

Master Lesson Plan

For

Basic Geometrical Ideas

Board	Standard	Subject	Chapter	Language	Reference Link	Creation date
CBSE	STD VI	Mathematics	Basic Geometrical Ideas	English	Basic Geometrical Ideas	2019-03-01 18:35:38

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Basic Geometrical Ideas

1. MS_Objectives-Basic Geometrical Ideas

Notes to the teacher:

This asset lays down the proposed plan for transacting this chapter.

It states the asset objectives of the MLP. This asset is for teacher's reference and need not be taught to the students.

Students will be able to

1. become interested in Geometry
2. describe fundamental geometrical concepts like points, lines, line segments etc
3. appreciate the need to love all beings
4. describe different types of lines like intersecting lines, concurrent lines, parallel lines and perpendicular lines
5. explain about rays, equal rays and opposite rays
6. differentiate between open curves, closed curves, simple closed curves etc
7. explain about polygons and parts of polygons
8. describe interior, exterior, boundary of closed figures and regions
9. explain angles, parts of angles, interior and exterior of angles etc
10. describe triangles and parts of triangles
11. explain quadrilaterals and parts of quadrilaterals
12. identify line segments, triangles and quadrilaterals seen in the given figure
13. apply their knowledge of circle and its parts to solve problems
14. give examples of points, lines, angles and curves in the world around us

Time to teach	Asset Type	Theme	SubTheme
3 Minutes	Main Script	Line, Curve & Angle	

2. IA_Origin of Geometry in the world

Origin of Geometry

Geometry is a branch of Mathematics that involves the study of solid objects, flat surfaces (planes), lines, angles and shapes of all kinds. In Greek language, the word Geometry means 'Measurement of Earth'. Geometrical concepts originated in ancient Egypt.

Egypt is called as "Gift of Nile". The Nile river flows through Egypt perennially supplying water for agriculture. The agricultural lands were always on the banks of Nile. The rest of the region was desert. In ancient Egypt, frequent flooding of land by Nile river changed the geometrical patterns of land every year. Surveying of land became difficult. Growth of knowledge in geometry helped them to solve such problems.

Geometrical Ideas

Egyptians employed people called "Rope Stretchers" who used a long rope as a mathematical tool to measure the land and establish its boundary again.



The rope could be stretched between two persons to form a straight line. When one person held the rope at a point, the other person would stretch it tight and move around the point to draw out a circular area. Similarly, using the stretching rope these persons could draw squares and rectangles, which then had established the land boundaries of neighboring plots.

These developments were compiled by the Greek Mathematician Euclid in his books. Euclid lived during the 3rd century BC.



His geometry books explained a vast number of self-evident facts (axioms) from which truths about different shapes of Geometry (theorems) were deduced.

Image Source:

[SSSVV Gallery-Keyword-rope](#)

[Euclid: SSSVV Gallery-Keyword-Mathematician](#)

Time to teach	Asset Type	Theme	SubTheme
3 Minutes	Interesting Asides	Line, Curve & Angle	Line

3. MS_Fundamental geometrical concepts

Fundamental geometrical concepts

‘Geometry’ deals with size and shape of objects. In order to have a better understanding of the various shapes, it is essential to know about the fundamental geometric concepts of a point, a line and a line segment.

One of the fundamental concepts in geometry is a 'point'. A point could be considered as a basic building block of geometry. We represent a point by a single dot '.'.

Point:

A point is commonly observed in a sentence as a full stop or a semi colon or points are also seen on location maps.



Mathematically, a point is smaller in size than the tip of a sharp pencil or pen or divider.



A point has no length, breadth or thickness. A point indicates a definite location. In order to differentiate one point from another, the points are named using 'Capital letters'.



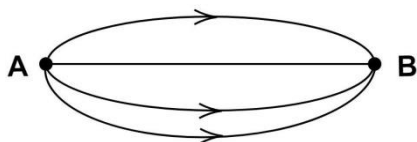
We generally read these as "Point A", "Point B" and "Point C".

The dots have to be invisibly thin.

No geometrical figure can be drawn without using the basic concept of a point. Every geometrical figure is named using the points present in it.

Line Segment

Consider any two points A and B. There are many ways to connect these two points.



The shortest path that connects these two points A and B is called as a line segment.



A line segment has two end points. Hence, it has a definite length. The length could be measured using a ruler.

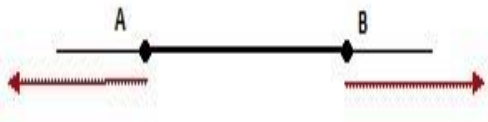
A line segment is named using its end points A and B as $\overline{AB}$ or $\overline{BA}$. Note that while naming the line segment, the order of end points can be interchanged.

Line

We know that when two points are connected by the shortest path, they form a line segment, say AB.



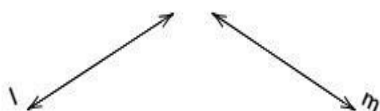
Suppose the line segment extends indefinitely beyond the points A and B in both directions, a line is formed.



As the line keeps extending indefinitely, it is not possible to draw a complete picture of a line. Hence, in order to represent a line we draw two arrows at the points A and B. The arrow head indicates that the line extends indefinitely in that direction.



Note that there are infinitely many points on the line. A line can be named using any two points lying on it. In the above example, the line passes through the points A and B and hence the line is denoted as $\overleftrightarrow{AB}$ or $\overleftrightarrow{BA}$. Note that the order of naming the endpoints can be interchanged. We can also represent a line with the alphabet 'l' or 'm'.

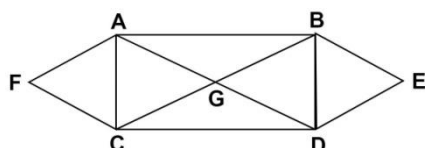


The table given below summarizes the fundamental concepts.

Concept	Figure	Property	Notation
Point		Has no length, breadth or thickness	Capital letter A
Line Segment		Has definite length	$\overline{AB}$
Line		Has infinite length	$\overleftrightarrow{AB}$

Illustrations

1) In the given figure, the points and line segments can be identified.

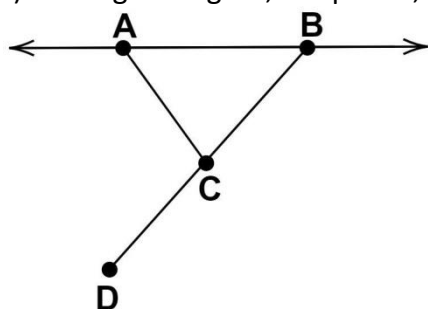


The points are A, B, C, D, E, F and G.

The line segments are

$\overline{AB}$, $\overline{AC}$, $\overline{AF}$, $\overline{AG}$, $\overline{BG}$, $\overline{BD}$, $\overline{DE}$, $\overline{CD}$, $\overline{CG}$, $\overline{CF}$, $\overline{BE}$ and $\overline{DG}$

2) In the given figure, the points, line and line segments are identified.



The points are A, B, C and D.

