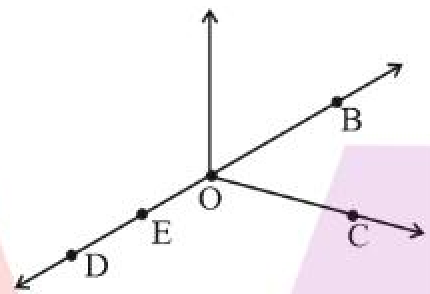
CBSE NCERT Solutions for Class 6 Mathematics Chapter 4

Back of Chapter Questions

Exercise 4.1

1. Use the figure to name:



(a) Five points

(b) A line

(c) Four rays

(d) Five-line segments

Solution:

(a) From the figure,

Five points are: O, B, C, D, E

(b) From the figure,

A line: $\overleftrightarrow{DB}$

(c) From the figure,

Four rays are: $\overrightarrow{OD}\ \overrightarrow{OE}\ \overrightarrow{OC}\ \overrightarrow{OB}$

(d) From the figure,

Five-line segments are: $\overline{DE}, \overline{OE}, \overline{OC}, \overline{OB}, \overline{OD}$

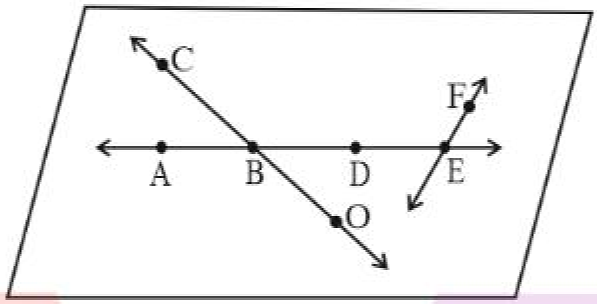
2. Name the line given in all possible (twelve) ways, choosing only two letters at a time from the four given.

Solution:

Taking two points at a time, the given line can be named in the following ways.

$\overleftrightarrow{AB}$, $\overleftrightarrow{AC}$, $\overleftrightarrow{AD}$, $\overleftrightarrow{BC}$, $\overleftrightarrow{BD}$, $\overleftrightarrow{CD}$, $\overleftrightarrow{BA}$, $\overleftrightarrow{CA}$, $\overleftrightarrow{DA}$, $\overleftrightarrow{CB}$, $\overleftrightarrow{DB}$, $\overleftrightarrow{DC}$.

3. Use the figure to name:



(a) Line containing point E.

(b) Line passing through A.

(c) Line on which O lies

(d) Two pairs of intersecting lines.

Solution:

The lines containing E are:

$\overleftrightarrow{AE}$, $\overleftrightarrow{BE}$, $\overleftrightarrow{DE}$, and $\overleftrightarrow{FE}$

A line passing through A:

$\overleftrightarrow{AE}$, $\overleftrightarrow{BA}$ and $\overleftrightarrow{DA}$

A line on which O lies :

$\overleftrightarrow{CO}$ or $\overleftrightarrow{OC}$

Two pairs of intersecting lines are:

$\overleftrightarrow{AD}$ and $\overleftrightarrow{OC}$

$\overleftrightarrow{AE}$ and $\overleftrightarrow{FE}$

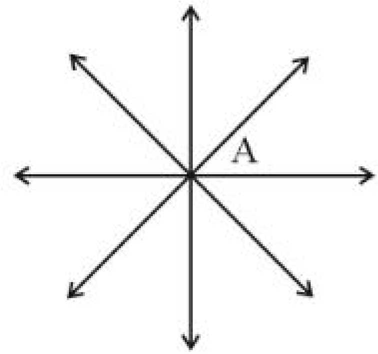
4. How many lines can pass through

(a) one given point?

(b) two given points?

Solution:

(a) It is given a single point, then infinite number of lines can pass through it.



(b) It is given two points, then only one line can pass through the two points.

5. Draw a rough figure and label suitably in each of the following cases:

(a) Point P lies on $\overline{AB}$.

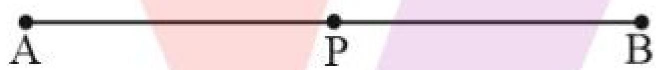
(b) $\overleftrightarrow{XY}$ and $\overleftrightarrow{PQ}$ intersect at M.

(c) Line l contains E and F but not D.

