

**Example 1**

Prove that the vectors  $a = \{1; 2\}$  and  $b = \{2; -1\}$  are orthogonal.

**Example 2**

Are the vectors  $a = \{3; -1\}$  and  $b = \{7; 5\}$  orthogonal?

**Example 3**

Find the value of  $n$  where the vectors  $a = \{2; 4\}$  and  $b = \{n; 1\}$  are orthogonal.

**Example 4**

Prove that the vectors  $a = \{1; 2; 0\}$  и  $b = \{2; -1; 10\}$  is orthogonal.

**Example 5**

Are the vectors  $a = \{2; 3; 1\}$  and  $b = \{3; 1; -9\}$  orthogonal.

**Answer 1**

Calculate the dot product of these vectors:

$$a \cdot b = 1 \cdot 2 + 2 \cdot (-1) = 2 - 2 = 0$$

since the dot product is zero, the vectors a and b are orthogonal.

**Answer 2**

Calculate the dot product of these vectors:

$$a \cdot b = 3 \cdot 7 + (-1) \cdot 5 = 21 - 5 = 16$$

since the dot product is not zero, the vectors a and b are not orthogonal.

**Answer 3**

Calculate the dot product of these vectors:

$$a \cdot b = 2 \cdot n + 4 \cdot 1 = 2n + 4$$

$$2n + 4 = 0$$

$$2n = -4$$

$$n = -2$$

vectors a and b are orthogonal when  $n = -2$ .

**Answer 4**

Calculate the dot product of these vectors:

$$a \cdot b = 1 \cdot 2 + 2 \cdot (-1) + 0 \cdot 10 = 2 - 2 + 0 = 0$$

since the dot product is zero, the vectors a and b are orthogonal.

**Answer 5**

Calculate the dot product of these vectors:

$$a \cdot b = 2 \cdot 3 + 3 \cdot 1 + 1 \cdot (-9) = 6 + 3 - 9 = 0$$

since the dot product is zero, the vectors a and b are orthogonal.