



SHAPES APPLIED

A WORKSHOP BY SABITHA PRABHU

Shapes and food we eat!

A QUICK RECAP



Shapes We Eat!

Identify the Shapes



Shapes We Use Everyday!

Identify the Shapes



NAMING THE SHAPES

Shapes We Eat!

Shapes and food we eat!



Cone



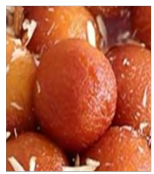
Rhombus/
Diamond



Hexagon



Cube



Sphere



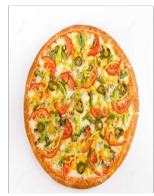
Prism



Triangle



Pyramids



Circle

Shapes We Use Everyday!

Shapes Around Us



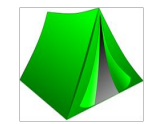
Rectangle



Hexagon



Cone



Prism



Rectangle



Sphere



Quadrilateral

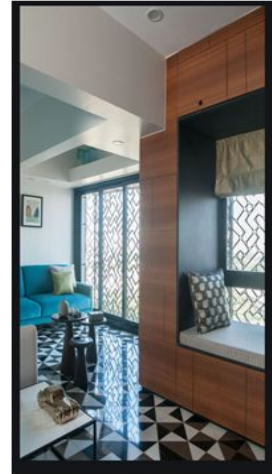
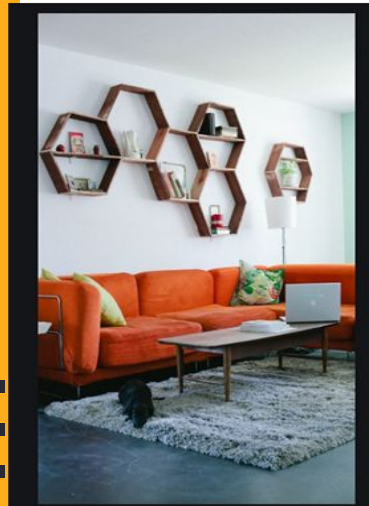


Circle

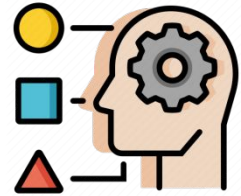


Cube

Shapes That Define Our Houses



Shapes That Define Our Houses



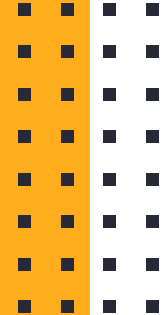
Which one of these shapes would give a strong support to a house?

- a. Triangle
- b. Rectangle
- c. Circle



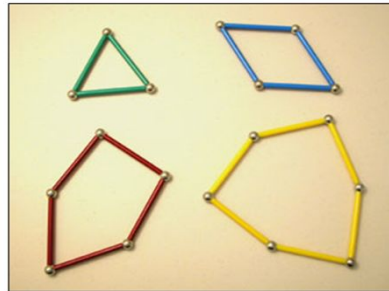
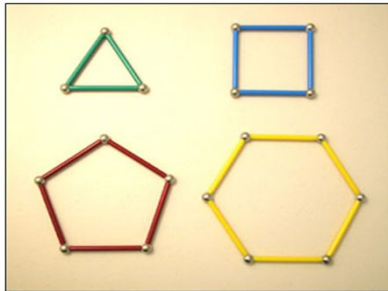


A triangular shape would give a strong support to a house than the rectangular or circular shapes.

