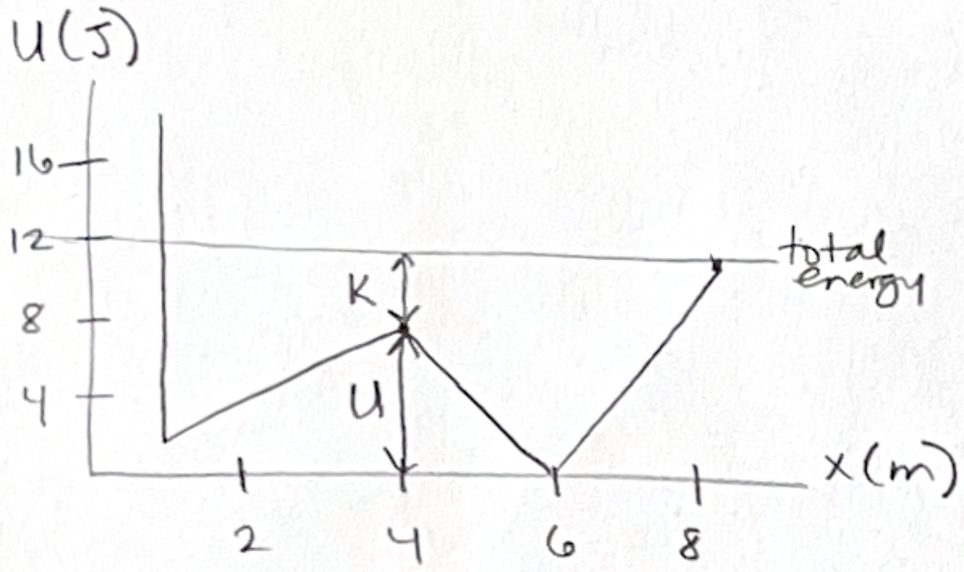
Ch 10 p. 257 #28



$M = 500g = 0.500kg$

mechanical energy is 12J

This term includes kinetic energy and potential energy.

a) What are the particle's turning points?

$E_T = K + U$ at any moment

The turning points occur when all the energy is potential, and at those moments, $K=0$, and so $v=0$. The particle will change direction.

At **$x = 1m$ and $x = 8m$**, all the energy is potential, so these are the turning points.

b) What is speed at $x = 4m$?

$E_T = K + U$

$12J = \frac{1}{2}mv^2 + 8J$ ← (from graph)

$12 = \frac{1}{2}(0.5kg)v^2 + 8$

$4\ m/s = v$

c) The maximum speed will occur when U is its smallest value, because this is when K is its greatest value. This occurs at $x = 6m$.

Write the energy equation for $x = 6m$ and find the velocity:

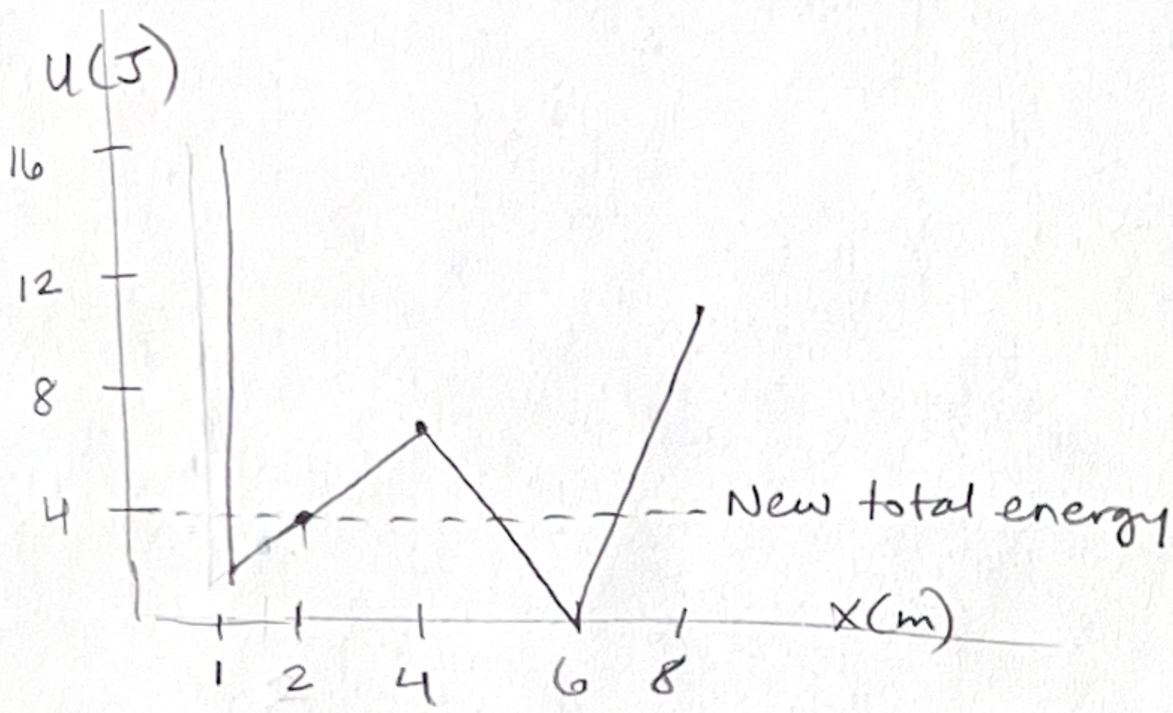
$E_T = K + U$

$12J = \frac{1}{2}mv^2 + 0$

$12 = \frac{1}{2}(.5kg)v^2$

$6.9\ m/s = v$

d) Suppose the total energy is lowered to 4.0 J. Can the particle ever be at x = 2.0m? At x = 4.0m?



Yes, the particle can be at x=2 because its U is 4 J there, which is the total energy. It would have a velocity of 0.

No, the particle cannot be at x=4 because that would mean it had more potential energy than total energy.