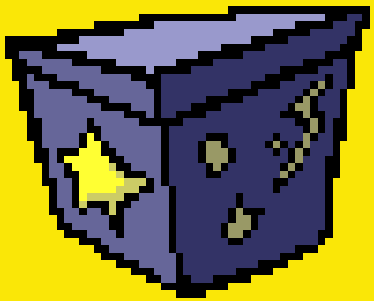
Potential & Kinetic Energy



Essential Question: How are potential & kinetic energy related?

Standards:

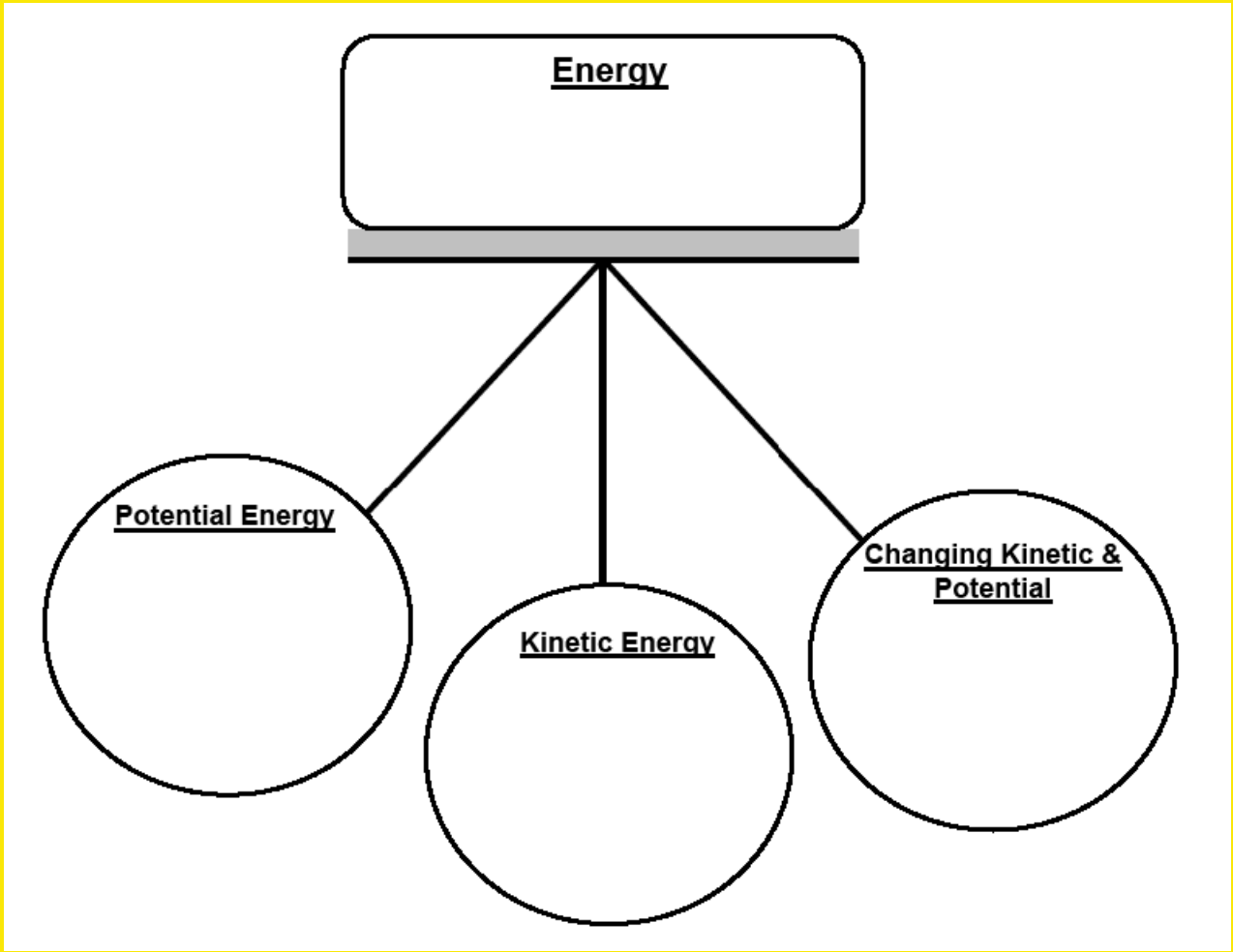
S8P2a. Analyze and interpret data to create graphical displays that illustrate the relationships of kinetic energy to mass and speed, and potential energy to mass and height of an object.

