



Potential and Kinetic Energy Lesson 1: *The Solve* Student Guide

Part 1: Video Clip of Phenomenon

Either on your own, in a small group, or as a class (your teacher will let you know), watch the video clip.

1. What was the purpose of the system in the video? What goal did it accomplish?

Watch the video 2–5 more times.	
2. What was the initial source of energy in the system?	3. What type of techniques were used to move objects in this video? Jot down three or more observed techniques.



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4. This system shows examples of something called potential energy (energy stored based on the position of an object) and kinetic energy (energy in a moving object).

A. Where do you think this system shows potential energy? Give at least two examples and explain your thinking.

B. Where do you think this system shows kinetic (moving) energy? Give at least two examples and explain your thinking.



Part 2. Let's Figure It Out!

Rube Goldberg is famous for designing complicated systems to accomplish simple, everyday tasks. Using any of the materials available in your box, your team will investigate the manipulation of kinetic and potential energy to design a system that can accomplish a simple classroom task (such as turning a page of a book, ringing a bell, or dropping a pencil into a cup). You'll be working in teams of 3–4.

As a team, choose the task you'll accomplish.

Design your own Rube Goldberg system. Draw your final model below. If you can, take a video or snap a photo of your final working model!



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Part 3. Connect

Reflecting on what you saw in the video and your experiences with creating your model, label your diagram (above) with these terms. Note that some of the terms may be new!

- Potential Energy: Stored energy related to an object's position
- Kinetic Energy: The energy of an object expressed as its motion
- Speed: The rate at which something moves
- Height: The vertical distance between an object and the ground

Part 4. Comparing Designs

1. Compare team designs within your classroom and note your observations in the table below.
 - a. What do you notice about the use of **potential energy**? How many instances of potential energy do you see in each model?
 - b. How did the team use the **kinetic energy** that was transformed from potential energy?

Team Task Name	Potential Energy Observation	Kinetic Energy Observation



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Conclusions Questions:

1. Which team had the model that started with the **most potential energy**?
How do you know?
2. What do you notice about the relationship between height and potential energy?
3. Which team had the model that had the point of the **greatest kinetic energy**? How do you know? Was it the same team that you named in question 1? Why or why not?
4. Based on your answers to questions 1–3, what conclusion can you draw about the relationship between potential and kinetic energy?



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Annotated Image

Label the event with the correct term(s) that describe(s) the energy characteristics of the bowling ball on a spiral rail track.

Terms

- | | |
|--|---|
| <ul style="list-style-type: none">• High potential energy• Low potential energy• High kinetic energy• Low kinetic energy• High speed | <ul style="list-style-type: none">• Low speed• Greatest speed• At rest• Greatest height• Least height |
|--|---|

Terms may be used more than once, and more than one term can be used in each box to correctly describe the energy characteristics of the ball.





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Part 5. Exit Ticket: Check for Understanding

Complete the exit ticket below or you can take the quiz online.

Name: _____

Date: _____

1. A ball at rest at the top of a hill has _____.
 - a. kinetic energy
 - b. motion
 - c. speed
 - d. potential energy
2. The ball is pushed so it begins to roll down the hill. It now has _____.
 - a. kinetic energy
 - b. a rest position
 - c. more potential energy
 - d. no energy
3. What factors can increase the speed of a ball rolling down a hill?
 - a. Increased potential energy
 - b. Increased kinetic energy
 - c. Both A and B
4. What is potential energy?
 - a. The amount of energy an object could have if it tried hard enough
 - b. Moving energy
 - c. Active energy
 - d. Stored energy
5. What is kinetic energy?
 - a. Stored energy
 - b. Moving energy
 - c. Potential energy
 - d. All of the above
6. A roller-coaster car is at the top of the hill, one is at the middle of the hill, and one is at the bottom of the hill. Which has the most potential energy?
 - a. The car at the bottom of the hill
 - b. The car in the middle of the hill
 - c. The car at the top of the hill
 - d. All the cars have zero potential energy.