



# Infinity & Beyond


**Digitized Version of Wall Magazine**

**Department of Mathematics  
Srikrishna College, Bagula**


# Who created this....!!




**MENTOR: SOMNATH  
CHAKRABORTY  
DALI BISWAS  
SONALI BISWAS  
SRIJANA BAG  
ANTAR BISWAS  
SATABDI MAJUMDAR**



**MENTOR: TUSHAR KANTI  
BISWAS  
SUSMITA DAS  
BIMAN HALDER  
SAGAR GHOSH  
SAYAN MONDAL  
PARTHA RAJ BISWAS  
ANUJ MONDAL  
SANGITA BISWAS  
SUBRATA MRIDHA**



**MENTOR: DR. PRANAB  
DAS  
SUMAN SADHUKHAN  
PRIYANKA SARKAR  
JYOTI CHAKRABORTY  
SNEHA MONDAL  
SUBHOJIT GHOSH  
ANIRBAN PODDER**



**MENTOR: NANDITA  
ADHIKARI  
PRIYA ROY  
TOUHID ALAM MONDAL  
RAJESH KUMAR MONDAL  
AMINA MONDAL  
PARTHIB BISWAS  
SAHELI RAY  
JIT BISWAS  
NILANJAN BISWAS  
MRIDUL KARMAKAR**



**MENTOR: ANANYA  
CHATTERJEE  
UJAN MALLIK  
SUBHA SADHUKHAN  
ANUSKA KARMAKAR  
SAYAN BISWAS  
BINAY RAY  
KINSHUK BISWAS**



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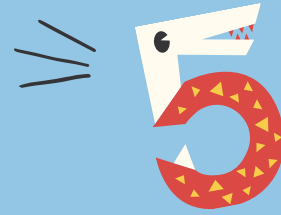
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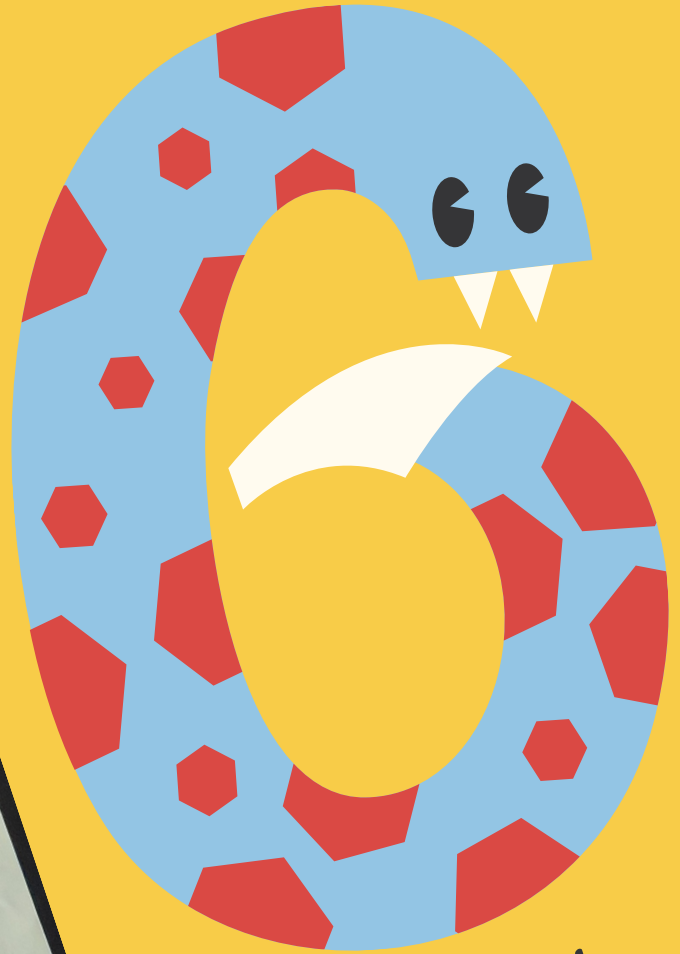
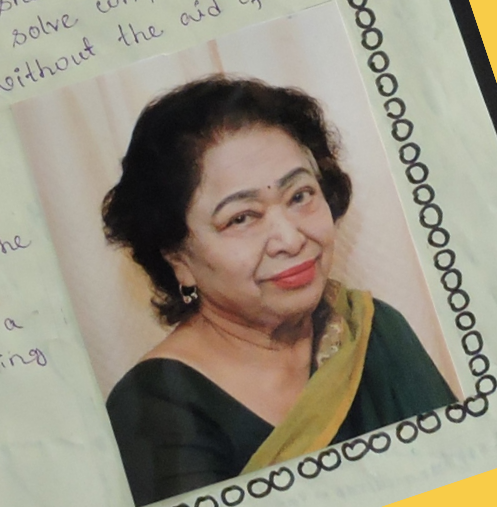
# Indian Mathematicians and their contributions



# SAKUNTALA DEVI

## SHAKUNTALA DEVI

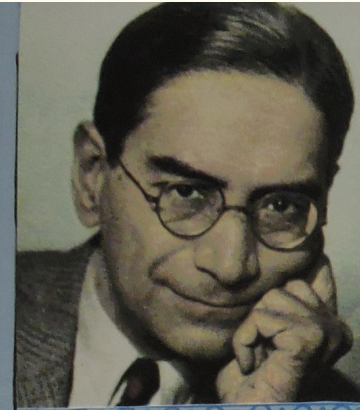
Shakuntala Devi, often hailed as the "Human Computer", made significant contributions to the world of mathematics. Born in 1929 in Bangalore, India, Devi demonstrated extraordinary mathematical abilities from a young age. Devi's exceptional talent for mental calculations became evident when she dazzled audiences with her ability to solve complex mathematical problems without the aid of any mechanical devices. Her efforts were instrumental in breaking down the stereotype that mathematics is a dry and daunting subject.



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# PRASANTA CHANDRA MAHALANOBIS



Prasanta Chandra Mahalanobis, a pioneering Indian statistician and applied mathematician, made significant contributions that have had a lasting impact on the fields of statistics and mathematics. Born on June 29, 1893, Mahalanobis played a crucial role in shaping statistical science in India and beyond.

One of Mahalanobis's most notable contributions is the development of the Mahalanobis distance between a point and a distribution. It has applications in various fields, including image recognition, classification, and clustering.

In addition to his work on distance metrics, Mahalanobis was instrumental in establishing the Indian Statistical Institute (ISI) in 1931, which became a center for research and training in statistics.

In recognition of his outstanding contributions, Prasanta Chandra Mahalanobis was honored with numerous awards and accolades, including the Padma Vibhushan, one of India's highest civilian awards. His legacy lives on through the impact of his mathematical and statistical innovations, which continue to shape research and practice in these fields globally.



# CALYAMPUDI RADHAKRISHNA RAO

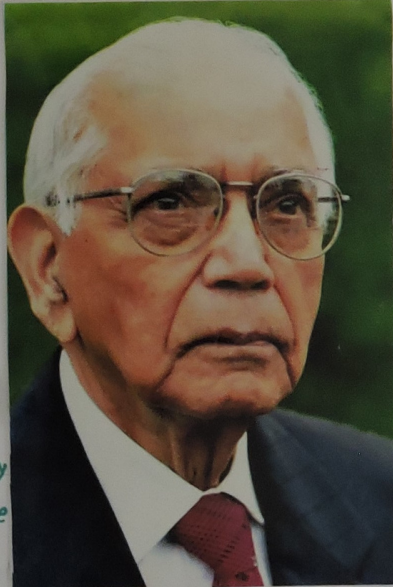
## C.R. RAO (Calyampudi Radhakrishna Rao)

Calyampudi Radhakrishna Rao, commonly known as C.R. Rao, is a distinguished Indian-American mathematician and statistician whose contributions have significantly shaped the fields of mathematics and statistics.

Born on September 10, 1920, Rao has had a profound impact on both theory and applications in these disciplines.

He was professor emeritus at Pennsylvania State University and Research Professor at the University at Buffalo. Rao was honored by numerous colloquia,

honorary degrees, and festschriften and was awarded the US National Medal of Science in 2002. The Times of India listed Rao as one of the top 10 Indian Scientists of all time.



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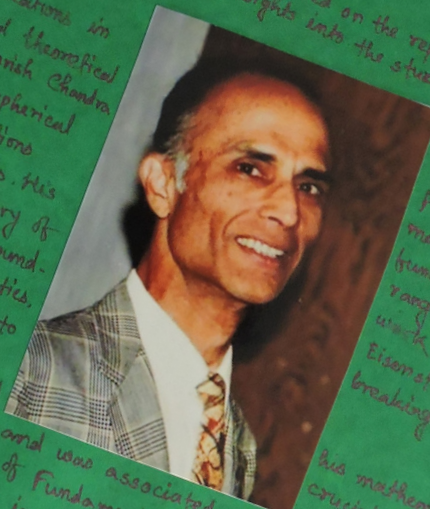
# HARISH CHANDRA

▲ Harish Chandra, born in 1923 in Kanpur, India, was a pioneering mathematician whose contributions have left an indelible mark on the field of mathematics, particularly in the areas of representation theory and harmonic analysis. His work has had a profound impact, influencing generations of mathematicians and significantly advancing our understanding of abstract algebra and mathematical physics.

