2.6 Kinetic Energy

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

Units:
J : joules

Kinetic Energy

$E_k = 1/2\ mv^2$

- energy due to the motion of an object

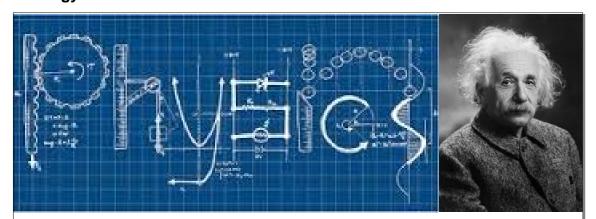Ex.) A car (m = 1500 kg) travels at 25.2 m/s, what is it's kinetic energy?

Calc: $0.5(1500)(25.2^2)$

$m = 1500 kg$
$V = 25.2 m/s$
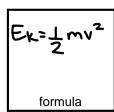$E_K = ?$

list all variables

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

formula

$E_K = \frac{1}{2} \cdot 1500 kg \cdot (25.2 m/s)^2$

$= 476,280$

$= 4.76 \times 10^5\ J$

substitute (with units) and solve
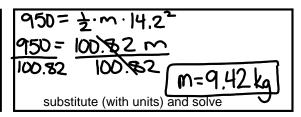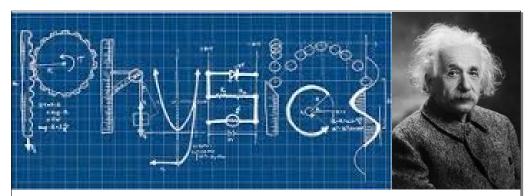
Ex.) An object has a speed of 14.2 m/s, and kinetic energy of 950 J. What is it's mass?
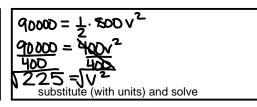
$V = 14.2 m/s$
$E_k = 950 J$
$m = ?$

list all variables

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

formula

$950 = \frac{1}{2} \cdot m \cdot 14.2^2$
$950 = 100.82\ m$
$\overline{100.82} \quad \overline{100.82}$

$\boxed{m = 9.42\ kg}$

substitute (with units) and solve

Ex.) What is the speed of an 800 kg car with a kinetic energy of 9.00×10^4 J?

$V = ?$
$m = 800 kg$
$E_k = 90000 J$

list all variables

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

formula

$90000 = \frac{1}{2} \cdot 800\ v^2$
$\dfrac{90000}{400} = \dfrac{400 v^2}{400}$
$\sqrt{225} = \sqrt{v^2}$

substitute (with units) and solve

$\boxed{V = 15.0\ m/s}$