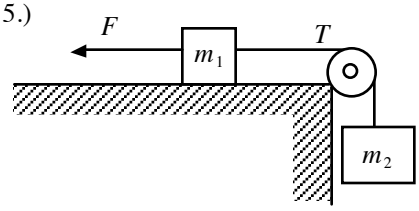
In the figure to the left, m_1 = 35 kg and m_2 = 25 kg. Assume that the pulley and cord have negligible mass and the coefficient of kinetic friction between the surface and m_1 is 0.25.

a.) Draw force diagrams for m_1 and m_2.

b.) Write net force equations for both masses.

m_1 m_2

c.) Find the acceleration of the system and the tension T in the cord.

15.) 

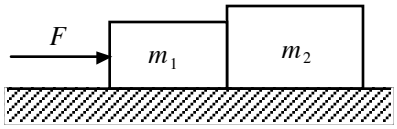
In the figure to the left m_1 = 35 kg and m_2 = 25 kg. The coefficient of kinetic friction is 0.15 between m_1 and the surface. A force F = 600 N is applied to m_1 causing it to accelerate to the left.

a.) Draw force diagrams for m_1 and m_2.

b.) Write net force equations for both masses.

m_1 m_2

c.) Find the acceleration of the system and the tension T in the cord.

16.) 

Two blocks are accelerated across a rough horizontal surface by a force applied to one of the blocks as shown in the figure to the left. The coefficient of static friction is 0.30 and the coefficient of kinetic friction is 0.20 between the blocks and the surface. m_1 = 5.0 kg and m_2 = 8.0 kg. A force F = 80 N is being applied to the smaller block.

a.) Draw force diagrams for both blocks.

b.) Write net force equations for both masses.

m_1 m_2

b.) What is the acceleration of the blocks and the force exerted on the larger block by the smaller block?