

Topic: Light and Colour

Dyed Flowers

Things you will need:

- A few stems of bright, white flowers such as lilies, chrysanthemums or carnations
- Jars filled with water
- Food colouring

Instructions:

1. Use the food dye to colour the water in each jar. This experiment works best with strong dye
2. Place the flowers into the jar.
3. Now watch and wait!

You may like to test some different colours, or maybe even draw a picture of your flower as it changes!

Walking Water

Things you will need:

- Three cups
- Paper towel
- Water
- Food colouring

Instructions:

1. Fill two of the cups half way with water and place them either side of the empty cup.
2. Colour the water in one cup with yellow dye, and the other with blue dye.
3. Fold or cut the paper towel into two long strips (a few cm wide).
4. Place one end of the first strip into the blue coloured water and the other end of the strip into the empty cup.
5. Place one end of the second strip into the yellow coloured water and the other end of the strip into the empty cup to join the first strip.
6. Watch and wait to see what happens!

You may like to try using different combinations of primary colours!

Separating Colours

Things you will need:

- Absorbent paper, e.g. paper towel or coffee filter
- Scissors
- A black marker
- Water
- A cup

Instructions:

1. Cut a long strip of the absorbent paper (about 5cm wide).
2. With the black marker, draw a line across the strip (parallel to the bottom, about half way along).
3. Put a little bit of water into a cup.
4. Place one end of the paper strip into the cup and fold the other end over the cup's edge so the strip doesn't fall in. Make sure that the black line is not touching the water.
5. Watch as the water flows up the absorbent paper. When it reaches the black line, you will start to see some different colours moving up the paper strip!

You may like to experiment with some different coloured markers, e.g. brown, orange, purple, or green.

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Split light to make a rainbow

http://www.madaboutsience.com.au/store/index.php?main_page=page&id=40

Split light without a prism Want to make a rainbow but don't have a prism? Here's a simple way to make one anytime the sun is shining. Suitable for kids aged 5 +

What you need:

- Shallow dish
- White wall (or large piece of white paper/card)
- Small mirror
- Water
- Sunlight (the stronger the better)

What to do:

1. Pour some water into the shallow dish.
2. Place the small mirror in the water and prop it at an angle against the side of the dish.
3. Put the dish near a sunny window and position the mirror so that sunlight bounces off it onto a white wall.
4. If you don't have a white wall you can use a large piece of white card or paper attached to the wall.
5. You should see a faint rainbow appear on the white wall or paper. If not, adjust the mirror until you see it.

How does it work?

The water in the shallow dish acts like a prism. When the sunlight travels from air into water it slows down and bends. The seven different colours that make up white light travel at different speeds and therefore bend at slightly different angles. The mirror reflects the different colours so the rainbow spectrum appears on the wall.

Topic: Light and colour
Bend a Straw with Your Eyes (Optical illusion)

<http://www.sciencekids.co.nz/experiments/strawbending.html>

Using the power of your eyes, bend a straw sitting in half a glass of water without even touching it! It sounds like magic but it's really another amazing scientific principle at work.

What you'll need:

- A glass half filled with water
- A straw
- 2 eyes (preferably yours)

Instructions:

1. Look at the straw from the top and bottom of the glass.
2. Look at the straw from the side of the glass, focus on the point where the straw enters the water, what is strange about what you see?

What's happening?

Our eyes are using light to see various objects all the time, but when this light travels through different mediums (such as water & air) it changes direction slightly. Light refracts (or bends) when it passes from water to air. The straw looks bent because you are seeing the bottom part through the water and air but the top part through the air only. Air has a refractive index of around 1.0003 while water has a refractive index of about 1.33.

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Make Your Own Rainbow

<http://www.sciencekids.co.nz/experiments/makearainbow.html>

What you'll need:

- A glass of water (about three quarters full)
- White paper
- A sunny day

Instructions:

1. Take the glass of water and paper to a part of the room with sunlight (near a window is good).
2. Hold the glass of water (being careful not to spill it) above the paper and watch as sunlight passes through the glass of water, refracts (bends) and forms a rainbow of colors on your sheet of paper.
3. Try holding the glass of water at different heights and angles to see if it has a different effect.

What's happening?

While you normally see a rainbow as an arc of color in the sky, they can also form in other situations. You may have seen a rainbow in a water fountain or in the mist of a waterfall and you can even make your own such as you did in this experiment.

Rainbows form in the sky when sunlight refracts (bends) as it passes through raindrops, it acts in the same way when it passes through your glass of water. The sunlight refracts, separating it into the colors red, orange, yellow, green, blue, indigo and violet.

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Make Glowing Water

<http://www.sciencekids.co.nz/experiments/glowingwater.html>

Make glowing water with the help of a black light in this fun science experiment for kids.

Tonic water doesn't look very strange under normal light but what happens when you look at it under a black light? Does the dye from a highlighter pen do the same thing? Find out what happens and why it happens with this cool experiment that you can do at home.

What you'll need:

- A black light (you can find them at hardware stores)
- Tonic water or a highlighter pen.
- A dark room to do the experiment.

Instructions:

1. If you are using a highlighter pen carefully break it open, remove the felt and soak it in a small amount of water for a few minutes.
2. Find a dark room.
3. Turn on the black light near your water, how does it look?

What's happening?

Simple explanation:

The ultra violet (UV) light coming from your black light lamp excites things called phosphors. Tonic water and the dye from highlighter pens contain phosphors that turn UV light (light we can't see) into visible light (light we can see). That's why your water glows in the dark when you shine a black light on it.