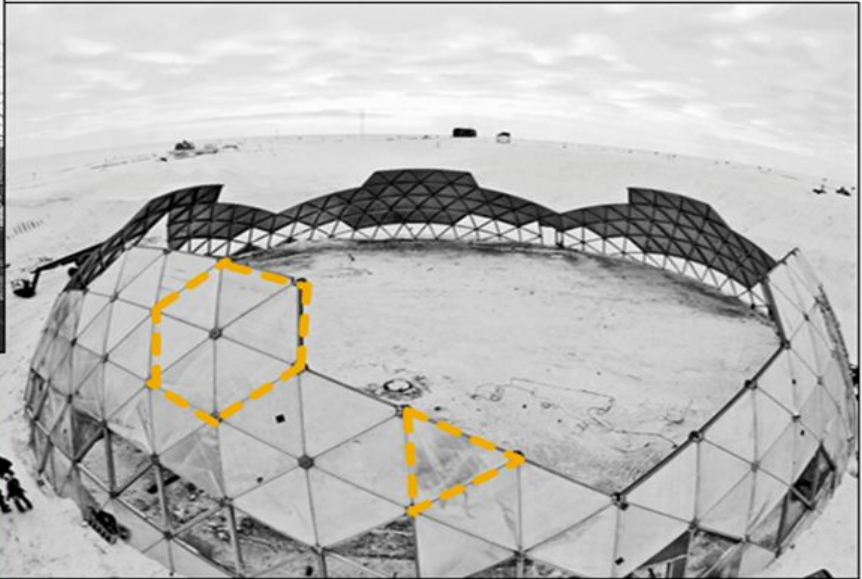
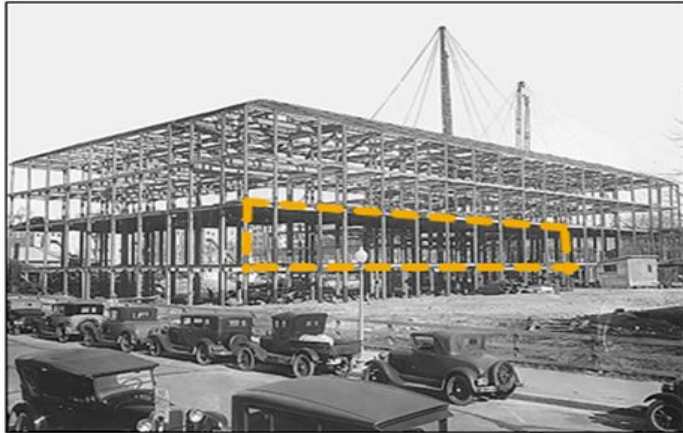


Triangles Everywhere

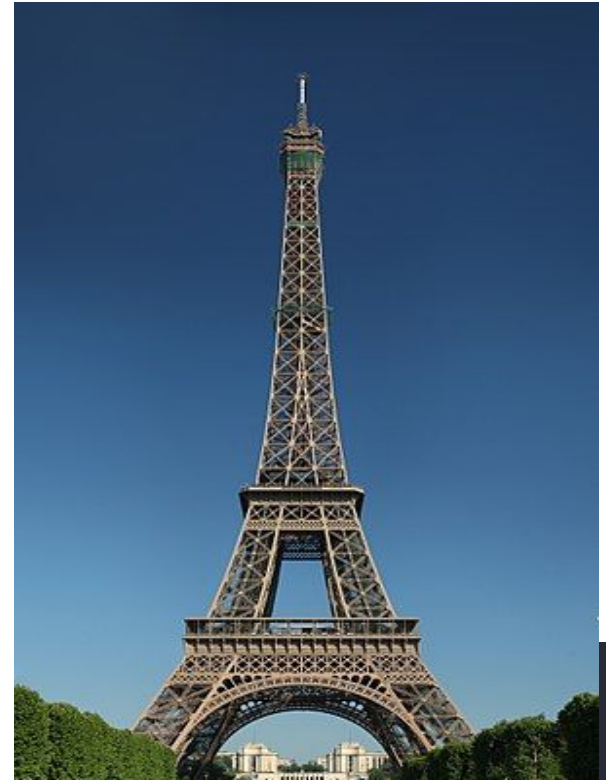
Does that mean one cannot use polygons other than triangle in construction?



