KD EDUCATION ACADEMY [9582701166]

Time : 3 hour | STD 9 Maths | Total Marks : 110

KD Sir 90+ Question chapter - 5 Euclid's geometry

* **Choose the right answer from the given options. [1 Marks Each]** **[46]**

1. The boundaries of the solids are:

(A) Curves. (B) Points. (C) Surfaces. (D) Lines.

Ans. :

c. Surfaces.

Solution:

A solid has shape, size, position and can be moved from one place to another. Its boundaries are called surfaces. They separate one part of the space from the other.

2. Euclid's Postulate 1 is:

(A) A straight line may be drawn from any point to any other point. (B) A terminated line can be produced indefinitely. (C) All right angles are equal to one another. (D) None of these.

Ans. :

a. A straight line may be drawn from any point to any other point.

3. A pyramid is a solid figure, whose base is:

(A) Only a triangle. (B) Only a square. (C) Only a rectangle. (D) Any polygon.

Ans. :

d. Any polygon.

Solution:

A pyramid is a solid figure, whose base is any polygon.

4. Which of the following is not a solid?

(A) Cube. (B) Cone. (C) Cylinder. (D) Circle.

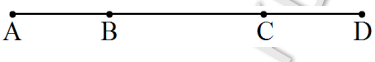
Ans. :

d. Circle.

Solution:

Any 3D figure is considered to be a solid. A circle is a 2D figure, so, it cannot be considered as a solid.

5. In this figure, if AC = BD, then:



(A) AB ≠ CD (B) BC = CD (C) AB = BC (D) AB = CD

Ans. :

d. AB = CD

Solution:

We have, AC = BD

⇒ AB + BC = BC + CD

⇒ AB = CD.

6. Which of the following statements are true?

(A) Only one line can pass through a single point.

(B) There is an infinite number of lines that pass through two distinct points.

(C) A terminated line can be produced indefinitely on both sides.

(D) If two circles are equal, then their radii are unequal.

Ans. :

c. A terminated line can be produced indefinitely on both sides.

7. If two line segments are equal then they are called:

(A) Line segment (B) Ray (C) Congruent (D) None of these

Ans. :

c. Congruent

Solution:

If two line segments are equal then they are called congruent segments.

8. The side faces of a pyramid are:

(A) Triangles. (B) Squares. (C) Trapeziums. (D) Polygons.

Ans. :

a. Triangles.

Solution:

The side faces of a pyramid are triangles.

9. Write the correct answer in the following:

The number of dimensions, a surface has:

(A) 1 (B) 2 (C) 3 (D) 0

Ans. :

b. 2

Solution:

Boundaries of a solid are called surfaces. A surface (plane) has only length and breadth. So, it has two dimensions.

10. Which of the following is a solid?

(A) Rectangle. (B) Circle. (C) Cylinder. (D) Square.

Ans. :

c. Cylinder.

Solution:

All the other figures are 2D except cylinder which is 3D. Any 3D figure is considered to be a solid.

11. How many points can be common in two distinct straight lines?

(A) One (B) Two (C) Three (D) None

Ans. :

a. One

12. Write the correct answer in the following:

It is known that if $x + y = 10$ then $x + y + z = 10 + z$. The Euclid's axiom that illustrates this statement is:

(A) First Axiom. (B) Second Axiom. (C) Third Axiom. (D) Fourth Axiom.

Ans. :

b. Second Axiom.

Solution:

The Euclid's axiom that illustrates the given statement is second axiom, according to which. If equals are added to equals, the wholes are equal.

13. The number of end points a ray has:

(A) 0 (B) 2 (C) 1 (D) None of these

Ans. :

c. 1

Solution:

A ray starts at a given point and goes off in a certain direction to infinity. The point where the ray starts is called the endpoint.

14. A point has:

(A) One part (B) Two parts (C) More than two parts (D) No parts

Ans. :

d. No parts

Solution:

A point has no length and no breadth.

A point is that which has no part.

15. The basic facts which are taken for granted, without proof, are called:

(A) Theorems. (B) Propositions. (C) Lemmas. (D) Axioms.

Ans. :

d. Axioms.

Solution:

An axiom is a proposition regarded as self-evidently true without proof.

