

Name _____

Date _____

Multiply a Vector by a Scalar - Step-by-Step Lesson

Find the angle θ between the vectors $A = (6, 4, 7)$ and $B = (2, -3, 1)$?

Explanation:

Step 1: When we use the dot product of the given vectors, it tells us that:

$$A \cdot B = A_x B_x + A_y B_y + A_z B_z$$

$$= 6(2) + 4(-3) + 7(1)$$

$$= 12 - 12 + 7 = 7$$

$$\text{Step 2: } \cos\theta = \frac{\vec{a} \cdot \vec{b}}{|\vec{a}| |\vec{b}|}$$

$$|\vec{a}| = \sqrt{a_x^2 + a_y^2 + a_z^2} = \sqrt{(6)^2 + (4)^2 + (7)^2} = \sqrt{36 + 16 + 49} = \sqrt{101}$$

$$|\vec{b}| = \sqrt{b_x^2 + b_y^2 + b_z^2} = \sqrt{(2)^2 + (-3)^2 + (1)^2} = \sqrt{4 + 9 + 1} = \sqrt{14}$$

$$\cos\theta = \frac{7}{\sqrt{101} \times \sqrt{14}} = 0.186$$

Step 3: Taking inverse on both sides to find the value of θ :

$$\theta = \cos^{-1}(0.186) = 79.27^\circ$$