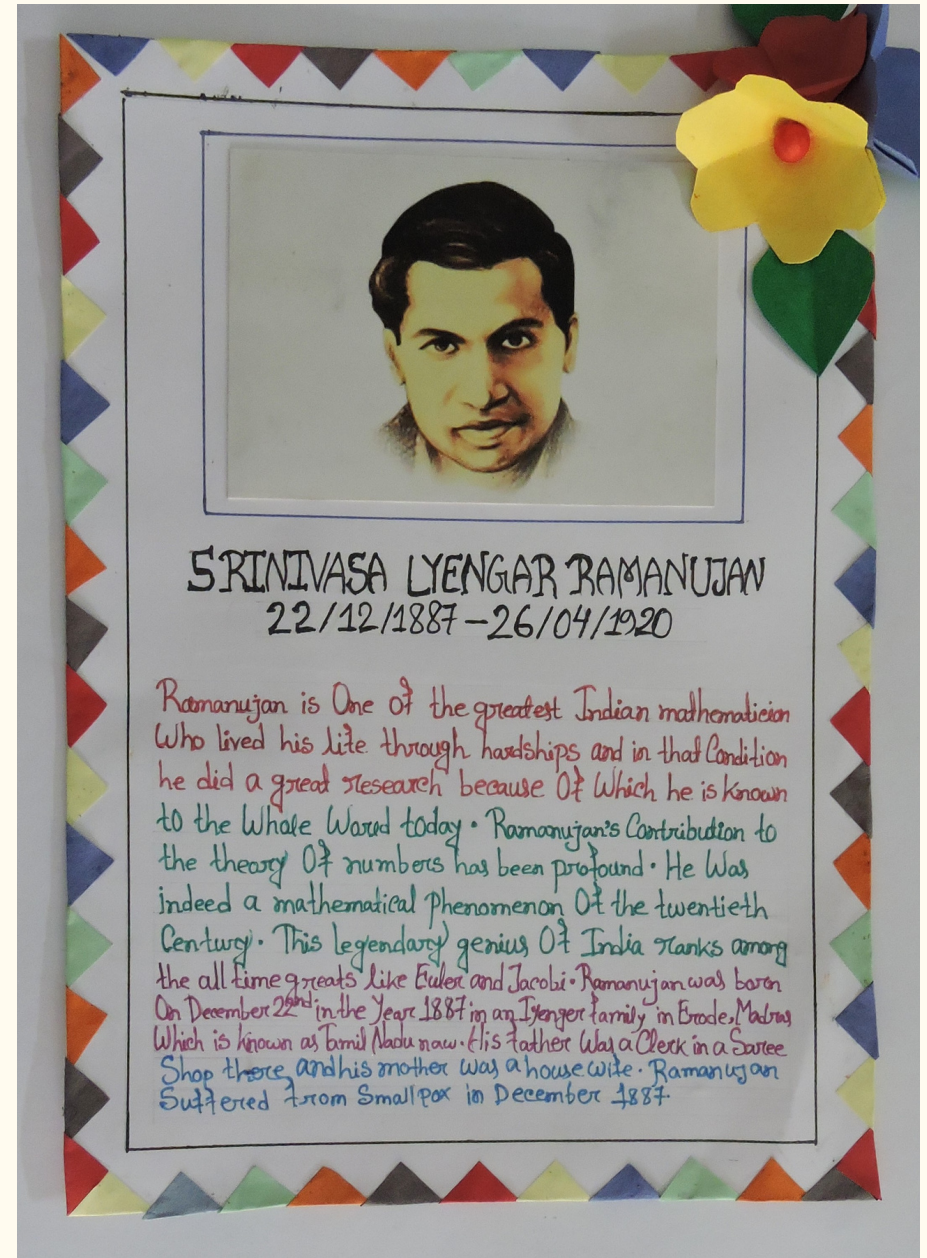
▲ Harish Chandra focused on the representation theory of semi-simple Lie groups and mathematical physics, providing deep insights into the structure and classification of representations. His work laid the foundation for the study of infinite-dimensional representations for various branches of mathematics and their applications in physics.

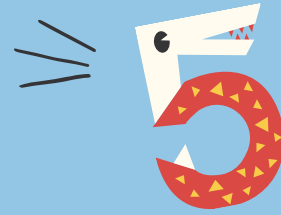
▲ Harish Chandra made important contributions to the theory of spherical functions on symmetric spaces and quantum mechanics. His theorem and the theory of various representations are widely regarded as groundbreaking and his influenced diverse areas of mathematics.

▲ In addition to his mathematical research, Harish Chandra played a crucial role in fostering various academic positions and education. He held several prestigious positions, including Tata Institute of Fundamental Research in Mumbai. His work on the Poincaré-Eisenstein integrals in his mathematical process, mentoring and his influenced legacy continues through the many scholars who have been influenced by his work.



# SRINIVASA RAMANUJAN





# Basic Mathematics





INVISIBLE MATH



**Invisible Math**

Any non zero number to the zero power equals one.  
 $6^0 = 1$

There is a decimal point at the end of every whole number.  
 $6 = 6.0$

Every number has an exponent of one.  
 $6 = 6^1$

There is a denominator of one for every number.  
 $6 = \frac{6}{1}$

There is a positive sign to the left of every number.  
 $6 = +6$





## PEMDAS



# PEMDAS

1.  $10 \div (3+2) \times 4 + 5^2 + 6 - 9 = 10 \div 5 \times 4 + 5^2 + 6 - 9$

2.  $10 \div 5 \times 4 + 5^2 + 6 - 9 = 10 \div 5 \times 4 + 25 + 6 - 9$

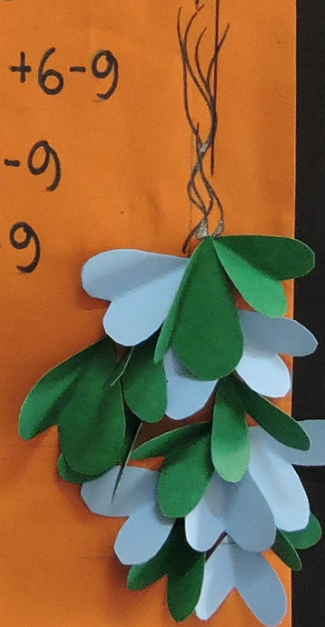
3.  $10 \div 5 \times 4 + 25 + 6 - 9 = 2 \times 4 + 25 + 6 - 9$

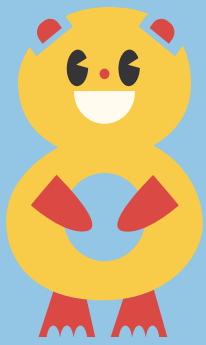
4.  $2 \times 4 + 25 + 6 - 9 = 8 + 25 + 6 - 9$

