



GOVT. V.Y.T. PG AUTONOMOUS COLLEGE, DURG, CHHATTISGARH, INDIA

(Erstwhile: Govt. Arts & Science College, Durg)

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DEPARTMENT OF MATHEMATICS

SESSION-2022

**REPORT ON EDUCATIONAL TOUR
BHUBANESWAR AND PURI, ODISHA
19TH TO 22ND MAY 2022**

ACKNOWLEDGEMENT: -

Study tour is quite valuable and important aspect to provide practical knowledge to the student of mathematics.

We are also very thankful to our principal **Dr. R. N. Singh** for providing us such a great opportunity and financial supports.

Our **HOD Dr. M. A. Siddiqui** a great inspirer & motivator, we are also thankful to the professors of mathematics department Govt.V.Y.T. PG. Autonomous College Durg (C.G.).

For this purpose we visited “Bhubaneswar and Puri” under the guidance of Dr. Rakesh Tiwari, Dr. Anshumala Chandankar. We are very much thankful for their kind & sincere guidance.

OBJECTIVE

The main objective of the educational tour is to learn mathematics by visiting some educational places in our surrounding and different places like temples, beach etc. always there is some mathematics hidden. But how we observe and notice such hidden mathematical perspective that enhances our imagination about any object and places.

Also, it is well known fact that the things which we learn directly by exploring are more effective than our daily classroom study. That is why this kind educational visits helps us learn much more.

There are some mathematical models which is explained by Professors.

SCHEDULE:-

Our Educational tour of Mathematics Department is scheduled from 18/05/22 to 22/05/22.

On 18/05/22 our journey begins by train from Durg to Bhubaneswar in Durg – Puri Express and we reached at a Bhubaneswar on 19/05/22 around 8:30 am.

On 19/05/22, two places are decided to visit and our task was to find **Mathematics** everywhere in every possible way, firstly we visited **Regional Science Centre Bhubaneswar**, and secondly at the evening time we visited **Lingaraj Temple**.

On 20/05/22, firstly we visited **Nandankanan** and then proceeding our tour we reached Puri via train from Bhubaneswar.

On 21/05/22 our first destination was **Konark Temple** and then we reached our second destination **Jagannath Puri Temple**.



On 22/05/22 to watch sunrise at early in the morning we visited Puri beach and then again we had a visit at Jagannath Puri temple and here comes an end of our journey. Then we had our return train on 22/05/22 at 7:10pm from Puri to Durg in Puri- Durg express and we reached Durg on 23/05/22 around 12:30pm.

SCHEDULE

19/05/2022-

Visited Regional science centre Bhubaneswar and Lingaraj temple.

20/05/2022-

Nandankanan Zoological Park.

21/05/2022-

Konark Sun Temple & first visit of Jagannath temple Puri.

22/05/2022-

Second visit of Jagannath temple.



**First day (Date-19/05/2022):- We visited ,
Regional Science Centre Bhubaneswar and
Lingaraj temple**

REGIONAL SCIENCE CENTRE

BHUBANESWAR

Regional science center, Bhubaneswar is our first destination. Here, there are several zones to learn specific things such as 3D show where we can learn or grab knowledge in an attractive way through 3-D animation (meaning three dimensional moving images). There is science zone where there is too many models related to physics, space, chemistry and mathematics etc.

Our main focus of learning is towards mathematical models, history and its application.

The analysis of models and charts are summarized with the help to images in the next part of our report



