2023-Ph-H1-Q3

Section: Our Dynamic Universe
Topic: Motion, Equations and Graphs

Summary:
The momentum of an object of mass $m = 4\,\text{kg}$ is $p = 20\,\text{kg m s}^{-1}$. We are asked to find the kinetic energy of the object.

Solution:
From momentum,

$$p = mv \quad \Rightarrow \quad v = \frac{p}{m} = \frac{20}{4} = 5\,\text{m s}^{-1}.$$

Kinetic energy is:

$$E_k = \frac{1}{2}mv^2 = \frac{1}{2} \times 4 \times 5^2 = 2 \times 25 = 50\,\text{J}.$$

Answer: B. 50 J

Guidance for Students:

- Momentum and kinetic energy are related through velocity $v = p/m$.
- Calculate velocity first, then substitute into $E_k = \frac{1}{2}mv^2$.

Revision Tips:

- **Momentum:** $p = mv$.
- **Kinetic Energy:** $E_k = \frac{1}{2}mv^2$.
- Be careful with squaring v; a common source of error.