5.  $8 + 25 + 6 - 9 = 33 + 6 - 9$

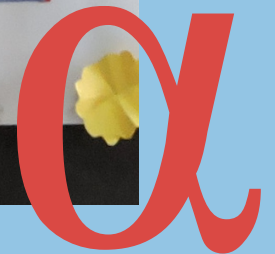
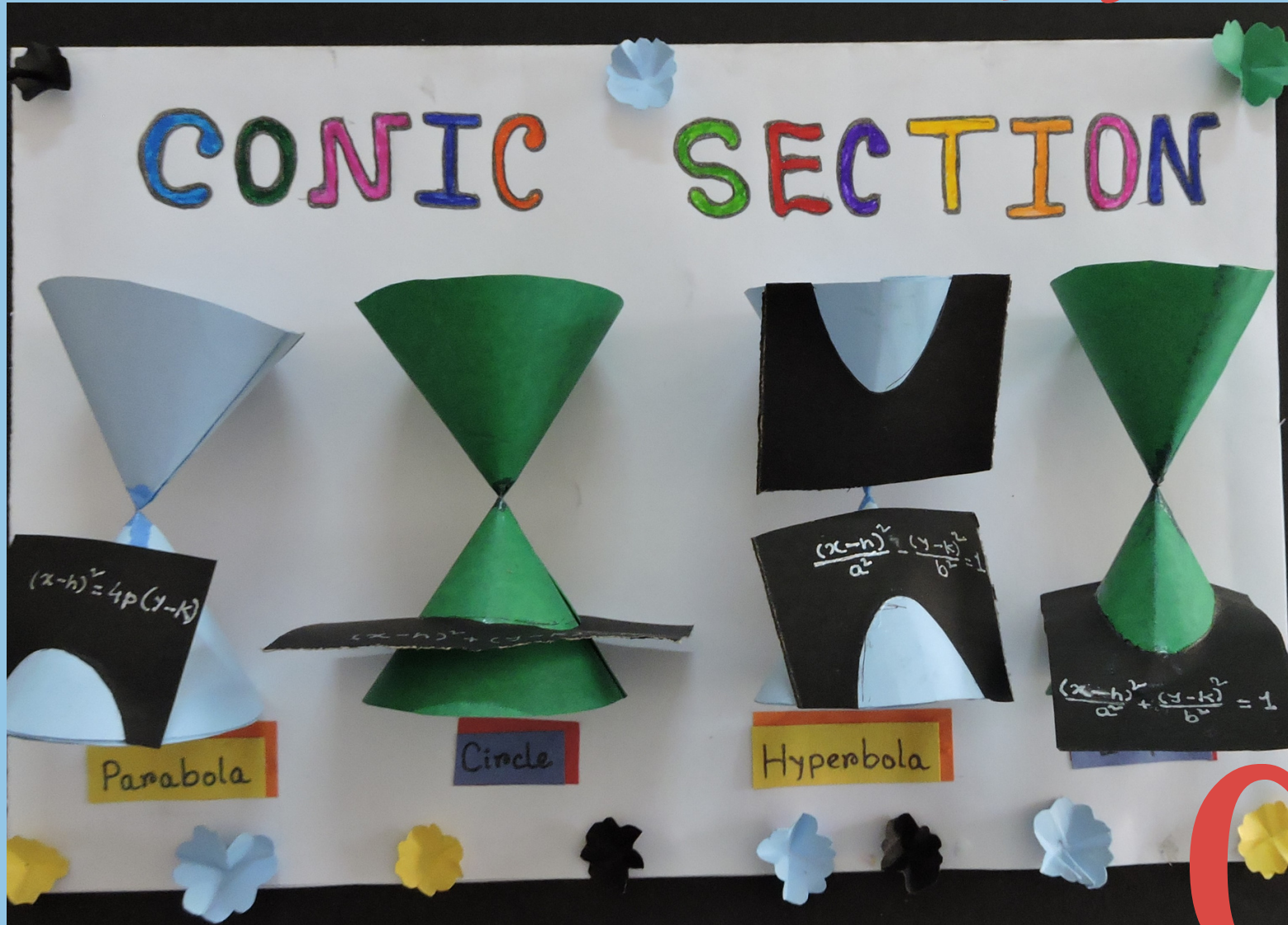
6.  $33 + 6 - 9 = 39 - 9$

7.  $39 - 9 = 30$



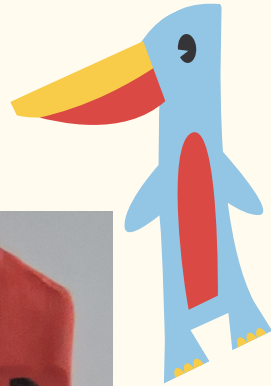


# CONIC SECTION





# AREA AND PERIMETER



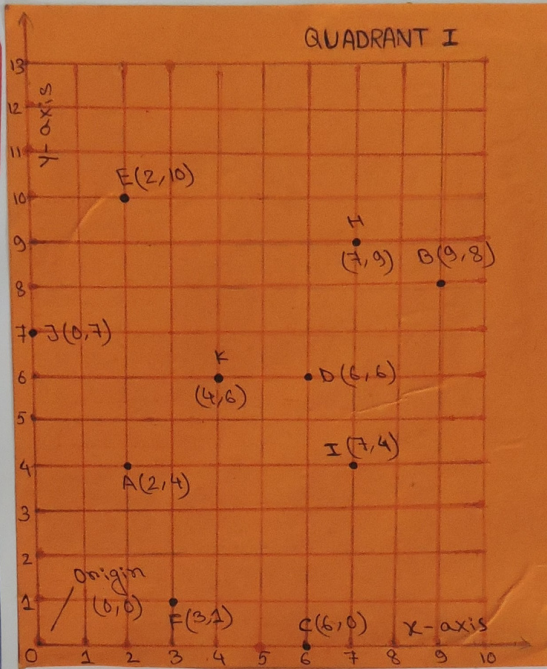
AR	EA	AND	PER	IME	TER
<b>CIRCLE</b>	<b>PARALLELOGRAM</b>	<b>TRAPEZOID</b>	<b>TRIANGLE</b>	<b>RECTANGLE</b>	<b>SQUARE</b>
					
$r = \text{radius}$ $d = \text{diameter}$	$b = \text{base}$ $h = \text{height}$	$b = \text{base}$ $h = \text{height}$	$b = \text{base}$ $h = \text{height}$	$l = \text{length}$ $w = \text{width}$	$s = \text{side}$
<b>AREA</b>	<b>AREA</b>	<b>AREA</b>	<b>AREA</b>	<b>AREA</b>	<b>AREA</b>
$A = \pi r^2$	$A = b \cdot h$	$A = \frac{(b_1 + b_2) \cdot h}{2}$	$A = \frac{b \cdot h}{2}$	$A = L \cdot w$	$A = s^2$
	<b>PERIMETER</b>	<b>PERIMETER</b>	<b>PERIMETER</b>	<b>PERIMETER</b>	<b>PERIMETER</b>
$C = 2\pi r$ $C = \pi d$	$P = 2(l + w)$ $P = 2 \cdot l + 2 \cdot w$	$P = s + s + s + s$	$P = s + s + s$	$P = 2(L + w)$ $P = 2 \cdot l + 2 \cdot w$	$P = 4 \cdot s$ $P = s + s + s + s$

# COORDINATE PLANE

## COORDINATE PLANE

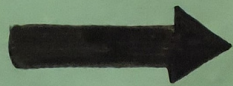
$x, y$

START AT THE ORIGIN  
 $(0, 0)$



CRAWL BEFORE YOU CLIMB

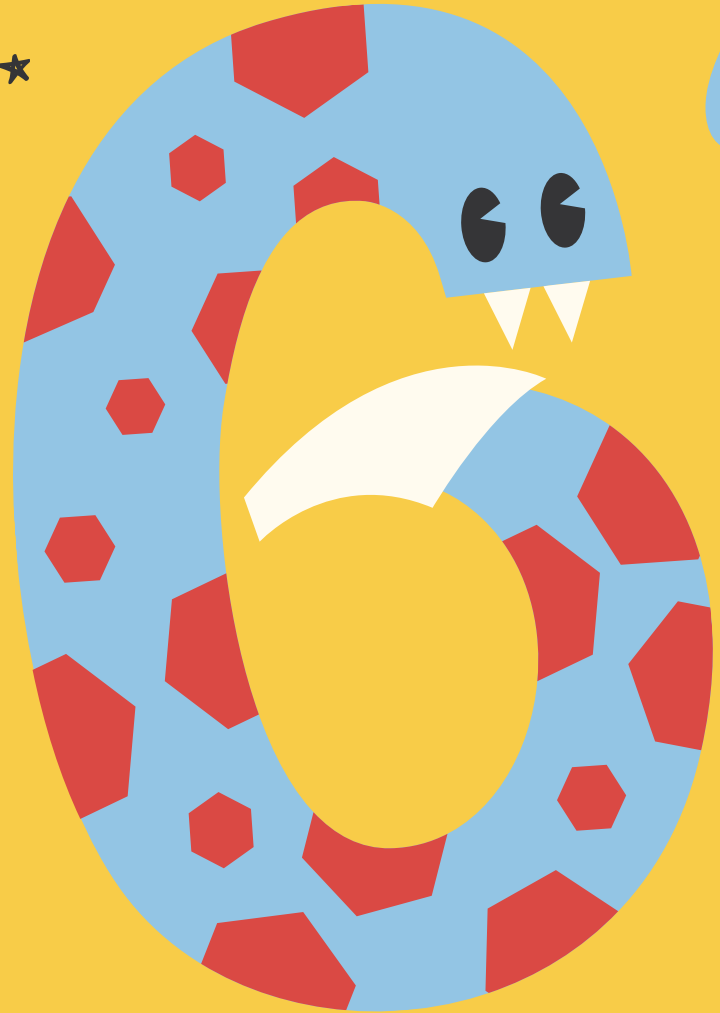
FIRST MOVE  
**RIGHT**



THEN MOVE  
**UP**



*Jo*



*Jo*



*Jo*

# SLOPE OF A LINE




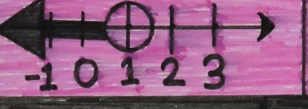

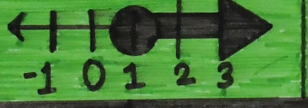

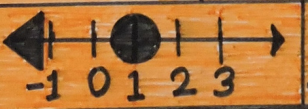
SLOPE		OF	A	LINE
FORMULEA	GRAPH		TABLE	
m = slope	$m = \frac{Y_2 - Y_1}{X_2 - X_1} =$ $\frac{4 - 1}{8 - 4} = \frac{3}{4}$		x	y
m = $\frac{\text{HEIGHT}}{\text{BASE}}$			-8	-8
m = $\frac{Y_2 - Y_1}{X_2 - X_1}$			-4	-5
y = mx + c			0	-2
	$y = \frac{3}{4}x - 2$		4	1
			8	4