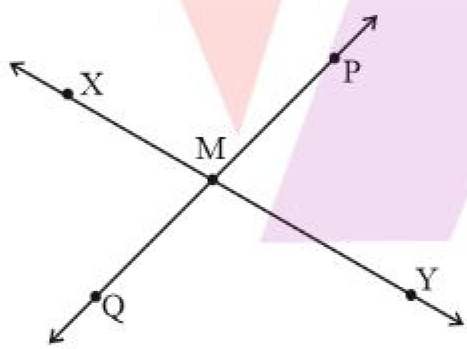
(d) $\overleftrightarrow{OP}$ and $\overleftrightarrow{OQ}$ meet at O.

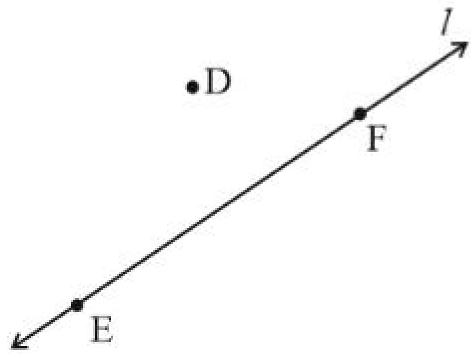
Solution:

(a)

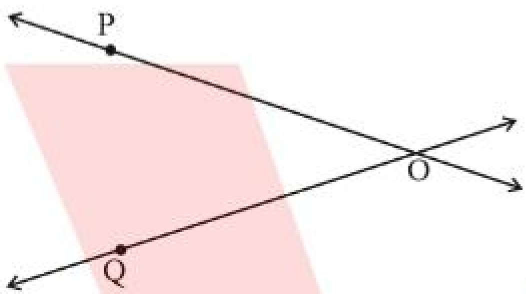


(b)



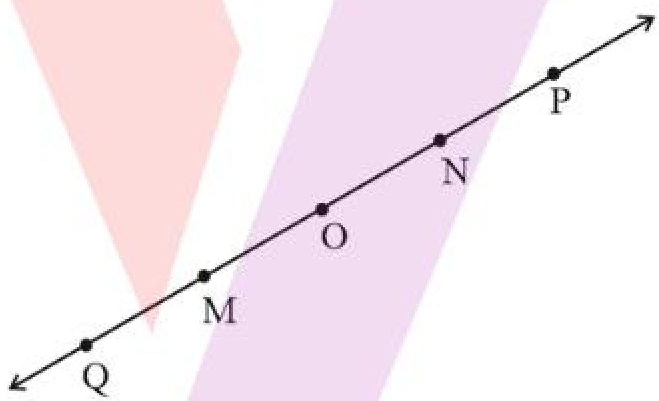


(d)



(e)

6. Consider the following figure of line $\overleftrightarrow{MN}$. Say whether following statements are true or false in context of the given figure.



(a) Q, M, O, N, P are points on the line $\overleftrightarrow{MN}$

(A) True

(B) False

Solution: (A)

From the given figure, we can observe the given points lie on the line $\overleftrightarrow{MN}$ are Q, M, O, N, P

Hence, the given statement is true.

(b) M, O, N are points on a line segment $\overline{MN}$

(A) True

(B) False

Solution: (A)

From the given figure, the given points are lying on the line segment $\overline{MN}$

Hence, the given statement is true.

(c) M and N are end points of line segment $\overline{MN}$.

(A) True

(B) False

Solution: (A)

Since, points M and N are a part of the given line, a line segment between them can be written as $\overline{MN}$.

From the given figure, we can observe that out of the three points M, N and O of the line segment $\overline{MN}$, M and N are the end points.

Hence, the given statement is true.

(d) O and N are end points of line segment $\overline{OP}$.

(A) True

(B) False

Solution: (B)

The line segment $\overline{OP}$ has points O, N and P lying on it.

From the given figure, we can observe that O and P are the end points of the line segment $\overline{OP}$.

Hence, the given statement is false.

(e) M is one of the end points of line segment $\overline{QO}$.

(A) True

(B) False

Solution: (B)

The line segment $\overline{QO}$ denotes the distance between points Q and O on the given line.

Since point M lies within the distance between Q and O, M cannot be the end point.

Therefore, Q and O are the end points of the given line segment.

Hence, the given statement is false.

(f) M is point on ray $\overrightarrow{OP}$.

(A) True

(B) False

Solution: (B)

The ray $\overrightarrow{OP}$ starts at O and extends on the other side.

