Length	Objectives	Chapter(s)	Activities
Unit 1 3 days September	**P2.1A** Calculate the average speed of an object using the change of position and elapsed time. **P2.1B** Represent the velocities for linear and circular motion using motion diagrams (arrows on strobe pictures). **P2.1C** Create line graphs using measured values of position and elapsed time. **P2.1D** Describe and analyze the motion that a position-time graph represents, given the graph. **P2.1h** Identify the changes in speed and direction in everyday examples of circular (rotation and revolution), periodic, and projectile motions.	Chapter 1,2,4	Labs, test, HW
Unit 2 4 days September	**P2.1E** Describe and classify various motions in a plane as one dimensional, two dimensional, circular, or periodic. **P2.1F** Distinguish between rotation and revolution and describe and contrast the two speeds of an object like the Earth. **P2.1g** Solve problems involving average speed and constant acceleration in one dimension. **P2.2A** Distinguish between the variables of distance, displacement, speed, velocity, and acceleration. **P2.2B** Use the change of speed and elapsed time to calculate the average acceleration for linear motion. **P2.2C** Describe and analyze the motion that a velocity-time graph represents, given the graph. **P2.2e** Use the area under a velocity-time graph to calculate the distance traveled and the slope to calculate the acceleration. **P2.3a** Describe and compare the motion of an object using different reference frames.	Chapter 3	Labs, test, HW

Unit 3 5 days September	**P3.1A** Identify the force(s) acting between objects in "direct contact" or at a distance. **P3.1d** Identify the basic forces in everyday interactions. **P3.2A** Identify the magnitude and direction of everyday forces (e.g., wind, tension in ropes, pushes and pulls, weight). **P3.2C** Calculate the net force acting on an object. **P3.2d** Calculate all the forces on an object on an inclined plane and describe the object's motion based on the forces using free-body diagrams. **P3.4A** Predict the change in motion of an object acted on by several forces. **P3.4B** Identify forces acting on objects moving with constant velocity (e.g., cars on a highway). **P3.4C** Solve problems involving force, mass, and acceleration in linear motion (Newton's second law).	Chapter 4	Labs, test, HW, group project
Unit 4 8 days September-October	**P2.1h** Identify the changes in speed and direction in everyday examples of circular (rotation and revolution), periodic, and projectile motions. **P3.1A** Identify the force(s) acting between objects in "direct contact" or at a distance.	Chapter 5	Labs, test, HW
Unit 5 8 days October	**P2.2g** Apply the independence of the vertical and horizontal initial velocities to solve projectile motion problems. **P3.4e** Solve problems involving force, mass, and acceleration in two-dimensional projectile motion restricted to an initial horizontal velocity with no initial vertical velocity (e.g., a ball rolling off a table). **P3.4f** Calculate the changes in velocity of a thrown or hit object during and after the time it is acted on by the force. **P3.4g** Explain how the time of impact can affect the net force (e.g., air bags in cars, catching a ball).	Chapter 6	Labs, test, HW

Unit 6 3 days October	**P3.6A** Explain earth-moon interactions (orbital motion) in terms of forces. **P3.6B** Predict how the gravitational force between objects changes when the distance between them changes. **P3.6C** Explain how your weight on Earth could be different from your weight on another planet. **P3.6d** Calculate force, masses, or distance, given any three of these quantities, by applying the Law of Universal Gravitation, given the value of *G*. **P3.6e** Draw arrows (vectors) to represent how the direction and magnitude of a force changes on an object in an elliptical orbit.	Chapter 7	Labs, test, HW
Unit 7 4 days October	**P2.1E** Describe and classify various motions in a plane as one dimensional, two dimensional, circular, or periodic. **P2.1F** Distinguish between rotation and revolution and describe and contrast the two speeds of an object like the Earth. **P2.1h** Identify the changes in speed and direction in everyday examples of circular (rotation and revolution), periodic, and projectile motions. **P2.2D** State that uniform circular motion involves acceleration without a change in speed. **P3.4D** Identify the force(s) acting on objects moving with uniform circular motion (e.g., a car on a circular track, satellites in orbit).	Chapter 8	Labs, test, HW
Unit 8 4 days October	**P3.5a** Apply conservation of momentum to solve simple collision problems.	Chapter 9	Labs, test, HW

Unit 9 4 days November	**P3.2B** Compare work done in different situations. **P4.1c** Explain why work has a more precise scientific meaning than the meaning of work in everyday language. **P4.1d** Calculate the amount of work done on an object that is moved from one position to another. **P4.1e** Using the formula for work, derive a formula for change in potential energy of an object lifted a distance *h*. **P4.3A** Identify the form of energy in given situations (e.g., moving objects, stretched springs, rocks on cliffs, energy in food). **P4.3B** Describe the transformation between potential and kinetic energy in simple mechanical systems (e.g., pendulums, roller coasters, ski lifts). **P4.3C** Explain why all mechanical systems require an external energy source to maintain their motion. **P4.3d** Rank the amount of kinetic energy from highest to lowest of everyday examples of moving objects. **P4.3e** Calculate the changes in kinetic and potential energy in simple mechanical systems (e.g., pendulums, roller coasters, ski lifts) using the formulas for kinetic energy and potential energy. **P4.3f** Calculate the impact speed (ignoring air resistance) of an object dropped from a specific height or the maximum height reached by an object (ignoring air resistance), given the initial vertical velocity.	Chapter 10	Labs, test, HW
Unit 10 10 days November	**P4.2A** Account for and represent energy transfer and transformation in complex processes (interactions). **P4.2B** Name devices that transform specific types of energy into other types (e.g., a device that transforms electricity into motion). **P4.2C** Explain how energy is conserved in common systems (e.g., light incident on a transparent material, light incident on a leaf, mechanical energy in a collision). **P4.2D** Explain why all the stored energy in gasoline does not transform to mechanical energy of a vehicle. **P4.2e** Explain the energy transformation as an object (e.g., skydiver) falls at a steady velocity. **P4.2f** Identify and label the energy inputs, transformations, and outputs using	Chapter 11+12	Labs, test, HW

	qualitative or quantitative representations in simple technological systems (e.g., toaster, motor, hair dryer) to show energy conservation. **P4.11a** Calculate the energy lost to surroundings when water in a home water heater is heated from room temperature to the temperature necessary to use in a dishwasher, given the efficiency of the home hot water heater. **P4.11b** Calculate the final temperature of two liquids (same or different materials) at the same or different temperatures and masses that are combined.		