S8P2b. Plan and carry out an investigation to explain the transformation between kinetic and potential energy within a system (e.g., roller coasters, pendulums, rubber bands, etc.)

Concept Attainment Activity

[see resources]

Use the Kinetic & Potential Energy Graphic Organizer to take notes.



WHAT IS ENERGY?

Energy is the ability to cause change.

Everything around you has energy, but you notice it only when a change takes place.

Anytime a change occurs, energy is transferred from one object to another.

Explain how these objects cause change…

(add this definition in the top right blank space)

Law of Conservation of Energy:

Energy cannot be created or destroyed, it transforms from one form to another.

Things that move can cause change. For example, a bowling ball rolls down the alley and knocks down some pins. Is energy involved?

A change occurs when the pins fall over. The bowling ball causes this change, so the bowling ball has energy.

As the ball moves, it has a form of energy called kinetic energy.

Kinetic Energy

Kinetic energy is the energy an object has due to its motion. If an object isn't moving, it doesn't have kinetic energy.

Kinetic Energy and Speed

Let's use our bowling ball example. If you roll the bowling ball so it moves faster, what happens when it hits the pins?

A faster ball causes more change to occur than a ball that is moving slowly.

Kinetic energy increases as an object moves faster.

Kinetic Energy & Mass

Suppose you roll a volleyball down the alley instead of a bowling ball. If the volleyball travels at the same speed as a bowling ball, do you think it will send pins flying as far?

An important difference between the volleyball and the bowling ball is that the volleyball has less mass. Even though the volleyball is moving at the same speed, it has less kinetic energy because is has less mass.

Kinetic energy increases as the mass of an object increases.

The Basics of Kinetic Energy

- Kinetic Energy is the energy of motion.
- Kinetic energy increases as an object moves faster.
- Kinetic energy increases as the mass of an object increases.

What if the bowling ball is not moving? Does it still have energy?

Potential Energy

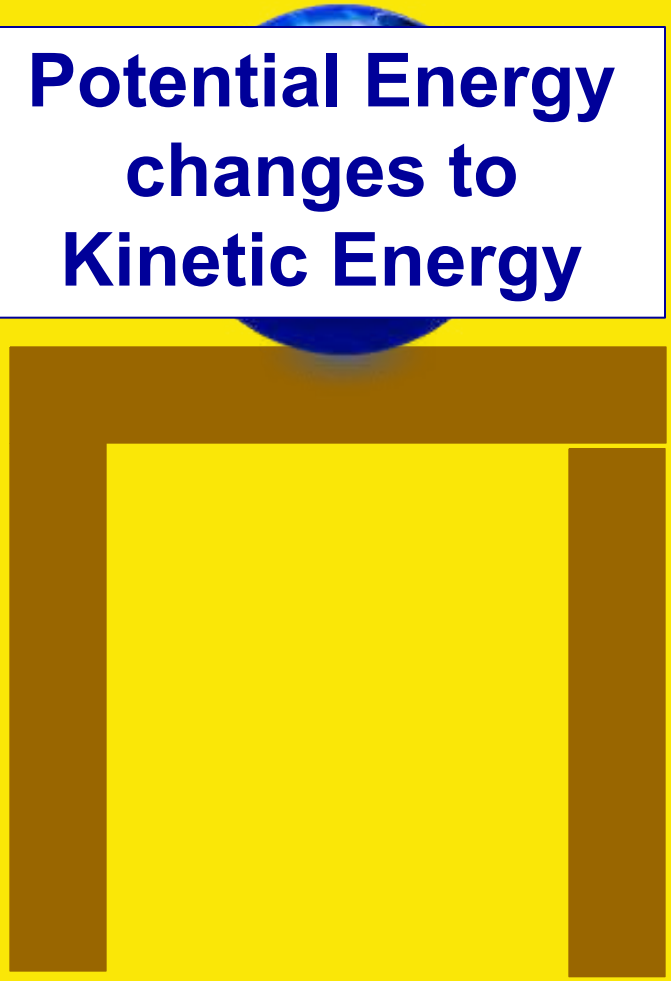
Potential energy is the energy stored in an object because of its position. It has the “potential” to cause change.

Potential Energy

Imagine our bowling ball is sitting on a table. It has Potential Energy as it sits on the table because it has the ability to cause change.

What happens if the bowling ball falls off the table?