The line segments are

$\overline{AC}$, $\overline{BC}$, $\overline{CD}$, $\overline{AB}$, $\overline{BD}$

The line is



Image Source :

Point: SSSVV Gallery-Keyword-point, semicolon

Point: SSSVV Gallery-Keyword-point representation

All mathematical drawing figures have been created using MS office tools. Original Contribution by dast.mca@gmail.com

Time to teach	Asset Type	Theme	SubTheme
15 Minutes	Main Script	Line, Curve & Angle	A line segment, Line, Point

4. VC_Love - The Base Line Of Life

A point determines a location. A line segment corresponds to the shortest distance between two points.

Points are the basic for all geometric figures. Similarly, love is the basic in our life. Just as all geometric figures can be expressed in terms of points, in the same manner love can be expressed in many forms like sharing, caring, etc.

Let us look at a story that highlights this.

This is a true story said to have happened in Japan. In order to renovate his house, a Japanese man broke open the wall. Japanese houses normally have a hollow space between the wooden walls.

When tearing down the walls, he found that there was a lizard stuck there, because a nail from outside had been hammered into one of its feet. He felt pity, and also curious. When he checked the nail he found it was nailed 5 years ago, when the house was built!!!



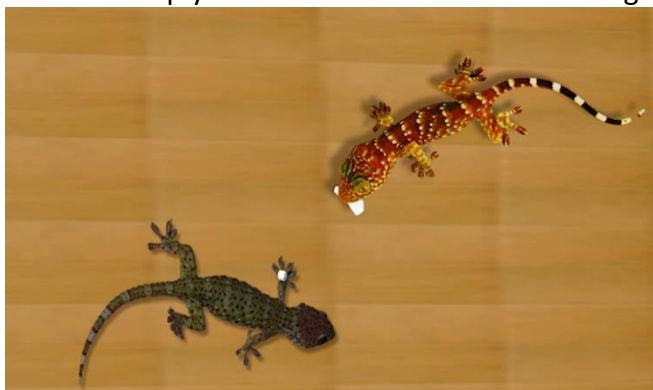
What happened?

The lizard had survived in such a position for 5 yrs!!!

In a dark wall partition for 5 years without moving was a lizard alive and well, it was impossible and mind-boggling!

Then he wondered how this lizard had survived for 5 years without moving a single inch, since its foot was impaled! So he stopped his work and observed the lizard, to see what it had been doing, and what and how it was eating.

Later, suddenly there appeared another lizard, with food in its mouth. Ah! He was stunned and was touched deeply. Another lizard had been feeding the impaled lizard for 5 years



Imagine...It has been doing that untiringly for 5 long years, without giving up hope on its partner. A small creature exhibited feelings of empathy and love for a fellow creature. In this journey called life which is filled with many curves, we human beings, should help one another to the best of our ability and make our journey pleasant.

Image Source:

<https://pixabay.com/es/photos/gecko-lagarto-tokhe-reptil-247316/>

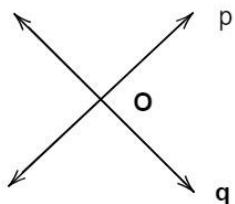
<https://pixabay.com/es/photos/gecko-lagarto-tokhe-reptil-239812/>

Time to teach	Value Type	Value Sub Type	Value Attribute
3 Minutes	Love		Stories

5. MS_Types of lines

Intersecting lines

If any two lines, say line **p** and line **q** meet at a point, then they are called **intersecting lines**.

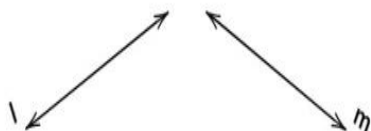


Mathematically, 'intersect' means 'meet'.

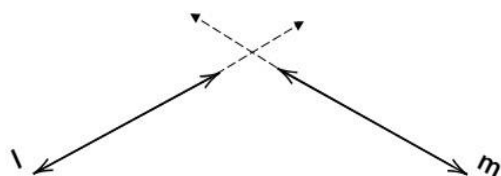
In the above example, the lines **p** and **q** meet at point O. This point O is called the point of intersection.

Any two intersecting lines will meet at exactly one point only.

Observe the two lines **l** and **m** shown below.



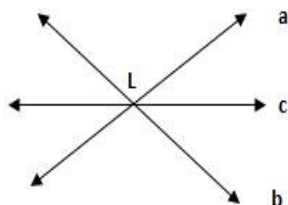
It is difficult to conclude if these two lines are intersecting or nonintersecting. However, the property of a line is that it extends infinitely in both directions. On extending both the lines, we observe that they do meet at a point.



Hence, the pair of lines **l** and **m** is intersecting lines.

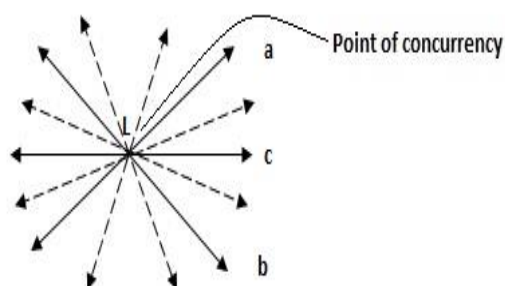
Concurrent lines

Consider three intersecting lines say line **a**, line **b** and line **c**.



The three lines intersect at point L.

Observe that any number of lines can pass through the point L.

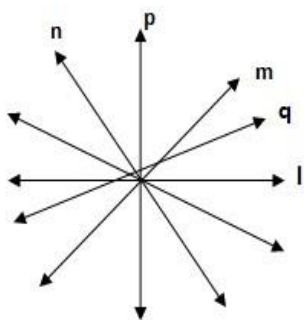


These lines are called **concurrent lines**.

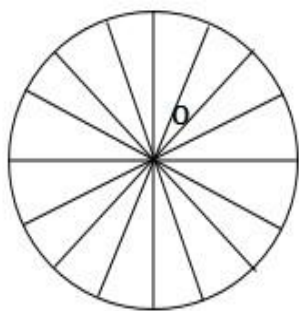
Three or more lines meeting at a point are called as **concurrent lines**. The point where they meet is called the **point of concurrency**.

In the above example, point L is called the **point of concurrency**.

Note the lines in the figure below.

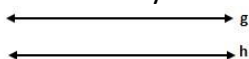


The lines **l, m, n, p** are concurrent lines. But line **q** is not concurrent with them.
 Diameters of a circle are concurrent at its centre O.

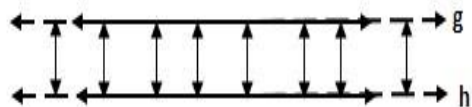


Parallel lines

Consider any two lines say line **g** and line **h**.



Observe that the two lines lie on a flat surface i.e. the sheet of paper on which they are drawn. The two lines never intersect each other even if they are extended indefinitely.



The distance between them always remains unchanged.

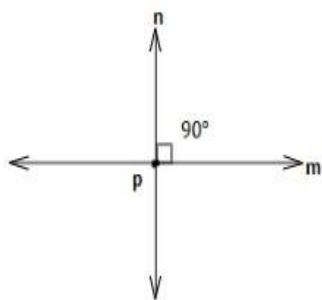
Such lines are called as parallel lines.

Parallel lines are denoted by two vertical lines **||**.

