

Answer on Question #76473, Physics / Other

If p is the momentum of an object of mass m then the expression p^2/m has the unit as?

Solution:

The unit of momentum is the product of the units of mass and velocity. In SI units, if the mass is in kilograms and the velocity is in meters per second then the momentum is in kilogram meters per second ($\text{kg}\cdot\text{m/s}$).

The kinetic energy is

$$KE = \frac{mv^2}{2} = m^2v^2/2m = \frac{p^2}{2m}$$

So,

$$\frac{p^2}{m} \text{ has the units of energy – Joules}$$

In terms of SI base units

$$1 J = 1 kg \left(\frac{m}{s}\right)^2 = 1 kg \cdot \frac{m^2}{s^2}$$

Answer: $J = kg \cdot \frac{m^2}{s^2}$

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