Potential Energy changes to Kinetic Energy



Potential Energy

What happens to the Potential Energy of the bowling ball if the table is higher?

The Potential Energy of an object is greater if the position of the object is higher. The object has the potential to cause more change.

Potential Energy

H al

The more mass an object has, the more potential energy it has because it has potential" to c more change.

The Basics of Potential Energy

- Potential Energy is stored energy.
- Potential Energy is greater if the position of an object is higher.
- Potential energy increases as the mass of an object increases.

Changing Kinetic Energy & Potential Energy Activity

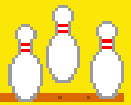
Use the QR Code activity to introduce the relationship between kinetic energy and potential energy if possible. Otherwise, use slides 21-27 with animations to demonstrate the concepts.

Changing Kinetic & Potential Energy

In a previous slide, we discussed how the potential energy of an object can change to kinetic energy.

For example, when you are holding the bowling ball, it has potential energy. As you release the ball, most of its energy is kinetic. However, as the ball begins to slow its kinetic energy decreases. But, the total energy of the ball hasn't changed.

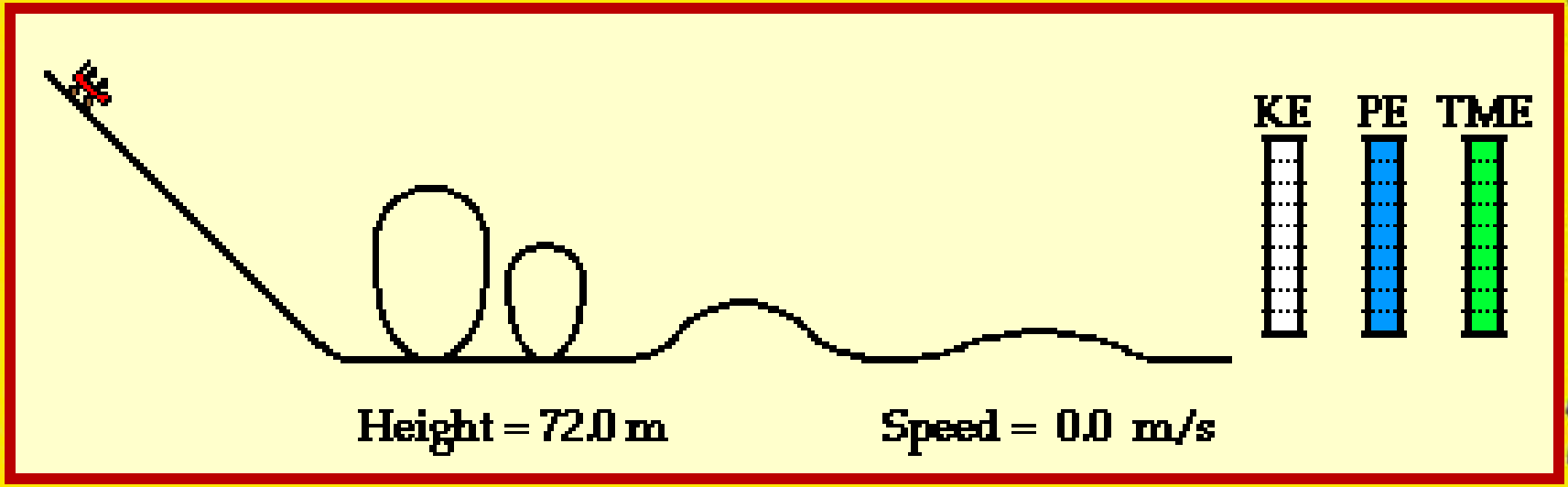
The decrease in kinetic energy equals the increase in potential energy. The total amount of energy remains constant.



Changing Kinetic & Potential Energy

http://www.classzone.com/books/ml_science_share/vis_sim/mem05_pg69_potential/mem05_pg69_potential.html

