Page 152

Question 1:
What is the kinetic energy of an object?

Answer 1:
Kinetic energy is the energy possessed by a body by the virtue of its motion. Every moving object possesses kinetic energy. A body uses kinetic energy to do work. Kinetic energy of hammer is used in driving a nail into a log of wood, kinetic energy of air is used to run wind mills, etc.

Question 2:
Write an expression for the kinetic energy of an object.

Answer 2:
If a body mass m is moving with a velocity v, then its kinetic energy E_k is given by the expression,

$E_k = \frac{1}{2} mv^2$.
Its SI unit is Joule (J).

Question 3:
The kinetic energy of an object of mass, m moving with a velocity of 5 m s^{-1} is 25 J. What will be its kinetic energy when its velocity is doubled? What will be its kinetic energy when its velocity is increased three times?

Answer 3:
Expression for kinetic energy
$E_k = \frac{1}{2} mv^2$
m = Mass of object
v = Velocity of the object in ms^{-1}
Given that kinetic energy, E_k=25J

(i) If the velocity of an object is doubled, then $v = 5 \times 2 = 10$ ms^{-1}.
Therefore, its kinetic energy becomes 4 times its original value, because it is proportional to the square of the velocity.
Hence, kinetic energy = $25 \times 4 = 100$ J.
(ii) If velocity is increased three times, then its kinetic energy becomes 9 times its original value, because it is proportional to the square of the velocity. Hence, kinetic energy = $25 \times 9 = 225$ J.80