



# High Touch High Tech<sup>®</sup>

Science Experiences That Come To You

## Magic Light Box

### Ingredients & Supplies:

- 16 oz. plastic bottles with lids (2-4)
- Cardboard box
- Food coloring
- Marker
- Water
- Duct tape
- Scissors

Optional:

- Paint
- Paintbrushes
- Aluminum foil
- Paper cups

### Instructions:

For this lighted experiment, you will need a cardboard box, 16 oz. plastic bottles with lids, scissors, duct tape, food coloring, a marker, and water. You can also decorate your light box with paint. To extend this activity once you have built your box, you will need aluminum foil and paper cups. After you've gathered the materials for your magic light box, ask an adult to assist you.

First, fill the plastic bottles with water. Place a few drops of food coloring in each bottle. Each bottle needs a different color (i.e. blue, green, red, yellow). Tightly place the lids on the bottles.

Trace the bottom of the plastic bottle on the lid of the cardboard box. You need 1 hole per bottle. Ask an adult to cut the holes in the box.

Next, ask an adult to cut a small rectangular square on the side of the box. This will be the window for you to look inside the box. You do not want this hole too big or it will let out light.

Now, push the colored bottle into the holes on top of the box.

You now have the light box set up for experimenting! Bring the box outside in the Sun. Look inside the window. What do you see? Colorful light is *refracting* inside



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the box! How is this happening? When sunlight hits a solid object, the light is absorbed; however, when sunlight hits the water inside the bottle, the light bends in all directions. The water makes the light waves slow down, bend, and spread out inside the box. This change in direction due to slowed light waves is called **refraction**.

Open the box and tape aluminum foil inside the box. Now, try your experiment again. What changed? The light is refracting against the foil. There should be even more light inside your box!

What would happen if you placed paper cups over some of the bottles? What if you put more bottles in the top of the box? What about different colors?

Now that you have a magic light box, you can try many different light experiments!



Experiment and pictures credit: [www.trueaimeducation.com](http://www.trueaimeducation.com)

## **The Science Behind It:**

During the Holidays, we see all types of colorful lights! People decorate the outside and inside of their homes with lights. This is a tradition that dates back to the 17<sup>th</sup> century. But, it wasn't until the late 19<sup>th</sup> century, that decorating with small glass lanterns with lit candles really took off.



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In 1882, one of Thomas Edison's apprentices, Edward Johnson, created the first lit Christmas Tree for the Holiday Season. This tree was in New York City and had 80 small electric lights he called "dainty glass eggs." Edward Johnson invented the first string of electric lights.

These electric lights, however, posed a danger as it heated up tender Evergreen branches and needles. Albert Sadacca created safe electric Christmas lights in 1917. The first year, the lights were all white. But, the following year, he made colorful Christmas lights that became a sensation in homes across the country.

Lights are also an essential Hanukkah tradition. A candelabrum (lamp stand) with nine branches, called a menorah, is lit during the 8-day Hanukkah holiday. In the Jewish tradition, the menorah brings light to this time of year.

As the days get shorter and the nights get darker, we welcome colorful Holidays lights! As you decorate around your home with lights, you can also create a fun, colorful magic light box to wow your friends and family.

## Modern LED Holiday Lights

For decades, incandescent light bulbs have decorated Christmas trees, window panes, and the outside of homes with bright colors during the Holidays. However, older incandescent light bulbs pose some problems. These strings of lights actually use a lot of energy. The older bulbs also can get very hot.

Fortunately, scientists invented LED light bulbs that solve these problems. LED stands for Light-Emitting Diodes. These modern bulbs use 10% of the electricity needed for incandescent light bulbs! LED bulbs are much cooler so they are much safer. For an extra bonus, LED bulbs last for an extremely long time! For the holidays, you will see all colors, shapes, and sizes of LEDs decorating homes for the season.

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