

Topic – Quadrilaterals

Class- IX

Subject - Mathematics



0962CH08

SUBODH PUBLIC SCHOOL

Affiliated to C.B.S.E.
NEAR AIRPORT, JAIPUR

GRAPHIC NOVEL



To access the comic book and additional interactive digital content, download DIKSHA app from Google Play Store on your Android smartphone or tablet.

Acknowledgement

It is a matter of immense pleasure to acknowledge that this Graphic Novel is the outcome of co-ordination and team work of teachers from different subjects and classes of Subodh Public School, Near Airport Terminal 1, Jaipur.

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Disclaimer

This Graphic Novel is published as a learning material to enable the students to have a better understanding of the different types of Quadrilaterals and their properties.

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Jaipur

Preface

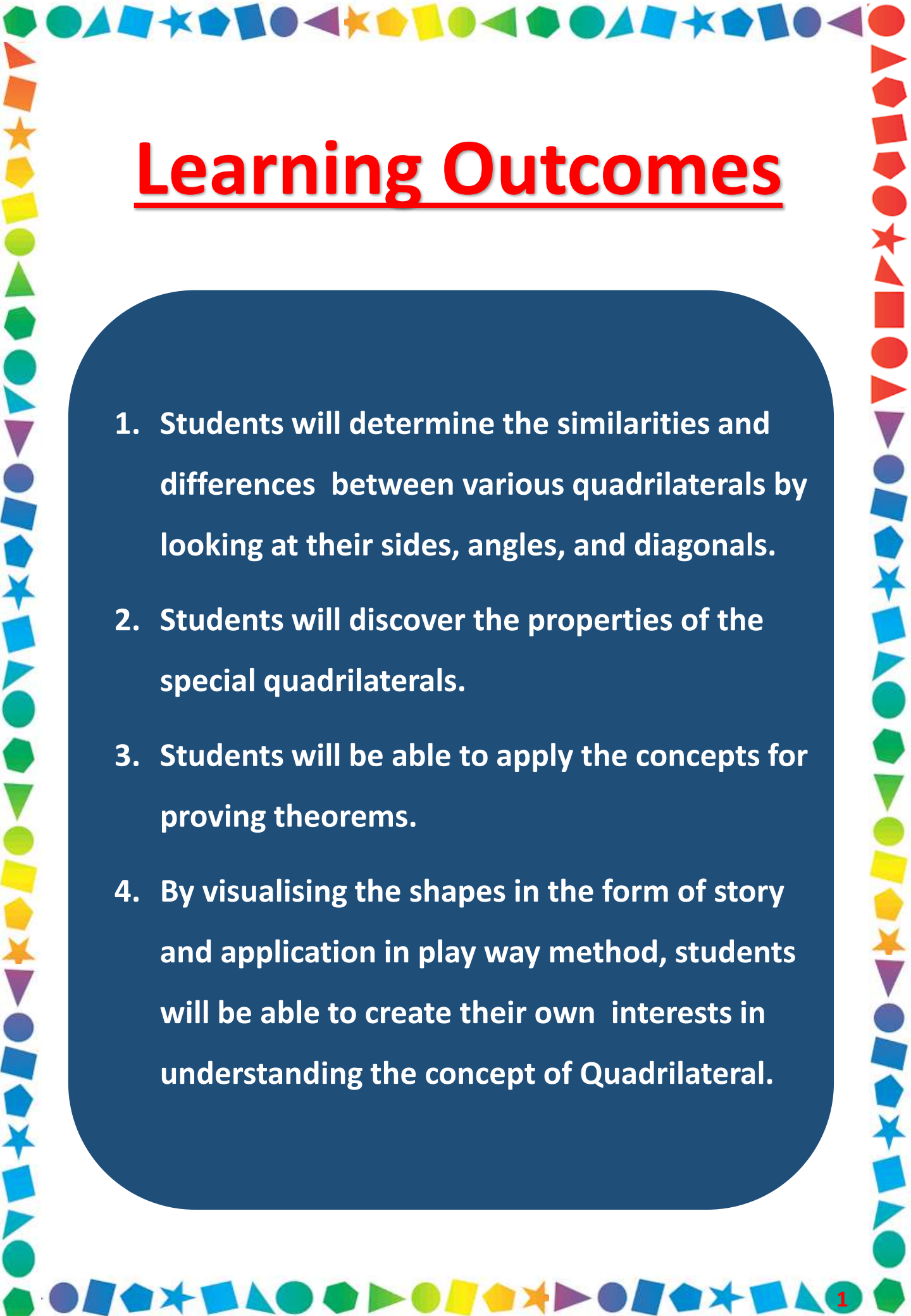
This graphic novel – ‘Quadrilaterals and its types’ thoroughly explains about quadrilateral and properties of its various types and makes this topic interesting and fun.

This novel is a creative approach with real life examples and pictures, which will keep the children glued to it.

We are confident that the novel will stimulate the curiosity of the students and they will acquire full advantage of it.

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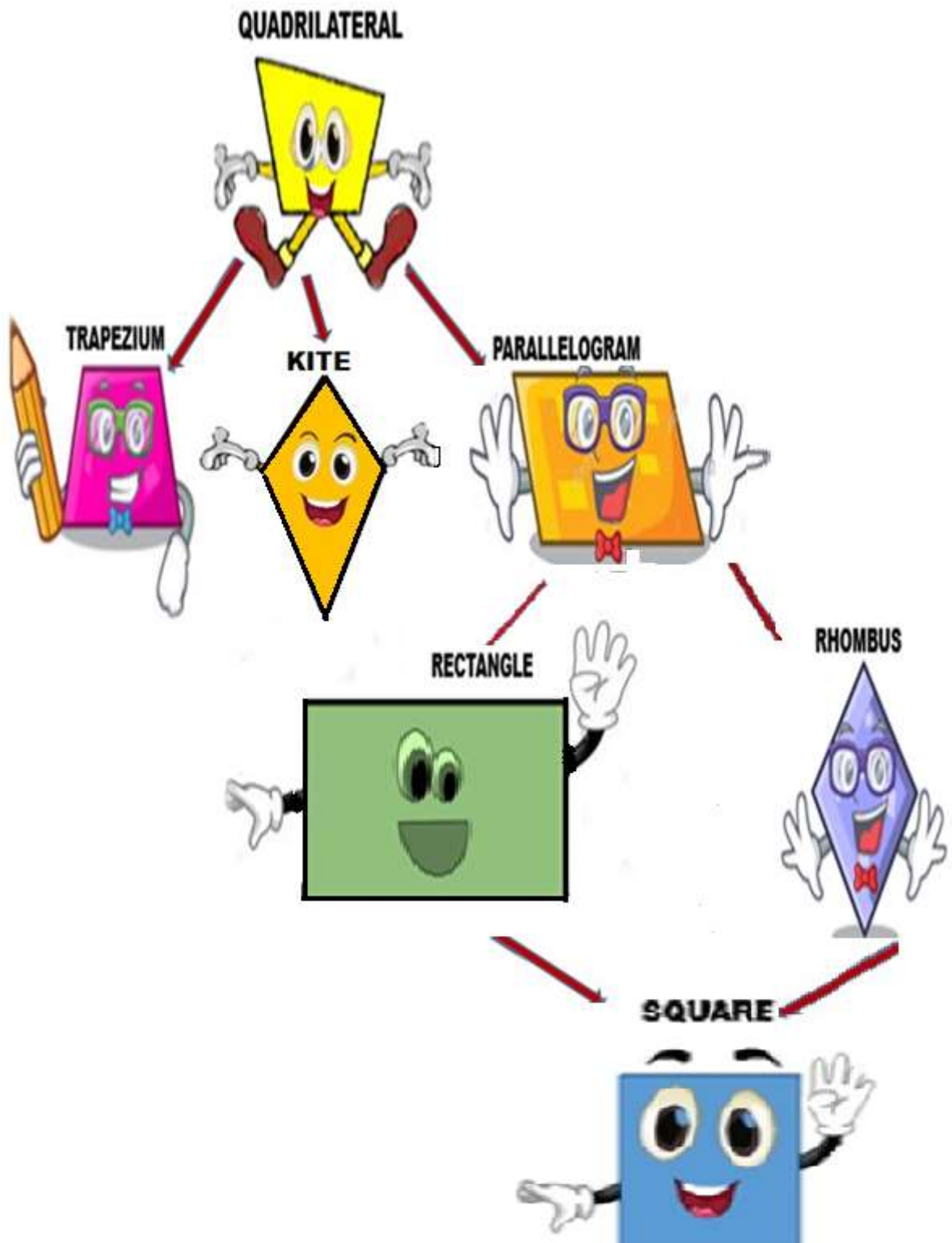
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A decorative border composed of various colorful geometric shapes including circles, triangles, squares, pentagons, and stars, arranged in a repeating pattern along the top, bottom, and sides of the page.

Learning Outcomes

1. Students will determine the similarities and differences between various quadrilaterals by looking at their sides, angles, and diagonals.
2. Students will discover the properties of the special quadrilaterals.
3. Students will be able to apply the concepts for proving theorems.
4. By visualising the shapes in the form of story and application in play way method, students will be able to create their own interests in understanding the concept of Quadrilateral.

Story-Board



Characters



Amita (Age 14)



Rohan (Age 13)



Rohit (Age 15)



Purvi (Age 13)



Mathematics Teacher- Ms. Swechha (Age 32)



Deepak (Age 14)



**Deepak's Father
(Age 41 – Civil Engineer)**



**Rohan's Mother
(Age 38 – House Maker)**

Lunch time in School.. Students of class IX including Rohan, Rohit, Amita and Purvi are heading towards playground after taking lunch.



Students are playing .



Rohan, Rohit, Amita and Purvi are standing in front of the newly constructed Auditorium of the school and start discussing about different shapes used in the construction.



Friends! Have you observed the front view of the new auditorium ??

Yes use of many shapes make it look fascinating.

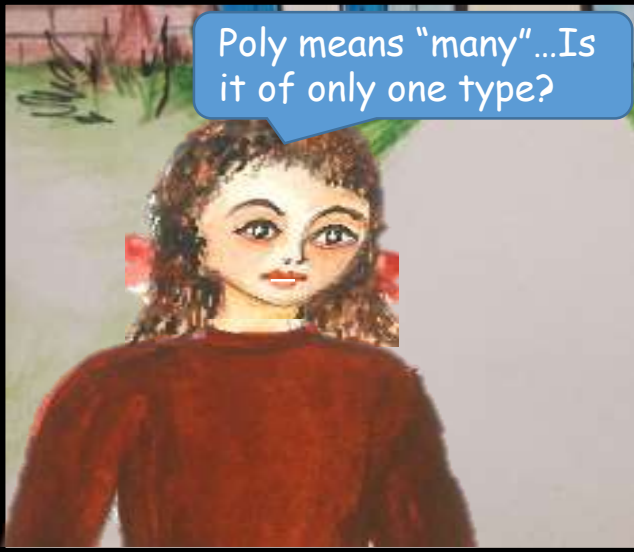
Do you know the names of these shapes?

Yes I know, these are all two dimensional shapes and known as Polygons.

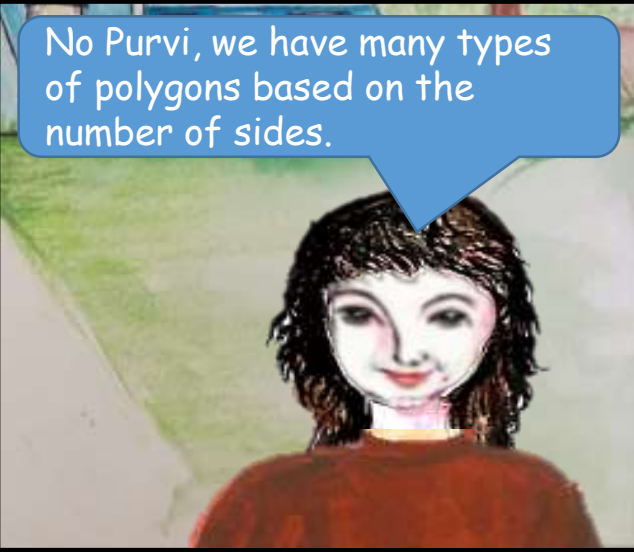
Rohit and Amita explain Polygons and Quadrilaterals .

Polygon !

POLYGON is a closed shape which is always formed with the help of line segments.



Poly means "many"...Is it of only one type?



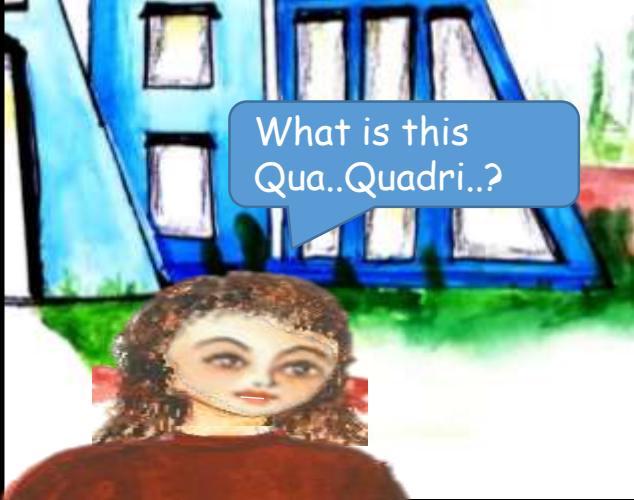
No Purvi, we have many types of polygons based on the number of sides.



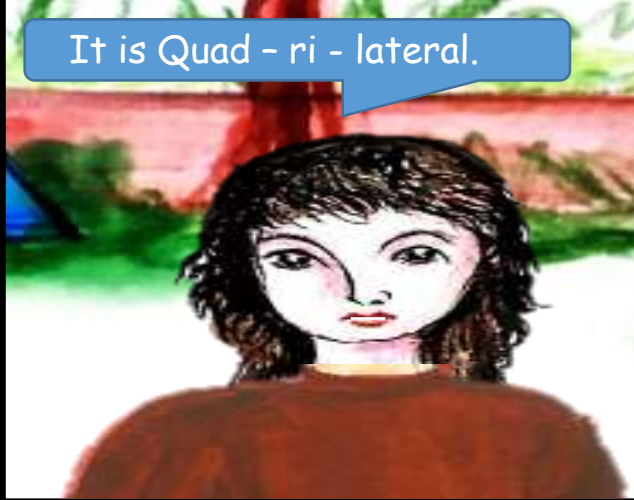
**Way
to
Auditorium**



Yes, I know. A Polygon with three sides is called triangle. Like this sign board.

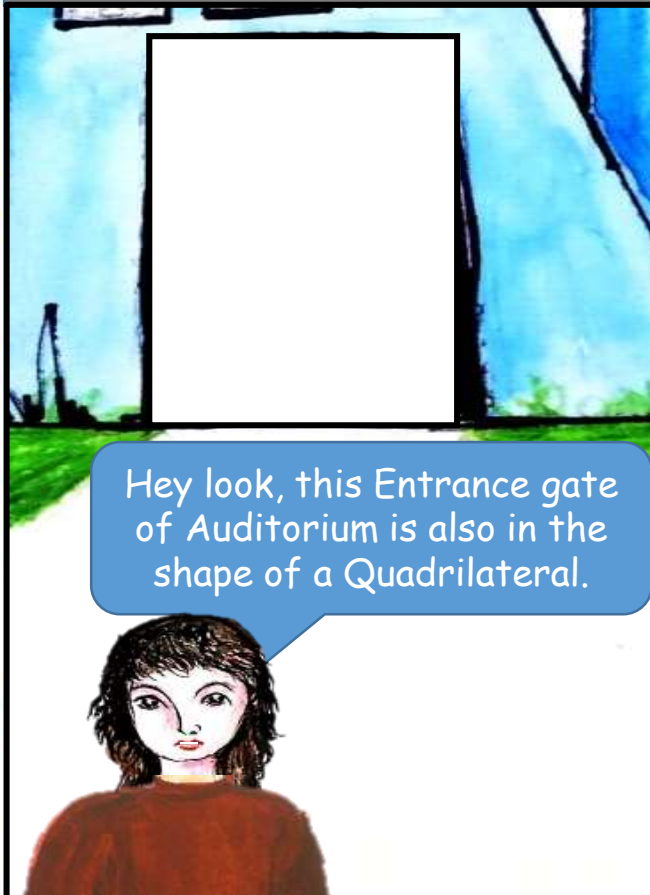


What is this Qua..Quadri..?



It is Quad - ri - lateral.

Looking back to the Auditorium.



Mathematics teacher Ms. Swechha enters in the class.

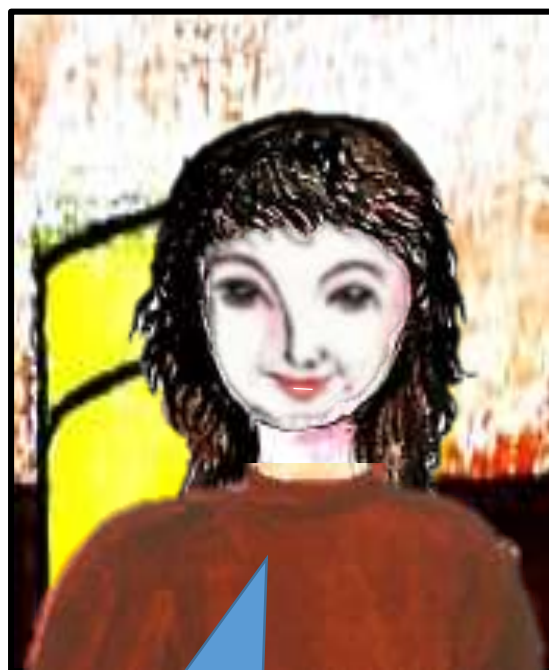


Namaskar ma'am

Namaskar to all.

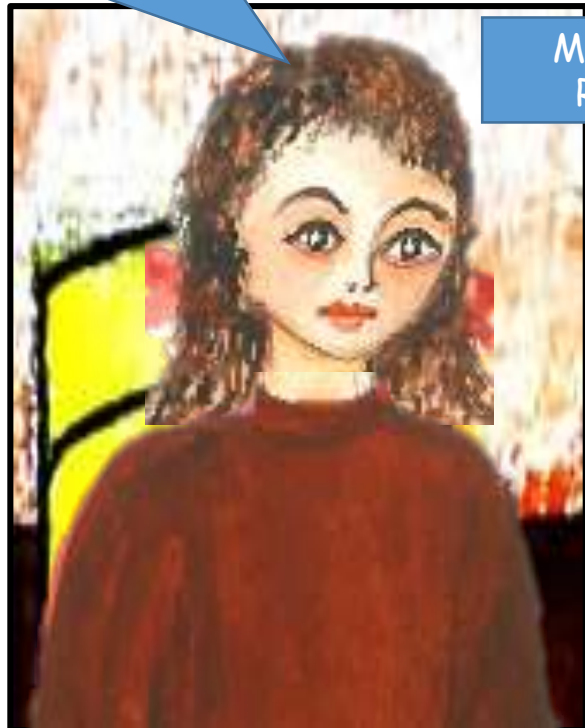


Ma'am we saw the architecture of our school auditorium today.

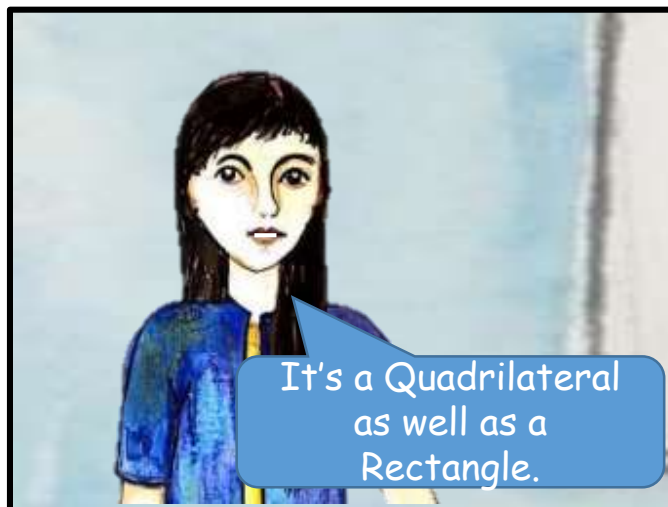


It looks beautiful. We found many polygons on its wall.

Can you please tell whether the shape of Entrance gate is a Quadrilateral or a Rectangle?



Ma'am, it is a Rectangle.



It's a Quadrilateral as well as a Rectangle.

