**Honors Physics Learning Standards – Trimester 1\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

The standards are listed here, but they are also listed within the textbook. At the beginning of each section are the 'Section Objectives' which are the standards the students will be mastering. The standards listed here are prefixed by a set of numbers. The first number corresponds to the chapter, the second corresponds to the section, and the third is the standard number. So for example, 2-2.3 represents the third standard from section 2 of chapter 2.

Lab Standards

Lab1 Create and populate data tables for a lab activity.

Lab2 Take measurements of variables in the laboratory with minimum error.

Lab3 Create graphs from data measured in a lab activity.

Lab4 Use graphs of data measured in a lab activity to perform an analysis of data collected.

Lab5 Draw complete and logical conclusions from the results of data analysis performed for a lab activity.

Lab6 Design the procedure for a lab activity, including identifying variables to be measured and possible analyses to be performed.

Lab7 Keep a clean and organized lab notebook, understanding the importance of scientific records.

Life Skills

Life1 Stays focused and actively engaged in class activities and discussions as well as seat work and individual activities.

Life2 Takes turns talking, makes appropriate comments, and avoids distracting others.

Life3 Comes to class prepared.

Life4 Completes and hands in work on time. Promptly arranges for and completes work after an absence.

Life5 Listens attentively and follows classroom rules and procedures.

Life6 Shows respect for self, other, and property.

Life7 Takes an active role in the group and stays on task.

Life8 Cooperates and helps create a positive group environment.

Chapter 1 The Science of Physics

1-2.1 List basic SI units and the quantities they describe.

1-2.2 Convert measurements into scientific notation.

1-2.3 Distinguish between accuracy and precision.

1-2.4 Use significant figures in measurements and calculations.

1-3.1 Interpret data in tables and graphs, and recognize equations that summarize data.

1-3.2 Distinguish between conventions for abbreviating units and quantities.

1-3.3 Use dimensional analysis to check the validity of equations.

Chapter 2 Motion in One Dimension

2-1.1 Describe motion in terms of frame of reference, displacement, time, and velocity.

2-1.2 Calculate the displacement of an object traveling at a known velocity for a specific time interval.

2-1.3 Construct and interpret graphs of position versus time.

2-2.1 Describe motion in terms of changing velocity.

2-2.2 Compare graphical representations of accelerated and non-accelerated motions.

2-2.3 Apply kinematic equations to calculate distance, time, or velocity under conditions of constant acceleration.

2-3.1 Relate the motion of a freely falling body to motion with constant acceleration.

2-3.2 Calculate displacement, velocity, and time at various points in the motion of a freely falling object.

2-3.3 Compare the motions of different objects in free fall.

Chapter 3 Two-Dimensional Motion and Vectors

3-1.1 Distinguish between a scalar and a vector.

3-1.2 Add and subtract vectors by using the graphical method.

3-1.3 Multiply and divide vectors by scalars.

3-2.1 Identify appropriate coordinate systems for solving problems with vectors.

3-2.2 Apply the Pythagorean theorem and tangent function to calculate the magnitude and direction of a resultant vector.

3-2.3 Resolve vectors into components using the sine and cosine functions.

3-2.4 Add vectors that are not perpendicular.

3-3.1 Recognize examples of projectile motion.

3-3.2 Describe the path of a projectile as a parabola.

3-3.3 Resolve vectors into their components and apply the kinematic equations to solve problems involving projectile motion.

3-4.1 Describe situations in terms of frame of reference.

3-4.2 Solve problems involving relative velocity.

Chapter 4 Forces and the Laws of Motion

4-1.1 Describe how force affects the motion of an object.

4-1.2 Interpret and construct free-body diagrams.

4-2.1 Explain the relationship between the motion of an object and the net external force acting on the object.

4-2.2 Determine the net external force on an object.

4-2.3 Calculate the force required to bring an object into equilibrium.

4-3.1 Describe an object's acceleration in terms of its mass and the net force acting on it.

4-3.2 Predict the direction and magnitude of the acceleration caused by a known net force.

4-3.3 Identify action-reaction pairs.

4-4.1 Explain the difference between mass and weight.

4-4.2 Find the direction and magnitude of normal forces.

4-4.3 Describe air resistance as a form of friction.

4-4.4 Use coefficients of friction to calculate frictional force.

Chapter 5 Work and Energy

5-1.1 Recognize the difference between the scientific and ordinary definitions of work.

5-1.2 Define work by relating it to force and displacement.

5-1.3 Identify where work is being performed in a variety of situations.

5-1.4 Calculate the net work done when many forces are applied to an object.

5-2.1 Identify several forms of energy.

5-2.2 Calculate kinetic energy for an object.

5-2.3 Apply the work-kinetic energy theorem to solve problems.

5-2.4 Distinguish between kinetic and potential energy.

5-2.5 Classify different types of potential energy.

5-2.6 Calculate the potential energy associated with an object's position.

5-3.1 Identify situations in which conservation of mechanical energy is valid.

5-3.2 Recognize the forms that conserved energy can take.

5-3.3 Solve problems using conservation of mechanical energy.

5-4.1 Relate the concepts of energy, time, and power.

5-4.2 Calculate power in two different ways.

5-4.3 Explain the effect of machines on work and power.

Chapter 6 Momentum and Collisions

6-1.1 Compare the momentum of different moving objects.

6-1.2 Compare the momentum of the same object moving with different velocities.

6-1.3 Identify examples of change in the momentum of an object.

6-1.4 Describe changes in momentum in terms of force and time.

6-2.1 Describe the interaction between two objects in terms of the change in momentum of each object.

6-2.2 Compare the total momentum of two objects before and after they interact.

6-2.3 State the law of conservation of momentum.

6-2.4 Predict the final velocities of objects after collisions, given the initial velocities.

6-3.1 Identify different types of collisions.

6-3.2 Determine the changes in kinetic energy during perfectly inelastic collisions.

6-3.3 Compare conservation of momentum and conservation of kinetic energy in perfectly inelastic and elastic collisions.

6-3.4 Find the final velocity of an object in perfectly inelastic and elastic collisions.

Chapter 7 Circular Motion and Gravitation

7-1.1 Solve problems involving centripetal acceleration.

7-1.2 Solve problems involving centripetal force.

7-1.3 Explain how the apparent existence of an outward force in circular motion can be explained as inertia resisting the centripetal force.

7-2.1 Explain how Newton's law of universal gravitation accounts for various phenomena, including satellite and planetary orbits, falling objects, and the tides.

7-2.2 Apply Newton's law of universal gravitation to solve problems.

7-3.1 Describe Kepler's laws of planetary motion.

7-3.2 Relate Newton's mathematical analysis of gravitational force to the elliptical planetary orbits proposed by Kepler.

7-3.3 Solve problems involving orbital speed and period.

Chapter 9 Heat

9-1.1 Relate temperature to the kinetic energy of atoms and molecules.

9-1.2 Describe the changes in the temperatures of two objects reaching thermal equilibrium.

9-1.3 Identify the various temperature scales, and convert from one scale to another.

9-2.1 Explain heat as the energy transferred between substances that are at different temperatures.

9-2.2 Relate heat and temperature change on the macroscopic level to particle motion on the microscopic level.

9-2.3 Apply the principle of energy conservation to calculate changes in potential, kinetic, and internal energy.

9-3.1 Perform calculations with specific heat capacity.

9-3.2 Interpret the various sections of a heating curve.