CHAPTER: Basic Geometrical Ideas

Grade: **6**
Board: **CBSE**
Book: **NCERT**

1.

Chapter Summary and Placement

<Read through the following to understand how this chapter is connected with the previous and next grades and also the important concepts covered in it.>

1. Some terms in the chapter have been introduced in the previous grades in definitions and extends to a more practical version in this grade.
2. It connects to the future grades as base for geometry chapters like lines and angles in grade VII, Circles in Grade IX and X

2.

LEARNING OUTCOMES

<On completion of the chapter, students will be able to:>

1. Define the terms geometry , point, line, ray, line segment, parallel lines intersecting lines.
2. Describes curves, simple curves, closed and open figures, Interior and exterior of closed curves
3. Define : angle and terms related to angle[vertex, arm, interior and exterior], Triangle and terms related to triangles[vertices, sides, angles, interior and exterior]
4. Define polygon and terms related to polygon[sides, vertices, diagonals]
5. Define quadrilateral and terms related to quadrilateral[adjacent sides, opposite sides, adjacent angles, opposite angles]
6. Define circle and terms related to circle[centre, radius, diameter, chord, arc, segment, sector, major and minor segment, major and minor sector]

4. TEACHING PLAN

Follow this section for getting ideas on teaching the content covered in the chapter. The subtopic given in the first column with the matching learning outcome can be explained using instructions and resources listed subsequently

Subtopic and Learning Objective #1

Subtopic: Point, line, ray, line segment, parallel lines and intersecting lines
LO
:Define the terms geometry , point, line, ray, line segment, parallel lines intersecting lines.

1. Make the student understand the terms mentioned

Teacher Activity

1. Introduce the definition of geometry, point, line, ray, line segment, parallel lines and intersecting lines by using practical examples.

Like New Delhi represents a point on the globe, a single straight train track represents a line, light ray from sun represents ray, length of your classroom represents a line segment, two rail tracks represent parallel lines, alphabet x represents intersecting lines.

Activity 1 can be performed to understand parallel and intersecting lines

Check for understanding:

a) Can ask the student to define any term[teachers choice]

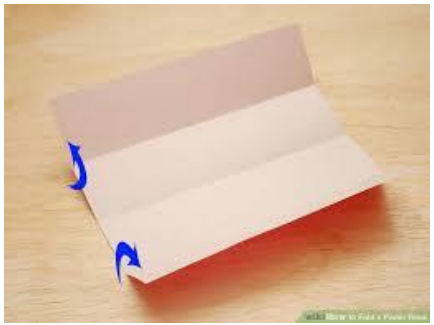
Resources Suggested

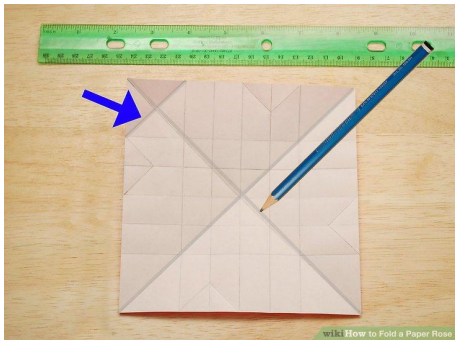
Blackboard, pen and paper. In **Resource sheet 1**
Point numbers 1, 2,3, 8 and 9 can be used for explanation of definitions

Activity 1

Name of the activity- Making parallel and intersecting lines by paper folding
Type of activity – Individual
Use it for – better understanding of parallel lines
Materials –2 Papers, pencil
Procedure –
Instructions to the teachers:

1. Ask students to take 2 papers and ask them fold and a line along the crease of folding to show parallel and perpendicular lines.
2. Here is example for teachers reference not to show to the students





Subtopic and Learning Objective #1

Sub topic:Closed and open curves, simple closed figure
LO:
Describes curves, simple curves, closed and open figures,
Interior and exterior of closed curves
1. To make student understand the definitions

Teacher Activity

1. Introduce closed and open curves, interior and exterior of the closed curves. Ask children to doodle on the paper and identify the closed, open, simple closed curves

Check for understanding:

a) Can ask the student to define any term[teachers choice]

Resources Suggested

Blackboard, pen and paper.In **Resource sheet 1**: Point numbers 5 and 6 can be used for explanation of definitions

Subtopic and Learning Objective #2

Sub topic:Angles and triangles
LO:
Define : angle and terms related to angle[vertex, arm, interior and exterior], Triangle and terms related to triangles[vertices, sides, angles, interior and exterior]

1. To make student understand the definitions

Teacher Activity

1. Introduce angle and terms related to angles.; Triangles and the terms related to it.
2. Can show corner of the book for angle.
3. A paper can be cut in the shape of triangle.
4. Can show the image of howrah bridge [**Resource 2**] how the bridge is formed with the triangles.

