SATISH SCIENCE ACADEMY

DHANORI PUNE-411015

INTRODUCTION TO ELUCID'S GEOMETRY

Class 09 - Mathematics

Time Allowed: 3 hours **Maximum Marks: 108**

Section A

1. The boundaries of surfaces are **[1]**

   a) points b) lines and curves

   c) surfaces d) curves

2. The three steps from solids to points are **[1]**

   a) Lines - surfaces - points - solids b) Solids – lines – points – surfaces

   c) Solids – surfaces – lines – points d) Lines - points - surfaces - solids

3. The number of end points a line segment has: **[1]**

   a) 1 b) 0

   c) 2 d) 3

4. If the point P lies in between M and N, C is the mid-point of MP then **[1]**

   a) MC + CN = MN b) CP + CN = MN

   c) MC + PN = MN d) MP + CP = MN

5. Thales belongs to the country: **[1]**

   a) Babylonia b) Greece

   c) Rome d) Egypt

6. Which of the following is not a Euclid's axiom? **[1]**

   a) If two things are equal, then their sum is equal to $\frac{1}{3}$ of the one thing.

   b) Things which are double of the same things are equal to one another.

   c) The whole is greater than the part.

   d) Thing which are halves of the same things are equal to one another.

7. How many dimensions does a point have? **[1]**

   a) 3 b) 2

   c) 0 d) 1

8. Euclid stated that if equals are subtracted from equals, the remainders are equal in the form of **[1]**

   a) A definition b) A statement

   c) A theorem d) An axiom

9. The number of planes passing through 3 noncollinear points is **[1]**

a) 1 b) 4

c) 3 d) 2

10. Three or more lines intersecting at the same point are said to be **[1]**

a) Non-Collinear b) Collinear

c) Concurrent d) Intersecting

11. In ancient India, the shapes of altars used for household rituals were **[1]**

a) triangles and rectangles b) trpeziums and pyramids

c) squares and circles d) rectangles and squares

12. Pythagoras was a student of: **[1]**

a) Euclid b) Thales

c) Both Thales and Euclid d) Archimedes

13. Which of the following is not a rectilinear figure? **[1]**

a) Square b) Rectangle

c) Rhombus d) Circle

14. If a point C lies between A and B then AC + BC = ________. **[1]**

a) AB b) 2 AB

c) $\frac{1}{2}$AB d) 2BC

15. A, B and C are three collinear points. How many lines can be determined by them? **[1]**

a) 2 b) 3

c) 1 d) 0

16. A polygon is a closed figure made up of **[1]**

a) three line segments only b) Four line segments only

c) three or more line segments d) two line segments

17. Into how many chapters was the famous treatise. The Elements divided by Euclid? **[1]**

a) 12 b) 11

c) 13 d) 9

18. The boundaries of the solids are **[1]**

a) Surfaces b) Curves

c) lines d) points

19. Given four distinct points in a plane. How many line segments can be drawn using them when no three of them are collinear? **[1]**

a) 8 b) 4

c) 6 d) 1

20. If C lies between A and B and AB = 10cm, AC = 3cm, then BC^2 = **[1]**

a) b)

13 cm^2 | 9 cm^2

c) 7 cm^2

d) 49 cm^2

21. Euclid belongs to **[1]**

a) Rome

b) Babylonia

c) Egypt

d) Greece

22. The number of line segments determined by three non-collinear points is **[1]**

a) 3

b) 2

c) 0

d) 1

23. A and B have the same weight. If they gain weight by 3 kg, then **[1]**

a) Weight of A $\neq$ Weight of B

b) Weight of A > Weight of B

c) Weight of A < Weight of B

d) Weight of A = Weight of B

24. The number of interwoven isosceles triangles in Sriyantra (in the Atharvaveda) is: **[1]**

a) Eight

b) Eleven

c) Seven

d) Nine

25. A point C is called the midpoint of a line segment $\overrightarrow{AB}$ if **[1]**

a) AC + CB = AB

b) C is an interior point of AB such that $\overrightarrow{AC} = \overrightarrow{CB}$

c) C is an interior point of AB

d) $\overrightarrow{AC} = \overrightarrow{CB}$

26. Things which are equal to the same thing are ________ to one another. **[1]**

a) Not equal

b) Perpendicular

c) Equal

d) Parallel

27. Two distinct intersecting lines cannot be parallel to the ________ line. **[1]**

a) Same

b) Each

c) Both Same and Different

d) Different

28. Two distinct points in a plane determine line(s). **[1]**

a) Three

b) Unique

c) One

d) Two

29. The side faces of a pyramid are **[1]**

a) Squares

b) Trapeziums

c) Polygons

d) Triangles

30. The things which are double of the same things are **[1]**

a) equal

b) halves of the same thing

c) unequal

d) double of the same thing

31. **Assertion (A):** Given two distinct points, there is a unique line that passes through them. **[1]**

