

The Dot Product (6.7)

The Dot Product

The dot product is the scalar between two vectors.

The dot product is a tool to find the angle between two vectors.

If the dot product is equal to 0, the vectors are orthogonal.

The Dot Product

Given $v = a_1i + b_1j$ and $w = a_2i + b_2j$

$$v \cdot w = a_1a_2 + b_1b_2$$

Angle between Two Vectors

$$\cos \theta = \frac{v \cdot w}{\|v\| \|w\|}$$

Finding the Dot Product: Use the given vectors to find $v \cdot w$ and $v \cdot v$.

1. $v = 7i - 2j$, $w = -3i - j$

2. $v = i$, $w = -5j$

Finding a Scalar: Find each specified scalar:

$u = 3i - 2j$, $v = -i - 4j$, and $w = -4i - j$

3. $v \cdot (u + w)$

4. $(5v) \cdot w$

Finding an Angle Between Vectors: Find the angle between \mathbf{v} and \mathbf{w} . Round to the nearest tenth of a degree.

5. $\mathbf{v} = -2\mathbf{i} + 5\mathbf{j}$, $\mathbf{w} = 3\mathbf{i} - \mathbf{j}$

6. $\mathbf{v} = 3\mathbf{j}$, $\mathbf{w} = 4\mathbf{i} + 5\mathbf{j}$

Finding Orthogonal Vectors: Use the dot product to determine whether \mathbf{v} and \mathbf{w} are orthogonal.

7. $\mathbf{v} = 3\mathbf{i} - 3\mathbf{j}$, $\mathbf{w} = \mathbf{i} - \mathbf{j}$

8. $\mathbf{v} = 5\mathbf{i}$, $\mathbf{w} = -6\mathbf{j}$