Potential versus Change in Potential

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Spring 2024

This material is borrowed/adapted from Chapter 10 of the *Student Workbook* for *Physics for Scientists and Engineers*.

XX-1: Potential versus Change in Potential

(a) If the force on a particle at some point in space is zero, must its potential energy also be zero at that point? Explain.

No. The rate of change of potential energy with respect to position will be zero at this point. For example, the potential energy can be a nonzero constant in the region that contains this point.

(b) If the potential energy of a particle at some point in space is zero, must the force on it also be zero at that point? Explain.

No. If the potential energy is changing along a line that passes through zero potential at this point, then the force will not be zero.