

**Example 1**

$$\vec{a} = (-1, 3)$$

$$\vec{b} = (2, -1)$$

Find  $(\vec{a}, \vec{b}) = ?$

**Example 2**

$$|\vec{a}| = 2$$

$$|\vec{b}| = 5$$

$$\cos(\vec{a}, \vec{b}) = \frac{\pi}{6}$$

Find  $\vec{a}\vec{b} = ?$

**Example 3**

$$|\vec{c}| = 3$$

$$|\vec{d}| = \sqrt{2}$$

$$\cos(\vec{c}, \vec{d}) = 135^\circ$$

Find  $\vec{c}\vec{d} = ?$

**Example 4**

$$\vec{c} = -\vec{a} + 2\vec{b}$$

$$\vec{d} = -\vec{a} + \vec{b}$$

$$|\vec{a}| = 4$$

$$|\vec{b}| = 2\sqrt{3}$$

$$\cos(\vec{a}, \vec{b}) = \frac{\pi}{6}$$

Find  $\vec{c}\vec{d} = ?$

**Example 5**

$$|\vec{a}| = 4$$

$$|\vec{b}| = 2\sqrt{2}$$

$$\vec{a}\vec{b} = 8$$

Find  $\cos(\vec{a}, \vec{b}) = ?$

**Answer 1**

$$(\vec{a}, \vec{b}) = -1 \cdot 2 + 3 \cdot (-1) = -2 - 3 = -5$$

$$(\vec{a}, \vec{b}) = -5$$

**Answer 2**

$$\vec{a}\vec{b} = 2 \cdot 5 \cdot \cos \frac{\pi}{6} = 10 \frac{\sqrt{3}}{2} = 5\sqrt{3}$$

**Answer 3**

$$\vec{c}\vec{d} = 3 \cdot \sqrt{2} \cdot \cos 135^\circ = 3\sqrt{2} \cdot \left(\frac{\sqrt{2}}{2}\right) = -3$$

**Answer 4**

$$\vec{c}\vec{d} = (-\vec{a} + 2\vec{b}) \cdot (-\vec{a} + \vec{b}) = 16 - 24\sqrt{3} \cdot \frac{\sqrt{3}}{2} + 24 = 4$$

**Answer 5**

$$\cos(\vec{a}, \vec{b}) = \frac{8}{4 \cdot 2\sqrt{2}} = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$$

$$\cos(\vec{a}, \vec{b}) = \arccos \frac{\sqrt{2}}{2} = \frac{\pi}{4}$$