16. The edges of the surface are:

(A) Points (B) Curves (C) Lines (D) None of the above

Ans. :

c. Lines

17. The shape of base of Pyramid is:

(A) Triangle (B) Square (C) Rectangle (D) Any polygon

Ans. :

d. Any polygon

18. If two circles are equal, then their radii are _____.

(A) Equal (B) Diminished (C) Different (D) None of these

Ans. :

a. Equal

19. 'Lines are parallel if they do not intersect' – is stated in the form of:

(A) A postulate (B) An axiom (C) A definition (D) A proof

Ans. :

a. A postulate

20. Which one of the following statements is true?

(A) A point determines always a unique line. (B) Three lines are concurrent when they have only one point in common. (C) A ray has two end points. (D) A line has definite length.

Ans. :

b. Three lines are concurrent when they have only one point in common.

Solution:

Lines which are concurrent have only one point in common and is called the point of concurrency.

21. **Directions:** In the following questions, the Assertions (A) and Reason(s) (R) have been put forward. Read both the statements carefully and choose the correct alternative from the following:

Assertion: a sequence finite or infinite list of numbers

Reason: 1, 2, 3, 4 ——– is the sequence an infinite sequence of natural no.

(A) Both Assertion and reason are correct and reason is correct explanation for Assertion. (B) Both Assertion and reason are correct but reason is not correct explanation for Assertion (C) Assertion is true but reason is false. (D) Both Assertion and reason are false.

Ans. :

a. Both Assertion and reason are correct and reason is correct explanation for Assertion.

22. If the point P lies in between M and N, C is the mid-point of MP then:

(A) CP + CN = MN (B) MC + CN = MN (C) MC + PN = MN (D) MP + CP = MN

Ans. :

b. MC + CN = MN

Solution:

Since, P lies between M and N, MN = MP + PN

Now, C is the mid-point of MP,

So, MP = MC + CP

⇒ MN = MC + CP + PN

⇒ MN = MC + CN (CP + PN = CN).

23. A and B have the same weight. If they gain weight by 3kg, then:

(A) Weight of A < Weight of B. (B) Weight of A = Weight of B. (C) Weight of A > Weight of B. (D) None of these.

Ans. :

b. Weight of A = Weight of B.

Solution:

Let the weights of A and B be x kgs. If both of them gain weight by 3 kgs, their new weight would be 'x + 3' kgs.

According to Euclid's axiom if equals are added in equals, then whole are equal. Hence, Weight of A = Weight of B.

24. Axioms are assumed:

(A) Universal truths specific to geometry. (B) Universal truths in all branches of mathematics. (C) Theorems. (D) Definitions.

Ans. :

b. Universal truths in all branches of mathematics.

Solution:

From ancient times, axioms have been acquired by man through the day to day experiences. No mathematical deduction is needed to prove them. So axioms are assumed universal truths in all branches of mathematics.

25. Euclid belongs to the country:

(A) India. (B) Greece. (C) Japan. (D) Egypt.

Ans. :

b. Greece.

Solution:

Euclid belongs to the country, Greece.

26. If a straight line falling on two straight lines makes the interior angles on the same side of it taken together less than 180◦, then the two straight lines, if produced indefinitely, meet on that side on which the angles taken together are:

(A) 180º (B) < 180º (C) = 180º (D) None of these

Ans. :

b. < 180º

Solution:

According to Euclid's fifth postulate, if a straight line crossing two straight lines makes the interior angles on the same side less than two right angles, the two straight lines, if extended indefinitely, meet on that side on which are the angles less than the two right angles.

27. Euclid divided his famous treatise “The Elements” into:

(A) 12 chapters. (B) 11 chapters. (C) 9 chapters. (D) 13 chapters.

Ans. :

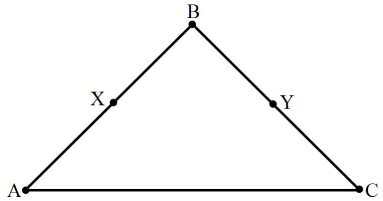
d. 13 chapters.

