

Balls inside the Slinky

Asian Try Zero G 2018

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ATZG 2015 - 2018

2015

2016

2017-2018

- Zero-G Painting
- Squeezing Ball
- Zero-G: Let it Melt!
- Inside the SLINKY

2015

2018

"Zero G" painting
You will need paintbrushes added with water or ink, paint brush and white paper.

Experiment I
1. Add food color with paint. Draw a straight line on the paper.
2. Try to make different picture, animal, across side way.
3. Compare the results.

Experiment II
1. Add food color brush with paint. Sign or write your name on the paper.
2. Try to make different picture, animal, across side way.
3. Compare the results.

Experiment III
1. Add food color brush with paint. Draw some picture on the paper.
2. Try to make different picture, animal, across side way.
3. Draw on your counting table.

Notes:
- Paper is fixed on the ground.
- Try to draw the lines on the paper at the same distance with the same speed every time.

1. Drawing and Signing in Above way:
In ZERO-G, You see down the straight line and sign your name on the paper in Above way without any picture below earth, the chosen paper will drop down to you when it above because of the gravity.

Above Way painting in Zero G

2. Drawing and Signing in Normal way:
In ZERO-G, You see down the straight line and sign your name on the paper in Normal way. This line will be records and different than when you do on earth because it has no effect from gravity.

Below Way painting on ground

3. Drawing and Signing in Side way:
In ZERO-G, You see down the straight line and sign your name on the paper in Side way and the line will be records. When you do on earth, your line will be every from the chosen paper because of the gravity.

Side Way painting in Zero G

Side Way painting on ground

Attachment-3

1. Activity Title: "SQUEEZING BALL"

2. Hypothesis and Theory
According to the use of universal gravitation, every objects has small gravity force that is called weight. Using the traditional ball of the same size on which is no dependent on the force above, the weight of the material gravitation doesn't change. This process will change the ball's gravity components to drag, surface tension of the container from bottom water molecules and so on. In water, the water will be more compressed and the small expansion area of the container. Therefore, water will gather around the object but does not expand out, but will remaining away from the surface. The water will be absorbed back once release it the sponge ball.

Observation Method:

1. squeeze the sponge ball with fingers
2. squeeze the sponge ball with a pump
3. press the sponge ball into sponge ball

Mathematical Assumption: (For young scientists and engineers, aged up to 27)

Attachment-2

1. Activity Title: "ZERO G: LET IT MELT!"

2. Hypothesis and Theory
-Hypothesis:
If, ice will melt from outside to inside creating a form of spherical water drop around the ice because of the water surface tension. The whole ice and water will be floating in the air due to effect from gravity.

-Schematic Model:

3. Chocolate will melt from outside to inside creating melted chocolate drop and floating in it
When added some warm water, the result will be the same as above but takes less time because of the warm water makes it melt faster.

4. Chocolate will melt from outside to inside creating melted chocolate drop and floating in it
When added some warm water, chocolate will become soft and sticky because water will a stick all sugar and cocoa particles into a paste, the result paste will be floating in the air. In fact, it also takes less time to melt because warm water makes it melt faster.

Mathematical Assumption: (For young scientists and engineers, aged up to 27)

1. Activity Title: "Inside the SLINKY"

2. Hypothesis and Theory
-Hypothesis:
Gravity and the Slinky's own momentum keep the Slinky moving down. Together with the mass (the balls) will make the slinky placed horizontally and down faster as gravity pulls them downward. When you fix Slinky with a variety of mass and stretch it out, the lightweight object won't slip through the wires but the heavyweight will. When stretching the slinky until the gap between the wires bigger than the object, the object will fall down.
In zero-G condition, there would be no force that act in pulling them down. The objects inside the slinky will not move anywhere ($F=0$) unless the slinky moved from your hand stretching it and pulls the objects to move. They can move anywhere. It's not necessary to be the downward direction. It depends on how much force the slinky put on them and at which angles they were hit by moving slinky.