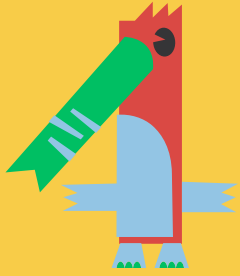


# INEQUALITIES

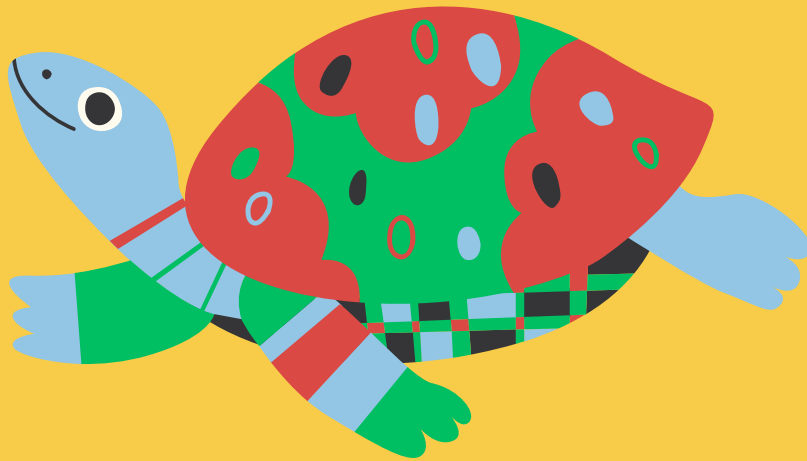
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INEQUALITIES:			
$>$	GREATER THAN		OPEN CIRCLE
		$x > 1$	
$<$	LESS THAN		OPEN CIRCLE
		$x < 1$	
$\geq$	GREATER THAN OR EQUAL TO		CLOSED CIRCLE
		$x \geq 1$	
$\leq$	LESS THAN OR EQUAL TO		CLOSED CIRCLE
		$x \leq 1$	



# Selected Topics of Mathematics



# MAGIC SQUARE

## MAGIC SQUARE

A magic square is a square grid of numbers arranged in such a way that the sum of the numbers in each

row, column,

is the same. known as the or "magic sum".

4	3	8
9	5	1
2	7	6

and diagonal.

This sum is "magic constant".

One of the earliest known magic square grid is the Lo Shu Square. The Lo Shu Square is a 3x3 magic square with a magic constant of 15.

There are odd order magic squares (3x3, 5x5) and even order magic squares (4x4, 6x6 etc.). Magic squares continue to inspire awe and curiosity.

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# FALLACIES IN MATHEMATICS

**FALLACIES IN MATHEMATICS**

In mathematics, fallacies are arguments or misconceptions that lead to incorrect conclusions. One common fallacy is the affirming the consequent, where assuming a statement's inverse is true. Another is the fallacy of division, incorrectly inferring that a property of a whole applies to its parts. Understanding and avoiding fallacies are essential for sound mathematical thinking.

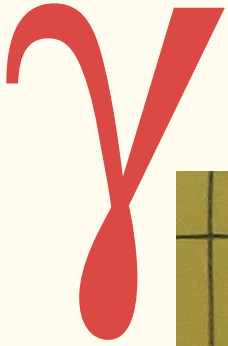
$2 = 1 + 1$ $= 1 + \sqrt{1 \times 1}$ $= 1 + \sqrt{(-1) \times (-1)}$ $= 1 + \sqrt{-1} \times \sqrt{-1}$ $= 1 + i \times i$ $= 1 + i^2$ $= 1 - 1 = 0$	$(-1)^2 = 1$ $\Rightarrow \log_{10} (-1)^2 = \log 1$ $\Rightarrow 2 \log_{10} (-1) = 0$ $\Rightarrow \log_{10} (-1) = 0$ $\Rightarrow -1 = 10^0 \Rightarrow -1 = 1$
$1^1 = 1$ $2^2 = 2 + 2$ $3^2 = 3 + 3 + 3$ $x^2 = x + x + \dots x \text{ times}$ <p>Now differentiating w.r.t <math>x</math></p> $2x = 1 + 1 + \dots x \text{ times}$ $2x = x \Rightarrow 2 = 1 \text{ what ??}$	$-1 = 1$ $-1/1 = -1/1$ $-1/1 = 1/-1$ $\sqrt{1/1} = \sqrt{1/-1}$ $i = 1/i$ $i^2 = 1$ $-1 = 1$

**SOME EXAMPLES ON IT**



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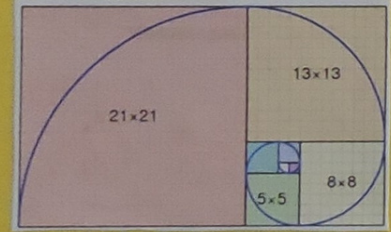
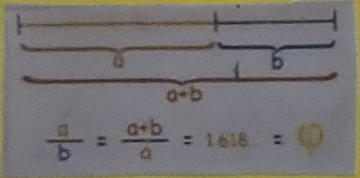


# GOLDEN RATIO



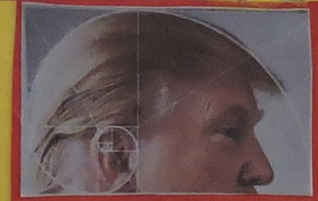
## GOLDEN RATIO

Golden Ratio is a special number approximately equal to 1.618 which is represented by a Greek letter "phi". It is an irrational number. This is the most beautiful number you have ever seen.



0, 1, 2, 3, 5, 8, 13, 21, ...

- 0 + 1 = 1
- 1 + 1 = 2
- 2 + 1 = 3
- 3 + 2 = 5
- 5 + 3 = 8
- 8 + 5 = 13

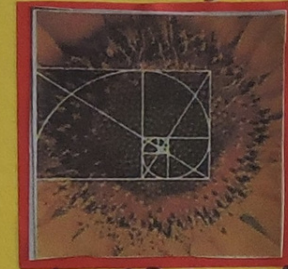


HUMAN EAR



HUMAN FACE

THE GOLDEN RATIO  
Divide the length of the face by the width of the face. The ideal result is close to 1.6, meaning faces that we find most attractive are roughly 1.5 times longer than they are wide.

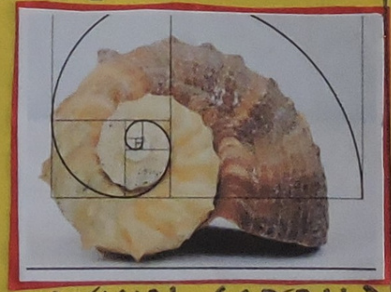


NATURE (SUN FLOWER)

**FIBONACCI SERIES:** The Fibonacci Series is a set of numbers that start with 0 or 1, followed by a one, and proceeds based on the rule that each is equal to the preceding two numbers.  
F(0) = 0, 1, 1, 2, 3, 5, 8, 21, ...



ARCHITECTURE (TAJ MAHAL)



ANIMAL (SNAIL)

# FIBONACCI SEQUENCE AND THE GOLDEN SPIRAL

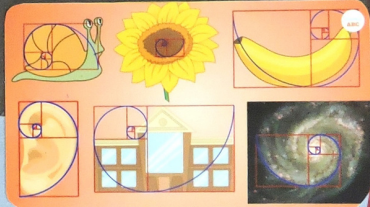
Fibonacci Sequence and  
The golden Spiral →

The fibonacci sequence is a sequence in which each number is the sum of the two preceding ones. Commonly denoted  $F_n$ . Although commonly the sequence starts from 0 and 1. The sequence begins 0, 1, 2, 3, 5, 8, 13, 21, 34, ... and continues on forever.

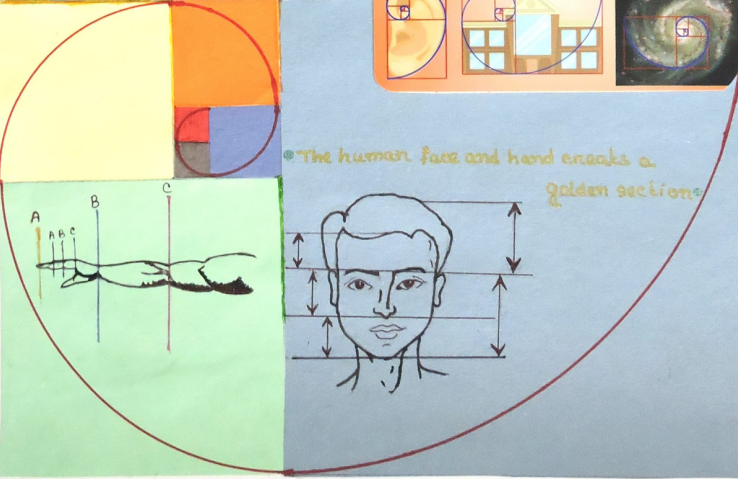
■ The golden ratio is an irrational number that is equal to  $\frac{1+\sqrt{5}}{2}$  or approximately 1.61803... ( $\phi$ ) frequently appears in art, architecture and natural sciences where it is derived from the Fibonacci series of numbers where each entry is the sum of the two numbers before it.

