

**Part 1: Circle or calculate the best answer for the following questions. Check your work with the answers.**

1. Which object has the least momentum?

Object A:  $m = 1 \text{ kg}$ ,  $v = 100 \text{ m/s}$   
Object B:  $m = 10 \text{ kg}$ ,  $v = 12 \text{ m/s}$   
Object C:  $m = 0.5 \text{ kg}$ ,  $v = 1000 \text{ m/s}$   
Object D:  $m = 100 \text{ kg}$ ,  $v = 2 \text{ m/s}$

2. If a 54 Ns impulse (recall, impulse is force\*time, so it is measured in Newtons\*seconds) is given to a 6-kg object, then the transfer of momentum is

- a. 6 Ns
- b. 9 Ns
- c. 54 Ns
- d. 324 Ns

3. Which quantities do not occur in equal and opposite pairs when two objects interact?

- a. impulses
- b. forces
- c. accelerations
- d. transfers of momentum

4. A firecracker is placed in the midst of a motionless cluster of billiard balls on a table. When the firecracker explodes, the balls scatter in all directions. The total momentum of the balls immediately after the explosion is

- a. more than before the explosion.
- b. less than before the explosion.
- c. the same as before the explosion.
- d. impossible to tell.

5. Alice and Bob are of equal mass (60kg). Alice has a momentum of 60 kg\*m/s. Bob is at rest. Alice runs into Bob and stops, while Bob starts moving.

a. What is Alice's momentum after the collision?

b. What is Bob's momentum after the collision?

c. How fast is Bob's moving after the collision?