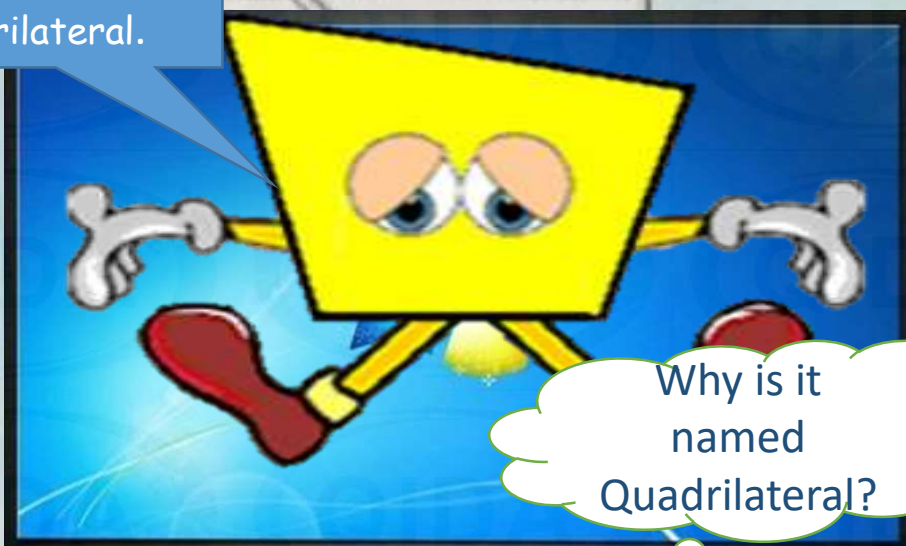
Ma'am how can one shape be both a rectangle and a quadrilateral?



Yes Rohit, it's possible. Let's see this module.

Mathematics teacher shows a module on the Smart Board.

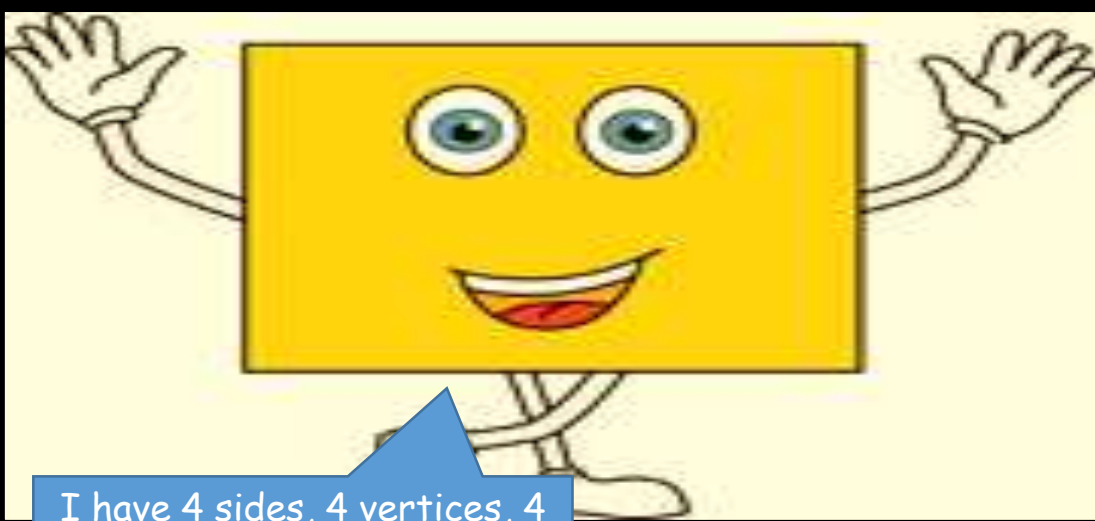
Hello Friends! I am a
Quadrilateral.



Why is it
named
Quadrilateral?



My name Quadrilateral is
derived from the words
QUAD and LATERAL
QUAD means 4 and
LATERAL means sides.



I have 4 sides, 4 vertices, 4 angles and 2 diagonals.



What is a diagonal?

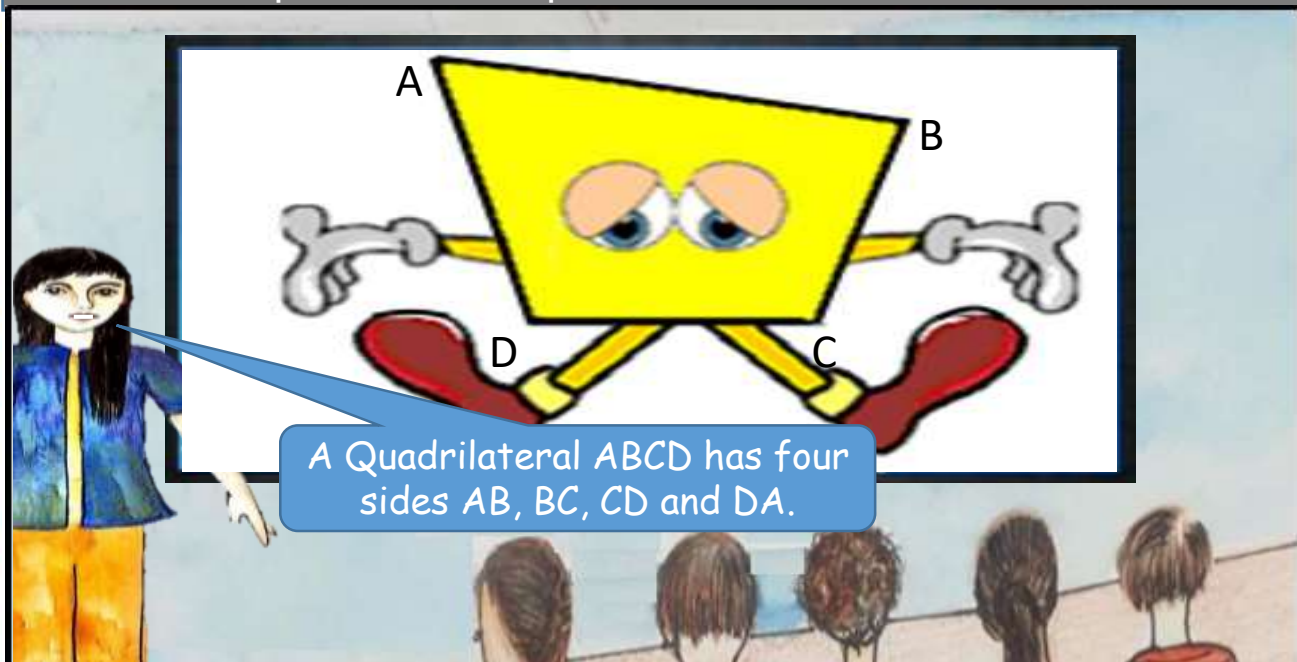


What are Vertices?



Which are its sides and angles ma'am?

The Teacher explains different parts of a Quadrilateral.



A Quadrilateral ABCD has four sides AB, BC, CD and DA.

The point where two sides of a quadrilateral meet is called a Vertex.

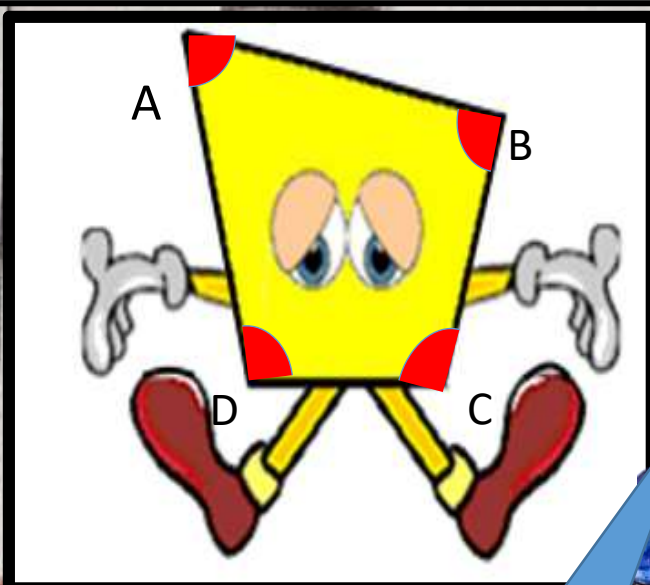


It means vertices are A, B, C and D

Yes, you are right.

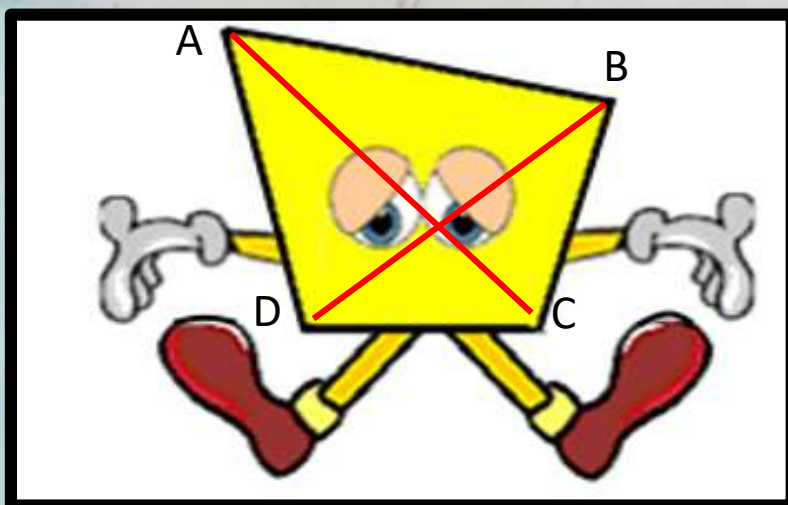


And its Angles are $\angle A$, $\angle B$, $\angle C$ and $\angle D$.



Yes, and sum of all these angles is 360° .

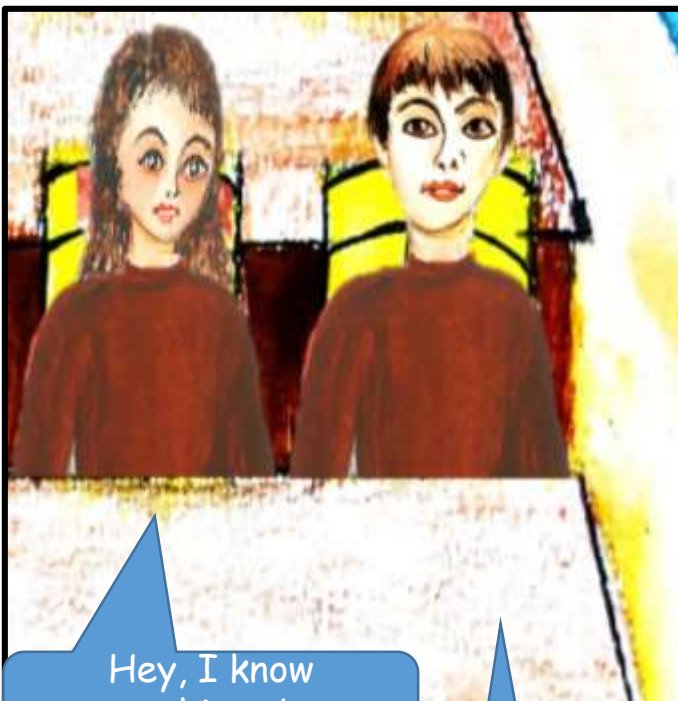




Ma'am, what is a diagonal?

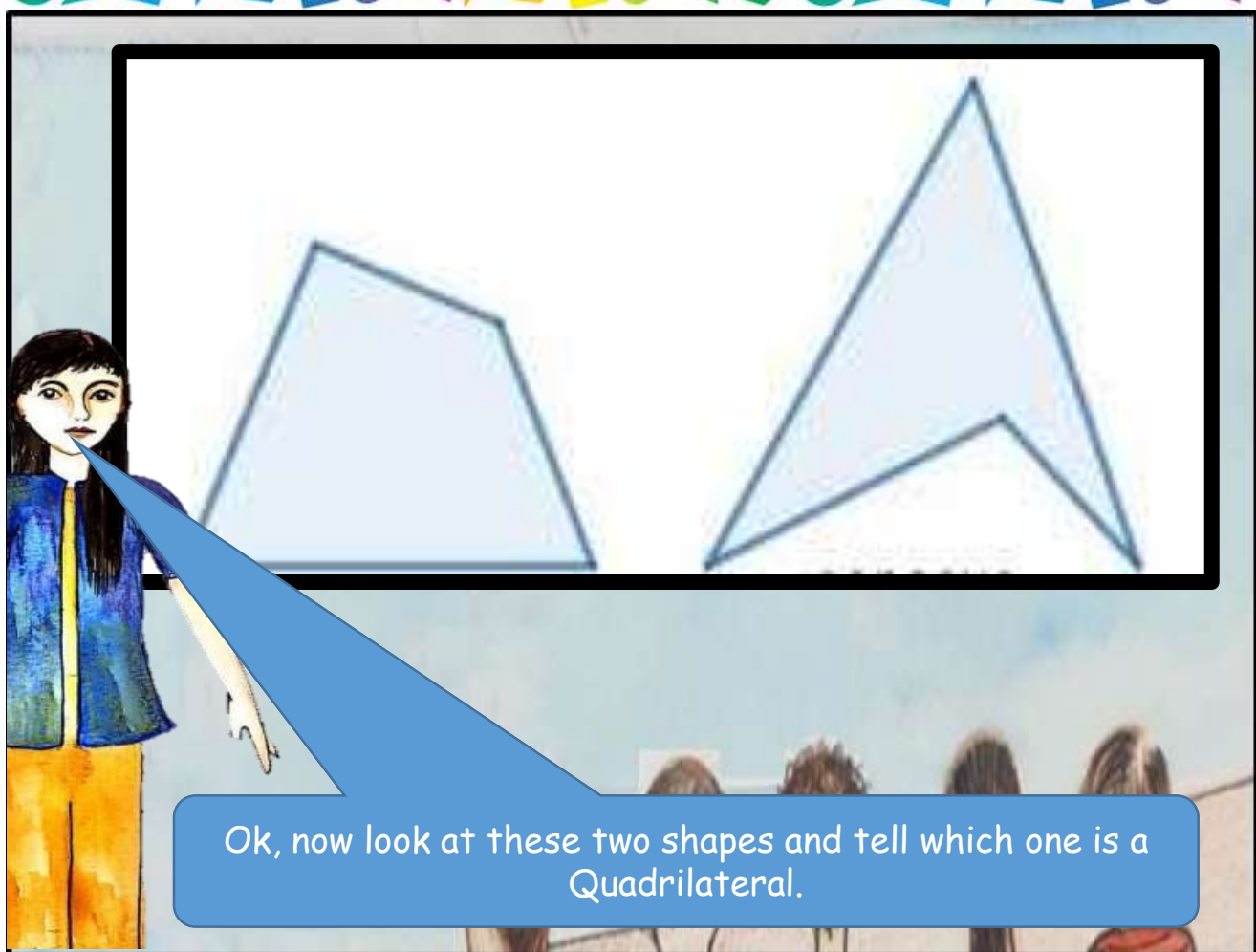


The line segment joining the opposite vertices is known as diagonal. So, AC and BD are its diagonals.



Hey, I know everything about Quadrilaterals now.

Me too.



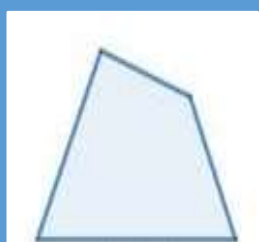
Ok, now look at these two shapes and tell which one is a Quadrilateral.



But why?



First figure is a Quadrilateral.



See, it has four sides.





Ok, but look at the second figure, I think this too has four sides.



Oh yes! the Second figure does have four sides.



But we have not seen this type of a Quadrilateral before.



Yes, you are right as these types of Quadrilaterals are not common.



Look at this Guitar. This is a Concave Quadrilateral.

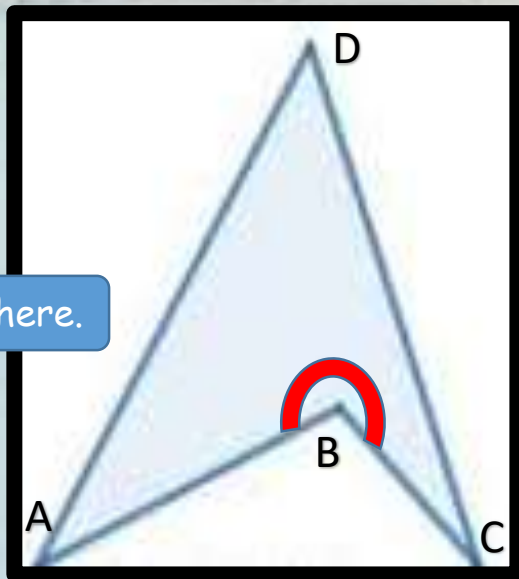


Concave Quadrilateral !!!

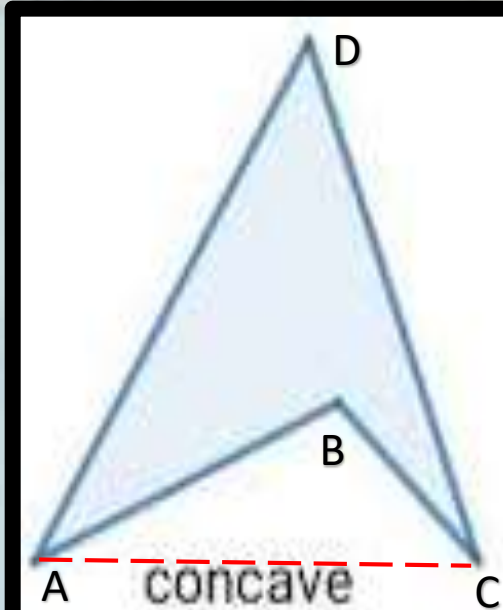
Yes dear, In a concave Quadrilateral at least one angle is greater than 180° .



Look here.



Yes, $\angle ABC$ is greater than 180° .

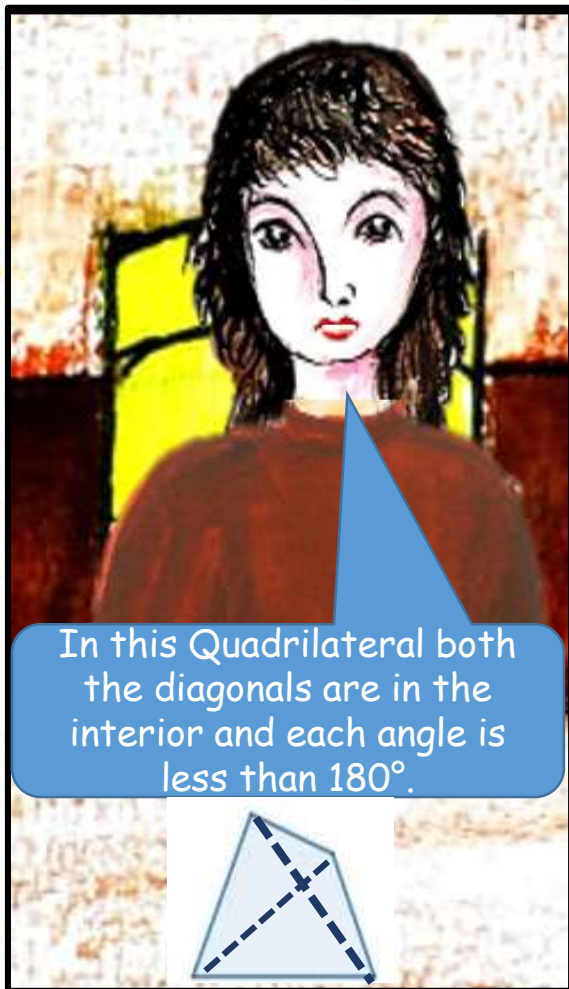


Also, you can see the diagonal AC of this Quadrilateral is at the exterior.



Oh ! It's really interesting.





In this Quadrilateral both the diagonals are in the interior and each angle is less than 180° .



What is the name of this type of a Quadrilateral?



These are called convex Quadrilaterals.



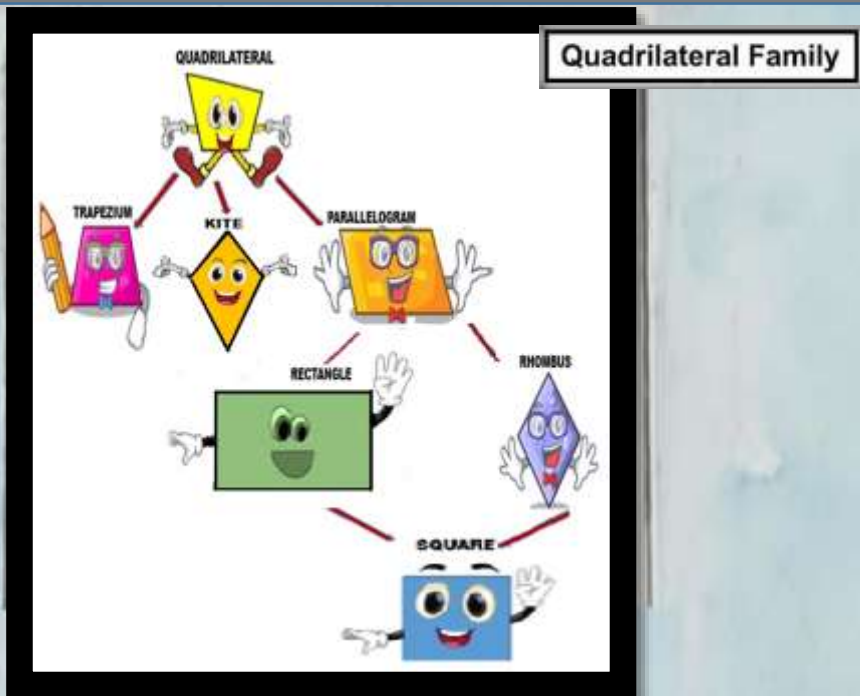
Everywhere around us are only convex Quadrilaterals.