Triangles Everywhere



Triangles Everywhere



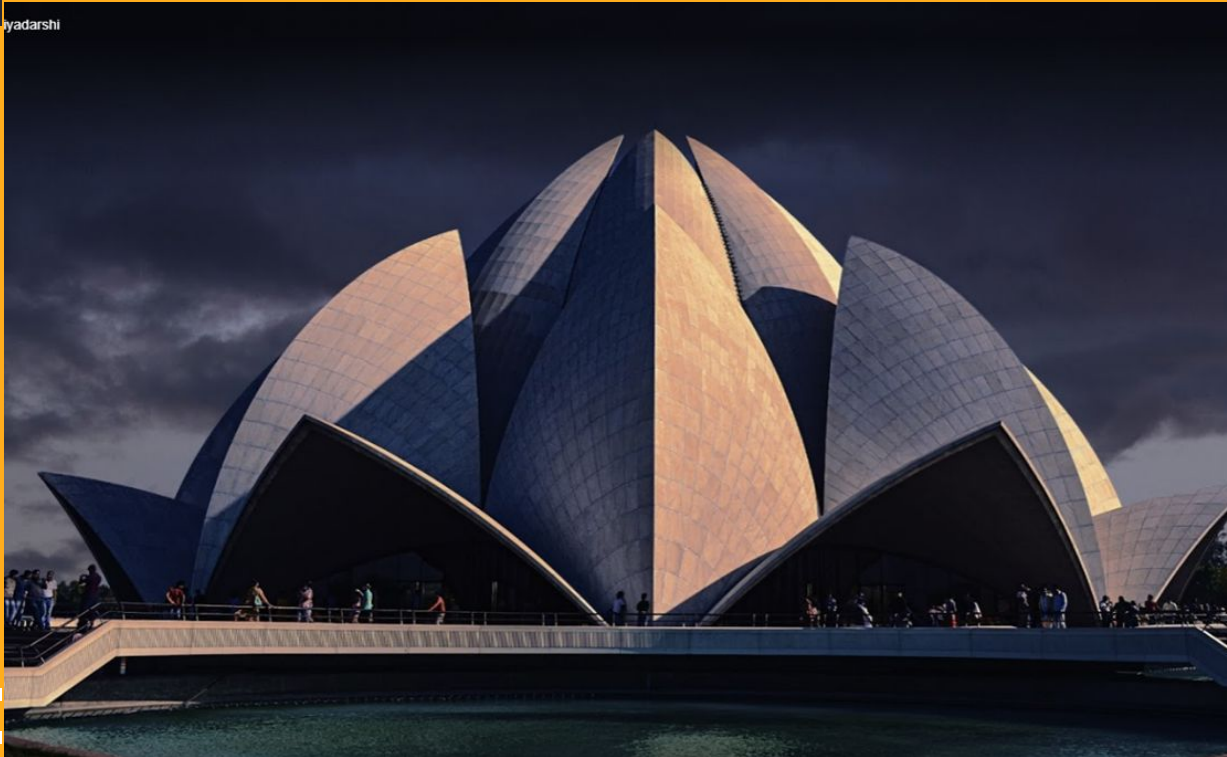
Triangles Everywhere

What is the advantage of having triangular frames in bicycles?

