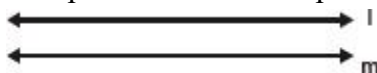
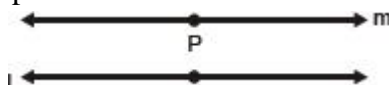


Ch-5 Euclid's Geometry

1. **Postulates** – The basic facts which are taken, for granted, without proof and which are specific to geometry are called postulates.
 2. **Axioms** – The basic facts which are taken, for granted, without proof and which are used throughout in the mathematics are called axioms.
 3. **Theorem** – The conclusions obtained through logical reasoning based on previously proved results and some axioms constitute a statement known as a theorem or a proposition.
 4. **Point** – A point is represented by a fine dot made by a sharp pencil on a sheet of paper.
 5. **Plane** – The surface of a smooth wall or the surface of a sheet of paper or the surface of a smooth black board are close examples of a plane.
 6. **Line** – A line is breadth less length e.g., if we fold a piece of paper, the crease in the paper represents a geometrical straight line. The edge of a ruler, the edge of the top of a table, the meeting place of two walls of a room are some examples of a geometrical straight line.
 7. **Incidence Axioms** –
 - a. **Axiom 1** – A line contains infinitely many points.
 - b. **Axiom 2** – Through a given point, infinitely many lines can pass through.
 - c. **Axiom 3** – In given two points A and B, there is one and only one line that contains both the points.
 8. **Collinear Points** – Three or more points are said to be collinear, if there is a line which contains all of them.
 9. **Concurrent Lines** – Three or more lines are said to be concurrent, if there is a point which lies on all of them.
 10. **Intersecting Lines** – Two lines which meet at one point are said to be intersecting lines. The common point is called the 'point of intersection'.
- Note** – Two distinct lines cannot have more than one point in common.
11. **Parallel Lines** – Two lines l and m in a plane are said to be parallel lines, if they never intersect with each other. If l and m are two parallel lines in a plane, we can write $l \parallel m$.

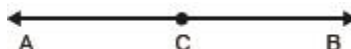


12. **Parallel Axiom** – If l is a line and P is a point not on line l , there is one and only one line m which passes through P and is parallel to l .

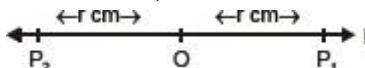


13. Two lines which are both parallel to the same line, are parallel to each other.
14. If l , m , n are three lines in the same plane such that l intersects m and $n \parallel m$, then l intersects n also.
15. If l and m are intersecting lines, $l \parallel p$ and $q \parallel m$, then p and q also intersect.
16. If lines AB , AC , AD and AE are parallel to a line l , then points A , B , C , D and E are collinear.
17. **Line Segment** – In given two points A and B on a line l , the connected part (segment) of the line with end points at A and B , is called the line segment AB .
18. **Interior Point of a Line Segment** – A point P is called an interior point of a line segment AB , if P is on line AB but P is neither A nor B .

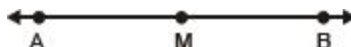
19. **Congruence of Line Segments** – Two line segments AB and CD are congruent, if the trace-copy of one can be superposed on the other so as to cover it completely and exactly.
20. **Line Segment Length Axiom** – Every line segment has a length. It is measured in terms of 'metre' or Its parts.
21. **Congruent Line Segment Length Axiom** – Two congruent line segments have equal length and conversely, two line segments of equal lengths are congruent, i.e., $AB \cong CD \Leftrightarrow l(AB) = l(CD)$.
22. **Line Segment Addition Axiom** – If C is any interior point of a line segment AB, then $l(AB) = l(AC) + l(CD)$. Also, A, B and C are collinear points.



23. **Line Segment Construction Axiom** – Given a point O on a line l and a positive real number r, there are exactly two points P_1 and P_2 on l, on either side of O such that $l(OP_1) = l(OP_2) = r$ cm.



24. **Distance between Two Points** – The distance between two points P and Q is the length of the line segment joining them and it is denoted by PQ.
25. **Mid-point of a Line Segment** – Given a line segment AB, a point M is said to be the mid-point of AB, if M is an interior point of AB such that $AM = MB$. Line through M, other than line AB is called the bisector of the segment AB.



26. **Opposite Rays** – Two rays AB and AC are said to be opposite rays if they are collinear and point A is the only common point of these two rays.

Note – Two rays or two line segments or a line segment and a ray (line) are said to be parallel, if the lines containing them are parallel.

27. **Euclid's Five Postulates** –

- A straight line may be drawn from any one point to any other point.
- A terminated line can be produced indefinitely.
- A circle can be drawn with any centre and any radius.
- All right angles are equal to one another.
- If a straight line falling on two straight lines makes the interior angles on the same side of it, taken together less than two right angles, then the two straight lines, if produced indefinitely, meet on that side on which the angles are less than two right angles.

28. **Some Euclid's axioms** –

- Things which are equal to the same thing are equal to one another.
- If equals are added to equals, the wholes are equal.
- If equals are subtracted from equals, the remainders are equal.
- Things which coincide with one another are equal to one another.
- The whole is greater than the part.
- Things which are double of the same things are equal to one another.
- Things which are halves of the same things are equal to one another.

29. A system of axioms is called consistent, if it is impossible to deduce from these axioms a statement that contradicts any axioms or previously proved statement.