KidzLabs™
Colour Lab Mixer

⚠ WARNING:
CHOKING HAZARD - Small parts.
Not for children under 3 years.

TO PARENTS: PLEASE READ THROUGH THESE INSTRUCTIONS BEFORE PROVIDING GUIDANCE

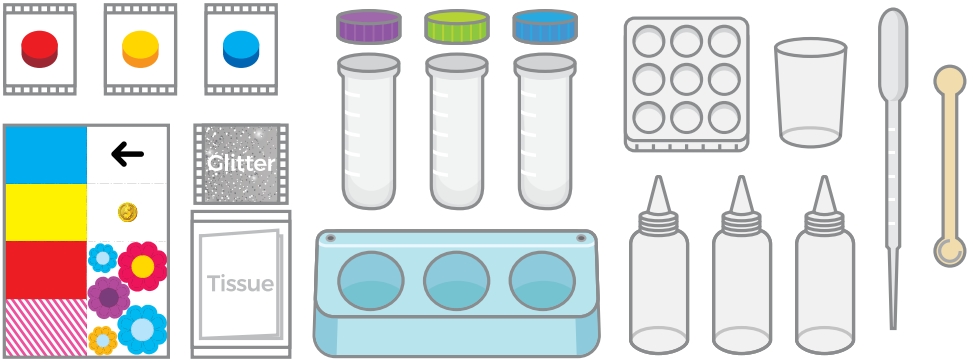
PLEASE SCAN THE QR CODE FOR VIEWING MULTI-LANGUAGE INSTRUCTIONS.

FR. Veuillez scanner le code QR pour afficher les instructions multilingues pour ce kit. **DE.** Bitte scanne den QR-Code, um die mehrsprachige Anleitung für dieses Set anzusehen. **NL.** Scan de QR-code om de instructies voor deze set in verschillende talen te bekijken. **IT.** Scansiona il codice QR per visualizzare le istruzioni multi-lingua per questo kit. **ES.** Escanee el código QR para ver instrucciones en varios idiomas para este kit. **JA.** QRコードをスキャンして、本キットの多言語説明書をご覧ください。

A. SAFETY MESSAGES

For use under adult supervision only. Read the instructions before use, follow and keep them for reference. Keep this kit out of reach of children under 5 years old. Food dye tablets are safe to be used, but Do Not Eat! Be careful handling the dye solution as it may stain. Wash hands after activities. Do not eat or drink in the experimental area. Keep the area clear and well lit and close to a water supply. Wear protective clothing, gloves and eye/face protection. Baking soda and vinegar (not included in this kit, but required from home) may be harmful if misused. Only carry out those activities which are listed in the instructions.

B. CONTENTS



3 food dye tablets, 3 test tubes with caps, 1 test tube rack, 1 dropper, 1 spoon, 1 container, 1 colour mixing tray, 3 squeeze bottles, 1 packet of tissue paper , 1 colour pattern card, 1 packet of glitter. Also required but not included in this kit (most materials are available in the kitchen): water, stapler, flower, toothpicks, pepper, dishwashing liquid, baking soda, vinegar, milk, honey, popcorn kernel, metal bolt, cooking oil, ice, plate, tablespoon and plastic beads.
Chemicals contain in tablets: Red tablet: Polyvinylpyrrolidone, Sea Salt, L-Leucine & FD&C Red No.4. Blue tablet: Polyvinylpyrrolidone, Sea Salt, L-Leucine & FD&C Blue No.1. Yellow tablet: Polyvinylpyrrolidone, Sea Salt, L-Leucine & FD&C Yellow No.5.

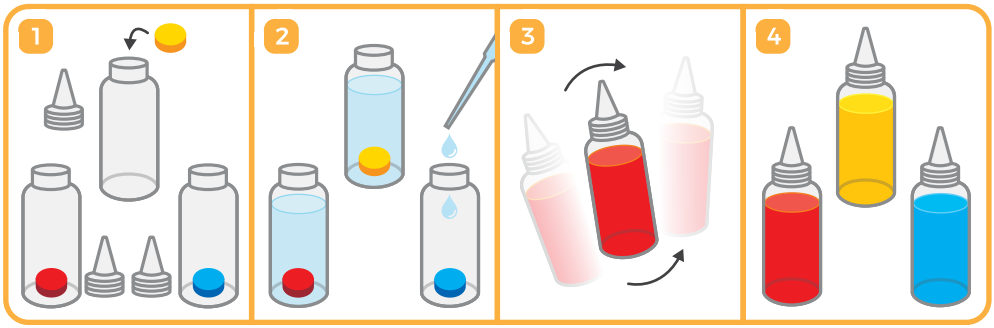
PROJECT 1

Make Your Own colour Dyes

You'll need

From the kit: food dye tablets, squeeze bottles, dropper
From home: water

Instructions:



Start by making your colour dyes solutions for the rest of the experiments. There are 3 food dye tablets included in the kit.
1. Place one food dye tablet into each squeeze bottle.
2. Then fill the squeeze bottle with water (you can use the dropper for this purpose).
3. Put the cap on. Make sure the cap is tight and shake the bottle until the tablet is fully dissolved.
4. Your colour dye is made. Repeat this process with the other two colours of dye. These are concentrated dye solutions that you can water down for use in the projects. Remarks: If you run out of dyes from the kit you can use food colouring from home to make fresh dyes.

Fun Facts

How does it work: You have carried out a chemical process mixing a solution. In chemistry a solution is a mixture of two or more substances whose atoms or molecules (groups of atoms) are mixed with each other. The substances that are dissolved are called solutes. The substance the solutes are dissolved in is called the solvent. When you mixed a colour dye, the food dye tablet was the solute, the water was the solvent and the dye you made is the solution.

- A dye is a substance that's used to colour different materials, especially fabrics used to make clothing.
- Natural dyes come from berries, leaves, fungi and lichen, and include indigo and saffron (which is yellow). There are also thousands of synthetic dyes.
- The red dye in food colouring is called cochineal. It comes from the body of a tiny insect also called a cochineal.

