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Key points

Point $\div$ A small dot marked by a sharp pencil on a sheet of paper or a prick made by a fine needle on a paper are examples of point.

Line $\div$ A line length only. It has no breadth or thickness

Plane $\div$ A plane has length and breadth. It has no thickness

Space $\div$ Space is the collection of all points in the universe. So, a point or a line or a plane is a part of Space

Axioms and Postulates $\div$ The assumptions which are actually 'obvious universal truths' are called axioms (or postulates)

Theorem, Corollary $\div$ A mathematical statement

which are actually proved by using axioms and other statements already proved is called a theorem.

★ Euclid's axioms

Some of Euclid's axioms, not in his order are given

1. Things which are equal to the same thing are equal to one another
2. If equals are added to equals, the wholes are equal.
3. If equals are subtracted from equals, the remainders are equal.
4. Things which coincide with one another are equal to one another.
5. The whole is greater than the part.
6. Things which are double of the same thing are equal to one another

7. Things which are halves of the same thing are equal to one another?

Postulate 1: A Straight line may be drawn from any point to any other point.

Postulate 2: A terminated line can be produced indefinitely.

Postulate 3: A Circle can be drawn with any centre and any radius.

Postulate 4: All right angles are equal to one another.

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Exercise 5.1

Q2 Give a definition for each of the following terms. Are there other terms that need to be defined first? What are they, and how might you define them?

(i) parallel lines

Ans Lines which have equal distance between them and they don't meet each other

(ii) perpendicular lines

Ans Lines which intersect each other at 90°

(iii) line segment

Ans Lines which ~~is~~ terminated in both ends

(iv) radius of a circle

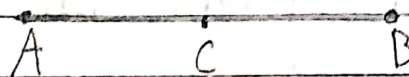
Ans Distance between center of circle and its boundary

(VI) Square

Ans Shape with 4 sides equal

Q4. If a point C lies between two points A and B such that $AC = BC$, then prove that $AC = \frac{1}{2} AB$. Explain by drawing the figure.

Ans Given that
 $AC = BC$



To prove

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

Proof:-

$$\Rightarrow AB = AC + CB$$

(If two parts are summed then its whole is equal to them)

$$\Rightarrow AB = AC + AC \quad (AC = BC)$$

$$\Rightarrow AB = 2AC$$

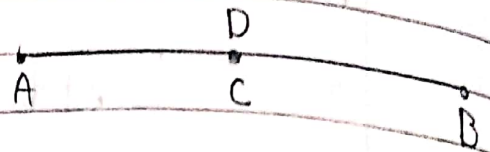
$$\Rightarrow \frac{1}{2} AB = AC$$

Hence proved

Q5. In Question 4, point C is called a mid-point of line segment AB. Prove that every line segment has one and only one mid-point.

Ans Given that

C is mid point of AB



To prove

Every line has one and only one mid-point

Proof :-

$$AC = AD$$

$$CB = BD$$

(Lines which coincide with each other are equal to one another)

$$D = C$$

$\therefore$ there can be only one mid-point in a line.

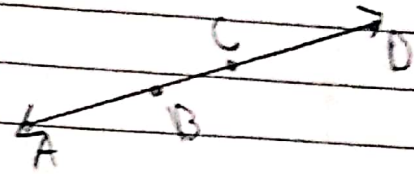
Q6. In Fig. 5.10, if $AC = BD$, then prove that $AB = CD$.

Ans Given that

$$AC = BD$$

To prove

$$AB = CD$$



Proof:

$$AC - BC = BD - BC \quad \text{(If equals are subtracted from equals then the remainder is equal)}$$

$$= AC - BC = AB$$

$$= BD - BC = CD$$

$$= AB = CD$$

Hence, proved