Component formula to solve a dot product of vectors in three dimensions

$$a.b = a_x b_x + a_y b_y + a_z b_z$$

$a = 6i + 2j + 10k$

$b = 12i + 3j + 5k$

$a \cdot b = 6 \times 12 + 2 \times 3 + 10 \times 5$

$a \cdot b = 72 + 6 + 50 = 128$

$a \cdot b = |a||b| \cos\theta$

$|a| = \sqrt{6^2 + 2^2 + 10^2} = \sqrt{140}$

$|b| = \sqrt{12^2 + 3^2 + 5^2} = \sqrt{178}$

$\cos\theta = \frac{a \cdot b}{|a||b|} = \frac{128}{\sqrt{140} \times \sqrt{178}} = 0.811$

$\theta = \cos^{-1} 0.811 = 35.8°$