Name _____ Date: _____

Focus on Energy

Student Notebook

Motion Energy

Focus on Energy: Preparing Elementary Teachers to Meet New Science Standards.
Supported by the National Science Foundation

The Energy Tracking Lens

Part 1. Describe what you observe.

Part 2. Tell the energy story.

- System components?
- Form(s) of energy?
- Energy gains and losses?
- Energy transfers?
- Energy transformations?
- Where does the energy come from and where does the energy go?

Use observations to support your energy story.

Energy ideas and experiences

What are some of your ideas about energy?

Some of my ideas about energy are (write or draw)

What are some of your experiences with energy?

Here is one experience with energy that I had (write or draw)

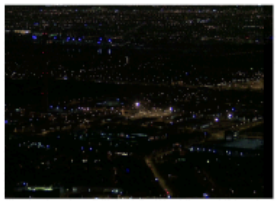
Energy in Everyday Life


1. _____


5. _____


9. _____


2. _____


6. _____


10. _____


3. _____


7. _____


11. _____


4. _____


8. _____


12. _____

How much **motion energy** do you think the ball has as it rolls at different speeds? Circle None, Some, or Lots?

Speed (observable)	Motion Energy (not observable) None, Some, or Lots?
No motion 	None, Some or Lots?
Slow motion 	None, Some or Lots?
Fast motion 	None, Some or Lots?

When a ball causes another ball to move, does it always lose some of its own energy?

Prediction

I think a ball will

___ always lose some of its own energy.

___ sometimes lose some of its own energy.

___ never lose any of its own energy.

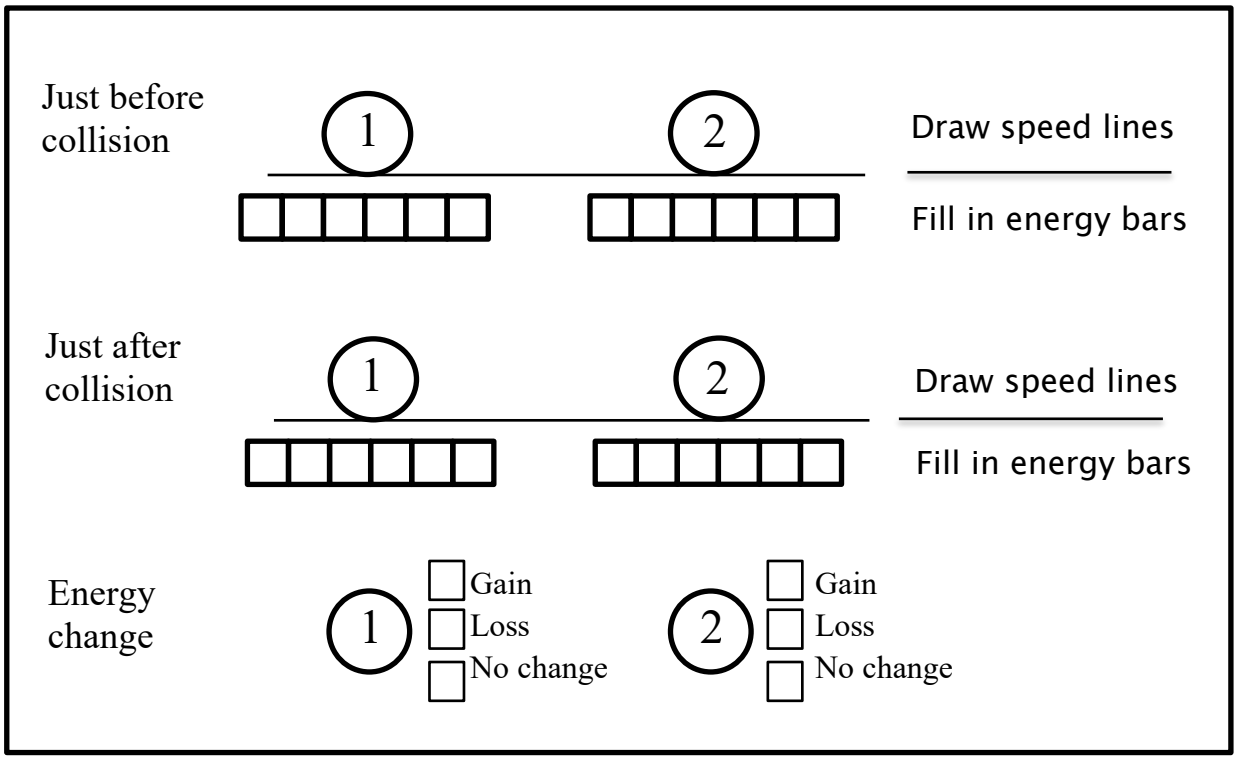
I think this because

This is how I will know that the ball has lost energy

Zoom in on Collisions: Trial 1

- Draw "**speed lines**" to show the speed of each ball.
- Fill in **energy bars** to show the motion energy of each ball.