Changing Kinetic & Potential Energy



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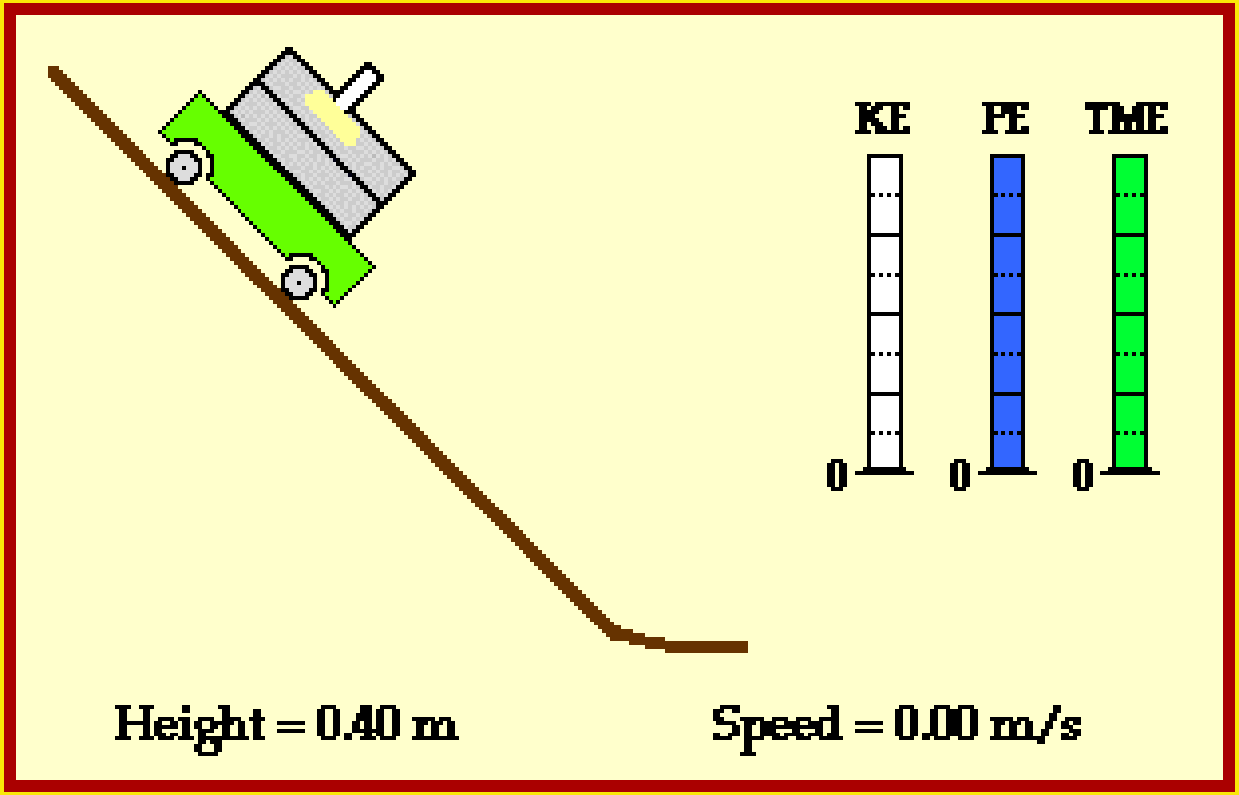
Changing Kinetic & Potential Energy



