

Introduction to Euclid's Geometry

Exercise 3A

Question 1:

A theorem is a statement that requires a proof. Whereas, a basic fact which is taken for granted, without proof, is called an axiom.

Example of Theorem: Pythagoras Theorem

Example of axiom: A unique line can be drawn through any two points.

Question 2:

(i) Line segment: The straight path between two points is called a line segment.

(ii) Ray: A line segment when extended indefinitely in one direction is called a ray.

(iii) Intersecting Lines: Two lines meeting at a common point are called intersecting lines, i.e., they have a common point.

(iv) Parallel Lines: Two lines in a plane are said to be parallel, if they have no common point, i.e., they do not meet at all.

(v) Half-line: A ray without its initial point is called a half-line.

(vi) Concurrent lines: Three or more lines are said to be concurrent, if they intersect at the same point.

(vii) Collinear points: Three or more than three points are said to be collinear, if they lie on the same line.

(viii) Plane: A plane is a surface such that every point of the line joining any two points on it, lies on it.

Question 3:

(i) Six points: A, B, C, D, E, F

(ii) Five line segments: $\overline{EG}, \overline{FH}, \overline{EF}, \overline{GH}, \overline{MN}$

(iii) Four rays: $\overrightarrow{EP}, \overrightarrow{GR}, \overrightarrow{GB}, \overrightarrow{HD}$

(iv) Four lines: $\overleftrightarrow{AB}, \overleftrightarrow{CD}, \overleftrightarrow{PQ}, \overleftrightarrow{RS}$

(v) Four collinear points: M, E, G, B

Question 4:

- (i) $(\overleftrightarrow{EF}, \overleftrightarrow{GH})$ and their corresponding point of intersection is R.
- $(\overleftrightarrow{AB}, \overleftrightarrow{CD})$ and their corresponding point of intersection is P.
- (ii) $\overleftrightarrow{AB}, \overleftrightarrow{EF}, \overleftrightarrow{GH}$ and their point of intersection is R.
- (iii) Three rays are: $\overrightarrow{RB}, \overrightarrow{RH}, \overrightarrow{RG}$
- (iv) Two line segments are: $\overline{RQ}, \overline{RF}$

Question 5:

- (i) An infinite number of lines can be drawn to pass through a given point.
- (ii) One and only one line can pass through two given points.
- (iii) Two given lines can at the most intersect at one and only one point.
- (iv) $\overline{AB}, \overline{BC}, \overline{AC}$

Question 6:

- (i) False
- (ii) False
- (iii) False
- (iv) True
- (v) False
- (vi) True
- (vii) True
- (viii) True
- (ix) True
- (x) False
- (xi) False
- (xii) True