3-D SHOW:-

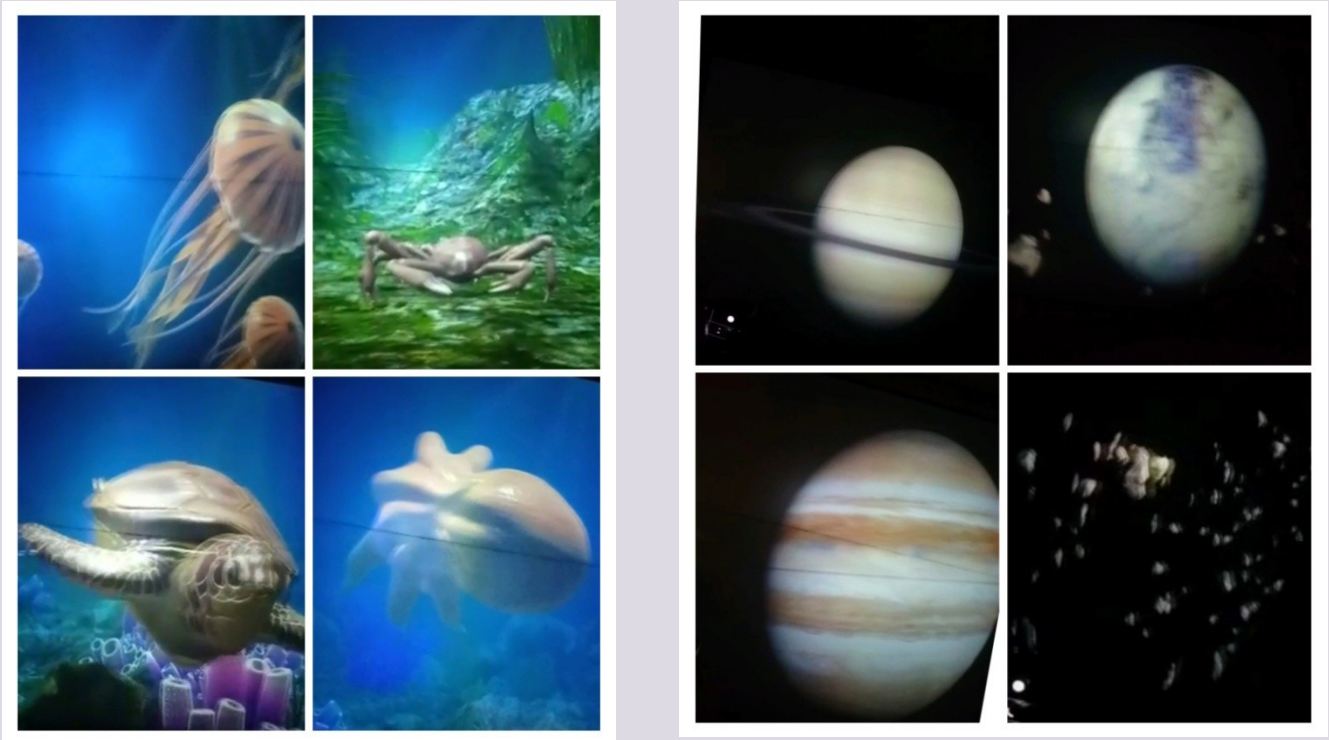
Before going to 3-D show let us start with a question.

What do we mean by 3-D animation?

3-D animation refers to three dimensional moving images. Three dimension images means the images



look extremely lifelike. This is why 3-D animation is so much more eye-catching as compared to the standard image.



In 3-D show at Regional Science Centre Bhubaneswar there were different short animations. One short animation is about the information of different planets, asteroids, meteoroids and its motion.

In another show there is information about different aquatic animals, their lifestyle and unique characteristics.

Nowadays 3-D animations are used in the field of education to make it much smoother, economical and engaging. Also, it is long lasting in the brain due to pictorial video learning.

TOSS A COIN:-



Press the TOSS switch to toss a one rupee coin. Observe the result of the toss. Enter the result by pressing the appropriate switch - HEAD or TAIL. Repeat the experiment several times. The display will tell you the

numbers of heads and tails secured by you and also the cumulative total.

When you toss a coin there are two possibilities outcomes. It can be head or a tail, both which are equally probable. That means the probability of winning on a head or a tail is equal. This can be verified if you toss for a large number of times.

ELLIPTICAL CARROM BOARD:-

you might have seen so many square shaped carrom boards in your life but this one is a special carrom, having an elliptical shape and this Elliptical Carrom is very interesting to play. Firstly we know about the Ellipse is like a circle but it has two centre known as foci of Ellipse. Ellipse have special property that if we calculate the total

distance between these two foci from any point on Ellipse then all the distance will be equal.



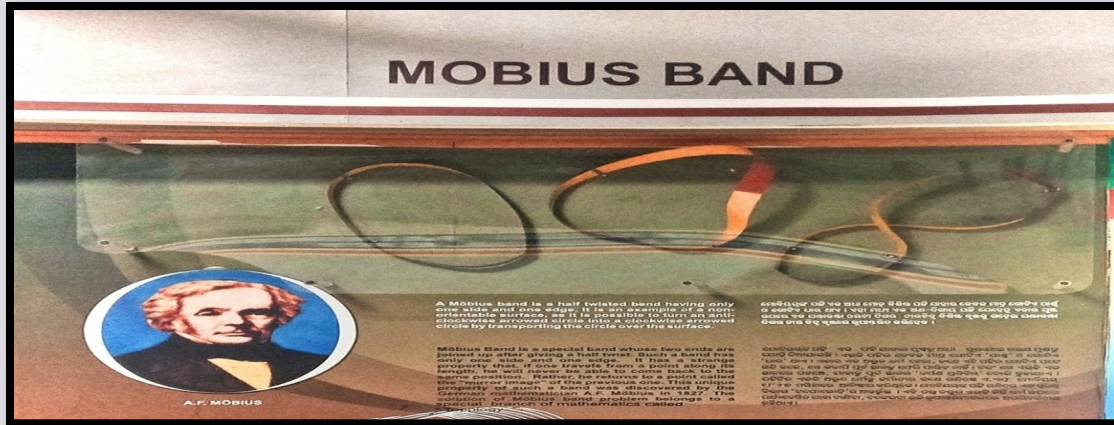
**Let's know
about how its
work:-**

We will put the carrom coin and the striker in both of foci of Ellipse. Now if we hit strike the striker from any point

either from anywhere the striker is going to hit this carrom coin. So according to the **Law of Reflection**, if you draw a tangent at the point of contact and as soon as the

