Unit 05: Vectors

Content Area: **Mathematics**
Course(s): **Generic Course**
Time Period: **Semester 1**
Length: **2 weeks**
Status: **Published**

Standards - NJCCS/CCSS

MA.N-VM.A.1	Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes (e.g., $\boldsymbol{v}$, $\lvert\boldsymbol{v}\rvert$, $\lvert\lvert\boldsymbol{v}\rvert\rvert$, $\boldsymbol{v}$).
MA.N-VM.A.2	Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point.
MA.N-VM.B.4a	Add vectors end-to-end, component-wise, and by the parallelogram rule. Understand that the magnitude of a sum of two vectors is typically not the sum of the magnitudes.
MA.N-VM.B.4b	Given two vectors in magnitude and direction form, determine the magnitude and direction of their sum.
MA.N-VM.B.4c	Understand vector subtraction $\boldsymbol{v} - w$ as $\boldsymbol{v} + (-w)$, where $-w$ is the additive inverse of w, with the same magnitude as w and pointing in the opposite direction. Represent vector subtraction graphically by connecting the tips in the appropriate order, and perform vector subtraction component-wise.
MA.N-VM.B.5a	Represent scalar multiplication graphically by scaling vectors and possibly reversing their direction; perform scalar multiplication component-wise, e.g., as $c(\boldsymbol{v}_x, \boldsymbol{v}$ subscript $y) = (c\boldsymbol{v}_x, c\boldsymbol{v}$ subscript $y)$.
9-12.HS-PS2-1.4.1	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.

Enduring Understandings

Vectors are used to represent many physical characteristics.

Vectors represent both direction and magnitude.

Essential Questions

What is a vector?

How do you do operations with vectors?

What is a scalar?

How do you resolve a vector into component form?

How do you find the direction angle of a vector?

How do we calculate the dot product between vectors?

Knowledge and Skills

- Add and subtract vectors.
- Rewrite a vector in component form.
- Use vectors to solve application problems.
- Calculate the "dot product" of two vectors.

Transfer Goals

Recognize and solve practical or theoretical problems involving mathematics, including those for which the solution approach is not obvious, by using mathematical reasoning and strategic thinking.

Simple systems can be scaled to model more complicated systems.

Resources

Precalculus: Graphical, Numerical, Algebraic 10th Edition

Desmos/Amplify

Deltamath

Problem-Attic

Geogebra