Black lights are used in forensic science, artistic performances, photography, authentication of banknotes and antiques, and in many other areas.

Detailed explanation:

Black light (also known as UV or ultra violet light) is a part of the electromagnetic spectrum. The electromagnetic spectrum also includes infrared, X-rays, visible light (what the human eye can see) and other types of electromagnetic radiation. A black light lamp such as the one you used emits a UV light that can illuminate objects and materials that contain phosphors. Phosphors are special substances that emit light (luminescence) when excited

by radiation. Your water glowed under the black light because it contained phosphors. If you used a highlighter pen then the UV light reacted with phosphors in the dye. If you used tonic water then the UV light reacted with phosphors in a chemical used in tonic water called quinine.

There are different types of luminescence, they include fluorescence (used in this experiment, it glows only when the black light is on), phosphorescence (similar to fluorescence but with a glow that can last even after the black light is turned off), chemiluminescence (used to create glow sticks), bioluminescence (from living organisms) and many others.

Topic: Light and colour
Sunrise sunset experiment

Aim: To observe the colour of sunlight in when light passes through thick layers of particle in milk.

Materials: clear drinking glass, water, whole milk, measuring cup, teaspoon and flashlight

Procedure:

1. Half fill a clear drinking glass with water.
2. Shine your flashlight on the glass directly above it.
3. The water will look white.
4. Now pour 1/2 cup of milk into the glass and mix well.
5. Take the glass somewhere dark and shine the flashlight from the side of glass through the milk.
6. The milk will look yellow, orange or red.

Observation:

What do you see?

Understanding and explanation:

Just like a sunset or sunrise, the light is shining through particles.

The atmosphere is full of billions of particles.

When the sun is low in the morning or early evening, its rays must travel through a thicker layer of atmosphere than at other times of the day.

When sunlight hits these particles, the light bounces off of them and scatters.

Orange and red lights scatter the least, which is why you see these colours in a sunrise or sunset.

Topic: Light and colour
How to make a periscope

http://www.exploratorium.edu/science_explorer/periscope.html

What you need

Two 1-quart (or 1 litre) milk cartons
Two small pocket mirrors (flat, square ones work best)
Craft cutting knife
Ruler
Pencil or pen
Masking tape

DANGER!

A cutting knife is very, very sharp. Have an adult do all the cutting in this activity.
Use the knife to cut around the top of each milk carton, removing the peaked "roof."

What to do

Cut a hole at the bottom of the front of one milk carton. Leave about $\frac{1}{4}$ inch (1 c.m.) of carton on each side of the hole.

Put the carton on its side and turn it so the hole you just cut is facing to your right. On the side that's facing up, measure $2\frac{3}{4}$ inches (7 c.m.) up the left edge of the carton, and use the pencil to make a mark there. Now, use your ruler to draw a diagonal line from the bottom right corner to the mark you made.

Slide the mirror through the slot so the reflecting side faces the hole in the front of the carton. Tape the mirror loosely in place.

Hold the carton up to your eye and look through the hole that you cut. You should see your ceiling through the top of the carton. If what you see looks tilted, adjust the mirror and tape it again.

Repeat steps 2 through 6 with the second milk carton.

Starting at the bottom right corner, cut on that line. Don't cut all the way to the left edge of the carton—just make the cut as long as one side of your mirror. If your mirror is thick, widen the cut to fit.

Stand one carton up on a table, with the hole facing you. Place the other carton upside-down, with the mirror on the top and the hole facing away from you.

Use your hand to pinch the open end of the upside-down carton just enough for it to slide into the other carton. Tape the two cartons together

Now you have a periscope! If you look through the bottom hole, you can see over fences that are taller than you. If you look through the top hole, you can see under tables. If you hold it sideways, you can see around corners.

What kinds of mirrors can I use to make a periscope?

You need two small mirrors, but they don't have to be identical. If you have a rectangular mirror, or one with a handle, it's okay if part of it sticks out the side of the carton. If your mirror is round, like the mirror in a make-up compact, you may want to tape or glue it to a square of cardboard before inserting it into the slot in the milk carton. If you have a mirror with a magnifying side and a nonmagnifying side, have the nonmagnifying side facing the hole.

To make a periscope from a 1-quart milk carton, your mirrors must be smaller than 3 1/2 inches in at least one dimension. If the only mirrors you can find are larger than that, you can use half-gallon milk cartons instead.

What if I want to use half-gallon milk cartons or some other boxes?

When you are making a periscope, it's important to make sure that your mirror is positioned at a 45-degree angle. If you use a wider milk carton or some other box, just measure how wide your box is. Then measure that same distance up the side of the box and make a mark. The line between your mark and the opposite corner of the box will be at 45 degrees.

How does my periscope work?

Light always reflects away from a mirror at the same angle that it hits the mirror. In your periscope, light hits the top mirror at a 45-degree angle and reflects away at the same angle, which bounces it down to the bottom mirror. That reflected light hits the second mirror at a 45-degree angle and reflects away at the same angle, right into your eye.

Can I make a periscope with a really long tube?

You can make your periscope longer, but the longer the tube is, the smaller the image you'll see. Periscopes in tanks and submarines have magnifying lenses between the mirrors to make the reflected image bigger.

History of periscopes

Periscope comes from two Greek words, peri, meaning "around," and scopus, "to look." A periscope lets you look around walls, corners, or other obstacles. Sub-marines have periscopes so the sailors inside can see what's on the surface of the water, even if the ship itself is below the waves.

Owl Books, Henry Holt & Company, New York, 1996 & 1997
ISBN 0-B050-4536 & ISBN 0-8050-4537-6