

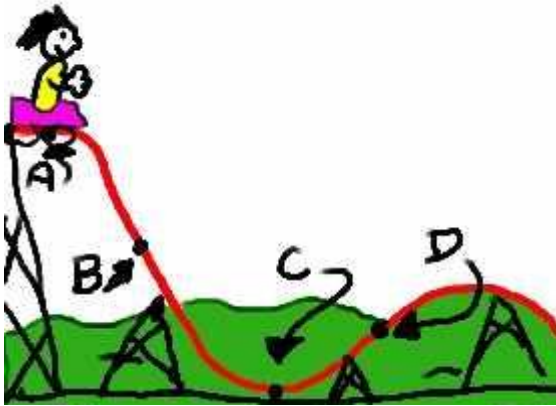
Exercises

Potential and Kinetic Energy

1. What is potential energy?
2. What is kinetic energy?
3. What is gravitational potential energy?
4. What does transfer of energy mean?
5. What is conservation of energy?

6. For the next six questions, use the image below.

Describe the potential and kinetic energy of this roller coaster car.



Where is the potential energy greatest?

Where is the kinetic energy greatest?

Where is potential energy lowest?

Where is kinetic energy lowest?

Where is kinetic energy increasing and potential energy decreasing?

Where is potential energy increasing and kinetic energy decreasing?

7. What's energy efficiency?

8. Which is more energy efficient, a nice new Hot Wheel car or one that's been stepped on?

9. In most systems, where are the most common two sources of non-useful energy?

10. What is work?

11. What does a Newton measure?

12. What does a Joule measure?

Answers to Potential and Kinetic Energy Exercises

1. Potential energy is the energy that something has that can be released.
2. Kinetic energy is the energy of motion ($KE = \frac{1}{2} mv^2$).
3. Gravitational potential energy is the energy something has due to gravity (Gravitational Potential Energy = mgh)
4. Energy can be changed from one form to another and from one object to another.
5. In a closed system, energy can neither be created nor destroyed.
6. See below...
 - Potential energy (PE) is greatest at a. The coaster car is at its highest point above the ground.
 - Kinetic energy (KE) is the greatest at c. The coaster car is going the fastest at this point.
 - PE is lowest at c. The coaster car is as low as it can get.
 - KE is lowest at a. The coaster car is not moving.
 - KE is increasing and PE is decreasing at b. The coaster car is losing height so it's losing PE but it is gaining speed so it is gaining KE.
 - PE is increasing and KE is decreasing at d. The coaster car is getting higher so it's gaining PE, but it's losing speed so it's losing KE.
7. Energy efficiency is how much energy in a system is transferred to useless energy.
8. It depends on what you want the car to do! If you want the car to go far after leaving the track, you want the brand new one. It will have less of the original potential energy transferred to heat since it will have less friction. However, if you want your car to generate heat, you want the stepped on one. It will have much more of its energy transferred to heat due to its high friction! (In other words, you need to be a bit careful with the term "useful" energy).
9. Sound energy and heat energy. Heat comes from the force of friction. Sound energy, as a matter of fact, also gets transferred to heat energy.
10. Work is defined as moving an object over a distance against a force (Work = force x distance).
11. A Newton is a unit of force, or how much force it takes to push or pull something. It takes about one Newton of force to lift an apple.
12. A Joule is a unit of energy. It takes one Joule to exert one Newton of force over a distance of one meter.