Chapter - 9

Basic Geometrical Ideas

What We Have Learnt

(1)

Curved line

Straight line

(2)

(a)

Triangle

(b)

Quadrilateral

(c)

Square

(3)

Circle using a bangle.

④ A circle has only one centre.

⑤

(i) A line segment has <u>two</u> end points

(ii) A ray has <u>no</u> definite length

(iii) Opposite side of a rectangle are <u>equal</u>.

(iv) Radius of a circle is <u>half</u> its diameter.

⑥

(a) T

(b) F

This case is true for only equilateral triangle

(c) T

(d) T

(e) F

Diameter of a circle is double of its radius.

Exercise 9.1

① (iii)

Solution: A line segment has definite length.

②

(i) A line segment has two end points.

(ii) A ray has only one end point.

(iii) A line has no end point because it has no definite length.

③

Ray	Starting point
$\overrightarrow{PQ}$	P
$\overleftarrow{AB}$	B
$\overrightarrow{XY}$	X
$\overleftarrow{MN}$	N
$\overrightarrow{OP}$	O
$\overleftarrow{OX}$	X
$\overleftarrow{PQ}$	Q

④ No, $\overrightarrow{PQ}$ and $\overrightarrow{QP}$ represents two opposite ray.

⑤

(i) An edge of a table top represents a line segment.

(ii) Corner of a room represents a point.

(iii) Metal tip of a compass represents a point.

⑥ Infinite line can be drawn through a given point.

⑦ There is one and only one line can we draw through two given points.

⑧

(a) $\overleftrightarrow{XY}$

(b) $\overleftrightarrow{PQ}$

(c) l

(9) Lines: l, $\overleftrightarrow{XY}$

Rays: $\overrightarrow{MN}$, $\overrightarrow{OP}$

Line segment: $\overline{AB}$

(10) (i) There are 10 line segments in the given figure. These are:

$\overline{AB}$, $\overline{AC}$, $\overline{AX}$, $\overline{AM}$, $\overline{BC}$, $\overline{BX}$, $\overline{BM}$, $\overline{CX}$, $\overline{CM}$, $\overline{XM}$

(ii) There are 4 rays starting from point C. These are:

$\overrightarrow{CX}$, $\overrightarrow{CM}$, $\overrightarrow{CA}$, $\overrightarrow{CB}$

(iii) Yes, $\overrightarrow{AB}$ and $\overrightarrow{AC}$ represent the same ray.

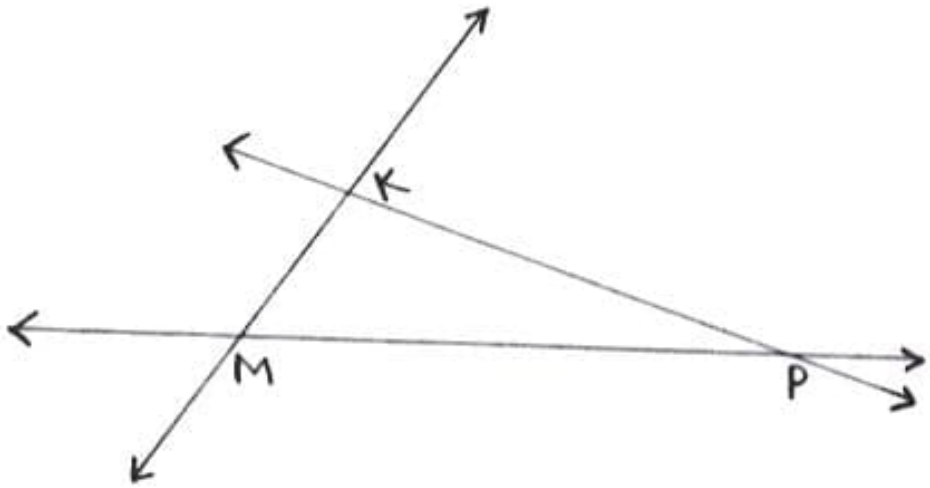
(iv) Two opposite rays with X as starting point are $\overrightarrow{XA}$ and $\overrightarrow{XM}$

(11)

Three or more points lying on one line are called collinear points.

Thus, the points P, Q A are collinear.

