

Check your understanding

10. Let \mathbf{a} and \mathbf{b} be vectors. How is the length of $\mathbf{a} + \mathbf{b}$ related to the lengths of \mathbf{a} and \mathbf{b} ?
- (a) $|\mathbf{a} + \mathbf{b}| = |\mathbf{a}| + |\mathbf{b}|$.
 - (b) $|\mathbf{a} + \mathbf{b}| \leq |\mathbf{a}| + |\mathbf{b}|$.
 - (c) Neither of the above is always true.

Answer: (b)

Explanation: The vector $\mathbf{a} + \mathbf{b}$ corresponds to a side of a triangle whose other two sides correspond to the vectors \mathbf{a} and \mathbf{b} . The inequality in (b) is the *triangle inequality*, asserting that the length of one side of a triangle cannot be greater than the sum of the other two sides. We will be able to prove this after introducing dot product (and more direct proofs are also possible).