Windows, Walls, Smart Board are all Convex.

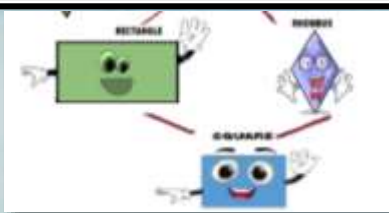


Yes, that's why in place of a Convex Quadrilateral, we can use the term Quadrilateral.

The teacher shows the modules on the Smart Board and the students watch carefully.



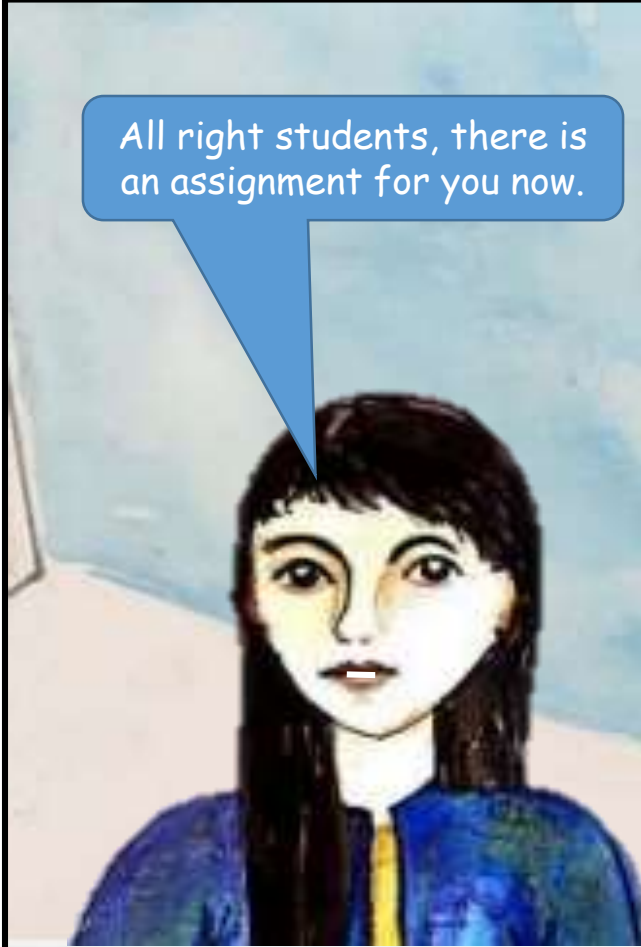
Now, let us see different kinds of Quadrilaterals.



All these shapes have four sides, so these are Quadrilaterals.

Now I understand that a Rectangle can also be called a Quadrilateral. Thank you ma'am

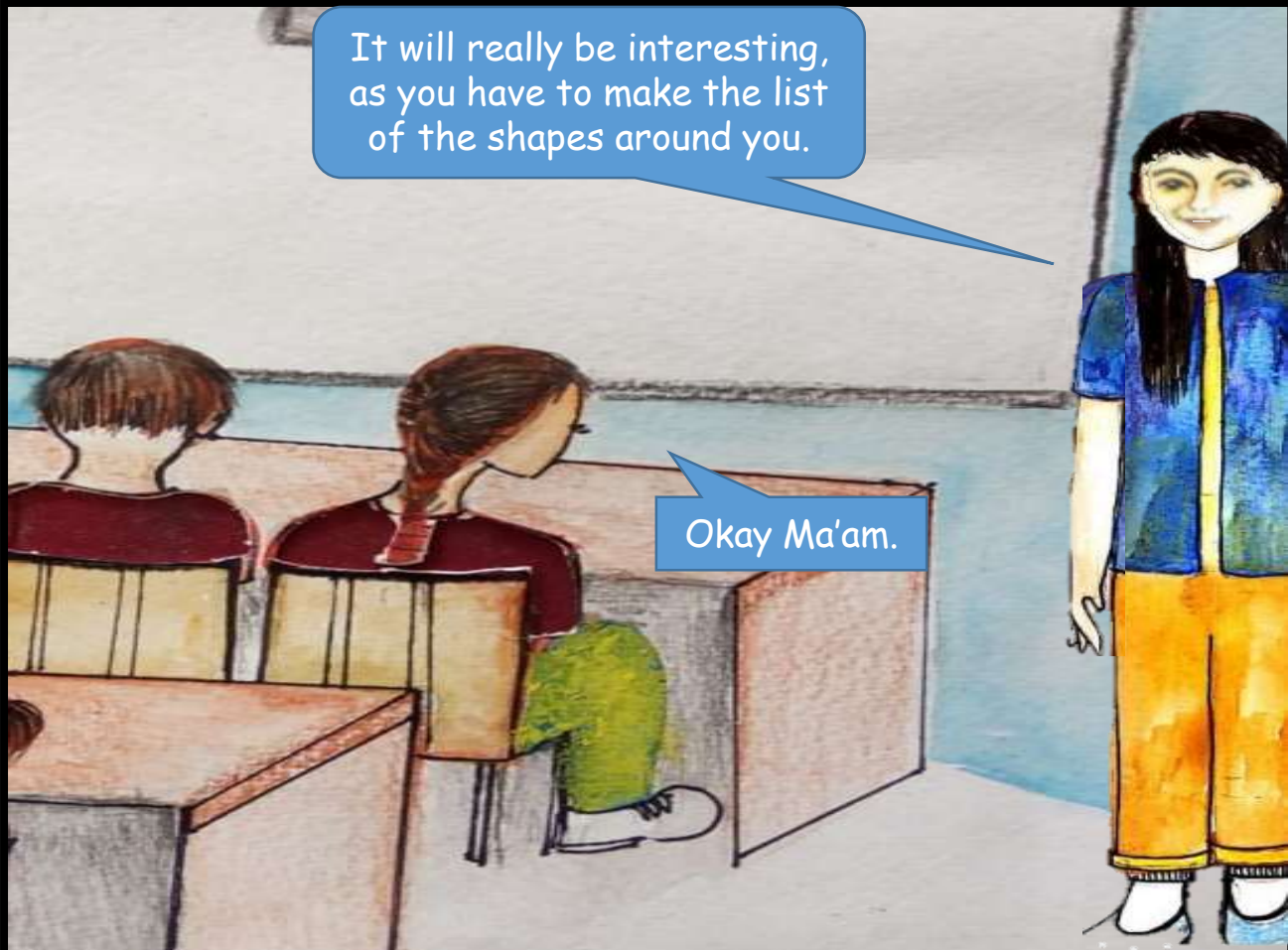




All right students, there is an assignment for you now.



Assignments, oh no...

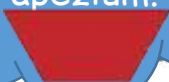


It will really be interesting, as you have to make the list of the shapes around you.

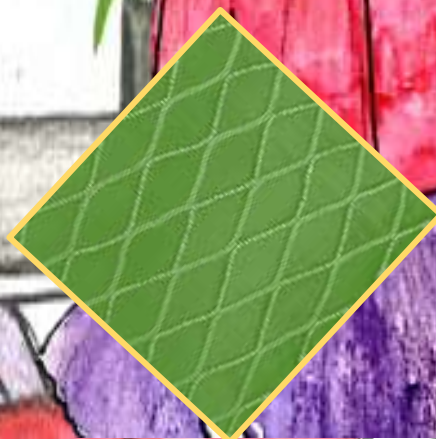
Okay Ma'am.

Same evening Amita, while observing the shapes in the drawing room...

The back of the sofa is in the shape of a Trapezium.



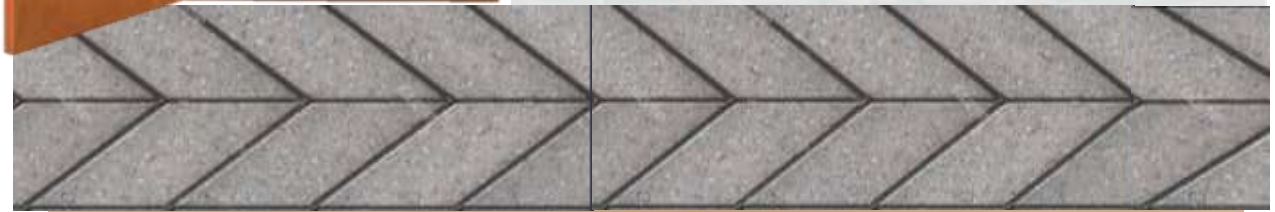
This cushion is in the shape of a Rhombus.



Same day Rohit while entering his home.



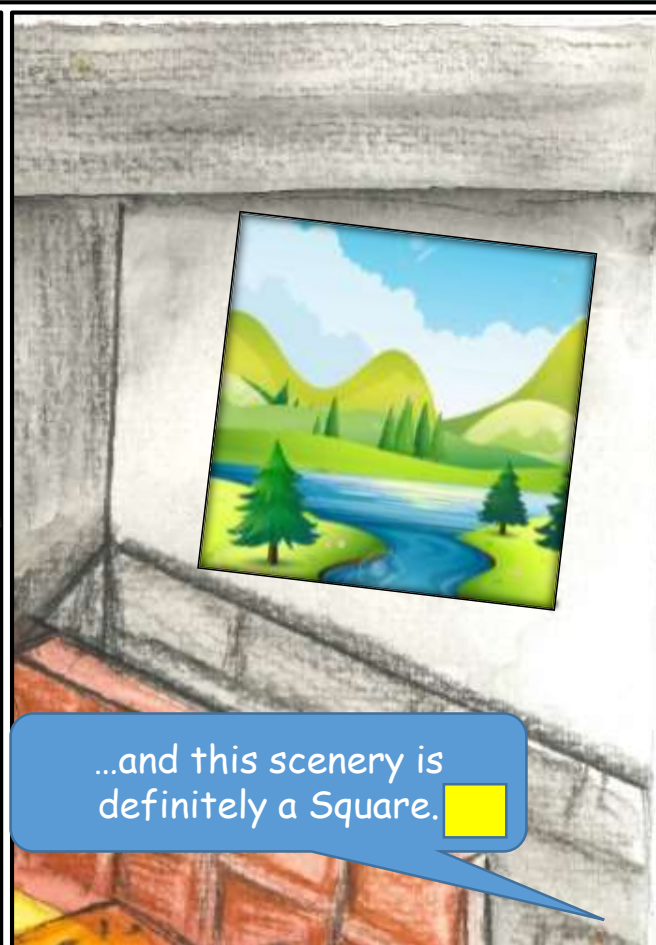
This door is in the shape of a Rectangle.



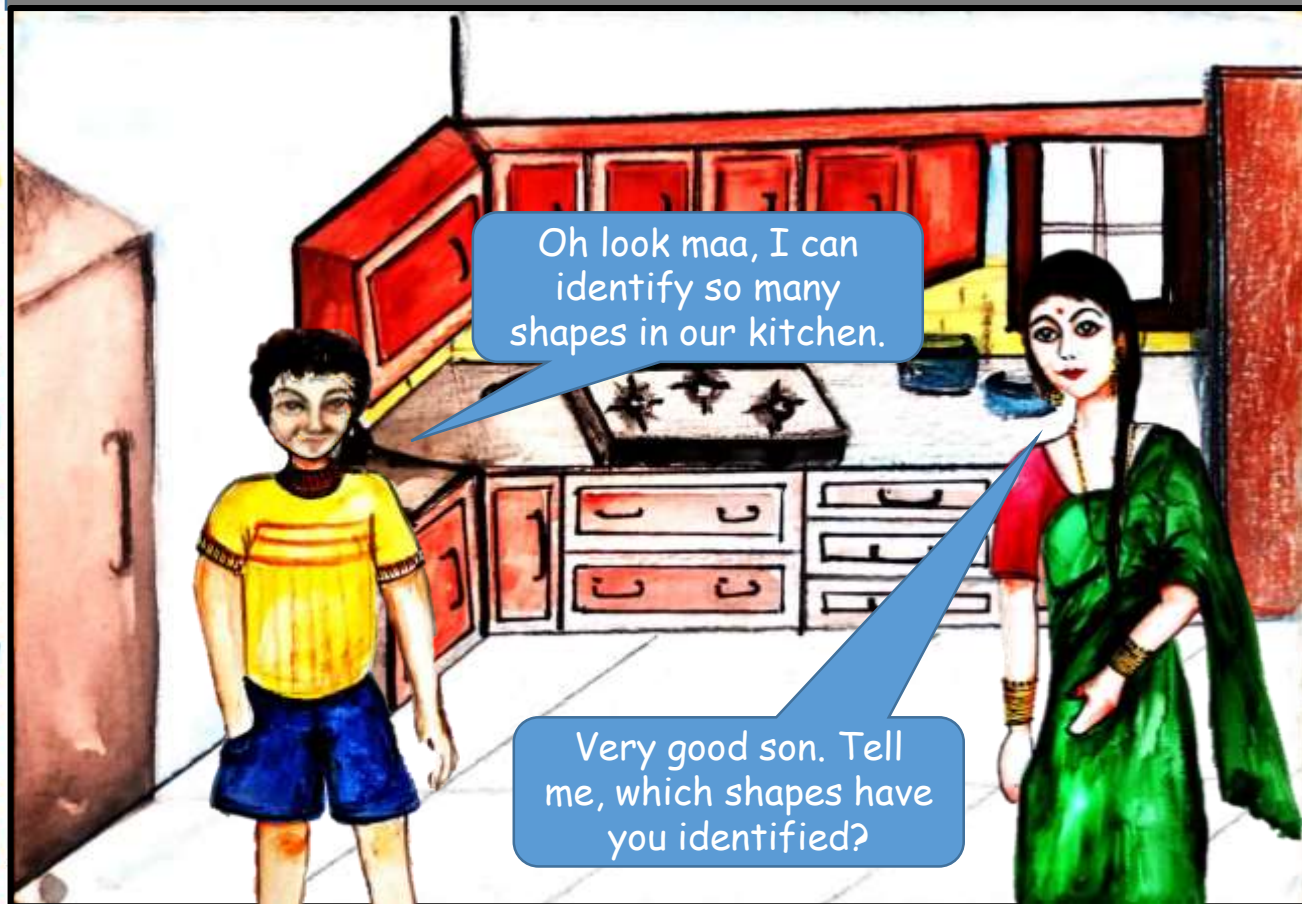
These floor tiles are in the shape of a Parallelogram.



Same day Purvi in her room.



Same day Rohan while observing the shapes in the kitchen with his mother.



World of Quadrilateral

Name the type of Quadrilateral

1)



.....

2)



.....

3)



.....

4)



.....

5)



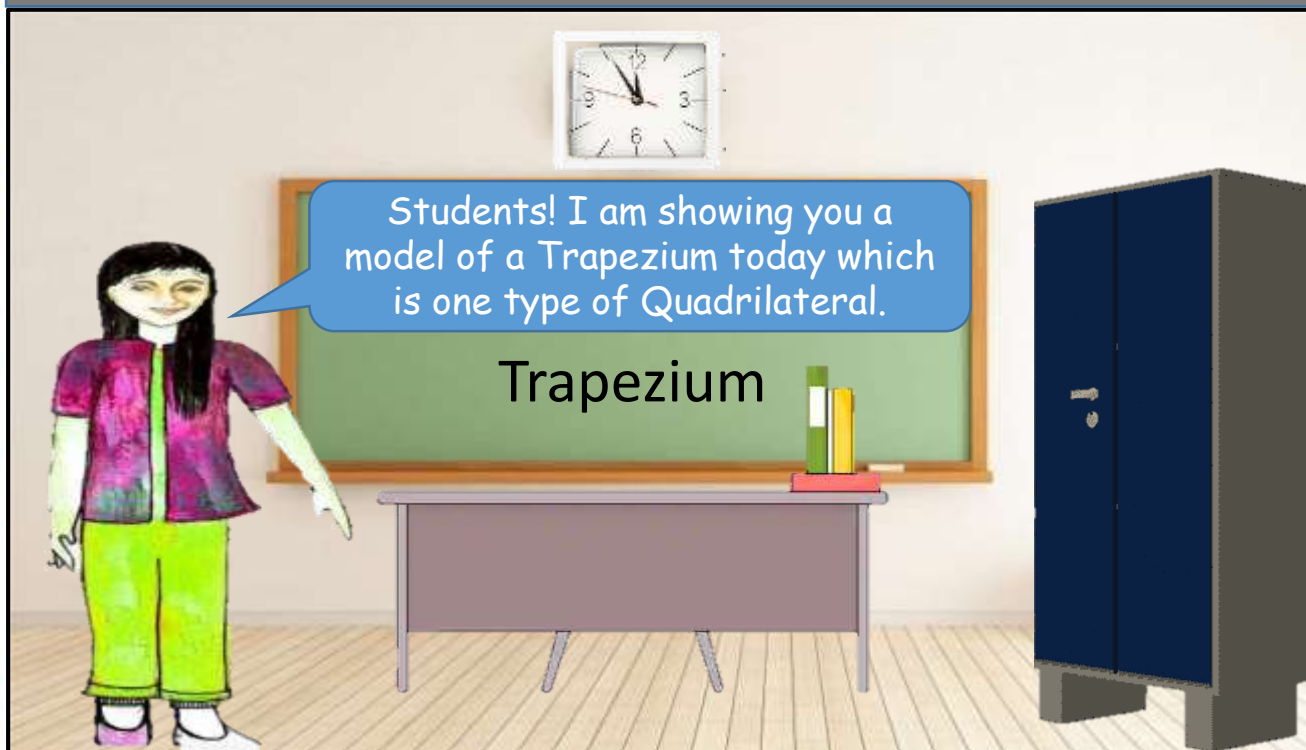
.....

6)



.....

Next day the mathematics teacher shows a Trapezium in Mathematics lab.

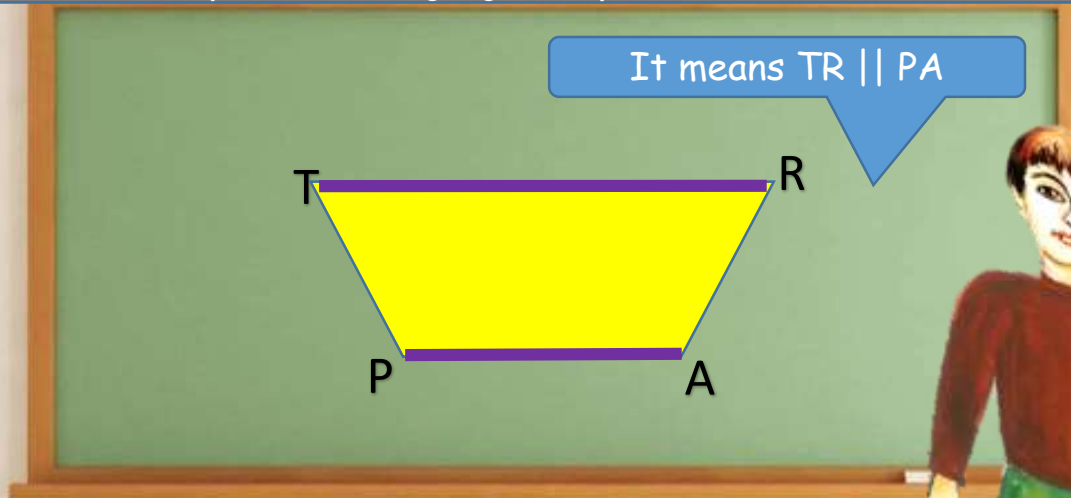




Yes, Rohit.



Rohit draws a Trapezium and highlight the parallel sides TR and PA



Parallel Lines($\parallel$) - Lines which never intersect

Perfect, I am looking for some more examples of Trapezium.

A Popcorn box looks like a Trapezium from front.
Ha.. Ha.. Ha....



Tell me, how does this stone in my ring look like from the front?





Our school Help Desk
also looks like a
Trapezium.

Yes, you are really a
good observer.

As we planned we will go
to Mathematics Park
tomorrow.

I am very
excited for it.

Wow !!!!

Deepak discussing the application of Trapezium shape with his father while watching TV.



Hey! Papa this bridge is in the shape of a Trapezium.

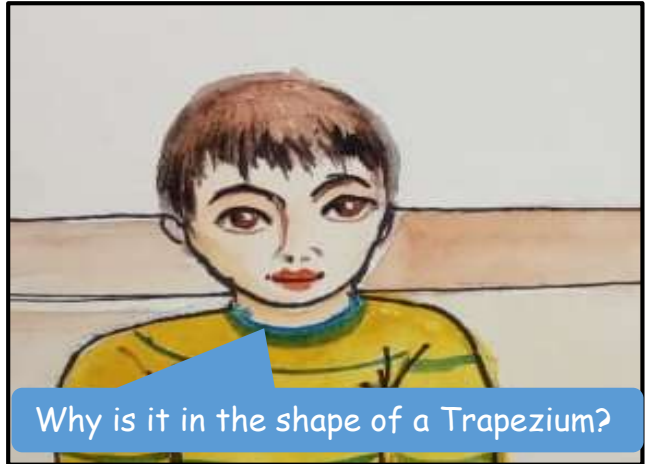


Yes, but do you know the name of this type of a bridge?