P is a point on it. Clearly, M does not lie on the ray $\overrightarrow{OP}$.

Hence, the given statement is false.

(g) Ray $\overrightarrow{OP}$ is different from ray $\overrightarrow{QP}$

(A) True

(B) False

Solution: (A)

Since, ray $\overrightarrow{OP}$ originates at O while ray $\overrightarrow{QP}$ originates at Q.

So, the two given rays are different from each other.

Hence, the given statement is true.

(h) Ray $\overrightarrow{OP}$ is same as ray $\overrightarrow{OM}$

(A) True

(B) False

Solution: (B)

Ray $\overrightarrow{QP}$ starts at O and extends towards point P while ray $\overrightarrow{OM}$ starts at O and extends towards M.

Since, the directions of the two rays are different, ray $\overrightarrow{OP}$ is not same as ray $\overrightarrow{OM}$.

Hence, the given statement is false.

(i) Ray $\overrightarrow{OM}$ is not opposite to ray $\overrightarrow{OP}$.

(A) True

(B) False

Solution: (B)

Ray $\overrightarrow{QP}$ starts at O and extends towards point P while ray $\overrightarrow{OM}$ starts at O and extends towards M.

Since, the directions of the two rays are different, ray $\overrightarrow{OP}$ is not same as ray $\overrightarrow{OM}$.

They are opposite to each other.

Hence, the given statement is false.

(j) O is not an initial point of $\overrightarrow{OP}$

(A) True

(B) False

Solution: (B)

$\overrightarrow{OP}$ denotes a ray that starts at O and extends infinitely in the direction of P.

Hence, O is the initial point of the given ray.

Therefore, the given statement is false.

(k) N is the initial point of $\overrightarrow{NP}$ and $\overrightarrow{NM}$

(A) True

(B) False

Solution: (A)

$\overrightarrow{NP}$ and $\overrightarrow{NM}$ represent two rays starting at N and extending infinitely in the directions of points P and M. Therefore, N is the initial point of both the rays.

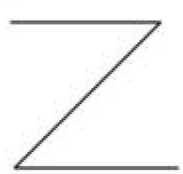
Hence, the given statement is true.

Exercise 4.2

1. Classify the following curves as

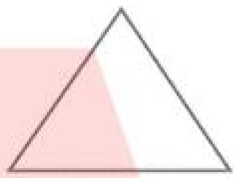
(i) Open or

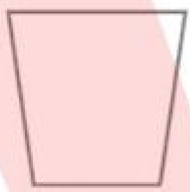
(ii) Closed.

(a) 

(b) 

(c) 

(d) 

(e) 

Solution:

A closed figure is the one in which the starting point and the ending point coincide to form closed boundary.

An open figure is incomplete since, the starting and ending points are different and does not coincide.

(a) Open curve

(b) Closed curve

(c) Open curve

(d) Closed curve

(e) Closed curve

2. Draw rough diagrams to illustrate the following:

(a) Open curve:

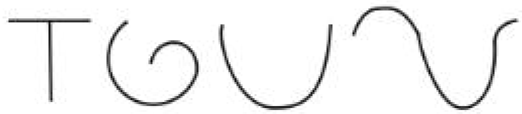
(b) Closed curve:

Solution:

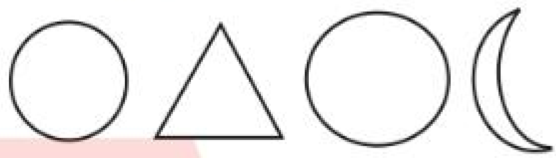
A closed figure is the one in which the starting point and the ending point coincide to form closed boundary.

An open figure is incomplete since, the starting and ending points are different.

(a) Open curves:



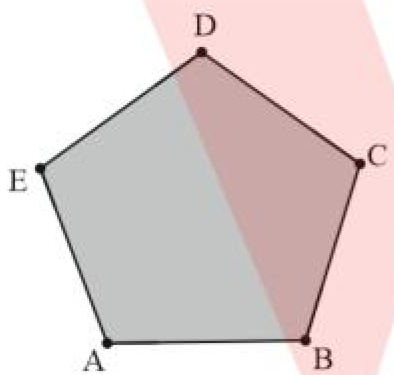
(b) Closed curves:



3. Draw any polygon and shade its interior.

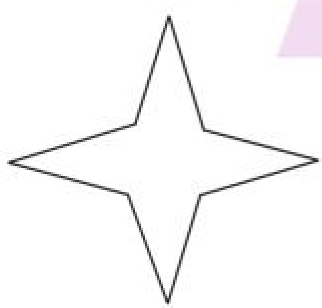
Solution:

Consider a polygon ABCDE as shown below:



The shaded region is its interior.

