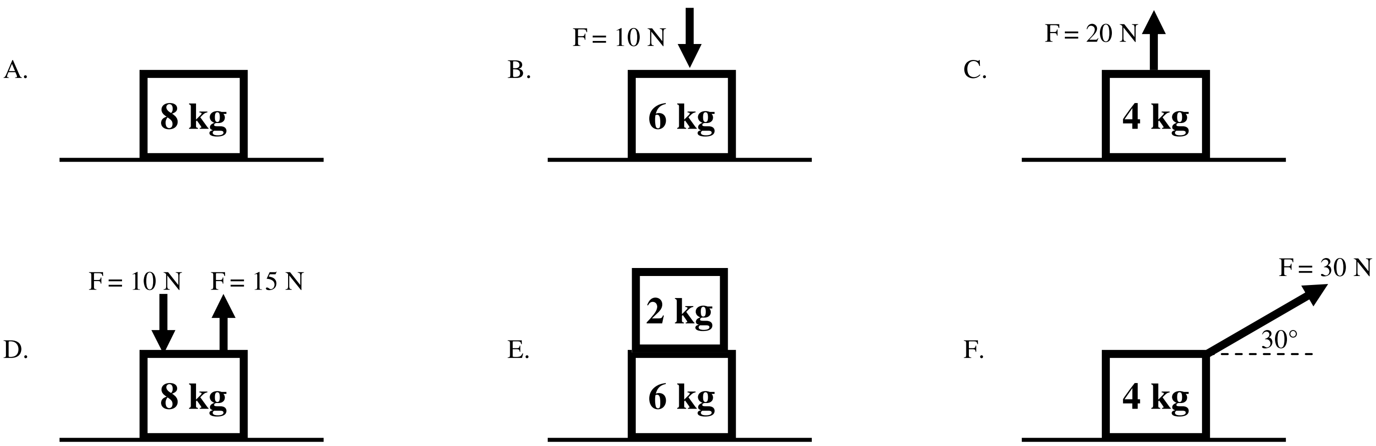
A-Day: Due Wed., 10/21
B-Day: Due Thurs., 10/22

2009 PreAP Forces 2

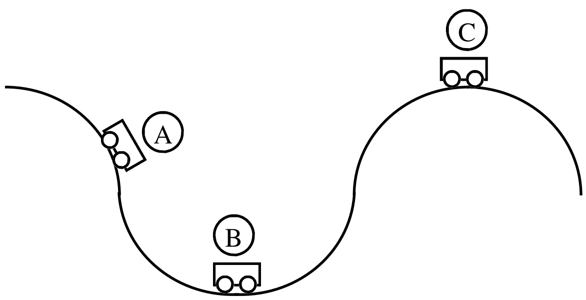
Notes you will need: "Normal Force"; "Surface Friction"; "Newton's Second Law".

1. Calculate the normal force on each of the objects below.



2. On letter D above, if $\mu_s = 0.24$ and $\mu_k = 0.10$,
   A. Calculate both frictions on the 8 kg object.

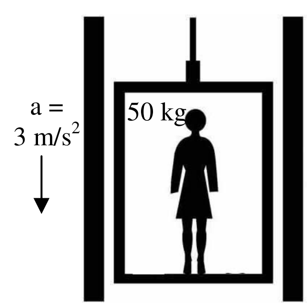
3. Heavier, lighter, or same as normal weight?
   A. ____When an elevator starts moving up?
   B. ____When an elevator is between floors?
   C. ____When an elevator is stopping while moving up?
   D. ____When an elevator starts down?
   E. ___When an elevator is stopping while moving down?



4. The diagram above shows a cart on a roller coaster.
   A. ____At which position do you feel heavier?
   B. ____At which position do you feel lighter?
   C. ____At which position does the track have to push harder on the cart?
   D. ____Where is the greatest normal force acting on the object?

5. A 50 kg person is in an elevator. The elevator accelerates up at 3 m/s^2.
   A. Find the normal force on the person.

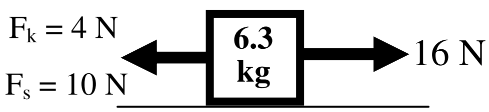
   B. How heavy do they "seem"?