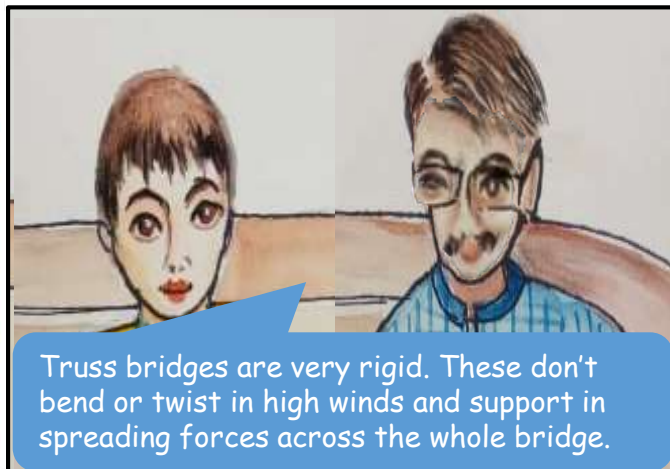
You know, this is a famous kind of a bridge design called a 'Truss Bridge'. It is in the shape of a Trapezium.



Why is it in the shape of a Trapezium?



Truss bridges are very rigid. These don't bend or twist in high winds and support in spreading forces across the whole bridge.



Oh! It's great.



Trip to Trapezium

Choose the correct option.

Q1) A trapezium is a quadrilateral with exactly one pair of _____ sides.

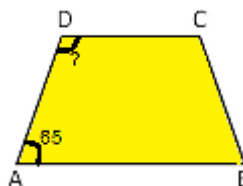
- I) Parallel
- II) Equal
- III) Perpendicular

Q2) Pair of non parallel sides of an isosceles trapezium are _____.

- I) Parallel
- II) Perpendicular
- III) Equal

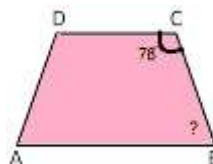
Q3) Find the missing angle D.

- I) 65
- II) 115
- III) 180
- IV) None of these



Q4) Find the missing angle B.

- I) 88
- II) 92
- III) 78
- IV) 102

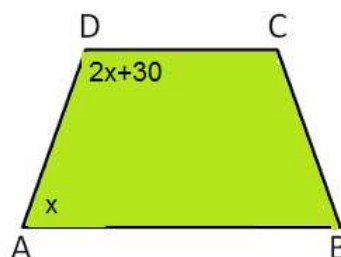


Q5) Interior angles of a trapezium add up to _____.

- I) 180
- II) 360
- III) 540
- IV) None of these.

Q6) Find the angle A of trapezium ABCD if $AB \parallel DC$

- I) 150
- II) 50
- III) 180
- IV) None of these.



Next day, while going to an Educational visit to the Mathematics Park.



Students while visiting Mathematicians gallery.

Mathematicians who showed ways to inventions

ARCHIMEDES



(288 BC - 212 BC)

The famous mathematician in Greece is known for his discovery of the relation between the surface and volume of a sphere and its circumscribing cylinder.

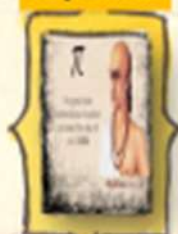
EUCLID
The Father of Geometry



(325 BC - 265 BC)

A Greek mathematician whose Elements is one of the most influential works in the history of mathematics, serving as the main textbook for teaching Geometry.

Aryabhata



(476 CE - 550 CE)

First of the major Mathematician from the classical age of Indian Mathematics and Indian Astronomy. He gave the world the digit "0" (zero).

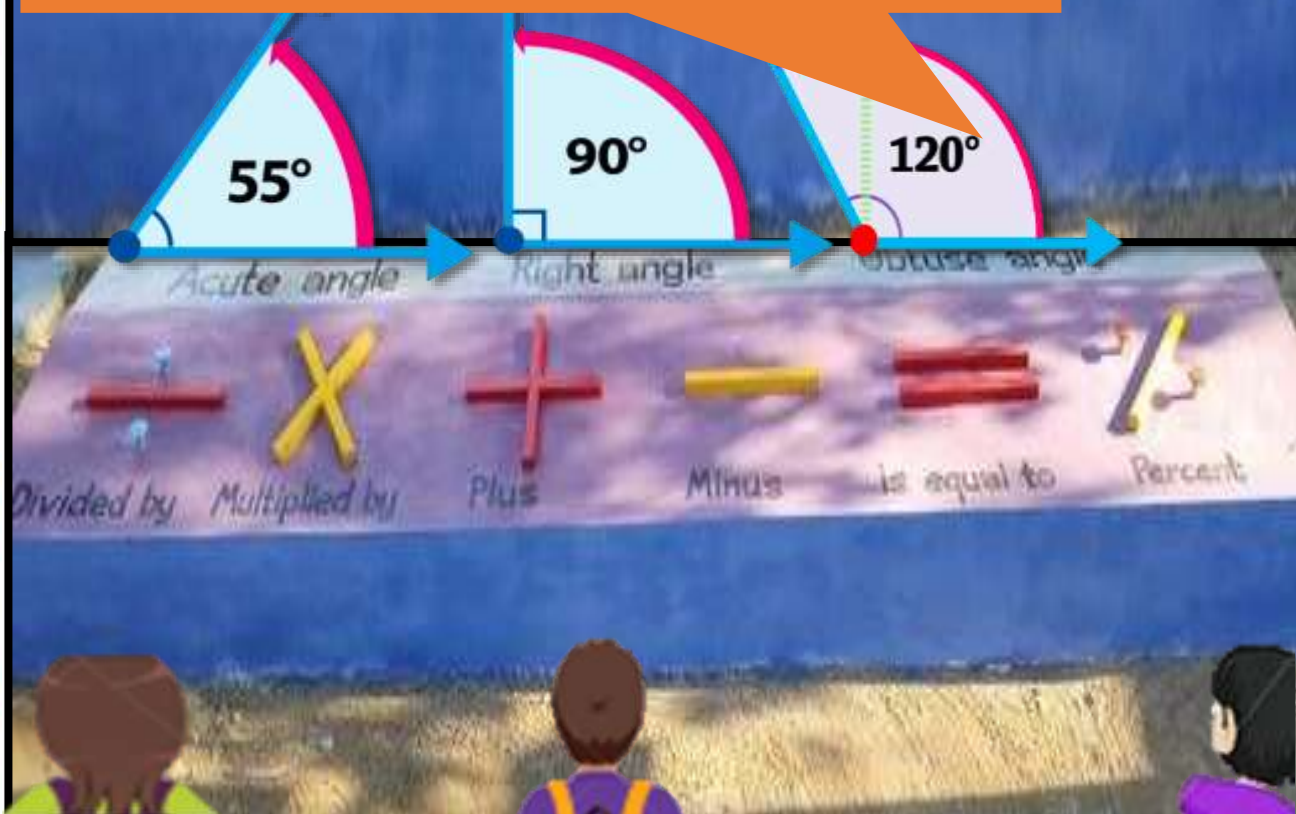
SRINIVASA RAMANUJAN



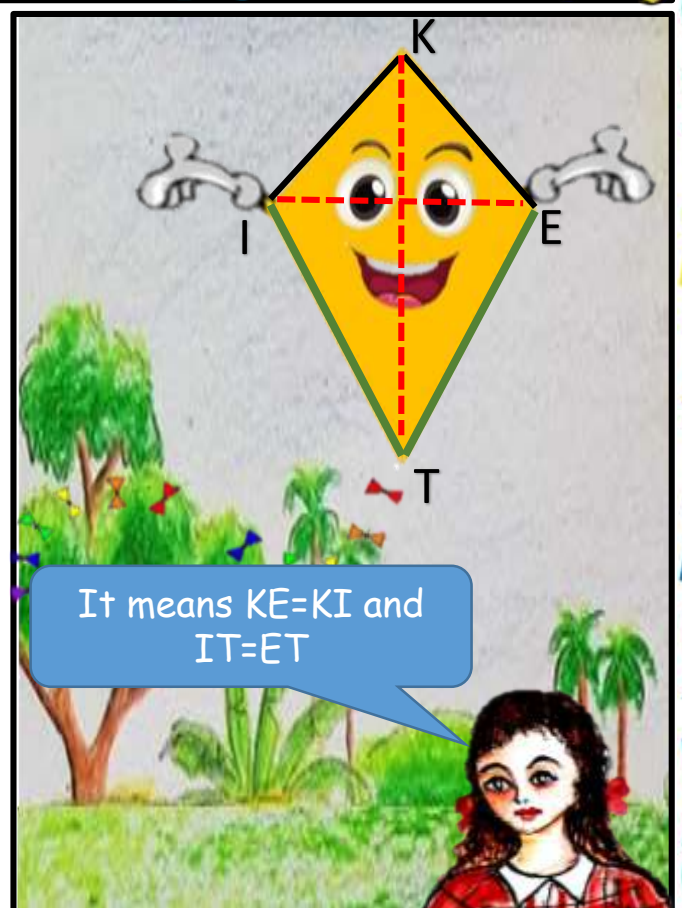
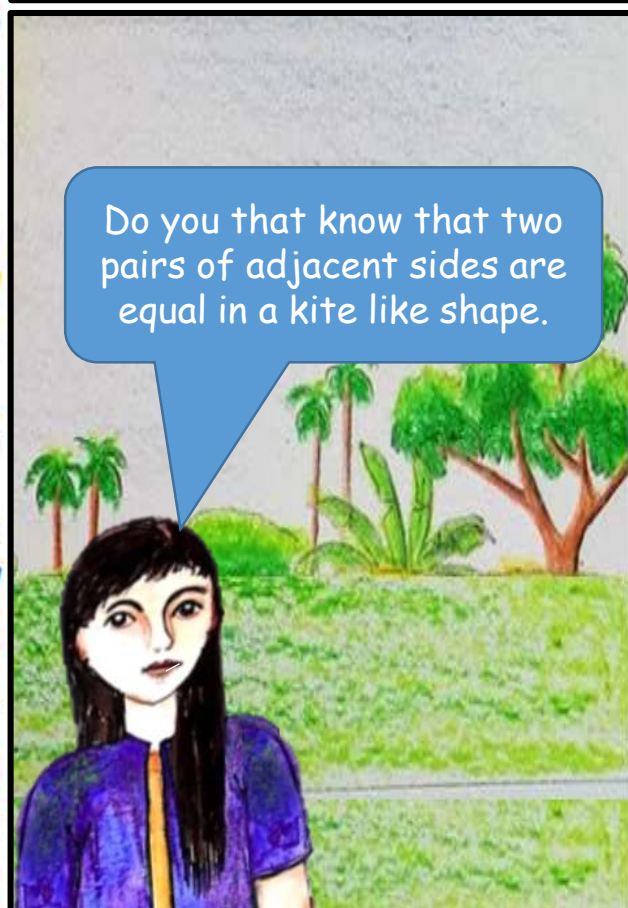
(1887 - 1920)

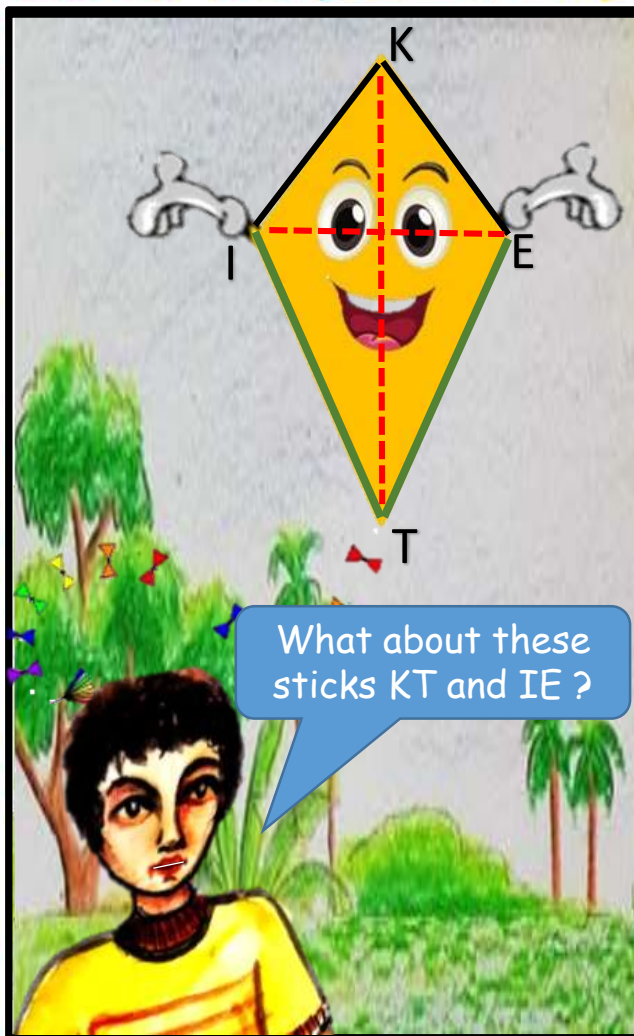
An Indian mathematician who made contributions to mathematical analysis, number theory, infinite series, and continued fractions.

Hey! Look different angles and mathematical signs

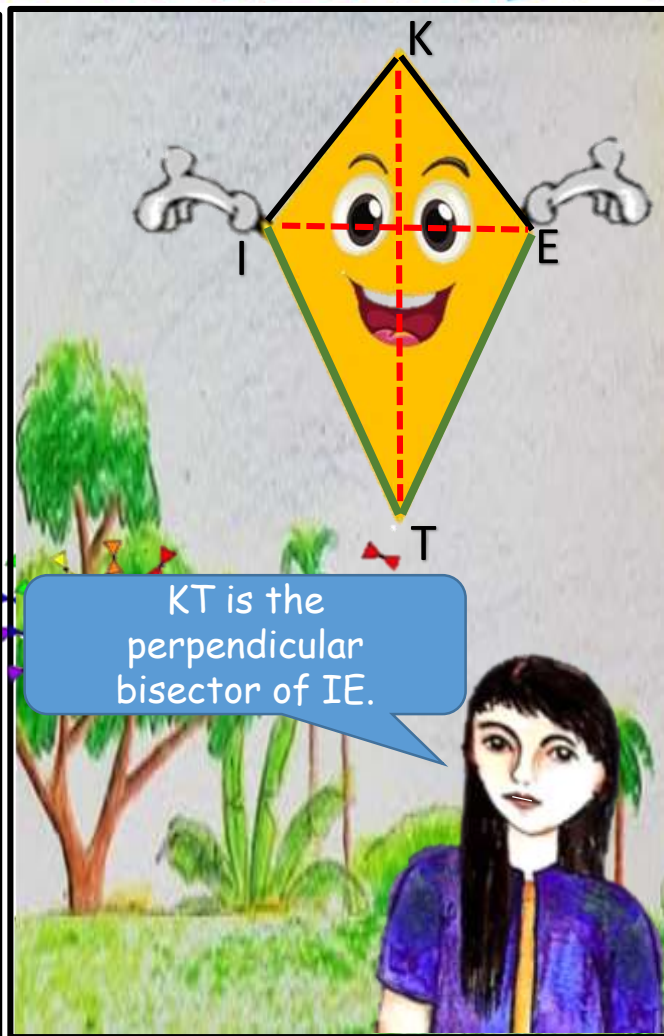


Students while visiting the Mathematics Park.





What about these sticks KT and IE ?



KT is the perpendicular bisector of IE.



Why do kites fly in the sky?

Wind resistance causes the air pressure under the kite to be greater than the air pressure above the kite, making the kite rise.



It's interesting. Let's visit some more places.

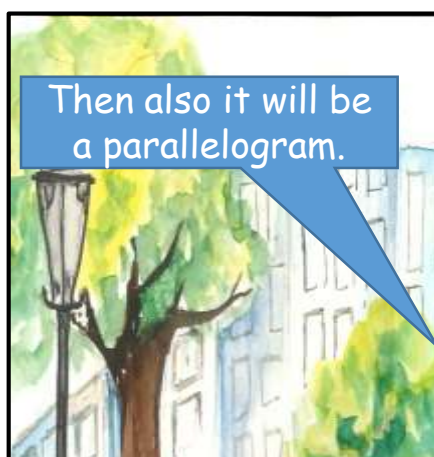
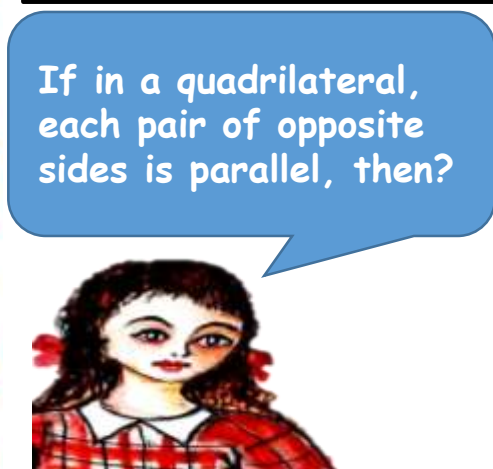
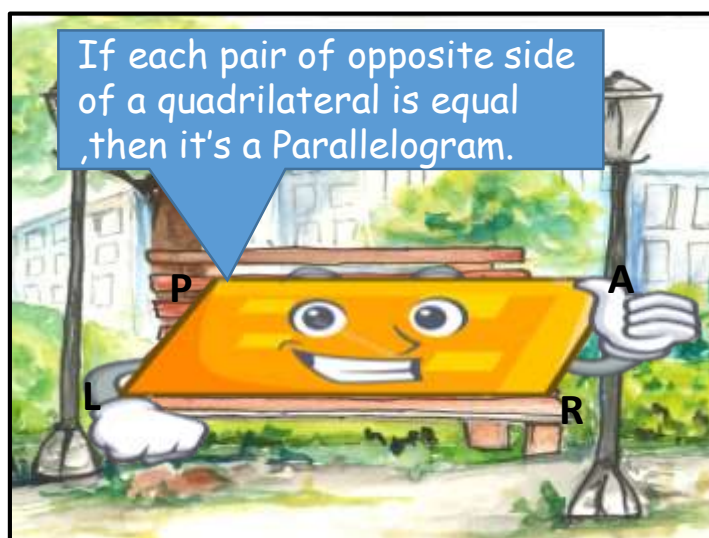
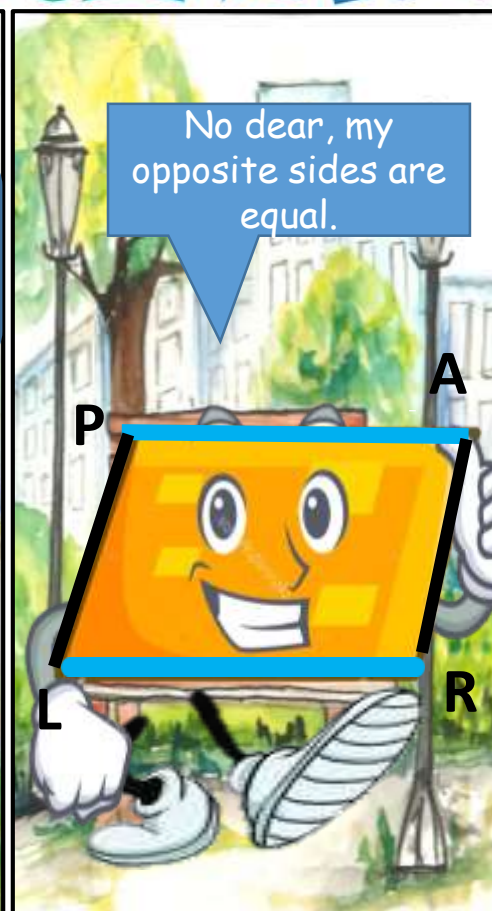
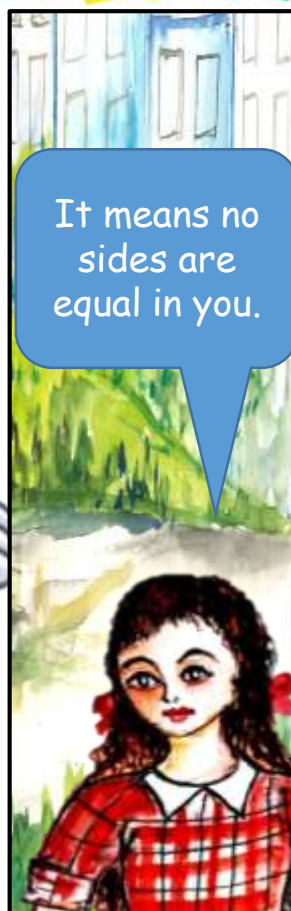
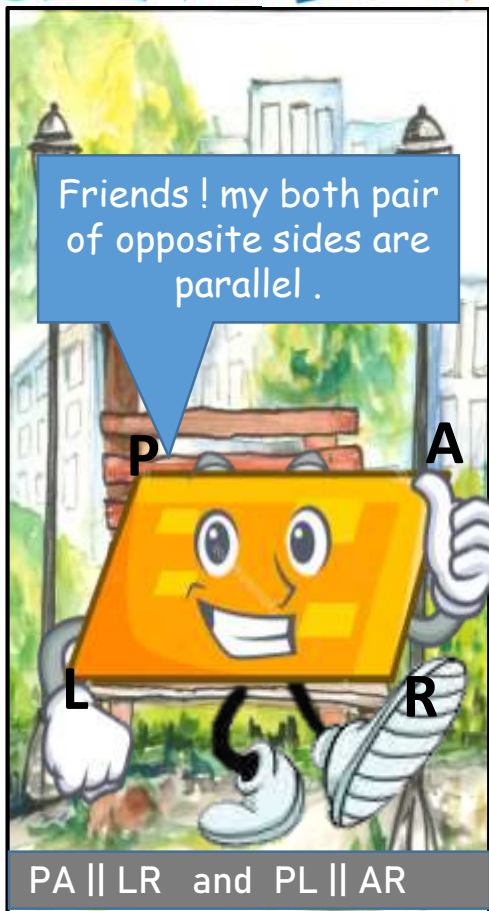
Suddenly a person disguised as a Parallelogram appeared.