Solution:

- Book 1 contains Euclid's 10 axioms.
- Book 2 is commonly called the "book of geometric algebra".
- Book 3 deals with circles and their properties.
- Book 4 constructs the incircle and circumcircle of a triangle.
- Book 5 is a treatise on proportions of magnitudes.

- Book 6 applies proportions to geometry: similar figures.
- Book 7 deals with elementary number theory.
- Book 8 deals with proportions in number theory and geometric sequences.
- Book 9 applies the results of the preceding two books and gives the infinitude of prime numbers.
- Book 10 attempts to classify incommensurable (in modern language, irrational).
- Book 11 generalizes the results of books 1-6.
- Book 12 studies volumes of cones, pyramids, and cylinders.
- Book 13 constructs the five regular Platonic solids.

28. In the figure, if AX = CY and BX = BY, then:



(A) AB = BC (B) AB < BC (C) AB > BC (D) None of these

Ans. :

a. AB = BC

Solution:

We have AX = CY and BX = BY, then we can say that AX + BX = CY + BY which means AB = BC.

29. In Indus Valley Civilisation (about BC 3000), the bricks used for construction work were having dimensions in the ratio of:

(A) 5 : 3 : 2 (B) 4 : 2 : 1 (C) 4 : 3 : 2 (D) 6 : 4 : 2

Ans. :

b. 4 : 2 : 1

Solution:

In Indus Valley Civilization (about 300 BC) the bricks used for construction work were having dimensions in the ratio is 4 : 2 : 1.

30. Theorems are statements which are proved using definitions, _____, previously proved statements and deductive reasoning.

(A) Definitions (B) Axioms (C) Theorems (D) Statements

Ans. :

b. Axioms

31. The two lines which are parallel to the same line are _____ to each other.

(A) Perpendicular. (B) Equal. (C) Parallel. (D) None of these.

Ans. :

c. Parallel.

Solution:

There are 3 lines AB, CD, EF, where AB and EF are parallel, and CD and EF are parallel.

Let line PQ cross AB at G, EF at H, CD at K. On parallel lines, AB and EF, angle AGK = GHF (Alternate interior angles).

On parallel lines AB and EF, angle AGK = GHF. (Alternate interior angles)

So, angle AGK = GKD. (Alternate interior angles)

So, AB is parallel to CD.

32. A line segment, when extended indefinitely in one direction is called a:

(A) Line. (B) Ray. (C) Line segment. (D) None of these.

Ans. :

b. Ray.

Solution:

A ray is part of a line, has one fixed endpoint, and extends infinitely along the line from the endpoint.

33. A point C is said to lie between the points A and B if.

(A) AC = CB. (B) AC + CB = AB. (C) Point A, C and B are collinear. (D) None of these.

Ans. :

c. Point A, C and B are collinear.

Solution:

If direction ratios of three vectors a, b, c are proportional then they are collinear.

34. Two distinct lines:

(A) Always intersect (B) Either intersect or parallel (C) Always have two common points (D) Always parallel

Ans. :

b. Either intersect or parallel

35. The number of dimension, a point has:

(A) 2 (B) 3 (C) 1 (D) 0

Ans. :

d. 0

Solution:

Because point has no part.

36. If p, q and t are three straight lines such that p || q and p || t, then.

(A) q || t (B) q = t (C) q ⊥ t (D) None of these

Ans. :

a. q || t

Solution:

When two lines are parallel to the same line, they are parallel to each other.

37. Euclid's fifth postulate implies the existence of:

(A) Perpendicular lines. (B) Parallel lines. (C) Intersecting lines. (D) None of these.

Ans. :

b. Parallel lines.

Solution:

According to Euclid's fifth postulate, 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.

38. In ancient India, the shapes of altars used for household rituals were:

(A) Squares and rectangles. (B) Squares and circles. (C) Triangles and rectangles. (D) Trapeziums and pyramids.

Ans. :

b. Squares and circles.

Solution:

Squares and circular altars were used for household rituals.

Whereas altars having shapes as combinatiotanglens of recs, triangles and trapeziums were used for public worship.

39. Write the correct answer in the following:

The three steps from solids to points are:

(A) Solids - surfaces - lines - points. (B) Solids - lines - surfaces - points. (C) Lines - points - surfaces - solids. (D) Lines - surfaces - points - solids.