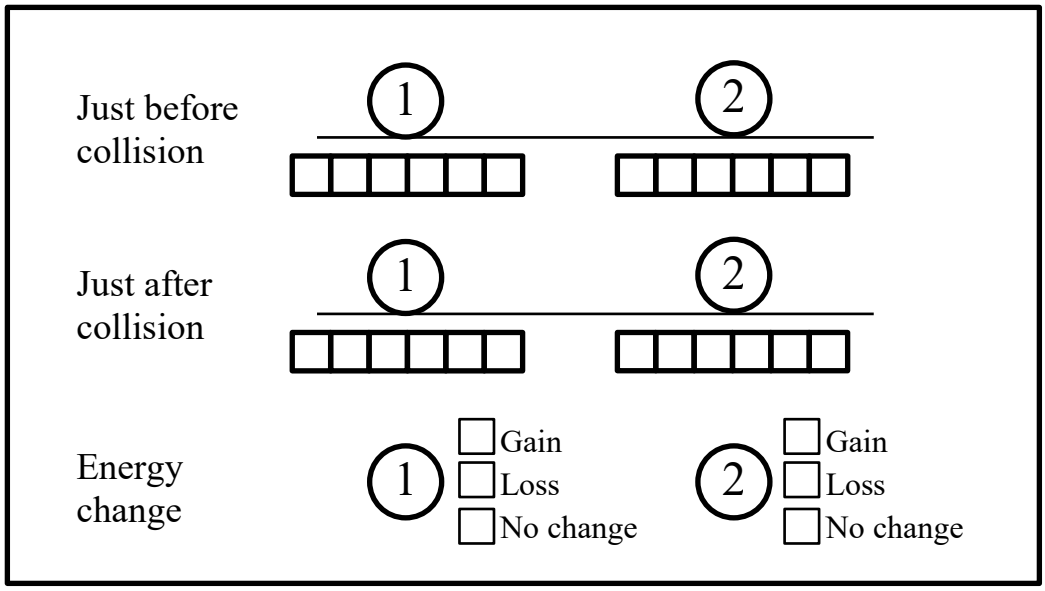
Remember, you can't see energy – you have to make sense of **indicators** or clues!



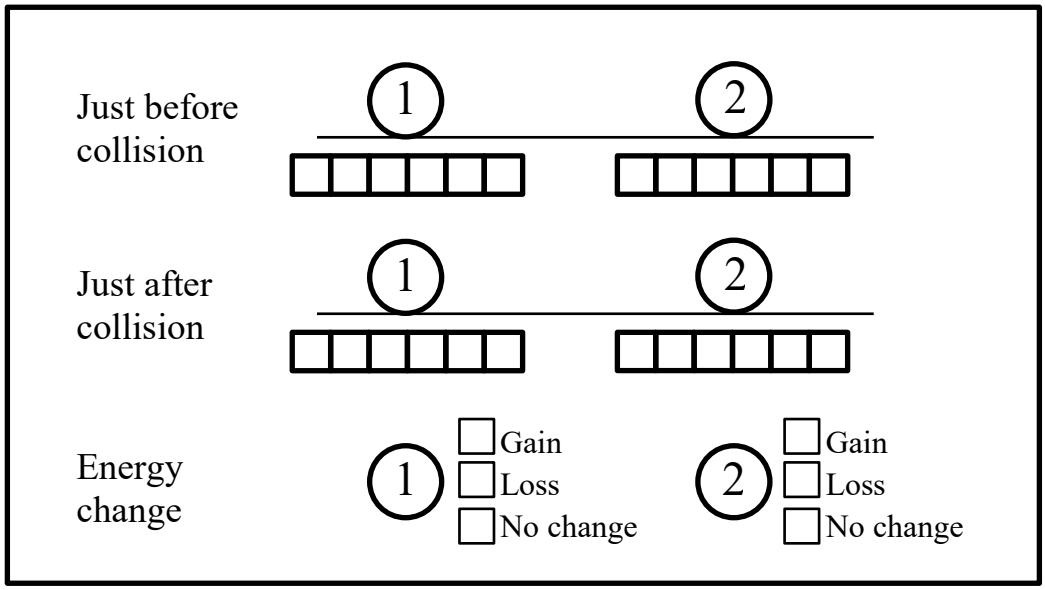
Zoom in on Collisions: Trials 2 – 3

- Draw "**speed lines**" to show the speed of each ball.
- Fill in **energy bars** to show the motion energy of each ball.