PROJECT 2

Make Your Own Colour Solutions

You'll need

From the kit: squeeze bottles of dye, test tubes, test tube rack
From home: water

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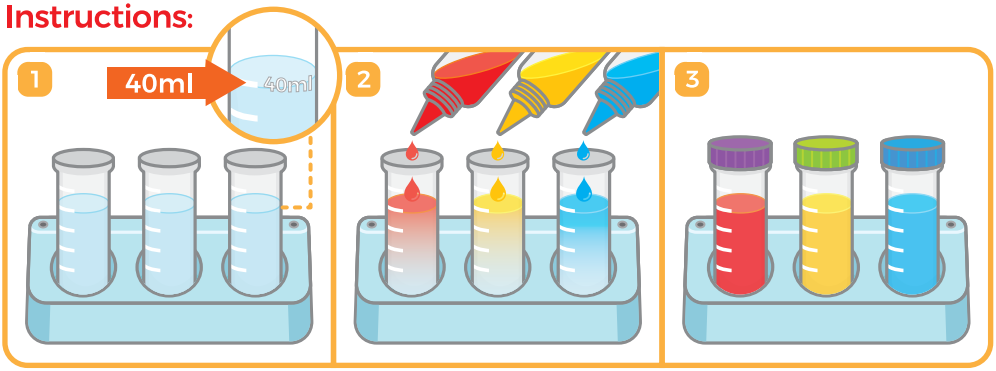


1. Place the test tubes in the test tube rack. Read the markings on the test tubes and then fill each test tube up to the 40 ml mark with clean water.
2. Squeeze 20 drops of red dye into one test tube, 20 drops of blue dye into the next tube, and 20 drops of yellow dye into the last tube.
3. You will see the colours disperse through the water to make clear solutions. Close the test tubes and store them for use.

Fun Facts

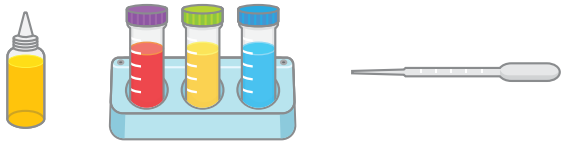
You have carried out another chemical process, called dilution. The colour dyes are diluted by the water, making the colours much lighter.

PROJECT 3

Magic colour Mixing

You'll need

From the kit: squeeze bottles of yellow dye, test tubes of colour solution (from Project 2), test tube rack, dropper
From home: water



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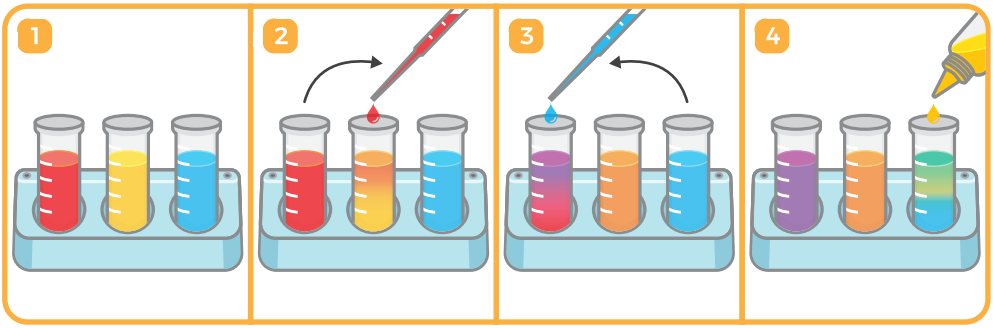


1. Use the colour solution you made in Project 2.
2. Using the dropper, add a little red solution to the yellow solution. What do you see? The yellow has changed to light orange! Continue adding red solution and the orange colour will get deeper and deeper.
3. Now try adding some blue solution to the remaining red solution. What do you see this time? The red solution turns purple.
4. Now squeeze a few drop of yellow dye into the remaining blue colour solution. The blue solution turns green. It's like magic! Try to create more colours by mixing the colour solutions and adding drops of dye. You can make many interesting colours, but avoid mixing too many colours as this will make the solution go muddy brown.

Fun Facts

How does it work: Light from the Sun is made up of many colours mixed together. When light hits a colour solution, the solution absorbs all the colours except its own colour, which it lets through. Red, blue and yellow are known as primary colours. You can combine them to make all the other colours. When you add red solution to blue solution, you get a solution that absorbs all the colours except purple.

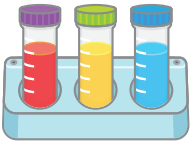
- Red, blue and yellow are known as primary colours of paint because you can mix these paints together to get almost any other colour.
- In printing, these primary colours are actually cyan, magenta and yellow. If you look at the colour photographs in this booklet with a magnifying glass, you'll see that the colours are made up of dots of these primary colours, plus black.

PROJECT 4

Rainbow Colour Mixer

You'll need

From the kit: test tubes of colour solution (from Project 2), test tube rack, dropper, mixing tray
From home: water



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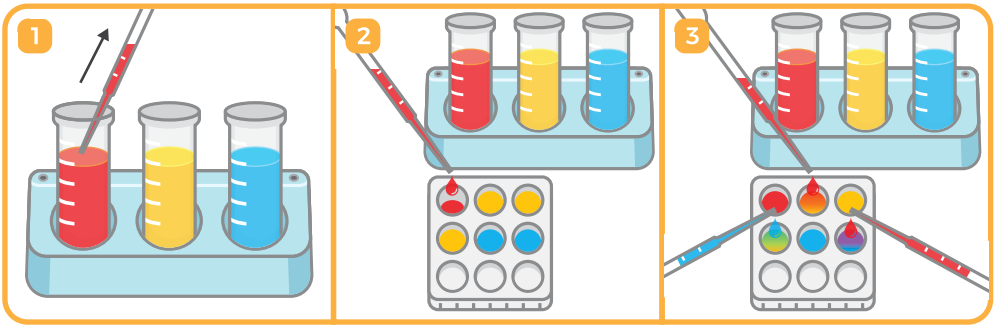


1. Prepare red, yellow and blue colour solutions in the test tubes as you did in Project 2.
2. Using the dropper, add the red, yellow and blue solutions to the compartments in the tray.
3. Now start mixing colours by dropping dye solutions into the solutions already in the compartments. This will create many different rainbow colours. Use the following colour chart as a guide to mix your colour solutions, or just experiment yourself by mixing different colours randomly to see what colours you get.

COLOUR CHART:

- yellow + red = orange
- yellow + blue = green
- red + blue = purple
- red + blue + purple = brown
- red + orange = red / orange
- yellow + green = leaf green
- blue + purple = ultramarine
- red + purple = red / purple
- yellow + orange = deep yellow
- blue + green = blue green

Fun Facts

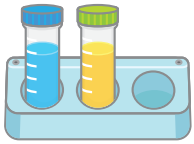
- A rainbow happens when rays of sunlight go into rain drops, bounce around inside, then come out again. The different colours of light come out at slightly different angles.
- To see a rainbow you have to stand with the Sun behind you and a rain shower in front of you.

