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?
   \[
   KE = \frac{1}{2} mv^2 \\
   KE = \frac{1}{2} (150\text{kg}) (15\text{ m/s})^2 \\
   KE = ? \\
   m = 150\text{kg} \\
   v = 15\text{m/s} \\
   KE = 16875\text{J}
   \]

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

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.
   \[
   KE = \frac{1}{2} mv^2 \\
   KE = 1500\text{J} \\
   m = ? \\
   v = 35\text{m/s} \\
   2KE/v^2 = m \quad \text{OR} \quad m = 2KE/v^2 \quad \text{(rearrange equation)} \\
   m = 2(1500\text{J})/(35)^2 \\
   m = 3,000/1225 \\
   m = 2.45\text{kg}
   \]

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

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

\[ KE = \frac{1}{2} mv^2 \]

\[ 2KE/v^2 = m \quad \text{OR} \quad m = 2KE/v^2 \quad \text{(rearrange equation)} \]

\[ KE = 500 \text{ J} \]

\[ m = \frac{2(500 \text{ J})}{(67)^2} \]

\[ m = \frac{1000 \text{ J}}{4489} \]

\[ m = 0.22 \text{ kg} \]

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?

\[ KE = \frac{1}{2} mv^2 \]

\[ 2KE/m = v^2 \quad \text{OR} \quad v^2 = 2KE/m \]

\[ KE = 88 \text{ J} \]

\[ v^2 = \frac{2(88 \text{ J})}{45 \text{ kg}} \]

\[ v^2 = 3.91 \]

\[ v = 1.98 \text{ m/s} \]

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.

\[ KE = \frac{1}{2} mv^2 \]

\[ 2KE/v^2 = m \quad \text{OR} \quad m = 2KE/v^2 \quad \text{(rearrange equation)} \]

\[ KE = 140 \text{ J} \]

\[ m = \frac{2(140 \text{ J})}{(21)^2} \]

\[ m = \frac{280 \text{ J}}{441} \]

\[ m = 0.63 \text{ kg} \]

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

\[ KE = \frac{1}{2} mv^2 \]

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

\[ KE = 7,812.5 \text{ J} \]