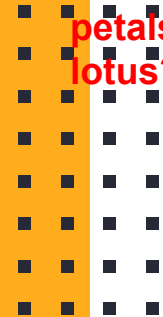




Geometry and Architecture



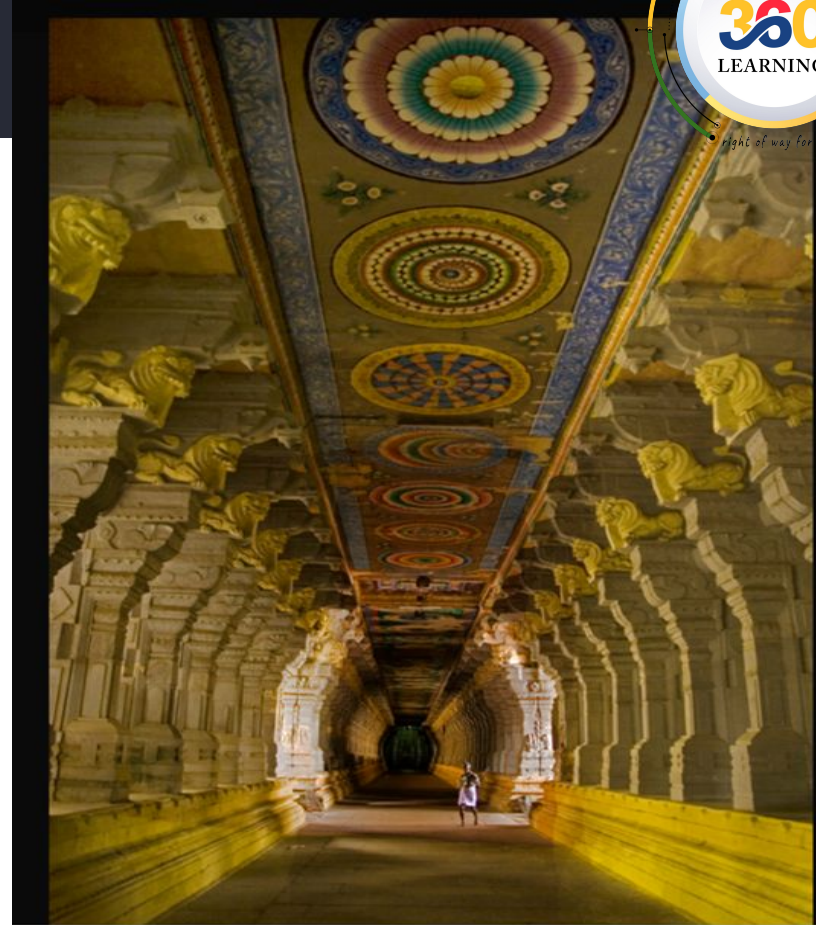
Which are the geometrical shapes found in the three tiers of petals of the lotus?



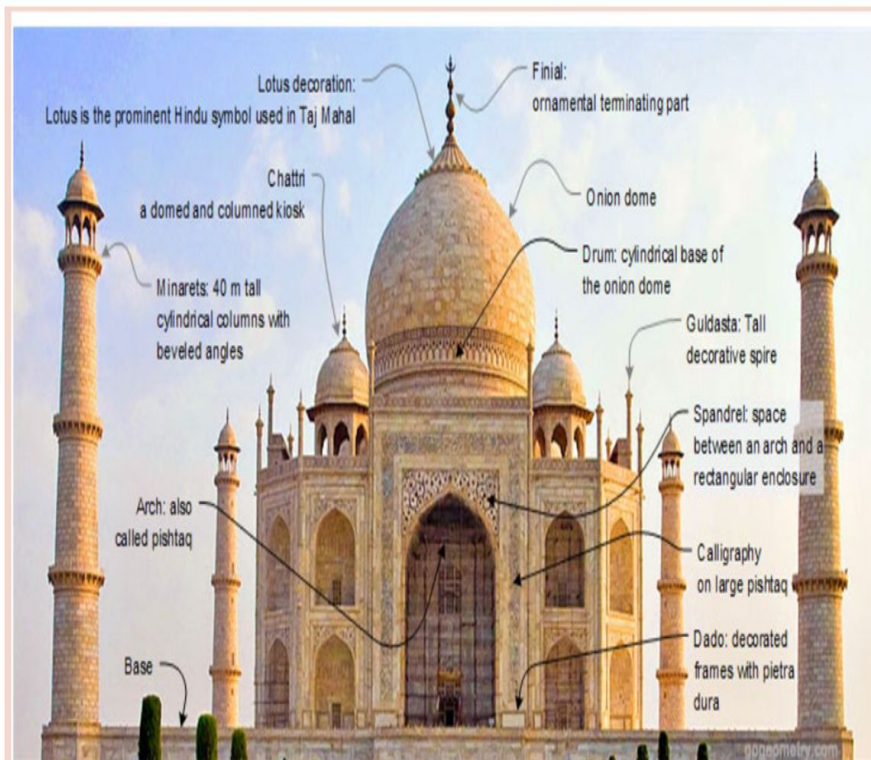
Geometry and Architecture



Geometry and Architecture



Geometry and Architecture



Geometry and Architecture



Architectural Wonders of India

Rani Ki Vav, Patan, Gujarat



Bhoga Nandeeshwara Temple, Nandi Hills, Karnataka



Architectural Wonders of India



Chand Baori, Abaneri, Rajasthan



Shaniwar Wada Palace, Pune, Maharashtra



Fractals are self-repeating patterns of diminishing sizes.