MOBIUS BAND: -

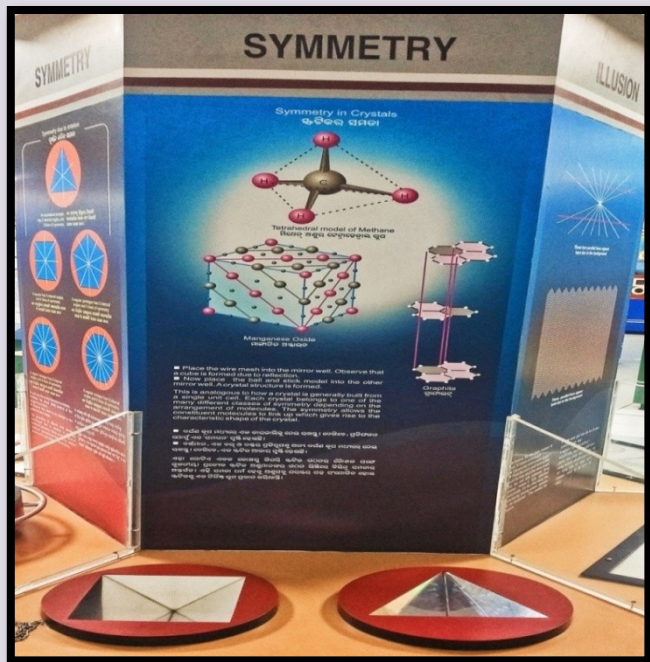
This band was discovered by the German mathematician **A.F. Mobius** in 1827. A Mobius band is a half twisted band having only one side and one edge.



Möbius Band is a special band whose two ends are joined up after giving a half twist. Such a band has only one side and one edge. It has a strange property that, if one travels from a point along its length, he will never be able to come back to the same position. Rather, he returns to the point called “Mirror Image” of the previous one. The solution of Möbius band problem belongs to a special branch of mathematics called “Topology”.

SYMMETRY: -

- Press the wire mesh into the mirror well. Observe that a cube is formed due to reflection. Now place the ball and stick model into the other mirror well. A crystal structure is formed. This is analogous to how a crystal is generally built from a single unit cell. Each crystal belongs to one of the many different classes of symmetry depending on the arrangement of molecules.



MIRROR MAGIC: -

One of the most interesting gallery we found was the **Mirror Gallery**. The gallery welcomes you with the exhibit “**Self Centered Mirror**” which produces multiple moving image of yourself as you pass in front of it. You can see a very long curved tunnel in the exhibit “**Curving tunnel**” where you would love to see peep in but cannot, for it’s just an image. Imagine a picture, named as “**Magic Mirror**”, that can feel your presence and turns into a mirror. There are many concave mirror, convex mirror, upside down mirror, fun mirrors and a mirror maze.



SECOND DAY (DATE- 20/05/2022):- THE VISIT OF NANDANKANAN ZOOLOGICAL PARK

After visiting “Regional Science Centre” and “Lingaraj temple” our next trip location is the most famous tourist place in Bhubaneswar is “Nandankanan Zoological Park”.

2nd day of our Bhubaneswar- Puri trip , Friday we went to Nandankanan zoo park by bus which is situated 17KM from our hotel in Bhubaneswar.



About Zoo Park:-

Nandankanan zoological park is the second largest zoo park in India. It is built in inside the forest and set in a completely natural environment , so all animal feels a natural environment in the park.

It is spread in area of 400 hectores , Nandankanan was established in 1960 and declared as a sanctuary and zoo in 1979.

The zoo contains many kinds of mammals , birds and snakes which attracts tourist in Nandankanan zoo park. There are some examples of that-

1. **Tigers:-** The centre of attraction in this zoo is Bengal tigers several size, few of them white and few of them pseudo-melanotic.



2. **Other mammals:-**

The zoo contains several mammals other than the tigers that have enclosures out in the open . These

mammals include- Asiatic lions , Indian leopards, Asian black bear, Sloth bear , Indian wolf , striped hyena , Giraffe , Gaur Zebra, Indian elephant, Hippopotamus , Nilgai , Nilgiri langur , Chimpanzee etc.

