

Chapter 8 Targets

8.1 Geometric Vectors	
Given a magnitude and a direction, I can find the vertical and horizontal components	1a) A hiker leaves her camp and walks for 15 miles in a direction 50° north of due east. Find the magnitude of her vertical and horizontal components.
8.2 Algebraic Vectors	
I can write a vector as an ordered pair $\overrightarrow{P_1P_2} = \langle x_2 - x_1, y_2 - y_1 \rangle$	2a) Write the ordered pair that represents the vector from $X(-2, 4)$ to $X(4, -6)$.
I can find the magnitude of a vector by $ \overrightarrow{P_1P_2} = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$	2b)...Then find the magnitude of \overrightarrow{XY} .
I can perform vector operations (addition, subtraction, scalar multiplication)	2c) Let $\vec{m} = \langle 2, -3 \rangle$, $\vec{n} = \langle 1, 5 \rangle$, and $\vec{p} = \langle -2, 4 \rangle$. Find each of the following. $\vec{m} - \vec{p}; 3\vec{n}; 2\vec{m} + 3\vec{p}$
I can write a vector as a sum of unit vectors	2d) Write \overrightarrow{AB} as the sum of unit vectors for $A(3, -2)$ and $B(7, 4)$.
8.3 Vectors in 3D Space	
I can represent a vector as an ordered triple $\langle x_2 - x_1, y_2 - y_1, z_2 - z_1 \rangle$	3a) Write the ordered triple that represents the vector from $X(4, 2, -5)$ to $X(3, -4, 1)$.
I can find the magnitude of an ordered triple $ \overrightarrow{P_1P_2} = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2}$	3b) Find the magnitude of the ordered triple in 3a
I can find perform vector operations on vectors with 3 dimensions	3c) Find an ordered triple that represents $4\vec{p} - 3\vec{q}$ if $\vec{p} = \langle 2, 5, 3 \rangle$ and $\vec{q} = \langle 4, -2, 1 \rangle$.
I can write a vector as a sum of unit vectors $a_1\vec{i} + a_2\vec{j} + a_3\vec{k}$	3d) Write \overrightarrow{AB} as the sum of unit vectors for $A(4, 2, 6)$ and $B(-3, 8, -1)$
8.4 Inner Product and Cross Product	
I can find the inner product of 2 vectors (also called dot product) $\vec{a} \cdot \vec{b} = a_1b_1 + a_2b_2$ or $\vec{a} \cdot \vec{b} = a_1b_1 + a_2b_2 + a_3b_3$	4a) Find the inner product of \vec{a} and \vec{b} if $\vec{a} = \langle -4, 2, 5 \rangle$ and $\vec{b} = \langle 3, 6, 1 \rangle$. Are the two vectors perpendicular?
I can determine when two vectors are perpendicular	(dot product = 0)
I can describe what a cross product is	Vector that is perpendicular to the plane which contains the two given vectors
I can find the cross product of two vectors and verify that the resulting vector is perpendicular to each given vector $\vec{a} \times \vec{b} = \begin{vmatrix} a_2 & a_3 \\ b_2 & b_3 \end{vmatrix} \vec{i} - \begin{vmatrix} a_1 & a_3 \\ b_1 & b_3 \end{vmatrix} \vec{j} + \begin{vmatrix} a_1 & a_2 \\ b_1 & b_2 \end{vmatrix} \vec{k}$	4b) Find the cross product of \vec{v} and \vec{w} if $\vec{v} = \langle 5, 2, 3 \rangle$ and $\vec{w} = \langle -2, 5, 0 \rangle$. Verify that the resulting vector is perpendicular to the two original vectors.

8.5 Applications With Vectors	
I can draw and label a diagram representing two given forces	5a) Two children are attempting to capture a loose dog. One of the children is exerting a force of 80 Newtons due north and the other is pulling with a force of 100 Newtons due east. Draw a labeled diagram that represents the forces.
I can determine the resultant force by finding the horizontal and vertical components of each vector and then summing the two unit vectors	5b) Determine the resultant force exerted on the dog by the two children.
I can find the angle/direction of the resultant force	5c) Find the angle the resultant force makes with the east-west axis.
8.6 Vectors and Parametric Equations	
I can write a vector equation of a line through a point and parallel to a vector \vec{a} $\vec{P_1P_2} = t\vec{a}$	6a) Write a vector equation describing a line passing through $P_1(3, 2)$ and parallel to $\vec{a} = \langle 4, -1 \rangle$.
I can write a parametric equation of a line that goes through a given point and is parallel to a given vector $x = x_1 + ta_1$ and $y = y_1 + ta_2$	6b) Find the parametric equations for a line parallel to $\vec{q} = \langle 4, -2 \rangle$ and passing through the point at $(-1, -3)$. Then make a table of values and graph the line.
After finding the parametric equations, I can make a table of values and graph the line	6c) Make a table of values and graph the line for 6b
I can write a parametric equation given a line in slope-intercept form	6d) Write parametric equations of $y = 3x - 5$
Given parametric equations, I can write an equation in slope-intercept form (<i>hint: solve for t first</i>)	6e) Write an equation in slope-intercept form of the line whose parametric equations are $x = 3 + 2t$ and $y = -1 - 4t$.
8.7 Modeling Motion Using Parametric Equations	
I know the definitions of projectile, trajectory and range	
I can find the initial horizontal and vertical velocity of an objective given an initial velocity and direction $ \vec{v}_x = \vec{v} \cos \theta$ and $ \vec{v}_y = \vec{v} \sin \theta$	7a) Find the initial horizontal velocity and vertical velocity of a ball kicked with an initial velocity of 15 feet per second at an angle of 40° .
I can find the parametric equations for the path of a projectile $x = t \vec{v} \cos \theta$ $y = t \vec{v} \sin \theta - \frac{1}{2}gt^2$	7b) Suppose a professional soccer player kicks a ball with an initial velocity of 31 yards per second at an angle of 60° to the horizontal. Write the parametric equations for this situation.
Using the parametric equations for a path of a projectile, I can find the horizontal or vertical height given a certain time, t	7c) ...Suppose a player on the opposing team comes into contact with the ball 5 seconds later. How far has the ball traveled horizontally and what is its vertical height at that time?