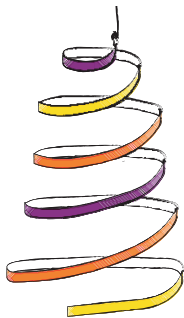
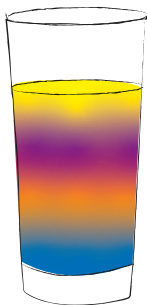
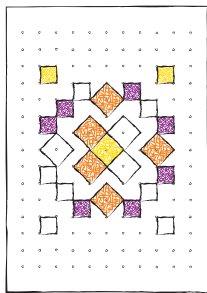


CHALLENGE CARDS

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

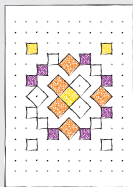


Please note that activities contained in here are intended for children aged seven and above. Adult supervision is recommended for all challenges.

About the challenges in this pack

Geometric kolam art Engineering challenge

Kolam are floor decorations done by Hindu households to welcome Deepavali. The designs incorporate geometrical and floral outlines using coloured rice. Make your own kolam using simple shapes.



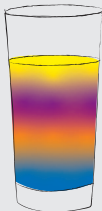
Spinning murukku Engineering challenge

Murukku are spiral shaped crunchy snacks specially made and consumed during Deepavali celebration. Spiral or helical shapes are found in engineering applications such as screws, staircases, drill bits and cyclone ducts. Learn about this fun application with the spinning murukku challenge.



Deepavali density Science challenge

Deepavali is also known as the festival of light and is celebrated with colours through its decorations, clothing, and food. The light and bright colours symbolise joy and victory. Gather your favourite colours and try out the Deepavali density challenge.

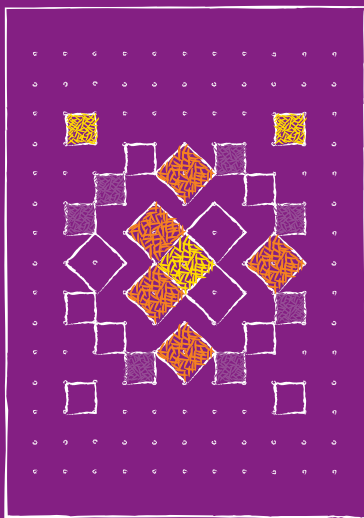


Please note that activities contained in here are intended for children aged seven and above. Adult supervision is recommended for all challenges.

ENGINEERING
CHALLENGE

GEOMETRIC KOLAM ART

Make your own kolam using simple shapes



THE
JAMES
DYSON
FOUNDATION

Instructions

Preparing coloured rice:

1. Pour 2 tablespoons of water into each of the 3 bowls.
2. Add a different watercolour to each bowl.
3. Add $\frac{1}{2}$ cup of rice into each bowl and mix well. If necessary, add more water or watercolour to achieve a vibrant colour.
4. Keeping the colours separate, spread out each bowl of rice onto a paper towel to dry.

Materials

6 tablespoons of water

3 bowls

3 watercolours of choice

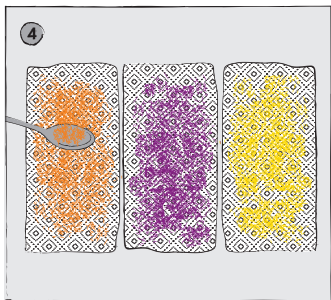
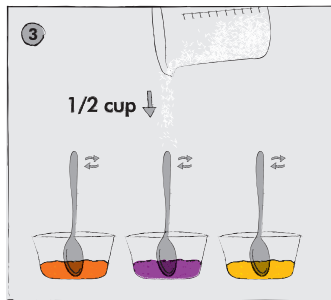
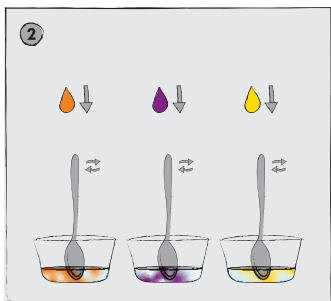
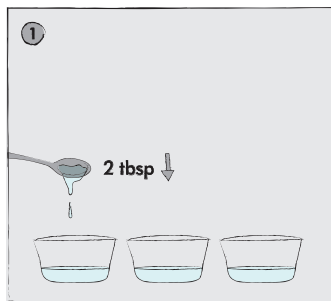
1 $\frac{1}{2}$ cups of raw white rice