4. Consider the given figure and answer the questions:



(a) Is it a curve?

(b) Is it closed?

Solution:

(a) Yes, it is a curve.

Any figure that can be drawn without lifting the pencil from the paper and without the use of ruler is termed as a curve.

(b) Yes, it is closed.

Since, the starting and ending terminals of the figure coincide and form a closed boundary, the given figure is a closed figure.

5. Illustrate, if possible, each one of the following with a rough diagram:

(a) A closed curve that is not a polygon.

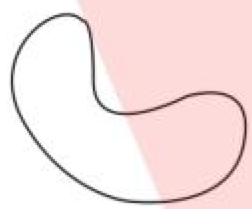
(b) An open curve made up entirely of line segments.

(c) A polygon with two sides.

Solution:

(a) Consider the following figure.

Since, a polygon is a closed figure made up of only line segments, the following figure is not a polygon but a mere closed figure.



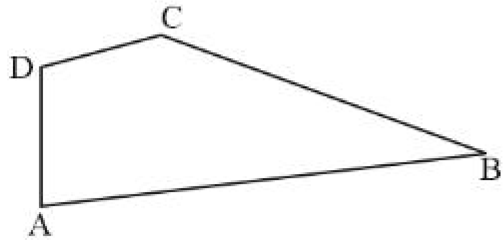
(b) Clearly, the figure below shows that it is not closed, but made up of line segments only.

(c) Polygon with two sides cannot be draw.

This is because, a closed figure cannot be obtained with two sides.

Exercise 4.3

1. Name the angles in the given figure.



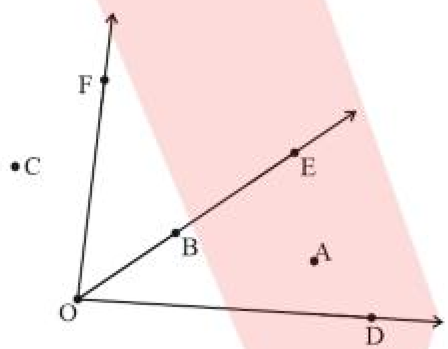
Solution:

A polygon with five sides has four angles.

There are four angles in given figure:

∠ABC, ∠CDA, ∠DAB, ∠DCB.

2. In the given diagram, name the point(s)



(a) In the interior of ∠DOE

(b) In the exterior of ∠EOF

(c) On ∠EOF

Solution:

(a) From the figure, Point A exists in the interior of ∠DOE

(b) From the figure, Points C, A and D exist exterior to ∠EOF

(c) From the figure, Points E, O, B and F lie on ∠EOF

3. Draw rough diagrams of two angles such that they have

(a) One point in common.

(b) Two points in common.

(c) Three points in common.

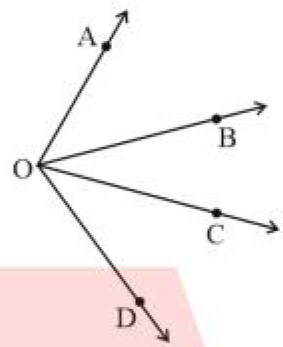
(d) Four points in common.

(e) One ray in common.

Solution:

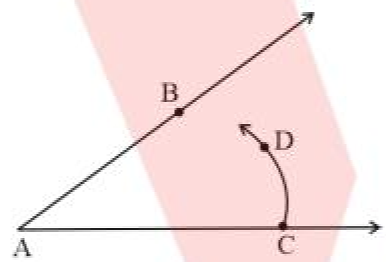
(a) From the figure given below,

∠AOB and ∠COD have only point O in common.



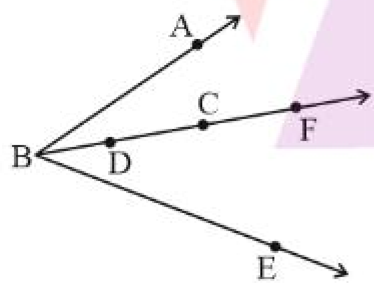
(b) From the figure given below,

∠BAC and ∠BAD have two points A and B in common.