TRIAL 2



TRIAL 3



When a ball causes another ball to move, does it always lose some of its own energy?

I found out that

When a ball causes another ball to move, it will

___ always lose some of its own energy.

___ sometimes lose some of its own energy.

___ never lose any of its own energy.

Does this make sense to you? __ yes ___ no.

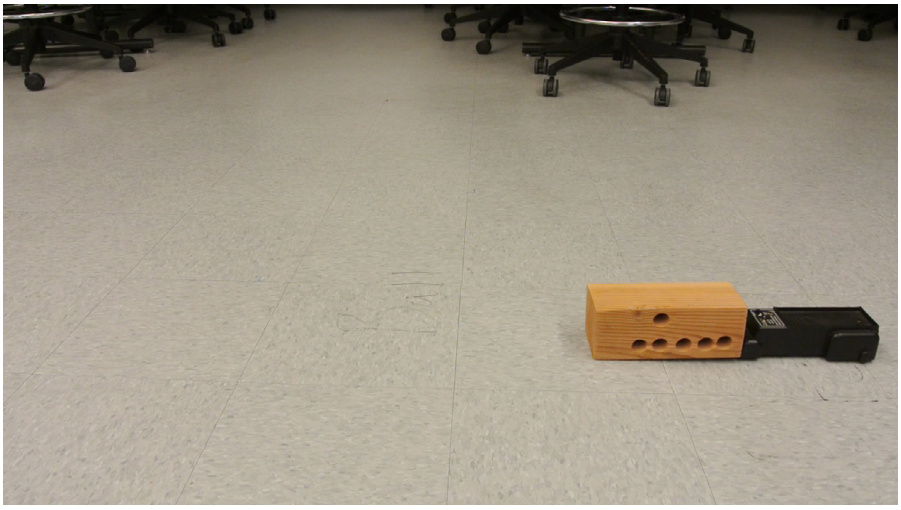
I'm convinced of my answer because I observed

Can you think of an example from your everyday life where there's a loss of energy somewhere and a gain of energy somewhere else?

My example is

Quick Check: Block Push Probe

Scenario: A battery powered car is pushing a wooden block across the floor as shown below. (Watch the video and answer the following questions.)



1. As the car pushes the block across the floor…
   - ○ the car has energy
   - ○ the car does not have energy

The statement I chose makes sense to me because

2. As the car pushes the block across the floor…
   - ○ the wooden block has energy
   - ○ the wooden block does not have energy

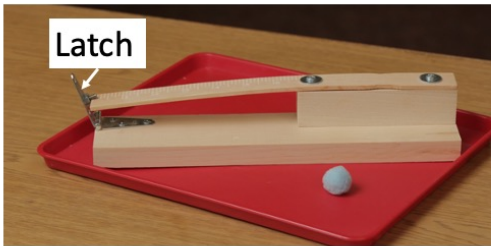
The statement I chose makes sense to me because

Can a paint paddle gain and lose energy?

Make a simple drawing of the paint paddle

No Elastic Energy	A little elastic energy	More elastic energy
		

Latch the paint paddle and place the pompom. Release the latch.