In the above example the parallel lines **g** and **h** are mathematically represented as **g || h**

Perpendicular lines

Consider two intersecting lines say line **m** and line **n**.



We observe that the two lines intersect each other at 90 degrees. Such lines are called **perpendicular lines**.

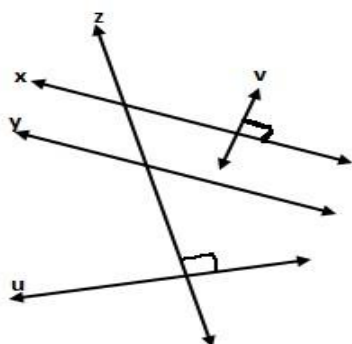
Lines that intersect each other at 90 degrees are called **perpendicular lines**.

Perpendicular lines are denoted symbolically as $\perp$

Mathematically the two perpendicular lines are represented as $m \perp n$

Illustration

The figure given below contains both parallel and perpendicular lines



The parallel lines are $x \parallel y$

The perpendicular lines are $u \perp z, x \perp v$

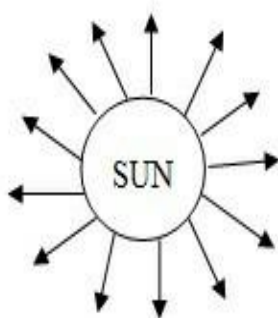
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Time to teach	Asset Type	Theme	SubTheme
15 Minutes	Main Script	Line, Curve & Angle	Intersecting lines, Parallel lines , Perpendicular lines and bisectors

6. MS_Rays

Introduction



The light coming from the sun is called light rays. The light rays start from a common point or source, which is the sun, and seem to proceed endlessly into space in all directions.

Definition:

Mathematically, a ray is defined as a portion of a line that starts at a point and goes off in particular direction up to infinity. On its way to infinity, it passes through infinitely many points.

Consider the ray as shown below,



The ray starts at point P and Q is any point in the path of the ray.

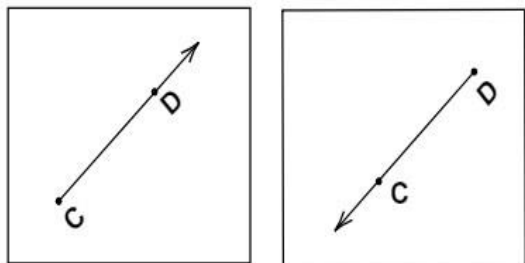
The point P where the ray starts is called the **starting point** of the ray.



Starting point

The ray is denoted by $\overrightarrow{PQ}$. This is read as "ray PQ". The arrow over the two letters indicates that ray starts at point P and proceeds along the path containing point Q. The starting point is written first and is read first, always.

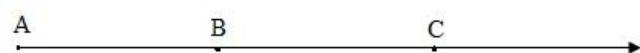
Consider the rays shown below:



Note that the rays $\overrightarrow{CD}$ and $\overrightarrow{DC}$ are not the same. Both rays have different starting point.

Equal rays

Consider the below example:



$\overrightarrow{AC}$ is a ray. It starts at A and passes through the points B and C. As points B and C lie on the same path, ray $\overrightarrow{AC}$ is same as ray $\overrightarrow{AB}$. Rays $\overrightarrow{AB}$ and $\overrightarrow{AC}$ are called **equal rays**.

Rays with same starting point and direction are called as **equal rays**.

Opposite rays

Suppose two rays have the same starting point but are exactly in opposite directions to each other forming a single straight line, they are called as '**opposite rays**'.



The rays $\overrightarrow{YZ}$ and $\overrightarrow{YX}$ are opposite rays as they have the same starting point Y but proceed in exactly opposite directions. Note that the two opposite rays form a straight line.

Drawing Source : All mathematical drawing figures have been created using MS office tools.

Original Contribution by dast.mca@gmail.com

Time to teach	Asset Type	Theme	SubTheme
7 Minutes	Main Script	Line, Curve & Angle	Ray

7. SA_Activity on Open and Closed Figures

Aim: To differentiate between open and closed curves.

Materials required: 30 cm string, a set of 10 chits (with capital alphabets written on it), an observation sheet, a small container or cup (to hold the chits), pencil (one each per team).

Setting of the Activity: Outdoor or indoor (according to convenience).

Type of the Activity: Demonstration by teacher, Experiment by students, Group activity.

Instruction to teacher:

Prior to the day of the activity

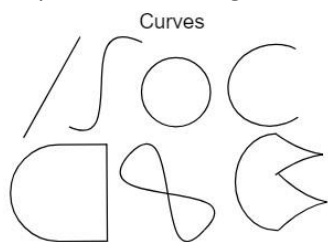
1. Teacher divides the class into groups of 10 students each.
2. Teacher asks each group (one student) to bring the materials required on the day of the activity.
3. Teacher prepares the observation sheets before the activity (one sheet per group).
4. Teacher prepares 10 chits containing alphabets C,V,D,S,O,U,B,G, M,L (one set for each group).

On the day of the activity

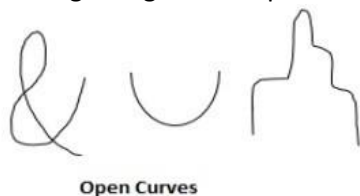
Teacher explains about curves with examples on the black board.

Curve:

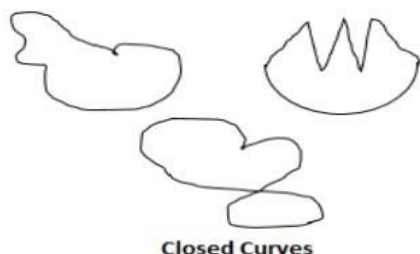
Any smooth flowing line is called a curve. In mathematics, a straight line is also considered as a **curve**.



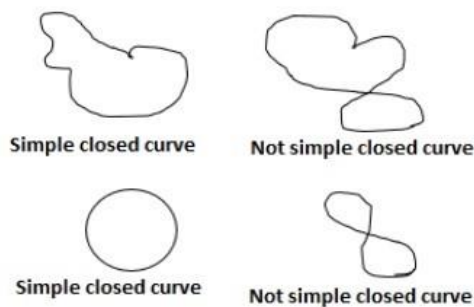
If the beginning and end points are different the curve is called an **open curve**.



If the beginning and end points are the same then the curve is called a **closed curve**.



A closed curve which does not cross itself is called a **simple closed curve**.



2. Teacher distributes a set of 10 chits and an observation sheet to each group.

S.No	Alphabet	Type of curve (Open/Closed)
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

3. Teacher explains the activity as given in the procedure.

Procedure:

1. Each group should form a circle and place the string, observation sheet, chits (in a container) and pencil in the center of the circle formed.
2. Each student from the group should move to the center of the circle and pick a chit.
3. The student should place the string in the form of alphabet in the chit.
4. The members of the group should identify and explain whether the alphabet is open or closed curve and give the answer.
5. The student in the center fills the observation sheet. The student notes down the alphabet and the type of curve in the observation sheet. For example, if the letter is "N", then write the word "open" beside it. Leave the observation sheet once again in the center and join the circle formed by other group members.
6. Next student (who has not gone to the center even once) from the group should move to center to continue.
7. Steps from 1 to 5 are repeated till all the chits are exhausted.
8. The team that completes quickest is declared winner after examining the correctness of answers in the observation sheet.