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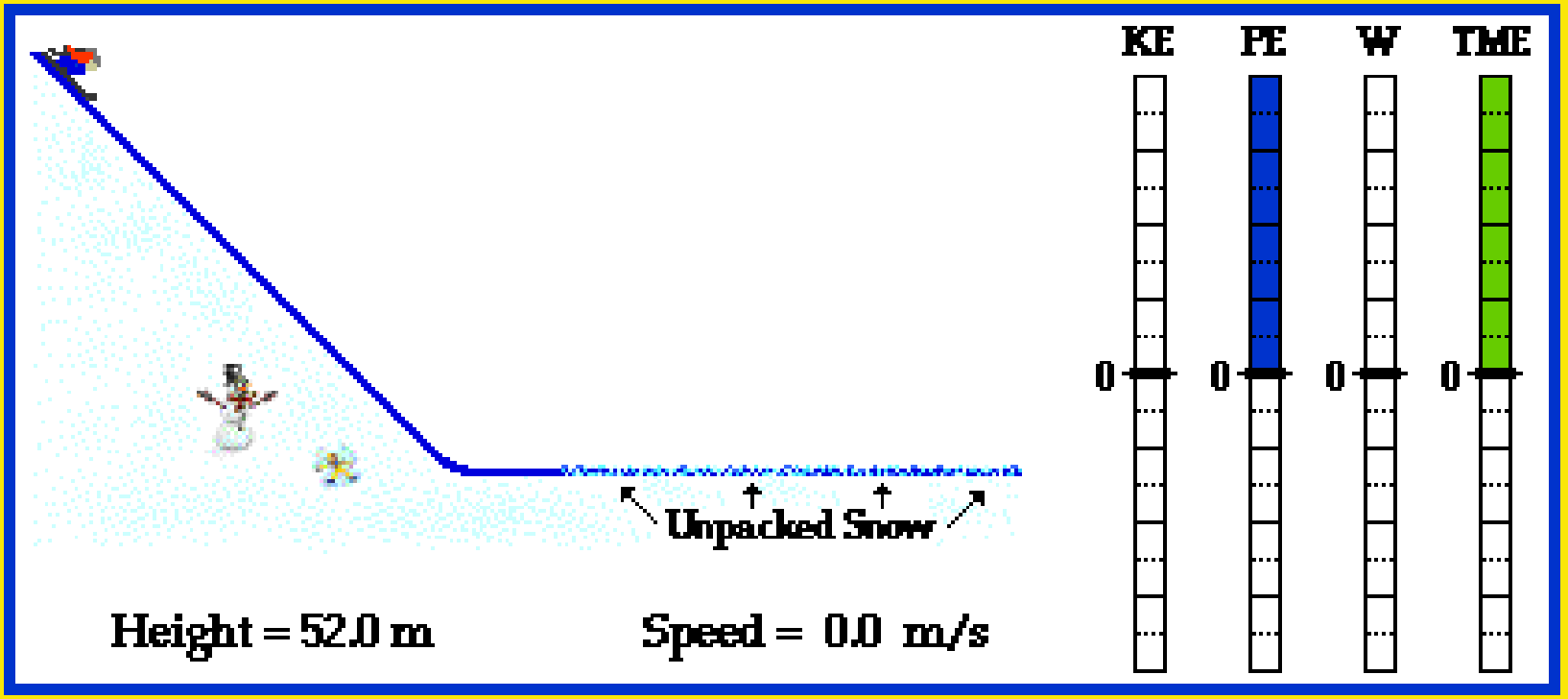
Changing Kinetic & Potential Energy



KE = Kinetic Energy
