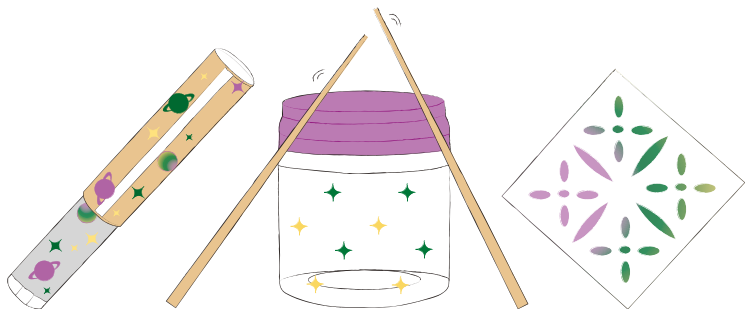


CHALLENGE CARDS

Three Ramadan themed engineering and science challenges from the engineers at Dyson.



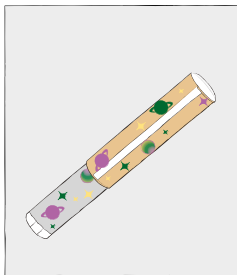
Please note that the activities contained in here are intended for children ages seven and above. Adult supervision is recommended for all projects.

About the challenges in this pack

Sights of Eid al-Fitr

Science challenge

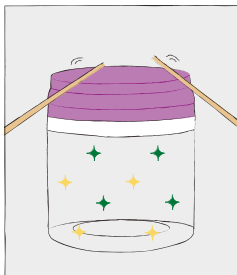
At the end of the fasting month, astronomers look at the sky with a telescope to see the New Moon. The New Moon is important as it marks the beginning of a new Islamic month and the first day of Eid al-Fitr. We will learn to make our own telescope to help us see objects that are far away.



Sounds of Ramadan

Engineering challenge

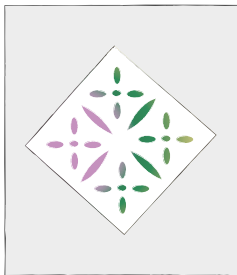
Traditional Malay music is based around percussion instruments, so drums play a vital role in it. Traditional music performances are common during celebrations, especially during Ramadan. Let's learn how to make our own drums using a balloon and a container.



Colourful Paper Batik

Science challenge

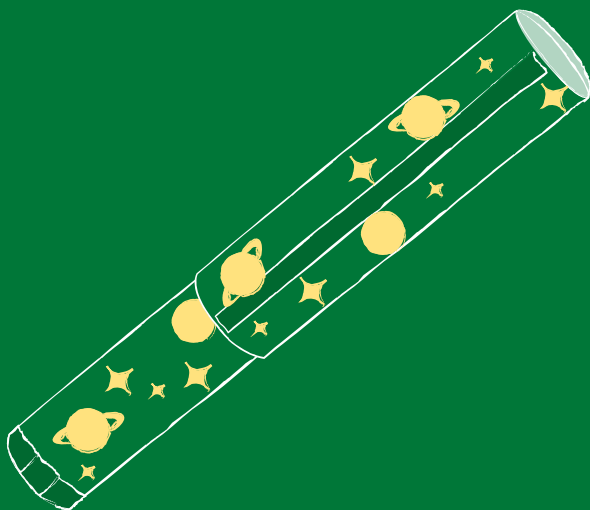
During Ramadan, many Muslims open their homes to welcome family and friends for celebrations. A variety of colourful decorations are used to brighten up homes. In this challenge, we will learn how to create our own colourful paper batik decorations.



ENGINEERING
CHALLENGE

SIGHTS OF EID AL-FITR

Build your own telescope
to look at faraway objects



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FOUNDATION

Instructions for Sights of Eid al-Fitr

1. Roll the 20cm × 30cm cardboard into a tube to fit the diameter of the convex lens and the paper towel roll snugly inside. Once rolled, tape the ends of the tube.
2. Apply Blu Tack around the edge of the double convex lens. Then, stick the lens inside the end of the tube you just rolled.
3. Using sticky tape, mount the double concave lens on one end of the paper towel roll.
4. Insert the open end of the paper towel roll into the open end of the tube; this should be a snug fit and require no adhesive. This is your telescope.
5. Point the telescope at a faraway object and look through the concave lens.
6. Slide the paper towel roll in and out of the tube until a clear image is seen.