Architectural Wonders of India

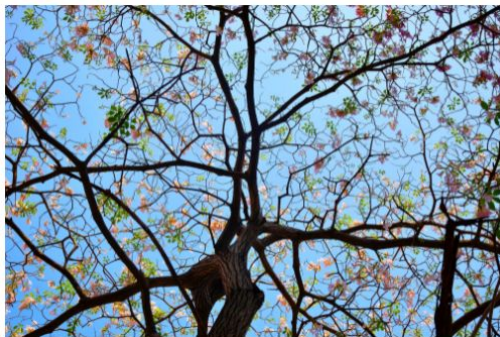


Fractals in Nature



Fractal Art in Nature

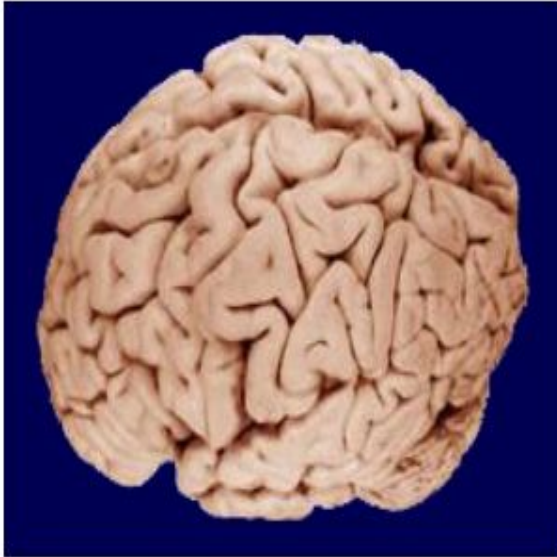
Look out for fractals in fruits and vegetables.



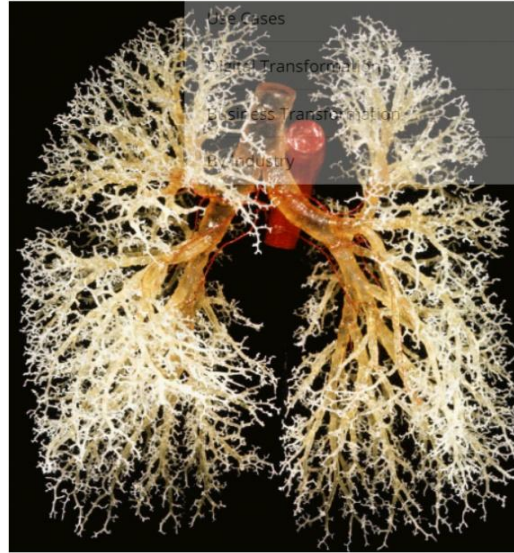
Jef Duncan



Fractals in Our Body

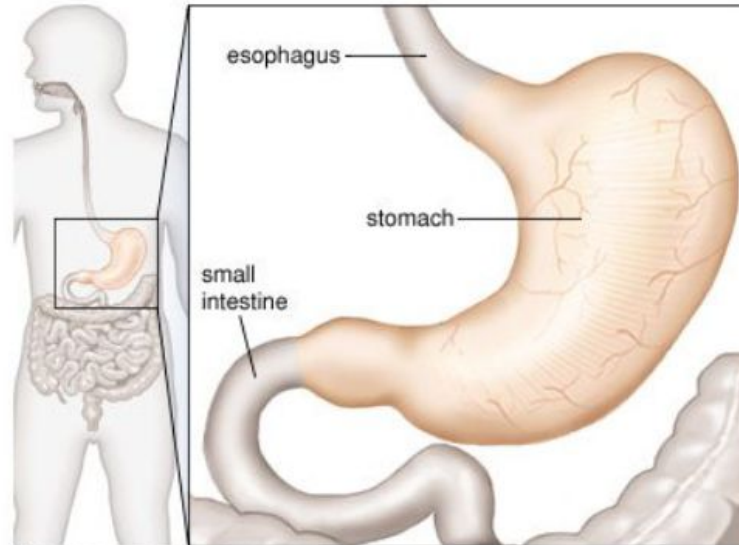


Human brain showing the convoluted cortex



The Shape of the Human Stomach

The shape of human stomach resembles _____ letter of the English alphabet.





