

**CHAPTER TEST: INTRODUCTION TO EUCLID'S GEOMETRY**

**Mathematics | Class IX (2026/EUCLID/09/001)**

**Time: 1.5 Hours**

**Max. Marks: 40**

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**General Instructions:**

1. All questions are compulsory.
  2. Section A contains 8 MCQs (1 mark each).
  3. Section B contains 4 Very Short Answer questions (2 marks each).
  4. Section C contains 3 Short Answer questions (3 marks each).
  5. Section D contains 2 Long Answer questions (5 marks each).
  6. Section E contains 1 Case Study (5 marks total).
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**Section A (Multiple Choice Questions)**

1. According to Euclid's definitions, "a line is breadthless \_\_\_\_\_":
  - (a) thickness
  - (b) length
  - (c) point
  - (d) surface
2. The number of dimensions a surface has is:
  - (a) 1
  - (b) 2
  - (c) 3
  - (d) 0
3. Euclid divided his famous treatise "The Elements" into:
  - (a) 13 chapters
  - (b) 12 chapters
  - (c) 11 chapters
  - (d) 9 chapters
4. Axioms are assumed:
  - (a) Universal truths in all branches of mathematics
  - (b) Universal truths specific only to geometry
  - (c) Theorems that need proof
  - (d) Definitions of geometric figures
5. "If equals are added to equals, the wholes are equal." This statement is a/an:

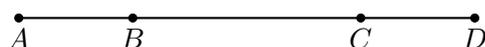
- (a) Definition
  - (b) Postulate
  - (c) Axiom
  - (d) Proof
6. The total number of Euclid's postulates is:
- (a) 3
  - (b) 4
  - (c) 5
  - (d) 7
7. Which of Euclid's postulates is responsible for the theory of parallel lines?
- (a) Second Postulate
  - (b) Third Postulate
  - (c) Fourth Postulate
  - (d) Fifth Postulate
8. The boundaries of solids are:
- (a) Surfaces
  - (b) Lines
  - (c) Points
  - (d) Dimensions

### Section B (Very Short Answer Questions)

1. Define the following terms as given by Euclid: (i) A Point (ii) A Plane Surface. (2)
2. State Euclid's First Axiom and give a practical example involving line segments to illustrate it. (2)
3. What is the difference between an Axiom and a Postulate? Explain with one example of each. (2)
4. Prove that an equilateral triangle can be constructed on any given line segment. (Only state the steps as per Euclid's logic). (2)

### Section C (Short Answer Questions)

1. Read the following statement: "An equilateral triangle is a polygon made up of three line segments out of which two line segments are equal to the third one and all its angles are  $60^\circ$ ." Define the terms used in this statement which you feel need to be defined first. (3)
2. In the figure below, if  $AC = BD$ , then prove that  $AB = CD$ . State which Euclid's axiom is used here.



(3)

3. Consider the following two "postulates": (i) Given any two distinct points  $A$  and  $B$ , there exists a third point  $C$  which is in between  $A$  and  $B$ . (ii) There exist at least three points that are not on the same line. Do these postulates contain any undefined terms? Are they consistent? (3)

## Section D (Long Answer Questions)

1. State Euclid's Fifth Postulate. Explain it using a diagram. 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, what can you conclude about the two lines? (5)
2. Prove that "Two distinct lines cannot have more than one point in common." Use the method of contradiction and justify your steps using Euclid's axioms/postulates. (5)

## Section E (Case Study Based Question)

Modern architecture relies heavily on the foundational logic established by Euclid thousands of years ago. When an architect begins a blueprint, they start with a point—an entity with no part. As they draw a wall, they create a line, which Euclid described as breadthless length. The floor of the building is a surface, having length and breadth only. Architects use the "Common Notions" or Axioms to ensure that measurements are consistent; for instance, if two different rooms are designed to have the same area as a central courtyard, then the two rooms must be equal in area to each other. This logic prevents structural errors. Even the concept of a "straight" corridor relies on Euclid's postulate that a straight line may be drawn from any one point to any other point. Without these self-evident truths, the complex geometry of modern skyscrapers would lack the logical consistency required for stability.

**Based on the above information, answer the following questions:**

1. The architect's floor represents a surface. According to Euclid, the edges of a surface are:
- (a) Points
  - (b) Lines
  - (c) Solids
  - (d) Angles
2. The statement "if two rooms have the same area as a central courtyard, then they are equal to each other" follows which axiom?
- (a) Things which coincide with one another are equal.
  - (b) Things which are equal to the same thing are equal to one another.
  - (c) The whole is greater than the part.
  - (d) If equals are subtracted from equals, the remainders are equal.
3. Euclid's definition of a "solid" would describe a completed building. How many dimensions does a solid have?
- (a) 1

- (b) 2
- (c) 3
- (d) 0

4. The "breadthless length" used by the architect to draw walls is called:

- (a) A Point
- (b) A Plane
- (c) A Line
- (d) An Axiom

5. According to Euclid's Postulates, how many straight lines can be drawn from any one point to any other point?

- (a) Exactly one
- (b) Two
- (c) Infinitely many
- (d) None

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