As an extension: Can ask student why huge building structures have embedded triangles in them?
Ans: As the triangle is the strongest closed figure it strengthens the building

Check for understanding:

a) Can ask the student to define any term[teachers choice]

Resources Suggested

Blackboard, pen and paper.In **Resource sheet 1**
Point number 10 and 12 can be used for explanation of definitions

Subtopic and Learning Objective #3

Sub topic: Polygons
LO:
Define polygon and terms related to polygon[sides, vertices, diagonals]
1. To make student understand the definitions

Teacher Activity

1. Introduce polygon and terms related to polygon[sides, vertices, diagonals]
2. **Activity 2** can be performed for clearing concepts

Can show quadrilateral[top view of charminar], pentagon[defense headquarters of USA], hexagonal shaped building

Resource 3 can be used to show to the students

Check for understanding:

a) Can ask the student to define any term[teachers choice]

Resources Suggested

Resource sheet 1
11th point can be used for explanation of definitions

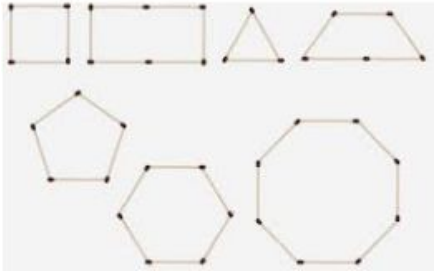
Activity - 2

Name of the activity- polygons
Type of activity – individual
Use it for – homework
Materials – A4 sheet paper, matchsticks/ ice cream sticks[basing on affordability] and glue
Procedure:

1. Student can form a shape or structure by using matchsticks/ Icecream sticks and polygon as base







Subtopic and Learning Objective #4

Sub topic: Polygons
LO:
Define polygon and terms related to polygon[sides, vertices, diagonals]
1. To make student understand the definitions

Teacher Activity

1. Introduce quadrilateral and terms related to quadrilateral[adjacent sides, opposite sides, adjacent angles, opposite angles]

Check for understanding:

a) Can ask the student to define any term[teachers choice]

Resources Suggested

Blackboard, pen and paper.In **Resource sheet 1**
13th point can be used for explanation of definitions

Subtopic and Learning Objective #5

Sub topic: Circle
LO:
Define circle and terms related to circle[centre, radius, diameter, chord, arc, segment, sector, major and minor segment, major and minor sector]
1. To make student understand the definitions

Teacher Activity

1. Introduce circle and terms related to circle[centre, radius, diameter, chord, arc, segment, sector, major and minor segment, major and minor sector]

Check for understanding:

a) Can ask the student to define any term[teachers choice]

Resources Suggested

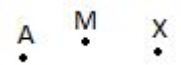
1. Introduce circle and terms related to circle[centre, radius, diameter, chord, arc, segment, sector, major and minor segment, major and minor sector]

Check for understanding:

a) Can ask the student to define any term[teachers choice]

Resource 1

1) Point: A dot placed with sharp tip of pencil gives the idea of a point and is represented with capital letters



2) Line: An infinite set of points which extend indefinitely in both directions is called a line and is represented as below. It has no length, breadth or height. A line has no end points.



3) RAY: An infinite set of points which extend indefinitely in one direction is called a ray and is represented as below



It has no length, breadth or height. A ray has one endpoint .

Note: alphabet representing starting point/endpoint, must be always written first. .

Resource 1

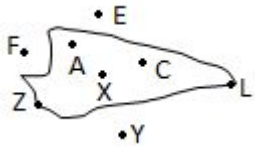
4) <u>Line segment:</u> A part of the line with two endpoints is called is called a line and is represented as below. It has length. A line segment has two endpoints but a line segment itself is made up of infinite points.



5) <u>Simple closed figure</u>: A figure start and end at the same point without crossing itself is called simple closed figure



<u>Interior or exterior of a closed curve</u> : Points A, C, X are in the interior of the curve and E, F, Y are exterior and L,Z are on the curve

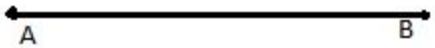


Resource 1

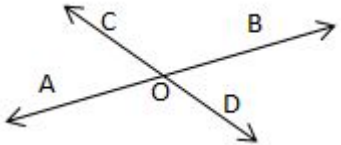
Open figure: A figure with different start and end points is called open figure



Collinear points: Points lying on the same line are called collinear points



Intersecting lines : Two lines in a plane which meet each other at a point/Two lines in a plane having a common point are said to be intersecting and the common point is called point of intersection. O is the point of intersection of



Resource 1

Parallel lines : Two lines in a plane which does not meet at any point a
re called parallel lines



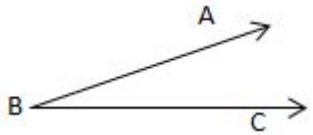
Note: a) Two lines in plane must be either intersecting or parallel to each other

b) Two intersecting lines in a plane determine a point in the plane

c) Two lines in a plane are said to be parallel if distance between them is equal

d) Infinite number of lines can be drawn through a point in a plane and only one line can be drawn through two points in a plane.