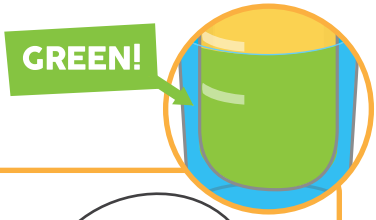
PROJECT 5

Optical colour Mixing

You'll need

From the kit: test tubes of blue and yellow solution (from Project 2), test tube rack, container
From home: water





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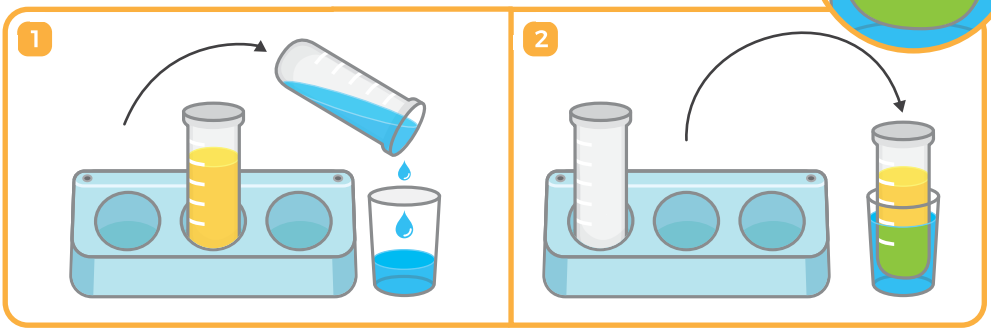
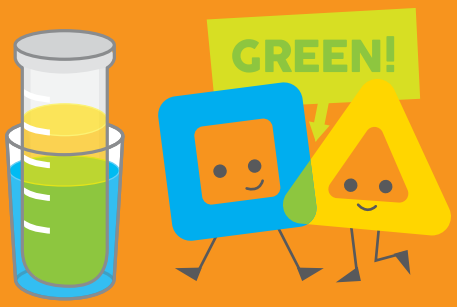


1. You can experiment with colour changes without mixing the solutions. Prepare a yellow colour solution in one of the test tubes. Also prepare a blue colour solution in the container.
2. Now put the test tube with the yellow solution into the container with the blue solution. What do you see from the side of the container? You should see a green colour. You can try this with different colour combinations.

Fun Facts

When you look through the container and test tube, you are seeing light that shines through from the other side. When this light shines through the yellow solution, the solution cuts out some blue light and some red light. The blue solution cuts out the rest of the red light, and the yellow and blue light mix to make green light.



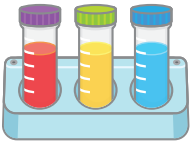
PROJECT 6

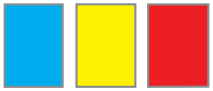
Colour Filters

You'll need

From the kit: test tubes of colour solution (from Project 2), test tube rack, colour cards

From home: water





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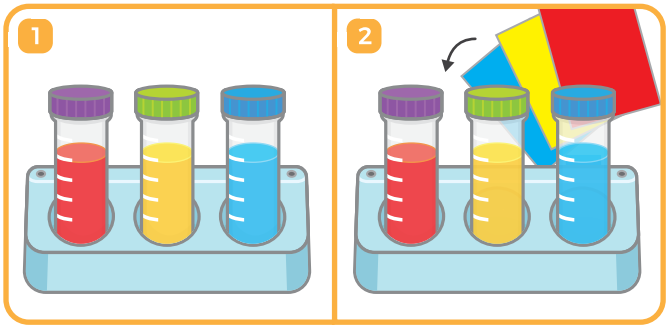
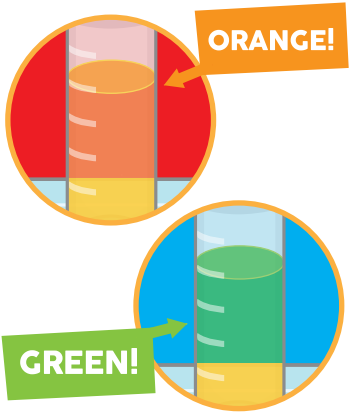




1. Prepare the red, yellow and blue colour solutions in the test tubes (see Project 2). Place the tubes in the test tube rack.
2. Place the colour card behind the test tube rack so that you view the colours on the card through the coloured solutions in the tubes. Move the card sideways to see what effects the different solutions have on the colours on the card.

Fun Facts

How does it work: In this project the solutions are acting as filters. A filter is a clear material that blocks some colours and lets others through (for example, a red filter blocks all colours except red). When you view other colours, such as the ones on the card, through the filters, the filters can change the colour you see. For example, if you look at the red card through the blue solution, you see dark purple. That's because most of the red light coming from the card is blocked by the blue solution.

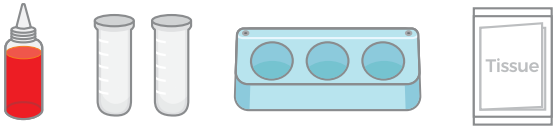
- Coloured filters are put in front of white spotlights in theatres to make beams of coloured lights to light up the performers.
- In photography, coloured filters put in front of lenses change the colours in the final photograph, giving dramatic effect such as making the sky look more blue.
- Sunglasses cut out a type of light called ultra-violet, that we can't see but that can damage your eyes when the sunshine is very strong.

PROJECT 7

Walking colour

You'll need

From the kit: squeeze bottle of red dye, 2 test tubes, test tube rack, tissue paper
From home: water



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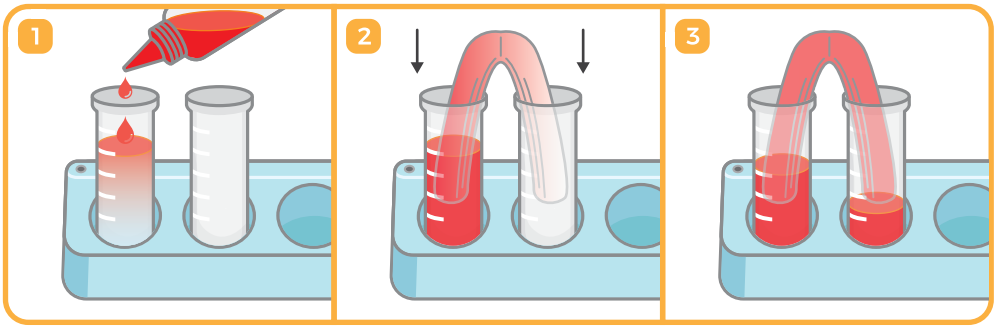


1. Prepare a red solution in one of the test tubes and place the tube on the rack. Put another empty test tube at the centre of the rack. (Note: for Project 7 to 9 you can intensify the colour of the solutions by adding a few more drops of colour dye. This will make the experiment results more noticeable.)
2. Roll one piece of tissue paper to make a long strip (length at about 22cm). Place the tissue strip between the two test tubes with one ending dipping into the red solution. Wait for about 10 to 20 minutes. What do you see?
3. The red solution starts to travel along the tissue strip to the empty test tube. Eventually you will see some water accumulate in the second test tube – the tube that was empty when the experiment started.