Observation:

S.No	Alphabet	Type of curve (Open/Closed)
1	N	Open
2		
3		
4		
5		
6		
7		
8		
9		
10		

The letters D, O and B are closed curves.

The letters C, V, M, L, S, U, G are open curves. ('N' is used for demonstration by teacher)

Conclusion: Open and closed curves are differentiated.

Question to reinforce:

Q: What is the difference between the curves 'O' and '8'?

Expected answer: The curve 'O' is simple closed curve but '8' is not simple closed curve as the curve crosses itself.

Extra worksheet for home practice

Extra work sheet			
Figure	Type of Curve		
	Closed	Simple Closed	Open
			
			
			
			
			
			
			

Answers

Figure	Extra work sheet		
	Type of Curve		
	Closed	Simple Closed	Open
	×	×	✓
	×	✓	×
	×	✓	×
	✓	×	×
	×	✓	×
	×	×	✓
	✓	×	×

Drawing Source: All mathematical drawing figures have been created using MS office tools.
Original Contribution by dast.mca@gmail.com

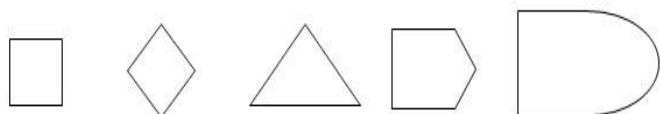
Drawing Source : All mathematical drawing figures have been created using MS office tools.
Original Contribution by dast.mca@gmail.com

Time to teach	Asset Type	Theme	SubTheme
20 Minutes	Suggested Activity	Line, Curve & Angle	Closed curve, Open curve

8. MS_Polygons

Polygons

Observe the following figures.



All the figures are simple closed curves. The first four figures are made of line segments and the fifth figure is made up of a curve and a line segment.

The first four figures are called polygons.

A figure is called a polygon, if it is a closed figure made up of definite number of line segments.

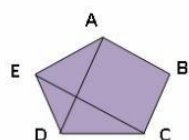
Definition: A **simple closed curve** made of **line segments** is called a polygon.



Observe the floor of the classroom or corridor. It is made up of line segments and the line segments form a simple closed curve. Thus, it forms a four sided polygon.

Parts of a polygon

Consider the following polygon



Sides: Line segments forming a polygon are called sides **of a polygon**.

Vertex: The meeting point of a pair of sides is called its **vertex**.

Adjacent Sides: Any two sides with a common end point are called the **adjacent sides** of the polygon.

Adjacent vertices: The **end points** of the **same side** of a polygon are called the **adjacent vertices**.

Diagonal: The line that connects vertices which are not adjacent is called a **diagonal**.

In the above figure, we observe the following:

Vertices	A,B,C,D,E
Sides	AB,BC,CD,DE,EA
Adjacent Vertices	A & B, B & C, C & D, D & E, E & A
Adjacent Sides	AB & BC, BC & CD, CD & DE, DE & EA, EA & AB
Diagonals	AD & CE

Other diagonals of the polygon would be AC, BE and BD.

Image source:

Floor: SSSVV Gallery-Keyword-floor

All mathematical drawing figures have been created using MS office tools.

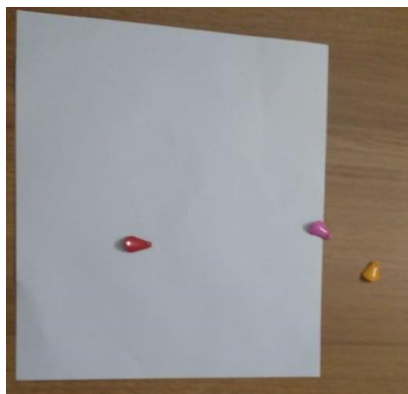
Original Contribution by dast.mca@gmail.com

Time to teach	Asset Type	Theme	SubTheme
7 Minutes	Main Script	Line, Curve & Angle	A line segment, Closed

curve

9. MS_Interior and Exterior of closed figures

Consider a sheet of paper placed on a flat surface, say, a table. Place three colored trinkets as shown below.



The red trinket is '**inside**' the sheet, the yellow trinket is '**outside**' the sheet, while the pink trinket is '**on**' the boundary of the sheet.

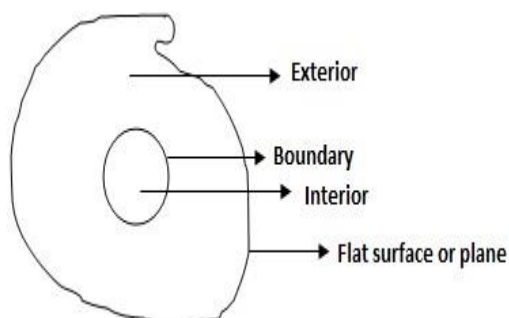
In mathematics, considering the boundary of the sheet as a closed curve on a flat surface / plane, we can infer that the closed curve divides the plane into three parts.

Interior ('inside') of the curve

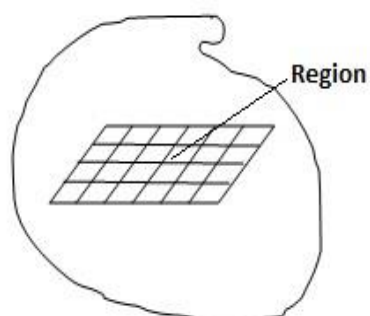
Boundary ('on') of the curve and

Exterior ('outside') of the curve

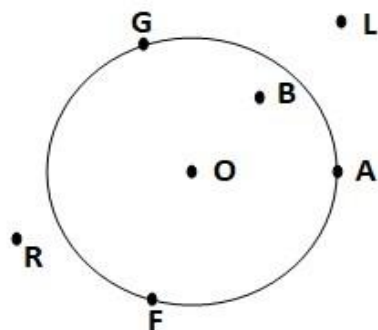
A plane divided into three parts by a closed curve is shown below:



The interior of a curve together with its boundary is called its "region".



Consider a circle shown below:

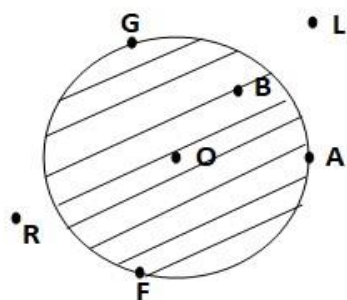


Boundary of a closed figure: The boundary of a closed figure is the set of all points between the points inside the figure and the points outside the figure. The points A, F and G lie on the boundary of the circle.

Interior of a closed figure: The interior of a closed figure is the set of all points in the figure except the boundary points. Points O and B are interior points of the circle.

Exterior of a closed figure: The exterior of a closed figure is the set of all points that are not a part of the figure and its boundary. The exterior of a closed figure is unbounded. It can be extended indefinitely in all directions. Points L and R are exterior points of the circle.

Region: The interior of a circle together with its boundary is called its **region**.