PE = Potential Energy
W = Work
TME = Time

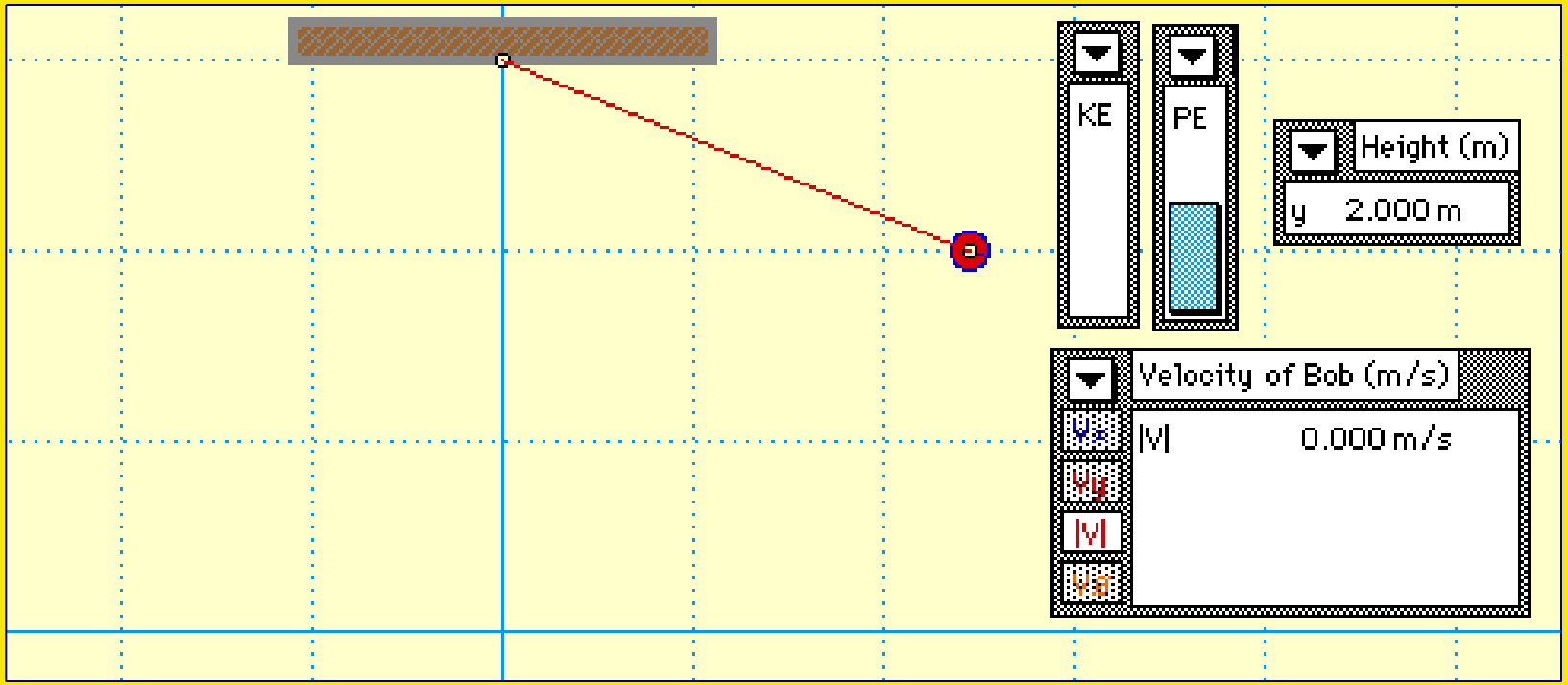
http://www.physicsclassroom.com/mmedia/energy/se.cfm