Nature's Tiny Mathematicians

Who could be this
nature's tiny
mathematician?

Nature's Tiny Mathematicians – Bees!



Let's watch the mathematicians at work!





Nature's Tiny Mathematicians – Bees!

Investigate the mathematics behind bee hive shape.





Honeycomb Cell Shape Investigation

Honeycomb Work Mat

How would honeycomb cells of different shapes fit together in a hive?

Use the work mat below to experiment with different shapes, using pattern blocks or cut-outs and pennies/circular candies.

- Arrange as many shapes as you can in the space provided. Honeycomb cells are never a mixture of different kinds of shapes, so you must use only one type of shape at a time.
- Try to arrange the shapes with as little space between them as possible.

Place shapes within the boundaries of the work mat.

It's okay if a few edges stick out a little.

Place shapes within the boundaries of the work mat.

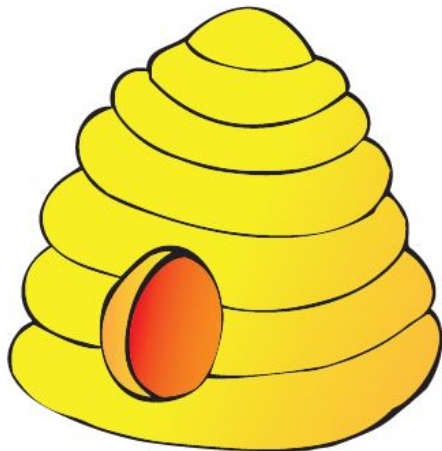
It's okay if a few edges stick out a little.



Observation Sheet



As you explore how shapes fit together on the work mat, you use this worksheet to record what you observe.



In the boxes below, draw a representation of each of the shape arrangements that you create on the work mat. You can either make a free-hand sketch or repeatedly trace one pattern block/penny. Note: Your drawings might show fewer shapes than you arranged on your mat. That's okay! Just do your best to make your drawings reflect the patterns you arranged.

Observations could include the following:

- How the shapes fit together
- Patterns that you observe
- Discoveries that you make about the shape
- Evidence for efficient or inefficient use of the shapes
- Additional observations



Honeycomb With Circles

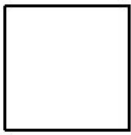


In the box below, draw what you observe when circles are used as a shape for a honeycomb

Are there spaces between the shapes?
Shade in the spaces.

Detailed Observations:

Would a circle be a good shape for a honeycomb cell? Explain why or why not, and use your observations to support your thinking.



Honeycomb With Squares



In the box below, draw what you observe when squares are used as a shape for a honeycomb



- Are there spaces between the shapes?
- Shade in the spaces.

Detailed Observations:

Would a square shape be good shape for a honeycomb cell? Explain why or why not, and use your observations to support your thinking.

Honeycomb With Triangles



In the box below, draw what you observe when triangles are used as a shape for a honeycomb.

Are there spaces between the shapes?

Shade in the spaces.

Detailed Observations

How about triangles? Would a triangle be a good shape for a honeycomb cell? Explain why or why not, and use your observations to support your thinking.

Honeycomb With Hexagons



In the box below, draw what you observe when hexagons are used as a shape for a honeycomb.



HEXAGONS



What about hexagons? Are hexagons a good shape for honeycomb cells? Explain why or why not, and use your observations to support your thinking.





Nature at its Best



STALACTITES AND STALAGMITES





STALACTITES AND STALAGMITES ACTIVITY

What you will need:

- Hot water, 2 glasses
- Kitchen salt
- Twine, ~10 inches
- Plate

Overview and Objective

In caves, water drips from the walls and leaves minerals behind. Over time, these can produce formations called stalagmites and stalactites.