Paper towel

Piece of A4 grid paper

Pencil

Ruler

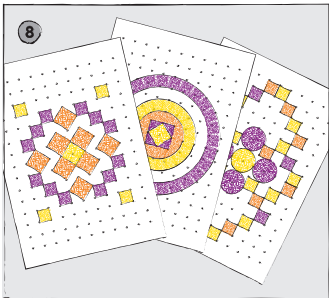
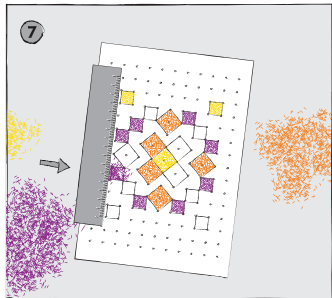
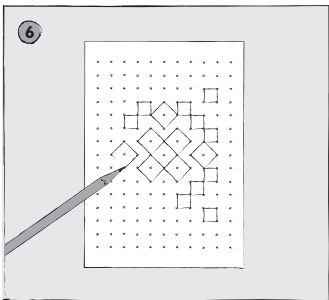
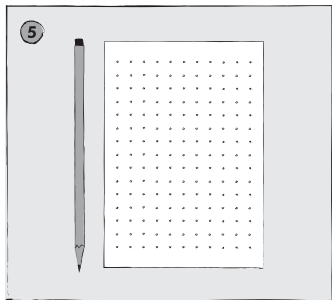


Designing the kolam:

5. Place the grid paper on a flat surface.
6. Draw different polygonal shapes on the paper to form symmetrical kolam designs.
7. Fill the different segments of the kolam design with your coloured rice.
8. Repeat the steps above and make different designs each time.

Design icon

These basic shapes are used by engineers to design products. Learning to draw and understand the connection between these shapes supports development of spatial skills.



ENGINEERING
CHALLENGE

SPINNING MURUKKU

Learn about the fun application of helical shapes with the spinning murukku challenge



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FOUNDATION

Instructions

1. On your sheet of paper, draw a spiral shape.
Decorate the spiral with your favourite colours and designs.
2. Cut out the spiral shape and pierce a small hole in the centre of the spiral with a colouring pencil.
3. Thread the string through the hole and tape it in place on the other side, being careful not to tape the spiral together.
4. Move the paper spiral up and down by pulling and releasing the string and observe the rotation direction of the spiral.

Materials

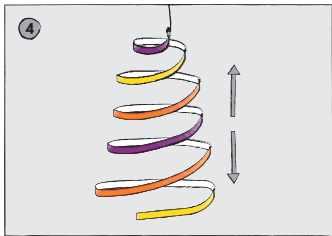
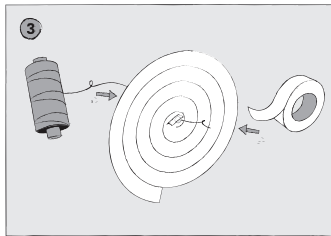
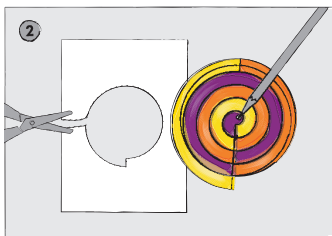
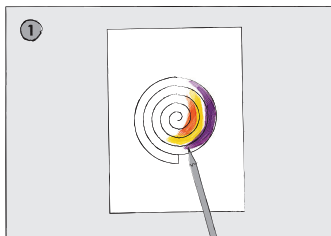
Sheet of paper

Colouring pencils

Scissors

30cm of string

Tape



How does it work?

When lifted, the spiral turns into a helical geometric shape that interacts with the air in the direction of motion. When moving the spiral up, the air interacts with the surface of the spiral and rotates either clockwise or anticlockwise depending on the upward or downward motion.