In the above figure, the shaded portion represents the region.

Image Source:

Source: Original Contribution : sailakshmi1973@gmail.com

All mathematical drawing figures have been created using MS office tools.

Original Contribution by dast.mca@gmail.com

Time to teach	Asset Type	Theme	SubTheme
5 Minutes	Main Script	Line, Curve & Angle	Simple curve

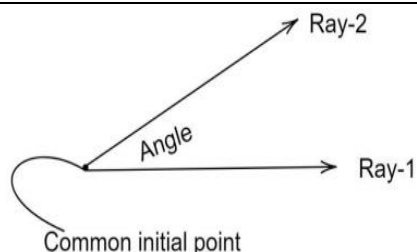
10. MS_Angles

Angles

We know that a ray starts from a fixed point and extends indefinitely in one direction.



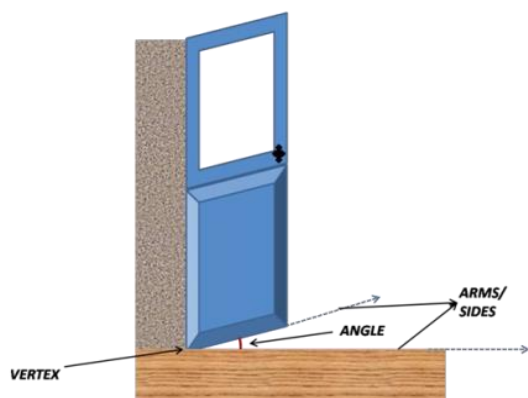
If a second ray also starts from the same point and proceeds in another direction, we find that there is a space created between the two rays.



This space between the two rays having a common initial point is called an angle.

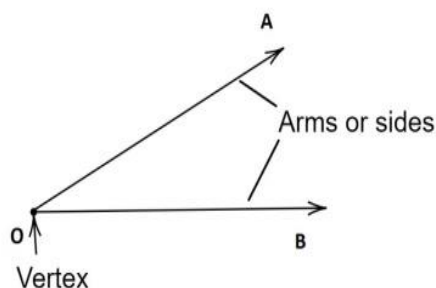
An angle is made up of two rays starting from a common end point.

Observe the opening of a door.



The door and the floor meet at a common point. The door and the floor can be visualized as rays by extending them as shown in the above figure. The two rays originate from a common point which is the edge of the door and floor. The two rays form an angle. Thus, we can say that where ever corners exist, angles are formed.

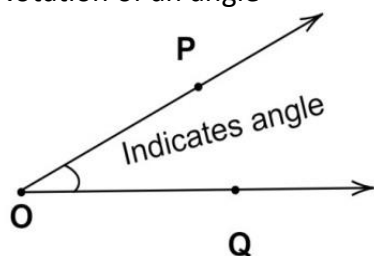
Parts of an angle



The two rays OA and OB forming the angle are called the arms or sides of the angle.

The common end point O of the two rays forming an angle is called the vertex of the angle.

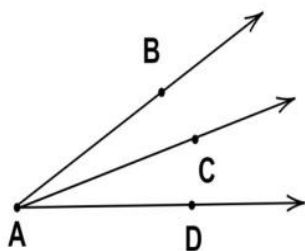
Notation of an angle



We use a small 'curve' at the vertex to indicate or denote an angle in a diagram. The symbol ' $\angle$ ' is used to denote an angle. As we can observe $\overrightarrow{OP}$ and $\overrightarrow{OQ}$ are two rays having a common point O. Now O is the vertex where the angle is formed. Here, we will denote the angle at 'O' as $\angle POQ$. Note that in specifying the angle, the vertex is always written as the middle letter. The angle can also be named as $\angle QOP$.

Angles with common vertex

Observe the figure given below,

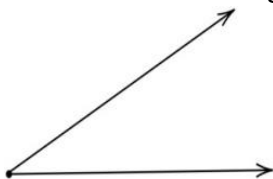


There are three angles originating from the same vertex. The angles are

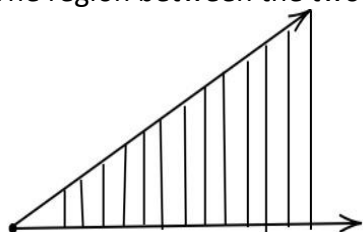
$\angle BAC, \angle CAD, \angle DAB$

Interior and exterior of an angle

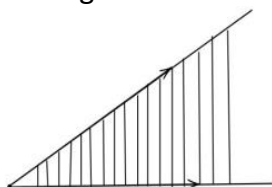
We know that an angle is formed between two rays that extend indefinitely in two directions.



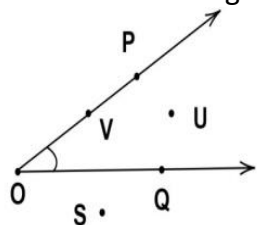
The region between the two rays is shown by the shaded portion.



The region also extends indefinitely as the two rays extend.



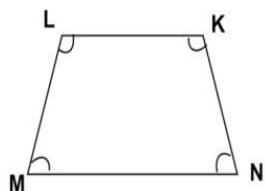
Any point lying in this region is called interior of the angle. Any point lying outside this region is called exterior of the angle. Any point lying on any of the arms of the angle is said to lie on the angle.



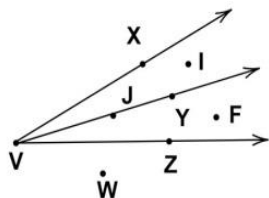
In the above figure, point S is on the exterior of the $\angle POQ$ while point U is on the interior and point V is on the $\angle POQ$.

Illustration

1) In the figure, the angles formed are $\angle MNK, \angle NKL, \angle KLM, \angle LMN$.



2) In the figure,



The points in the interior of $\angle XVY$ is I.

The points in the exterior of $\angle YVZ$ are I, W, X.

Image Source :

Created using MS Office Tools.

All mathematical drawing figures have been created using MS office tools.

Original Contribution by dast.mca@gmail.com

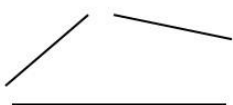
Time to teach	Asset Type	Theme	SubTheme
15 Minutes	Main Script	Line, Curve & Angle	Arm, Vertex and Angle

11. MS_Triangle

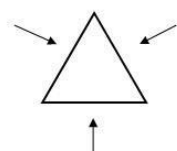
Triangles

Introduction:

Consider any three line segments



A closed figure could be formed using the three segments as shown below.



This closed figure formed by three line segments is called a triangle.

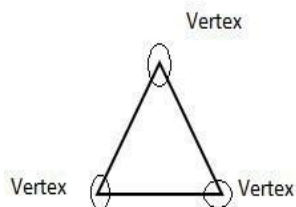
Definition:

A triangle is a simple closed figure formed by joining three line segments. It could also be defined as a three sided polygon.

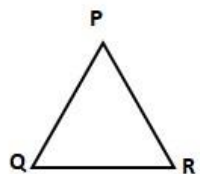
Parts of a triangle:

Vertex:

In any closed figure, the point at which two line segments meet is called a vertex. The triangle has three corners at which two line segments meet. Thus, a triangle has three vertices (plural of 'vertex').