-Schematic Model:

Experiment I

Experiment II

Mathematical Assumption: (For Category 2, young scientists and engineers up to 27 years old)

HOW DID THE IDEA COME TO US?

As for the 2018 Try Zero G experiment, the name is **“Inside the Slinky”**. This idea came to us spontaneously. When we went to look for our toy *slinky* in the toy trunk. We found a slinky with numerous toys getting stuck inside and hanging from it. So we planned out an experiment; putting balls of different weights but same size inside the slinky. Then proceed to stretch the slinky horizontally and vertically and observe how three balls move inside the Slinky.



EXPERIMENT PURPOSE

To observe how three balls move inside the Slinky when applying vibration and centrifugal force to the Slinky.

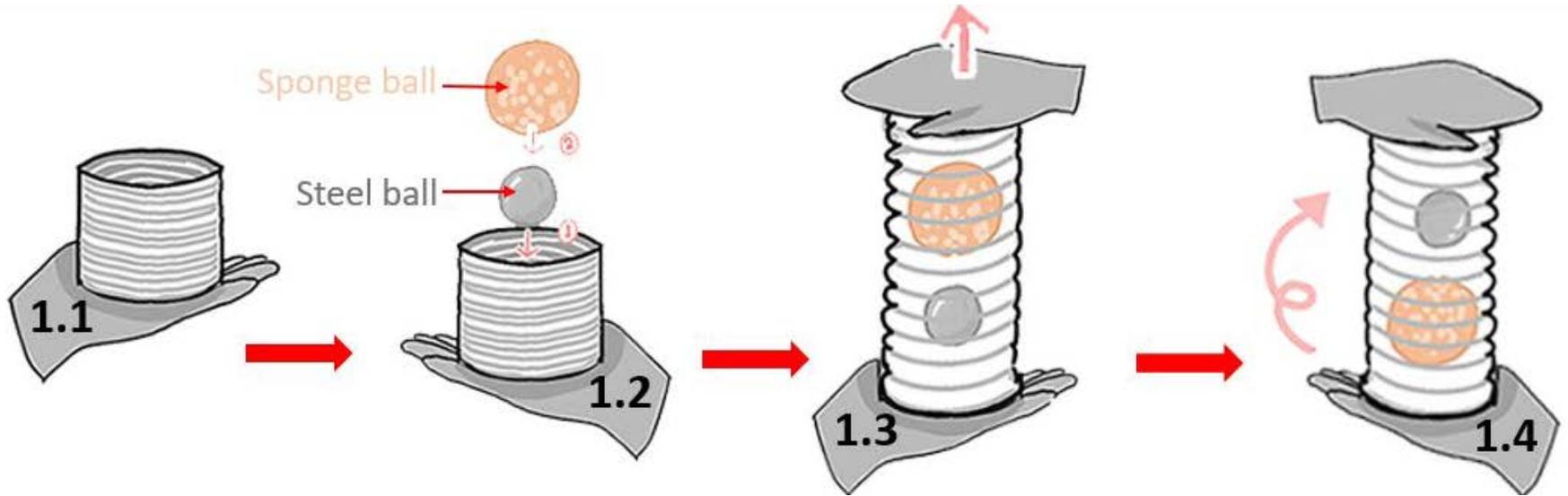
MATERIALS

- Sponge Ball with diameter of 45 millimeters and mass of 1.2 grams.
- Mass Comparison Kit (Balls): Steel, Vinyl and Wood
- Slinky