Ans. :

a. Solids - surfaces - lines - points.

Solution:

The three steps from solids to points are solids-surface-lines-points.

40. The things which are double of same things are:

(A) Halves of same thing (B) Double of the same thing (C) Equal (D) Unequal

Ans. :

c. Equal

41. It is known that if a + b = 4 then a + b - c = 4 - c. The Euclid’s axiom that illustrates this statement is:

(A) III axiom. (B) II axiom. (C) I axiom. (D) IV axiom.

Ans. :

a. III axiom.

Solution:

If equals be subtracted from equals, the remainder are equal.

42. Two lines are said to be _____ if they intersect at right angles.

(A) Concurrent. (B) Parallel. (C) Perpendicular. (D) None of these.

Ans. :

c. Perpendicular.

Solution:

A line is perpendicular to another if it meets or crosses it at right angles (90º).

43. The Sri yantra consists of _____ interwoven isosceles triangles.

(A) Three. (B) One. (C) Six. (D) Nine.

Ans. :

d. Nine.

Solution:

The Sri Yantra ('great object') belongs to a class of devices used in meditation, mainly by those belonging to the Hindu tantric tradition. The diagram consists of nine interwoven isosceles triangles four points upwards, representing Sakti, the primordial female essence of dynamic energy, and five-point downwards, representing Siva, the primordial male essence of static wisdom The triangles are arranged in such a way that they produce 43 subsidiary triangles, at the center of the smallest of which there is a big dot known as the Bindu.

44. "Lines are parallel if they do not intersect" is stated in the form of:

(A) A proof. (B) A postulate. (C) A definition. (D) An axiom.

Ans. :

c. A definition.

Solution:

Euclid gave the definition of parallel lines in Book I, Definition 23 just before the five postulates.

45. The number of lines passing through one point.

(A) Infinite (B) 1 (C) 2 (D) 3

Ans. :

a. Infinite

Solution:

Infinite number of lines can pass through a single point.

46. Two intersecting lines cannot be parallel to the same line is stated in the form of:

(A) A theorem. (B) A postulate. (C) A definition. (D) None of these.

Ans. :

b. A postulate.

Solution:

Euclid's fifth postulate can also be stated in the following form: Two distinct intersecting lines cannot be parallel to the same line.

*** A statement of Assertion (A) is followed by a statement of Reason (R). [6]**

Choose the correct option.

47. **Directions:** In the following questions, the Assertions (A) and Reason(s) (R) have been put forward. Read both the statements carefully and choose the correct alternative from the following:

Assertion: Euclid's fifth postulate imply the existence of parallel lines.

Reason: The sum of the interior angles will be equal to sum of the two right angles then two lines will not meet each other on either sides and therefore they will be parallel to each other.

a. Both Assertion and Reason are correct and Reason is the correct explanation for Assertion.
b. Both Assertion and Reason are correct and Reason is not the correct explanation for Assertion.
c. Assertion is true but the reason is false.
d. Both assertion and reason are false.

Ans. :

a. Both Assertion and Reason are correct and Reason is the correct explanation for Assertion.

48. **Directions:** In the following questions, the Assertions (A) and Reason(s) (R) have been put forward. Read both the statements carefully and choose the correct alternative from the following:

Assertion: Boundaries of surfaces are curves.

Reason: Surfaces are dimensional figures and their boundaries are one - dimensional which curves are.

a. Both Assertion and Reason are correct and Reason is the correct explanation for Assertion.
b. Both Assertion and Reason are correct and Reason is not the correct explanation for Assertion.
c. Assertion is true but the reason is false.
d. Both assertion and reason are false.

Ans. :

a. Both Assertion and Reason are correct and Reason is the correct explanation for Assertion.

49. **Directions:** In the following questions, the Assertions (A) and Reason(s) (R) have been put forward. Read both the statements carefully and choose the correct alternative from the following:

Assertion: It is given that AD = BC. Then AC = BD.

Reason: Above line we can prove by Euclid axiom 3 If equals are subtracted from equals, the remainders are equal."

a. Both Assertion and Reason are correct and Reason is the correct explanation for Assertion.
b. Both Assertion and Reason are correct and Reason is not the correct explanation for Assertion.
c. Assertion is true but the reason is false.
d. Both assertion and reason are false.