3. Aviary:-

The zoo has a large section dedicated to Indian and non-indian birds , including :- Emu, Indian bittern , Cattle egret , Little egret , Spot-billed pelicum , Peacock , Parrot , Rosella Eastern , Ostrich.

4. Nocturnal House:-

The zoo has a nocturnal house for creatures that can be seen only at night or at low-lighting conditions. These animals include:

Asian palm civet, Small Indian civet , Indian Pangolin, Indian crested porcupine , jungle cat, Oriental scops owl , Brown fish owl, Barn owl etc.

5. Reptiles:-

The zoo has a reptile house , with a cave-like entrance guarded by a life-size replica of a Tyrannosaurus rex. This houses the majority of the zoo's reptiles , including:

Indian python , Burmese python , Bengal monitor , Water monitor , King Cobra , Monocled Cobra , Spectacled Cobra , Common Krait , Banded Krait etc.

6. Special facilities for tourist:-

Many facilities are provided to tourist in zoo park like Safaris , Battery operated vehicle , Boating and Toy train for children.

We enjoy ride in the battery operated vehicle to observe the wildlife closely is an all-time favourite activity for us and also for all tourists .



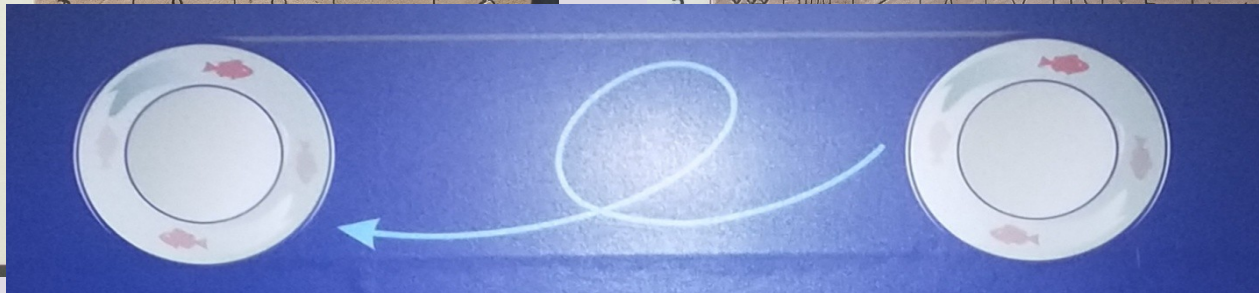
Uniqueness of Nandankanan:-

- Nandankanan is the only conservation breeding centre of Indian Pangolins in the world.
- Nandankanan is the only zoological park in India to become an institution member of World Association of Zoos and Aquarium(WAZA).
- Nandankanan is the only zoo in India after which an express train Puri-new Delhi express has been named as “ Nandankanan Express”.
- Nandankanan is the first zoo in India where endangered Ratel was born in captivity.
- Nandankanan is the first zoo in the world to bread white tiger and melanistic tiger.

Ancient numerals :-

Numerals with place-value in ancient India					
Value	GURJARA grants. (A.D. 595)	BAUKA Inscriptions (A.D. 837)	GWALIOR Inscriptions (Bhojadeva) (A.D. 870)	GWALIOR Inscriptions (Bhojadeva) (A.D. 876)	MAHIPALA Inscriptions (A.D. 917)
1					
2					
3					
4					

Numerals in different ancient civilisations								
Number	Mesopotamian	Egyptian	Chinese	Etruscan	Roman	Indian (Brahmi)	Greek	Mayan
1								
2								
3								
4								
5								



As man learned to write, he used symbols to represent numbers called the '**numerals**'. The Phoenician traders of the Mediterranean were the first to develop numerals. The Babylonians used a wedge shaped Cuneiform numeral engraved on clay tablets. The Egyptians used the decorative Hieroglyphic numerals to write on pyramid walls. The Roman numerals consisted of special symbols which were used to generate higher numbers by additive and subtractive techniques. The modern system of numeration is the **decimal number system** in which the position of a number represents its value was developed in

Pythagoras theorem:-

Rotate the circular discs so that the liquid from the bigger container is poured into the two smaller ones. Reverse the experiment to put the liquid back into the bigger ones. Observe that liquid exactly fills up the space in each case, indicating that the volumes are same.



