Kinetic energy calculations

1. A car that travels at a speed of 20m/s and has a mass of 1200 kg. Find its KE.

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

$= \frac{1}{2}(1200)(20)^2$

$= 240\,000J$

2. A year 11 pupil with a mass of 55kg swinging back on their chair and falling off it at a speed of 0.6m/s. Find its KE.

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

$= \frac{1}{2}(55)(0.6)^2$

$KE = 9.9J$

3. Bus travelling through town, with a mass of 5040kg and kinetic energy of 493900J. Find its speed.

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

$\sqrt{\frac{KE}{\frac{1}{2}m}} = v$

$v = \sqrt{\frac{493900}{\frac{1}{2}(5040)}}$

$v = 14m/s$

4. Automatic door closing 0.2m/s, with a kinetic energy of 1.6J. Find its mass.

$\frac{KE}{\frac{1}{2}v^2} = m$

$m = 80kg$

5. A runner with a mass of 62kg running at a speed of 0.8m/s. Find its KE.

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

$= \frac{1}{2}(62)(0.8)^2$

$KE = 19.84J$

6. Automatic door closing 0.2m/s, with a kinetic energy of 1.6J. Find its mass.

$\frac{KE}{\frac{1}{2}v^2} = m$

$m = 80kg$

7. Wind turbine blade with a kinetic energy of 104040J, turning at 6m/s. Find its mass.

$\frac{KE}{\frac{1}{2}v^2} = m$

$m = 5780kg$

8. A tennis ball travelling at a speed of 46m/s with a mass of 58kg. Find its KE.

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

$= \frac{1}{2}(58)(46)^2$

$KE = 61364J$

9. A lift travelling up to the top floor of the Empire State building with a mass of 4200kg and a kinetic energy of 4116J. Find its speed.

$\sqrt{\frac{2KE}{m}} = v$

$v = 1.4m/s$

10. Bird flying towards its nest with a mass of 0.25kg and a kinetic energy of 40.5J. Find its speed.

$\sqrt{\frac{2KE}{m}} = v$

$v = 18 m/s$

11. A dog running across a field at a speed of 1.2m/s with a mass of 3.2kg. Find its KE.

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

$= \frac{1}{2}(3.2)(1.2)^2$

$KE = 2.304J$

12. A Wii remote flung from a hand through a TV, with a kinetic energy of 1.44J and a mass of 4.5kg. Find its speed.

$\sqrt{\frac{2KE}{m}} = v$

$v = 0.8 m/s$

13. Aeroplane travelling at 75m/s with a kinetic energy of 843700J. Find its mass.

$\frac{2KE}{v^2} = m$

$m = 299.98kg$

14. Hot air balloon with a kinetic energy of 76550J and a mass of 1890kg. Find its speed.

$\sqrt{\frac{2KE}{m}} = v$

$v = 9 m/s$

15. Canoe moving down the river with a kinetic energy of 5J and a speed of 0.5m/s. Find its mass.

$\frac{2KE}{v^2} = m$ $\quad m = 40kg$

16. Child riding a bike at a speed of 6m/s, with a total kinetic energy of 1224J. If the mass of the child is 30kg, what is the mass of the bike?

$\frac{2KE}{v^2} = m$

$\frac{2(1224)}{(6)^2} = 68$

Total mass = 68kg

$-30kg$

$= 38kg$