Ans. :

a. Both Assertion and Reason are correct and Reason is the correct explanation for Assertion.

50. **Directions:** In the following questions, the Assertions (A) and Reason(s) (R) have been put forward. Read both the statements carefully and choose the correct alternative from the following:

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

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

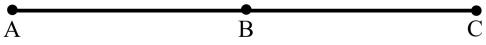
a. Both assertion and reason are true and reason is the correct explanation of assertion.

b. Both assertion and reason are true but reason is not the correct explanation of assertion.
c. Assertion is true but reason is false.
d. Assertion is false but reason is true.

Ans. :

b. Both assertion and reason are true but reason is not the correct explanation of assertion.

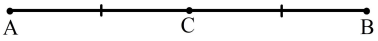
Solution:



AB + BC = AC.

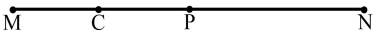
51. **Directions:** In the following questions, the Assertions (A) and Reason(s) (R) have been put forward. Read both the statements carefully and choose the correct alternative from the following:

Assertion: If a point C be the mid-point of a line line segment AB, then the relation among AC, BC and AB



is $\mathrm{AC} = \mathrm{CB} = \left(\frac{1}{2}\right)\mathrm{AB}$.

Reason: If a point P be the mid-point of MN and C is the mid - point of MP, then the relation between MC and MN



is $\mathrm{MC} = \left(\frac{1}{4}\right)\mathrm{MN}$.

a. Both Assertion and Reason are correct and Reason is the correct explanation for Assertion.
b. Both Assertion and Reason are correct and Reason is not the correct explanation for Assertion.
c. Assertion is true but the reason is false.
d. Both assertion and reason are false.

Ans. :

c. Assertion is true but the reason is false.
b. Both Assertion and Reason are correct and Reason is not the correct explanation for Assertion.

52. **Directions:** In the following questions, the Assertions (A) and Reason(s) (R) have been put forward. Read both the statements carefully and choose the correct alternative from the following:

Assertion: According to Euclid's 1st axiom- "Things which are equal to the same thing are also equal to one another".

Reason: If AB = PQ and PQ = XY, then AB = XY.

a. Both Assertion and Reason are correct and Reason is the correct explanation for Assertion.
b. Both Assertion and Reason are correct and Reason is not the correct explanation for Assertion.
c. Assertion is true but the reason is false.
d. Both assertion and reason are false.

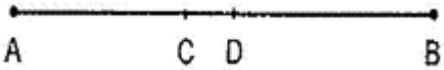
Ans. :

a. Both Assertion and Reason are correct and Reason is the correct explanation for Assertion.

*** Answer the following questions in one sentence. [1 Marks Each]** **[6]**

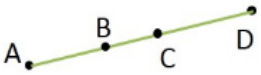
53. Point C is called a mid point of line segment AB, prove that every line segment has one and only one mid-point.

Ans. :



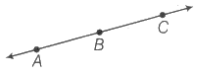
Let a line AB have two mid-points, say, C and D. Then
AB = AC + CB = 2AC . . . . (i) . . . [As C is the mid-point of AB]
and AB = AD + DB = 2AD . . . . (ii) [As D is the mid-point of AB]
From equation (i) and (ii)
AC = AD and CB = DB
But this will possible only when D lies on point C. So every line segment has one and only one mid-point.

54. In fig., if AC = BD, then prove that AB = CD

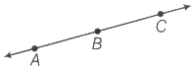


Ans. : AC = BD . . . . [Given] . . . (1)
AC = AB + BC . . . . [Point B lies between A and C] . . . . (2)
BD = BC + CD . . . . [Point C lies between B and D] . . . . (3)
Substituting (2) and (3) in (1), we get
AB + BC = BC + CD
$\Rightarrow$ AB = CD . . . . [Subtracting equals from equals]

55. In the given figure, if A, B and C are three points on a line and B lies between A and C, then prove that AB + BC = AC.