More on Back

6. Static or Kinetic Friction?

A. _____ Usually the smaller one.
B. _____ If this is greater than the applied force, the object will slow down and eventually stop.
C. _____ Between your shoes and the ground when you are walking normally.
D. _____ Use to calculate acceleration.
E. _____ When you are going down a slide.
F. _____ How much force is needed to keep an object sliding.
G. _____ When a car "loses traction".
H. _____ Only exists when the object is not moving.
I. _____ Maximum friction before an object slides.



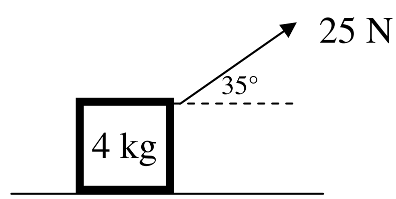
7. For the mass at the left:
A. How much force is necessary to keep this object moving?
B. How much force is necessary to start this object sliding?
C. If this object starts at rest, will this object slide?
D. Find the acceleration of the object.

E. Find the normal force on the object.

F. Work backwards to find μ_s and μ_k.

8. For the 4 kg object at the right.
A. Since the 25 N force is pulling up (above the horizon), does it increase or decrease the normal force?

B. Calculate the normal force on the object.



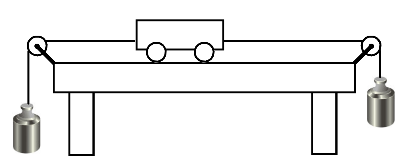
B. If μ_s = 0.35 and μ_k= 0.2, find Fs and Fk.

C. How much force is pulling to the right?

D. Will the object slide? (*Prove it.)*

E. If it does slide find its acceleration.

9. The cart at the right has two equal masses pulling on it.
A. Does the cart have to be at rest?
B. Could the cart be accelerating?
C. Does the cart have balanced or unbalanced forces acting on it?
D. Therefore, the velocity has to be:
E. Is it at equilibrium or not?



10. Tell me everything you know about objects at equilibrium. (v, a, direction, forces, Δv…)

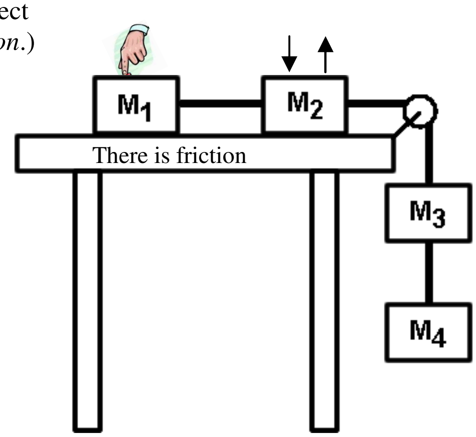
11. A 15 kg object is floating in space. Calculate its mass.

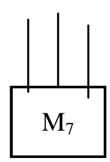
12. A 28 N object is sitting on a desk. Calculate its weight.

From the notes: "Newton's Second Law" [*study help available*]. *Look at the pictures below. You have to identify the forces acting on each object. Take Mass 5 for example. In the y-direction (vertical) the arrow shows a force pulling up (F). Even though they are not drawn, you know that weight is pulling down (F_W) and normal force is pushing up (F_N) [it is on a surface]. So the $\Sigma F_y = ma$ becomes: $F - F_W + F_N = ma$. In the x-direction there is no friction, so the only horizontal force acting on the object is tension (there is a rope), so $\Sigma F_x = ma$ becomes: $T = ma$.*

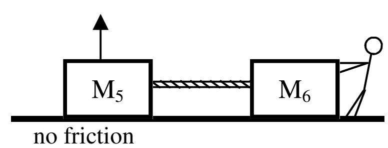
13. Match the following Newton's Second Law equations with the correct mass at the right. (*Hint: draw the forces on each object; F_f is friction*.)

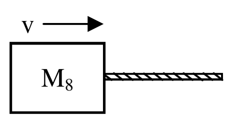
   A. ______ $T = ma$
   B. ______ $T - T - F_W = ma$
   C. ______ $F_N - F - F_W = ma$
   D. ______ $T - F_f = ma$
   E. ______ $F_N + F - F_W = ma$
   F. ______ $F_N + F - F - F_W = ma$
   G. ______ $T - F_f = 0$
   H. ______ $T - T - F_f = ma$
   I. ______ $F_W = ma$
   J. ______ $T - F_W = ma$
   K. ______ $F_N - F_W = ma$
   L. ______ $F - T = ma$





Falling in a vacuum





At constant speed, with friction.

