Momentum 4

1. m_1	A. Velocity of two objects after they collide and stick together.
2. m_2	
3. m_{1+2}	B. Mass of the first object
4. v_{i1}	C. Velocity of the first object before.
5. v_{f1}	D. Mass of the second object
6. v_{i2}	E. Two objects stuck together.
7. v_{f2}	F. Initial velocity of the second object.
8. v_{f1+2}	G. Final velocity of the first object.
	H. Velocity of the second object after.

9) A dump truck full of sand is traveling down a highway.
A) How does the momentum change if it speeds up?

B) How does the momentum change if sand leaks out of the back, but the truck keeps at constant speed?

10) If you jump from the top of a ladder to the ground. You could land with your legs stiff or relaxed.
A) In which case is your Δp greater?
B) In which case is the impulse greater?
C) In which case are you more likely to be hurt?
D) Why?

11) A ball going 4 m/s hits a wall and rebounds (going the opposite direction). Afterward it is going 2 m/s. Find Δp.

12) A person pulls with 54 N to the **right** on a 3 kg object initially going 20 m/s to the **left**. If he pulls for 10 seconds, find the object's final velocity.

13) Tanner is standing in a 135 kg boat (not very smart, huh?!). Both are at rest. If Tanner moves to the right at 3 m/s, and has 70 kg of mass, find the boat's velocity.

14) A 10 kg object going 4 m/s to the right collides with a 6 kg object going 5 m/s to the left. After the collision the 6 kg object is going 6 m/s to the right. If they do not stick together, find the final velocity of the 10 kg object.

15) An 8 kg object is moving at 4 m/s to the right. It explodes into 4 pieces. After the explosion a 1 kg piece is going 8 m/s up, a 2 kg piece is moving down, a 3 kg piece is going 6.7 m/s to the right, and the 4th piece is going to the left.
(Follow the steps from class exactly and it's pretty easy.)
A) What is the mass of the 4th piece?

B) Find the velocity of the piece going down.

C) Find the velocity of the piece going left.

16) In perfectly elastic collisions kinetic energy is conserved and the colliding objects do not stick together.
Write the equation for a perfectly elastic collision between two objects: m_1 and m_2. (Use the subscripts in the matching.)

17) A 3 kg object stops due to friction. If the frictional force is 4 N and acts for 10 m, find how fast the object was going before? (Hint: review question.)

18) Review: A 40 kg object is on a 30° ramp. Find the normal force acting on the object.

19) What kind of symbiosis?
   A. Mistletoe living on a tree. The tree lives, but is weakened by the mistletoe feeding off of it.
   B. A lion eating a gazelle.
   C. Humans living with dogs. Humans get companionship and protection; dogs are fed and housed.
   D. A bird living in a tree. The bird gets shelter, the tree could care less.

20) Give an element that has similar reactivity with the following:
   A. Magnesium:
   B. Helium:
   D. Oxygen:

21) What are the charges of the following?
   A. An electron:
   B. A proton:
   C. A neutron:
   D. An atom that gives up 2 electrons:
   E. An atom that gains 4 electrons: