PHASE ONE: BREAK DOWN
ENERGY EXCHANGE

Mission: What determines whether energy will transfer?
Age: 8+
Materials cost: $5
Time: 25 min (Set-up: 5 min Activity: 15 min Clean-up: 5 min)

What you need:

Materials:
- Paperclips (same size paperclips)
- Washers or binder clips
- Yarn or string
- Tape

Equipment:
- Scissors
- Ruler
- Two dining room chairs (make sure not to sit on the chairs or to disturb them during the experiment.)

What to do:

1. Cut a 3-foot-long string (about hip to floor length). Tie or tape each end to the backs of two chairs and move them apart until the string is straight, but not pulled too tight.

2. Make a paperclip chain by hooking equal-sized paperclips together until it is about 8 inches long.

3. Weight the chain by adding washers or binder clips to the last paper clip. Count how many you use.

4. Hang the chain at the middle point of the string, with the weighted end hanging down.

5. Keeping the chain straight, pull the weight back until it is slightly lower than the string, then open your fingers and let it go. Observe how much time it takes to swing back and forth once.

- Next, try changing the number of paper clips to see how the swing time is affected. What do you notice? Does the time for each swing stay the same or does it change?
- After testing several different lengths, return the chain to its original length.

6. Make a second identical chain and hang both on the string, using a ruler to place each of them an equal distance from each chair. (Make sure there is enough space between them so they don't accidentally hit while swinging.)

7. Pull back just one of the weighted chains (not both!) and let it swing, just like you did in Step 5. Watch what happens to the second chain!

8. Now shorten or lengthen just one of the chains (so that they are different lengths) and try it again. What happens to their swings this time? Why do you think that happens?

9. Keep experimenting!

Clean-up:

Remove the paper clip chains from the string. Take the washers off the chains and disassemble them. Undo the string from the chairs and discard it. Return the chairs to their original locations.