



Build a Linear Accelerator

Materials:

Industrial magnets, steel marbles, ruler, wood blocks

Procedure:

- 1: To the right side of each red arrow, place two steel balls in the groove.
- 2: Place a "target" a few inches to the right of the grooved channel.
- 3: Place the last ball in the groove on the far left end of the channel (opposite the target).
- 4: Let the ball go and stand back!



Lights, Camera, Refraction

Materials:

Transparent glass, permanent water, Piece of paper, Water

Procedure:

- 1: Fill the transparent glass with water.
- 2: Using the black permanent marker, draw a horizontal arrow on the piece of paper.
- 3: Place the piece of paper with the horizontal arrow behind the transparent glass of water. Make sure the paper is touching the transparent glass of water and observe the horizontal arrow.
- 4: Move the piece of paper with the horizontal arrow away from the transparent glass of water and observe the horizontal arrow.



Newton's Nightmare

Materials:

Copper tube, aluminum tube, pvc pipe,
iron nut, neodymium magnets

Procedure:

1. Take a metal nut and drop it through each of the tubes and take note of what happens.
2. Now take the stack of neodymium magnets and drop them through each of the tubes.
3. What did you notice when the magnets were dropped through the copper and aluminum tubes?

What questions do you have?

What questions do you want to investigate further?



Tippee Top

Materials:

Paper plate, spinning top

Procedure:

1. Lay out a paper plate on the table.
2. Give the top a really fast spin and observe what happens.
3. What happened with the top before it ended it's spin

What questions do you have?

What questions do you want to investigate further?



Ice Melting Blocks

Materials:

Melting blocks, ice, paper towels

Procedure:

1. Touch both blocks. Which feels warmer?
(The foam block will feel warmer.) Predict which block will cause ice to melt faster.
2. Place the O-rings on the blocks to prevent water from flowing off. Place an ice cube on each block.
3. Observe the rates at which the ice cubes melt.
Which material is conducting heat into the ice faster?
(The aluminum block will melt ice much faster than the foam block.)
4. After a few minutes, remove the ice and water, and touch the blocks again. Explain what you observe.
(The aluminum block feels even cooler now, and it is cooler.
Energy stored as heat inside the block was transferred to the ice when it melted. Now the block has less thermal energy than before.)
5. The aluminum block felt cool at the beginning for the same reason that it melted the ice faster. It is better at conducting heat away from your hand, and makes your skin feel cool.



Cloud in a Bottle

Materials:

Two liter bottle, rubbing alcohol, water, pump, rubber stopper

Procedure:

1. Let's start with making the easy cloud first and then you'll know what to do for the tougher version. Wear safety glasses and pour a little alcohol into the bottle so it puddles in the bottom..

2. Swirl the alcohol around inside the bottle. Make sure it coats the lower sides of the bottle.

NOTE: The metal inflation tube needs to go through the stopper. From the bottom of the stopper, drill a hole through the center of the stopper that's a little smaller than the inflation tube. The tube should slide easily through the stopper from the top to the bottom but still be tight enough to seal the air inside the bottle. The tip of the tube goes inside the bottle and the pump connection goes outside. Attach the pump to the inflation tube.

4. Insert the stopper into the bottle and pump eight to ten times. As you start to pump, you'll notice that the stopper wants to pop out. Hold it tightly in the bottle opening so it doesn't. It may be stronger than you think!

5. When you're ready, quickly remove the stopper and watch the cloud form almost instantly in the bottle. If the cloud is faint or just a small puff of one, you'll need to add more pressure in the bottle before you pop the stopper.