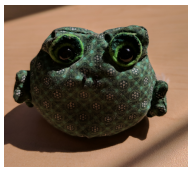
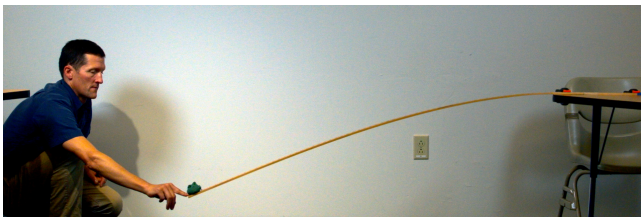
# Motion Energy: Giant Paint Paddle Probe – Interpretation Guide

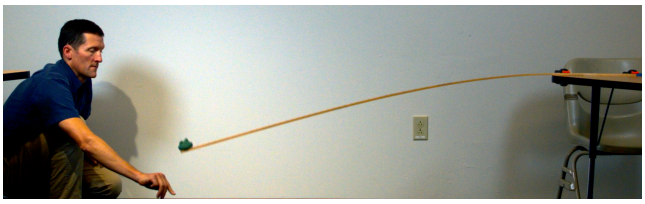
**Scenario**: Mr. L uses a long, flexible stick to launch a small bean bag frog into the air. Watch this scenario at <u>normal speed</u> and then in <u>slow motion</u> and answer the following questions.)



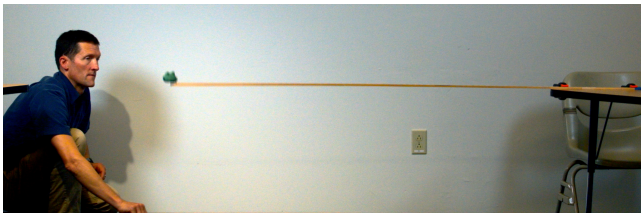
Consider the four pictures shown below which occur during the launch of the frog.



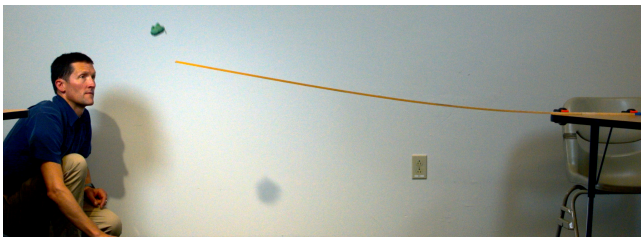
Picture #1 – Mr. L is holding down the end of the stick with his hand.



Picture #2 – Mr. L lets go of the stick. The stick and the frog both move upward.



Picture #3 – The stick passes the point where it is horizontal.



Picture #4 – The frog leaves the stick and moves upward.

1. As the stick moves upward between picture #1 and picture #2 the elastic energy of the stick:
   - ○ Stays the same **Students may be thinking that the "springiness" or elasticity of the stick does not change.**
   - ○ Increases **Students may not think the stick has energy in picture #1 because Mr. L has not let go yet.**
   - ★ Decreases
   - ○ The stick does not have elastic energy

2. What forms of energy does the stick have in picture #2?

- ○ Only motion energy **Some students may not realize that an frog can have two forms of energy at the same time.**
- ○ Only elastic energy **Some students may not think the stick has motion energy because the entire stick is not moving.**
- ★ Both motion and elastic energy **The stick is moving and it is still bent in picture #2 so it has both motion energy and elastic energy.**
- ○ Neither motion or elastic energy

3. Three students have different ideas what is happening to the energy of <u>the stick</u> between picture #1 and picture #2.

Which student do you agree with the most?

- ○ Ani says, "When Mr. L lets go, he gives the stick motion energy."
- ★ Kayla says, "Elastic energy in the stick is transforming into motion energy." **Kayla correctly describes the transformation of energy in the stick.**
- ○ Carlos says, "The stick wants to straighten out so it creates motion energy."

4. Three students have different ideas what is happening to the energy of <u>the frog</u> between picture #1 and picture #2.

Which student do you agree with the most?

- ○ Zakia says, "The energy that Mr. L used to hold the stick still is transferred to the frog." **Students who agree with Ani and/or Zakia can be encouraged to think about how the scenario would be different if the stick were held down with a latch instead of by Mr. L.**
- ○ Emil says, "The stick pushes upward on the frog and creates motion energy." **Students who agree with Carlos and/or Emil could be encouraged to represent the energy story with Energy Cubes. This representation will prompt them to think about where the motion energy comes from.**
- ★ Franco says, "Energy is transferred from the stick to the frog." **Franco correctly describes the transfer of energy.**

**Additional Challenge Question:**

For which picture does the long stick have the **<u>least elastic energy</u>**?

- ○ Picture #1 **Students may not think the stick has energy in picture #1 because Mr. L has not let go yet.**
- ○ Picture #2
- ○ Picture #3 **The stick has the least elastic energy when it is not bent.**
- ○ Picture #4 **Students may think that the elastic energy keeps decreasing until the stick reaches the highest point. These students could be encouraged to consider whether the paint paddle has elastic energy when it is bent upward.**