Introduction: Special Relativity

Unit: Special Relativity

Topics covered in this chapter:

This chapter describes changes to the properties of objects when they are moving at speeds near the speed of light.

- *Relative Motion* and *Relative Velocities* describes relationships between objects that are moving with different velocities.
- *Speed of Light* describes some familiar assumptions we have about our universe that do not apply at speeds near the speed of light.
- *Length Contraction & Time Dilation* and the *Energy-Momentum Relation* describe calculations involving changes in the length, time, mass, and momentum of objects as their speeds approach the speed of light.

New challenges in this chapter involve determining and understanding the changing relationships between two objects, both of which are moving in different directions and at different speeds.

Textbook:

- *Physics Fundamentals* Ch. 27: Relativity (pp. 765–797)

Standards addressed in this chapter:

Massachusetts Curriculum Frameworks (2016):

No MA curriculum frameworks are addressed in this chapter.

Use this space for summary and/or additional notes:

AP® only

AP® Physics 2 Learning Objectives:

1.D.3.1: The student is able to articulate the reasons that classical mechanics must be replaced by special relativity to describe the experimental results and theoretical predictions that show that the properties of space and time are not absolute. [Students will be expected to recognize situations in which nonrelativistic classical physics breaks down and to explain how relativity addresses that breakdown, but students will not be expected to know in which of two reference frames a given series of events corresponds to a greater or lesser time interval, or a greater or lesser spatial distance; they will just need to know that observers in the two reference frames can "disagree" about some time and distance intervals.] [**SP 6.3**, **7.1**]

Topics from this chapter assessed on the SAT Physics Subject Test:

- **Relativity**, such as time dilation, length contraction, and mass-energy equivalence.

1. Special Relativity

Skills learned & applied in this chapter:

- keeping track of the changing relationships between two objects

Use this space for summary and/or additional notes: