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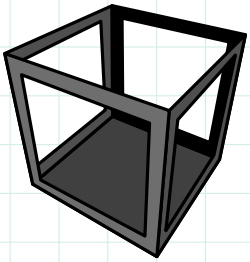
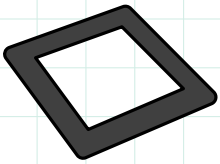
Before you start

This top secret science set will help you to explore and learn about coding, circuitry, secret messaging and more!
Adult supervision is required.

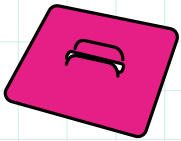
What's included



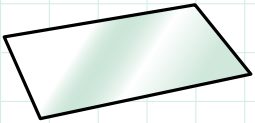
Money Box Frame



Money Box Top

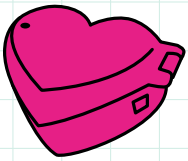


Money Box Lid

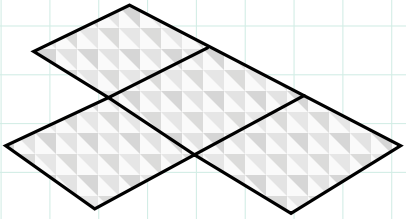


Money Box Mirror

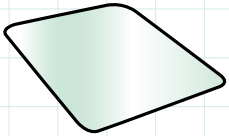
Black Light Pen



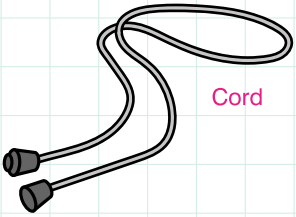
Locket Room Guard



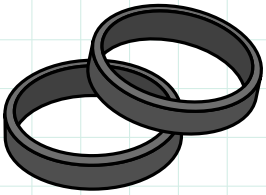
Holographic Card



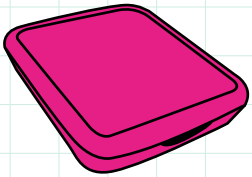
Mirror for Compact Messaging Mirror



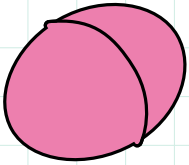
Cord



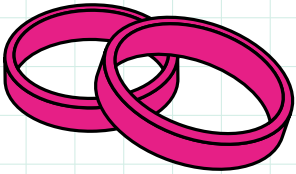
2 x Black Coding Bracelet Rings



Compact Messaging Mirror



Hidden Message Water Fizzer



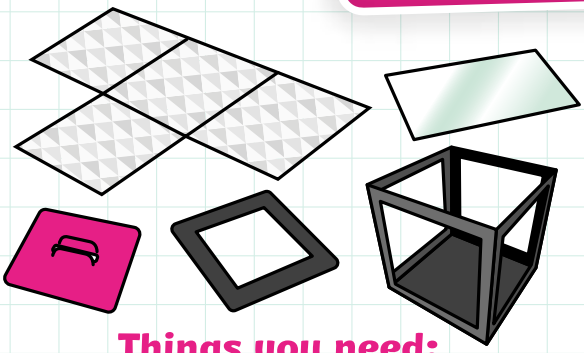
2 x Pink Coding Bracelet Rings

2 x Coding Strips

Some activities require additional household objects and ingredients **(not included)** These are – 2 x AA Batteries, Sticky Tape, Kitchen Foil, Small Torch Bulb, Lemon Juice, Baking Powder, Purple Grape Juice and Tonic Water.

OPTICAL ILLUSIONS

ACTIVITY 1: Magic Photo Money Box

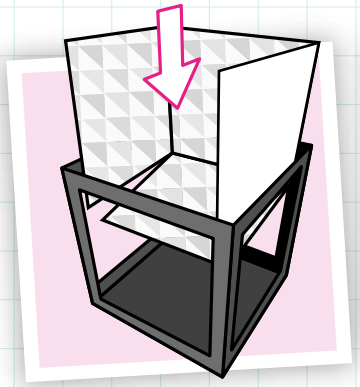


What is an Optical Illusion?

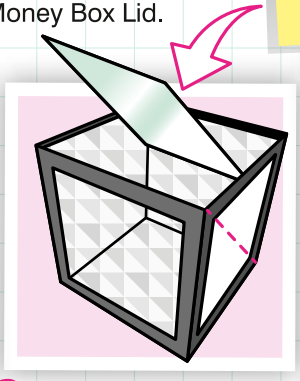
An optical illusion is something that deceives the eye by appearing to be something other than it is. They occur when our eyes send information to the brain that tricks us into perceiving something that does not match reality

Things you need:

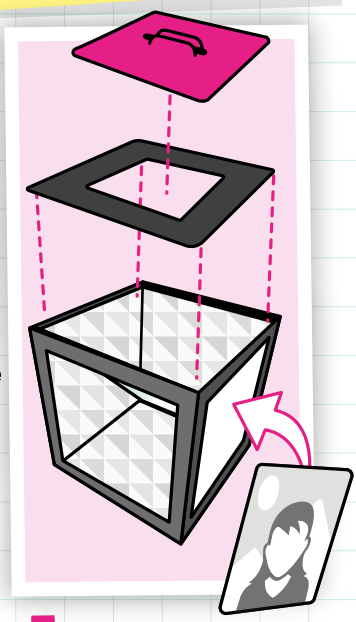
Holgraphic Card, Money Box Mirror, Money Box Frame, Money Box Top, Money Box Lid.



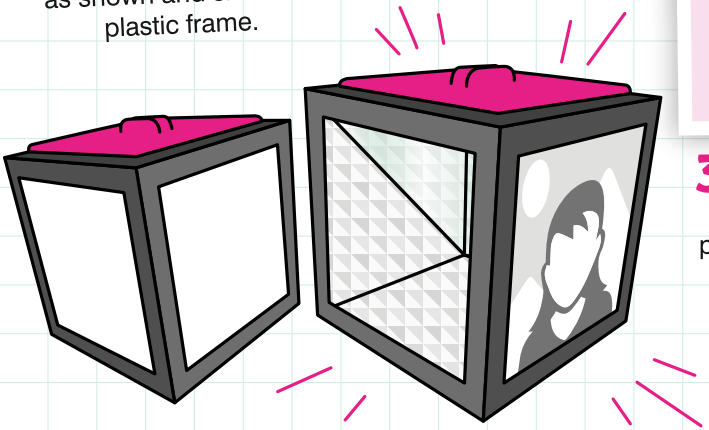
1 Fold holographic card as shown and slide into plastic frame.



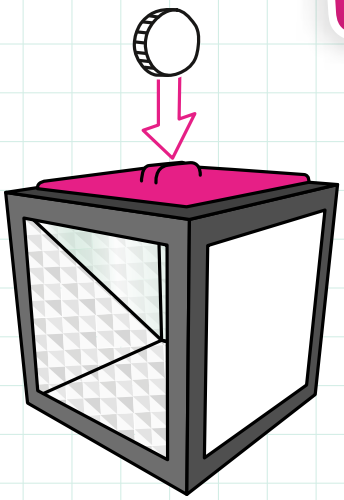
2 Peel back the protective film from the mirror then position it as shown.



3 Customise your magic photo box by inserting photos or pictures of your choice into each of the windows.



Demonstrating your Magic Box



Take a coin and post it through the slot. Look in the front of the box. What do you see? Nothing?

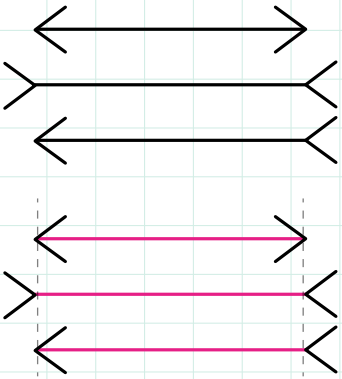
Amaze your friends and family with this optical illusion! You can also use this magic box to store your pocket money.

What's happening?

Placing a mirror at 45° inside the magic photo box, gives the impression that the inside of the box is completely hollow. When a coin is dropped into the box the mirror makes it appear as if the coin should be seen dropping to the bottom, but in actual fact the coin has remained on the top surface of the mirror and thus cannot be seen in the box.

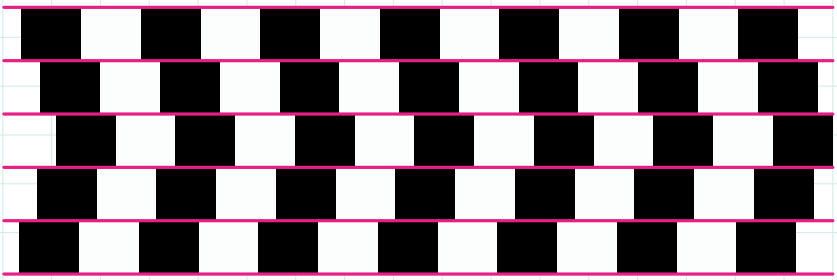
Other Optical Illusions

The Muller Lyer illusion tests visual perception by a series of arrows. Look at the three arrows. Place a vertical line through each line where you think the mid-point is. Which arrow do you think is the longest?

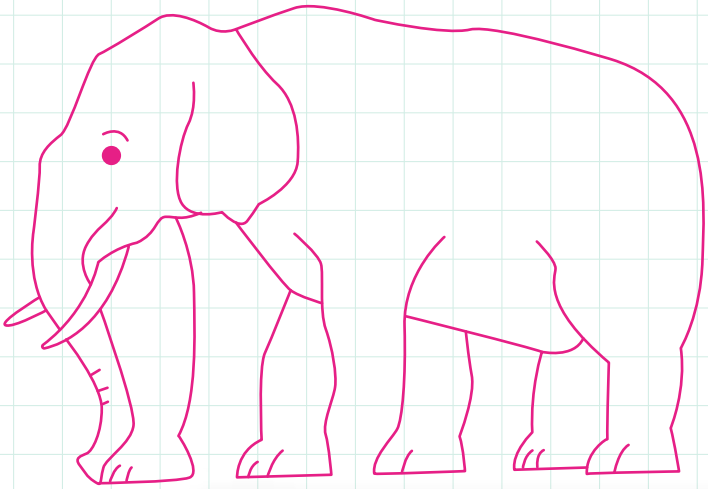


Now look at the same arrows with the lines in red. Take a rule and measure the lines. What did you find?

Look at the image below. Are the red lines straight or sloping?



Look at the elephant image below. How many legs does he have?!

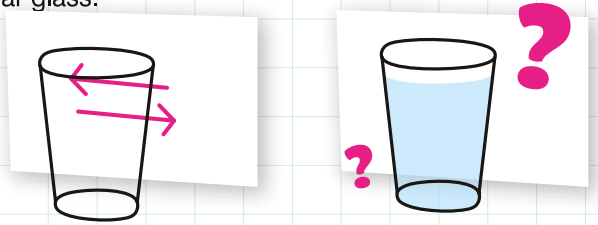


ACTIVITY 2: Reversing Arrows

You will need:

Pen or pencil, paper, clear glass, water.

1. Draw two arrows pointing in opposite directions on a piece of paper and place behind a clear glass.



2. Pour water into the glass and watch what happens to the arrows. Draw what you see in the empty glass above.

What's happening?

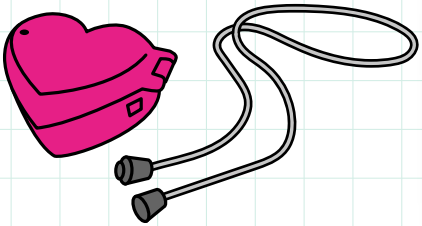
What you have just observed is a demonstration of REFRACTION, the bending of light. Light only bends when it moves from a substance of one density into a substance with a different density. In this case air to water. In this activity, the refraction causes the arrows to change direction.

This bending by refraction makes it possible for us to have rainbows! Even our eyes depend upon this bending of light. Without refraction, we wouldn't be able to focus light onto our retina and see objects clearly.

CIRCUITS

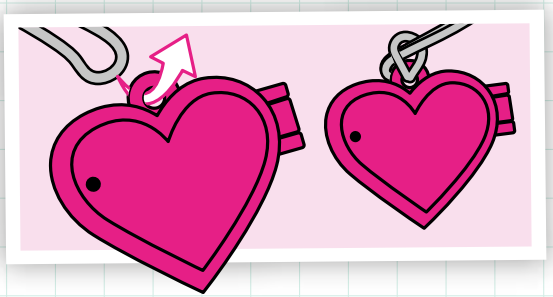
ACTIVITY 3: Locket Room Guard

In these activities we will be exploring simple electronic circuits.
ELECTRONICS is the scientific study of electric current and the technology that uses it. Do things mysteriously go missing from your bedroom? Would you like to protect your special belongings? Well, by using the specially disguised locket room guard in this set you can do just that.

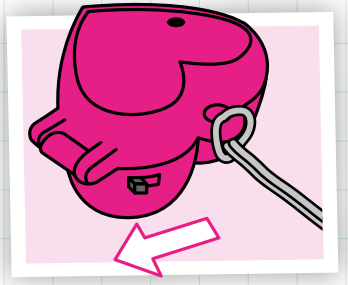


Things you need:

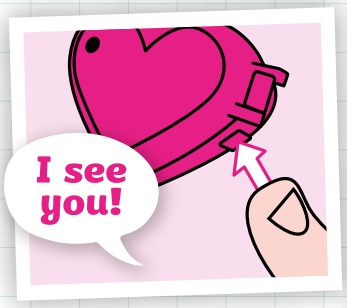
Locket Room Guard, Cord.



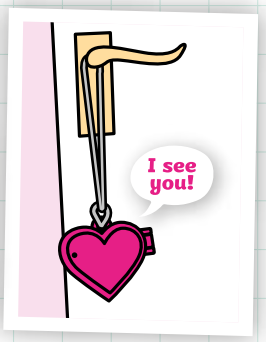
1 First attach the cord to the locket and tie a knot.



2 Turn the switch on the locket to the ON position.



3 Hold the button while you record your message...
NOTE: You can re-record your message at any time.

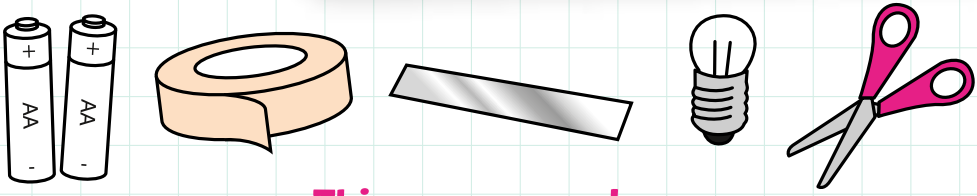


4 ...hang it up and wait for an unwelcome visitor to get the message!

So...how does it work?

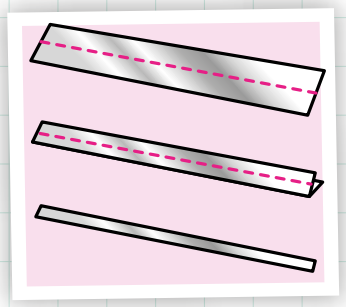
The electronics consists of a CIRCUIT. A circuit is a closed path that allows electricity to flow from one point to another. A circuit has a start and a finish and is contained within a loop. The combination of electronic elements in the circuit creates a DEVICE. This is the term used to describe an object that has been designed for a particular purpose. In this kit the device is the motion sensor room guard. It has been designed to detect motion, which then triggers the recorded message to play. What are some other examples of electronic devices?

ACTIVITY 4: Make an Electrical Circuit

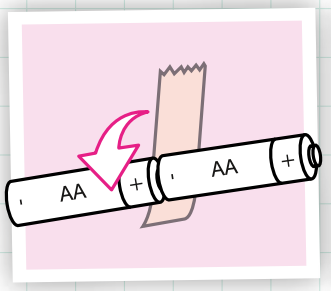


Things you need:

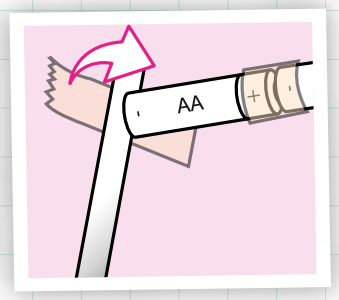
2 x AA Batteries, Sticky Tape, Kitchen Foil (dimensions 30cm x 3cm), Scissors, Small Bulb (e.g. from a torch) plus an adult to help you.



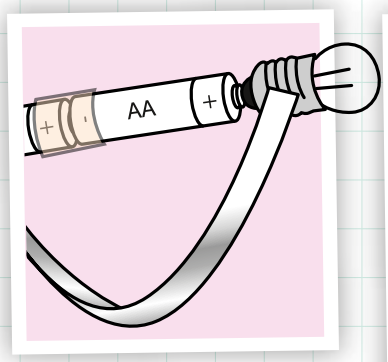
1 Fold the foil in half lengthways. Then fold it in half again.



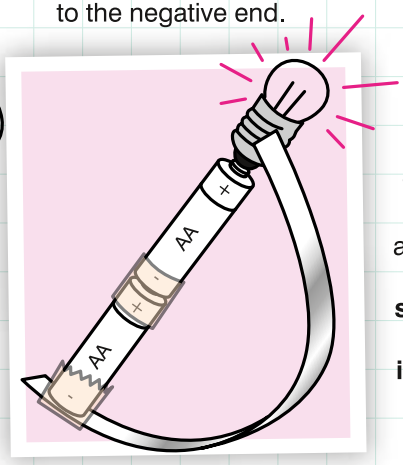
2 Tape the batteries together so that the positive end is connected to the negative end.



3 Tape one end of the foil to the negative end of the battery.



4 Place the bulb on the positive end and place the other end of the foil onto the metal neck of the bulb.



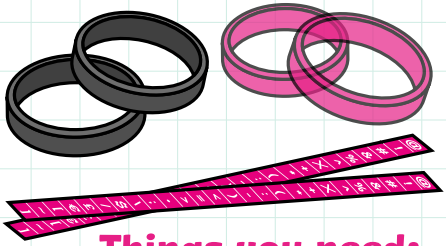
5 Your circuit is now complete and the bulb should light up.

NOTE: It is important that your length of foil is a consistent width and at least 20cm long. **Make sure you separate the batteries and remove the foil immediately after you have finished the experiment.**

CODING

ACTIVITY 5: Making your Coding Bracelets

This kit includes the materials to make two coding bracelets.
One for you and one for a friend.

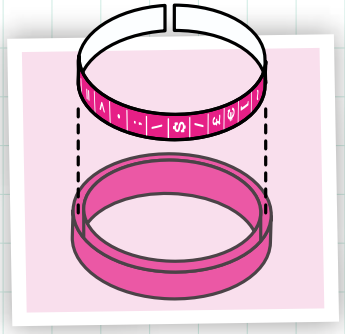


Things you need:

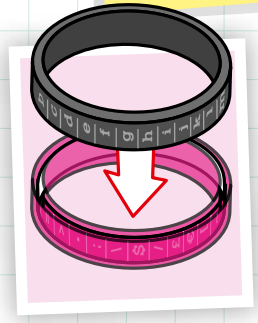
Coding bracelets, coding strips.

Cryptography

The art and science of concealing messages in order to maintain secrecy of information is known as CRYPTOGRAPHY. The origins of cryptography can be found in Egyptian and Roman civilisations. The word cryptography is a combination of two Greek words, "krytpo" and "graphene". To find out the meaning of these words, build your coding bracelets and crack the codes on page 7!

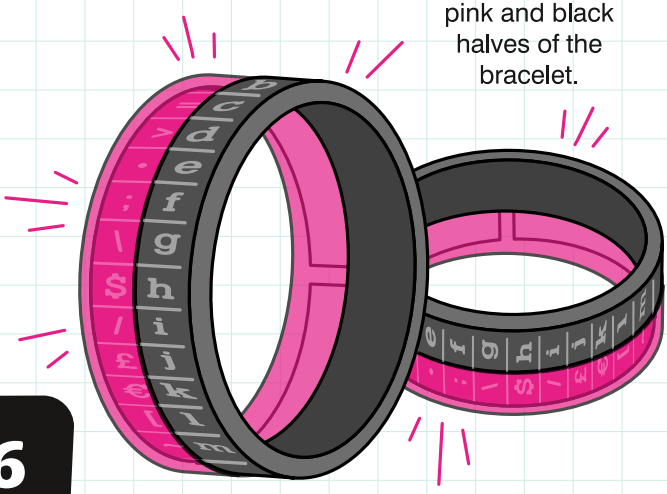


1 Insert the printed coding strip into the pink half of the bracelet.



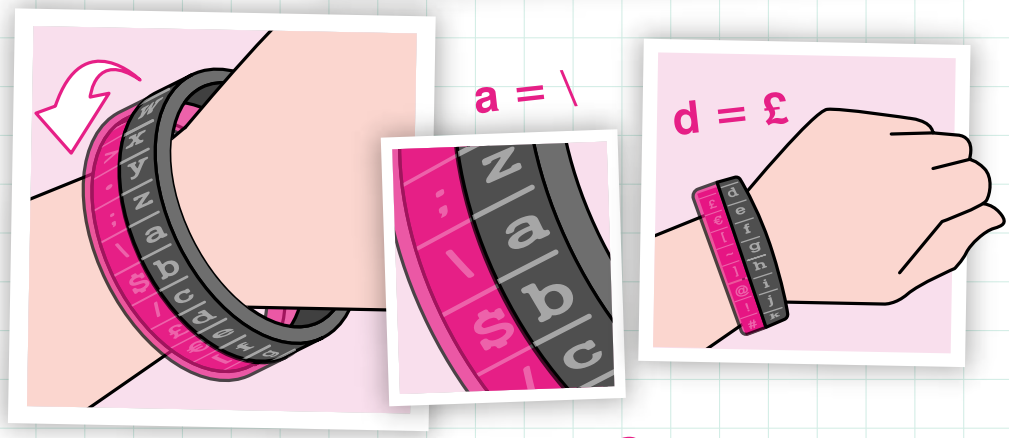
2 Clip together the pink and black halves of the bracelet.

3 Slide onto your wrist and you're ready to go!



NOTE: The printed strip has been devised so that the symbols used also correspond with those found on a mobile phone or tablet.
This means you can either hand write or text your secret messages to your friend.

Using your Coding Bracelets



1 To set your code, twist the pink ring to choose what symbol will equal letter “a”.

2 **DO NOT** twist the pink ring. Now to see what each letter equals, see what symbol is next to it on the bracelet!

Using your bracelet try to crack these codes...

a = *

\ ] X [! €

/) * £ @

— — — — — —

— — — — —

> • - -) £

— — — — — —

a = %

: £ % $ - * ; *

— — — — — — — —

• * % ; €

@ £) [ ) ; :

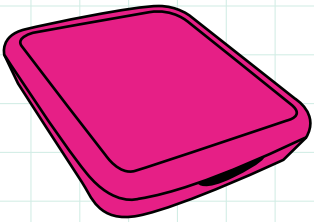
— — — — —

— — — — — — —

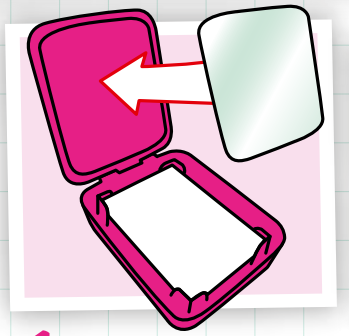
MIRROR MESSAGING

A simple way of disguising your messages can be to use mirror messaging. You can try this method using the compact mirror provided.

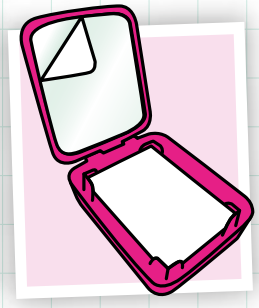
Making your Compact Message Mirror



Things you need:
Compact messaging mirror.



1 Peel off the adhesive strips from the back of the mirror and stick the mirror into position in the compact.



2 Peel back the protective film from the mirror.

ACTIVITY 6:

Create a Mirror Alphabet

You will need:
Compact mirror.

Additional items you need (not included): pen or pencil, sheet of paper.

1. On the piece of paper write out the letters of the alphabet in lowercase, leaving a space underneath each one.
2. Underneath each letter you now need to write it in mirror form.
3. Practise each letter using the mirror compact. Use your pen/pencil to write the letter backwards and check in the mirror to see whether it is correct. Once you have mastered it, write the letter on your piece of paper.

Observations

What letters look the same written forwards as they do backwards? Which ones are symmetrical?

Once you have your alphabet, practise writing messages in your mirror compact!

INVISIBLE INKS

You can also use your compact mirror for invisible messaging using the included black light pen.

Write a message in the compact mirror using the black light pen. What do you see? Expose the message by pressing the button and lighting up your writing! How about trying invisible mirror messaging?

Whats happening?

UV ink contains substances that glow under certain wavelengths of light yet remain invisible to the human eye. Examples of materials that have this property are found in laundry detergents, tonic water and even human saliva! Take your black light around the house. What objects can you find that glow?

ACTIVITY 7: Making Invisible Inks

Invisible inks can be heat, light or chemically activated. This activity explores these different types of inks.

Heat Activated

You will need (not included): Lemon juice, paintbrush or cotton bud, sheet of paper, iron (set to a low temperature).

1. Squeeze half a lemon into a cup.
2. Dip a paintbrush or cotton bud into the liquid and then write a message on a loose piece of paper.
3. Wait for it to dry.
4. You will then need some help to expose the message. Ask an adult to carefully iron your piece of paper and watch your message magically appear!

Chemically Activated

You will need (not included): baking powder, water, purple grape juice, paintbrush or cotton bud.

1. Mix equal parts of baking powder with water.
2. Use a paintbrush or cotton bud to write a message with this liquid on a loose piece of paper.
3. Wait for it to dry.
3. Paint over your message with purple grape juice to expose the words!

Light Activated

You will need: Black Light Pen.
You will need (not included): tonic water, paintbrush or cotton bud.

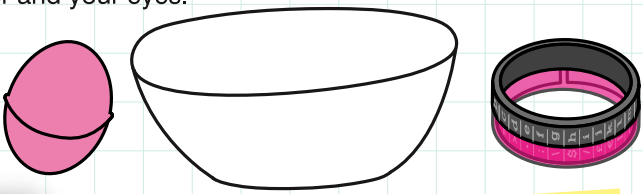
1. Use a paintbrush or cotton bud to write a message with the tonic water on a loose piece of paper.
2. Wait for it to dry.
3. Use your black light pen and reveal your hidden message!

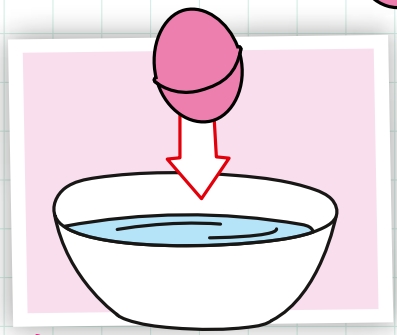
ACTIVITY 8: Hidden Message Water Fizzer

In this set we have included a secret water fizzer.
Hidden within the fizzer is a special secret coded message.
NOTE: This water fizzer does not contain fragrance and is not intended to be used as a personal care item. When diluted the fizzer has the potential to cause irritation, so avoid contact between the water and your eyes.

Things you need:

Water fizzer, coding bracelets, bowl.

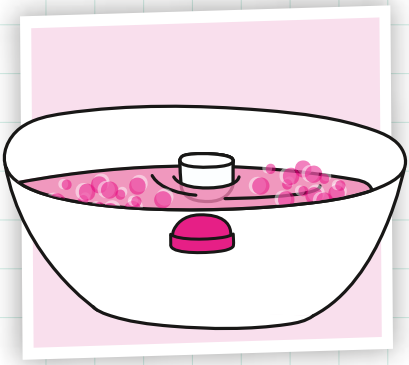




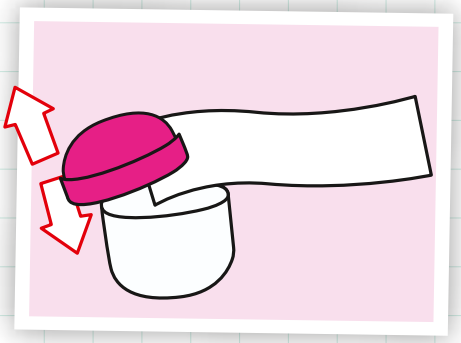
1 To find your message, fill a bowl with cold water and add your water fizzer.

What's happening?

When your fizzer is dropped into the water this sets off a chemical reaction between two of the ingredients – citric acid and sodium bicarbonate. This reaction creates carbon dioxide which is why you see bubbling in the water. The bubbling stops when the fizzer is completely broken down and the reaction ends.

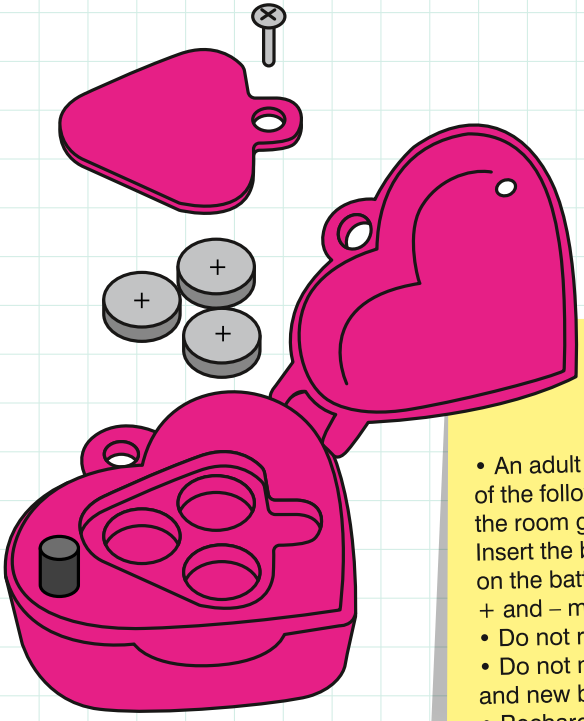


2 After a few minutes, your water fizzer will have broken down to reveal a small plastic container.



3 Open the container and de-code your secret message. Write your answer below.

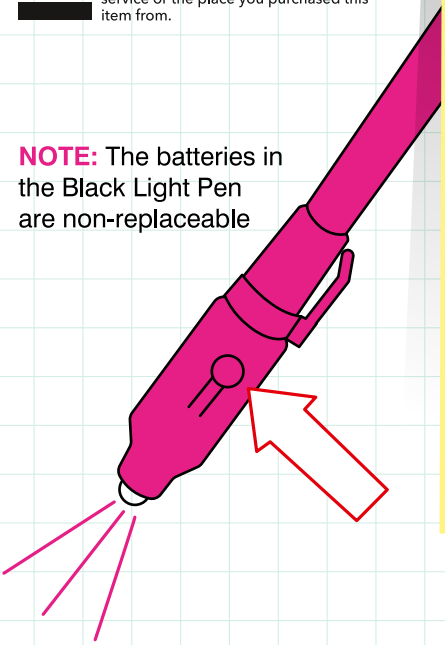
HINT: Using your coded bracelets. a =@



NOTE: The locket roomguard requires 3 x LR44 batteries (included)

Disposal of old electrical equipment. This symbol on the product or its packaging indicates that this product should not be treated as household waste. Instead it should be handed over to local Civic Office, your household waste disposal service or the place you purchased this item from.

NOTE: The batteries in the Black Light Pen are non-replaceable



Battery information

- An adult should install the batteries and take note of the following – open the cover on the bottom of the room guard by using a cross head screw driver. Insert the batteries making sure the + and – signs on the batteries are aligned with the corresponding + and – markings inside the compartment.
- Do not recharge non-rechargeable batteries.
- Do not mix different types of batteries, or used and new batteries.
- Rechargeable batteries are to be removed from the toy before charging them.
- Rechargeable batteries are only to be charged under adult supervision.
- Only batteries of the same or equivalent type, as recommended, are to be used.
- Insert batteries in the correct polarity.
- Remove exhausted (used) batteries from the toy.
- Remove batteries from the toy if it is not going to be used for a long period of time.
- Do not short-circuit the supply terminals.
- Batteries should be replaced by an adult.
- Do not attempt to power battery products from the mains supply and do not insert connection wires into electrical socket outlets.
- Dispose of used batteries at a recycling point. Never dispose of batteries in fire.

WARNING: Dispose of used batteries immediately. Keep new and used batteries away from children. If you think batteries might have been swallowed or placed inside any part of the body, seek immediate medical attention.

ANSWERS: KRYPTO MEANS HIDDEN, GRAPHENE MEANS WRITING