

# Science Experiments

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## How Do Satellites Orbit?



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### Purpose:

You're going to apply the principles of historic geniuses like Johannes Kepler and Thomas Edison to figure out how to get a satellite into orbit.

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### You'll need:

- String
- Table
- Small metal washers
- Glass cup

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### Procedure:

1. Tie a few metal washers onto your string.
2. Tape or tie the other end of the string so that the washers hang an inch or so above a flat surface. (You could fix the loose end of the string to the bottom of a raised kitchen cabinet use the countertop beneath as your experiment area).
3. Mark where the washers hang, and then place the glass upside-down so that it is directly underneath where you've attached the string. You can then let the washers rest against the side of the glass.
4. Try to nudge the washers so that they swing away from the side of the glass. Start with a light tap and experiment with the direction and force of your launch until you can get the washers to "orbit" around the glass.
5. Reflection: Which direction do you need to nudge the washers to get them to not touch the glass? How much force allowed the washers to orbit the glass for the longest amount of time? Can you get your washers to land on a specific part of the cup?

# Science Experiments

## What does the greenhouse effect mean?

### Purpose:

The greenhouse effect is the trapping of heat in the atmosphere. Without the gases in the air, heat from the sun would bounce back into space. Too much gas in the air causes too much heat to be absorbed into the atmosphere, therefore disrupting the earth's equilibrium.

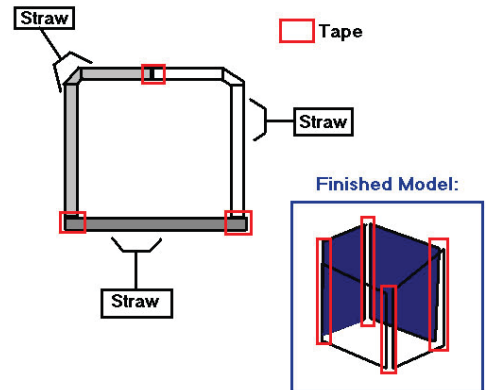
### You'll need:

- 12 Bendy straws
- Plastic wrap
- Tape
- 2 Thermometers
- Watch, clock, or timer

### Procedure:

#### Part One

1. Grab the bendy straws. Put them together like this diagram.
2. Make 4 sides that look like the diagram above. Notice the bottom gray straw is straight. If the bendy straw sticks out, cut the excess length.
3. Tape the straws together in all the red areas.
4. The finished model should be a cube with no roof or bottom. Making those parts would be a waste of material.
5. Wrap the plastic wrap around the cube so that it forms a complete cube and there are no openings.
6. Draw or print out a chart to record your temperatures.



Here is an example:

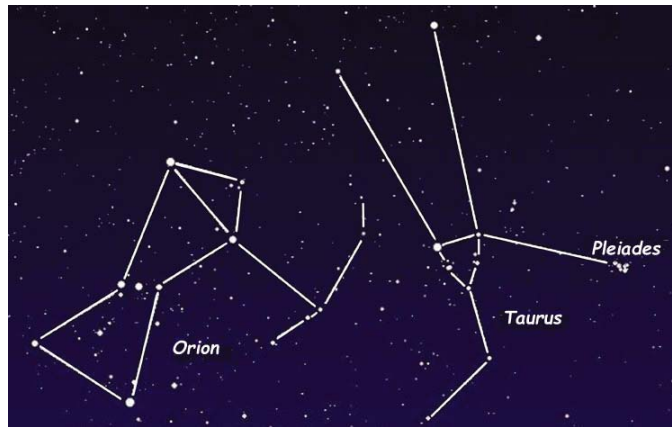
	Inside Cube	Outside Cube
<b>In the sun</b>		
0 min.	<input type="text"/>	<input type="text"/>
1 min.	<input type="text"/>	<input type="text"/>
2 min.	<input type="text"/>	<input type="text"/>
3 min.	<input type="text"/>	<input type="text"/>
4 min.	<input type="text"/>	<input type="text"/>
5 min.	<input type="text"/>	<input type="text"/>
<b>In the shade</b>		
0 min.	<input type="text"/>	<input type="text"/>
1 min.	<input type="text"/>	<input type="text"/>
2 min.	<input type="text"/>	<input type="text"/>
3 min.	<input type="text"/>	<input type="text"/>
4 min.	<input type="text"/>	<input type="text"/>
5 min.	<input type="text"/>	<input type="text"/>

#### Part Two

1. Go outside and place the cube on the ground. Make sure it is in direct sunlight.
2. Look at your thermometers. Record the starting temperatures in the 0 minute boxes.
3. Make a small slit through the roof of the cube and tape the thermometer inside the cube. Make sure it does not touch the ground.
4. Use your watch, clock or timer to write down the temperature inside and outside the cube every 1 minute.
5. After 5 minutes, move your cube and the thermometers into the shade.
6. Record the temperatures in the shade every 1 minute.
7. After 5 minutes, you should have completed your chart.
8. Write down what differences you saw in the cube and outside the cube.

# Science Experiments

## Constellations in a Canister



### Purpose:

Constellations are a group of stars and/or galaxies that astronomers use to map the sky. The International Astronomical Union (IAU) currently lists 88 constellations in the night, breaking up the sky into specific areas.

People are generally most familiar with the Zodiac, being those 13 constellations that lie on the ecliptic (the path that sun appears to travel through the sky).

The IAU bases most of the constellations on the ancient Greek symbols. However, there are different stories and legends from many cultures including the Aztecs, Aborigines and American Indians; just to name just a few.

### You'll need:

- Six small black film canister, you can often pick these up for free!
  - One Nail or a wooden Skewer
    - Bicarbonate Soda
      - Paper
    - Stick tape or glue

### Procedure:

1. Print off pictures of your favorite constellations or make your own on paper.
2. Cut each picture out and stick it onto the bottom of the film canister.
3. Pierce the middle each dot with the skewer/nail.
4. Look through the film canister without the lid to see the stars!

# Science Experiments

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## Make a Tea Bag Rocket



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### Purpose:

You are going to be creating a convection current of air moving inwards, towards the burning tea bag, and rising up as a hot air column.

The rocket could only rise once the tea bag became lighter. Heating air adds more energy to the air molecules. These molecules with extra energy move around very quickly and become more separate from each other than in the cold, lower energy, air. When you separate molecules you effectively have a less dense substance.

This is why hot air balloons work! Hot air rises!

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### You'll need:

- Adult supervision/assistance
  - A tea bag that is stapled
    - Matches
  - Non-flammable plate
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### Procedure:

1. Stay safe! Make sure to do this experiment away from anything that is flammable.
2. Cut the top of the bag to remove the staple.
3. Pour the tea leaves onto the plate and flatten them out.
4. Open up the tea bag so that it forms a cylinder.
5. Place the cylinder on top of the 'Tea Leaf Launchpad', 'the non-flammable plate' standing upright, like a column.
6. Ask an adult to light the top of the cylinder with a match.
7. BLAST OFF!