Hello friends ! I am a Parallelogram and my name is PARL.



Hello, Mr. Parl.

Please tell us about yourself.



It means $\angle A = \angle L$ and $\angle P = \angle R$.

Opposite angles are also equal.

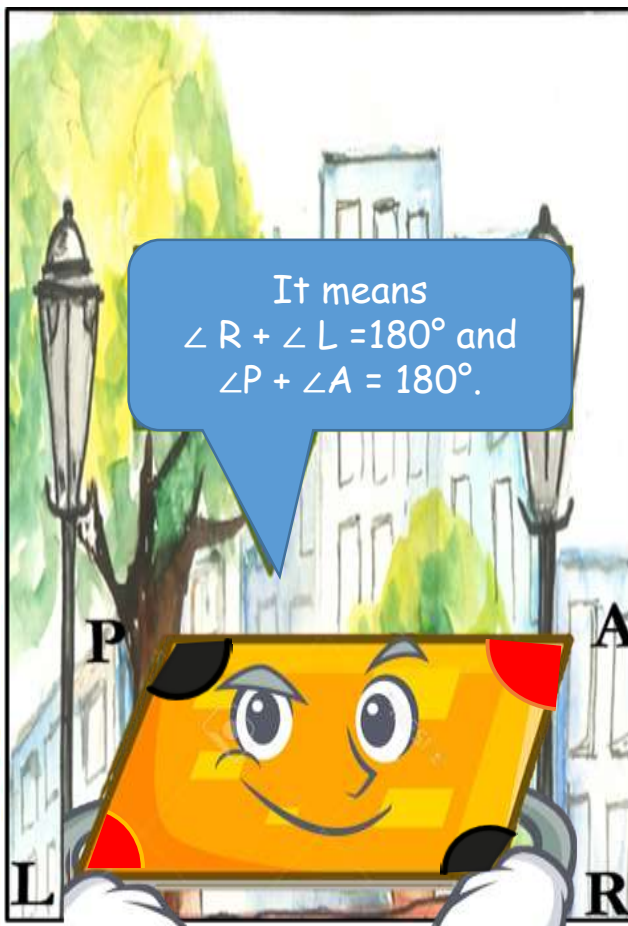
If in a quadrilateral, each pair of opposite angles is equal, then also it is a parallelogram.

Do you have some other ways also to prove any Quadrilateral to be a Parallelogram?

Yes, a quadrilateral is a parallelogram if a pair of opposite sides is equal and parallel.

Mr. Parl, what about your adjacent angles?

The sum of my adjacent angles is 180° .



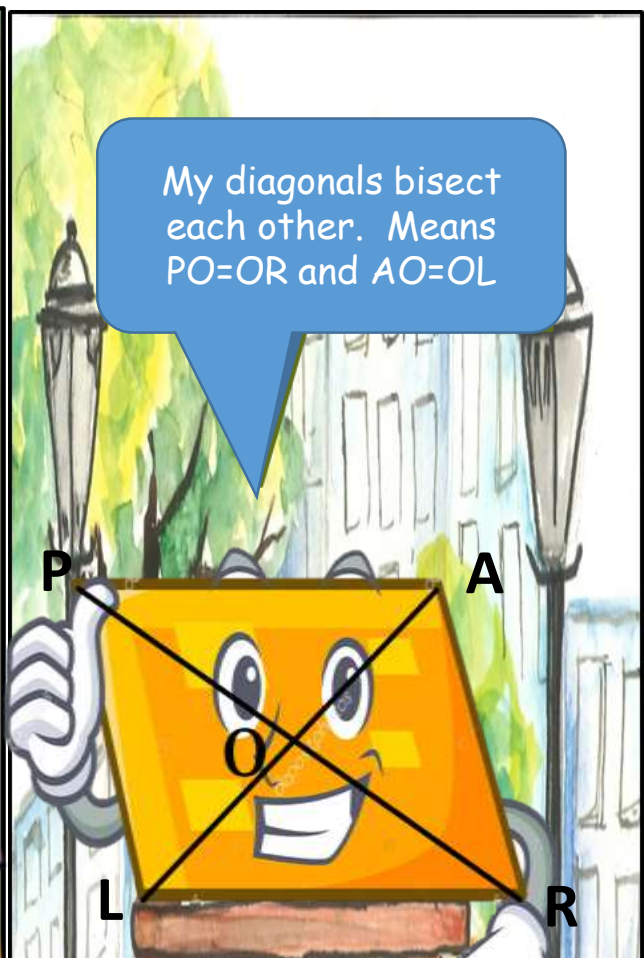
It means
 $\angle R + \angle L = 180^\circ$ and
 $\angle P + \angle A = 180^\circ$.



Wow! It's amazing.



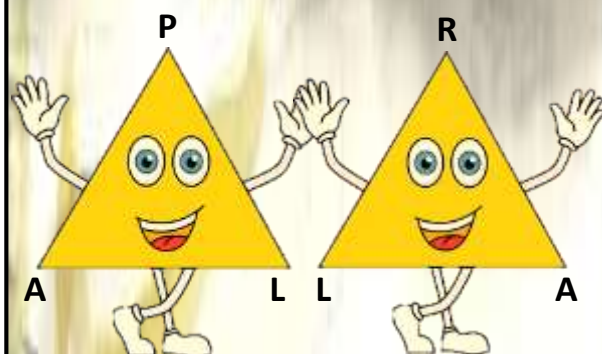
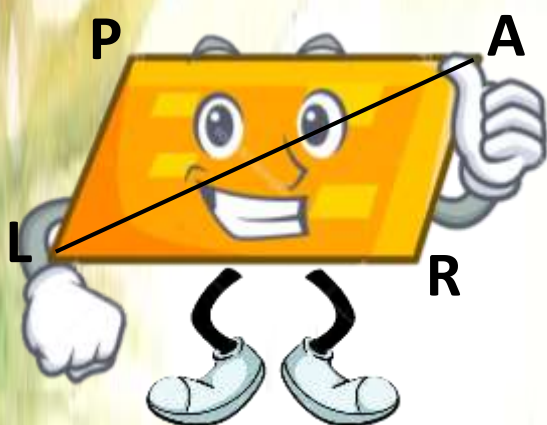
And what about your
 diagonals?



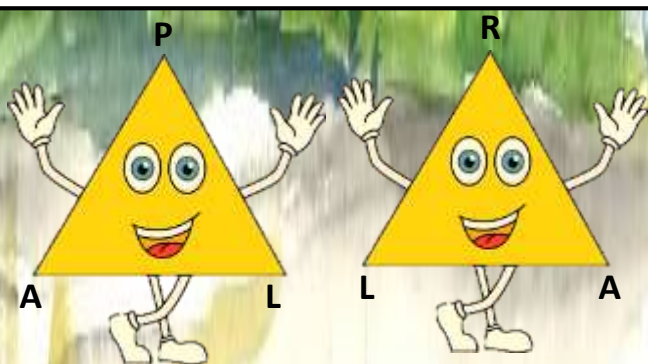
My diagonals bisect
 each other. Means
 $PO = OR$ and $AO = OL$

If diagonals of quadrilateral bisect each other, then it is a parallelogram..

What can you say about the two shapes formed by drawing one of my diagonals?

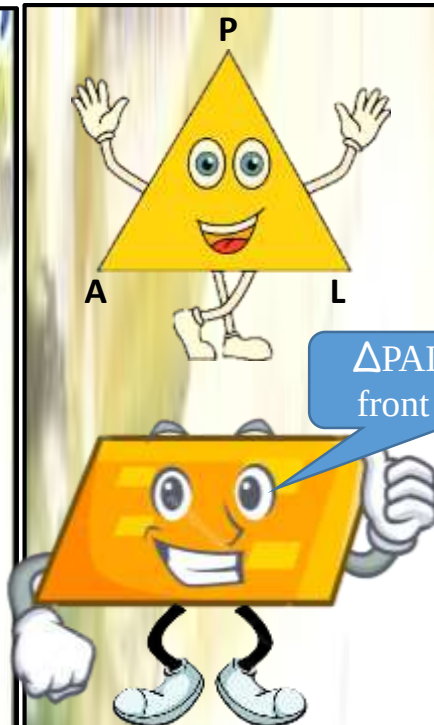


These are two triangles.
 $\triangle PAL$ and $\triangle RLA$.



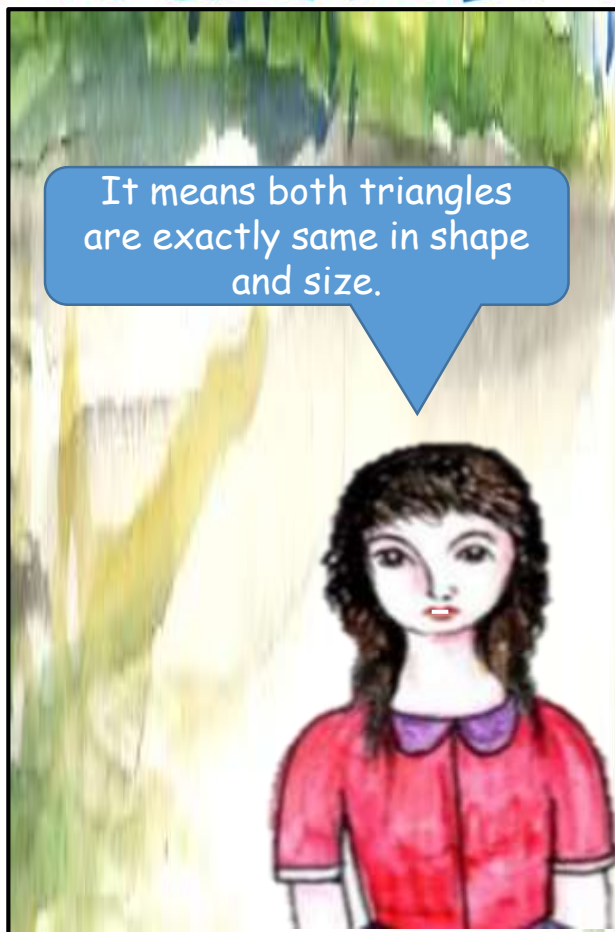
$\triangle PAL$ is greater than $\triangle RLA$

No, $\triangle RLA$ is greater than $\triangle PAL$.



$\triangle PAL$, come in front of $\triangle RLA$

Hey! $\triangle PAL$ is completely and exactly overlapping $\triangle RLA$



World of Parallelograms

Let me take you to the world of Parallelograms.



Look everything is in the shape of Parallelogram.

Yes, see these designer frames.



Hey! the top view of my eraser is also in the shape of a Parallelogram.

Thank you Mr. Parl ,
to tell us about you
and for the visit.

It's my pleasure
dear friends,
Good bye!



Hey friends, I am really
happy to meet Mr. Parl.

Yes and now we know
everything about
Parallelograms.



Let's have
lunch now.

Wonder of Parallelogram

Is the following statement true or false?

Q1) In a parallelogram, only one pair of opposite sides is parallel and equal in length.

- I) True
- II) False

Q2) In a parallelogram, diagonal divides it in to two congruent triangles.

- I) True
- II) False

Choose the correct option.

Q3) The diagonals of a parallelogram always

- I) Are congruent
- II) Are perpendicular
- III) Bisect each other
- IV) Are parallel

Q4) The opposite angles of a parallelogram are

- I) Complementary
- II) Congruent
- III) Supplementary
- IV) Perpendicular

Q5) Which is NOT a property of a parallelogram?

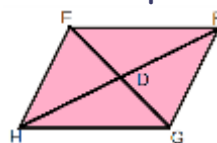
- I) Diagonals bisect each other
- II) Diagonals are congruent
- III) Both pairs of opposite sides are parallel
- IV) Both pairs of opposite angles are congruent

Q6) Consecutive/Adjacent angles of a parallelogram are

- I) Congruent
- II) Complementary
- III) Supplementary
- IV) Acute

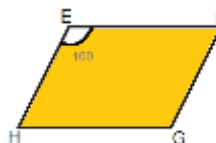
Q7) Which statement below can be used to prove that EFGH is a parallelogram?

- I) EG and FH bisect each other
- II) EG and HF are congruent
- III) EF and FG are congruent
- IV) EG and DF are congruent



Q8) Given $m\angle E = 100^\circ$. What must be $m\angle G$ to prove EFGH is a parallelogram?

- I) 20
- II) 80
- III) 90
- IV) 100

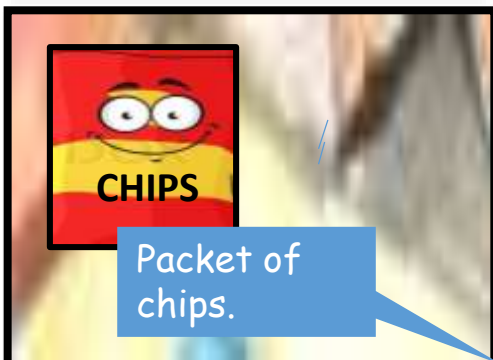




Hey! you all look around yourself and find Rectangular shapes.



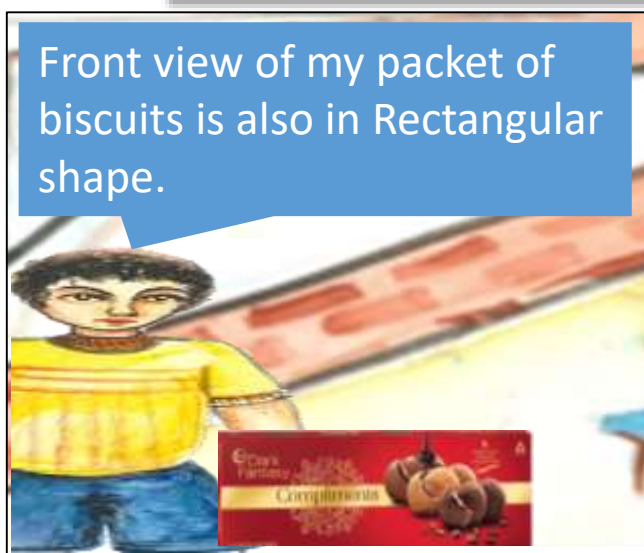
Table top ,



Packet of chips.



Front of Refrigerator.



Front view of my packet of biscuits is also in Rectangular shape.

Yes, very good all these objects are Rectangular in shape.



But ,these look like a Parallelogram.

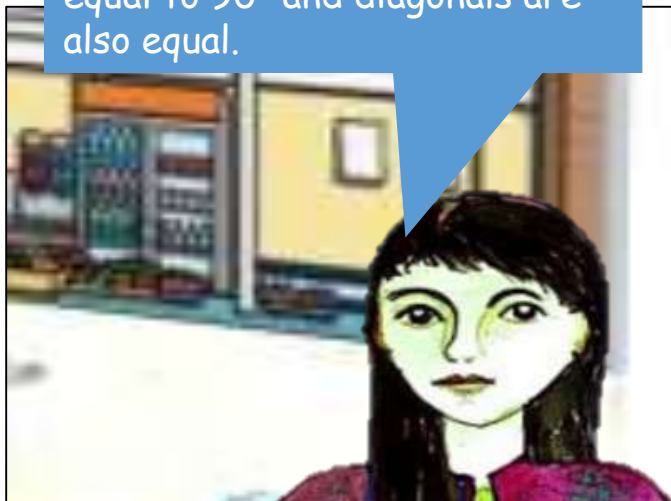


Yes, It's similar to Parallelogram as both shapes have equal and parallel opposite sides.

Then, what is the difference between a Rectangle and a Parallelogram?



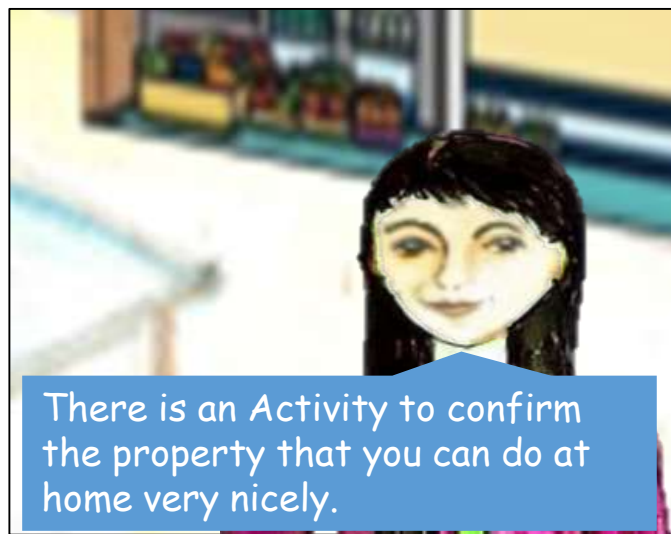
In Rectangle, all angles are equal to 90° and diagonals are also equal.



Oh ! It is really interesting.



There is an Activity to confirm the property that you can do at home very nicely.



Activity?

Measure the length of diagonals of any rectangular shape without using measuring device. We will discuss the observation in the Mathematics class.

Sure ma'am, we are excited to do it.

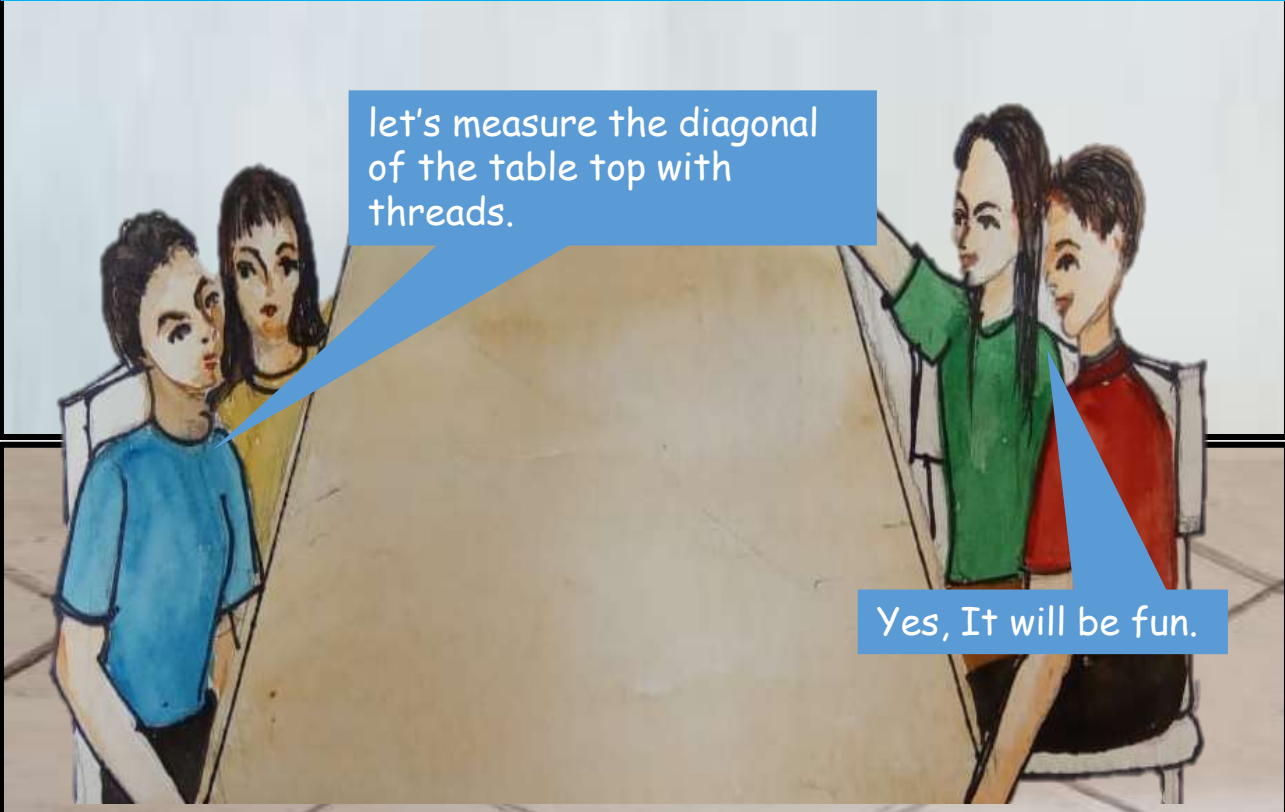
Discussion continues among the students.

I saw different angles and shapes in park.

There are Mathematical games also.

Hey students, I know that you have so many things to discuss, but first of all finish your lunch.

