

Check your understanding

11. Which of the following associative properties does the dot product satisfy?

(a) $\mathbf{a} \cdot (\mathbf{b} \cdot \mathbf{c}) = (\mathbf{a} \cdot \mathbf{b}) \cdot \mathbf{c}$.

(b) $(\mathbf{a} \cdot \mathbf{b})\mathbf{c} = (\mathbf{b} \cdot \mathbf{c})\mathbf{a}$.

(c) Neither.

Answer: (c)

Explanation: The equation in (a) does not make sense because the dot product of a vector and a scalar is not defined. The equation in (b) does make sense, because each side involves multiplying a vector by a scalar (which in turn is the dot product of two other vectors). However it is not true, for example when $\mathbf{a} = \mathbf{b} = \langle 1, 0, 0 \rangle$ and $\mathbf{c} = \langle 0, 1, 0 \rangle$, in which case the equation says $\langle 0, 1, 0 \rangle = 0$.