Reason (R): If A, B and C are three points on a line and B lies between A and C then AB + BC = AC.

a) Both A and R are true and R is the correct explanation of A.

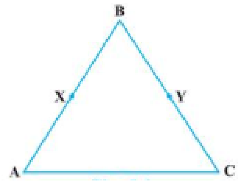
b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

Section B

32. In the given figure, we have BX = $\frac{1}{2}$AB and BY = $\frac{1}{2}$BC and AB = BC. Show that BX = BY. **[2]**



33. It is known that x + y = 10 and that x = z. Show that z + y = 10? **[2]**

34. If a point O lies between two points P and R such that PO = OR then prove that $\boldsymbol{PO = \frac{1}{2}PR}$. **[2]**

35. Read the following two statements which are taken as axioms: **[2]**

 i. If two lines intersect each other, then the vertically opposite angles are not equal.
 ii. If a ray stands on a line, then the sum of two adjacent angles so formed is equal to 180°.

 Is this system of axioms consistent? Justify your answer.

36. Point C is called a mid point of line segment AB, prove that every line segment has one and only one mid-point. **[2]**

37. Why is axiom 5, in the list of Euclid's axioms, considered as a 'universal truth'? **[2]**

38. Study the following statement: **[2]**

 Two intersecting lines cannot be perpendicular to the same line

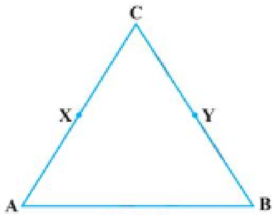
 Check whether it is an equivalent version to the Euclid's fifth postulate.

 [Hint: Identify the two intersecting lines l and m and the line n in the above statement.]

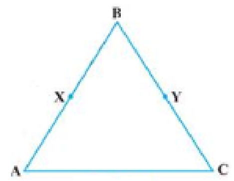
39. Prove that every line segment has one and only one mid-point. **[2]**

40. Solve the equation a - 15 = 25 and state which axiom do you use here. **[2]**

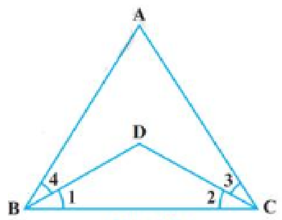
41. In the given figure, we have X and Y are the mid-points of AC and BC and AX = CY. Show that AC = BC. **[2]**



42. In the given figure, we have AB = BC, BX = BY. Show that AX = CY. **[2]**



43. In the given figure, we have ∠ABC = ∠ACB,$\angle 4 = \angle 3$. Show that $\angle 1 = \angle 2$. **[2]**



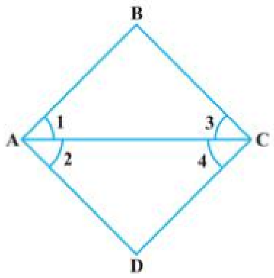
44. Solve the equation u - 5 = 15 and state the axiom that you use here. **[2]**

45. Given three distinct points in a plane, how many lines can be drawn by joining them? **[2]**

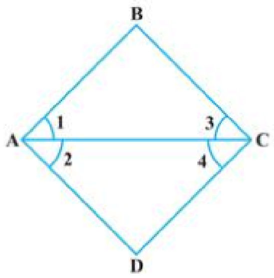
46. Ram and Ravi have the same weight. If they each gain weight by 2 kg, how will their new weights be compared? [2]

47. Why is Axiom 5, in the list of Euclid's axioms, considered a **universal truth**? [2]

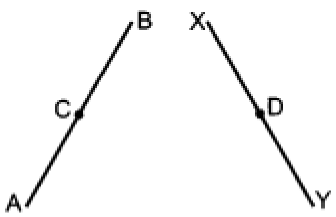
48. In the given figure, we have $\angle 1 = \angle 2, \angle 2 = \angle 3$. Show that $\angle 1 = \angle 3$. [2]