Four friends measuring length of diagonals of rectangular table top at Amita's home.



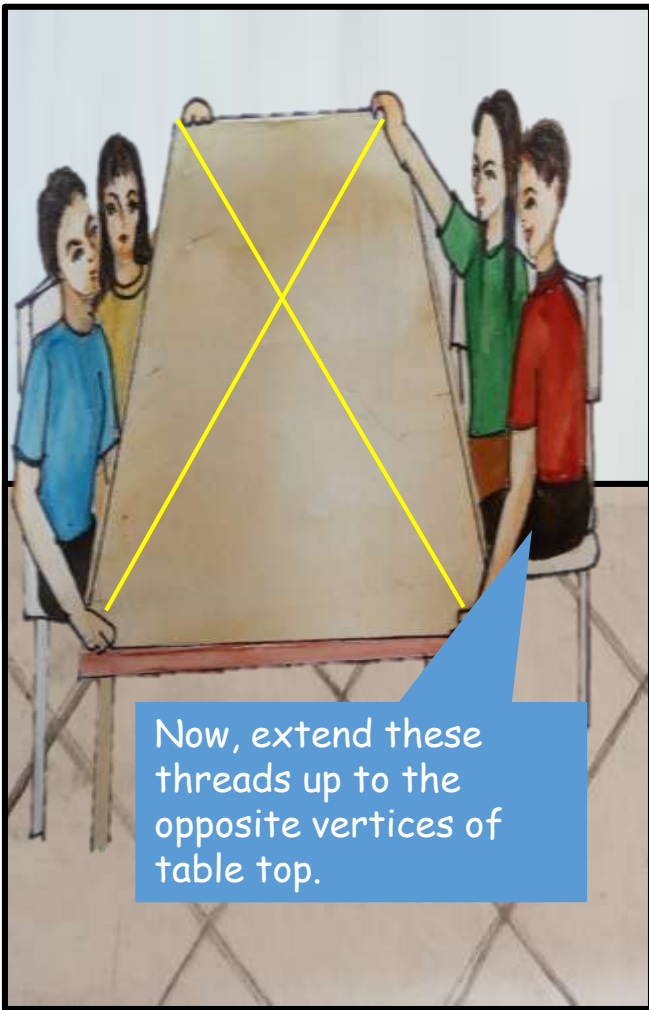
let's measure the diagonal of the table top with threads.



Yes, It will be fun.

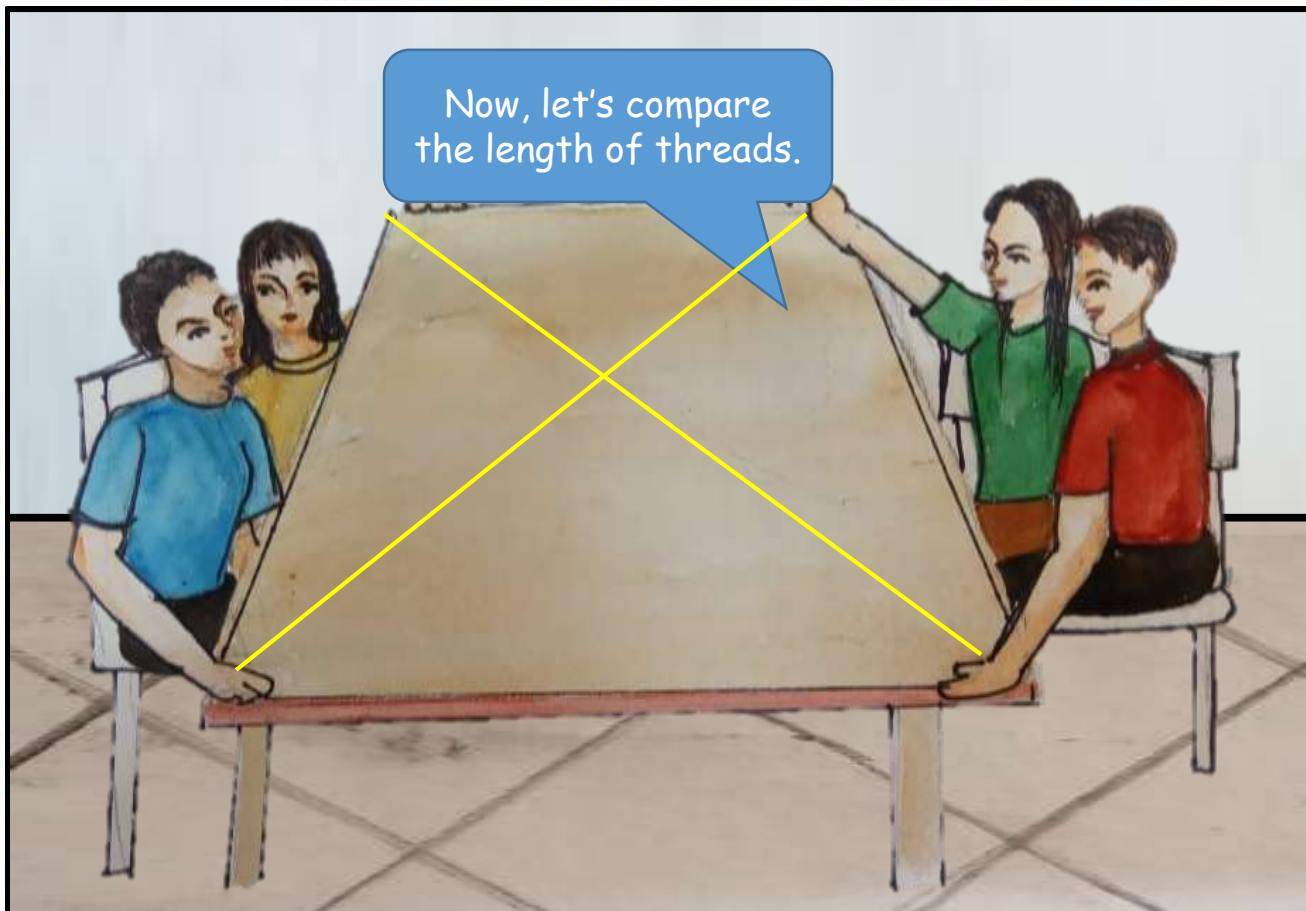


Amita, please bring two threads.

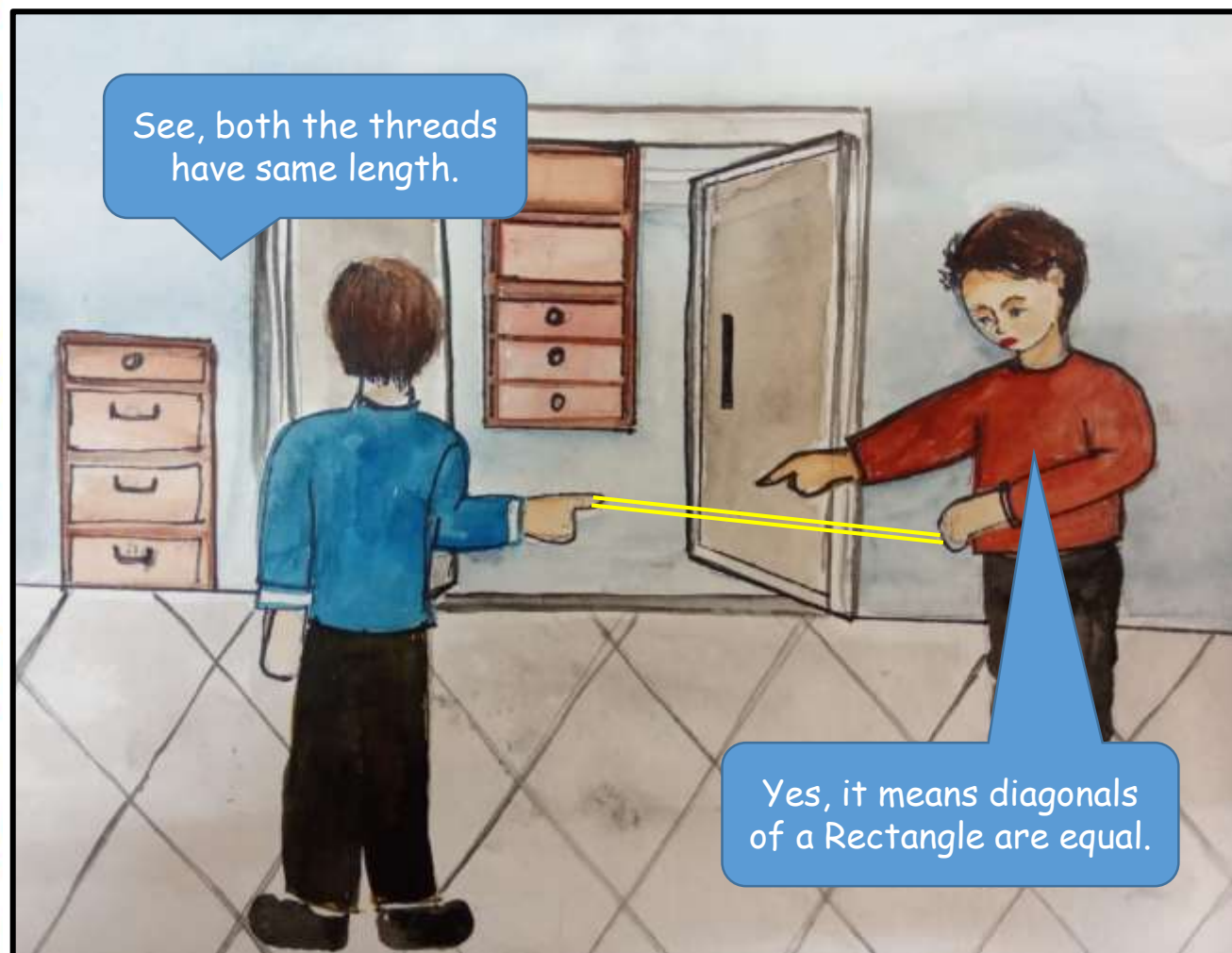


Now, extend these threads up to the opposite vertices of table top.

Now, let's compare the length of threads.



See, both the threads have same length.





Rectangle Everywhere

Is the following statement true or false?

Q1) In a rectangle, opposite sides are parallel.

- I) True
- II) False

Q2) In a rectangle, opposite angles are equal.

- I) True
- II) False

Q3) All parallelograms are rectangles.

- I) True
- II) False

Q4) All rectangles are parallelograms.

- I) True
- II) False

Choose the correct options.

Q5) The properties of a rectangle

- A. It has two pairs of parallel sides.
- B. It has only one pair of sides equal in length.
- C. It is a parallelogram of four right angles.
- D. It has only one pair of right angles.

- I) A and C
- II) A and D
- III) B and C
- IV) B and D
- V) A and B

Q6) A rectangle is a parallelogram with

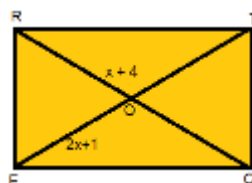
- I) four congruent sides
- II) four congruent diagonals
- III) four acute angles
- IV) four congruent angles

Q7) Which of the following is **NOT** always true about a rectangle?

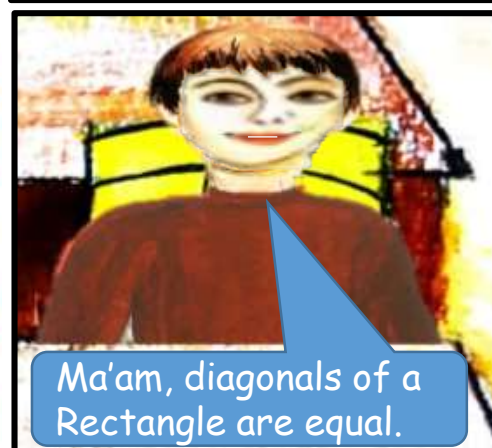
- I) All sides are equal.
- II) The diagonals are equal.
- III) Any two opposite sides are equal.
- IV) All angles are right angles.

Q8) In rectangle RECT, if $RC = x + 4$ and $TE = 2x + 1$.find x .

- I) 0
- II) 1
- III) 2
- IV) 3



Next Day in Mathematics class, the teacher and the students discussing the results of the activity.



Teacher : (pointing on rhombus shape wall clock)



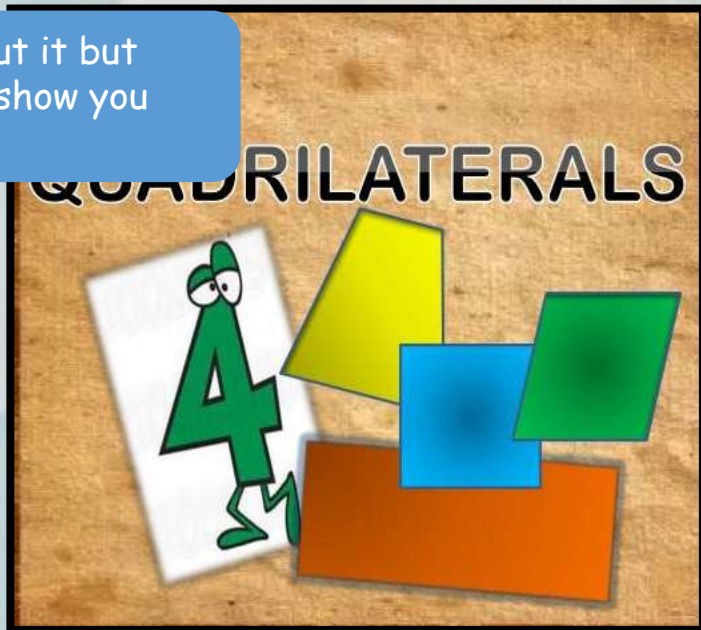
Can you tell the shape of a clock.



May be, it's a Rhombus or a Square.

(The teacher starts a video on the Smart Board)

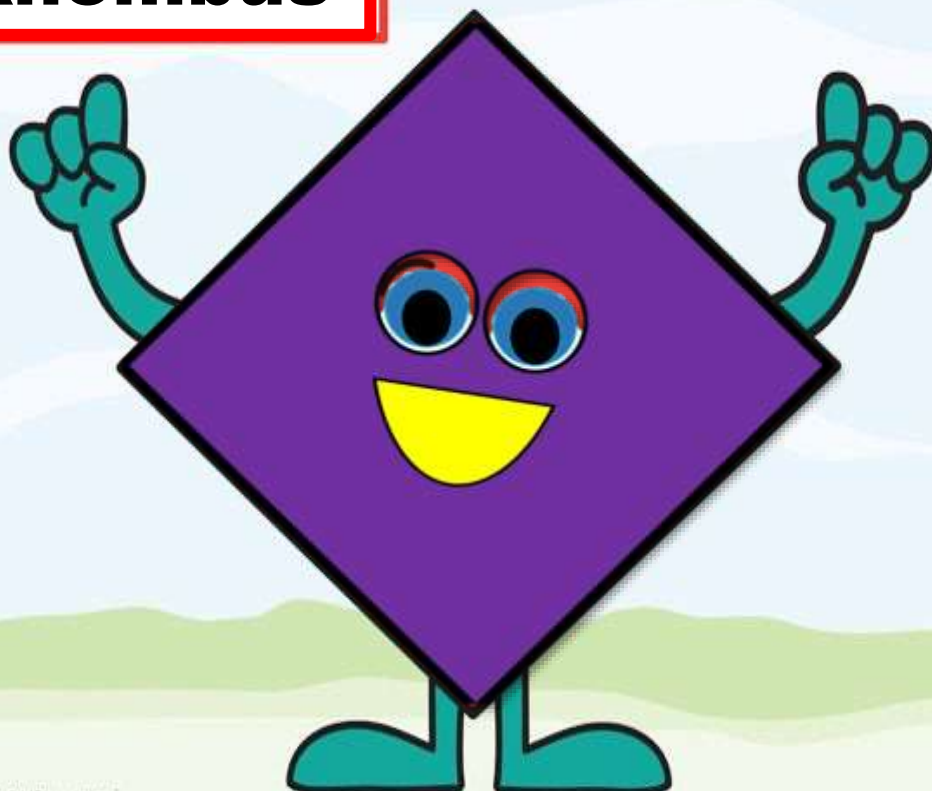
We will discuss about it but before that let me show you this module.



Ok, ma'am!

(Animation on the Smart Board: A Rhombus appeared in front of everyone.)

Rhombus



Hello friends!

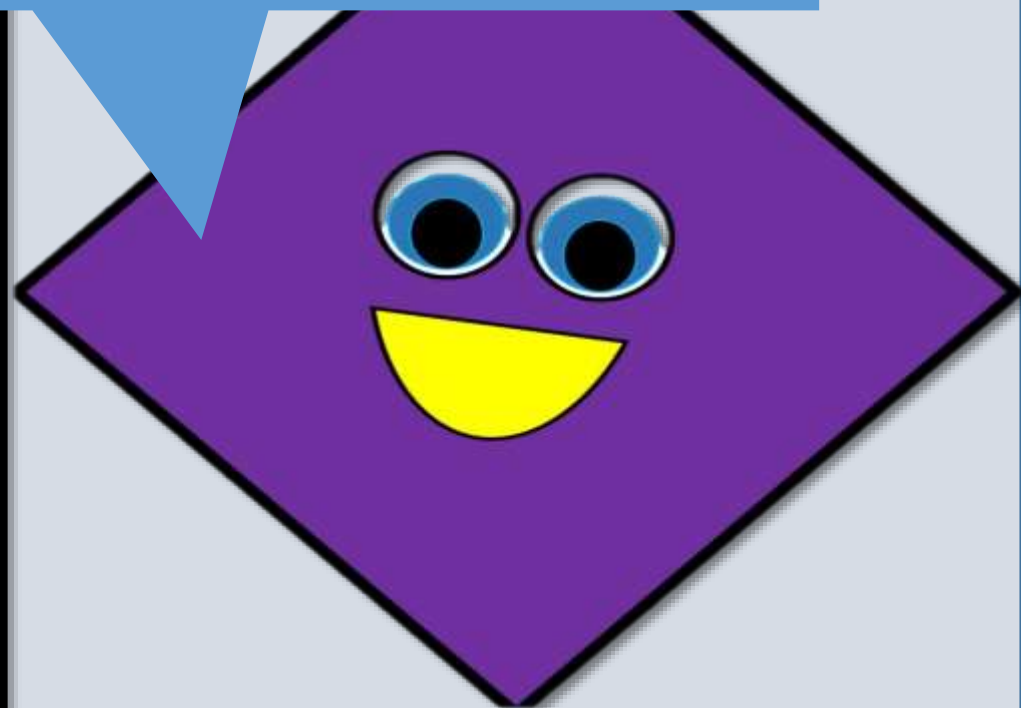
I am Rhombus

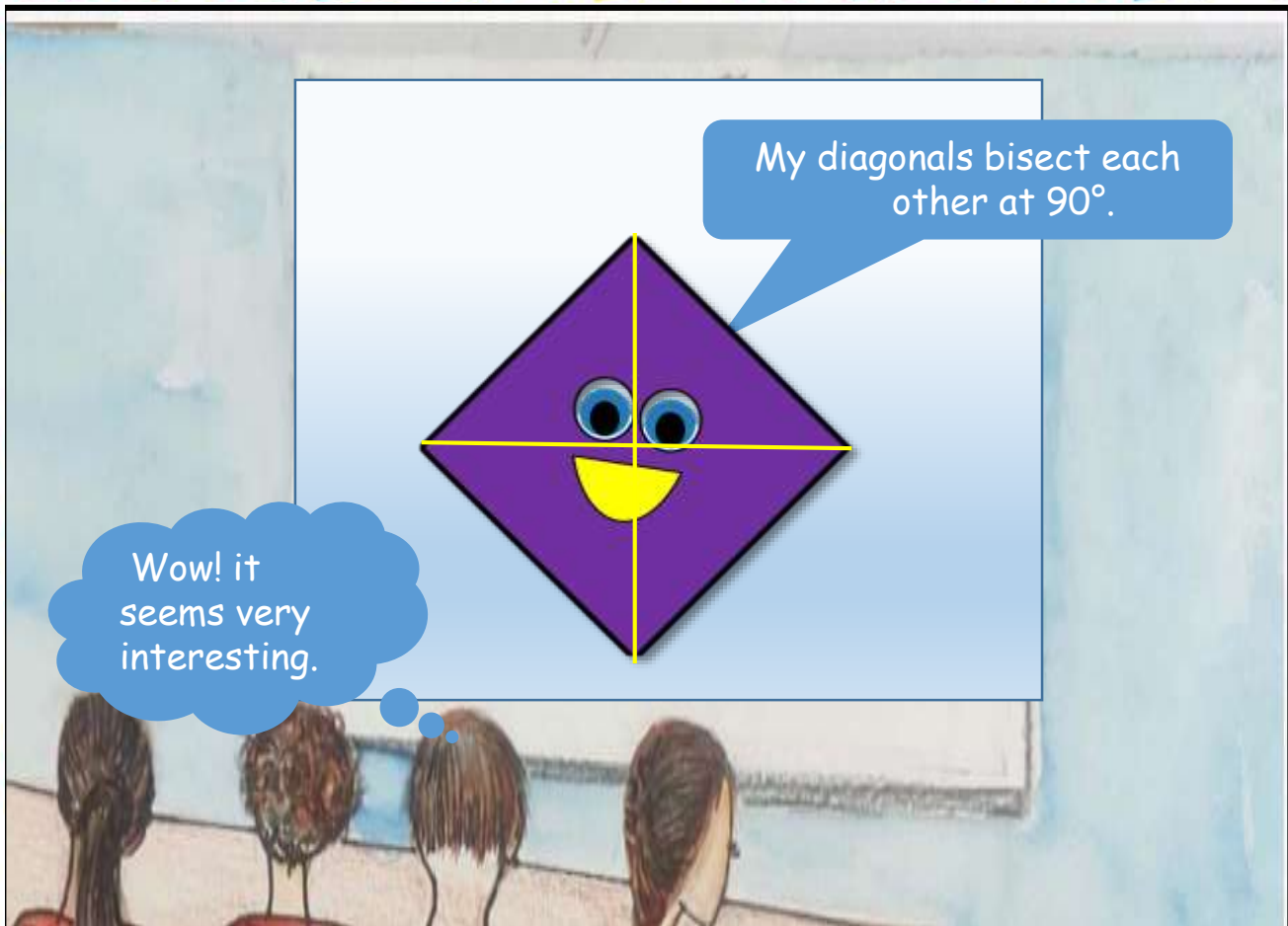
Hey! But it looks like a Parallelogram.



