Kinetic Energy Practice Problems

1. What is the Kinetic Energy of a 150 kg object that is moving with a speed of 15 m/s?
   \[ KE = \frac{1}{2} m v^2 \]
   \[ KE = \frac{1}{2} (150\text{kg}) (15\text{ m/s})^2 \]
   \[ KE = \frac{1}{2} (150\text{kg})(225) \]
   \[ KE = 16875\text{J} \]

2. An object has a kinetic energy of 25 J and a mass of 34 kg, how fast is the object moving?
   \[ KE = \frac{1}{2} m v^2 \]
   \[ 2KE/m = v^2 \text{ OR } v^2 = 2KE/m \]
   \[ KE = 25\text{J} \]
   \[ m = 34\text{kg} \]
   \[ v^2 = 2(25\text{J})/34\text{kg} \]
   \[ \sqrt{v^2} = \sqrt{1.47} \]
   \[ v = 1.28\text{m/s} \]

3. An object moving with a speed of 35 m/s and has a kinetic energy of 1500 J, what is the mass of the object.
   \[ KE = \frac{1}{2} m v^2 \]
   \[ 2KE/v^2 = m \text{ OR } m = 2KE/v^2 \text{ (rearrange equation)} \]
   \[ KE = 1500\text{J} \]
   \[ m = 35\text{m/s} \]
   \[ m = 2(1500\text{J})/(35)^2 \]
   \[ m = 300/1225 \]
   \[ m = 2.45\text{kg} \]

4. What is the Kinetic Energy of a 1200 kg object that is moving with a speed of 24 m/s?
   \[ KE = \frac{1}{2} m v^2 \]
   \[ KE = \frac{1}{2} (1200\text{kg}) (24\text{ m/s})^2 \]
   \[ KE = \frac{1}{2} (1200\text{kg})(576) \]
   \[ KE = 345,600\text{J} \]

5. An object has a kinetic energy of 14 J and a mass of 17 kg, how fast is the object moving?
   \[ KE = \frac{1}{2} m v^2 \]
   \[ 2KE/m = v^2 \text{ OR } v^2 = 2KE/m \]
   \[ KE = 14\text{J} \]
   \[ m = 17\text{kg} \]
   \[ v^2 = 2(14\text{J})/17\text{kg} \]
   \[ \sqrt{v^2} = \sqrt{1.65} \]
   \[ v = 1.28\text{m/s} \]
6. An object moving with a speed of 67 m/s and has a kinetic energy of 500 J, what is the mass of the object.

\[ KE = \frac{1}{2} mv^2 \]
\[ KE = 500 \text{J} \]
\[ m = \frac{2(500 \text{J})}{(67)^2} \]
\[ m = 1000 \text{J}/4,489 \]
\[ v = 67 \text{m/s} \]
\[ m = 0.22 \text{kg} \]

7. What is the Kinetic Energy of a 478 kg object that is moving with a speed of 15 m/s?

\[ KE = \frac{1}{2} mv^2 \]
\[ KE = \frac{1}{2} (478 \text{kg})(15 \text{ m/s})^2 \]
\[ KE = 53,775 \text{J} \]

8. An object has a kinetic energy of 88 J and a mass of 45 kg, how fast is the object moving?

\[ KE = \frac{1}{2} mv^2 \]
\[ 2KE/m = v^2 \]
\[ v^2 = 2(88 \text{J})/45 \text{kg} \]
\[ \sqrt{v^2} = \sqrt{3.91} \]
\[ v = 1.98 \text{m/s} \]

9. An object moving with a speed of 21 m/s and has a kinetic energy of 140 J, what is the mass of the object.

\[ KE = \frac{1}{2} mv^2 \]
\[ 2KE/v^2 = m \]
\[ m = 2(140 \text{J})/(21)^2 \]
\[ m = 280 \text{J}/441 \]
\[ v = 21 \text{m/s} \]
\[ m = 0.63 \text{kg} \]

10. What is the Kinetic Energy of a 100 kg object that is moving with a speed of 12.5 m/s?

\[ KE = \frac{1}{2} mv^2 \]
\[ KE = \frac{1}{2} (100 \text{kg})(12.5 \text{ m/s})^2 \]
\[ KE = 7,812.5 \text{J} \]