Materials

20cm × 30cm cardboard

Paper towel roll

Double convex lens
with 30cm focal length

Double concave lens
with 10cm focal length

Sticky tape

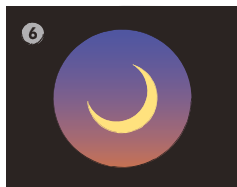
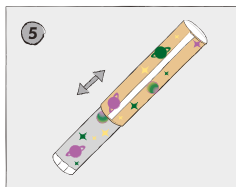
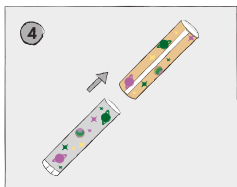
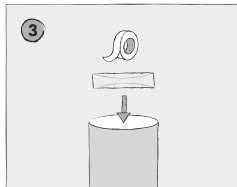
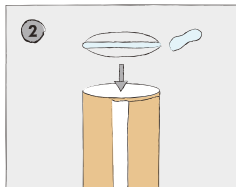
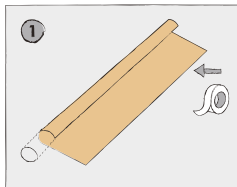
Blu Tack

Stickers (optional)

Convex lens
Thicker in the center



Concave lens
Thicker at the sides



How does it work?

A refracting telescope works by bending light rays with lenses. The convex lens gathers, bends and converges light rays down the tube, forming an image as a result. The concave lens magnifies the image, making the object look closer to you than it actually is.

SCIENCE
CHALLENGE

SOUNDS OF RAMADAN

Make your own drums
and create your own sound



THE
JAMES
DYSON
FOUNDATION

Instructions for Sounds of Ramadan

1. Cut the balloon in half across the middle.
2. Place the balloon over the mouth of the container. Then, tape the edges of the balloon to secure it in place. Decorate the container with stickers if you want.
3. Tap the top of the balloon using the chopsticks or your hands to make a sound.
4. Repeat the same steps with a container of a different material. Listen to the difference.

Materials

Empty containers
of different materials

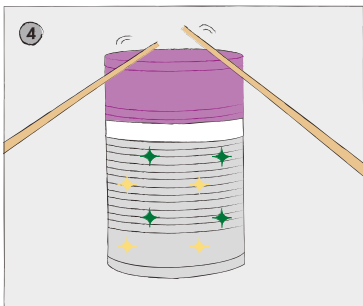
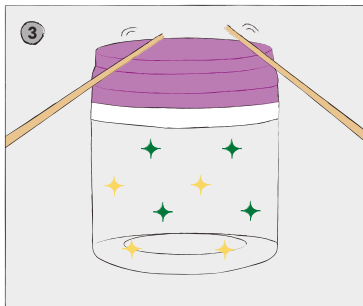
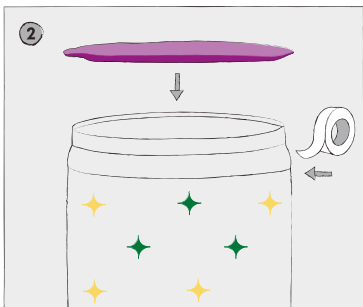
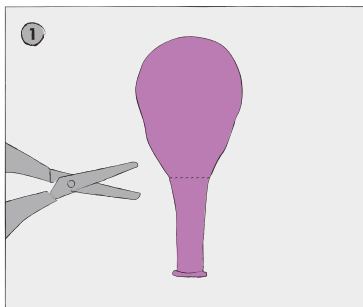
Balloons

Scissors

Sticky tape

Chopsticks

Stickers (optional)



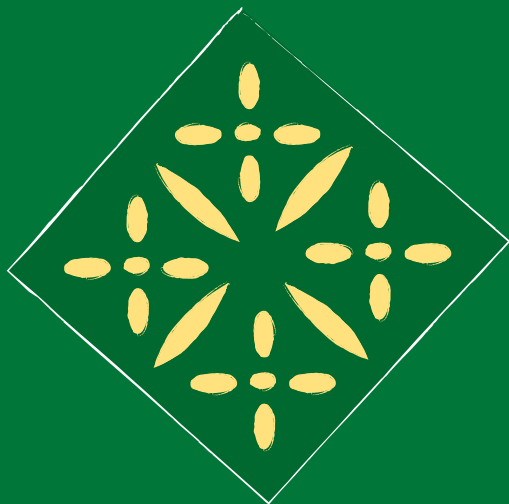
How does it work?

Tapping the balloon causes vibration, rapidly compressing and expanding the air underneath. This causes rapid air changes which reach your ears as sound waves.

SCIENCE
CHALLENGE

COLOURFUL PAPER BATIK

Create your own colourful decorations



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Instructions for Colourful Paper Batik

1. Fill the plate with milk. Then, add a few drops of different food colouring on the milk.
2. Place a drop of dish soap on the tip of the cotton swab.
3. Touch different parts of the food colouring with the soapy tip, starting with the center. Watch the colours swirl.
4. Take a square piece of tracing paper and fold it in half to form a triangle. Fold it in half three more times to make a smaller triangle.