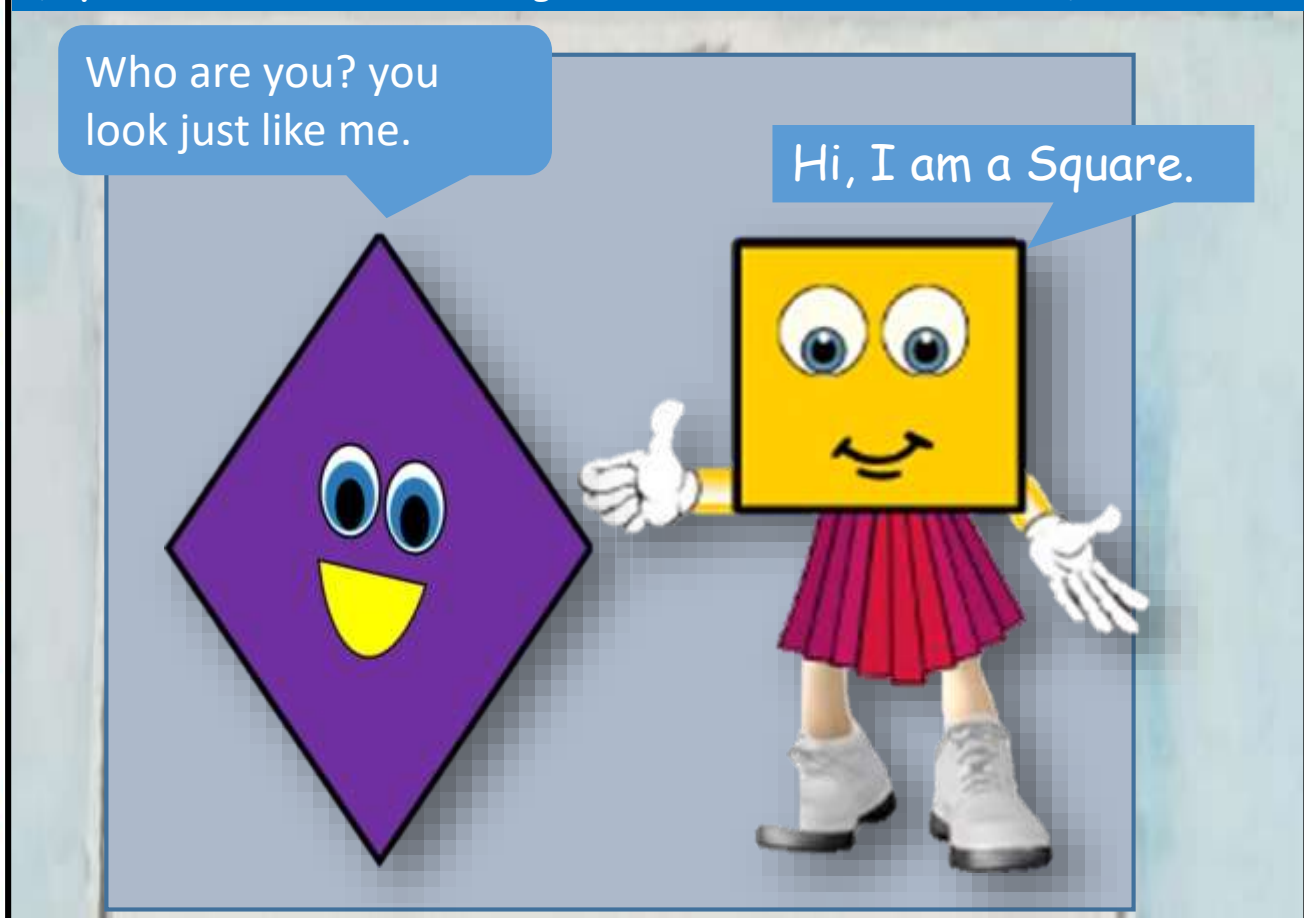
The teacher (Continues animation)

I have all the Properties of a Parallelogram along with some more properties of my own, as my all sides are equal.





(Square and Rhombus talking on the Smart Board screen)



Fun with Rhombus

Are the following statements true or false?

Q1) In a rhombus, all sides are equal in length.

- I) True
- II) False

Q2) A rhombus has only one pair of parallel sides.

- I) False
- II) True

Q3) Are the both pairs of opposite sides of a rhombus parallel?

- I) Yes
- II) No

Q4) Are the two diagonals of a rhombus perpendicular?

- I) No
- II) Yes

Q5) Do the two diagonals of a parallelogram and a rhombus bisect each other?

- I) No
- II) Yes

Q6) Are the angles in a rhombus right angles?

- I) No
- II) Yes

Choose the correct options.

Q7) Choose from the following statements the properties of a rhombus.

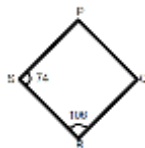
- A. It has four right angles.
- B. It has two pairs of angles equal in measure.
- C. It has only one pair of parallel sides.
- D. It is a parallelogram of four sides of equal length.
- E. It is a parallelogram of four equal angles.
- I. D and E
- II. B and C
- III. B and D
- IV. B and E
- V. A and B

Q8) If $ABCD$ is a rhombus, which line is the perpendicular bisector of BD ?

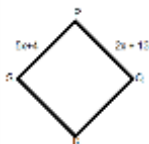
- I) CD
- II) AD
- III) AC
- IV) AB

Q9) Determine the measures of $\angle P$ and $\angle Q$ in the rhombus $OPQR$.

- I) $\angle P = 106^\circ, \angle Q = 74^\circ$
- II) $\angle P = 37^\circ, \angle Q = 53^\circ$
- III) $\angle P = 53^\circ, \angle Q = 37^\circ$
- IV) $\angle P = 74^\circ, \angle Q = 106^\circ$

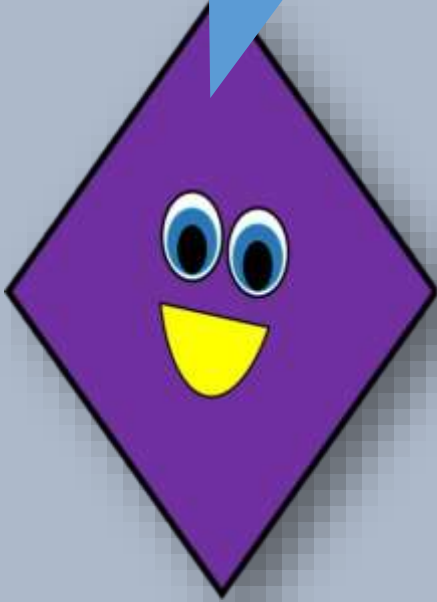


Q10) Find all the sides of rhombus PQRS from given figure.

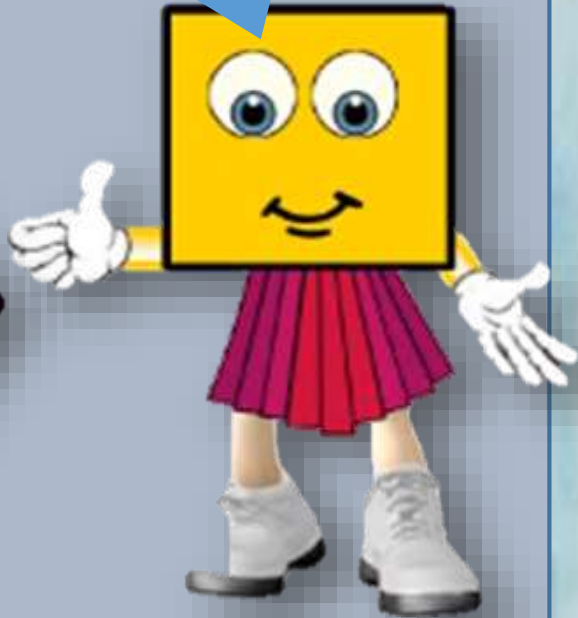


(Square and Rhombus continue talking)

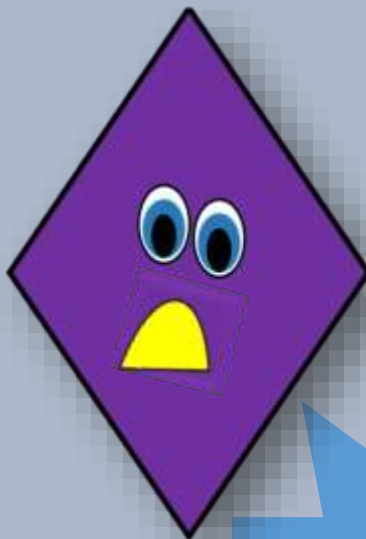
Do you also have equal sides, like me ?



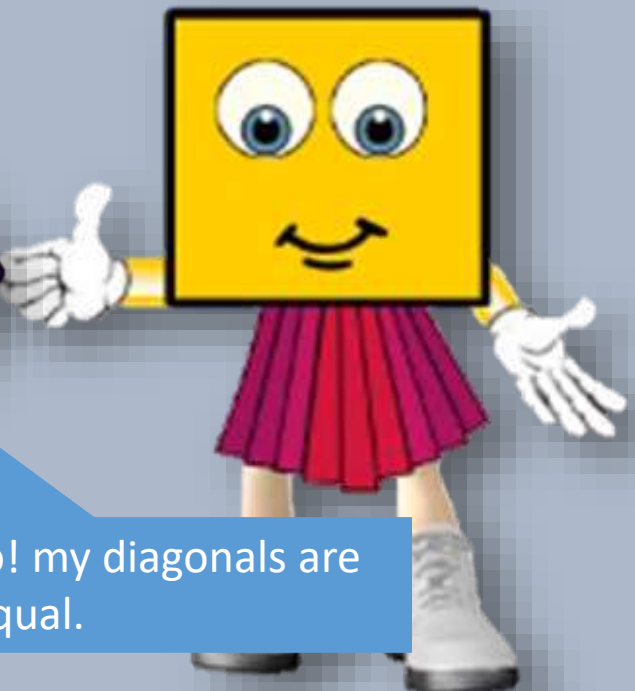
Yes. I have equal sides and also each angle of 90° .



My diagonals are equal and bisect each other at 90° .



Oh no! my diagonals are not equal.



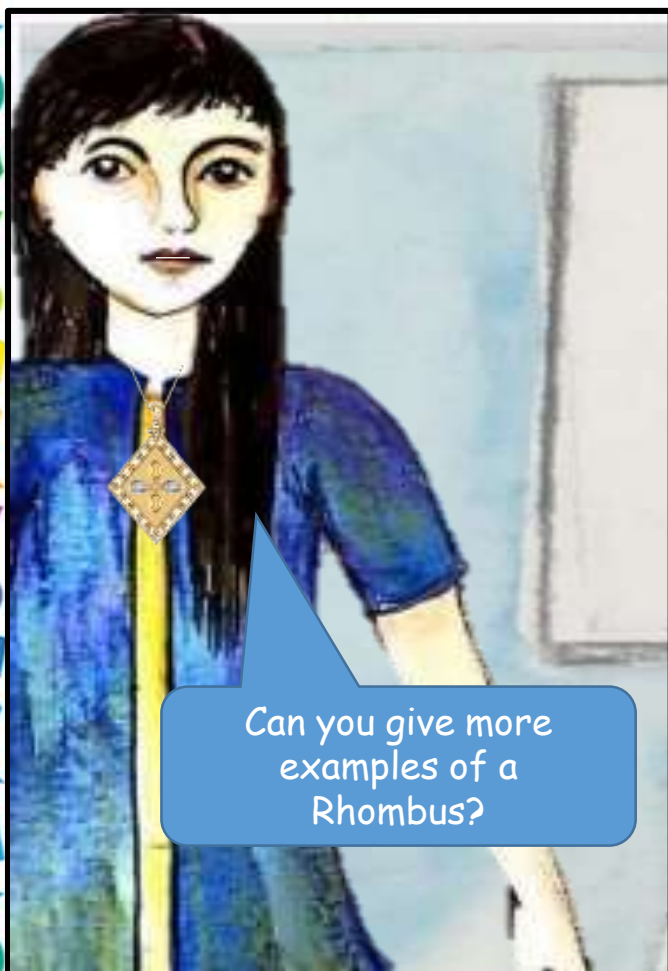
Teacher : (pointing on rhombus shape wall clock)



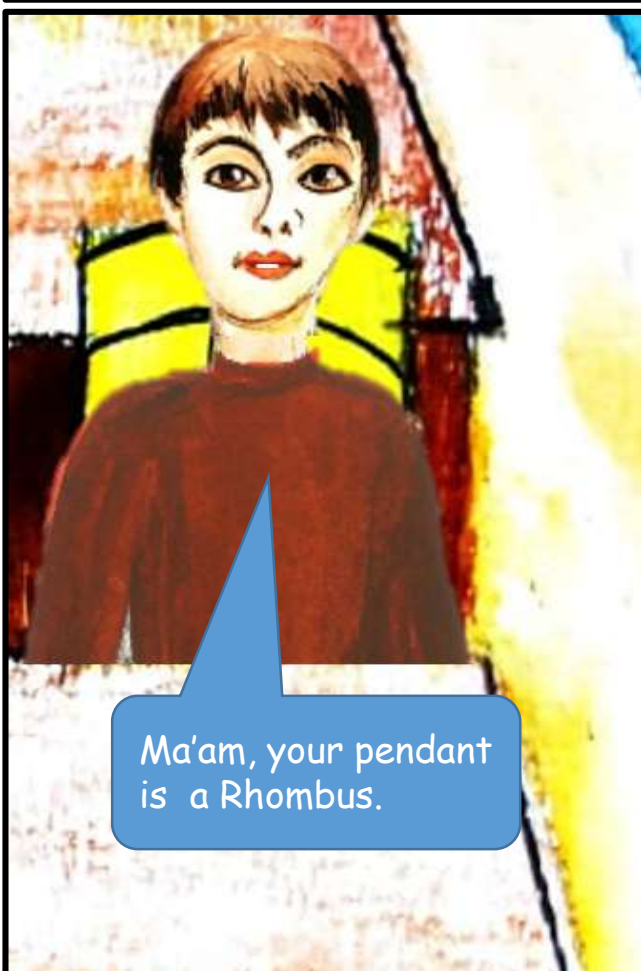
Now can you tell the exact shape of this wall clock?



It's a Rhombus.

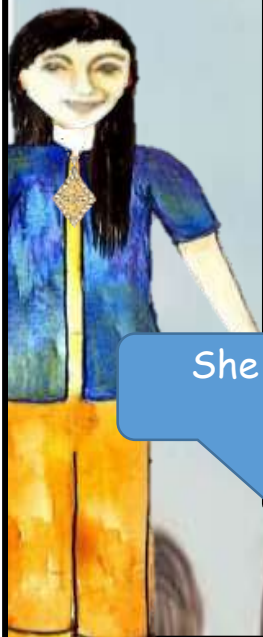


Can you give more examples of a Rhombus?



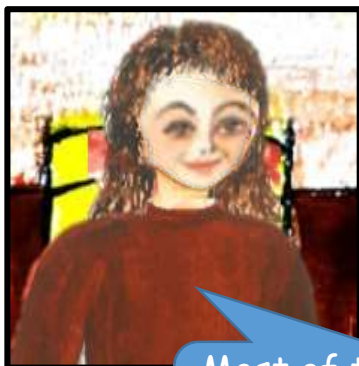
Ma'am, your pendant is a Rhombus.

Tell me what have you observed in the background of the picture?



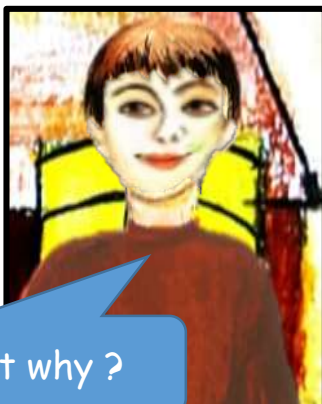
She is our Principal ma'am.

Yes, but ma'am is asking for the background.



Most of the shapes in the building are Rectangle or Square.

90° angles are very strong structurally, economically and spatially. Vertical stacks and vents align better.



Yes ma'am ...but why ?

Spatially : in a way that relates to the position, area, and size of things.

Now, tell me what you understood Rohit?



Yes, ma'am my yummy chocolate bars look like Square from top.

Ha..ha..ha...

Ha..ha..ha...



Everyone started laughing.(Bell rings)

**COMPLETE THE GRID GIVEN BELOW BY
WRITING YES / NO**

PROPERTY	SQUARE	RHOMBUS	RECTANGLE	TRAPEZIUM	PARALLELOGRAM
Opposite sides are equal					
Opposite sides are parallel					
Adjacent sides are equal					
Adjacent angles are equal					
Opposite angles are equal					
All angles are right angle					
Diagonals bisect each other					
Diagonals bisect at right angle					
Diagonals are equal in length					
Diagonal divides it into two congruent triangles					

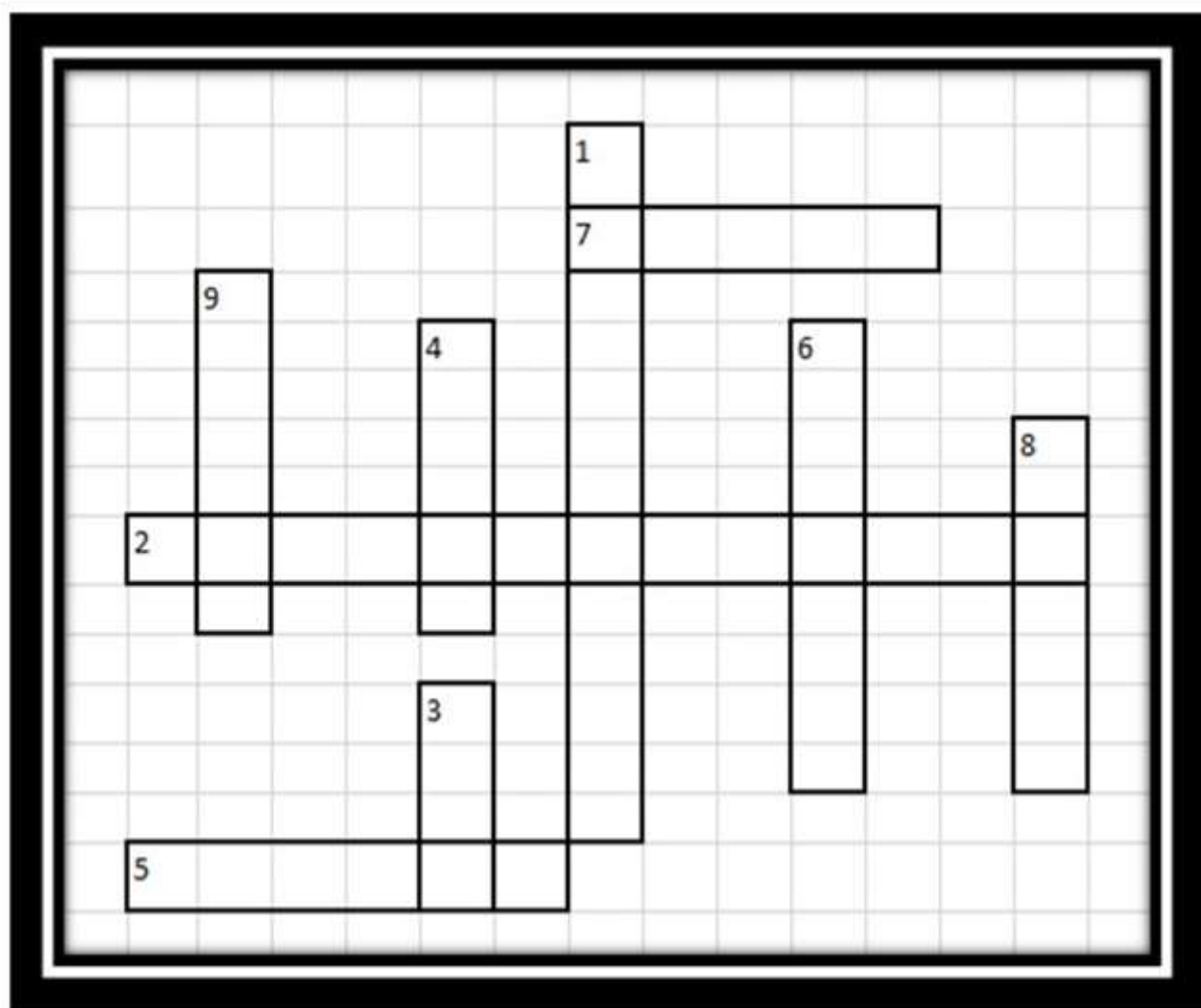
Crossword Puzzle

Down

1. A figure with 2 pairs of parallel sides.
3. A 4 sided figure with 2 pairs of adjacent sides that are equal in lengths.
4. A rectangle with 4 equal sides.
6. A quadrilateral with 1 pair of parallel sides.
8. A closed figure formed by line segments.

