

Determining the Energy of a Rolling Ball

		Height 1	Height 2	Height 3	Formula
A	Mass of ball (kg)				
B	Length of ramp (m)				
C	Height of ramp (m)				
D	Time-Trial 1 (sec)				
E	Time-Trial 2 (sec)				
F	Time-Trial 3 (sec)				
G	Average Time (sec)				
H	Average Speed (sec)				
I	Final Speed (m/s)				
J	Kinetic Energy (j)				
K	G.P.E. (j)				

Analyzing Your Results

Calculate the average speed of the ball using the following equation and record in row H.

$$\text{Average speed} = \frac{\text{Length of ramp (m)}}{\text{Average time (sec)}}$$

Multiply the average speed by 2 to obtain the final speed of the ball, and record the final speed in row I.

$$\text{Final Speed} = \text{Average speed} \cdot 2$$

Calculate and record the final kinetic energy of the ball by using the following equation.

$$\text{Kinetic Energy} = \frac{\text{mass of ball (kg)} \cdot (\text{final speed})^2}{2}$$

Calculate and record the G.P.E. by using the following equation

$$\text{G.P.E.} = \text{mass of ball} \cdot 9.8 \text{ m/s}^2 \cdot \text{height of ball (m)}$$

Defending Your Conclusions

1. For each of the three heights, compare the ball's potential energy at the top of the ramp with its kinetic energy at the bottom of the ramp. _____

2. How did the ball's potential and kinetic energy change as the height of the ramp was increased? _____

3. Suppose you perform this experiment and find that your kinetic energy values are always just a little less than your potential energy values. Does that mean you did the experiment wrong? _____

_____ Why or why not? _____

Practice Problems - Kinetic Energy

Name _____

$$\frac{m \cdot v^2}{2} = \text{K.E.}$$



SHOW YOUR WORK AND USE THE CORRECT UNITS!

1. 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?
2. A cheetah can run briefly with a speed of **31 m/s**. Suppose a cheetah with a mass of **47 kg** runs at this speed. What is the cheetah's kinetic energy?
3. A table tennis (ping-pong) ball has a mass of about **2.45 g**. Suppose the ball is hit across the table with a speed of about **4.0 m/s**. What is its kinetic energy? (**Hint:** mass unit is in grams and needs to be kg)
4. A 2.0 kg ball and a 4.0 kg ball are traveling at the same speed. If the kinetic energy of the 2.0 kg ball is 5.0 J, what is the kinetic energy of the 4.0 kg ball? (**Hint:** You do not need to solve for the speed.)
5. A 2.0 kg ball has 4.0 J of energy when traveling at a certain speed. What is the kinetic energy of the ball when traveling at twice the original speed? (**Hint:** You do not need to solve for the original speed.)