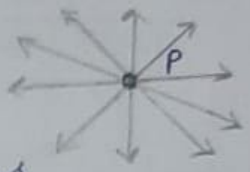
5. Introduction To Euclid's Geometry.

Exercise - 5.1

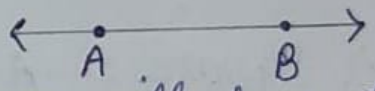
Question-01

Ans (i) False, Infinitely many lines can pass through a point.



(ii) False, Only one line can pass through two distinct points.

(iii) True, A terminated line or line segment can be produced indefinately on both sides.



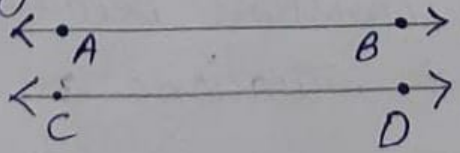
(iv) True, Two circles of equal area will have the same radius. [From relation πr^2]

v) True, According to axiom if two things are, separately, equal to third thing. Then, they are equal to each other.

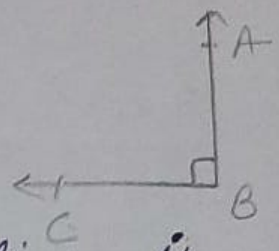
Question 2

Ans (i) Parallel lines :- Two straight lines in a plane that do not intersect at any point are said to be parallel.

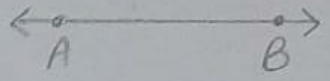
for example



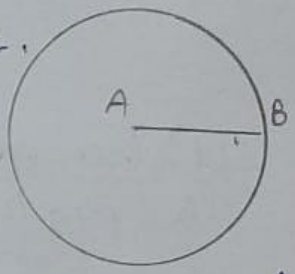
(ii) Perpendicular Lines :— Perpendicular lines are lines that intersect at a right (90 degree) angle.



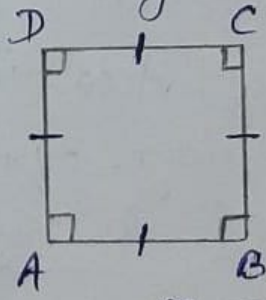
(iii) Line Segment :— A part of a line is called line segment.



(iv) Radius of Circle :— The line segment with one end point at the centre and other at any point on the circle.



v). Square :— A quadrilateral with all sides equal and all angles right (90°) angles is a square.



Question 03 :—

Answer :- Yes, these postulates contain undefined terms such as 'Point and Line'. Also, these postulates are consistent because they deal with two different situations as

(ii) says that, given two points A and B, there is a point C lying on the line in between them whereas

(iii) says that, given points A and B, you can take point C not lying on the line through A and B.

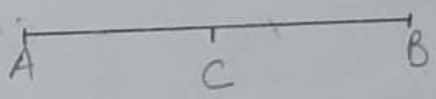
No, these postulates do not follow from Euclid's postulates.

However, they follow from axiom, "Given two distinct points, there is a unique line that passes through them".

Question 04 :—

Solution :—

$AC = BC$ -- (Given)



$\therefore AC + AC = BC + AC$

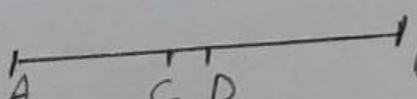
[if equals added to equals then wholes are equal]

or $2AC = AB$ [$\because BC + AC = AB$]

or $AC = \frac{1}{2} AB$

Question 05 :—

Solution :— Let the given line AB is having two mid points 'C' and 'D'. Then from above theorem,



$AC = \frac{1}{2} AB$ — ①

and $AD = \frac{1}{2} AB$ — ②

From ① & ②, we get

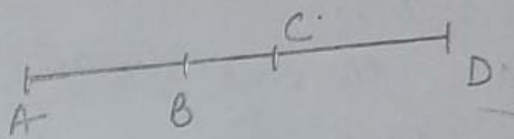
$AC = AD$

But this is possible only if 'D' coincides with 'C'.

∴ C is a unique mid point.

Question 06 Imp:

Solution :—



Given :- $AC = BD$

To prove :- $AB = CD$

Prove :— $AC = BD$ — given

Subtracting 'BC' on both sides, we get

$AC - BC = BD - BC$

$AB = CD$ Proved.

Question 07.

Answer :— Axiom 5 :— 'whole is always greater than parts'

This is Universal truth because part is included in the whole and therefore can never be greater than whole.

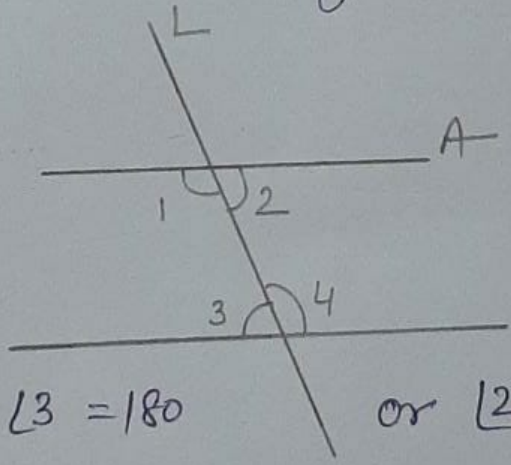
Exercise – 5.2

Question 1 :—

Answer :— Two distinct intersecting lines cannot be parallel to the same line.

Question 2 :—

Answer :— Yes, Euclid's fifth postulate does imply the existence of parallel lines. If the sum of the interior angles are equal to 180°, then two lines will not meet each other at any point, hence making them parallel to each other.



$\angle 1 + \angle 3 = 180$ or $\angle 2 + \angle 4 = 180°$

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