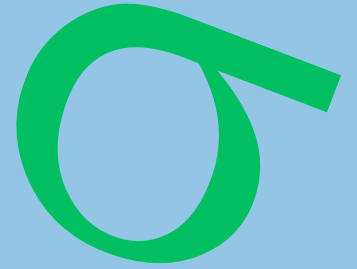
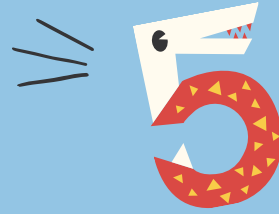
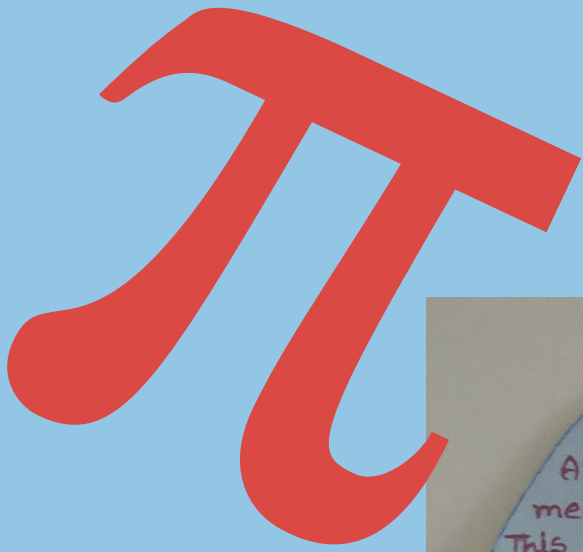
The Fibonacci sequence and its (golden ratio) can be found across all of nature: plants, animals, flowers, weather structures, star system even in human body also - It is even present in the universe.

Some real life examples of golden spiral



• The human face and hand creates a golden sections





Pi ( $\pi$ ), a mathematical constant that represents the ratio of a circle's circumference to its diameter, is a captivating and ubiquitous figure in the realm of mathematics. Approximately equal to 3.14159, pi is an irrational number, meaning its decimal repeating never repeats or terminates. This seemingly simple yet endlessly non-repeating sequence has intrigued mathematicians for centuries. The fascination with pi extends beyond its geometric origins. It appears in various branches of mathematics and physics, playing a crucial role in equations describing wave functions, probability and even the fundamental principles of quantum mechanics. Mathematicians have diligently calculated pi to millions, even trillions of decimal places, with no discernible pattern emerging. From reciting digits to baking pi-shaped pies, Pi Day provides a lighthearted opportunity to appreciate the significance of pi in our mathematical understanding of the world.