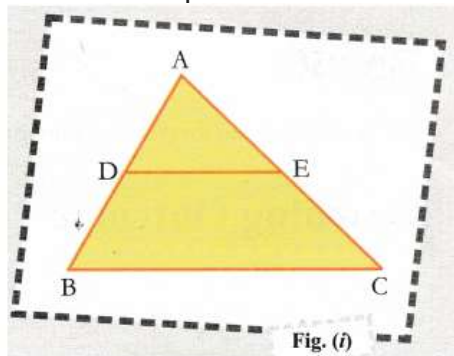
Across

2. A 4 sided figure.
5. A point where two edges meet.
7. The space between two sides.
9. A parallelogram with 4 equal sides.

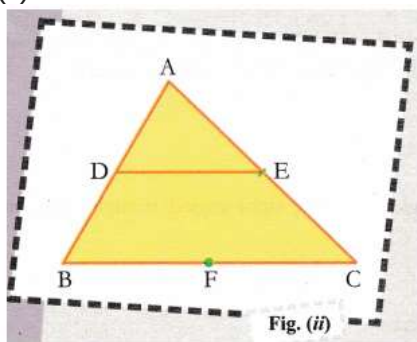


Next day students are doing activity on Mid Point Theorem in Lab Manual.

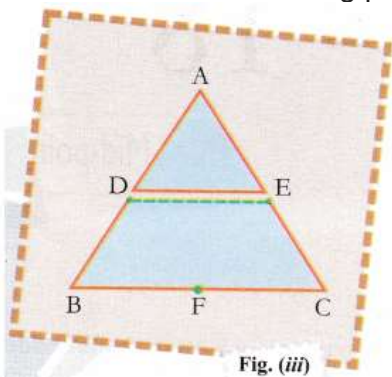
1. Draw $\triangle ABC$ on the yellow glazed paper of any measurement and paste it on white sheet.
2. Find mid-points of the two sides (say AB and AC) of a triangle by paper folding. We obtain D and E as mid-points of AB and AC respectively in 1st triangle.



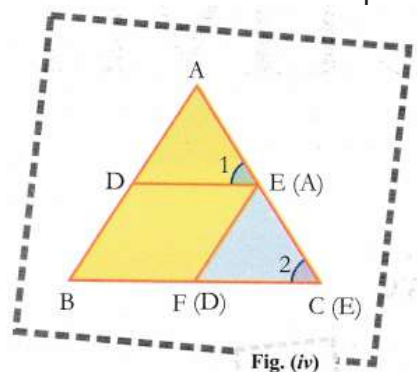
3. Draw horizontal line DE. Similarly find mid-point of side BC and name it F as shown in fig. (ii).



4. Trace the $\triangle ABC$ on tracing paper and cut $\triangle ABC$ along line DE as shown in fig.(iii).



5. Paste this cut out of triangle ADE [fig. (iii)] on $\triangle ABC$ of fig. (ii) such that AE coincides with EC and ED lies on CB and point D coincides with F as shown in fig. (iv).



6. $\triangle ADE$ completely covers $\triangle EFC$.

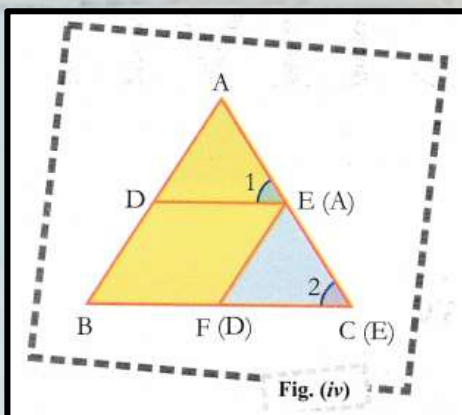


Fig. (iv)



$\angle 1 = \angle 2$, because they exactly overlap each other.



These are corresponding angles too.



Does it mean $DE \parallel BC$?



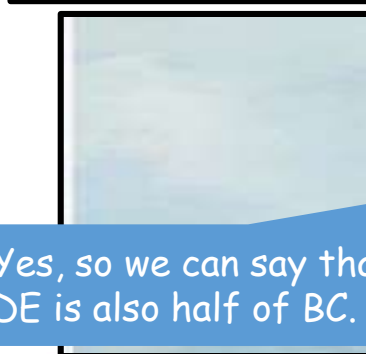
Yes, you are right.
 $DE \parallel BC$



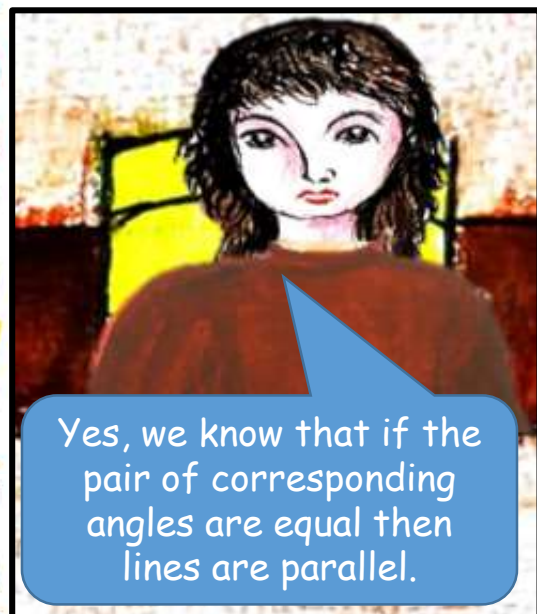
What can you say about DE and FC?



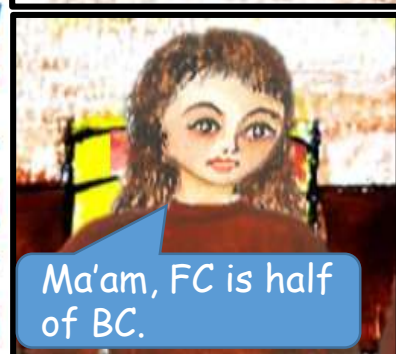
These are equal.



Yes, so we can say that DE is also half of BC.



Yes, we know that if the pair of corresponding angles are equal then lines are parallel.



Ma'am, FC is half of BC.

Line segment joining the mid-points of any two sides of a triangle is parallel to the third side and is equal to half of it.



This result is known as Midpoint Theorem.

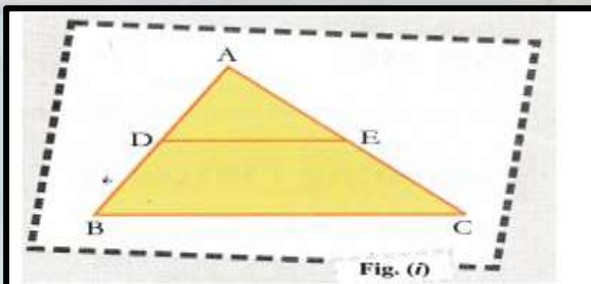


Ma'am, what about its converse ?

The straight line drawn through the midpoint of one side of a triangle parallel to another bisects the third side.



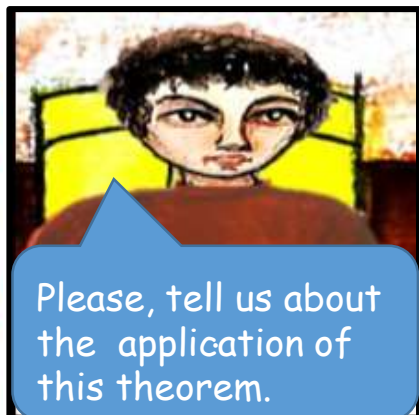
What?



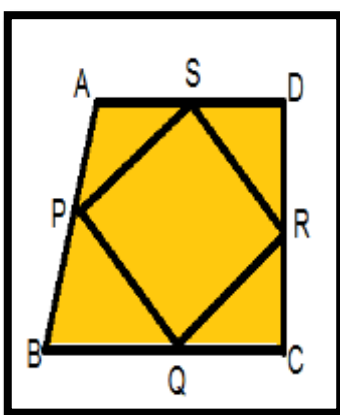
Does it mean if D is the mid point of BC and $DE \parallel AC$ then E must be the mid point of AC ?



Yes, so we can say that converse of Mid Point Theorem is also true.

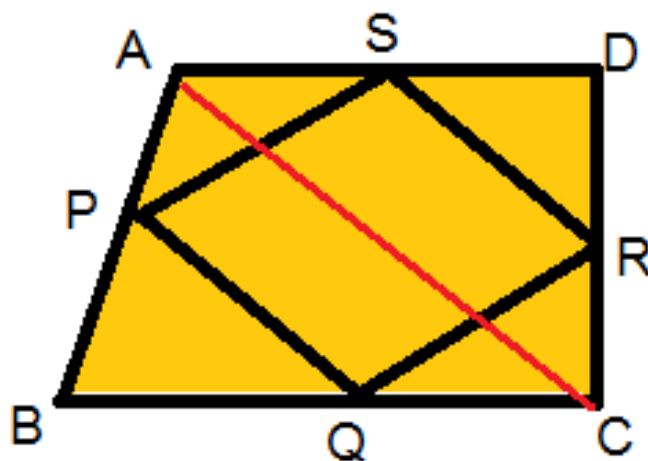


Please, tell us about the application of this theorem.



First of all, draw a Quadrilateral and join the mid points of its sides.

Now, Join vertices A and C.



By Mid Point Theorem
 $SR \parallel AC$ and
 $SR = \frac{1}{2} AC$

Also, $PQ \parallel AC$ and
 $PQ = \frac{1}{2} AC$

Yes, so we can say
that $PQ \parallel SR$ and
 $PQ = SR$.

It means PQRS is
a Parallelogram.

Try this concept on Rhombus,
Square and Rectangle at your home.

Okay ma'am.

It seems very
interesting.

Students are looking motivated.(class gets over)

Mid Point Theorem

1. The figure obtained by joining the mid-points of the sides of a Quadrilateral, taken in order, is
 - (a) a rhombus
 - (b) a rectangle
 - (c) a square
 - (d) any parallelogram.
2. The figure obtained by joining the mid-points of the sides of a Rhombus, taken in order, is
 - (a) a rhombus
 - (b) a rectangle
 - (c) a square
 - (d) any parallelogram.
3. The figure obtained by joining the mid-points of the sides of a Rectangle, taken in order, is
 - (a) a rhombus
 - (b) a rectangle
 - (c) a square
 - (d) any parallelogram.
4. The figure obtained by joining the mid-points of the sides of a Square, taken in order, is
 - (a) a rhombus
 - (b) a rectangle
 - (c) a square
 - (d) any parallelogram.
5. The quadrilateral formed by joining the mid-points of the sides of a quadrilateral PQRS, taken in order, is a rectangle, if
 - (a) PQRS is a rectangle
 - (b) PQRS is a parallelogram
 - (c) diagonals of PQRS are perpendicular
 - (d) diagonals of PQRS are equal.
6. The quadrilateral formed by joining the mid-points of the side of quadrilateral PQRS, taken in order, is a rhombus, if
 - (a) PQRS is a rhombus
 - (b) PQRS is a parallelogram
 - (c) diagonals of PQRS are perpendicular
 - (d) diagonals of PQRS are equal.
7. The figure formed by joining the mid-points of the sides of a quadrilateral ABCD, taken in order, is a square only, if
 - (a) ABCD is a rhombus
 - (b) diagonals of ABCD are equal
 - (c) diagonals of ABCD are equal and perpendicular
 - (d) diagonals of ABCD are perpendicular

Glossary

Point : We represent a point by a fine dot which has no dimensions.

Angle : An angle is formed when two rays originate from the same point ,the rays making an angle are known as arms of the angle .

Polygon : A closed shaped formed with the help of line segments.

Vertices : Point where two sides of a Quadrilateral meet.

Diagonal : Line joining two opposite vertices.

Adjacent sides : Sides which meet at a common vertex of a Quadrilateral.

Opposite sides : Sides which do not meet at a common vertex of a Quadrilateral .

Adjacent angles : Angles with one common side of a Quadrilateral.

Opposite angles : Angles with no common sides of a Quadrilateral.

Bisect : Divides into two equal parts.

Perpendicular lines : Lines which intersect each other at 90° .

Congruent : Two shapes are said to be congruent if they have same shape and size.

ANSWER KEY

World of Quadrilateral

- 1) RECTANGLE 2) RHOMBUS 3) SQUARE 4) TRAPEZIUM 5) KITE
6) PARALLELOGRAM

Trip to Trapezium

- 1) I 2) III 3) II 4) IV 5) II 6) II

Wonder of Parallelogram

- 1) II 2) I 3) III 4) II 5) II 6) III 7) I 8) IV

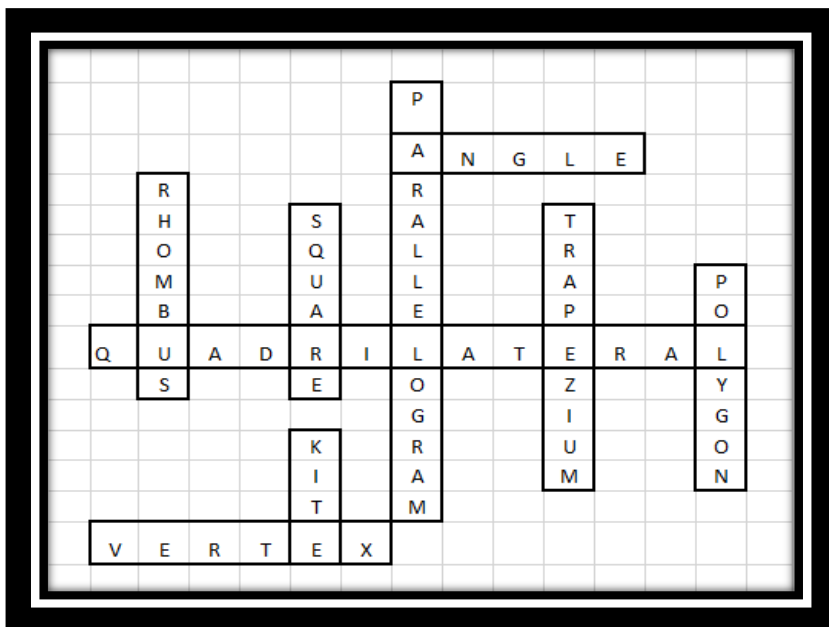
Rectangle Everywhere

- 1) I 2) I 3) II 4) I 5) I 6) IV 7) I 8) IV

Fun with Rhombus

- 1) I 2) I 3) I 4) II 5) II 6) I 7) III 8) III 9) I 10) 19

Crossword



Midpoint Theorem

- 1) d 2) b 3) a 4) c 5) c 6) d 7) c

Bibliography

- ❑ NCERT Book
- ❑ Expressions changer website.
- ❑ Image of guitar - <https://qph.fs.quoracdn.net/main-qimg-51a022779448318fbcc0f6219e99acf1>
- ❑ Image of Parallelogram - <https://www.alamy.com/geek-parallelogram-character-cartoon-style-image213137357.html>
- ❑ Image of Angles - <https://in.pinterest.com/pin/763289836837079678/>
- ❑ Image of Trapezium shaped Bridge - <https://www.ck12.org/geometry/quadrilaterals/rwa/Traveling-on-Trapezoids/>.
- ❑ Image of Rhombus - https://www.pinclipart.com/pindetail/hbTTbh_diamond-shapes-for-kids-clip-art-rhombus-shape/
- ❑ Image of Trapezium - <https://www.alamy.com/student-trapezoid-character-cartoon-style-vector-illustration-image212792491.html>
- ❑ Mid Point Theorem Activity - <https://www.cbsesamplepapers.info/cbse/cbse-class-9-maths-lab-manual-mid-point-theorem>

“Be willing to be a beginner... but grow through what you go through...” Life is about accepting the challenges along the way, choosing to keep moving forward, and savouring the journey. Only difficult roads lead to the best places, when things do not go easy, let's remember that every challenge - every adversity - contains within it the seeds of opportunity and growth.

It was a great opportunity for the teachers to showcase their creativity through this Graphic Novel and the teachers did an excellent job. I am sure that this Graphic Novel will surely explain the difficult concepts to the learners in an interesting way.

I wish the publication very best.

N. R. KOTHARI

PRESIDENT

SHRI. S. S. JAIN SUBODH SHIKSHA SAMITI, JAIPUR.



“Every right implies responsibility... Every opportunity an obligation... Every possession is a duty...” Continuous effort - not strength or intelligence - is the key to unlocking our potential. Satisfaction lies in the effort. If everyone is moving forward together, then success takes care of itself. Resolution to succeed is more important than anything. Teachers, your ability has taken you the new height of success. This Graphic Novel is a great job and this is the result of your dedication and hard work and yes...confidence too in the tough time of the pandemic.

Many congratulations to the mentor and team Subodh.

S. S. BOTHRA

HONY. SECRETARY

SHRI. S. S. JAIN SUBODH SHIKSHA SAMITI, JAIPUR.





**“The Law of Universe neither blesses us nor punishes us,
it only responds to the vibrations of our Attitude...”**

Happiness in life depends on how we perceive it, but it's a simple fact that without efforts we cannot gain anything. As we grow in years more efforts and work need to be done. When we do something selflessly for the society, it makes us more humane and teaches to respect humanity.

The dedication, enthusiasm and insight of the team of teachers in designing the Graphic Novel is really inspiring.

VINOD LODHA

JOINT SECRETARY

SHRI. S. S. JAIN SUBODH SHIKSHA SAMITI, JAIPUR.

Knowledge becomes invaluable when put into practice...

Students should understand the values of practice. We may need book...we may need internet...but the best cure for curiosity is creativity.

Graphic Novel is the creativity of the team of teachers. Their perseverance has helped them to accomplish this task. Congratulations for their accomplishment and to utilize this challenging times into creativity.



ANIL KUMAR GOKHROO

CONVENER

SUBODH PUBLIC SCHOOL, AIPRORT, JAIPUR



0962CH08

PRINCIPAL'S DESK

“Creativity is what drive innovation and progress...”

The work done in this pursuit was a journey of self-exploration of creativity, ideas, thoughts, team spirit, collaboration, co-ordination and much more than all this. Initially when the idea of graphic novel was shared the response of some teachers was a kind of ‘Wishful thinking for some doubt’ for self etc. It took some time for the teachers to decide of the topic and class, to start putting the text in the form of graphic novel. After a few days of processing thoughts, discussions, there was a need of orientation and exchange of ideas. It was significant to convey complex ideas and theories in a creative manner. After the orientation sessions teachers felt more confident but when the things were put on the paper, they were to adopt different roles e.g. story— teller, sketcher to draw the characters, more imagination to select names from the context, expressions with cultural diversity, authenticity with aesthetics etc. The effort to make a graphic novel to create interest and understanding of the reader had been a challenging task. We hope that readers will acquire the same. It had been a time exhausting exercise and simultaneously carries an attribute to a new hope, enthusiasm, innovation and confidence in team members. The Information Technology Teachers and Fine Arts Teachers too contributed a lot, since the context was to be put in different blocks without losing the context and the attempt to make learning interesting and meaningful. The objective of graphic novel is to encourage critical thinking in the learners, eliminate the learning gap and to promote experiential learning. It was observed that during the process teachers’ acceptability of ideas creativity, co-operation, adaptability was a marvelous example of team spirit. Each teacher is feeling more cognizant, confident, energetic, enriched and motivated.

We wish the journey of happy and joyful learning will continue...

KAMALJEET YADAV

PRINCIPAL

SUBODH PUBLIC SCHOOL, AIRPORT, JAIPUR



Summary

One day during lunch time, Purvi, Amita, Rohan and Rohit, students of class IX, were looking at newly constructed auditorium of their school.

They observed various polygons in the form of a window, gate and exterior design and they started discussing about the shape of the gate of the auditorium that it was a Rectangle or a Quadrilateral.

After lunch, in Mathematics class, they asked their queries to their Mathematics teacher

The Mathematics teacher explained them about Quadrilaterals and its types such as Parallelogram, Rectangle, square, Trapezium and Rhombus by showing animated Videos and real life objects.

She also explained the similarities and differences of these shapes by giving them the task of measuring the diagonals and observing the real life objects at home.



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