METHODS

Experiment I



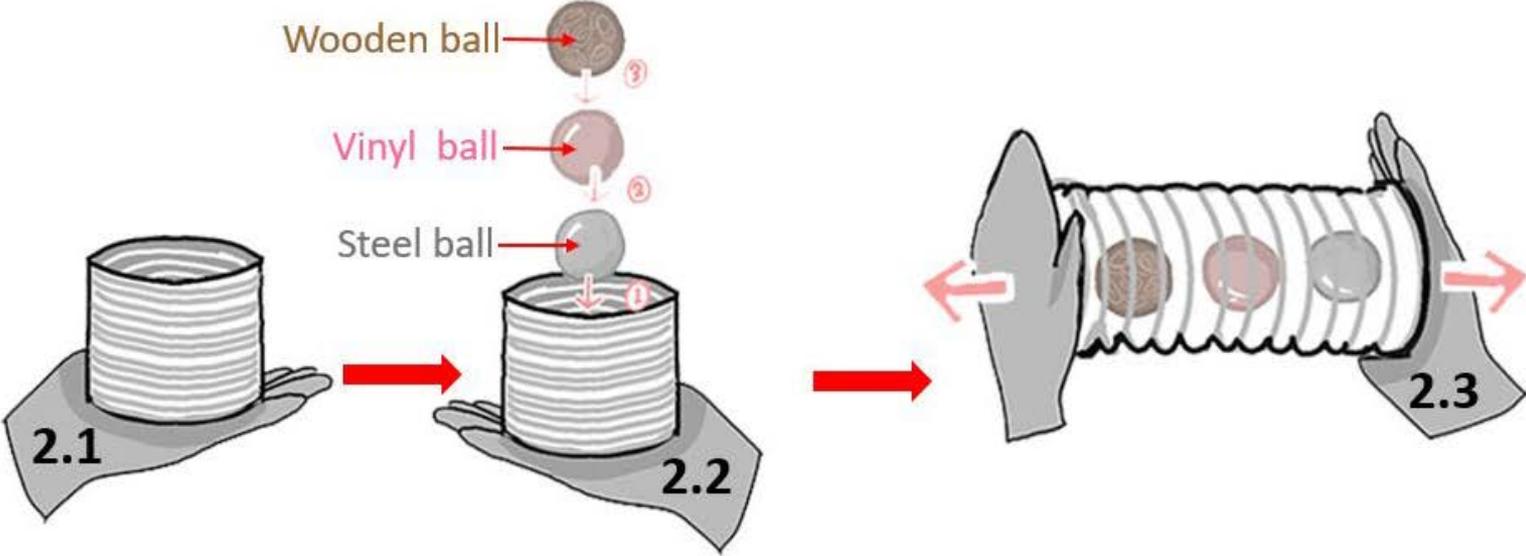
METHODS

Experiment I

- 1.1 Have your palm faced up and hold one end of the slinky.
- 1.2 Insert **steel ball** then **sponge ball** into the opening on the top. Observe.
- 1.3 Hold both ends of slinky with your hands (palms facing each other). Begin stretching the slinky vertically to between 1 and 2 feet long. Observe.
- 1.4 Repeat 1.1-1.3, but ,this time, flip the slinky upside down before begin stretching it. Observe.