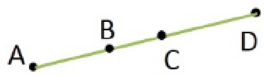
49. In the given figure, we have $\angle 1 = \angle 3$ and $\angle 2 = \angle 4$. Show that $\angle A = \angle C$. [2]



50. In fig. AC = XD, C is the mid-point of AB and D is the mid-point of XY. Using a Euclid's axiom, show that AB = XY. [2]

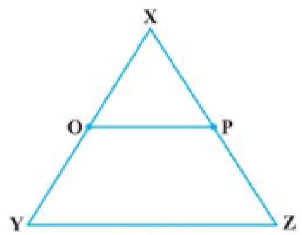


51. In fig., if AC = BD, then prove that AB = CD [2]

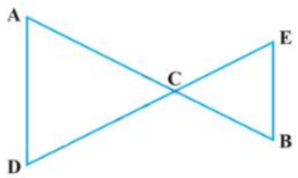


Section C

52. In the given figure, if OX = $\frac{1}{2}$XY, PX = $\frac{1}{2}$XZ and OX = PX, show that XY = XZ. [3]



53. In the given figure, we have AC = DC, CB = CE. Show that AB = DE. [3]

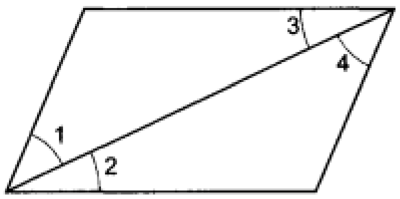


54. Read the following statement: [3]

A square is a polygon made up of four line segments, out of which, length of three line segments are equal to the length of fourth one and all its angles are right angles.

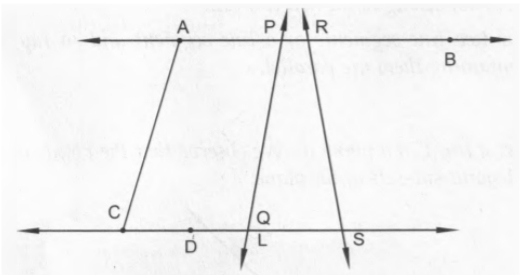
Define the terms used in this definition which you feel necessary. Are there any undefined terms in this? Can you justify that all angles and sides of a square are equal?

55. In Fig., if $\angle 1 = \angle 3$, $\angle 2 = \angle 4$ and $\angle 3 = \angle 4$, write the relation between $\angle 1$ and $\angle 2$ using Euclid's axiom. **[3]**



Section D

56. In Fig, name the following: **[5]**



i. Five line segments

ii. Five rays

iii. Four collinear points

iv. Two pairs of non-intersecting line segments

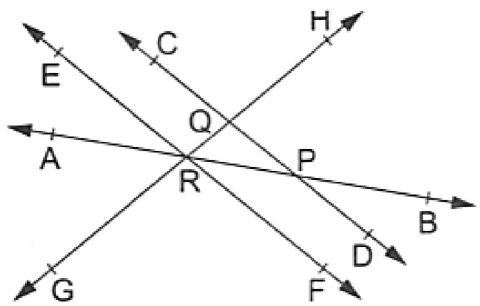
57. In the adjoining figure, name: **[5]**

i. Two pairs of intersecting lines and their corresponding points of intersection

ii. Three concurrent lines and their points of intersection

iii. Three rays

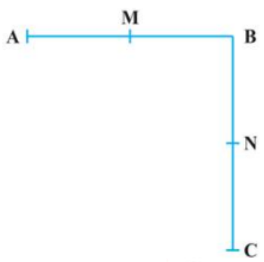
iv. Two line segments



58. In a line segment AB point C is called a mid-point of line segment AB, prove that every line segment has one and only one mid-point. **[5]**

59. i. AB = BC, M is the mid-point of AB and N is the mid-point of BC. Show that AM = NC. **[5]**

ii. BM = BN, M is the mid-point of AB and N is the mid-point of BC. Show that AB = BC.



60. In the adjoining figure, name: **[5]**

i. Six points

ii. Five line segments

iii. Four rays

iv. Four lines

v. Four collinear points