Changing Kinetic & Potential Energy

Shooting a Dart

http://www.physicsclassroom.com/mmedia/energy/dg.cfm

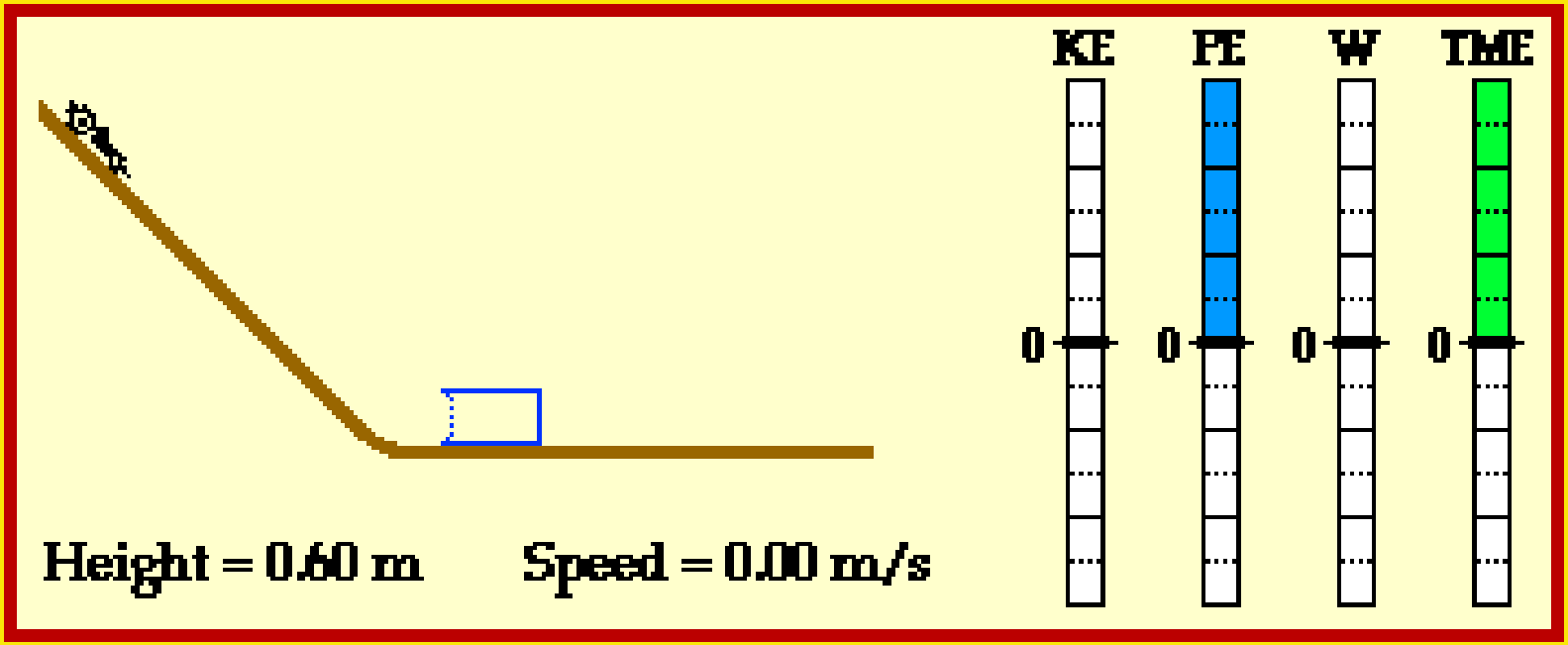
Changing Kinetic & Potential Energy



Pendulum

http://www.physicsclassroom.com/mmedia/energy/pe.cfm

Changing Kinetic & Potential Energy



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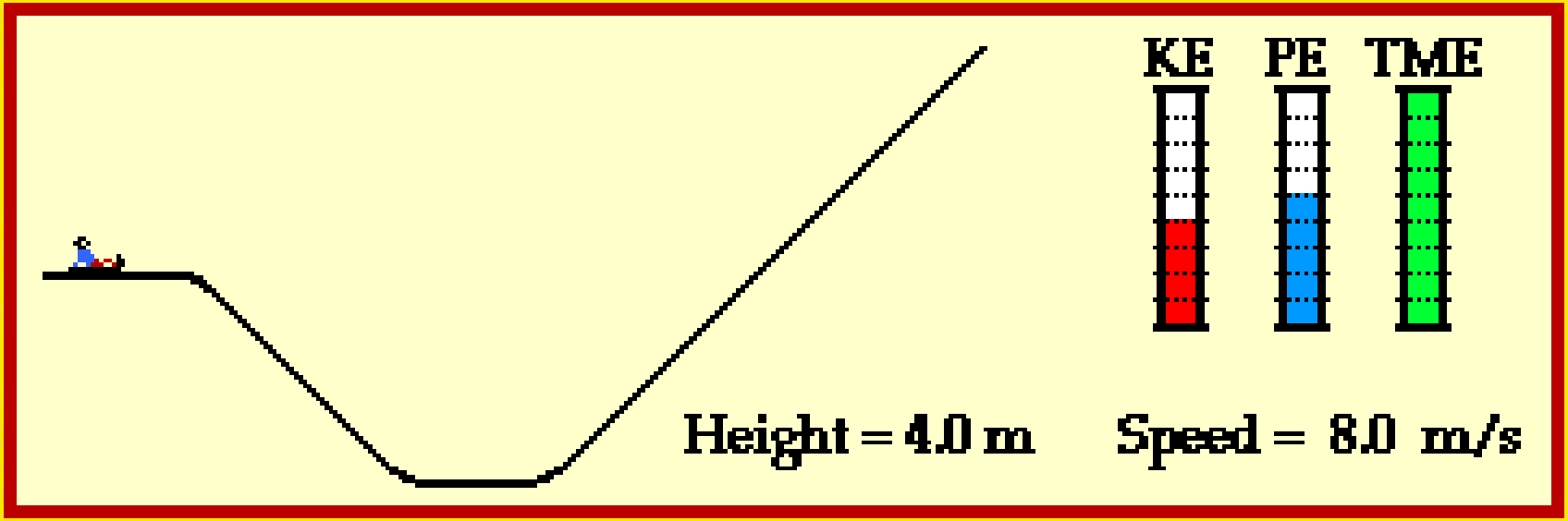
Changing Kinetic & Potential Energy



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Changing Kinetic & Potential Energy