METHODS

Experiment II



METHODS

Experiment II

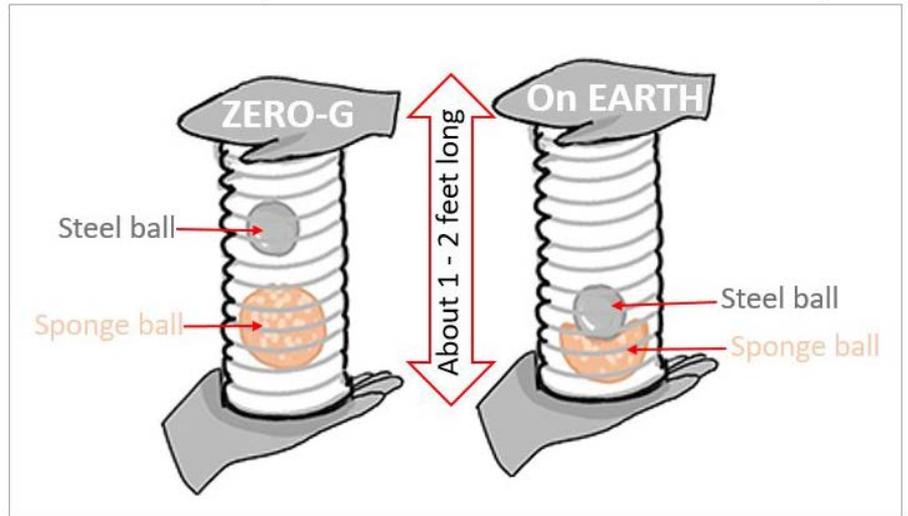
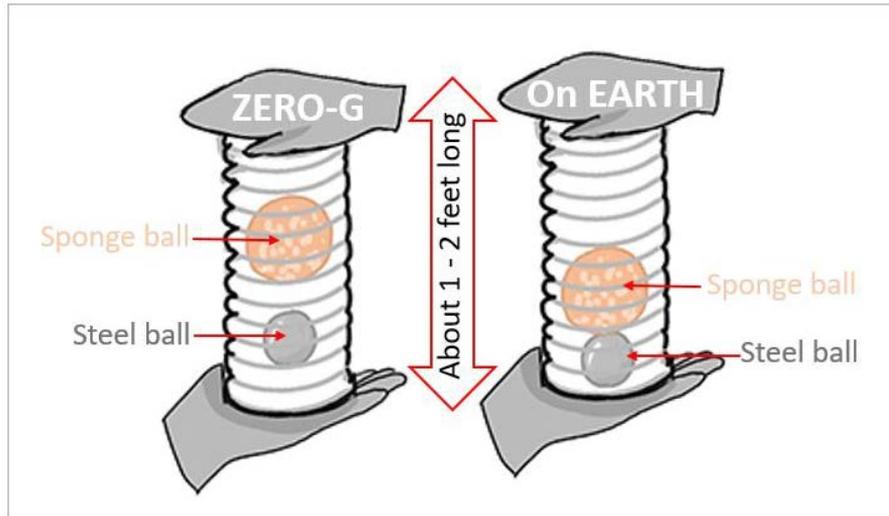
2.1 Have your palm faced up and hold one end of the slinky.

2.2 Insert 3 balls from Mass Comparison Kit into the opening on top of slinky. Place the balls vertically by arranging them from the heaviest to the lightest ; **Steel, Vinyl** and **Wooden ball**. Observe.

2.3 Hold both ends of slinky with your hands (palms facing each other). Begin stretching the slinky horizontally to between 2 and 3 feet long or until the gaps between the wires are bigger than the balls. Observe.

