

If the linear momentum of a body is increased by 50%, then the kinetic energy of that body increases by 1)225% 2)25% 3)100% 4)125%?

**Solution.**

The linear momentum is the product of mass  $m$  and velocity  $v$  of a body:

$$p = m \cdot v;$$

So, if the linear momentum of a body is increased by 50%, then body velocity increases by 50% too, because mass is constant.

Write this as:

$$v_2 = 1.5 v_1;$$

where  $v_1$  - initial velocity of a body;

$v_2$  - finish velocity of a body;

The kinetic energy is:

$$E = \frac{mv^2}{2};$$

So, relation between finish and initial kinetic energy is:

$$\frac{E_2}{E_1} = \frac{mv_2^2}{2} \cdot \frac{2}{mv_1^2} = \frac{v_2^2}{v_1^2} = \frac{(1.5 v_1)^2}{v_1^2} = \frac{2.25v_1^2}{v_1^2} = 2.25$$

The kinetic energy of that body increases by 125% ( $E_2 = 2.25E_1 \rightarrow E_2 - E_1 = 1.25E_1$ )

**Answer:** The kinetic energy of that body **increases by 125%**.