Name: Class: Date:

KINETIC ENERGY WORD PROBLEMS (A)

Kinetic energy (KE) is the energy of motion, which may be a horizontal, vertical, or spinning motion. To calculate the KE of a moving object, use the following formula:

KE = ½ mass x velocity ^{2} *or…* KE = ½ mv^2		
Where…	**Mass**:	measured in kilograms (kg)
	Velocity:	measured in meters per second (m/s)
	KE:	measured in Joules (J) *or* kilojoules (kJ)

NOTE: To earn full marks when solving science word problems, you must **SHOW YOUR WORK:**

Formula	Rough work	Final answer rounded to the correct significant figures	Correct units

Example:

Q. Roger Federer serves a tennis ball with a velocity of 35.0 m/s. If the ball has a mass of 0.15 kg, what is the kinetic energy (KE) of the ball?

Known Values:
Mass = *0.15 kg*
Velocity = *35.0 m/s*

Unknown Values:
Unknown: KE = 1/2 mv^2

Solution:
KE = ½ mv^2
= (0.5) x 0.15 kg x 35^2
= (0.5) x 0.15 x 1225
= 91.875 (not rounded)
KE = 91.9 **J** (note significant figures!)

Questions: (*Your solutions should be organized similar to the example above)*

1. A cheetah can run briefly with a speed of 31.0 m/s. Suppose a cheetah with a mass of 47.0 kg runs at this speed. What is the cheetah's kinetic energy?

2. A ping pong ball has a mass of about 2.45 grams. Suppose that Forrest Gump hits the ball across the table with a speed of about 4.00 m/s. What is the ball's KE?

3. The largest land predator is the male polar bear, which has a mass of around 500.00 kg. If the top speed of a male polar bear is 11.0 m/s, how much KE does it have?

4. Though slow on land, the leatherback turtle holds the record for the fastest water speed of any reptile. The largest leatherback yet discovered could swim at a speed of 9.78 m/s. If its KE was 60,800.0 J, what was its mass?

5. What is the KE of a 1.00 kg hammer swinging at 20.0 m/s?

6. Japan's fasted high speed "bullet" trains, also known as the *Shinkansen*, travel at a speed of 88.9 m/s. It has an estimated mass of 480,000.0 kg. What is the maximum KE of this train?

7. The spring of a dart gun exerts a force on a 0.02 kg dart as it is launched from the gun with 4.00 J of KE. At what velocity does the dart come out of the gun?

   (HINT: To solve for V from V^2 you must perform the opposite operation of squaring)