10) Angle : Union of two rays with same end point is called as an angle and is represented as ∠ABC or ∠B or ∠CBA



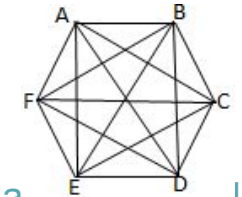
Resource 1

Polygon: A simple closed figure bounded by line segments is called a polygon. Some examples of polygons are

Terms related to polygon : In the following figure

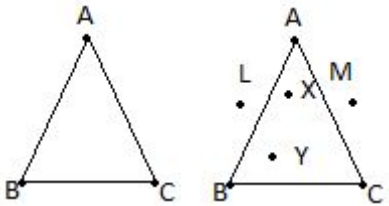
The end points of same side are called adjacent vertices Eg: A and B, A and C, B and A, B and C …….. are called adjacent vertices.

A line joining non adjacent vertices is called diagonal.



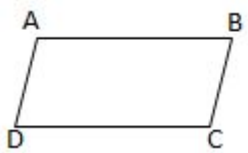
Triangle : A simple closed figure bounded by 3 line segments is called a triangle and is represented as ∆ABC or ∆CBA. A, B and C are called vertices of the triangle, AB, BC and AC are sides and ∠A, ∠B and ∠C are angles of the triangle

Interior and exterior of a triangle : In the below figure X and Y are in the interior of the triangle, L and M exterior of the triangle and A, B, C are on the triangle

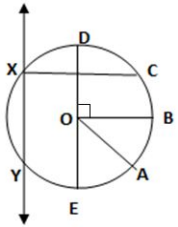


Resource 1

Quadrilateral and terms related to quadrilateral : A simple closed figure bounded by 4 line segments is called a quadrilateral. Sides formed by the same vertex are called adjacent sides Eg.: AB and AC, BA and BC…… Sides that are opposite to each other are called opposite sides Eg.: AB and CD; Ad and BC. Angles formed at the end of each side are called adjacent angles Eg. : ∠ A and ∠B; ∠ A and ∠ C……..Angles that are opposite to each other are called opposite angles Eg.: ∠ A and ∠ C; ∠ B and ∠ D



Resource 1



Circle and terms related to circle : An infinite set of points in a plane which are equidistant from a given point is called a circle

A point inside the circle and is at an equal distance from all the points on the circle is called center of the circle. o is center of the given circle

A line segment joining center and any point on the circle is called Radius of the circle. OB, OA, OE, OD are radii of given circle

A line segment joining any two points on the circle is called Chord of the circle. XY, ED and XC are chords of circle

A line segment joining any two points on the circle and passes through the center of the circle is called Diameter of the circle. DE is the diameter of the circle

A chord divides the circle into two parts called segment. XCD, XYEABCD are segments. More specifically EFG is called minor segment and XYEABCD as major segment.

A part of circle bounded by two radii and arc subtended by radii is called sector of the circle AOB

Resource 1

Note:

- Longest chord of the circle is diameter
- A circle has infinite number of radii, diameters, chords.
- Diameter of circle is twice the radius and radius of a circle is half of diameter
- Diameter divides the circle into two equal parts called semi circles
- Length of circle is called Circumference of the circle
- A part of length of circle is called arc of the circle
- If the angle between the two radii of the sector is 90^0 is called Quadrant of the circle
- Circles having same center are called concentric circles
- A line passing through two points of a circle is called secant of a circle

Resource 2



Resource 3







5. WORKSHEETS

Print or copy the worksheet questions on the blackboard and ask the students to attempt them. They can be given as homework or a class test as well.

Worksheet 1

Use it like: test after the chapter is complete, homework

Answer the following:

1. A dot placed with sharp tip of pencil gives the idea of a _____
2. An infinite set of points which extend indefinitely in both directions is called _____
3. An infinite set of points which extend indefinitely in one direction is called _____
4. A part of the line with two endpoints is called_____
5. A line has_____ end points.
6. A line segment has_____ endpoints.
7. A ray has_____ endpoints.
8. A figure start and end at the same point without crossing itself is called _____
9. A figure with different start and end points is called_____
10. Number of points on a line is _____

Worksheet 1

11. Simple closed figure bounded by 3 line segments is called_____
12. Simple closed figure bounded by 4 line segments is called_____
13. Points lying on the same line are called _____
14. Two lines in plane must be either _____or _____to each other
15. Two lines in a plane having a common point are said to be _____
16. Two intersecting lines in a plane determine a_____
17. Two lines in a plane are said to be parallel if _____between them is equal
18. _____ number of lines can be drawn through a point in a plane and _____lines/line can be drawn through two points in a plane.