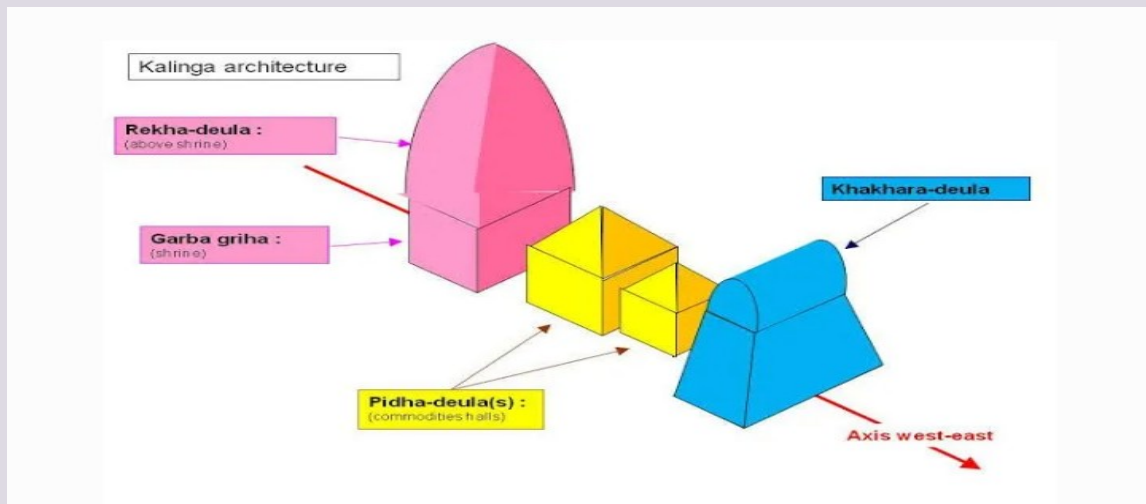
The thickness the containers being same, the area of the figure under the bigger container is equal to the sum of the other two areas. As the figures are constructed over the three sides of a right angled triangle, the square of the longest side(hypotenuse) is equal to the sum



of squares of the other two sides (base and perpendicular). This interesting property of a right angled triangle was discovered by the Greek mathematician Pythagoras in 6th century BC.

LINGARAJ TEMPLE:-

Lingaraj temple is one of the most famous religious sites in Bhubaneswar. The temple is dedicated to Lord **Shiva**. Lingaraj temple is built by **King Jajati Keshri** in the 10th century and completed by King **Lalatendu Keshari** in the 11th century.



The courtyard of the temple is 150 meters square and the Kalash is 40 meters long. The main towers of the temple are 180 feet tall. It was built by using **red stone** and is a timeline example of the **Kalinga style of architecture**.

Lingaraj temple is divided into four important sections. First is the **Garbh Griha** or the **sanctum sanctorum**, second is the **Yajna Shala** which means the *hall of Yajnas*, third is the **Bhoga Mandap**, meaning the *hall of offering* and the fourth and the last is the **Natya shala** which is the *hall of dance*.



“In the outside view of Lingaraj temple the designs from each and every section it is approximately same in **length** and **surface area**. Also designs of these repeated sections are equal and **symmetric**.”

“Bhoga mandap in Lingaraj temple is constructed in such a way that the sunlight does not fall in Bhoga as it is considered that if sunlight falls first on the Bhoga it is firstly consumed by sun before the Lord Shiva. So, by taking care of this the construction is done carefully with some specific angles, slanted floor etc. into consideration to avoid the fall of sunlight in Bhoga.”

The temple has a Shiva Linga which is said to have self-originated. The Linga is as Lord Vishnu as well as Lord Shiva. As we have already mentioned that right before the completion of Lingaraj Temple, Jagannath culture started to flourish, that’s why the deity in this temple is also called **Hari-Hara**. While Hari means Lord Vishnu, Hara indicates Lord Shiva.

Nandankanan Zoological Park



Date opened	29 December 1960
Location	Bhubaneswar, Odisha, India
Coordinates	20.399965°N 85.814703°E
Land area	432 hectare (1,080 acres)
No. of animals	3517 (2019-03-31)
No. of species	157 (2019)
Annual visitors	3.2 million (April 2018- March 2019)
Major exhibits	White Tiger Safari, Lion Safari, Butterfly Park, orchid house

THIRD DAY (DATE- 21/05/2022) :- THE MOST FAMOUS TEMPLE IN ODISHA TO VISIT SUN TEMPLE, KONARK.