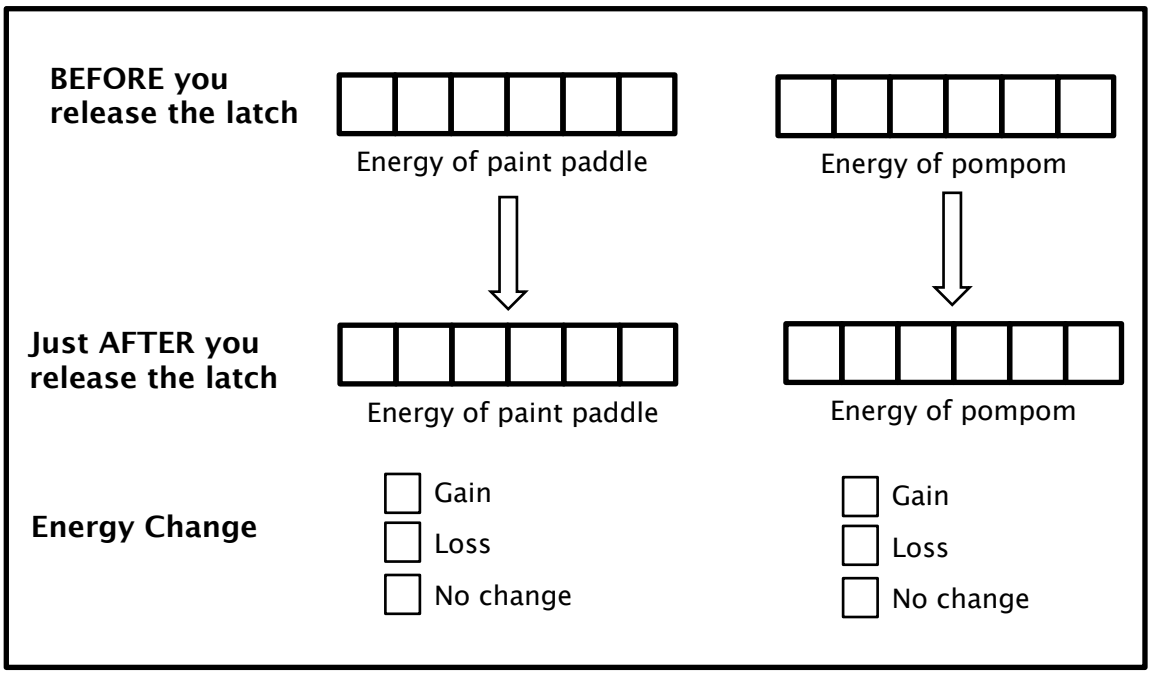


Part 1. Observe

BEFORE you release the latch		AFTER you release the latch
Draw and label the spring board/pompom system	Release Latch →	Draw and label the spring board/pompom system

Part 2. Tell the Energy Story of the pompom and the paint paddle

1. Decide how to fill in the energy bars.



2. Where does the energy come from and where does the energy go? (Write or draw your ideas.)

Look for Elastic Objects and Evidence of Elastic Energy

What's an elastic object? If you can twist, bend, stretch or squeeze it, and it returns to its original shape when you let go, it's an elastic object!

1. Some elastic objects I found **indoors** are

2. Some elastic objects I found **outdoors** are

3. Give examples of evidence of elastic energy in your everyday life.

I can bend a: _____

I can stretch a: _____

I can compress (squeeze) a: _____

Explore the propeller and elastic band system

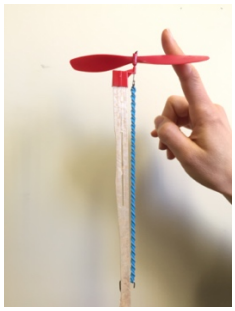
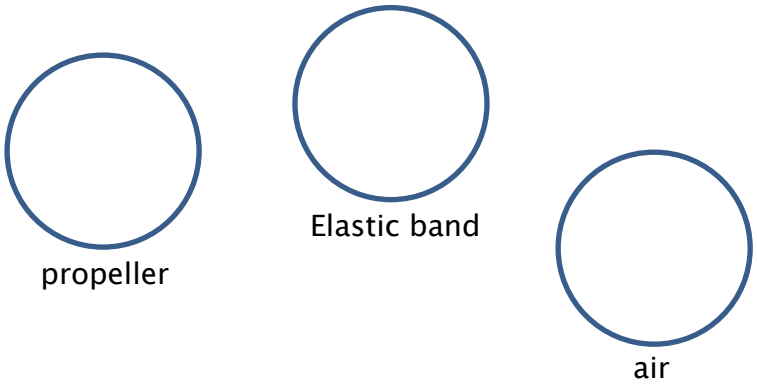
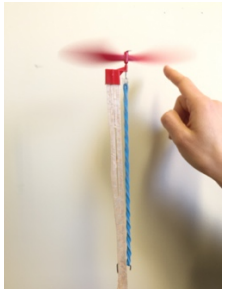
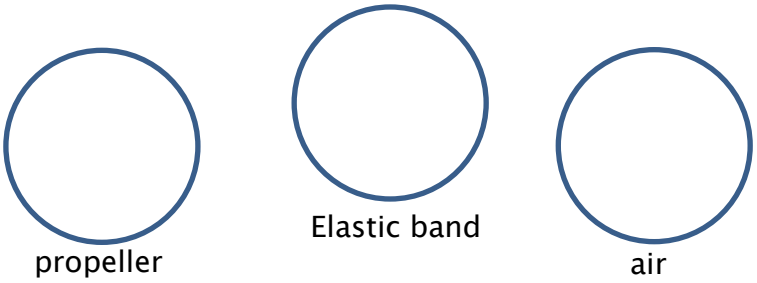
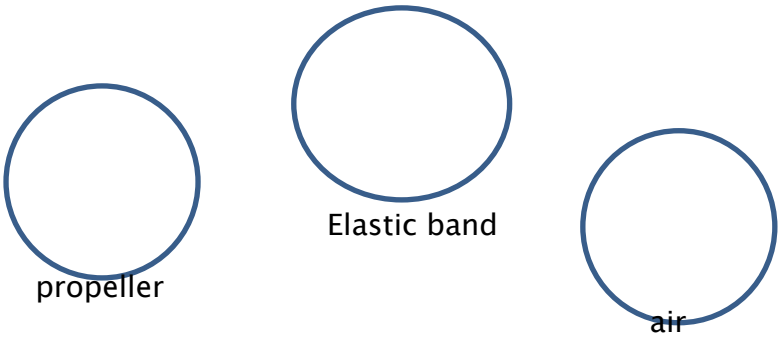
Tell the energy story.