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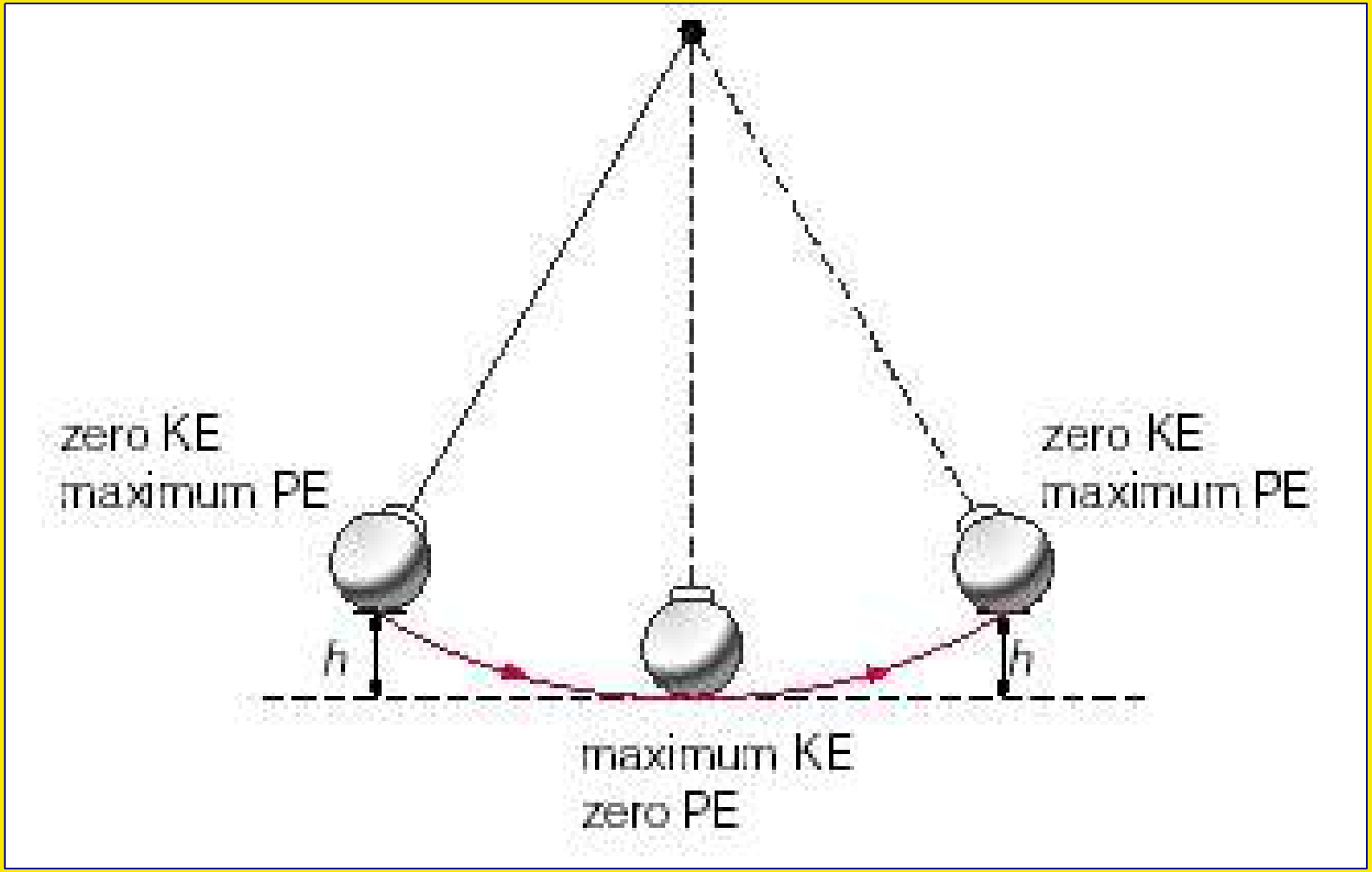
zero KE
maximum PE
zero KE
maximum PE
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maximum KE
zero PE

Watch the video clip of the cartoon Road Runner. Identify at least two examples of Kinetic Energy and two examples of Potential Energy

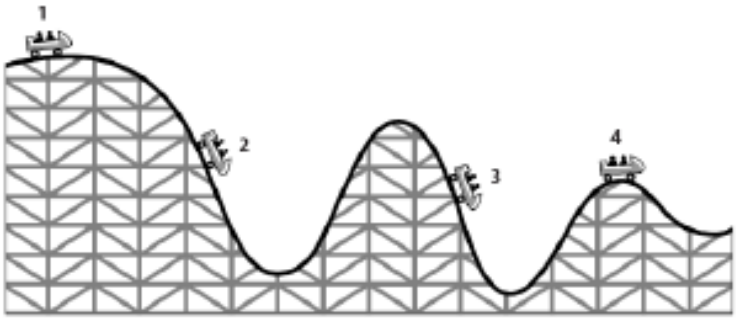
http://www.youtube.com/watch?v=8H41zbqrwVo

Other Suggested Activities:

- Trill Ride Activity, Spool Racer, or Button Whizzer
- Kinetic & Potential Energy Images
- Science of NHL Hockey

Summarizing Strategy

Potential & Kinetic Energy Summarizer Name_____ Date _____ Period ___



1. Define Potential Energy. _____

2. Define Kinetic Energy. _____

3. Which number in the diagram above shows the roller coaster at the point where it has the most potential energy? _____

4. Which number in the diagram above shows the roller coaster at the point where it has the most kinetic energy? _____

5. Explain the relationship between potential energy and kinetic energy between points 1 and 2 in the diagram above. _____

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