Fun Facts

How does it work: This fun effect relies on a scientific principle called capillary action. Capillary action is when water flows into tiny gaps in materials. It happens because the water is attracted to the surface of the material, and it can even make water flow uphill. In this project the coloured solution is attracted to the fibres in the tissue paper and flows into the tiny gaps between the fibres. You can use any thick cotton string at home to replace the tissue strip.

- Capillary action makes water rise up inside a straw left in a cup of water. The water only rises a little way because the weight of the water in the straw stops it rising any further.
- Capillary action is why water rises and soaks a towel if you dip one corner of the towel in the bath.
- The thinner a tube is, the higher water will rise up it because of capillary action.

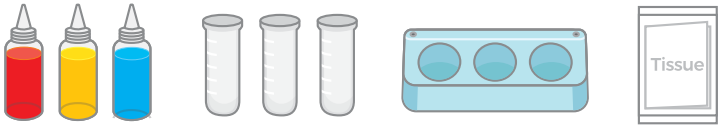
PROJECT 8

Walking Colour Rainbow

You'll need

From the kit: squeeze bottles of dye (from Project 1), 3 test tubes, test tube rack, tissue paper

From home: water



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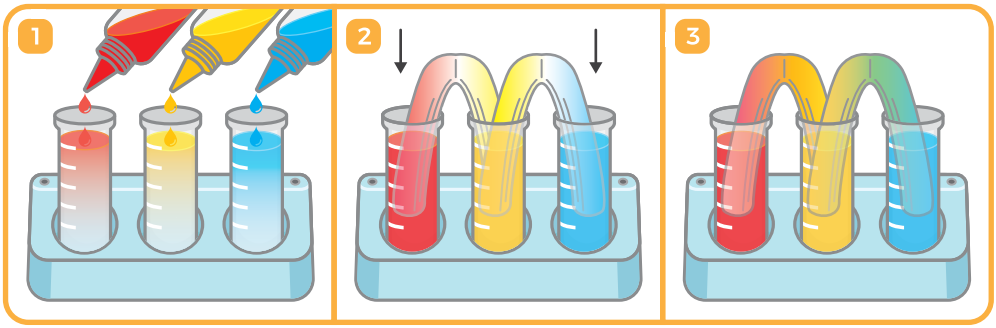


1. Place the test tubes in the rack. Read the marking on the test tubes then fill the three test tubes up to the 50 ml with clean water. Then, squeeze about 40 drops of red dye into one test tube, 40 drops of yellow dye into the next tube, and 40 drops of blue dye into the last tube. Place each tube in the test tube rack. (We are making the colour solution with stronger colour so as to achieve a better rainbow effect.) You will see the colours disperse through the water to make clear solutions.
2. Roll two pieces of tissue paper to make two long strips. Put a strip between the centre tube and the two end tubes. Wait for a while. What do you see?
3. The colour solutions start to travel along the tissue paper strips and mix. You can see blending colours along the tissue paper strips. It looks like a rainbow!

Fun Facts

This project uses capillary action too. Capillary action makes the coloured solutions flow into the tiny gaps between the fibres in the tissue. Where the solutions mix, their colours combine to make new colours.

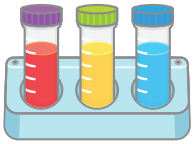
PROJECT 9

Dye Flower

You'll need

From the kit: test tubes of colour solution (from Project 2), test tube rack, tissue paper

From home: water, stapler



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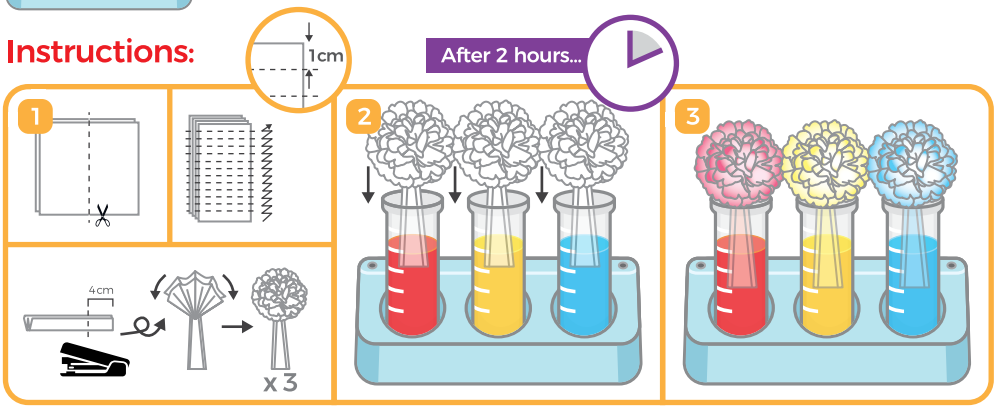

1. Take 2 tissue papers and overlap them. Cut along the centre crease line. Overlap all 4 tissue papers. Then accordion fold into a 1 cm strip. Staple the tissue paper around 4 cm from one end. Gently spread the tissue layers. For best results, pull from the top to bottom of one side before moving to the next side. A pretty blossom tissue flower is ready for use!
2. Make three tissue flowers. Stand the tissue flowers in test tubes of your favourite colour solution to make special carnation flowers. Wait two hours to see what happens. Wait overnight for the best results.
3. The flowers will be dyed with the colours of the solutions. Remarks: you can also dye a real flower by putting it into a colour solution. If you choose a flower with light colours like white or yellow and intensify the dye solutions by adding more drops of dye, the colour effect will be easy to see. You can also dye a small piece of cabbage to make the plant veins inside show up.

Fun Facts

How does it work: With the tissue paper, capillary action makes the coloured solution flow up the tiny gaps between the fibres in the tissue, and this slowly colours the tissue. Capillary action happens in the real flower too. It's how flowers get the water they need. The water flows up tiny pipes inside the stem.

- The stem of a plant contains millions of tiny tubes that carry water by capillary action.
- Capillary action can make water rise two to three metres up inside a plant.
- Capillary action makes molten wax rise up to the top of a wick of a candle where the wax burns.

PROJECT 10

Water Trick 1 - Missing Coin

You'll need

From the kit: squeeze bottles of dye (from Project 1), container, coin card
From home: water

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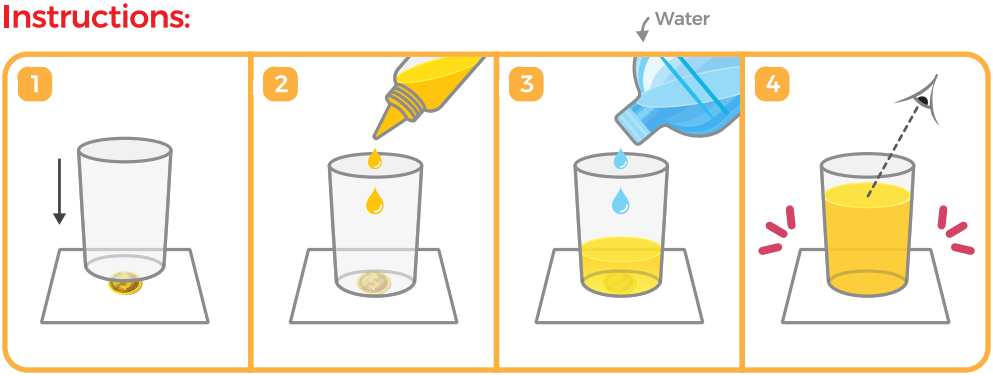

1. Place the container on top of the art template with a coin.
2. Squeeze a few drops of your favourite colour dye into the empty container.
3. Slowly pour water into the container and watch the colour solution form.
4. Viewed from the side of the container the coin has disappeared! This magic trick will amaze your family and friends! You can use a glass and a real coin from home to do this trick too.

Fun Facts

How does it work: This trick uses the fact that light gets bent when it passes in or out of water. This effect is called refraction. With no water in the glass light from the coin goes straight into your eyes. But when you add water to the container, the light from the coin gets bent as it leaves the water, so it no longer reaches your eye. The light that does reach your eye comes from the tabletop next to the coin.

- Refraction makes water look less deep that it really is. Things in water look less deep down than they really are, too. This effect is called apparent depth.
- At the swimming pool, waves on the surface make light from things under the water (such as lines painted on the pool bottom) refract at different angles, making the things look wobbly.

PROJECT 11

Water Trick 2 - Water Lens

You'll need

From the kit: squeeze bottles of dye (from Project 1), container, pattern cards
From home: water

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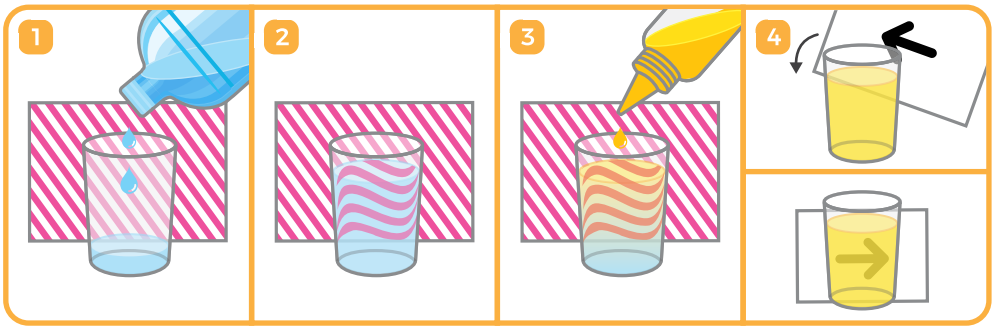


1. Place one of the colour pattern cards behind the container. Pour water into the container.
2. Look through the container to the card. What's happened to the patterns? They are distorted to make different pattern.
3. You can also add a few drops of the dye to the water to form colour solutions. Place the card at the back again and see how the colour solutions change the colours of the card.
4. Now try with the pattern card with an arrow on it. The arrow will be reversed.

Fun Facts

How does it work: Light coming from the cards gets bent on the way to your eyes. It gets bent when it goes from the air into the water in the container and bent again when it goes from the water back into the air. This makes the water in the container act like a lens. It makes light from the right of the card appear to be coming from the left, and light from the left of the card appear to be coming from the right. So the image on the card is reversed.

- The container is acting like a convex lens – a lens that bulges out on both faces. A concave lens has faces that dip inwards.
- Most lenses are made from very clear glass called optical glass or clear plastic.
- The world's largest glass lens is 1.57 metres across. It was produced for a huge optical space telescope.

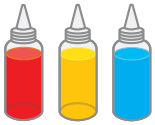
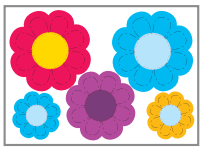
PROJECT 12

Water Trick 3 - Flower Blossoms

You'll need

From the kit: squeeze bottles of dye (from Project 1), flower pattern card, container, dropper

From home: water

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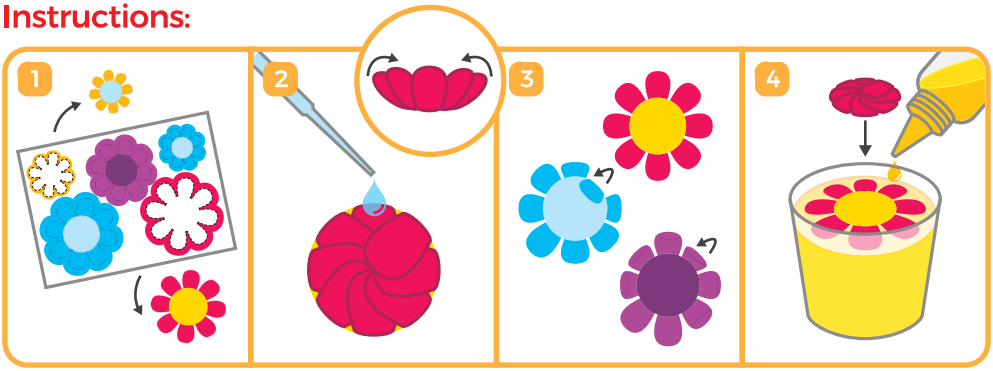


1. Punch out the die cut flowers from the card template. Fold each petal over into the centre of the flower. Place it on waterproof surface.
2. Drop some water to the flower.
3. The flower magically opens up and starts to bloom!
4. You also can prepare a container of water then add few drops of your favourite colour dye. Place the folded flower on the water surface. The flower magically opens up and starts to blossom. Add other colour dyes to the water to change the colour and make a beautiful flower colour show.

