

# PH201 Reading

## Chapter 9: Momentum

We start to add conservation laws to our toolbox to solve physics problems. The initial 7 weeks we studied and predicted how systems move, and why they move. We learned about acceleration and forces, and how the sum of all forces on a body (the net force) result in acceleration and therefore in the change of the velocity of bodies. Now we look at quantities that are conserved. We will start learning about impulse and momentum and will see that momentum is conserved if two or more objects interact only with each other and no other outside object. We carefully need to make sure in these problems that we really include all objects involved.

To be ready for class, explore concepts associated with momentum and impulse of chapter 9 in your textbook. While reading the chapter carefully answer the “Stop to think” questions. Good guidance are always the conceptual questions at the end of the chapter and the Multiple Choice questions. For this class you should be able to answer the conceptual questions 1-14 and 19-25.

### Student Learning Objectives

In covering the material of this chapter, students will learn to

- Communicate and apply the concept of impulse, and to be able to calculate impulse as the area under a force-time curve.
- Find the momentum of an object in terms of its mass and velocity, and describe that momentum is a vector quantity.
- Understand the relationship between the impulse imparted to an object and the change in that object’s momentum; this is the impulse-momentum theorem.
- Understand and apply the law of conservation of momentum, that is, that the total momentum of an isolated system is the same before and after an interaction.
- Apply the concept of angular momentum and its conservation, and to understand the close similarity of these ideas with those of linear momentum.

### Some questions that successful students can answer after reading the text

What is Impulse?

Impulse is the area under what curve?

How is the net force related to the change of the momentum in a system?

How is momentum related to impulse?

What are the units of momentum?

Under what circumstances is the momentum of a system of particles conserved?

What is an objects angular momentum proportional to?