Ans. :

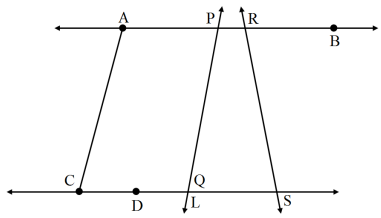


In the given figure, AC coincides with AB + BC.
Also, Euclid's axiom 4 says that things which coincide with one another, are equal to one another. So, it can be deduced that
AB + BC = AC

56. Name the line segments determined by the three collinear points P. Q and R.

Ans. : PQ, QR, PR

57. In the below figure. Name the following:

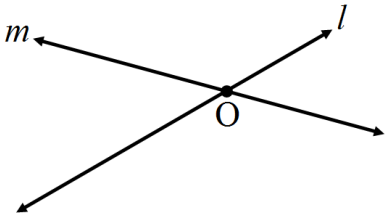


Four collinear points.

Ans. : Four collinear points. C, D, Q, S.

58. At how many points can two lines at the most intersect?

Ans. : At most two lines can intersect at one point.

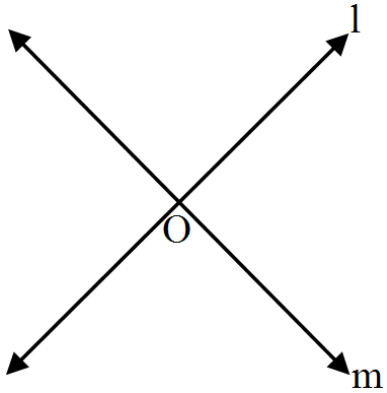


*** Answer the following short questions. [2 Marks Each]** **[6]**

59. In how many points two distinct lines can intersect?

Ans. : Two distinct lines can intersect at only point, as there is only one common point betwwen two intersecting lines.

For example, if l and m are two intersecting lines then there is only one common point O between them. This is the point of intersecting.



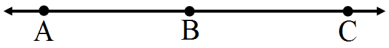
60. How many planes can be made to pass through three distinct points?

Ans. : The number of planes that can pass through three distinct points is dependent on the arrangement of the points.

- If the points are collinear, then infinite number of planes may pass through the three distinct points.
- If the points are non collinear, then only one unique plane can pass through the three distinct points.

61. Define the following terms:
Half line.

Ans. : Half line: A straight line extending from a point indefinitely in one direction only is a half line.



*** Answer the following questions. [3 Marks Each]** **[9]**

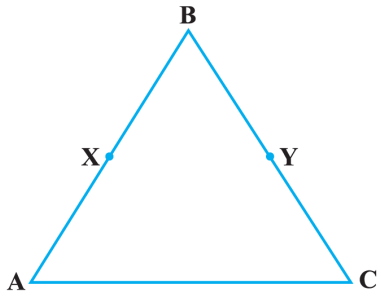
62. Solve the following question using appropriate Euclid's axiom:
Two salesmen make equal sales during the month of August. In September, each salesman doubles his sale of the month of August. Compare their sales in September.

Ans. : Let the sales of two salesmen in the month of August be x and y. As, they make equal sale during the month of August, x = y. In September, each salesman double his sale of the month of August, So 2x = 2y.

Now, by Euclid's axiom, thing which are double of the same things are equal to one another.

Hence, we can say that in the month of September also, two salesmen make equal sales.

63. In the we have $\mathrm{BX} = \frac{1}{2}\mathrm{AB},\ \mathrm{BY} = \frac{1}{2}\mathrm{BC}$ and AB = BC. Show that BX = BY.



Ans. : Given, $\mathrm{BX} = \frac{1}{2}\mathrm{AB}$

$\Rightarrow 2\mathrm{BX} = \mathrm{AB} \ldots (\mathrm{i})$

$\Rightarrow \mathrm{BY} = \frac{1}{2}\mathrm{BC}$

$\Rightarrow 2\mathrm{BY} = \mathrm{BC} \ldots (\mathrm{ii})$

and $\mathrm{AB} = \mathrm{BC} \ldots (\mathrm{iii})$

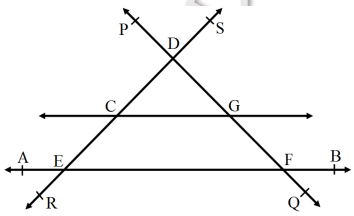
On putting the values from Eqs. (i) and (ii) in Eq. (iii), we get

2BX = 2BY

According to Euclid's axiom, things which are double of the same things are equal to one another.