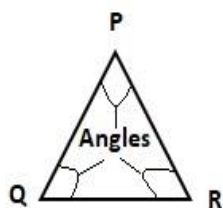


The vertices are named using alphabets like P, Q, R as shown below.



Angles:

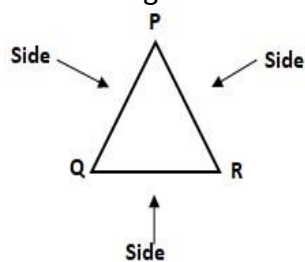
We know that where ever corners exist angles are formed. In a triangle, there are three corners. So, three angles are formed.



The angles formed are $\angle PQR, \angle QRP, \angle RPQ$.

Sides:

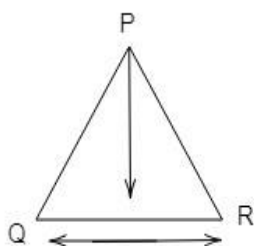
The line segments forming the triangle are called sides of the triangle.



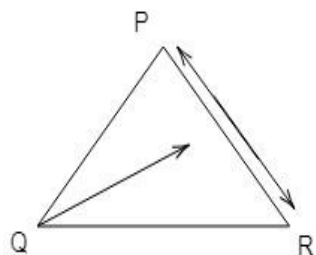
Thus, a triangle has three sides. The three sides of the triangle are PQ, QR and RP.

Side opposite to each vertex:

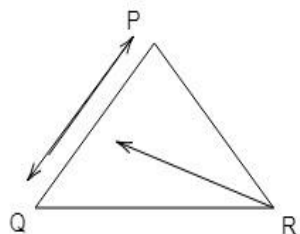
Side QR is opposite to vertex P



Side RP is opposite to vertex Q



Side PQ is opposite to vertex R



Notation of a triangle Δ

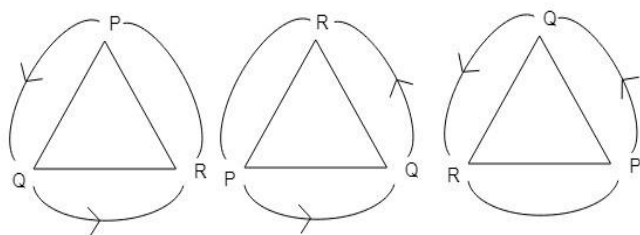
The triangle with vertices P, Q and R is named as triangle PQR or ΔPQR .
Mathematically, a triangle is represented symbolically as Δ .

The triangle could be named in three ways as

ΔPQR or ΔQRP or ΔRPQ in anticlockwise direction

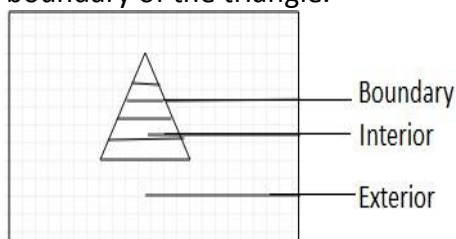
or ΔPRQ or ΔRQP or ΔQPR in clockwise direction.

Only condition for naming a triangle is that 'order of writing the vertices should be cyclic (clockwise or anticlockwise)'. The below picture shows naming of triangle in anticlockwise direction.



Position in a triangle

The triangle divides the flat surface into three regions namely interior region, exterior region and boundary of the triangle.

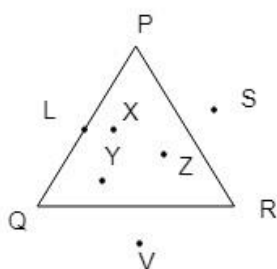


Points lying inside the triangle are called interior points of triangle.

Points lying on the sides of the triangle are called boundary points of triangle.

Points lying outside the triangle are called exterior points of triangle.

Consider the triangle shown below,



Interior points are X, Y and Z.

Boundary point is L.

Exterior points are V and S.

All points lying inside the triangle including the boundary points is called triangular region.

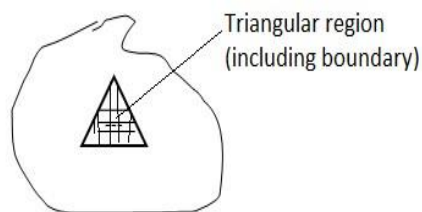


Image Source : All images have been drawn using MS Office tools.

Original Contribution : dast.mca@gmail.com

Time to teach	Asset Type	Theme	SubTheme
10 Minutes	Main Script	Line, Curve & Angle	Arm, Vertex and Angle

12. MS_Quadrilaterals

Quadrilateral:

Introduction:

A quadrilateral is a closed figure bound by four line segments. 'Quad' means four and 'lateral' means side.



Any four sided polygon is called a quadrilateral. Each of the above figures is a quadrilateral.

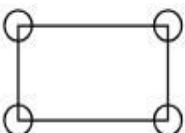
Parts of a quadrilateral:

Consider the quadrilateral shown below.



Vertices:

The four corners in the quadrilateral are called as vertices.



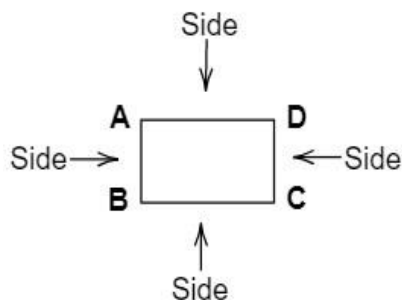
They are named using capital alphabets as A, B, C and D.



Every quadrilateral consists of four vertices.

Sides:

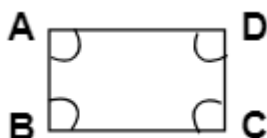
The line segments that join together to form the quadrilateral are called sides of the quadrilateral.



The sides of the quadrilateral are $\overline{AB}, \overline{BC}, \overline{CD}, \overline{DA}$.

Every quadrilateral consists of four sides.

Angles:

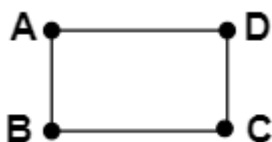


The quadrilateral consists of four angles namely $\angle A, \angle B, \angle C, \angle D$. (Here the angles are named based on the vertex where they are formed).

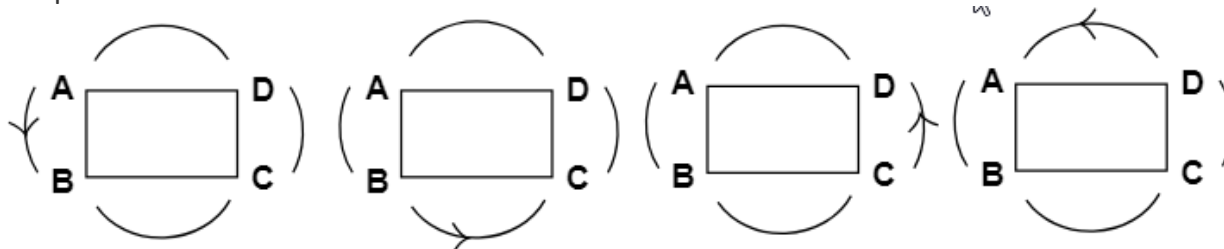
A better way of naming the angles is based on sides forming the angles. The four angles of the quadrilateral are $\angle ABC, \angle BCD, \angle CDA, \angle DAB$.

