

YEAR 12 - MATHEMATICS

HSC Topic 8 – Further Operations with Vectors

MATHEMATICS EXTENSION 1

LEARNING PLAN

<p>Learning Intentions Student is able to:</p>	<p>Learning Experiences Implications, considerations and implementations:</p>	<p>Success Criteria I can:</p>	<p>Resources</p>
<p>define, calculate and use the magnitude of a vector in two dimensions</p> <p>use the notation \underline{u} for the magnitude of a vector $\underline{u} = x\underline{i} + y\underline{j}$</p> <p>define and use the direction of a vector in two dimensions</p>	<ul style="list-style-type: none"> – prove that the magnitude of a vector, $\underline{u} = x\underline{i} + y\underline{j}$, can be found using: $\underline{u} = x\underline{i} + y\underline{j} = \sqrt{x^2 + y^2}$ – identify the magnitude of a displacement vector \vec{AB} as being the distance between the points A and B – convert a non-zero vector \underline{u} into a unit vector \hat{u} by dividing by its length: $\hat{u} = \frac{\underline{u}}{ \underline{u} }$ 	<p>define, calculate and use the magnitude of a vector in two dimensions</p> <p>use the notation \underline{u} for the magnitude of a vector $\underline{u} = x\underline{i} + y\underline{j}$</p>	

<p>define, calculate and use the scalar (dot) product of two vectors $\underline{u} = x_1 \underline{i} + y_1 \underline{j}$ $\underline{v} = x_2 \underline{i} + y_2 \underline{j}$ and</p>	<ul style="list-style-type: none"> – apply the scalar product, $\underline{u} \cdot \underline{v}$, to vectors expressed in component form, where $\underline{u} \cdot \underline{v} = x_1 x_2 + y_1 y_2$ – use the expression for the scalar (dot) product, $\underline{u} \cdot \underline{v} = \underline{u} \underline{v} \cos \theta$ where θ is the angle between vectors \underline{u} and \underline{v} to solve problems – demonstrate the equivalence, $\underline{u} \cdot \underline{v} = \underline{u} \underline{v} \cos \theta = x_1 x_2 + y_1 y_2$ and use this relationship to solve problems – establish and use the formula $\underline{v} \cdot \underline{v} = \underline{v} ^2$ – calculate the angle between two vectors using the scalar (dot) product of two vectors in two dimensions 	<p>define, calculate and use the scalar (dot) product of two vectors $\underline{u} = x_1 \underline{i} + y_1 \underline{j}$ and $\underline{v} = x_2 \underline{i} + y_2 \underline{j}$</p>	
<p>examine properties of parallel and perpendicular vectors and determine if two vectors are parallel or perpendicular</p>	<ul style="list-style-type: none"> – examine properties of parallel and perpendicular vectors and determine if two vectors are parallel or perpendicular 	<p>determine if two vectors are parallel or perpendicular</p>	
<p>define and use the projection of one vector onto another</p>	<ul style="list-style-type: none"> – 		

solve practical problems involving vector concepts in two dimensions	–	solve problems involving displacement, force and velocity involving vector concepts in two dimensions	
prove geometric results and construct proofs involving vectors in two dimensions	<ul style="list-style-type: none"> – Prove the diagonals of a parallelogram meet at right angles if and only if it is a rhombus – Prove the midpoints of the sides of a quadrilateral join to form a parallelogram – Prove the sum of the squares of the lengths of the diagonals of a parallelogram is equal to the sum of the squares of the lengths of the sides 	I can use vectors to prove properties of quadrilaterals.	
Past HSC Questions			

<p>Established Goals (Syllabus Outcomes): ME12-2, ME12-6, ME12-7</p>
<p>Estimated Time: 1.5 Weeks</p>
<p>Reading Strategies: Annotate the Question, Vocabulary Pre-Teach + Morphology, Graph/Diagram Decode Routine, Skim–Scan–Select Routine</p>