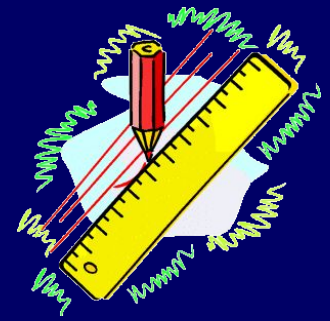




Higher



Outcome 1

Тема урока

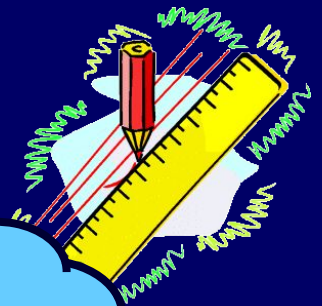
**Скалярное произведение
векторов, угол между
векторами**



Higher

The scalar product

Outcome 1

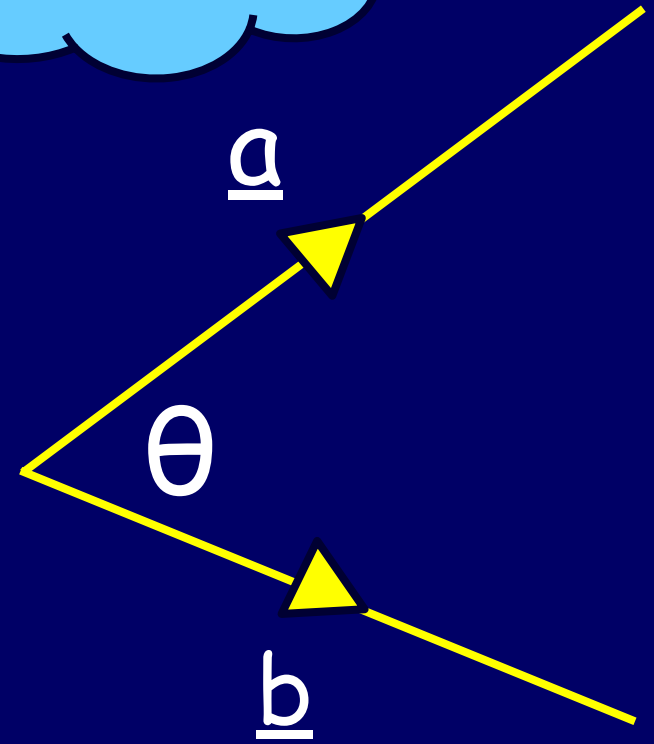


The scalar product is de

Must be
tail to tail

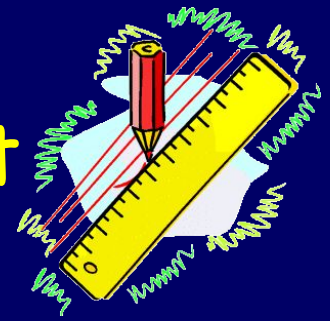
$$\underline{a} \cdot \underline{b} = |\underline{a}| |\underline{b}| \cos \theta$$

$$0 \leq \theta \leq 180^\circ$$





Component Form Scalar Product



Higher

Outcome 1

If

$$\underline{a} = \begin{pmatrix} a_1 \\ a_2 \\ a_3 \end{pmatrix} \quad \text{and} \quad \underline{b} = \begin{pmatrix} b_1 \\ b_2 \\ b_3 \end{pmatrix} \quad \text{then}$$

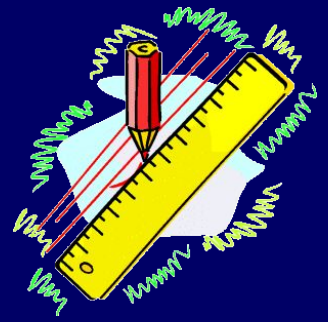
$$\underline{a} \cdot \underline{b} = a_1b_1 + a_2b_2 + a_3b_3$$



Higher

Angle between Vectors

Outcome 1



To find the angle between two vectors we simply use the scalar product formula rearranged

$$\cos\theta = \frac{\underline{a} \cdot \underline{b}}{|\underline{a}| |\underline{b}|}$$

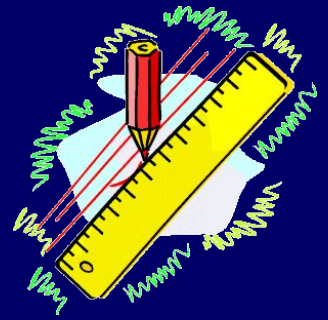
or

$$\cos\theta = \frac{a_1b_1 + a_2b_2 + a_3b_3}{|\underline{a}| |\underline{b}|}$$



Higher

Perpendicular Vectors



Outcome 1

Given $|\underline{a}| \neq 0$ and $|\underline{b}| \neq 0$ and $\underline{a} \cdot \underline{b} = 0$

Then

$$\cos \theta = \frac{\underline{a} \cdot \underline{b}}{|\underline{a}| |\underline{b}|} = \frac{0}{|\underline{a}| |\underline{b}|} = 0$$

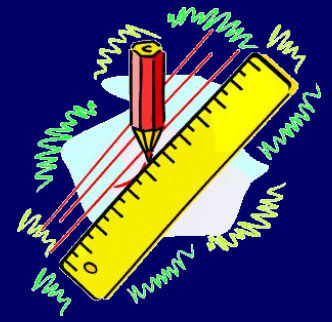
$$\theta = \cos^{-1}(0) = 90^\circ$$

If $\underline{a} \cdot \underline{b} = 0$ then \underline{a} and \underline{b} are perpendicular



Higher

Properties of a Scalar Product



Outcome 1

Two properties that you need to be aware of

$$\underline{a} \cdot \underline{b} = \underline{b} \cdot \underline{a}$$

$$\underline{a} \cdot (\underline{b} + \underline{c}) = \underline{a} \cdot \underline{b} + \underline{a} \cdot \underline{c}$$