(12)



We can draw 3 lines with 3 different non-collinear points K, M and P.

Joining these points in pairs, we get $\overleftrightarrow{KM}$, $\overleftrightarrow{KP}$, $\overleftrightarrow{MP}$.

(b) Yes

(c) Yes

(16) Four pairs of intersecting lines are:

(i) $(\overleftrightarrow{AB}, \overleftrightarrow{PS})$; $(\overleftrightarrow{AB}, \overleftrightarrow{RS})$; $(\overleftrightarrow{CD}, \overleftrightarrow{PS})$; $(\overleftrightarrow{CD}, \overleftrightarrow{RS})$

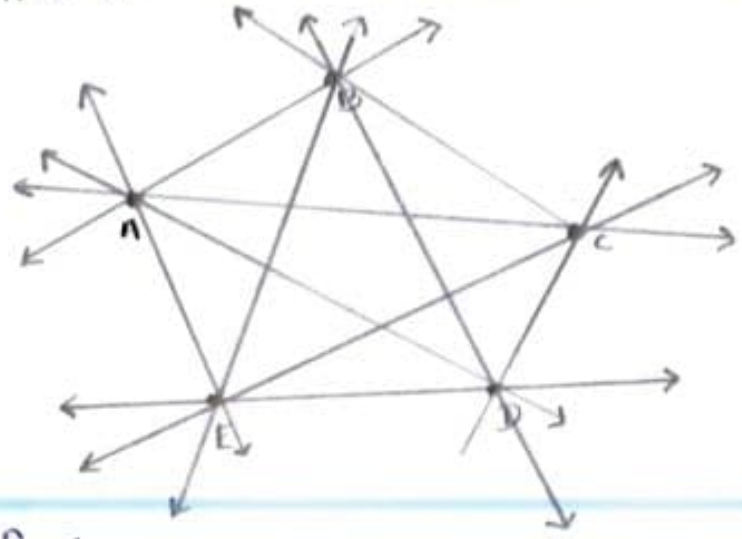
(ii) Four collinear points are A, Q, S, B

(iii) Three non-collinear points A, C, B.

(iv) Three concurrent lines are
$\overleftrightarrow{AB}$, $\overleftrightarrow{PS}$, $\overleftrightarrow{RS}$

(v) Three lines whose point of intersection is p are $\overleftrightarrow{CD}$, $\overleftrightarrow{PQ}$ and $\overleftrightarrow{PS}$

(17) Consider the points A, B, C, D and E, no three of which are collinear.



There are 10 lines.

(13)

(i) Lines passing through A: $\overleftrightarrow{AB}$, $\overleftrightarrow{AC}$, $\overleftrightarrow{DE}$

(ii) Lines passing through B: $\overleftrightarrow{BA}$, $\overleftrightarrow{CE}$

(iii) Line passing through B, C and E: $\overleftrightarrow{CE}$

(14)

(i) Parallel line segments are:

$\overline{AD} \parallel \overline{BC}$; $\overline{AB} \parallel \overline{DC}$

(ii) $\overline{AC}$ and $\overline{BD}$ are two line segments which are intersecting at point P.

(15)

(a)

(i) 4 line segmets are: $\overline{AB}$, $\overline{BC}$, $\overline{BE}$, $\overline{EP}$

(ii) 4 rays are: $\overrightarrow{ED}$, $\overrightarrow{CQ}$, $\overrightarrow{EP}$, $\overrightarrow{BD}$

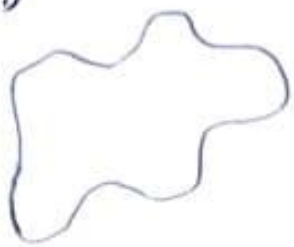
(iii) 2 lines are: $\overleftrightarrow{AC}$ and $\overleftrightarrow{DE}$

(iv) 3 collinear points are A, B and C.

