NYU Physics I 2017-10-03

Agenda — Qs

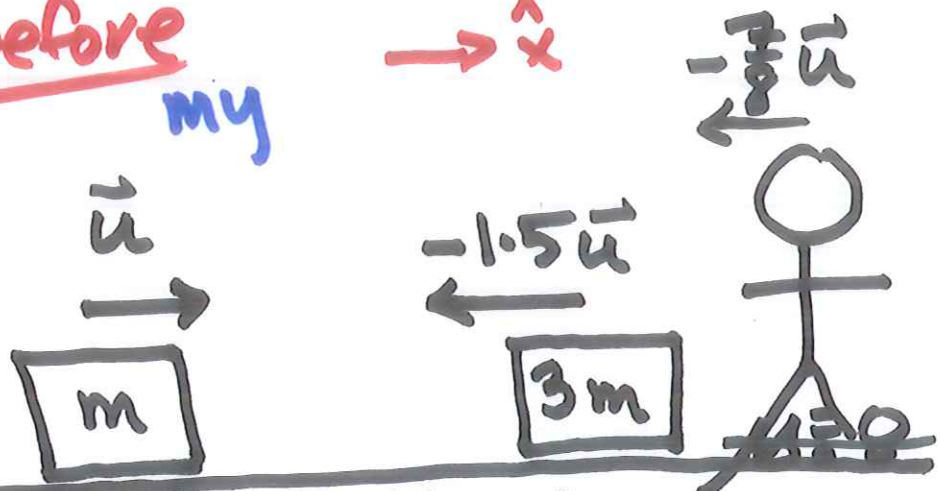
Reading — Energy-momentum
"Impulse"
Collisions
"elastic"

Team Exam 2

Collision.

"Elastic" - Mechanical energy is "invariant"

before my

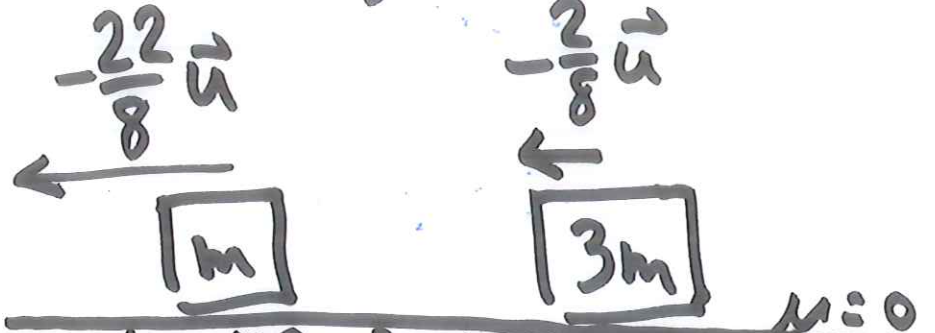


$KE = \frac{1}{2}mu^2 + \frac{1}{2}(3m)(1.5u)^2$

$\vec{p} = m\vec{u} + 3m(-1.5\vec{u}) = -3.5m\vec{u}$

$\frac{\vec{p}_{total}}{m_{total}} = -\frac{3.5m\vec{u}}{4m} = -\frac{7}{8}\vec{u}$

after my

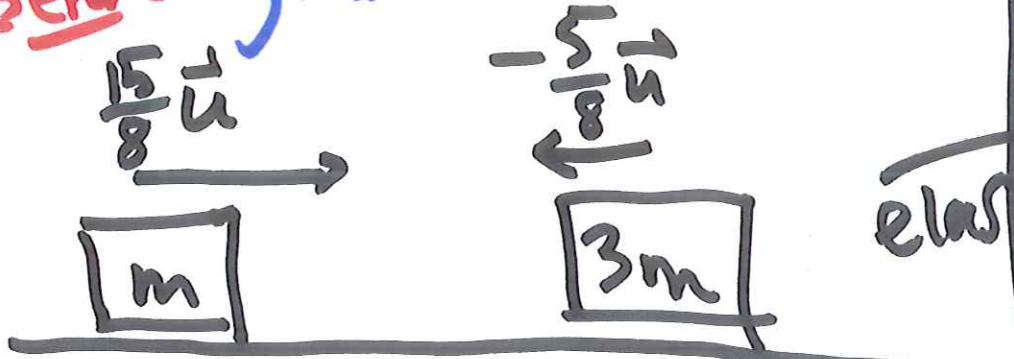


$KE = \frac{1}{2}m\left(\frac{22}{8}u\right)^2 + \frac{1}{2}(3m)\left(\frac{2}{8}u\right)^2 =$

