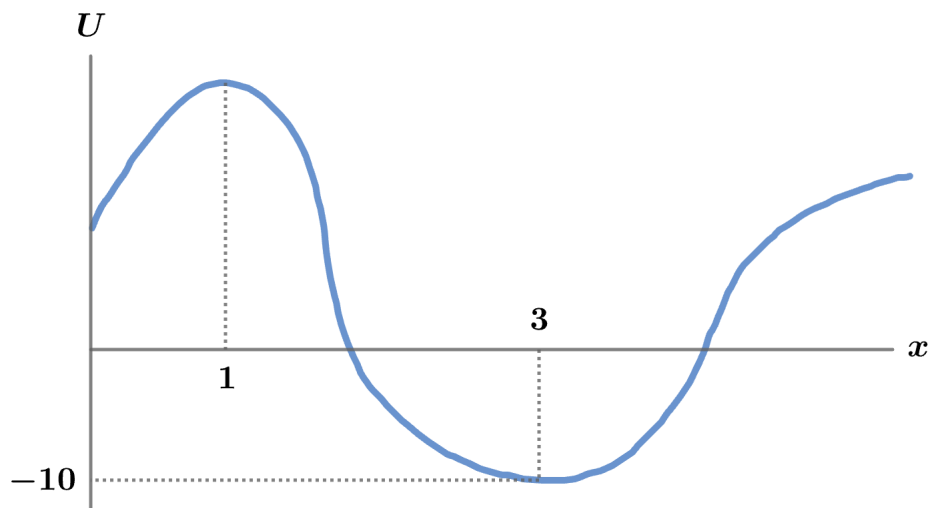


2015 F=ma Exam: Problem 16

Kevin S. Huang



Recall a particle moving in a potential energy landscape $U(x)$ experiences a force

$$F = -\frac{dU}{dx}$$

- A) True because at $x = 1$ cm and $x = 3$ cm, the slope of the U - x plot is zero so there is no force at those points.
- B) True because the minimum possible kinetic energy is zero (particle at rest) and the minimum possible potential energy in this plot is $U = -10$ J at $x = 3$ cm.
- C) True because the slope at this point is about 10 J/cm = 1000 N.
- D) True because the minimum possible potential energy is $U = -10$ J so if the total energy is $E = 0$ J, then $K = E - U = 10$ J.
- E) Not true because the slope at this point is about -20 J/cm = -2000 N. Since the particle has mass 0.50 kg, its acceleration $a = -2000/0.50$ m/s² = -4000 m/s².

Thus, the answer is E.