SCIENCE
CHALLENGE

DEEPAVALI DENSITY

Gather your favourite colours and
try out the Deepavali density challenge



THE
JAMES
DYSON
FOUNDATION

Instructions

1. Fill 4 glasses with 1 cup of warm water each. Leave the fifth glass empty and set aside.
2. Add 2–3 drops of different food colourings to each glass of water.
3. Add 2 tablespoons of sugar to the first glass, 4 tablespoons to the second, 6 tablespoons to the third, and none to the fourth.

Materials

5 glasses

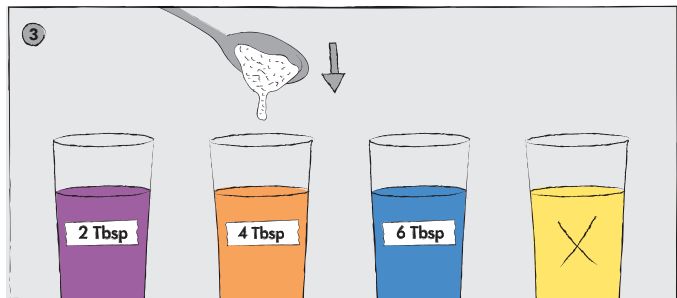
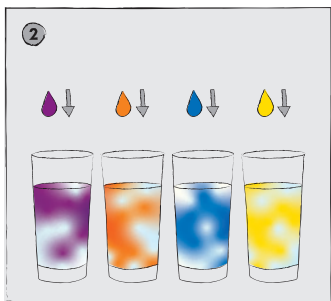
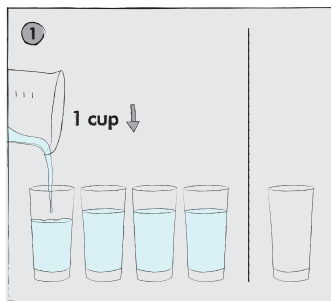
4 cups of warm water

4 food colourings

4 tablespoons

12 tablespoons of sugar

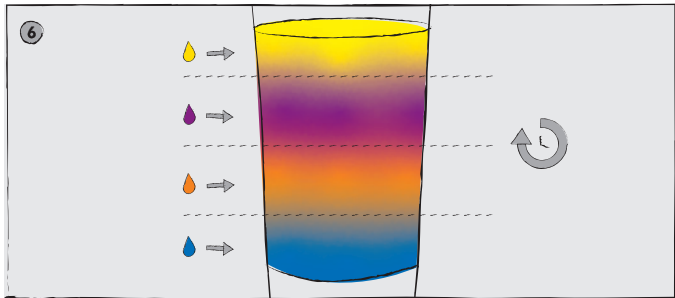
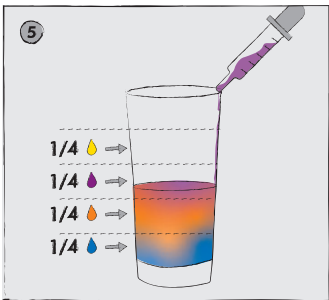
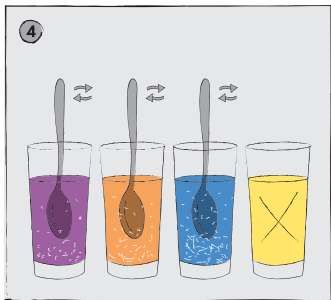
Pipette or syringe



4. Stir each mixture with a spoon until the sugar is dissolved.
5. Using the pipette or syringe, fill the empty fifth glass $\frac{1}{4}$ full of the solution with 6 tablespoons of sugar, then add $\frac{1}{4}$ of the solution with 4 tablespoons of sugar. Repeat this step with the other two solutions, decreasing sugar content each time. Dispense the liquid gently from the pipette or syringe so the layers don't mix.
6. Observe your rainbow and how the layers sit on top of each other.

How does it work?

Density is the number of particles in a given volume. When the sugar dissolves in the water, it increases the density of the water. The solution with the greatest number of sugar particles is the most dense. This means it stays at the bottom of the glass and the least dense stays on top.



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
Founder

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.

These challenges were designed by Dyson engineers to encourage inquisitive young minds to get excited about engineering.

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