

Basic Concepts

1. In geometry, we take a point, a line and a plane as undefined terms.
2. An axiom or a postulate is a mathematical statement which is assumed to be true without proof. These assumptions are obvious universal truths.
3. We use the term postulate for the assumption that are specific to geometry. Axioms, on the other hand are assumptions used throughout mathematics and not specifically linked to geometry.
4. Theorems are statements which are proved, using definitions, axioms, previously proved statements and deductive reasoning.
5. Some of the Euclid's axioms are:
 - (i) Things which are equal to same thing are equal to one another.
 - (ii) If equals are added to equals, the wholes are equal.
 - (iii) If equals are subtracted from equals, the remainders are equal.
 - (iv) Things which coincide with one another are equal to one another.
 - (v) The whole is greater than the part.
 - (vi) Things which are double of the same thing are equal to one another.
 - (vii) Things which are halves of the same thing are equal to one another.
6. Euclid's five postulates are:
 - (i) A straight line may be drawn from any point to any other point.
 - (ii) A terminated line can be produced indefinitely.
 - (iii) A circle can be drawn with any centre and any radius.
 - (iv) All right angles are equal to one another.
 - (v) 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 sum of angles is less than two right angles.
7. 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.
8. Euclid's first postulate can also be stated as below:

Given two distinct points, there is a unique line that passes through them.

9. Two distinct lines cannot have more than one point in common.

10. **Playfair's Axiom:** For every line l and for every point P not lying on l , there exists a unique line m , passing through P and parallel to l .

11. Two distinct intersecting lines cannot be parallel to the same line.

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