Check your understanding

12. Given a nonzero two-dimensional vector $\mathbf{a}$, how many vectors $\mathbf{b}$ are there such that $\mathbf{a} \cdot \mathbf{b} = 0$ and $|\mathbf{b}| = 1$?

    (a) 0.

    (b) 1.

    (c) 2.

    (d) Infinitely many.

13. Given a nonzero three-dimensional vector $\mathbf{a}$, how many vectors $\mathbf{b}$ are there such that $\mathbf{a} \cdot \mathbf{b} = 0$ and $|\mathbf{b}| = 1$?

    (a) 2.

    (b) 3.

    (c) 4.

    (d) Infinitely many.

Answers: 12 (c), 13 (d).

Explanation for 13: In three dimensions, the set of such vectors forms a circle in a plane orthogonal to $\mathbf{a}$.