**Potential and Kinetic Energy**

Pre-Lab Questions

1. What is energy?
2. Define potential and kinetic energy.
3. What factors influence potential and kinetic energy? How?
4. Describe how energy is changed (converted)? Give one example.

Purpose: Students will observe and record the work done by three different marbles rolling down an incline plane and hypothesize about the reasons for the differences. Students will also observe and differentiate between potential and kinetic energy.

Objectives:

* Discover that the larger the mass and the higher an object is raised, the more energy it has.
* Calculate averages.
* Make predictions, record observations, and create a hypothesis.

Question: Which marble do you think will move the milk carton the farthest? (The small, medium, or large marble)

Materials:

* 3 marbles (different masses)
* incline plane/ramp
* metric ruler
* milk carton

Procedure:

* 1. Break up students in groups of 3-5.
  2. Set up a ramp. Start with a height of 10 cm.
  3. Measure the mass of each marble. Place answer in data table
  4. Place milk carton at the bottom of the ramp to catch the marble.
  5. Roll the smallest marble first, and measure the distance it moves the carton. Record data in table 1.
  6. Roll the same marble two more times and record data, then repeat experiment with the other marbles.
  7. Change height of ramp to 20 cm and repeat steps 2-5. Record data in table 2.
  8. Change height to 30 cm and repeat steps 2-5. Record data in table 2.

Conclusion:

1. What energy conversion did you demonstrate in this experiment?
2. Draw a diagram of your experiment. Label where the marble has most potential energy and where it has the most kinetic energy.
3. How did increasing the mass affect the distance the carton moved?
4. How did increasing the height affect the distance the carton moved?
5. Was your hypothesis correct? Explain why or why not.
6. What are some real life examples of storing and using energy?

Hypothesis: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Data:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Marble** | | **Mass** (g) | **Height** (cm) | **Trial 1**  Distance Moved (cm) | **Trial 2**  Distance Moved (cm) | **Trial 3**  Distance Moved (cm) | **Average** |
| 1 |  | | 10 cm |  |  |  |  |
| 2 |  | | 10 cm |  |  |  |  |
| 3 |  | | 10 cm |  |  |  |  |

***Table 1***

***Table 2***

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Marble** | **Mass** (g) | **Height** (cm) | **Trial 1**  Distance Moved (cm) | **Trial 2**  Distance Moved (cm) | **Trial 3**  Distance Moved (cm) | **Average** |
| 1 |  | 20 cm |  |  |  |  |
| 2 |  | 20 cm |  |  |  |  |
| 3 |  | 20 cm |  |  |  |  |

***Table 3***

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Marble** | **Mass** (g) | **Height** (cm) | **Trial 1**  Distance Moved (cm) | **Trial 2**  Distance Moved (cm) | **Trial 3**  Distance Moved (cm) | **Average** |
| 1 |  | 30 cm |  |  |  |  |
| 2 |  | 30 cm |  |  |  |  |
| 3 |  | 30 cm |  |  |  |  |