Fun Facts

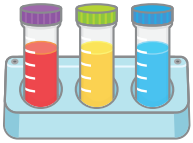
- This is another trick that relies on capillary action. When you drop the card flower into the water, capillary action draws water into the card. This makes the card swell up slightly, which makes the petals open up.
- You can copy the flower template to make additional flowers from blank paper. Colour them and put a secret message at the centre. The message will magically appear when the flower 'blossoms' in water!
- Many plants have flowers that open in the day and close again at night.


PROJECT 13

Glowing Star

You'll need

From the kit: test tubes of colour solution (from Project 2), test tube rack, dropper
From home: water, toothpicks



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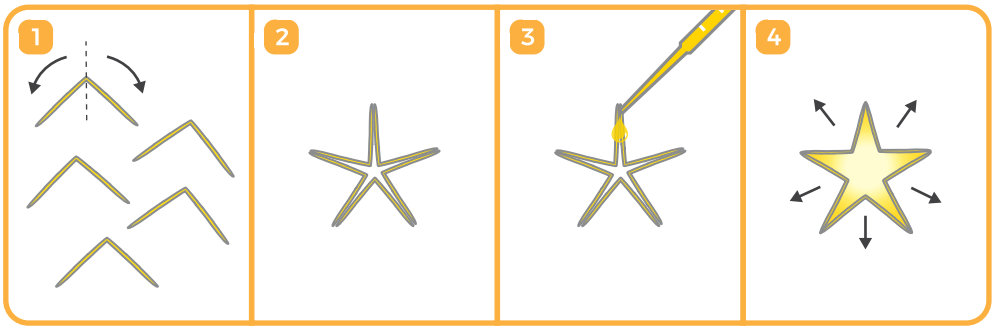


1. Take five toothpicks. Bend each one in the centre so that it snaps but does not break into two halves.
2. Arrange the sticks to form a five-pointed star on a waterproof surface.
3. Use the dropper to drip colour solutions into the centre of star so that water can reach the breaks in the toothpicks.
4. What happens? The star magically opens out.

Fun Facts

How does it work: When you add water to the toothpicks, capillary action makes water soak into the wood between the fibres. This makes the wood swell up slightly, which makes the stick unbend a little, opening up the star.

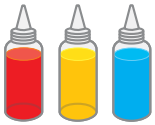
- Wood always swells up when it gets wet. That's why wooden doors can get jammed if rain seeps into them.
- Wooden barrels, made of strips of wood, are often leaky when they are first filled with liquid. But then the liquid makes the wood swell up, which closes up any gaps.

PROJECT 14

Magic Starburst

You'll need

From the kit: squeeze bottles of dye (from Project 1), glitter
From home: water, pepper, dishwashing liquid, plate



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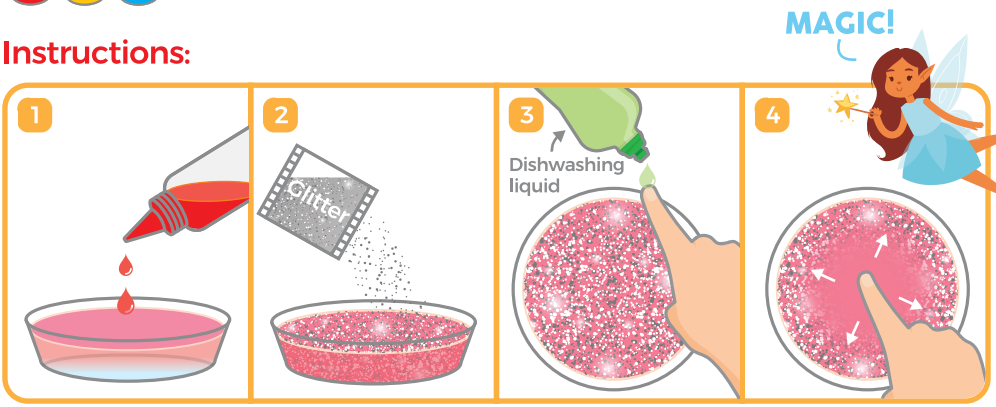


1. Pour water into the plate. Add a few drops of your favourite colour dyes.
2. Gently shake some glitter or pepper onto the water surface.
3. Dip your finger into the water and watch what happens. There will be little effect on the glitter or pepper. Now put a drop of dishwashing liquid on your finger.
4. Now dip your finger into the water again. The glitter or pepper will rush to the outer edges of the plate. It's like a magic starburst!

Fun Facts

How does it work: The surface of water acts like it has a skin. This effect is called surface tension. It happens because the tiny particles of water (called molecules) are attracted to each other. Surface tension stops the bits of glitter or pepper from sinking into the water. When you touch the water with dishwashing liquid, the dishwashing liquid reduces the surface tension. This allows the water to spread out further on the dish, and it carries the glitter or pepper with it.

- Insects such as water boatman travel across the water surface without sinking in because of surface tension.
- It's surface tension that make small blobs of water become spherical – a sphere has the smallest surface area possible compared to its size.
- Surface tension lets you overfill a glass with water so that the water makes a slight dome above the top of the glass.

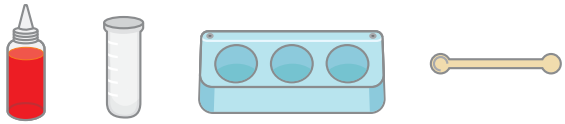
PROJECT 15

Colour Eruptions!

