CHAPTER TEST: INTRODUCTION TO EUCLID'S GEOMETRY
Mathematics | Class IX (2026/EUCLID/09/002)

Time: 1.5 Hours **Max. Marks: 40**

General Instructions:

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

Section A (Multiple Choice Questions)

1. If a point C lies between two points A and B such that $AC = BC$, then $AC = \frac{1}{2}AB$. This result is derived from which Euclid's axiom?
   (a) Things which are double of the same things are equal.
   (b) Things which are halves of the same things are equal.
   (c) The whole is greater than the part.
   (d) If equals are added to equals, the wholes are equal.

2. In the equation $x + y = 10$, if $x = z$, then $z + y = 10$. This is an application of:
   (a) Euclid's 2nd Postulate
   (b) Substitution based on Euclid's 1st Axiom
   (c) Euclid's 5th Postulate
   (d) Definition of a plane

3. How many lines can pass through two distinct points?
   (a) Infinitely many
   (b) Only two
   (c) Only one
   (d) None

4. "The whole is greater than the part" is Euclid's:
   (a) Postulate 4
   (b) Axiom 5
   (c) Postulate 1
   (d) Axiom 3

5. A pyramid is a solid figure, the base of which is:

(a) Only a triangle

(b) Only a square

(c) Any polygon

(d) Only a circle

6. If L, M and N are three points on a line and M lies between L and N, then $LM+MN = LN$ represents:

   (a) Things which coincide with one another are equal.

   (b) Things equal to the same thing are equal.

   (c) Postulate of a straight line.

   (d) Definition of a point.

7. Two salesman have the same turnover in December. In January, each salesman doubles his turnover of December. Their turnovers in January are still equal. This clarifies:

   (a) Axiom 6

   (b) Axiom 3

   (c) Postulate 5

   (d) Axiom 1

8. The number of interwoven isosceles triangles in Sri Yantra is:

   (a) 7

   (b) 9

   (c) 11

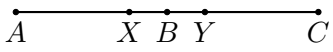
   (d) 13

Section B (Very Short Answer Questions)

1. If $a < b$, prove that there exists a point c such that $a < c < b$. Relate this to the undefined term 'Line'. (2)

2. Solve the equation $u - 15 = 25$ and state which axiom you use here. (2)

3. Look at the figure. If $AB = BC$ and $BX = BY$, show that $AX = CY$. State the Euclid's axiom used.



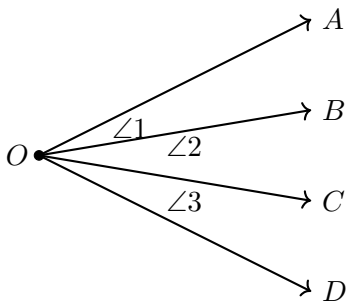
(2)

4. Give a definition for 'Parallel Lines'. Are there other terms that need to be defined first? (2)

Section C (Short Answer Questions)

1. 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. (3)

2. In the figure, $\angle 1 = \angle 2$ and $\angle 2 = \angle 3$. Show that $\angle 1 = \angle 3$. Mention the specific Euclid's axiom used to reach this conclusion.



(3)

3. If A, B and C are three points on a line, and B lies between A and C, prove that $AB + BC = AC$. Which Euclid's axiom supports the idea that the sum of parts equals the whole? (3)

Section D (Long Answer Questions)

1. (i) State Playfair's Axiom. (ii) How is it an equivalent version of Euclid's Fifth Postulate? (iii) Does Euclid's geometry hold true on the surface of a sphere? Briefly justify. (5)

2. Given $AB = CD$. Prove that $AC = BD$ using the following points:

   (a) Point C lies between A and B.

   (b) Point B lies between C and D.

   (c) Use Axiom 2 (If equals are added to equals, the wholes are equal).

   Draw the line segment and label points A, C, B, D in order. (5)

Section E (Case Study Based Question)

In high-precision manufacturing, engineers use coordinate measuring machines to verify the dimensions of engine parts. A technician is verifying the alignment of three drill holes on a flat metal plate, represented as points P, Q, and R. According to the technical manual, if the distance between the first and second hole (PQ) is equal to the distance between the second and third hole (QR), then the second hole is exactly the midpoint. The manual states that for the part to be balanced, $PQ + QR$ must coincide with the total length PR. This logic ensures that the force distributed during operation is equal across the plate. The engineer notes that even though they are using digital sensors, the underlying logic is based on Euclid's Common Notions. For instance, if the plate's left side length equals the right side length, and we cut 2mm from both sides, the remaining lengths will still be equal.

Based on the above information, answer the following questions:

1. The manual's claim that $PQ + QR = PR$ is based on which Euclid's Axiom?

   (a) Axiom 4: Things which coincide with one another are equal to one another.

   (b) Axiom 7: Things which are halves of the same things are equal.

   (c) Axiom 5: The whole is greater than the part.

   (d) Postulate 3: A circle can be drawn with any center and radius.

2. If $PQ = 5cm$ and $QR = 5cm$, the engineer concludes $PQ = QR$ because they are both equal to $5cm$. Which axiom is this?

   (a) Axiom 3

   (b) Axiom 1

   (c) Postulate 2

   (d) Axiom 5

3. "Cutting 2mm from equal sides leaves equal remainders" represents:

   (a) Axiom 2 (addition)

   (b) Axiom 3 (subtraction)

   (c) Axiom 4 (coincidence)

   (d) Postulate 5 (parallel)

4. The flat metal plate represents which of Euclid's geometric concepts?

   (a) A Point

   (b) A Solid

   (c) A Plane Surface

   (d) A Line

5. If the plate is 3-dimensional, it has:

   (a) No dimensions

   (b) One dimension

   (c) Two dimensions

   (d) Three dimensions