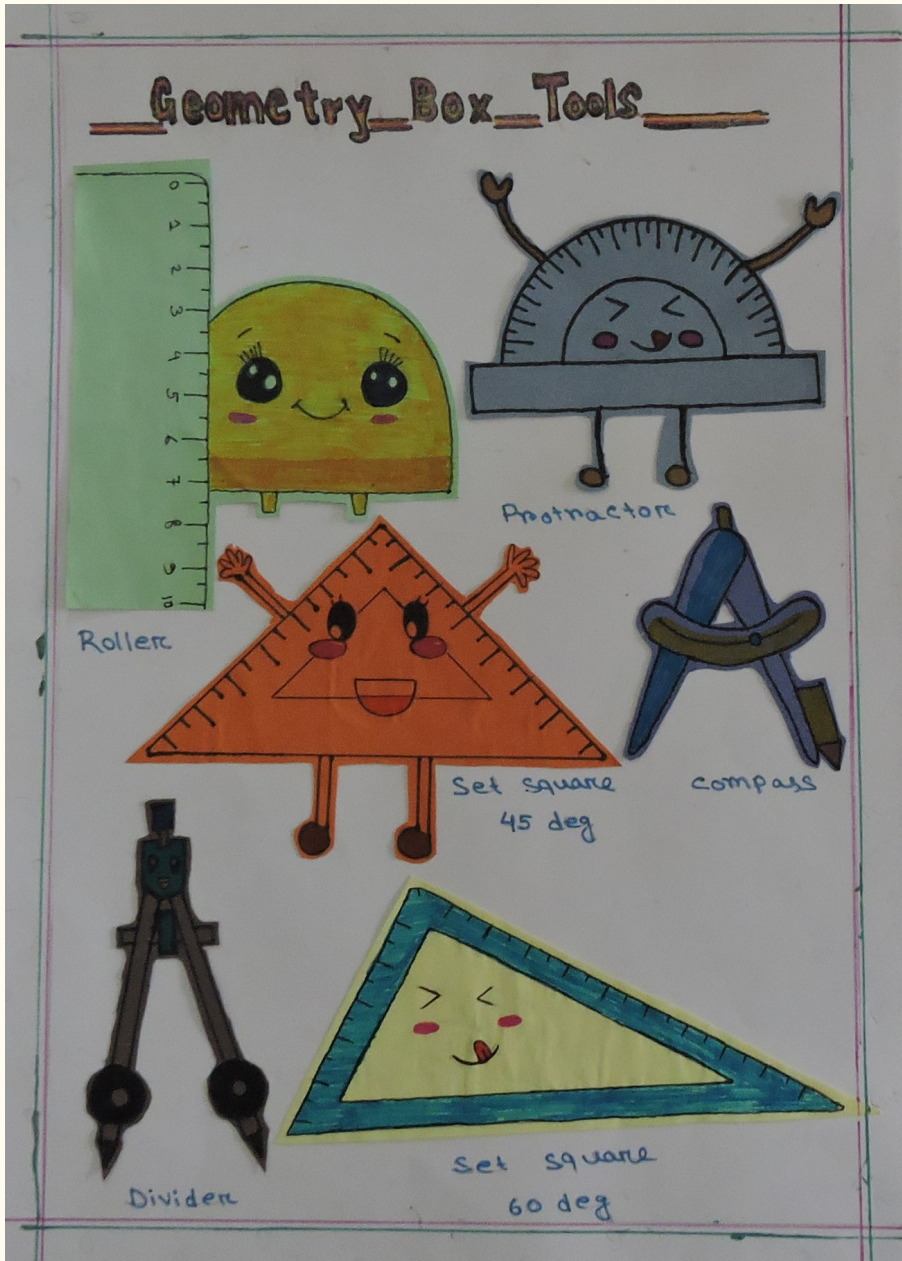


# Mathematical

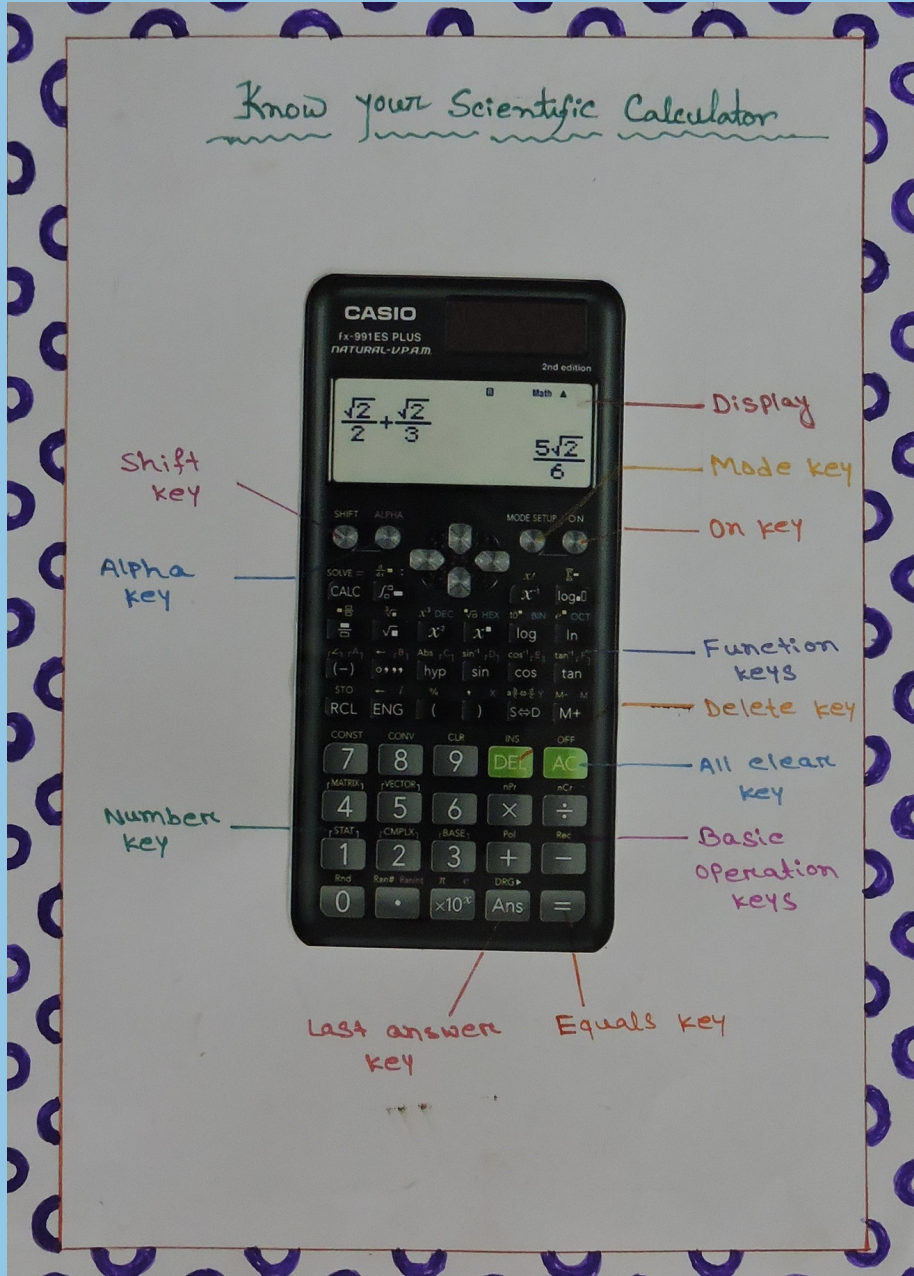
# Tools



# GEOMETRY TOOL BOX



# KNOW YOUR SCIENTIFIC CALCULATOR

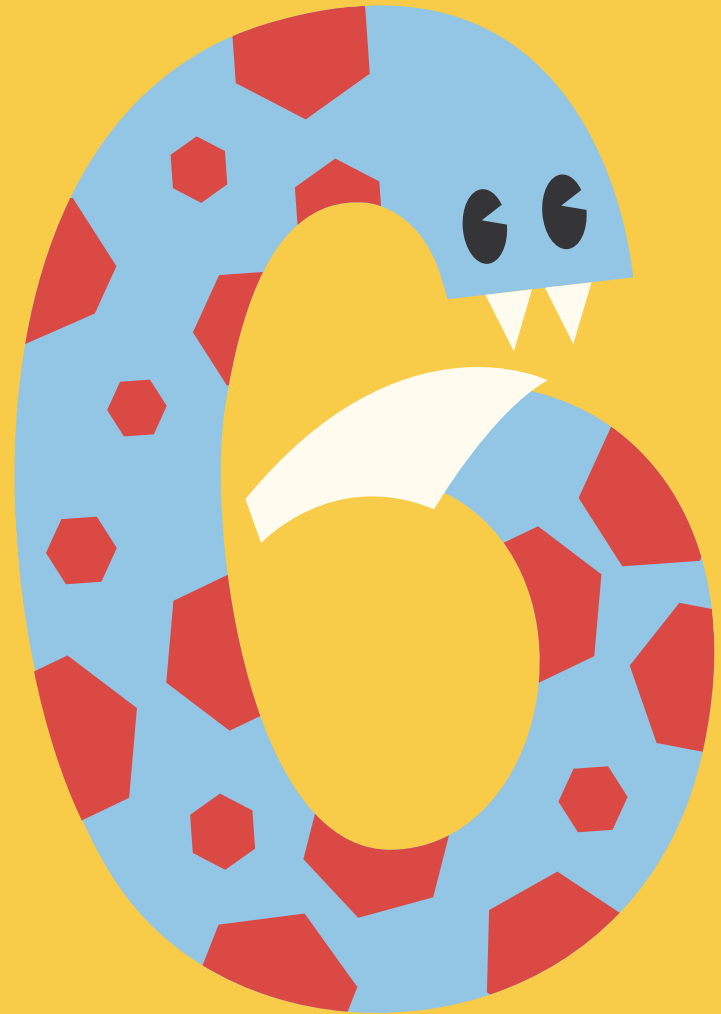




**Mathematics**

**&**

**Art**





# BEAUTY OF MATHEMATICS

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## BEAUTY OF MATHEMATICS

$$\begin{aligned}51 \times 51 &= (25+1) \times 100 + 1 \times 1 = 2601 \\52 \times 52 &= (25+2) \times 100 + 2 \times 2 = 2704 \\53 \times 53 &= (25+3) \times 100 + 3 \times 3 = 2809 \\54 \times 54 &= (25+4) \times 100 + 4 \times 4 = 2916 \\55 \times 55 &= (25+5) \times 100 + 5 \times 5 = 3025 \\56 \times 56 &= (25+6) \times 100 + 6 \times 6 = 3136 \\57 \times 57 &= (25+7) \times 100 + 7 \times 7 = 3249 \\58 \times 58 &= (25+8) \times 100 + 8 \times 8 = 3364 \\59 \times 59 &= (25+9) \times 100 + 9 \times 9 = 3481\end{aligned}$$

$$\begin{aligned}1 \times 8 + 1 &= 9 \\12 \times 8 + 2 &= 98 \\123 \times 8 + 3 &= 987 \\1234 \times 8 + 4 &= 9876 \\12345 \times 8 + 5 &= 98765 \\123456 \times 8 + 6 &= 987654 \\1234567 \times 8 + 7 &= 9876543 \\12345678 \times 8 + 8 &= 98765432 \\123456789 \times 8 + 9 &= 987654321\end{aligned}$$

$$\begin{aligned}1 \times 9 + 2 &= 11 \\12 \times 9 + 3 &= 111 \\123 \times 9 + 4 &= 1111 \\1234 \times 9 + 5 &= 11111 \\12345 \times 9 + 6 &= 111111 \\123456 \times 9 + 7 &= 1111111 \\1234567 \times 9 + 8 &= 11111111 \\12345678 \times 9 + 9 &= 111111111 \\123456789 \times 9 + 10 &= 1111111111\end{aligned}$$

$$\begin{aligned}05 \times 05 &= 0 \times 1 \times 100 + 5 \times 5 = 25 \\15 \times 15 &= 1 \times 2 \times 100 + 5 \times 5 = 225 \\25 \times 25 &= 2 \times 3 \times 100 + 5 \times 5 = 625 \\35 \times 35 &= 3 \times 4 \times 100 + 5 \times 5 = 1225 \\45 \times 45 &= 4 \times 5 \times 100 + 5 \times 5 = 2025 \\55 \times 55 &= 5 \times 6 \times 100 + 5 \times 5 = 3025 \\65 \times 65 &= 6 \times 7 \times 100 + 5 \times 5 = 4225 \\75 \times 75 &= 7 \times 8 \times 100 + 5 \times 5 = 5625 \\85 \times 85 &= 8 \times 9 \times 100 + 5 \times 5 = 7225 \\95 \times 95 &= 9 \times 10 \times 100 + 5 \times 5 = 9025\end{aligned}$$

$$\begin{aligned}135 &= 1^1 + 3^2 + 5^3 \\195 &= 1^1 + 9^2 + 5^3 \\518 &= 5^1 + 1^2 + 8^3 \\598 &= 5^1 + 9^2 + 8^3\end{aligned}$$



# BEAUTY OF MATHEMATICS



অঙ্কের সৌন্দর্য ।

স্বচা স্বকথা আক্ষর্যজলক কুও যেখানে  
২ থেকে ৩২ অঙ্খ্যা লেখা ২ য়েছে কোন  
স্বকথা গুণিপিচ বা পুনরাবৃত্তি ছাড়াই এবং  
প্রত্যেকটা অঙ্খ্যা কে ব্যবহার করে ।

শ্রব স্বল সৌন্দর্যটা হল যে কোনও  
দুটো পাক্সাপাক্সি অঙ্খ্যার যোগফল  
হল স্বকথা নিখুঁত স্বর্গ ।



# REAL LIFE CURVE



## REAL LIFE CURVE

Class of Curves:  $r = a \sin n\theta$




Fig-1-1 Flower

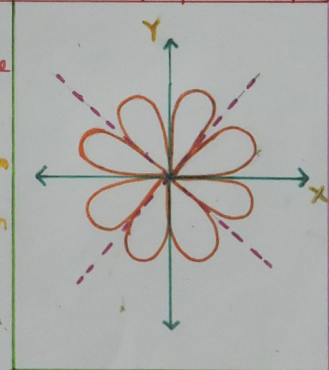
We begin with a particular case when  $n = 4$  ( $r = a \sin 4\theta$ ).  
The following table of corresponding value of  $r$  and  $\theta$  will enable one to trace the curve:

$4\theta$	Inter-mediate values	$\frac{2\pi}{3}$	Inter-mediate values	$\frac{4\pi}{3}$	Inter-mediate values	$\pi$	Inter-mediate values	$2\pi$
$\theta$	"	$\frac{\pi}{6}$	"	$\frac{\pi}{3}$	"	$\frac{\pi}{4}$	"	$\frac{\pi}{2}$
$r$	Positive Increasing	$a$	Positive Decreasing	$a$	Positive Decreasing	$0$	Positive Increasing	$0$