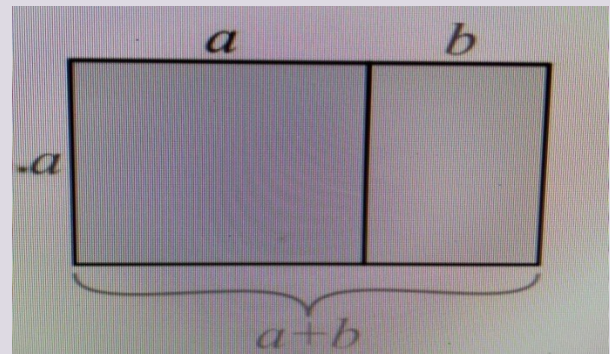
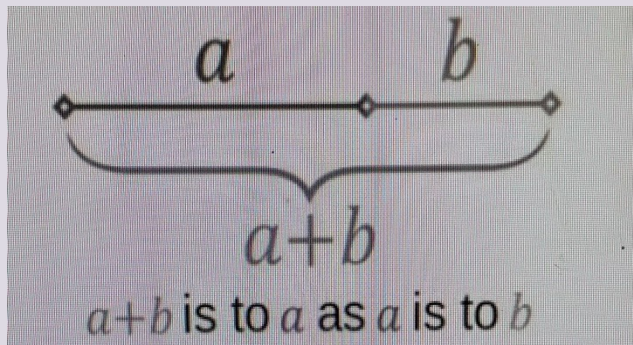
Sun Temple - Konark, Orissa

The word **Konark** is derived from the Sanskrit name Konarka. Konarka is a combination of two words i.e 'Kona' which means corner and 'Arka' means **Sun**, when these two words are combined it holds the meaning as 'Sun of the corner'. Thus it was one of the ancient centres for

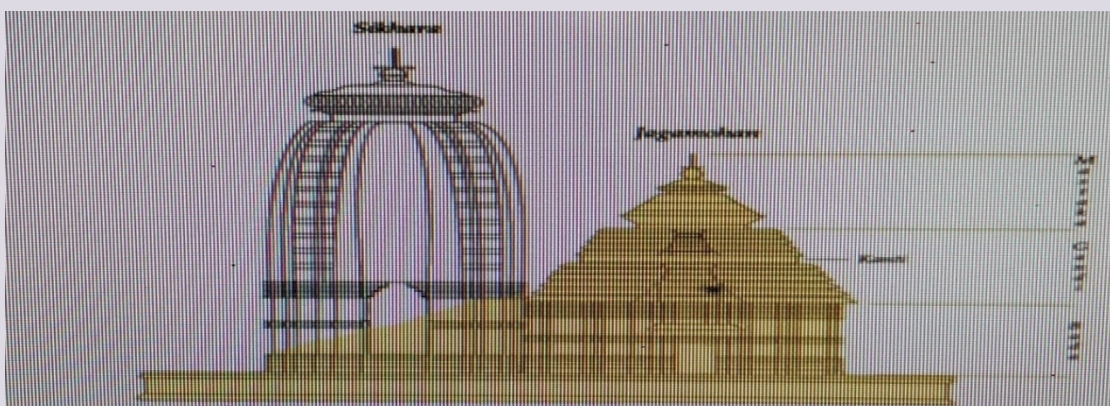


worshipping Sun god in India. The existence of Sun temple is cited in many of the religious texts and Puranas. In Puranas the place is mentioned as Munira or Mundirasvamin, which was later replaced by the name Konarka.

The Golden Ratio



The Konark Sun Temple can be largely divided into two parts: the main temple and the assembly hall. As shown in the figure, only the yellow coloured section or the assembly hall still remains standing today while the 229 ft. nowhere to be found due to its destruction in 1837. The jaganmohan, which is 128 ft. high, still stands and is the principal structure in the surviving ruins. The dimensions of the Jaganmohan are 857 ft. by 540 ft. By using these values, the golden ratio of the Konark Sun Temple can be found out to be 1.58 which is very close to the ideal golden ratio, 1.618.... Therefore, the Konark Sun Temple is a stunning example of the use of the Golden Ratio in architecture to make it more aesthetically appealing.