HYPOTHESIS

Experiment I



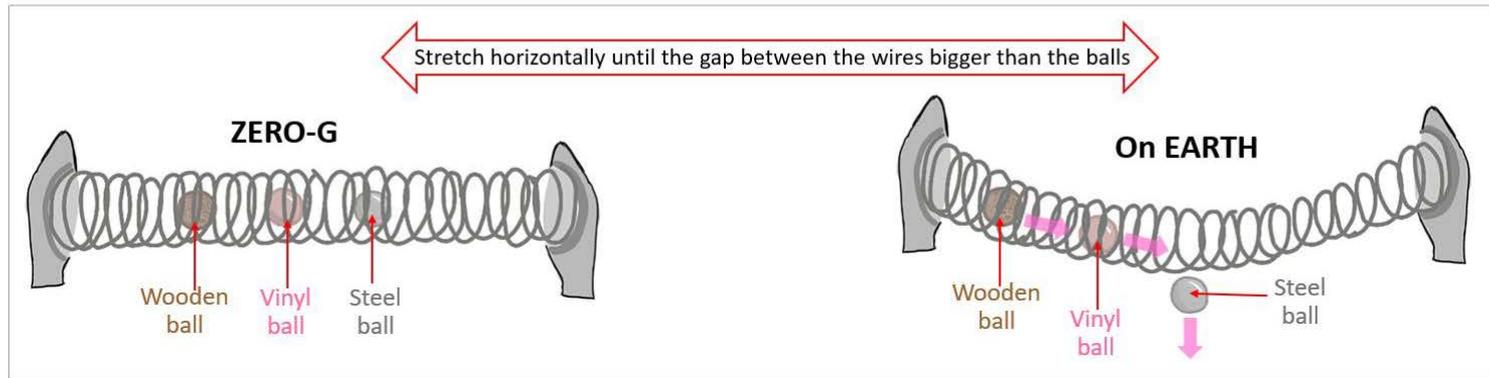
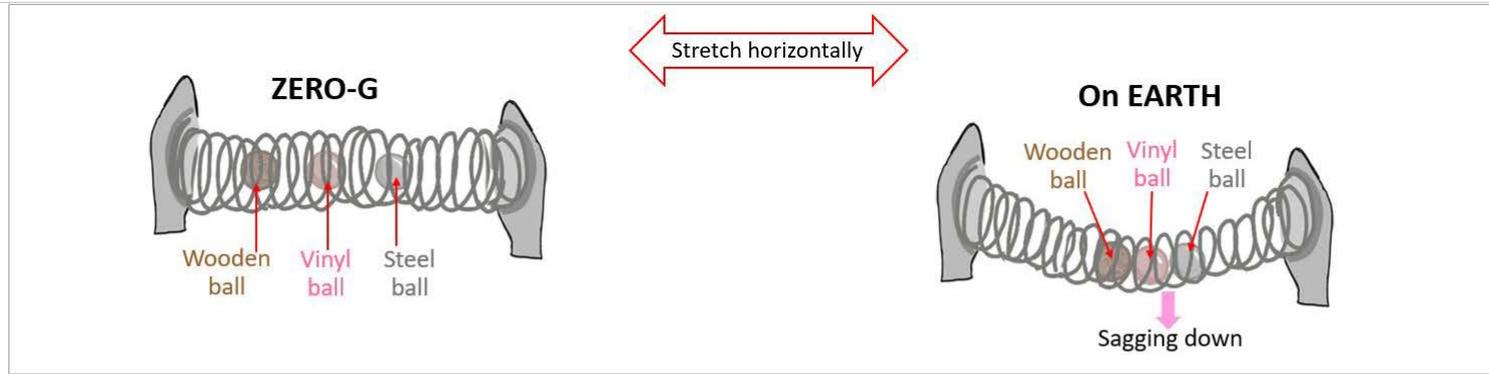
HYPOTHESIS

Experiment I

Gravity and the Slinky's momentum keep the Slinky moving down. Together with the mass (the balls) will make the slinky placed horizontally sag down faster as gravity pulls them downward. When you fill Slinky with a variety of mass and stretch it out, the lightweight object won't slip through the wires but the heavyweight object will. When stretching the slinky until the gaps between the wires are bigger than the object, the object will fall down.