Now let's do a little review of where stalagmites and stalactites are located. A good trick to remember is: stalaGmites are on the Ground (has a "G") and stalaCtites are on the Ceiling (has a "C")! Another useful tip, stalactites hold "tite" (tight) to the ceiling.

These structures are sometimes found under water even! But don't be confused, they didn't form underwater. They initially formed in an open cave and then filled with water.



PROCESS



Process:

1. Pour salt into the hot water and stir.
2. Continue adding salt until it will no longer dissolve.
3. Take your pieces of twine and bend it into an “M” shape. Place the ends of the twine into each glass, making sure that the tip is completely saturated by the water. Have the center of the twine dip over the plate.
4. Leave this set up for 1-2 weeks in a safe area until you see significant buildup of your own stalactite.



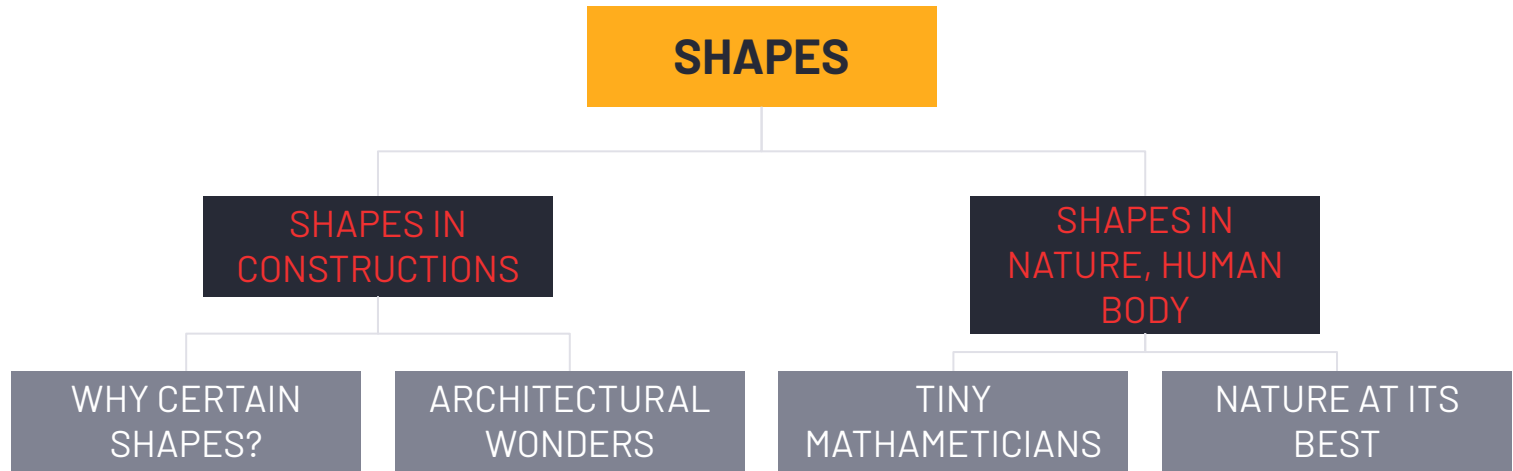


Mandala Art



Geometry for Relaxation

SUMMING UP





Thanks!

Any questions?



2. Extra Resources



Can you imagine children studying in the middle of the Thar desert, where day temperatures peak close to 50 degrees Celsius and harsh winds cause sand to blow through the day? An architectural marvel, located just a six-minute drive away from Jaisalmer's famous Sand Dunes, has taken shape in Kanoi village, with an aim to educate girls and empower them. The School is made of yellow sandstone, and surprisingly, has no air conditioners. Here, students can study and even play in the protected courtyard without worrying about the extreme weather. Rajkumari Ratnavati Girl's School will serve more than 400 girls, from kindergarten to class 10, from below the poverty line residing in the mystic Thar Desert region of Jaisalmer in Rajasthan, India-- where female literacy barely touches 32%. The school will be the first in a complex of three buildings known as the GYAAN Center. Desert Needs no Acs!