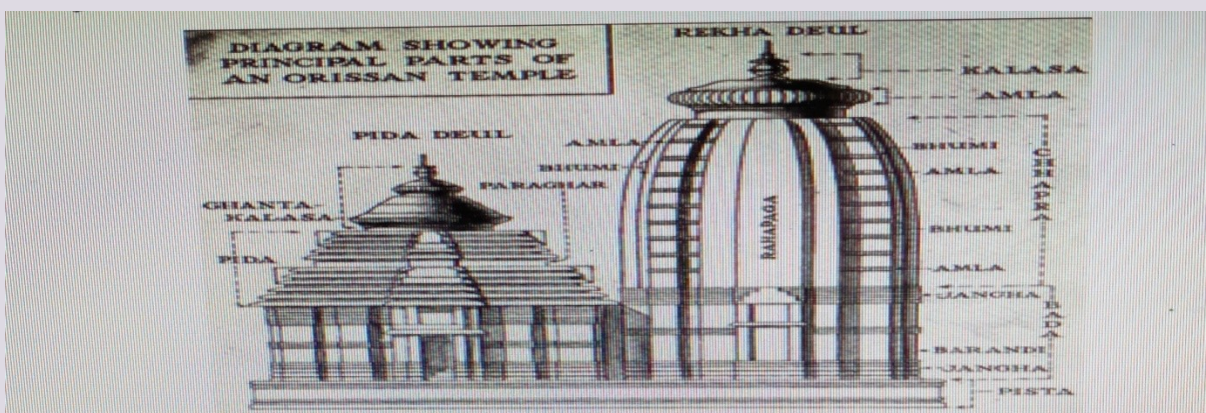


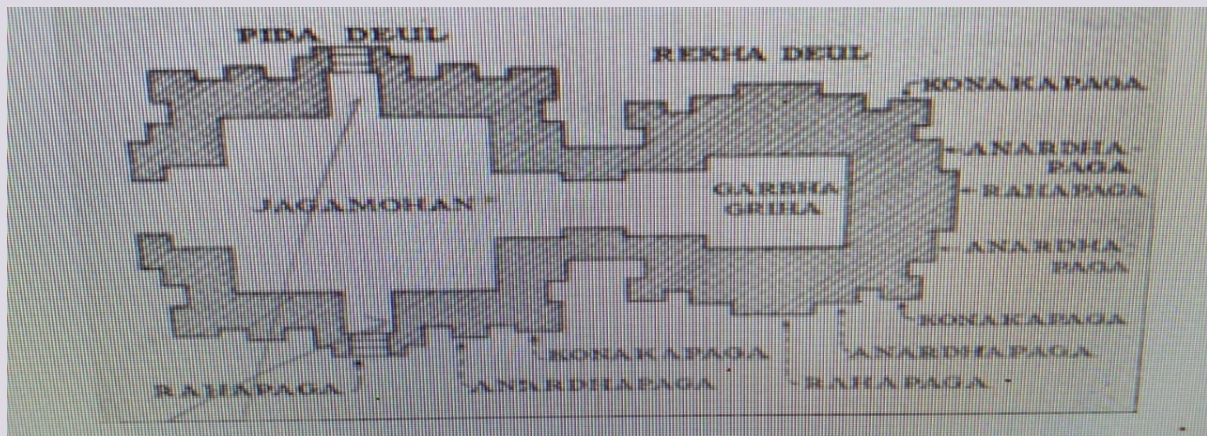
Directions and Bearings

The Konark Sun Temple has a meticulously planned structure such that the first rays of the morning sun fall directly on the statue of the Surya Deva, kept in the garbhagriha. The Konark Sun Temple is not situated parallel to the east axis but slightly deviated with such a precise slant that the first rays of the morning sun fall on the main entrance. The garbhagriha was positioned in such a way so as to receive direct sun ray sunrise on a particular day and at a precisely determined angle based on astronomical computations. This was determined by three factors:-

1. The angular position of the earth rotating around the sun is dependent upon the oval orbit .
2. Angular position of the ea between 22.1 and 24.5 degrees (a phenomenon called precession) measured by Milankovich cycles.
3. The quantum of radiation which enters dependent upon solar activity (flares) cycles emanating carbon in a 2000 year cycle.

Geometry





The word 'Konark' is a combination of two Sanskrit words, 'Kona' meaning corner or an angle and 'Arka' meaning the sun. It signifies that the main deity, to whom the temple is dedicated to, is the Sun God and the temple was built in an angular format. In terms of elevation, there is a huge curvilinear tower (shikhara), inclining inwards and capped. The main characteristics of the Orissa style are primarily two: the deul and the jaganamohana or the assembly hall. The latter has a pyramidal roof built up by a succession of receding platforms known as pidhas. Both structures are squares internally and use a common platform. The temple is situated within a large quadrangular court enclosed by massive walls and with a massive gate in the east.

Rath Yatra at Puri

The Jagannath triad are usually worshiped in the sanctum of the temple at Puri, but once during the month of Asadha (Rainy Season of Orissa, usually falling in month of June or July), they are brought out onto the Bada Danda (main street of Puri) and travel (3 km) to the Shri Gundicha Temple, in huge chariots (ratha), allowing the public to have darśana (Holy view). This festival is known as Rath Yatra, meaning the journey (yatra) of the chariots (ratha). The Rathas are huge wheeled wooden structures, which are built anew every year and are pulled by the devotees. The chariot for Jagannath is approximately 45 feet high and 35 feet square and takes about 2 months to construct. The artists and painters of Puri decorate the cars and paint flower petals and other designs on the wheels, the wood-carved charioteer and horses, and the inverted lotuses on the wall behind the throne. The huge chariots of Jagannath pulled during Rath Yatra is the etymological origin of the English word Juggernaut. The Ratha-Yatra is also termed as the Shri Gundicha yatra.