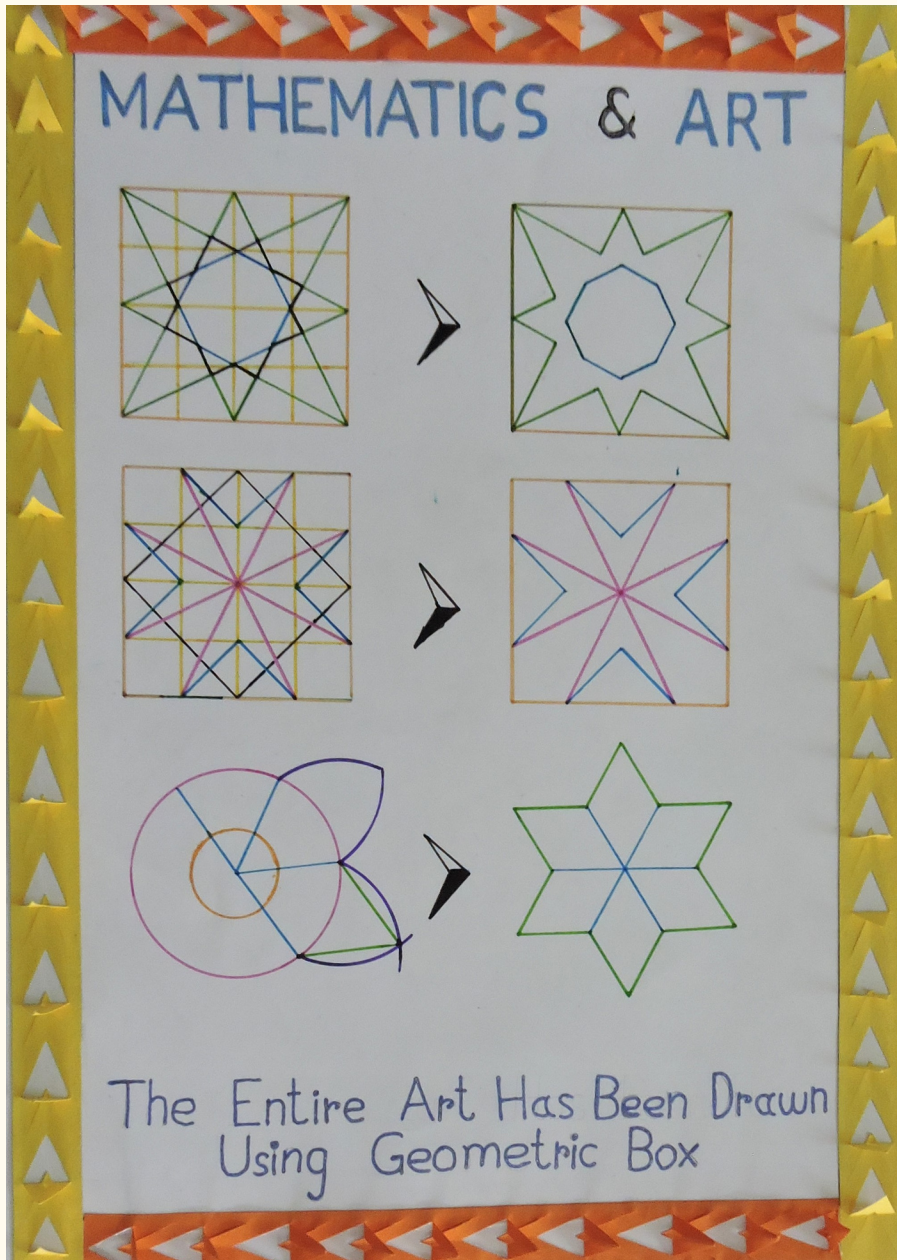
**Observations:**

- $r$  is never greater than  $|a|$ ; there is no asymptote. Here  $\phi = \frac{1}{4} \tan 4\theta$   
Hence  $\phi = 0$  whenever  $r$  vanishes.
- The curve consists of a series of similar loops as shown in Fig-1-2, all being arranged symmetrically about the origin and lying entirely within a circle of radius  $a$  and the center at the origin.

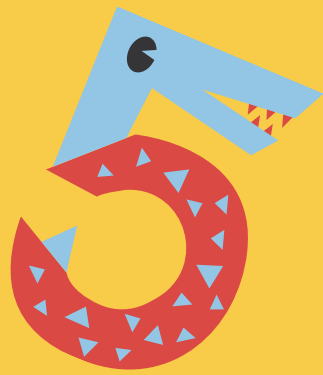
So, Flower have a beautiful mathematical structure shown in Fig-1-2.

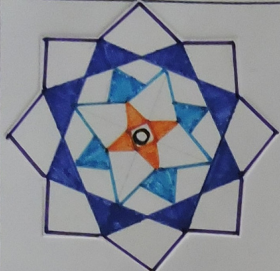


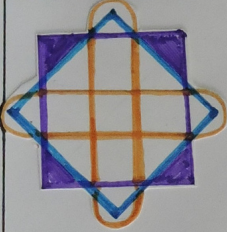
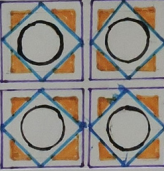
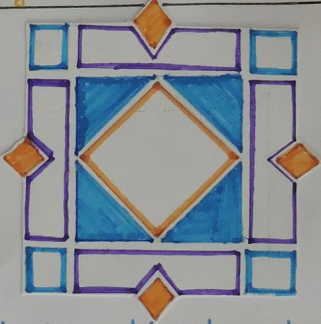


# MATHEMATICS & ART

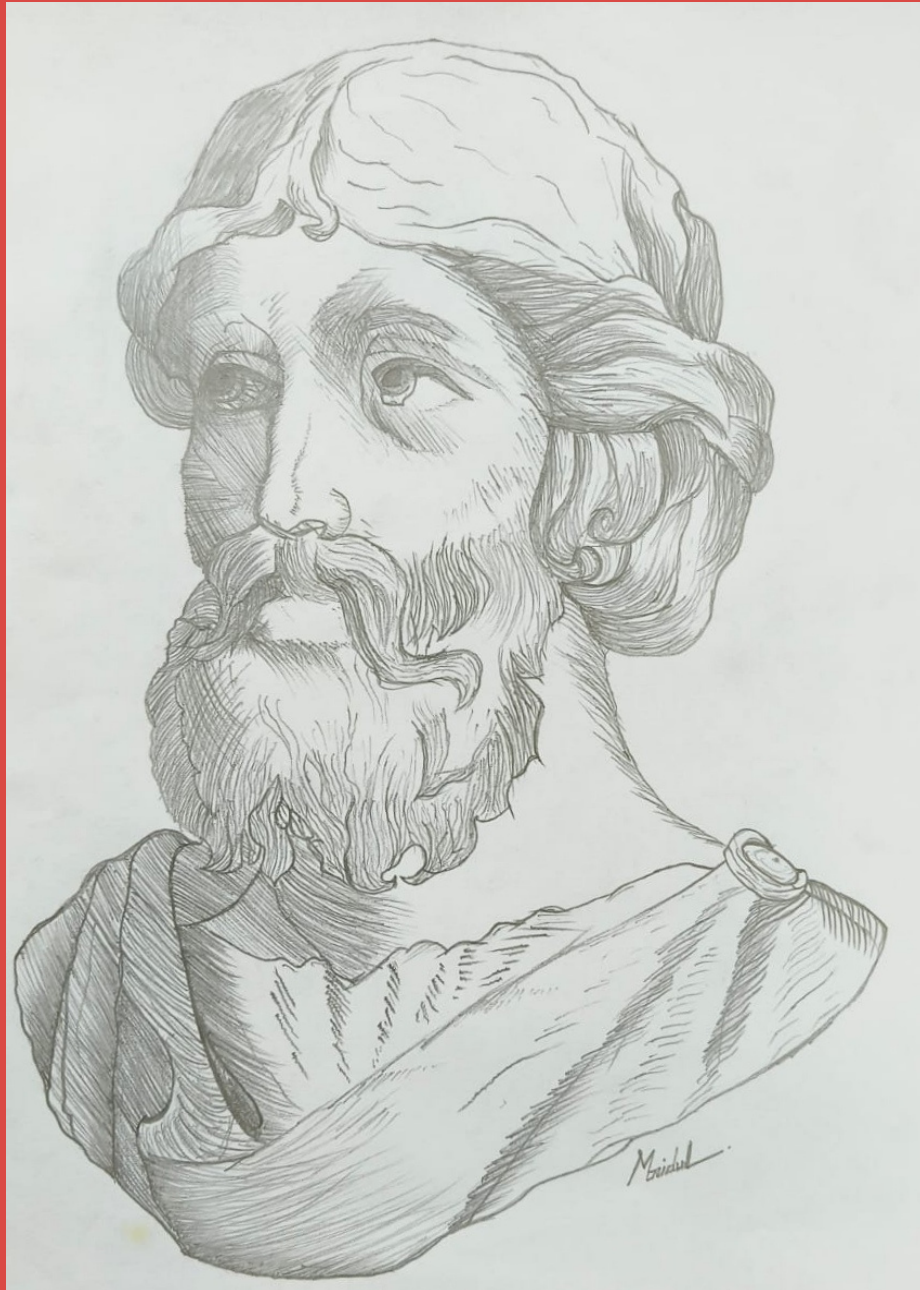


# ISLAMIC MOTIF ART



 	
<p>Islamic motif art is a captivating and rich form of artistic expression that has flourished for centuries, reflecting the deep cultural and spiritual heritage of the Islamic world. Rooted in the Islamic Prohibition of depicting living beings, Islamic art channels</p>	<p>Geometry plays a central role in Islamic motif art, with complex patterns of interlocking shapes adorning architecture, textiles and manuscripts. These geometric designs symbolize the nature of God.</p>
 	