You'll need

From the kit: squeeze bottle of red dye (from Project 1), an empty test tube, test tube rack, spoon

From home: water, baking soda, vinegar



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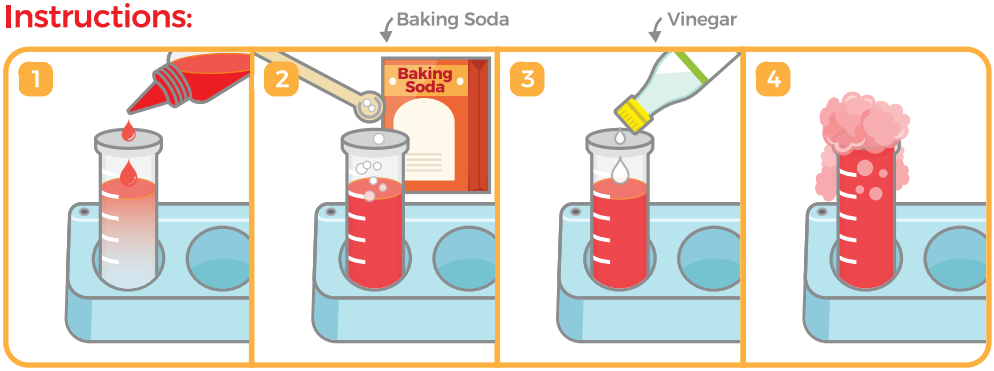
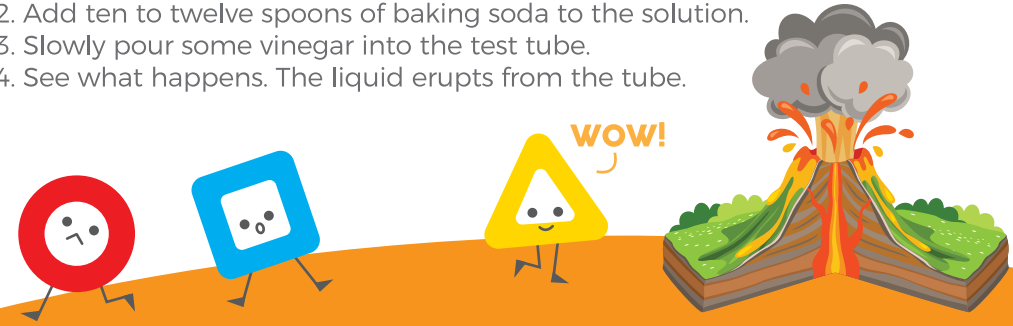


1. Prepare some red solution in the test tube.
2. Add ten to twelve spoons of baking soda to the solution.
3. Slowly pour some vinegar into the test tube.
4. See what happens. The liquid erupts from the tube.



Fun Facts

- The solution fizzes up because gas is made when you add the vinegar. The vinegar contains an acid and the baking soda is a type of chemical called a base. These two chemicals react together, creating carbon dioxide gas, which makes the bubbles.
- You can try this experiment with other colour solutions or mix the three colours together to make a spectacular colour show.
- Vinegar contains a type of acid called acetic acid, and the baking soda in made up of a chemical called sodium bicarbonate. In a cake, the baking soda reacts with an acid in the other ingredients (such as lemon juice) to make a gas that makes the cake spongy.
- Indigestion tablets contain a base that reacts with the acid in your stomach, which reduces the amount of acid and gets rid of indigestion.

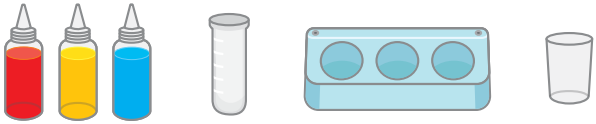
PROJECT 16

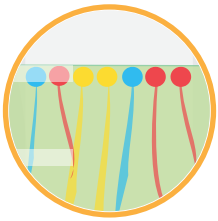
Fireworks in Water

You'll need

From the kit: squeeze bottles of dye (from Project 1), an empty test tube, test tube rack, container

From home: warm water, cooking oil, tablespoon





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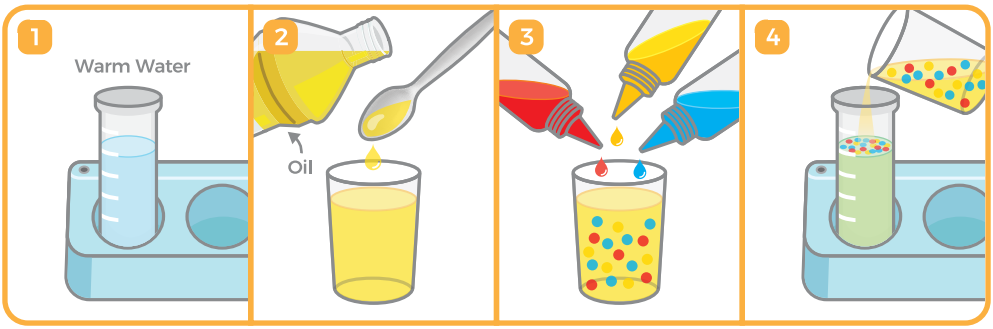


1. Fill the test tube about three quarters full with warm (not hot) water.
2. Carefully add three to four tablespoons of oil to the container.
3. Squeeze a few drops of dye from the squeeze bottles into the container. The dye will form colour droplets in the oil.
4. Carefully pour the oil with the colour droplets into the warm water and watch what happens. The drops of dye will sink through the oil and into the water. They will make little "explosions" of colour.

Fun Facts

- Oil and water don't mix together because they don't dissolve into each other. So when you drop the dye, which is made with water, into the oil, the dye drops stay as drops in the oil instead of mixing in. Water is also more dense than oil, so the dye drops sink slowly through the oil. As soon as a dye drop enters the water, it spreads out in the water, making it appear to explode.
- If you would like to make a bigger firework show, you could use a large glass at home instead of the test tube, together with larger quantities of oil and more drops of dye.
- Oil and water are described as immiscible, which means they don't mix together. If you do mix them together, they soon separate into layers.
- Chemicals called emulsifiers help oil and water to mix better. Egg yolk is a natural emulsifier, which is why it's often added to cake recipes to help water and oily ingredients mix.
- Oil is described as hydrophobic, which means "water hating".

