Momentum, Impulse and Momentum Change

Read from **Lesson 1** of the **Momentum and Collisions** chapter at **The Physics Classroom**:

http://www.physicsclassroom.com/Class/momentum/u4l1a.html
http://www.physicsclassroom.com/Class/momentum/u4l1b.html

MOP Connection: Momentum and Collisions: sublevels 1 and 2

Momentum

1. The momentum of an object depends upon the object's _____. Pick two quantities.
   a. mass - how much *stuff* it has
   b. acceleration - the rate at which *the stuff* changes its velocity
   c. weight - the force by which gravity attracts *the stuff* to Earth
   d. velocity - how fast and in what direction it's *stuff* is moving
   e. position - where the *stuff* is at

2. Momentum is a _____ quantity.
   a. scalar b. vector

3. Which are **complete** descriptions of the momentum of an object? Circle all that apply.
   a. 2.0 kg/s b. 7.2 kg•m/s, right c. 6.1 kg•m/s^2, down
   d. 4.2 m/s, east e. 1.9 kg•m/s, west f. 2.3 kg•m/s

4. The two quantities needed to calculate an object's momentum are _____ and _____.

5. Consider the mass and velocity values of Objects A and B below. Compared to Object B, Object A has ____ momentum.
   a. two times the b. four times the
   c. eight times the d. the same
   e. one-half the f. one-fourth the
   g. ... impossible to tell without knowledge of the F and a.

6. Calculate the momentum value of ... . (Include appropriate units on your answers.)
   a. ... a 2.0-kg brick moving through the air at 12 m/s.

   b. ... a 3.5-kg wagon moving along the sidewalk at 1.2 m/s.

7. With what velocity must a 0.53-kg softball be moving to equal the momentum of a 0.31-kg baseball moving at 21 m/s?

Impulse and Momentum Change

8. Insert these words into the four blanks of the sentence: **mass**, **momentum**, **acceleration**, **time**, **impact**, **weight**, **impulse**, and **force**. (Not every word will be used.)

   In a collision, an object experiences a(n) _____ acting for a certain amount of _____ and which is known as a(n) _____ ; it serves to change the _____ of the object.

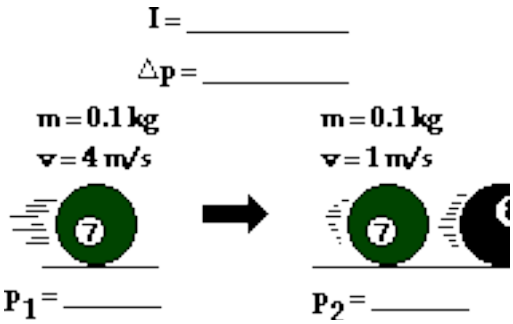
9. A(n) _____ causes and is equal to a change in momentum.
   a. force b. impact c. impulse d. collision

10. Calculate the impulse experienced by .... . (Show appropriate units on your answer.)
    a. ... a 65.8-kg halfback encountering a force of 1025 N for 0.350 seconds.

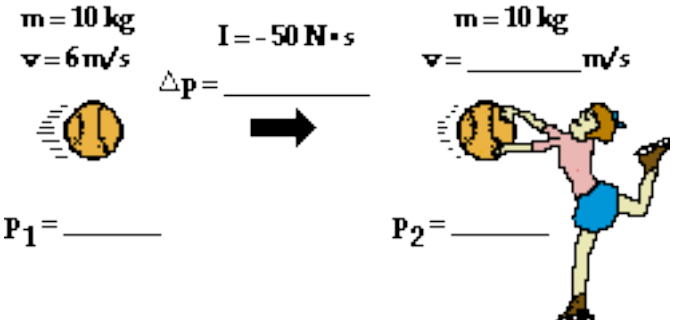
    b. ... a 0.168-kg tennis ball encountering a force of 126 N that changes its velocity by 61.8 m/s.

11. Determine the impulse (**I**), momentum change (**Δp**), momentum (**p**) and other values.

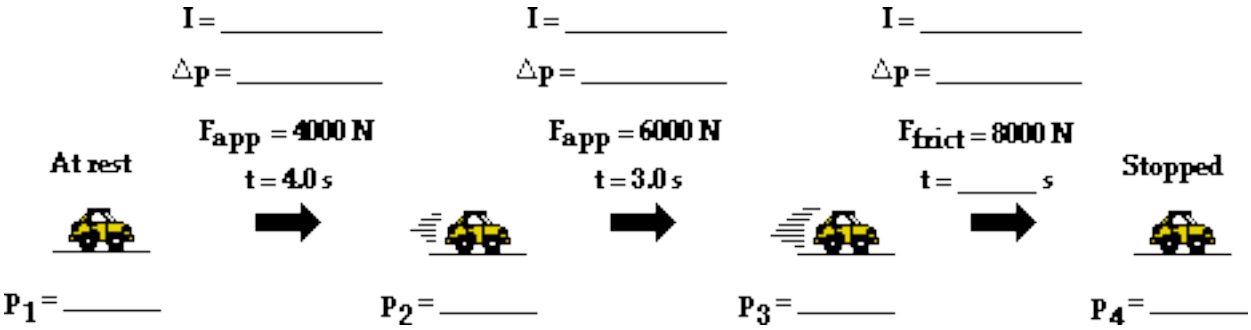
A 7-ball collides with the 8-ball.



A moving medicine ball is caught by a girl on ice skates.



A car is at rest when it experiences a forward propulsion force to set it in motion. It then experiences a second forward propulsion force to speed it up even more. Finally, it brakes to a stop.



A tennis ball is at rest when it experiences a forward force to set it in motion. It then strikes a wall where it encounters a force that slows it down and finally turns it around and sends it backwards.