Physics

SP1. Obtain, evaluate, and communicate information about the relationship between distance, displacement, speed, velocity, and acceleration as functions of time.

a. Plan and carry out an investigation of one-dimensional motion to calculate average and instantaneous speed and velocity.

   Analyze one-dimensional problems involving changes of direction, using algebraic signs to represent vector direction.

   Apply one-dimensional kinematic equations to situations with no acceleration, and positive, or negative constant acceleration.

b. Analyze and interpret data using created or obtained motion graphs to illustrate the relationships among position, velocity, and acceleration, as functions of time.

c. Ask questions to compare and contrast scalar and vector quantities.

d. Analyze and interpret data of two-dimensional motion with constant acceleration.

   Resolve position, velocity, or acceleration vectors into components (x and y, horizontal and vertical).

   Add vectors graphically and mathematically by adding components.

   Interpret problems to show that objects moving in two dimensions have independent motions along each coordinate axis.

   Design an experiment to investigate the projectile motion of an object by collecting and analyzing data using kinematic equations.

   Predict and describe how changes to initial conditions affect the resulting motion.

   Calculate range and time in the air for a horizontally launched projectile.

SP2. Obtain, evaluate, and communicate information about how forces affect the motion of objects.

a.

   acceleration of a body.

   Explain and predict the motion of a body in absence of a force and when forces are applied

   st Law (principle of inertia).

   nd Law, including situations where multiple forces act together.

   Identify the pair of equal and opposite forces between two interacting bodies and relate

   rd Law.

b. Develop and use a model of a Free Body Diagram to represent the forces acting on an object (both equilibrium and non-equilibrium).

c. Use mathematical representations to calculate magnitudes and vector components for typical forces including gravitational force, normal force, friction forces, tension forces, and spring forces.

e. Plan and carry out investigations to describe common features of light in terms of color, polarization, spectral composition, and wave speed in transparent media.