HW

Ch-5 Introduction to Euclid Geometry

EXERCISE 5.1

1) i) False. This can be seen visually.
ii) False. This contradicts the Axiom.
iii) True by Euclid's Postulate (ii)
[A terminated line can be produced indefinitely.]
iv) True. If we superimpose the region bounded by one circle on the other, then they coincide. So, their centres and boundaries coincide therefore, their radii will coincide.
v) True by the first Axiom of Euclid.
[Things which are equal to the same thing are equal to one another.]

2. i) Parallel lines - Lines which do not intersect anywhere are called parallel lines.
ii) Perpendicular lines - Two lines which are at a right angle to each other are called perpendicular lines.

iii) Line Segment — It is a terminated line.

iv) Radius – The length of the line-segment joining the centre of a circle to any point on its circumference is called its radius.

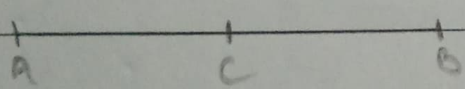
v) Square – A quadrilateral with all the four sides equal and all the four angles of measure 90° each is called a square.

3.) Yes, these postulates contain undefined terms such as 'Point and line'. Also, these postulates are consistent because they deal with two different situations as.

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

ii) 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 the axiom, "Given two distinct points, there is a unique line that passes through them."

4. We have



AC = BC [Given]

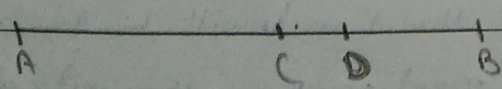
∴ AC + AC = BC + AC.

[If equals added to equals then wholes are equal]

or 2AC = AB [∵ AC + BC = AB]

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

5. Let the given line AB is having two mid points 'C' and 'D'



$AC = \frac{1}{2} AB$ ..... (i)

and $AD = \frac{1}{2} AB$ .... (ii)

Subtracting (i) from (ii), we have.

$AD - AC = \frac{1}{2} AB - \frac{1}{2} AB$

or $AD - AC = 0$ or $CD = 0$

$\therefore$ C and D coincide.

Thus, every line segment has one and only one mid-point.

6. Given : $AC = BD$

$\Rightarrow AB + BC = BC + CD$

Subtracting BC from both sides, we get :

$AB + BC - BC = BC + CD - BC$

[When equals are subtracted from equals, remainders are equal]

$\Rightarrow AB = CD$.

7. As statement is true in all the situations. Hence, it is considered a 'universal truth'.

EXERCISE 5.2

1. We can write Euclid's fifth postulate as 'Two distinct intersecting lines cannot be parallel to the same line.'

2. Yes, If a straight line l falls on two lines m and n such that sum of the interior angles on one side of l is two right angles, then by Euclid's fifth postulate, lines m and n will not meet on this side of l. Also, we know that the sum of the interior angles on the other side of the line l will be two right angles too. Thus, they will not meet on the other side also.

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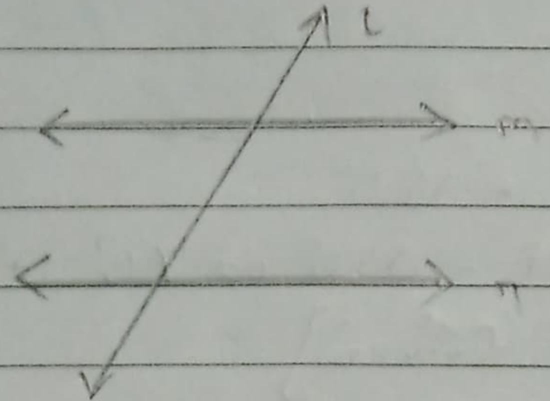

$\therefore$ The lines m and n never meet, i.e. They are parallel.