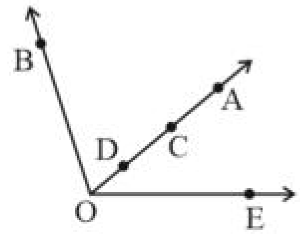
(c) From the figure given below,

∠ABF and ∠FBE have points D, C and F in common.



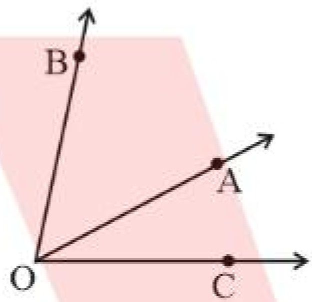
(d) From the figure given below,

∠BOA and ∠AOE have points O, D, C and A in common.



(e) From the figure given below,

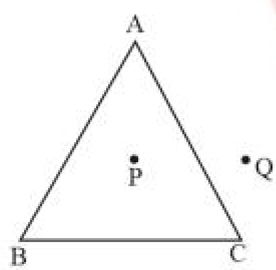
$\angle BOA$ and $\angle AOC$ have $\overrightarrow{OA}$ in common.



Exercise:4.4

1. Draw a rough sketch of a triangle ABC. Mark a point P in its interior and a point Q in its exterirror. Is the point A in its exterior or in its interior?

Solution:



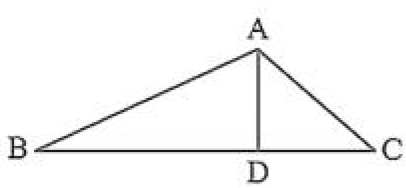
From the figure we can observe that,

A is neither interior of the figure nor exterior or triangle. It is a vertex.

Point P lies in the interior part of the triangle ABC.

Point Q lies in the exterior part of the triangle ABC.

2.



(a) Identify three triangles in the figure.

(b) Write the names of seven angles.

(c) Write the names of six line segments.

(d) which two triangles have ∠B as common?

Solution:

From the figure given,

The three triangles are: ΔABC, ΔABD, ΔADC

From the figure given,

The seven angles belong to ΔABC, ΔABD, ΔADC

Angles are: ∠ADB, ∠ADC, ∠ABD, ∠ACD, ∠BAD, ∠CAD, ∠BAC

From the figure given,

The six line segments are: $\overline{AB}$, $\overline{AC}$, $\overline{AD}$, $\overline{BD}$, $\overline{DC}$, $\overline{BC}$

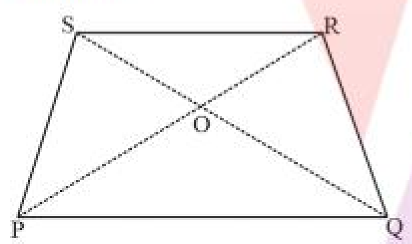
From the figure given,

Triangles having ∠B in common are: ΔABC, ΔABD.

Exercise 4.5

1. Draw a rough sketch of a quadrilateral PQRS. Draw its diagonals. Name them. Is the meeting point of the diagonals in the interior or exterior of the quadrilateral?

Solution:



Diagonals PR and SQ meet at point O. Clearly, point O exists in the interior of the quadrilateral.

2. Draw a rough sketch of a quadrilateral KLMN. State,

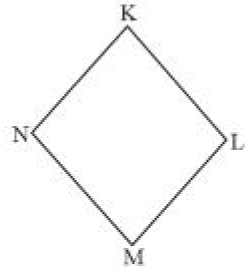
(a) two pairs of opposite sides,

(b) two pairs of opposite angles,

(c) two pairs of adjacent sides,

(d) two pairs of adjacent angles.

Solution:



(a) From the figure,

The pair of opposite sides are: KL and MN, KN and LM.

(b) From the figure,

The pair of opposite angles are: $\angle K, \angle M$ and $\angle N, \angle L$

(c) From the figure,

The pair of adjacent sides are: $\overline{KL}, \overline{KN}$ and $\overline{NM}, \overline{ML}$ or $\overline{KL}, \overline{LM}$ and $\overline{NM}, \overline{NK}$

(d) From the figure,

The pair of adjacent angles are: $\angle K, \angle L$ and $\angle N, \angle M$ or $\angle K, \angle L$ and $\angle L, \angle M$

3. Investigate:

Use strips and fasteners to make a triangle and a quadrilateral.

Try to push inward at any one vertex of the triangle. Do the same to the quadrilateral.

Is the triangle distorted? Is the quadrilateral distorted? Is the triangle rigid?