Gallery : -

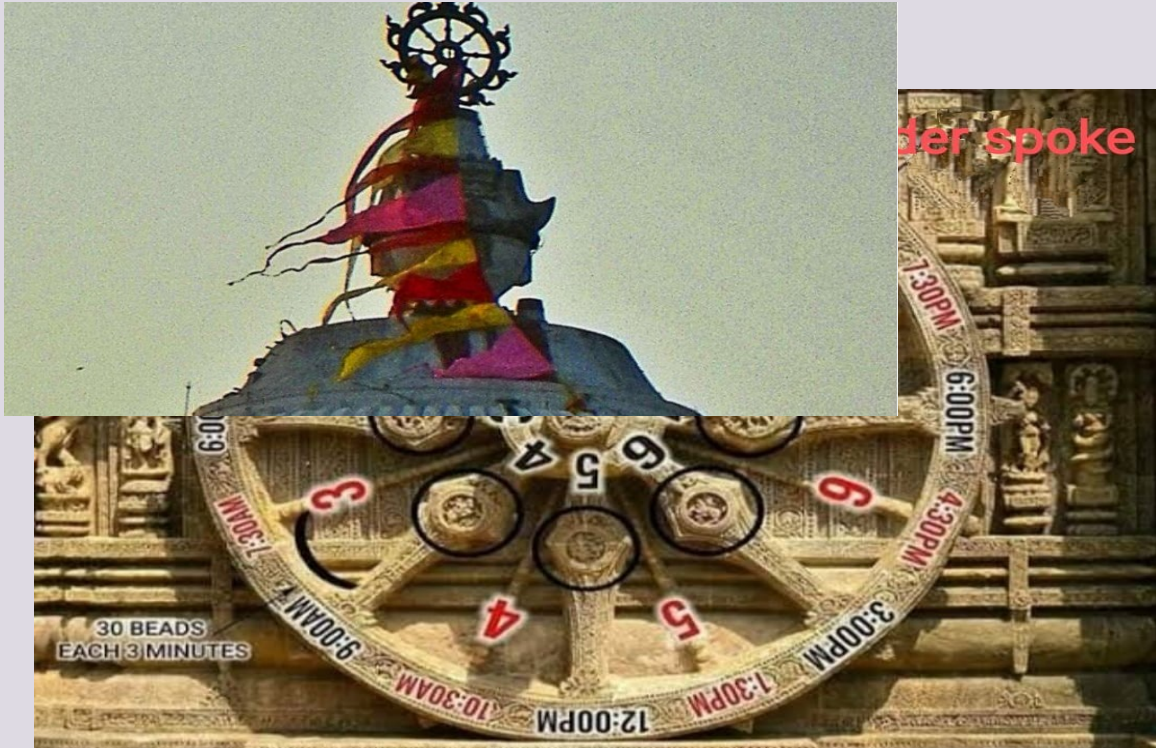




Mysteries of Jagannath Temple that defy scientific logic
The temple flag that defies logic: -The flag atop the temple strangely always floats in the opposite direction of wind. The flag floating in opposite direction brings your scientific reasoning to a halt, and you just tend to believe that there is some force more powerful than science.



The Sudarshan Chakra : - The chakra is actually 20 ft high and weighs a ton. It is fitted on top of the temple. But what is interesting about this chakra is that, you can see this chakra from any corner of the Puri city. The engineering mystery behind the placing and positioning of chakra is still a mystery because irrespective of your position, you can



always feel that the chakra is facing toward you.

The wheels of the temple chariot:

The construction of this temple is a masterpiece of Orissa's medieval architecture. One of the main attractions of this temple is the 24 wheels which are carved around the base of the temple. Each wheel is of about 10 feet in diameter with a set of spokes and elaborate carvings. These wheels

are located in both north and south sides of the temple.

Here we can see that 8 wider spoke i.e.

8 wider spoke = 3600

1 wider spoke = 3600 /8

1 wider spoke = 450 (angle between two wider spoke)

30 BEADS between wider spoke and thinner spoke which is equal to 1.5 hr (i.e. 7:30 AM to 9:00 am).

Then **30BEADS = 90MIN** => **1 BEADS = 3MINUTES**

Conclusion : - These tours provide the students with the opportunity of learning through travel, especially to places that they may not otherwise get to visit. Educational trips provide valuable educational opportunities away from the classroom, without using textbooks and other tools which are used in a normal school setting. Students on educational trips can often learn while having fun in a more informal environment. The alst but not least we are much enjoy by gaining knowledge of certain things. This trip was awesome .the more thing is that we are alots of knowledge by travelling like that” the train are running in parallel away which are related in maths.the tress iut the windows which snows are standing .which was related by science.this trip was emotional,attach to our teachers and our trip groups also we always remember such a beautiful movement we have done by our department .And trip was mentally also benefical we get more knowledge of every fields. And triop was also in physical way awe are contious



travelling and visit others place.that was really inbersting
inevery fields.