<p>Another hallmark of Islamic motif art is calligraphy, where skilled artists transform Arabic Script into a visual feast. Verses from the Quran, the holy book of Islam, are often incorporated, elevating the art from a spiritual.</p>	<p>Islamic motif art is not confined to a particular region or time period, showcasing a remarkable diversity across the Islamic world.</p>

# PYTHAGORAS

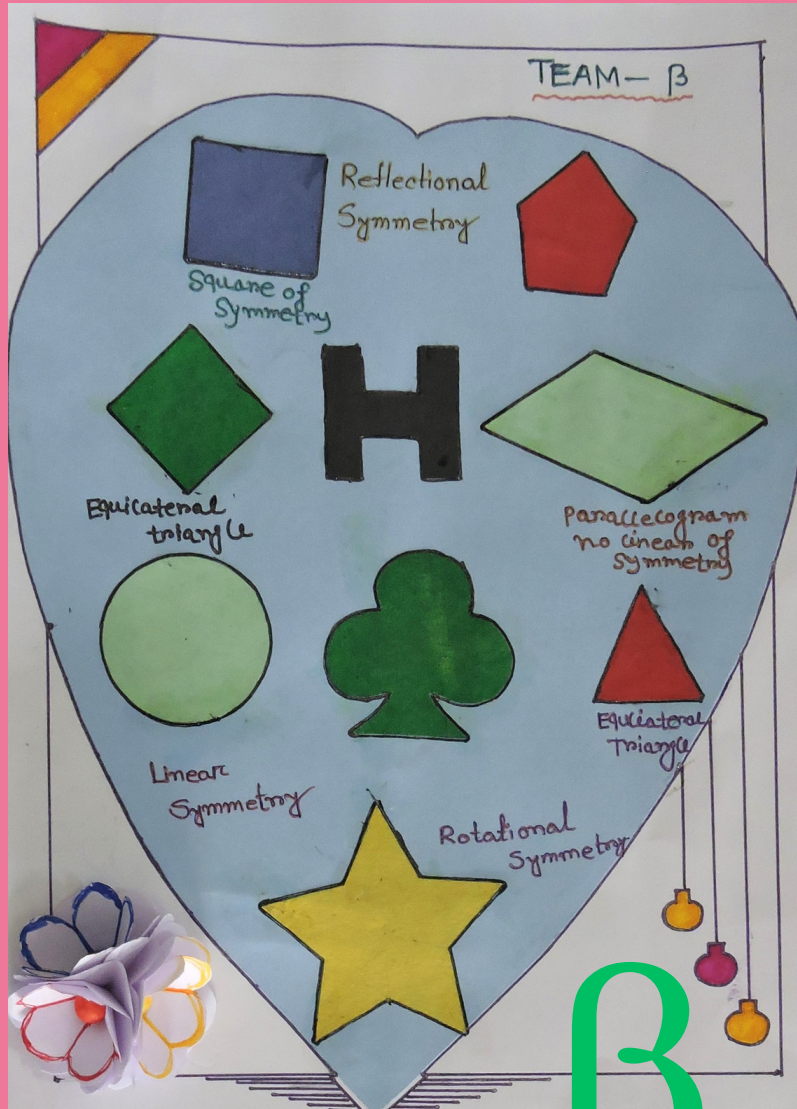




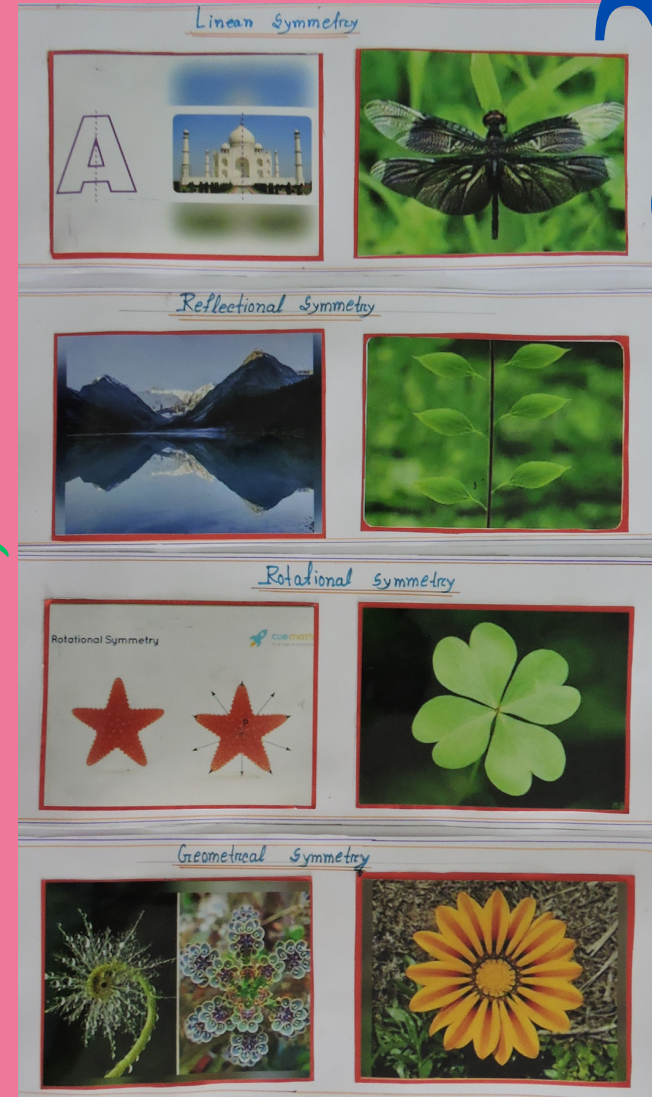
# FEW REAL LIFE EXAMPLES



# SYMMETRY IN MATHEMATICS



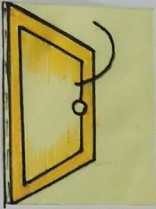
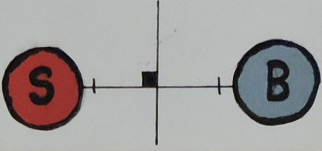
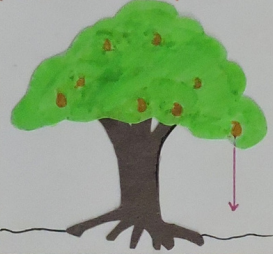
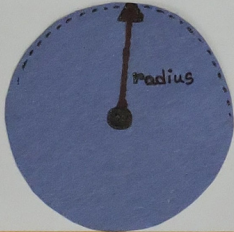
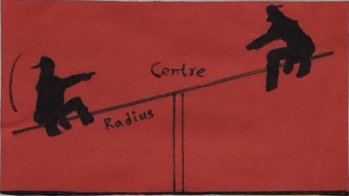
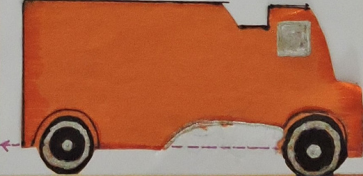
# SYMMETRY IN REAL LIFE



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# DAILY LIFE EXAMPLES OF LOCUS

DAILY LIFE EXAMPLES OF LOCUS	
<p>The handle of a door moving on hinges.</p>  <p>The locus is an arc of a circle.</p>	<p>A Person moving equidistant from school and bus stand.</p> <p>The locus is perpendicular bisector of the line segment joining them.</p> 
<p>A fruit falling from a tree.</p> <p>The Locus is a vertical line from the point where it is present.</p> 	<p>The tip of the minutes hand of a clock.</p> <p>The locus is a circle with length of minute hand as radius.</p> 
<p>A Boy sitting on a see-saw.</p> <p>The locus is arc of a circle with fulcrum as centre and distance from it to the boy as radius.</p> 	<p>The centre of the wheel of a vehicle moving on a straight road.</p> <p>The Locus is a line parallel to the road with radius of wheel as distance between them.</p> 





**THE END**