Our goals in our study of Conservation of Momentum (which includes Chapter 9 – Momentum and the associated lecture, lab, problem session, and problem set) are to be able to:

1. State and recognize the Impulse-Momentum Theorem, explain its connection to Newton's Second Law, and be able to use it qualitatively.

2. Calculate the linear momentum $\vec{p}$ of an object in terms of its mass m and its velocity $\vec{v}$, recognizing that $\vec{p}$ is a vector quantity. Also calculate the total momentum $\vec{P}$ for a system of objects.

3. State and recognize the conditions under which conservation of linear momentum applies, paying attention to choice of system.

4. Apply conservation of linear momentum to various isolated systems, including explosions and collisions in one or two dimensions.

5. Calculate the angular momentum $\vec{L}$ of an object in terms of its moment of inertia I and its angular velocity $\vec{\omega}$, recognizing that angular momentum is a vector quantity. Also calculate the total angular momentum for a system of objects.

6. State and recognize the conditions under which conservation of angular momentum applies, paying attention to choice of system.

7. Apply conservation of angular momentum to various isolated systems, including collisions or change of shape.

Reading Assignment
Ch. 9: Momentum
Complete "Things That Go Bump…" from the Week 1 lab
Review your notes from Stations III, IV, and V from the Week 1 lab

Problem Set
Chapter 9
Student Workbook: 2, 12, 14, 19, 21
Conceptual/Multiple Choice: 5, 8, 11, 16, 18, 25
Problems: 13, 16, 19, 25, 26, 29, 58, 67, 35, 72, 74, 75

A2: Harry and Hermione are playing in the GraviFree Room at Hogwart's. Harry (mass 55 kg) is floating motionless in the center of the room. Hermione (mass 45 kg) pushes off from the wall and approaches Harry at a speed of 6.0 m/s. Neglect air resistance in this problem.
a) As Hermione moves past Harry, he reaches out and grabs her outstretched hand, holding on tightly. Show that the speed with which Hermione and Harry move after they grab hold of each other is 2.7 m/s.
b) Harry and Hermione notice Ron giving them a funny look. They just simply stop holding hands - they don't push each other but just let go. Explain why the speed with which Harry and Hermione each move after they let go is still 2.7 m/s.