Why is it that structures like electric towers make use of triangular shapes and not quadrilaterals?

Solution:

No, the triangle is not distorted but the quadrilateral is distorted.

On pushing the vertex of the triangle inward, whole triangle moves, but the shape remains same.

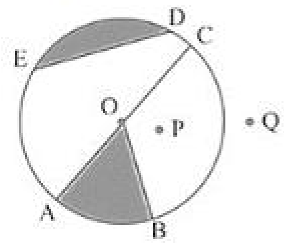
So clearly, the triangle is rigid.

But on pushing the vertex of quadrilateral inward, the shape of the quadrilateral becomes distorted.

Hence, the structures like electric towers make use of triangular shape so that they will not be distorted easily, and they will remain rigid.

Exercise 4.6

1. From the figure, identify:



(a) the centre of circle

(b) Three radii

(c) a diameter

(d) a chord

(e) two points in the interior

(f) a point in the exterior

(g) a sector

(h) a segment

Solution:

(a) The centre of the circle is O

(b) $\overline{OA}, \overline{OB}$ and $\overline{OC}$ are the radii of the circle.

(c) $\overline{AC}$ is the diameter of the circle.

(d) $\overline{ED}$ is the chord of the circle.

(e) O, P are the two points that lie in the interior of the circle.

(f) Q is a point that lies exterior to the circle.

(g) OAB is a sector of the given circle.

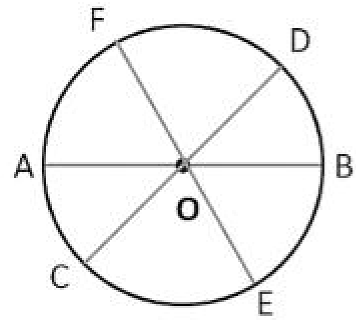
(h) ED is the segment of the circle.

2. (a) Is every diameter of a circle also a chord?

(b) Is every chord of a circle also a diameter?

Solution:

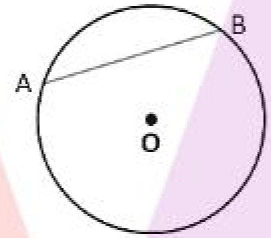
(a) Yes, every diameter of a circle is also a chord.



Since, the ends of a diameter always lie on the circumference of the circle.

Therefore, every diameter of a circle becomes chord.

(b) No, every chord of a circle need not be a diameter.



From the figure,

AB is a chord, but it does not pass through the center of the circle.

Hence, every chord of a circle need not be a diameter.

3. Draw any circle and mark

(a) its centre

(b) a radius

(c) a diameter

(d) a sector

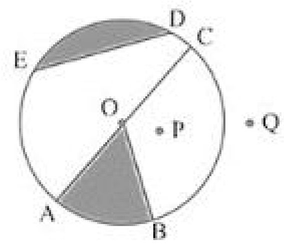
(e) a segment

(f) a point in its interior

(g) a point in its exterior

(h) an arc

Solution:



(a) O is the centre of the circle

(b) OB is the radius of the circle.

(c) AC is the diameter of the circle.

(d) OAB is a sector of the circle.

(e) ED is the segment of the circle.

(f) P is a point in the interior of the circle.

(g) Q is a point in the exterior of the circle.

(h) arc ABC is one of the arcs of the circle.

4. Say true or false:

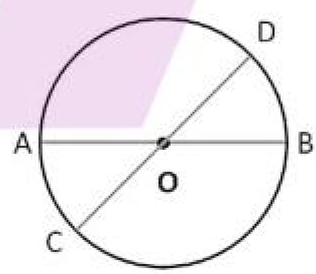
(a) Two diameters of a circle will necessarily intersect.

(A) True

(B) False

Solution: (A)

Since, the diameters of a circle pass through the centre, any two diameters will necessarily intersect at the center.



Hence, the given statement is true.

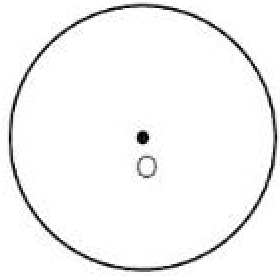
(b) The centre of a circle is always in its interior.

(A) True

(B) False

Solution: (A)

The centre of a circle is equidistant to all the other points on the circle.



Since, a circle is drawn from its centre, by fixing its radius, the centre of a circle always lies in the interior of the circle.

Hence, the given statement is true.

♦♦♦