

An object whose momentum is 200 kg-m/s has a kinetic energy of 1000J. What is its mass?

**Solution**

A kinetic energy of the object is defined by

$$K = \frac{mv^2}{2}.$$

where  $m$  – mass of the object and  $v$  – it's velocity.

A momentum of the object is defined by

$$P = mv.$$

We have a set of equations

$$\begin{cases} K = \frac{mv^2}{2} \\ P = mv \end{cases} \rightarrow \begin{cases} K = \frac{mv^2}{2} \\ v = \frac{P}{m} \end{cases} \rightarrow K = \frac{m}{2} \left(\frac{P}{m}\right)^2 = \frac{P^2}{2m},$$

$$m = \frac{P^2}{2K} = \frac{200^2}{2 * 1000} = 20 \text{ kg}.$$

**Answer: 20 kg.**