Calculating Kinetic Energy

The kinetic energy of a moving object depends on its mass (how heavy it is) and its velocity (how fast it is going).

$$Kinetic\ energy = \frac{1}{2} \times mass \times velocity \times velocity$$

OR

$$E_k = \frac{1}{2}mv^2$$

The mass **must** be in kilograms (kg) and the velocity **must** be in metres per second (ms^{-1}) for the energy to be calculated in Joules.

Example:

Find the kinetic energy of a 12 kg dog running at 4 m s^{-1}.

m = 12kg
v = 4 m s^{-1}
E_k = ?

Ek = ½mv^2
= ½ x 12 x (4^2)
= 6 x 16
= 96 J

Find the kinetic energy of the following objects.

1. A 25 kg boy walking at 1 m s^{-1}.
2. A 25 kg boy running at 3 m s^{-1}.
3. A 75 kg man walking at 1.5 m s^{-1}.
4. A 75 kg man on a 12 kg bike who is riding at 8 m s^{-1}.
5. A 0.003 kg bullet shot at 120 m s^{-1}.

Answers:
1. 12.5 J
2. 112.5 J
3. 84.4 J
4. 2784 J
5. 21.6 J