M = a unit of motion energy

E = a unit of elastic energy

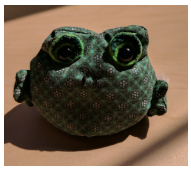
Begin with 6 units of energy in Time 1.

Show how the energy is distributed at each time.

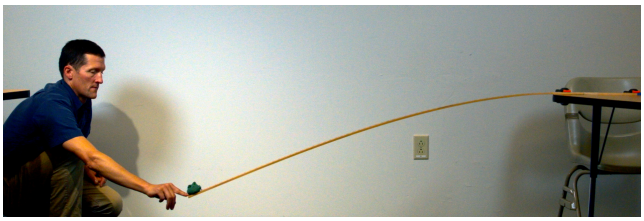
Time 1	Propeller not moving Elastic fully wound 	
Time 2	Propeller spinning Elastic unwinding 	
Time 3	Propeller not moving Elastic completely unwound 	

Wrap Up: Giant Paint Paddle

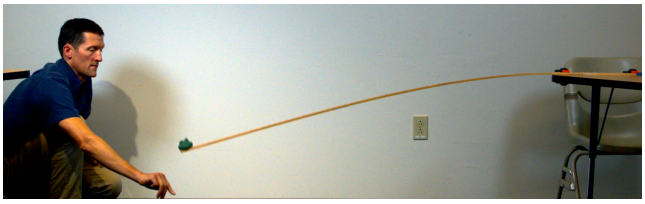
Mr. L uses a long, flexible stick to send a small bean bag into the air. Watch this at normal speed. Then watch in slow motion.



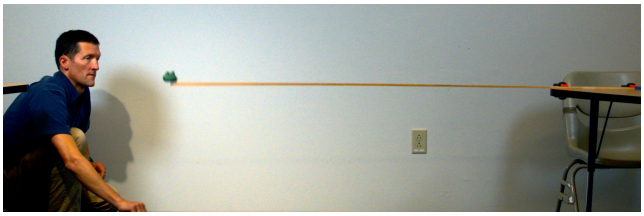
Look at the four pictures below. Then answer the questions.



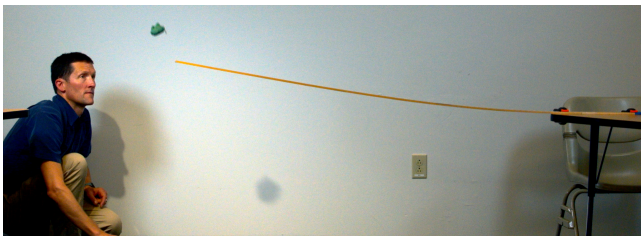
Time #1 – Mr. L is holding down the end of the stick with his hand.



Time #2 – Mr. L lets go of the stick. The stick and the bean bag both move upward.



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



Time #4 – The bean bag leaves the stick and moves upward.

1. As the stick moves upward between time #1 and time #2 the elastic energy of the stick:
   - ○ Stays the same
   - ○ Increases
   - ○ Decreases
   - ○ The stick does not have elastic energy

This answer makes sense to me because _____

_____

_____

2. What forms of energy does the stick have at time #2?
   - ○ Only motion energy
   - ○ Only elastic energy
   - ○ Both motion and elastic energy
   - ○ Neither motion or elastic energy

This answer makes sense to me because _____

_____

3. Three students have different ideas about what is happening to the energy of <u>the stick</u> between time #1 and time #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."
- ○ Carlos says, "The stick wants to straighten out so it creates motion energy."

4. Three students have different ideas about what is happening to the energy of <u>the bean bag</u> between time #1 and time #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 bean bag."
- ○ Emil says, "The stick pushes upward on the bean bag and creates motion energy."
- ○ Franco says, "Energy is transferred from the stick to the bean bag."

Additional Challenge Question:

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

- ○ Time #1
- ○ Time #2
- ○ Time #3
- ○ Time #4

The time I chose makes sense to me because _____

_____

_____