Materials

Plate

Full-fat milk

Variety of food colouring

Dish soap

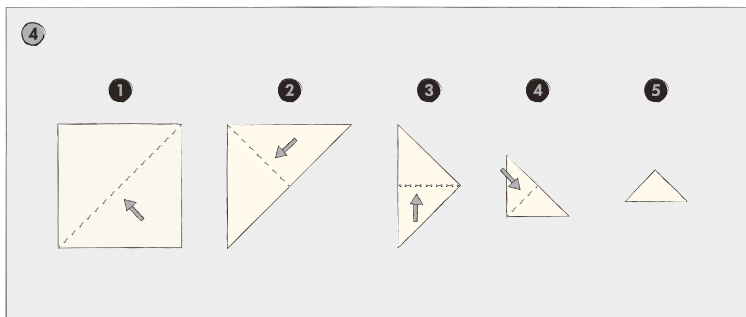
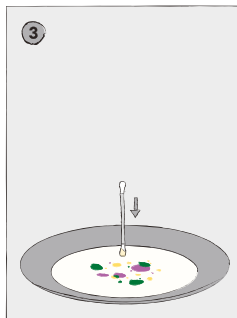
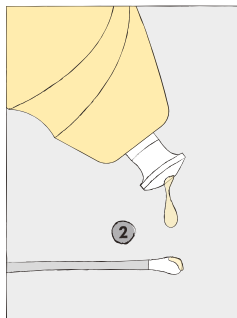
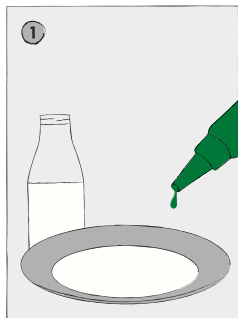
Cotton swab

Tracing paper

Water colour paper

Scissors

Glue stick



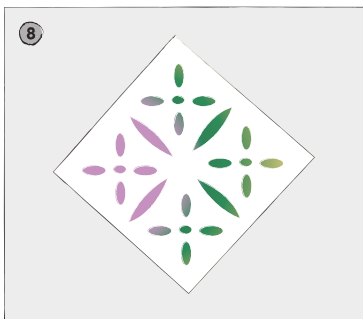
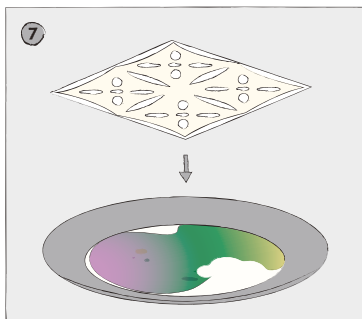
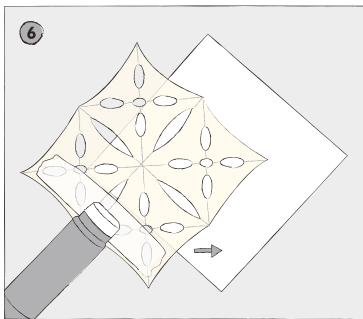
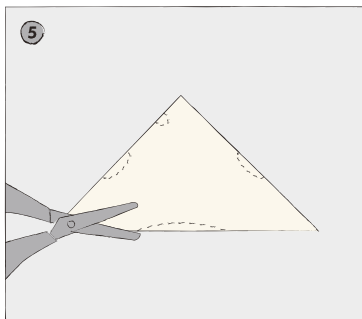
Instructions for Colourful Paper Batik

- Using a pair of scissors, cut a variety of shapes into the sides of the triangle.
- Open up the triangle to reveal your batik pattern. Then, apply glue onto one side and mount it together with the water colour paper.
- Place the paper in the plate with the tracing paper side down for five seconds.
- Remove and peel off the tracing paper to reveal your colourful batik.

How does it work?

Milk contains fat molecules that don't dissolve in water, while soap contains molecules that are 'water-loving' (hydrophilic) and 'water-fearing' (hydrophobic).

When soap is added to milk, the hydrophobic portion of the soap breaks up the fat molecules and the hydrophilic portion connects with the water molecules of the milk. This pushes the food colouring molecules in all directions resulting in an explosion of colour.



We want to inspire the next generation of engineers and scientists and we want to do this through hands-on learning and experimentation.

James Dyson
Chief Engineer

The James Dyson Foundation encourages young people to think creatively and invent. Through free educational resources and workshops, we introduce the exciting reality of a career in engineering.

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