Naming a quadrilateral

A quadrilateral is named using the vertices.



The above quadrilateral is named as quadrilateral ABCD or quadrilateral BCDA or quadrilateral CDAB or quadrilateral DABC in anticlockwise direction.



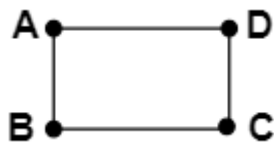
The quadrilateral can also be named in clockwise direction as quadrilateral DCBA or ADCB or BADC or CBAD.

Note that the vertices are named in a cyclic manner.

The above quadrilateral cannot be named as ACDB because the vertices are not written in cyclic order.

Diagonals of a quadrilateral

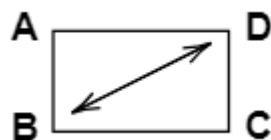
Consider the quadrilateral shown below



The vertices A and C are opposite to each other.



The vertices B and D are opposite to each other.



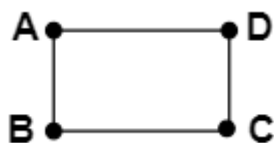
The line segment joining the opposite vertices is called a diagonal.



The quadrilateral ABCD has two diagonals namely $\overline{BD}$, $\overline{AC}$.

Adjacent and Opposite sides of a quadrilateral

Consider the quadrilateral ABCD



Any two sides of a quadrilateral that have a common end point are called as **adjacent sides**.



The adjacent sides in the quadrilateral are

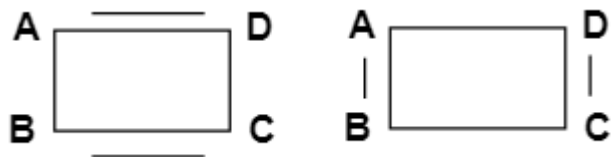
$\overline{AB}$ and $\overline{BC}$

$\overline{BC}$ and $\overline{CD}$

$\overline{CD}$ and $\overline{DA}$

$\overline{DA}$ and $\overline{AB}$

Any two sides of a quadrilateral that do not have a common end point are called as **opposite sides**.



The opposite sides of the quadrilateral are

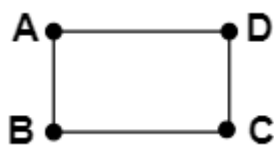
$\overline{BC}$ and $\overline{DA}$

$\overline{AB}$ and $\overline{CD}$

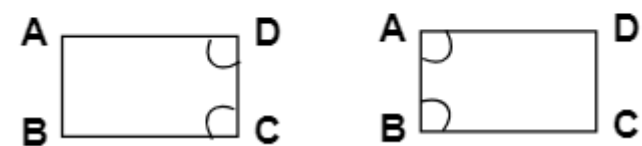
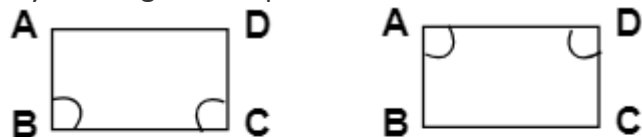
Any quadrilateral has four pair's adjacent sides and two pairs of opposite sides.

Adjacent and opposite angles of a quadrilateral

Consider the quadrilateral ABCD



Any two angles of a quadrilateral that share a common arm are called as **adjacent angles**.



The adjacent angles in the quadrilateral ABCD are

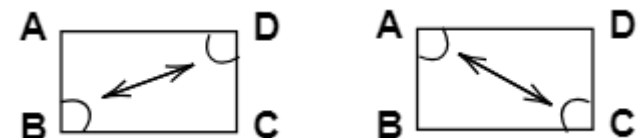
$\angle A$ and $\angle B$

$\angle B$ and $\angle C$

$\angle C$ and $\angle D$

$\angle D$ and $\angle A$

Any two angles of a quadrilateral that do not share a common arm are called as **opposite angles**.



The opposite angles in the quadrilateral ABCD are

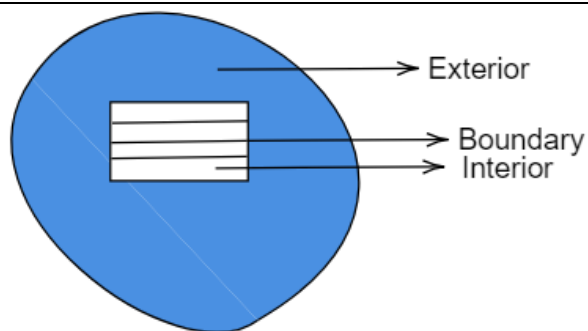
$\angle A$ and $\angle C$

$\angle B$ and $\angle D$

Any quadrilateral has four pairs of adjacent angles and two pairs of opposite angles.

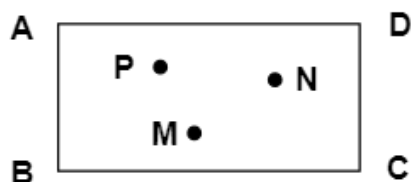
Position in a quadrilateral

A quadrilateral divides the flat surface i.e. the plane into three regions.



Interior of a quadrilateral

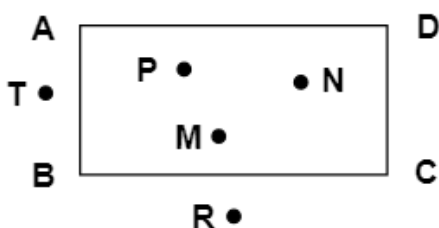
The region inside the quadrilateral is called as **interior region**. In the quadrilateral ABCD shown below



Points M, N, P lie in the interior region.

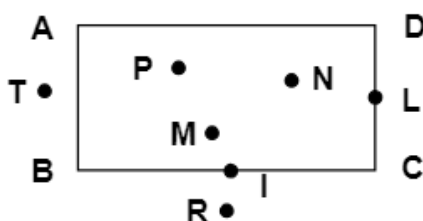
Exterior of a quadrilateral

The region outside the quadrilateral is called as **exterior region**. In the quadrilateral ABCD shown below



Points R, T lie in the exterior region.

Boundary of the quadrilateral



Points L and I lie on the boundary of the quadrilateral.

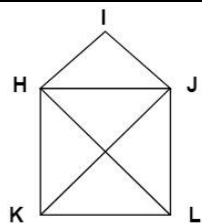
Drawing Source : All mathematical drawing figures have been created using MS office tools.