BX = BY

64. From the given figure, name the following:
    a. Three lines.
    b. One rectilinear figure.
    c. Four concurrent points.



Ans. :

a. $\text{Line } \overleftrightarrow{\mathrm{OQ}},\ \text{Line } \overleftrightarrow{\mathrm{RS}} \text{ and Line } \overleftrightarrow{\mathrm{AB}}$

b. $CEFG$

c. No point concurrent.

*** Questions with calculation. [4 Marks Each]** **[16]**

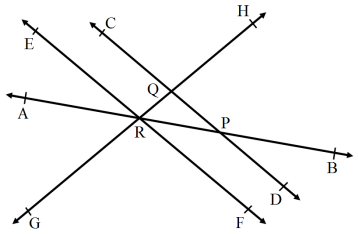
65. In the adjoining figure, name:

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.



Ans. :

i. Two pairs of intersecting lines and their point of intersection are.

$$\left\{\overleftrightarrow{EF},\ \overleftrightarrow{GH},\ \text{point R}\right\}, \left\{\overleftrightarrow{AB},\ \overleftrightarrow{CD},\ \text{point P}\right\}$$

ii. Three concurrent lines are.

$$\left\{\overleftrightarrow{AB},\ \overleftrightarrow{EF},\ \overleftrightarrow{GH},\ \text{point R}\right\}$$

iii. Three rays are.

$$\left\{\overrightarrow{RB},\ \overrightarrow{RH},\ \overrightarrow{RF}\right\}$$

iv. Two line segments are.

$$\left\{\overline{RQ} \text{ and } \overline{RP}\right\}$$

66. In the adjoining figure, name:

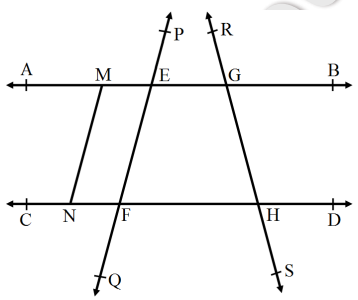
i. Six points.

ii. Five lines segments.

iii. Four rays.

iv. Four lines.

v. Four collinear points.



Ans. :

i. Points are A, B, C, D, P and R.

ii. $\overline{EF},\ \overline{GH},\ \overline{FH},\ \overline{EG},\ \overline{MN}$

iii. $\overrightarrow{EP}, \overrightarrow{GR}, \overrightarrow{HS}, \overrightarrow{FQ}$

iv. $\overleftrightarrow{AB}, \overleftrightarrow{CD}, \overleftrightarrow{PQ}, \overleftrightarrow{RS}$

v. Collinear points are M, E, G and B.

67. What is the difference between a theorem and an axiom?

Ans. : Axiom: An axiom is a basic fact that is taken for granted without proof.

Examples:

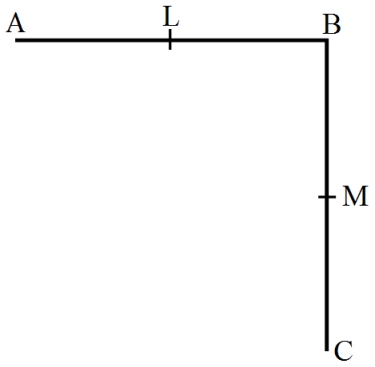
i. Halves of equals are equal.
ii. The whole is greater than each of its parts.

Theorem: A statement that requires proof is called theorem.

Examples:

i. The sum of all the angles around a point is 360°.
ii. The sum of all the angles of triangle is 180°.

68. In the given figure, L and M are the mid-points of AB and BC respectively.



i. If AB = BC, prove that AL = MC.
ii. If BL = BM, prove that AB = BC.

Hint:

i. $AB = BC \Rightarrow \frac{1}{2}AB = \frac{1}{2}BC \Rightarrow AL = MC.$

ii. $BL = BM \Rightarrow 2BL = 2BM \Rightarrow AB = BC.$

Ans. :

i. It is given that L is the mid-point of AB.

