

Momentum, Impulse and Momentum Change

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

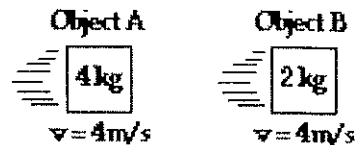
<http://www.physicsclassroom.com/Class/momentum/u4l1a.html>

<http://www.physicsclassroom.com/Class/momentum/u4l1b.html>

MOP Connection: Momentum and Collisions: sublevels 1 and 2

Momentum

- The momentum of an object depends upon the object's _____. Pick two quantities.
 - mass - how much *stuff* it has
 - acceleration - the rate at which *the stuff* changes its velocity
 - weight - the force by which gravity attracts *the stuff* to Earth
 - velocity - how fast and in what direction it's *stuff* is moving
 - position - where the *stuff* is at
- Momentum is a _____ quantity.
 - scalar
 - vector
- Which are **complete** descriptions of the momentum of an object? Circle all that apply.
 - 2.0 kg/s
 - 7.2 kg•m/s, right
 - 6.1 kg•m/s², down
 - 4.2 m/s, east
 - 1.9 kg•m/s, west
 - 2.3 kg•m/s
- The two quantities needed to calculate an object's momentum are _____ and _____.
- Consider the mass and velocity values of Objects A and B below. Compared to Object B, Object A has _____ momentum.
 - two times the
 - four times the
 - eight times the
 - the same
 - one-half the
 - one-fourth the
 - ... impossible to tell without knowledge of the F and a.
- Calculate the momentum value of ... (Include appropriate units on your answers.)
 - ... 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.

- 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

- 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.



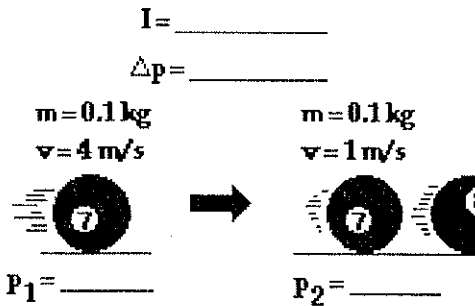
Momentum and Collisions

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.

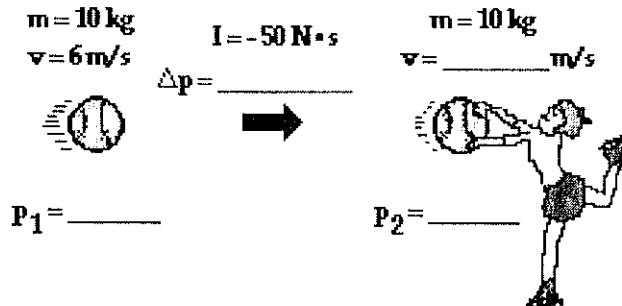
b. ... a 0.168-kg tennis ball encountering a force of 126 N that changes its velocity by 61.8 m/s.

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

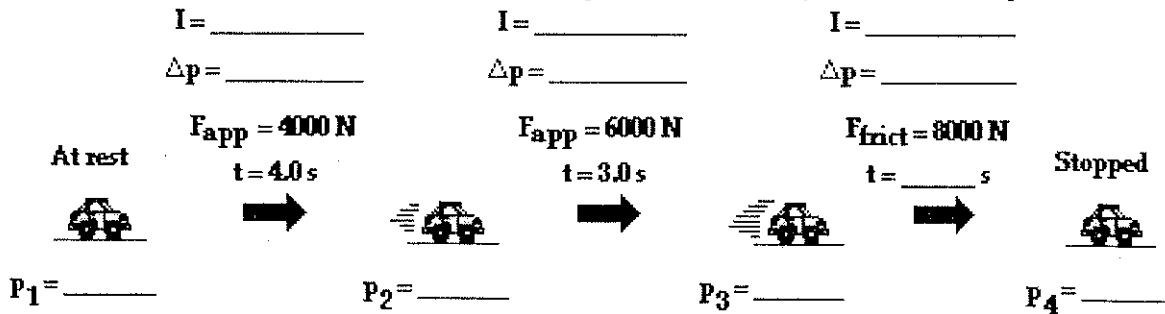
A 7-ball collides with the 8-ball.



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.