$\vec{p} = -\frac{22}{8}m\vec{u} - \frac{6}{8}mu = -\frac{28}{8}mu$ ✓

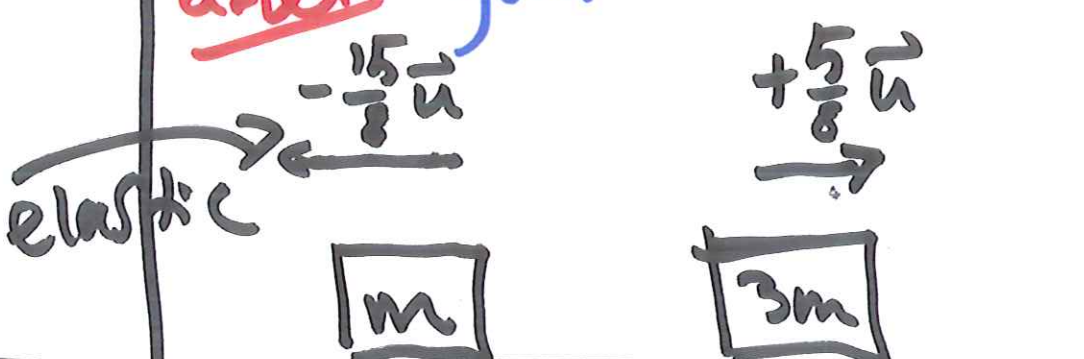
$KE = \frac{121}{32}mu^2 + \frac{3}{32}mu^2 = \frac{31}{8}mu^2$

before your

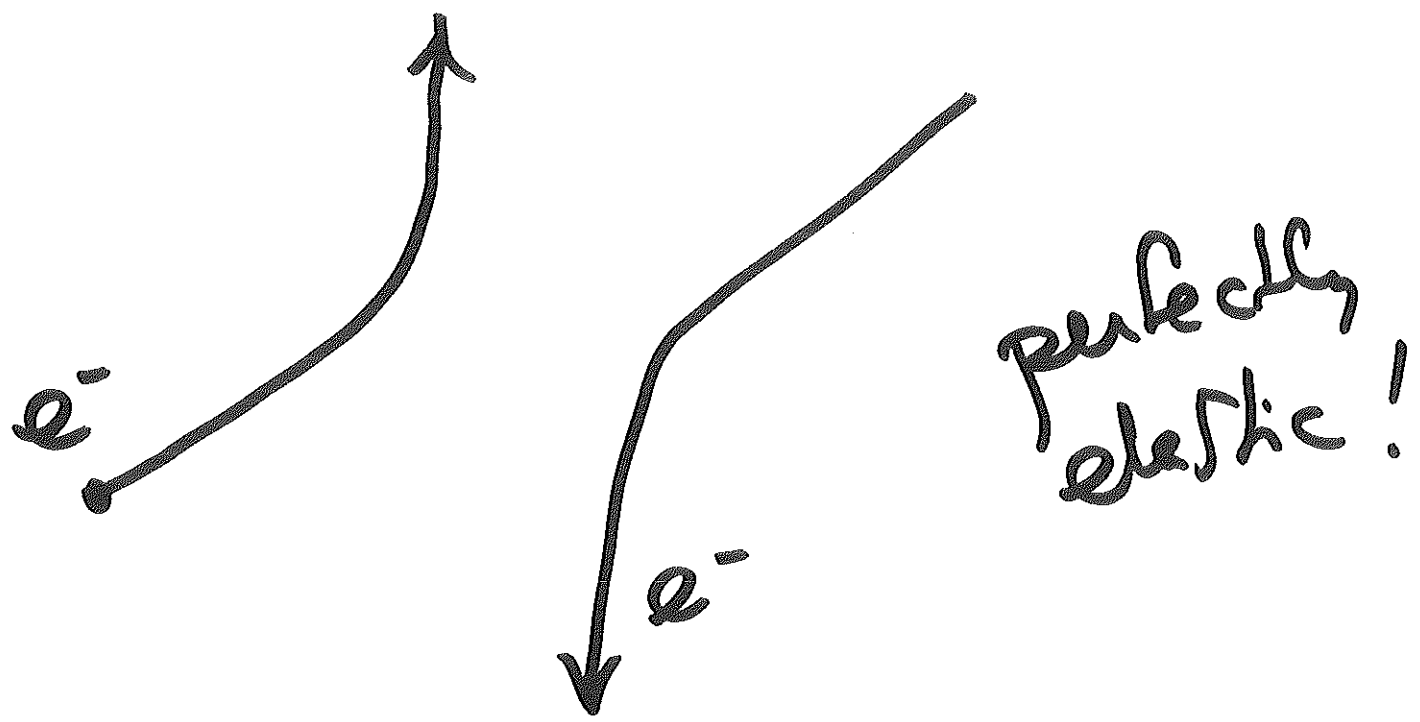


$\vec{p} = \vec{0}$!!

after your



$\vec{p} = \vec{0}$


e⁻
e⁻
perfectly
elastic!

useful facts: $KE = \frac{1}{2}mv^2$ scalar

momentum $\vec{p} = \gamma m \vec{v}$ vector

$\gamma = \frac{1}{\sqrt{1 - \frac{v^2}{c^2}}}$ ← speed of light

gonna ignore γ.

$KE = \frac{1}{2}\frac{(mv)^2}{m} = \frac{p^2}{2m} = \frac{\vec{p}\cdot\vec{p}}{2m}$

only true for a point particle