

**SUVA SANGAM COLLEGE**

**YEAR 13**

**MATHEMATICS**

**WORKSHEET 8**

Strand 2	Vectors
Sub-Strand	Dot Product and Its Application
Content Learning Outcome	To find the dot product and angle between two vectors.
Reference from Text	Pg 46 - 50

**Questions**

	<p><b>CONCEPT IN BRIEF:</b></p> <p>The dot product or scalar product between two given vectors; <math>\tilde{a} = \begin{pmatrix} a_1 \\ a_2 \\ a_3 \end{pmatrix}</math> and <math>\tilde{b} = \begin{pmatrix} b_1 \\ b_2 \\ b_3 \end{pmatrix}</math> is defined as: <math>\mathbf{a \cdot b} = a_1b_1 + a_2b_2 + a_3b_3</math></p>
1.	<p>Two vectors are given as <math>\tilde{a} = \begin{pmatrix} 1 \\ -2 \\ -2 \end{pmatrix}</math> and <math>\tilde{b} = \begin{pmatrix} -2 \\ 1 \\ 3 \end{pmatrix}</math></p> <p>Find:</p> <p>(a) <math> a </math> (b) <math>a \cdot b</math></p>
	<p><b>CONCEPT IN BRIEF:</b></p> <p>To find the angle between two vectors:</p> $a \cdot b =  a  b \cos \theta$ $\theta = \cos^{-1} \left( \frac{a \cdot b}{ a  b } \right)$
2.	<p>Consider the vectors <math>\tilde{x} = \begin{pmatrix} 2 \\ -3 \\ 1 \end{pmatrix}</math> and <math>\tilde{y} = \begin{pmatrix} 0 \\ 3 \\ 1 \end{pmatrix}</math></p> <p>Calculate the <b>angle</b> between the two vectors.</p>
	<p><b>CONCEPT IN BRIEF:</b></p> <ul style="list-style-type: none"><li>• Two vectors <math>\tilde{a}</math> and <math>\tilde{b}</math> are parallel if the angle between them is either <math>0^\circ</math> or <math>180^\circ</math>.</li><li>• Two vectors <math>\tilde{a}</math> and <math>\tilde{b}</math> are perpendicular(orthogonal) if:<ul style="list-style-type: none"><li>➤ The angle between them is <math>90^\circ</math></li><li>➤ The dot product is equal to zero.</li></ul></li></ul>
3.	<p>Show that the vectors <math>\tilde{x} = \begin{pmatrix} 1 \\ -3 \\ 4 \end{pmatrix}</math> and <math>\tilde{y} = \begin{pmatrix} 1 \\ 3 \\ 2 \end{pmatrix}</math> are orthogonal.</p>