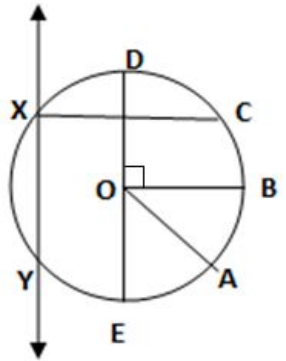
Worksheet 2

Use it like: test after the chapter is complete, homework

Answer the following:

1. An infinite set of points in a plane which are equidistant from a given point is called_____
2. A point inside the circle and is at an equal distance from all the points on the circle is called_____
3. A line segment joining center and any point on the circle is called_____
4. A line segment joining any two points on the circle is called_____
5. A line segment joining any two points on the circle and passes through the centre of the circle is called_____
6. A chord passing through the center of the circle is called_____
7. Longest chord of the circle is _____
8. A circle has _____ radii.
9. A circle has _____ diameters.
10. A circle has _____ chords.

Worksheet 2



11.Diameter of circle is _____ radius

12.Radius of a circle is _____ diameter

13.A chord divides the circle into two parts called_____

14.Diameter divides the circle into two_____ parts called _____

15.Length of circle is called _____

16.A part of length of circle is called _____

17.A part of circle bounded by two radii and arc subtended by radii is called _____

18.If the angle between the two radii of the sector is 90^0 is called _____

19.A line passing through any two points on the circle is called_____

20. Circles having same center are called _____

21.Observe the following figure and write an example for the following:

a) Radii

b) Diameter

c) Chord

d) Major segment

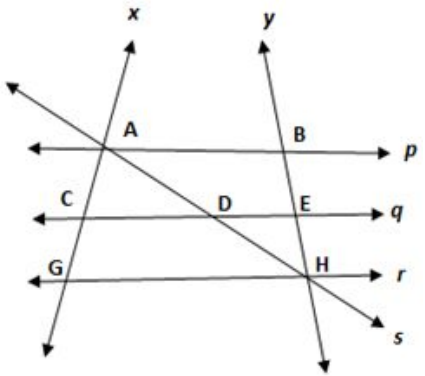
e) Minor segment

f) Quadrant

g) Sector

h) Semicircle

Worksheet 3

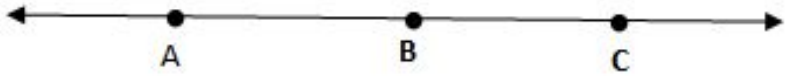


Use it like: test after the chapter is complete, homework

Answer the following:

1. Look at the adjacent figure and answer the following
   (i) All the lines passing through D
   (ii)Lines intersecting at C
   (iii) One pair of parallel lines
   (iv) One set of collinear points

2. Write all possible rays from the following figure



6. SOLUTIONS

This section gives you sample answers for activities and questions listed above.

Worksheet 1

1. Point
2. Line
3. Ray
4. Line segment
5. No
6. Two
7. One
8. Simple closed figure
9. Open figure
10. Infinite
11. Triangle
12. Quadrilateral
13. Collinear
14. Parallel, intersecting
15. Intersecting
16. Point
17. Distance
18. Infinite, only one

Worksheet 2

1. Circle
2. Center
3. Radius
4. Chord
5. Diameter
6. Diameter
7. Diameter
8. Infinite
9. Infinite
10. Infinite
11. Twice
12. Half of
13. Segments
14. Equal, semicircles
15. Circumference of the circle
16. Arc of the circle
17. Sector
18. Quadrant of the circle
19. Secant
20. Concentric circles
21. Answers

a. OA [Answer may vary as per student choice]
b. DE
c. XC [Answer may vary as per student choice]
d. XYEABC [Answer may vary as per student choice]
e. XDC [Answer may vary as per student choice]
f. DOB [Answer may vary as per student choice]
g. AOB [Answer may vary as per student choice]
h. DXYE [Answer may vary as per student choice]

Worksheet 3

1. Answers

   i) line s/ AH, line q / CE

   ii) line x/ AG , line q / CE

   iii) AB // CE [Answer may vary as per student choice]

   iv) A, C, G

2. Answers

$\overrightarrow{AB}, \overrightarrow{AC}, \overrightarrow{BA}, \overrightarrow{CA}, \overrightarrow{BC}, \overrightarrow{CB}$

7. EXTRA RESOURCES

Carry out the following suggested activities/ tasks if you have the time and resources to do them

Teacher can use these videos if time and facilities permit:

1. https://www.youtube.com/watch?v=NytgqC81iCo - Point, line, intersecting lines, parallel lines visual experience
2. https://www.youtube.com/watch?v=69lfTURDles - Polygon song
3. https://www.youtube.com/watch?v=BPnP_EEZvQc - Circle and its parts