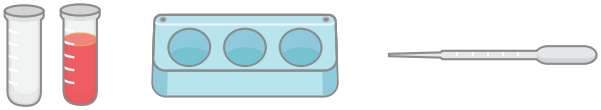
PROJECT 17

Float and Sink Colour Tower

You'll need

From the kit: an empty test tube, test tube of blue solution (from Project 2), test tube rack, dropper

From home: oil, water, dishwashing liquid, honey, milk, metal screw / bolt, plastic beads, popcorn kernel



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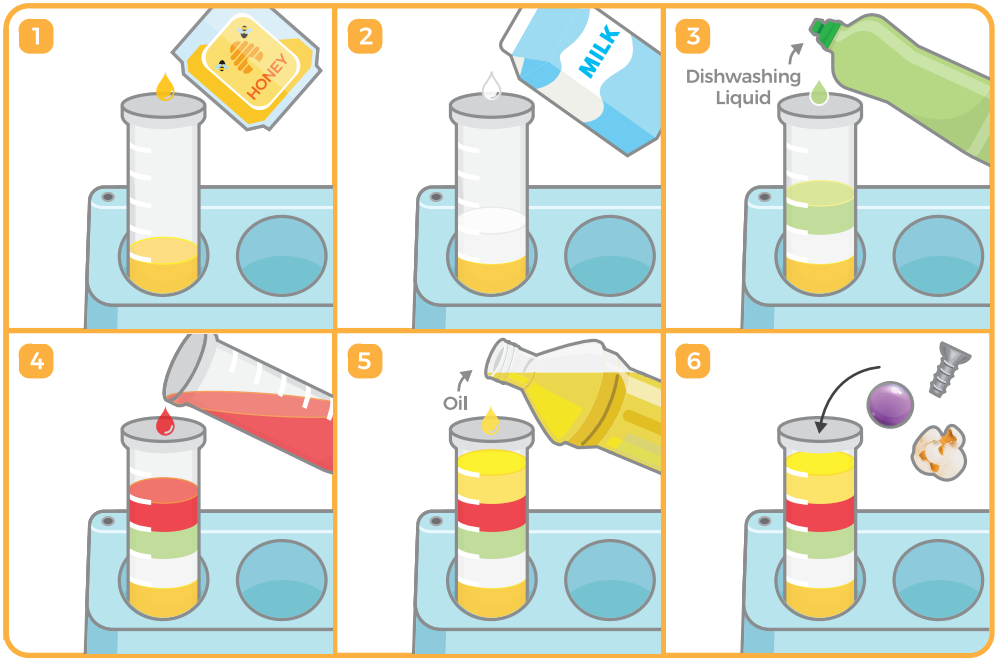
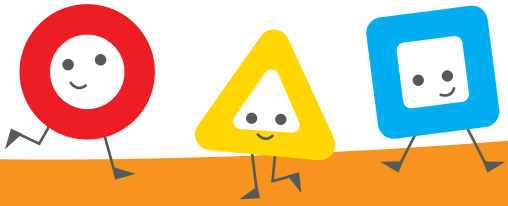


Fun Facts

The density of a substance is a measure how much mass is contained in a particular volume. The different liquids used in this experiment have different densities. Liquids that are less dense float on top of liquids that are more dense. In the tube, the oil floats on the colour solution, which floats on top of the dishwashing liquid, which floats on top of the milk, which floats on top of the honey. This also applies to the objects you placed into colour tower. The metal screw / bolt has the highest density, so that it sinks to the bottom. The popcorn has second highest density – it sinks through the milk but floats on the honey. The bead is made of plastic which has a density lower than water, so it floats on top of the colour solution.

1. First gently pour a layer of honey into the bottom of the test tube.
2. Then very gently pour the milk on top. This is best done by pouring the milk down the side of the test tube. The milk should stay separated from the layer of honey. You could use the dropper for adding the milk.
3. Now pour in the dishwashing liquid to form another layer.
4. Next pour in the colour solution to form another layer.
5. Finally pour in oil on top. Fantastic! Your Float & Sink Colour Tower is complete. The colour layers will stay in place for a while before they mix together gently (except the oil, as the all other liquids are water based).
6. Now in sequence, gently place the metal screw / bolt, the popcorn kernel and the bead into the colour tower. What do you see? The objects 'float' on the different layers like magic.



QUESTIONS & COMMENTS

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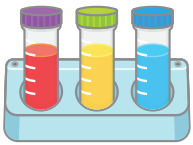
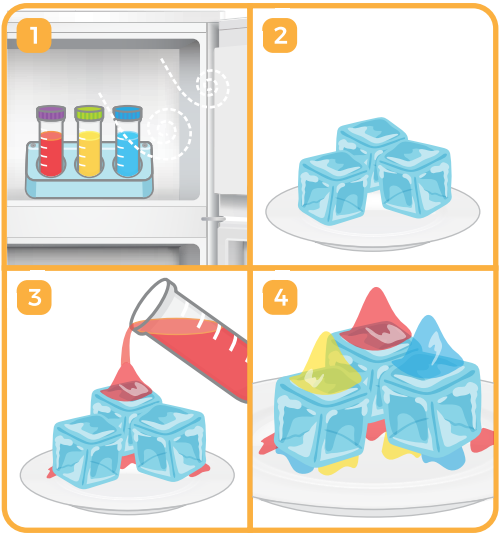
Ice Rainbow

You'll need

From the kit: test tubes of colour solution (from Project 2), test tube rack
From home:
pure/mineral water,
ice cubes, plate





Instructions:

1. First prepare three test tubes of colour solution. You may use mineral water or very pure water for this to achieve a better result. Then place them together with the rack in your freezer and leave them there for between 45 and 60 minutes. The idea is for the solutions to be very cold, but not frozen. Different refrigerators have different power, so you will need to monitor and adjust the timing accordingly. (Remarks: please make sure the surfaces of the test tubes and the insides of the test tube rack are completely dry before they are placed into the freezer, otherwise any water left will be frozen and the test tubes will become stuck in the rack.)
2. When it is the time to start the experiment (i.e. after the colour solutions have been in the freezer for between 45 and 60 minutes) put a few fresh ice cubes on a plate.
3. Now very gently take your super-icy solutions out of the freezer. Don't shake or knock the test tubes or the solutions might turn to ice before you are ready. Then pour a steady stream of the colour solution over the ice and you will see the solution turn to ice and build into a heap (keep a distance between the test tube and the heap of ice). You have to pour the solutions quickly after removing them from the freezer or they will warm up and will not form ice heaps. You can start with one ice cube or a bunch of ice cubes.
4. Keep the stream of solution flowing. Move it around a bit as your ice tower grows taller to grow more ice around your container. You can create lots of ice towers in different colours. Be patient! It might take a few attempts to make the cooled water.

Fun Facts

When water is a liquid, its tiny particles (called molecules) can move past each other. When water freezes, the molecules join together, making the water solid. But the molecules normally need something to freeze on, such as speck of dust in the water. Very pure water can get below freezing point without freezing because there is nothing in the water to make it start freezing. This is called supercooling. When you pour supercooled water onto ice, it quickly turns to ice. You may also prepare the ice cube with colour solution to make the show more colourful.

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