HYPOTHESIS

Experiment II



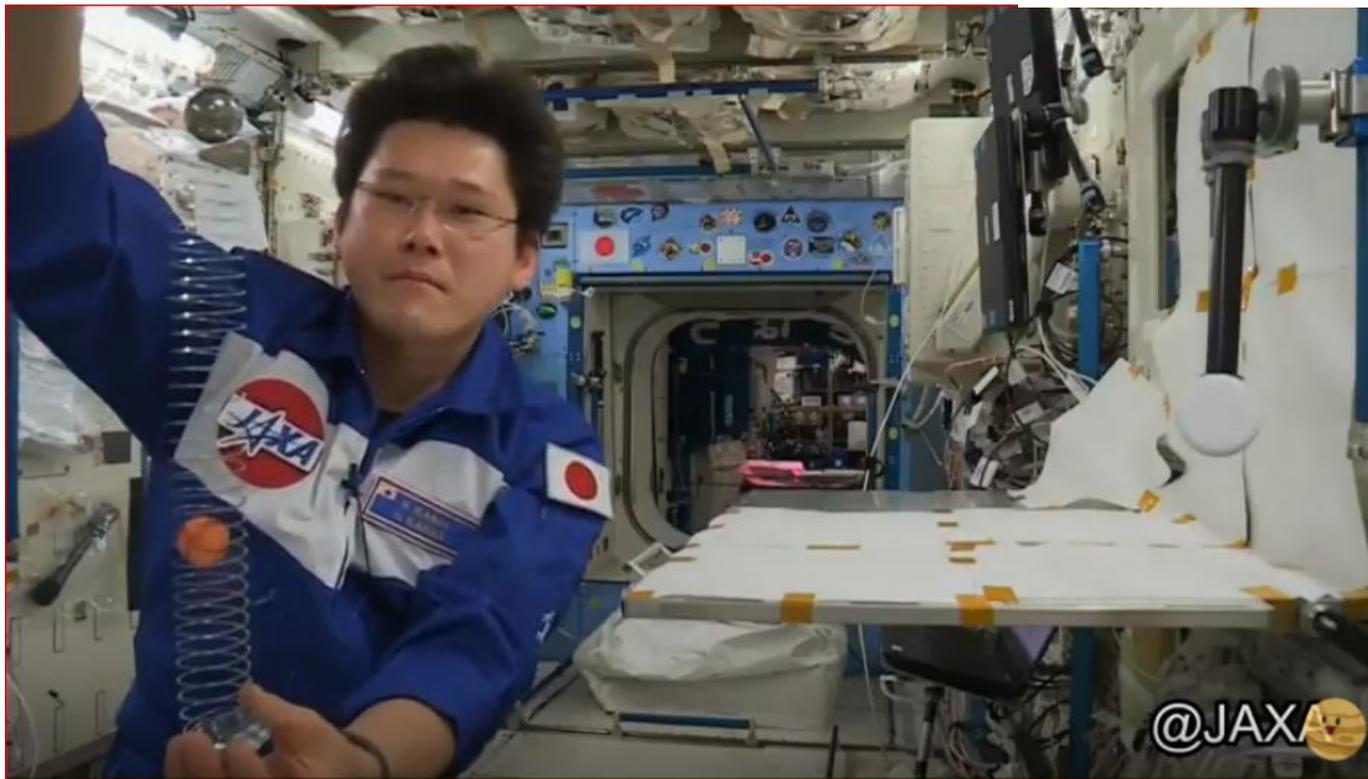
HYPOTHESIS

Experiment II

In zero G condition, there would be no force that act in pulling them down. The objects inside the slinky will not move anywhere ($F=0$) unless the slinky moved from your hand stretching it and propels the objects to move. They can move anywhere. It's not necessary to be the downward direction. It depends on how much force the slinky put on them and at which angles they were hit by moving slinky.

RESULTS

Experiment I



RESULTS

Experiment II



RESULTS

The result of the experiment went accordingly to the hypothesis. Unlike on earth, the balls weren't pulled by the force of gravity. Therefore, they didn't fall down toward one direction but rather float around regardless of their weights. According to the first law of Newton, the object will keep moving in the same direction if there's no other force that acts on it. When the inside of the slinky hit the ball, they move in straight line until the slinky or other ball hit them again, propelling them toward another direction. Even when they're held vertically, the metal ball won't fall and squash the sponge one. When held horizontally, none of the ball fall off the slinky by their weight unless pushed with enough force.

RESULTS

The result of this experiment, we can adapt the knowledge obtained from this to help develop the transportation process in zero gravity. Weightless object must be easier to move around when compared to objects with weight. However, another factor that could matter in null gravity environment is shapes. To study how to control the directions of these objects in zero gravity condition, we have to further the experiment with objects of the same mass but different shapes moving inside the greater diameter silky.



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Thank You