Original Contribution by dast.mca@gmail.com

Time to teach	Asset Type	Theme	SubTheme
15 Minutes	Main Script	Line, Curve & Angle	Closed curve

13. IQ_Trace it out

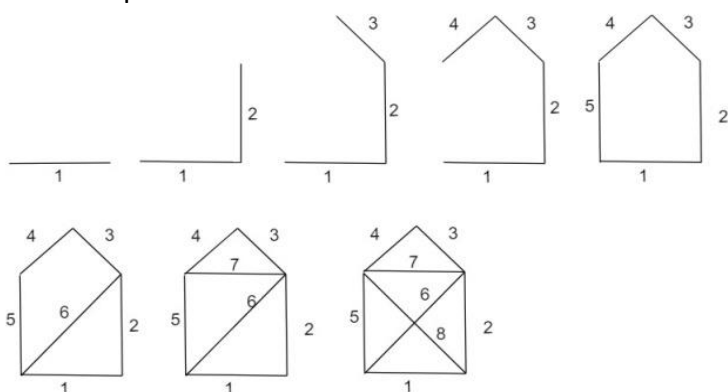
Observe the figure given below:



1. Identify the line segments named in the figure.
2. Name any four triangles seen in the figure.
3. Name three quadrilaterals seen in the figure.
4. Try to trace the figure without lifting your pencil or repeating a line segment.

Solution:

1. The eight line segments are HI, IJ, JL, LK, KH, HJ, HL, JK.
2. Triangles are HIJ, HLK, JLK, HJL. Also JHK.
3. Quadrilaterals are HIJL, HKJI, HJLK.
4. The steps are as shown below:



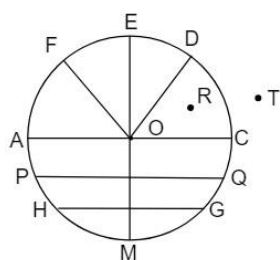
Drawing Source: All mathematical drawing figures have been created using MS office tools.
Original Contribution by dast.mca@gmail.com

Time to teach	Asset Type	Theme	SubTheme
8 Minutes	Inquisitive Questions	Line, Curve & Angle	A line segment

14. QA_Parts of a circle

I. Fill in the blanks

Observe the figure below and fill in the blanks



- 1) AOF, FOE, EOD and DOC are four ----- of the circle.
- 2) HMG is a minor -----of the circle.
- 3) O and R are ----- points of the circle.
- 4) AC and ME are the -----of the circle.
- 5) PQ is a ----- of the circle.
- 6) AP is an ----- of the circle.
- 7) OD is ----- of the circle.
- 8) T is an -----point of the circle.

Solutions:

- 1) sectors 2) segment 3) interior 4) diameters 5) chord 6) arc 7) radius
8) exterior

II.Say 'True' or 'False' and write the reason.

- 1) The radius is the longest chord of the circle.
- 2) Diameter is twice the radius of the circle.
- 3) There are infinitely many diameters of a circle.
- 4) One -fourth of a circle is called as a segment.
- 5) The complete distance around a circle is called its circumference.
- 6) All the radii of a circle are of equal length.
- 7) Diameters of the circle never intersect.
- 8) The centre of the circle lies in the interior of the circle.
- 9) Arc is a portion of the circle.
- 10) Diameter divides the circle into major and minor segment.

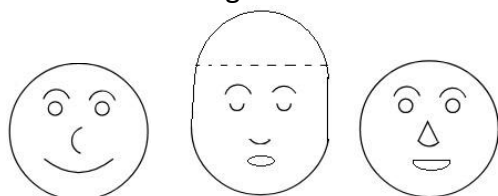
Solutions:

- 1) False. Diameter is the longest chord of a circle. 2) True 3)True
4) False. One fourth of a circle is called a sector or quarter of a circle. 5) True 6)True
7) False. Diameters of a circle intersect at its center. 8)True 9)True
10) False. Diameter divides the circle into two equal segments.

III.Draw it out

Draw a face using parts of a circle-segment, sector, circumference, arc etc. Use one or all parts of the circle.

One such drawing is shown below.



Drawing Source: All mathematical drawing figures have been created using MS office tools.

Original Contribution by dast.mca@gmail.com

Time to teach	Asset Type	Theme	SubTheme
10 Minutes	Assessments	Line, Curve & Angle	Simple curve

15. DD_Lines, Angles and Curves in the world around us

Lines, Angles and Curves in the world around us

The basic geometrical concepts of point, line, line segment, ray, circles, curves, angles etc are seen commonly in the world around us.

Point:

The tip of a safety pin creates a point when pressed on a paper.



In South India, designs are drawn at the entrance of the homes with rice flour. These designs are plotted placing points in orderly fashion.



Lines:

We write on a straight line in ruled notebooks.



In school assembly, each class stands in a line vertically.



Line segment

Line segments are often seen in furniture designs. The edges of a table are line segments.



Line segments border the doormats on all sides.



Rays:

We often find rays originating from sun, torch light etc.

**Parallel lines:**

We notice parallel lines on the railings of a ladder, railings of staircase, on railway tracks etc.

**Intersecting lines:**

The spokes of the wheel show intersecting lines.



Window grills are usually made of intersecting lines.

**Angles:**

Angles are noticed in many objects around us...

Roof tops of houses in rainy regions are made sloppy at some angle so that rain water slides down the roof easily.

**Circles:**

Circular objects are commonly seen around us.

The CD used as storage device is circular in shape.



An expert cook prepares circular chappatis .They are served mostly on circular plates.



Curves:

Curves are observed on the winding paths up a hill.



Curves are noticed on curtains in home decor.



Curves of different types are noticed in blouse designs and in design of dresses.



Thus we observe that the basic geometrical concepts are always a part of our daily life.

Image Source:

SSSVV Gallery-Keyword-rice flour designs

SSSVV Gallery-Keyword-pin point

Lines: SSSVV Gallery-Keyword- straight lines

SSSVV Gallery-Keyword-school assembly

Table: SSSVV Gallery-Keyword-table line

SSSVV Gallery-Keyword-doormat

Sun rays: SSSVV Gallery-Keyword-rays

Railings: SSSVV Gallery-Keyword-staircase

SSSVV Gallery-Keyword-Windows

House: SSSVV Gallery-Keyword-Kashmir house

CD: SSSVV Gallery-Keyword-disc

SSSVV Gallery-Keyword-Chappatis

SSSVV Gallery-Keyword-hill station

SSSVV Gallery-Keyword-curtains

SSSVV Gallery-Keyword-summer wear

Time to teach	Asset Type	Theme	SubTheme
5 Minutes	Day-to-day Relevance	Line, Curve & Angle	Line

16. MS_Summary-Basic Geometrical Ideas

- The origin of geometry in Ancient Egypt is explained-Due to flooding of Nile river, there was a need for surveying land every year. In this way Geometry was originated
- Fundamental geometrical concepts like points, lines and line segments are explained
- The need to love all beings is explained by means of a story
- The different types of lines like, intersecting lines, concurrent lines, parallel lines and perpendicular lines are explained
- Different types of rays like equal rays, opposite rays etc were explained
- The different types of curves like open curves, closed curves and simple closed curves are explained in an activity
- Polygons and their parts are described
- The interiors, exteriors, boundaries of closed figures and the regions are defined
- Angles, parts of angles, interior and exterior of angles are explained
- Triangles and quadrilaterals with their parts are explained
- The method of identifying line segments, triangles and quadrilaterals in a given figure is explained
- Questions related to circles and their parts are solved
- The points, lines, angles and the curves in the world around us are listed

Time to teach	Asset Type	Theme	SubTheme
5 Minutes	Main Script	Line, Curve & Angle	