Unit 01B: Vectors NJ NGSS

Content Area: **Science**
Course(s): **Generic Course**
Time Period: **Marking Period 1**
Length: **3**
Status: **Published**

Standards

- Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly. (HS-PS2-1),(HS-PS2-3)
- Analyze data using tools, technologies, and/or models (e.g., computational, mathematical) in order to make valid and reliable scientific claims or determine an optimal design solution. (SLO 1, 2 & 3), (HS-PS2-1)
- Use mathematical representations of phenomena to describe explanations. (SLO 1, 2 & 4), (HS-PS2-2)
- Apply scientific ideas to solve a design problem, taking into account possible unanticipated effects. (HS-PS2-3)
- Criteria may need to be broken down into simpler ones that can be approached systematically, and decisions about the priority of certain criteria over others (trade-offs) may be needed. (HS-PS2-3)
- When investigating or describing a system, the boundaries and initial conditions of the system need to be defined. (HS-PS2-2)

http://www.state.nj.us/education/modelcurriculum/sci/physicsu1.shtml

SCI.9-12.HS-PS2	Motion and Stability: Forces and Interactions
SCI.9-12.HS-PS2-2	Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system.
SCI.9-12.HS-PS2-1	Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.

Essential Questions

- How do we describe the motion of an object?
- Can we predict the motion of an object?
- How can one predict an object's continued motion, changes in motion, or stability?

Content / Skills

- Distinguish between a scaler and a vector quantity. (Accelerated & CP)
- Describe motion in terms of frame of reference, displacement, time, and velocity. (Accelerated & CP)

- Construct and interpret position versus time graphs. (Accelerated & CP)
- Construct and interpret velocity versus time graphs. (Accelerated & CP)
- Graph and analyze the motion of an object. (Accelerated & CP)
- Design, Construct, and Test a functioning self propelled vehicle from limited materials. (Accelerated & CP)
- Represent vectors graphically and algebraically. (Accelerated & CP)
- Apply the rules of vector addition and multiplication graphically. (Accelerated & CP)
- Apply the rules of vector addition and multiplication graphically and algebraically. (Accelerated & CP)
- Resolve vectors into components. (Accelerated & CP)
- Solve vector problems. (Accelerated & CP)
- Calculate net force using the rules of vectors. (Accelerated & CP)
- Describe motion in 2 dimensions. (Accelerated & CP)
- Use 2-D motion to describe the path of a projectile. (Accelerated & CP)
- Understand that x and y motion of a projectile are independent and be able to describe the motion in the respective directions. (Accelerated & CP)
- Solve projectile motion problems. (Accelerated)
- To dissect the necessary elements of motion into its components; namely acceleration, velocity, displacement, distance, speed & time. (Accelerated & CP)
- To differentiate between average and instantaneous values. (Accelerated & CP)
- To understand the vector nature of motion. (Accelerated & CP)
- To understand motion across multiple dimensions. (Accelerated)