Name: _____

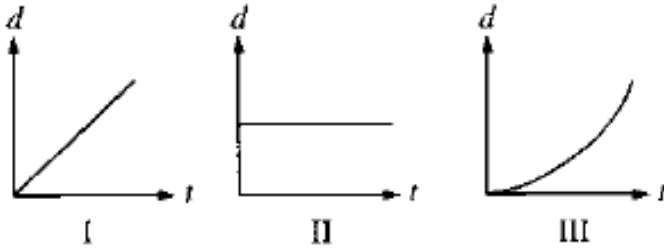
AP Physics I: Impulse, Momentum, & Collisions
Impulse, Momentum, & Conservation of Momentum HW

Conceptual Questions:

1. How does an air mattress or landing pad protect a stunt person landing on the ground after a stunt?

2. An astronaut is out on a spacewalk with a camera taking pictures of the Earth. She finds her tether has become unfastened and she is drifting away from the shuttle. With no propulsion device, what could she do to start moving back towards the shuttle? (Consider, there is no air in space, so swimming in the air won't work)

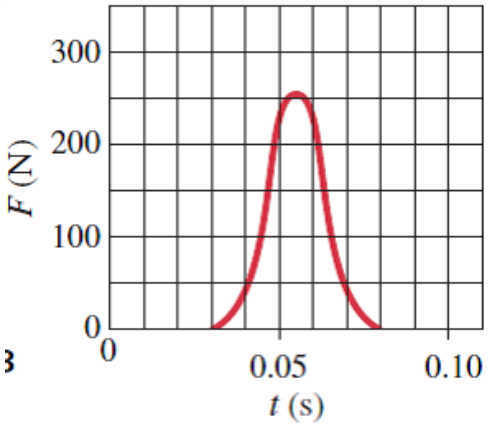
3. Three objects can only move along a straight, level path. The graphs below show the position d of each of the objects plotted as a function of time t .



The magnitude of the momentum of the object is increasing in which of the cases?
   A. II only
   B. III only
   C. I and II only
   D. I and III only

The sum of the forces on the object is zero in which of the cases?
   A. II only
   B. III only
   C. I and II only
   D. I and III only

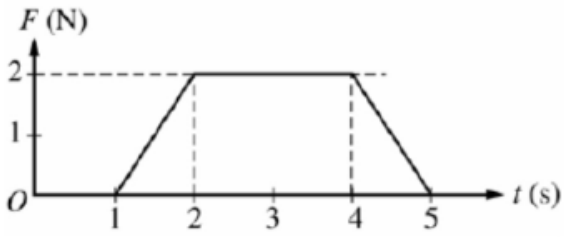
4. A positive force acting on a racketball (mass = 0.060 kg) is shown in the figure to the right as a function of time. Show your work to justify your answers for the following.
   A. What is the total impulse given to the ball?
   B. What is the velocity of the ball after being hit if it began close to a resting position?



Mathematical Questions

5. A 50 kg skater at rest on a frictionless rink throws a 2 kg ball, giving the ball a velocity of 10 m/s. What is the velocity of the skater?

6. A 2 kg object initially at rest is subjected to a force of magnitude F in the direction of motion. A graph of F as a function of time t is shown. What is the increase, if any, in the velocity of the object during the time the force is applied?



7. A 25.0 g BB pellet is traveling 230.0 m/s when is encounters a giant stationary mold of jello (mass = 2.00 kg, yes, that's a lot of jello). The BB passes straight through the jello and continues on but with a velocity of 170.0 m/s. What is the velocity of the jello after the BB passes through?

8. A 4.00 kg ball is initially moving 10.0 m/s to the right when it strikes a 6.00 kg ball that is initially at rest. The two collide in an **elastic** collision. Determine the final velocities of the two balls.