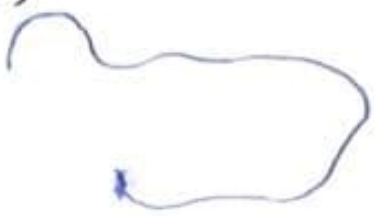
Exercise 9.2

(1)

(i)



(ii)



(iii)

(iv)

(2)

Simple open curves: (iv), (v) and (ix)

Simple closed curves: (ii), (iii), (viii) and (xi)

Open but not simple : (i) and (vi)

Closed but not simple : (vii) and (x)

③

(i) Three angles formed:

$\angle BAC$, $\angle CAB$, $\angle ABC$

(ii) Four angles formed:

$\angle BAD$, $\angle ABC$, $\angle BCD$, $\angle CDA$

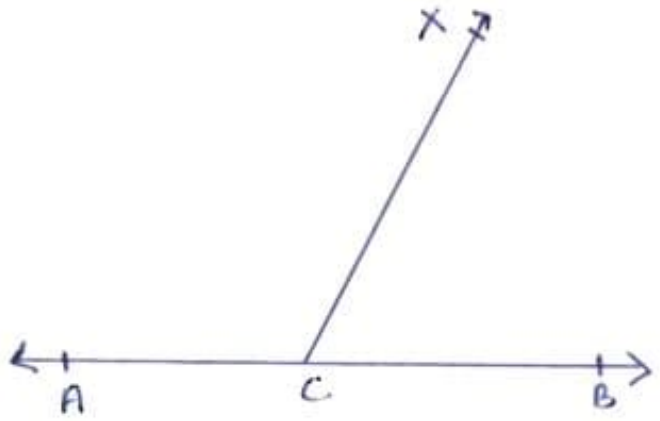
(iii) Eight angles formed:

$\angle ABD$, $\angle BAD$, $\angle BCD$, $\angle ADC$, $\angle ADB$, $\angle ABC$, $\angle DBC$, $\angle CDB$

④

Five angles are: $\angle XBR$, $\angle XBP$, $\angle RBP$, $\angle PBC$, $\angle CBX$

⑤



There are 3 angles formed: $\angle ACX$, $\angle BCX$ and $\angle ACB$.

(6)

Two angles in which OR as their common arm are: $\angle ROQ$ and $\angle ROP$

(7) (i) Points lying in the interior of $\angle AOX$ are L and P.

(ii) Points lying on $\overrightarrow{OA}$ are R and M.

(iii) Points lying on $\overrightarrow{OB}$ are K and B.

(iv) Points lying in the interior of $\angle AOB$ are H and E.

(v) Points lying in the exterior of $\angle XOB$ are G, C and D.

(8)

(i) $\angle 1 = \angle EPB$

(ii) $\angle 2 = \angle PQC$

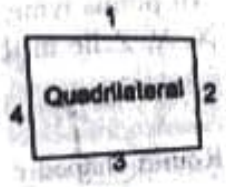
(iii) $\angle 3 = \angle FQD$

Exercise 9.3

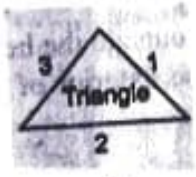
① Minimum 3 line segments are needed to draw a polygon.

No, because 2 line segments donot make a closed figure.

②



(i)

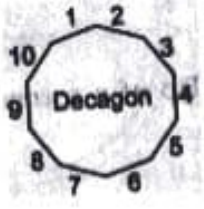


(ii)

(iii)

(iv)

(v)



(vi)

③

(i) 4 vertices

(ii) 3 vertices

(iii) 5 vertices

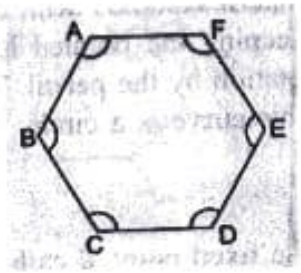
(iv) 6 vertices

(v) 8 vertices

(vi) 10 vertices

④ A polygon is said to be regular, if it has all its sides equal and all its angles also equal

Look at the adjoining figure.



Here, $AB = BC = CD = DE = EF = FA$

and $\angle A = \angle B = \angle C = \angle D = \angle E = \angle F$

So, ABCDEF is a regular hexagon.

