 Name Key

Worksheet: Determining Kinetic Energy Period_____ Date_____

(Frameworks Code)

Recall that the formula for calculating kinetic energy is: $KE=1/2mv^2$. Manipulate this formula to answer the following problems. Be sure to show the four step set-up.

1. A cheetah can run at a speed of 31 m/s. If a cheetah with a mass of 47 kg runs at this speed, what would its kinetic energy be?

Given:
$m = 47\ kg$
$V = 31\ m/s$
$KE = ?$

Soln: $KE = \frac{1}{2}mv^2$
$= \frac{1}{2}(47\ kg)(31\ m/s)^2$
$KE = 22583.5\ J$

2. A 725 kg automobile has a kinetic energy of 302,000 J as it travels along the highway. What is the car's velocity?

Given:
$m = 725\ kg$
$V = ?$
$KE = 302,000\ J$

Soln: $KE = \frac{1}{2}mv^2$
$v^2 = \frac{2KE}{m}$
$v^2 = \frac{2(302,000\ J)}{725\ kg}$
$V = 28.9\ m/s$

3. A baseball is pitched with a speed of 35 m/s. If the baseball has a mass of 0.146 kg, what is its kinetic energy?

Given:
$m = .146\ kg$
$V = 35\ m/s$
$KE = ?$

Soln: $KE = \frac{1}{2}mv^2$
$= \frac{1}{2}(.146\ kg)(35\ m/s)^2$
$KE = 89.4\ J$

4. A bullet train can reach speed of 76.4 m/s. What is the mass of a train that reaches this speed if its total kinetic energy is 2,780,000,000?

Given:
$m = ?$
$V = 76.4\ m/s$
$KE = 2,780,000\ J$

Soln: $KE = \frac{1}{2}mv^2$
$m = \frac{2KE}{v^2}$
$m = \frac{2(2,780,000\ J)}{(76.4\ m/s)^2}$
$m = 952,544.1\ kg$

5. A polar bear with a mass of 500 kg has 60,500 J of kinetic energy. How fast is it moving?

Given:
$m = 500\ kg$
$V = ?$
$KE = 60,500\ J$

Soln: $KE = \frac{1}{2}mv^2$
$v^2 = \frac{2KE}{m}$
$v^2 = \frac{2(60,500\ J)}{500\ kg}$
$V = 15.6\ m/s$

6. A pigeon flies with a velocity of 5.1 m/s. If it has 46.8 J of kinetic energy, what is its mass?

Given:
$m = ?$
$V = 5.1\ m/s$
$KE = 46.8\ J$

Soln: $KE = \frac{1}{2}mv^2$
$m = \frac{2KE}{v^2}$
$m = \frac{2(46.8\ J)}{(5.1\ m/s)^2}$
$m = 3.6\ kg$

7. The kinetic energy of a golf ball is measured to be 143.3 J. If the golf ball has a mass of about 0.047 kg, what is its speed?

Given:
$m = .047\ kg$
$V = ?$
$KE = 143.3\ J$

Soln: $KE = \frac{1}{2}mv^2$
$v^2 = \frac{2KE}{m}$
$v^2 = \frac{2(143.3\ J)}{(.047\ kg)^2}$
$V = 78.1\ m/s$

8. A ping-pong ball has a mass of about 2.45 g. Suppose the ball is hit across the table with a speed of 4.0 m/s. What is its kinetic energy?

Given:
$m = 2.45\ g = .00245\ kg$
$V = 4.0\ m/s$
$KE = ?$

Soln: $KE = \frac{1}{2}mv^2$
$= \frac{1}{2}(.00245\ kg)(4.0\ m/s)^2$
$KE = .0196\ J$