

### Core Content

<b>Cluster Title: Represent and model with vector quantities.</b>
<b>Standard (Honors) N.VM.1:</b> 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., $\mathbf{v}$ , $ \mathbf{v} $ , $\ \mathbf{v}\ $ , $v$ ).
<b>Concepts and Skills to Master</b>
<ul style="list-style-type: none"> <li>Recognize vector quantities as having both magnitude and direction.</li> <li>Represent vector quantities by directed line segments, and use appropriate symbols for vectors (<math>\mathbf{v}</math>) and their magnitudes (e.g., <math> \mathbf{v} </math>, <math>\ \mathbf{v}\ </math>, <math>v</math>).</li> <li>Find the magnitude of a vector.</li> </ul>

### Supports for Teachers

<b>Critical Background Knowledge</b>	
Pythagorean Theorem, distance formula	
<b>Academic Vocabulary</b>	
Vector, magnitude, displacement	
<b>Suggested Instructional Strategies</b>	<b>Resources</b>
<ul style="list-style-type: none"> <li>Relate vectors to bearings.</li> <li>Relate vectors to velocity of planes when affected by crosswinds.</li> </ul>	
<b>Sample Formative Assessment Tasks</b>	
<b>Skill-based Task</b> Find $\ \mathbf{v}\ $ if $\mathbf{v} = \langle 7, -12 \rangle$ .	<b>Problem Task</b> A car has driven 125 km due west, then 60 km due south. Represent the displacement of the car with a vector. Find the magnitude of the vector to find the displacement of the car.

### Core Content

<b>Cluster Title: Represent and model with vector quantities.</b>
<b>Standard (Honors) N.VM.2:</b> Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point.
<b>Concepts and Skills to Master</b>
<ul style="list-style-type: none"> <li>Find the horizontal and vertical components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point.</li> </ul>

### Supports for Teachers

<b>Critical Background Knowledge</b>	
Definition of vector, vector notation, coordinate plane, graphing points	
<b>Academic Vocabulary</b>	
Vector, components, initial point, terminal point	
<b>Suggested Instructional Strategies</b>	<b>Resources</b>
Explore vectors using contextual situations such as air or sea navigation.	
<b>Sample Formative Assessment Tasks</b>	
<b>Skill-based Task</b> Write the components of a vector whose initial point is (-7,2) and whose terminal point is (5,-3).	<b>Problem Task</b> Create pairs of initial and terminal points that represent the vector $\mathbf{v} = \langle -2, 5 \rangle$ .

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<b>Cluster Title: Represent and model with vector quantities.</b>
<b>Standard (Honors) N.VM.3:</b> Solve problems involving velocity and other quantities that can be represented by vectors.
<b>Concepts and Skills to Master</b>
<ul style="list-style-type: none"> <li>• Represent real world contexts with geometric vector models.</li> <li>• Solve contextual problems involving velocity and other quantities that can be represented by vectors in a variety of disciplines (e.g. science, sports, medicine).</li> </ul>

### Supports for Teachers

<b>Critical Background Knowledge</b>	
<ul style="list-style-type: none"> <li>• Find the direction and magnitude of a vector.</li> <li>• Graph vectors.</li> <li>• Use vector notation.</li> </ul>	
<b>Academic Vocabulary</b>	
Vector, direction, magnitude, velocity, force	
<b>Suggested Instructional Strategies</b>	<b>Resources</b>
<ul style="list-style-type: none"> <li>• Use contextual problems to explore applications of vectors.</li> <li>• Have students create contextual situations for given vectors.</li> <li>• Use tools (e.g. compass, ruler, cm. paper) to model vector situations geometrically.</li> </ul>	
<b>Sample Formative Assessment Tasks</b>	
<b>Skill-based Task</b> You are going to swim across a 20 m. river with a current of 6 kph. Draw a scale model of the vector that represents the path of your swim and estimate how far down-stream you are when you reach the other side.	<b>Problem Task</b> A car is travelling north at 45 mph and collides into another car travelling east at 30 mph. Represent the collision graphically.