⑤

(i) O

(ii) AF and CB

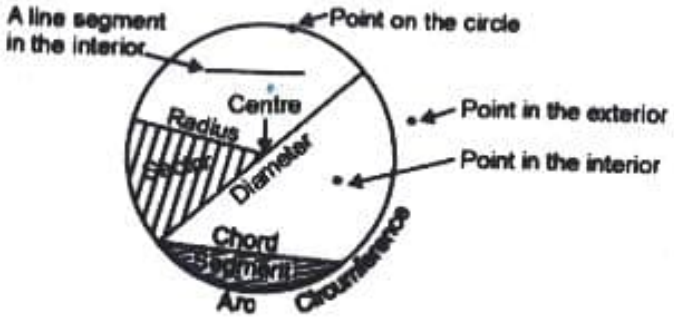
(iii) OA, OB, OD, OE, OF

(iv) AB and DE

(v) AQF and BPC

(vi) OAD, OEF and OBE

(6)

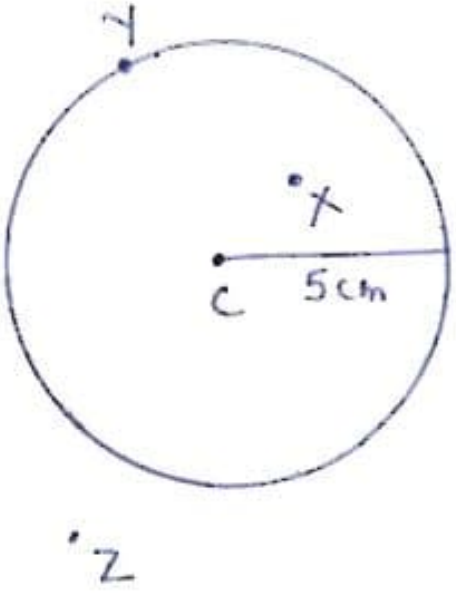


(7) From point P, which is on the circumference of the circle, we can draw infinite number of chords.
There is one and only one diameter.

(8)

Here when we join CX, CY and CZ, we see that,

$CX < CY < CZ$



(9)

(i) A line segment whose one end point is the centre of the circle and the other end point is on the circle is called <u>radius</u>.

(ii) By joining any two points on the circle, a chord is obtained.

(iii) Any part of the circle is called an arc.

(iv) A chord passing through the centre is called diameter.

(v) All the diameters pass through the centre.

(vi) A secant of a circle is a line which intersects the circle at two points.

(vii) Sector of a circle is bounded by two radii and arc.

(viii) Segment of a circle is bounded by chord and arc.

(ix) A chord divides a circle in two parts; each part is called a segment.

(x) All radii of a circle are equal.

(xii) Centre of the circle lies in the interior of the circle.

(xi) Every circle has one centre but infinite diameters.

(xiii) If P is a point lying outside the circle with radius O, the OP is greater than the radius of the circle.

Multiple choice Questions

(1) (b)

Solution: A line has infinite length.

2 (a)

Solution: A point where three or more than three lines meet is called the point of concurrence.

3 (b)

Solution: A line segment has two end points.

4 (a)

Solution: The maximum number of points of intersection of three lines, taking two at a time is 1.

5 (a)

Solution: The meeting point of a pair of adjacent sides of a polygon is called its vertex.

6(b)

Solution: An angle has one vertex and two arms.

7(a)

Solution: angle Y = $\angle XYZ$

8(d)

Solution: $\angle PQR$ can also be named as $\angle RQP$.

9(c)

Solution: A circle is a closed curve.

10(d).

Solution: Circles having different radii but the same centre are called concentric circles.

Value Based Questions:

(a) Three real life examples where we can see the formation of angles are:

(i) Time shown by a clock

(ii) Crossing roads

(iii) Blades of a fan

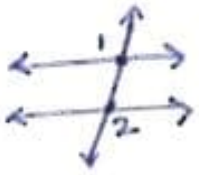
Mental Maths

① T

② T

③ F

Explanation: Two parallel lines intersect at two points.



④ T

⑤ F

Explanation: An angle has one vertex and two arms.

⑥ T

⑦ T

⑧ T

⑨ F

Explanation: A line segment joining any two points of the circumference is called a chord.

(10) F

Explanation: All the chords of a circle are not equal. When the chord passes through the centre of a circle is called the diameter and it is the longest chord of a circle.