$\therefore AL = BL = \frac{1}{2}AB \ldots . (1)$

Also, M is the mid-point of BC.

$\therefore BM = MC = \frac{1}{2}BC \ldots . . (2)$

$AB = BC$ (Given)

$\Rightarrow \frac{1}{2}AB = \frac{1}{2}BC$ (Things which are halves of the same thing are equal to one another)

$AL = MC$ [From (1) and (2)]

ii. It is given that L is the mid-point of AB.

$\therefore AL = BL = \frac{1}{2}AB$

$\Rightarrow 2AL = 2BL = AB \ldots . . (3)$

Also, M is the mid-point of BC.

$\therefore BM = MC = \frac{1}{2}BC$

$\Rightarrow 2BM = 2MC = BC \ldots\ldots (4)$

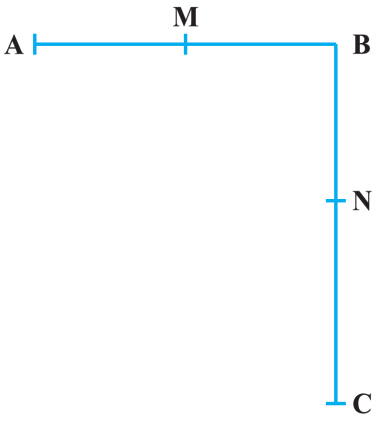
$BL = BM$ (Given)

$\Rightarrow 2BL = 2BM$ (Things which are double of the same thing are equal to one another)

$\Rightarrow AB = BC$ [From (3) and (4)]

*** Answer the following questions. [5 Marks Each]** **[5]**

69. In the:



i. AB = BC, M is the mid-point of AB and N is the mid- point of BC. Show that AM = NC.

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

Ans. : Given, AB = BC ....(i)

M is the mid-point of AB.

$\therefore AM = MB = \frac{1}{2}AB \ldots (ii)$

And N is the mid-point BC.

$\therefore BN = NC = \frac{1}{2}BC \ldots (iii)$

According to euclid's axiom, things which are halves of the same things are equal to one another.

From Eq. (i) AB = BC

On multiplying both sides by $\frac{1}{2}$, we get

$\frac{1}{2}AB = \frac{1}{2}BC$

$\Rightarrow AM = NC$ [Using Eqs. (ii) and (iii)]

Given, BM = BN ....(i)

M is the mid-point of AB

$\therefore AM = BM = \frac{1}{2}AB$

$\Rightarrow 2AM = 2BM = AB \ldots . (ii)$

and N is the mid-point of BC.

$\therefore 2BN = 2NC = BC \ldots (iii)$

According to Euclid's axiom, things which are double of the same thing are equal to one another.

On multiplying both sides of Eq. (i) by 2, we get

$\Rightarrow \ 2\mathrm{BM} = 2\mathrm{BN}$

$\mathrm{AB} = \mathrm{BC}$ [Using Eqs. (ii) and (iii)]

*** Case study based questions.** **[16]**

70. 1. Highways 20A and 56C run parallel to each other for 20 km in a state.
Which of the following statements is most likely to be true regarding them?
A. Both highways are of the same length.
B. There can be no link road between them.
C. The highways make an angle 90° with each other.
D. The distance between the two highways remains almost the same in the state.

Ans. : 1. D. The distance between the two highways remains almost the same in the state.

71. Karan marks his city on the map as point A.

2. Savita says, 'A dot is dimensionless, so your city is also dimensionless.' Why is Savita wrong? Justify your answer.
3. Which of the following is not true?
A. A line has one dimension.
B. A plane has two dimensions.
C. A circle can be drawn with any radius and at any point.
D. Two distinct lines can pass through a point in the same direction.

Ans. : 2. Answer demonstrates understanding of geometrical axioms and their relation with real-world.
- A dot in the map is for representational purpose.
- Dot is used only to show the location of the city, not its area.

3. D. Two distinct lines can pass through a point in the same direction.

72. The map shows three cities Conlen ©, Stratford (S), and Texhoma (T) on a straight highway.

4. Which of the following is true for the length of the highway between them?

A. The length of the highway between C and S is equal to the length of the highway between S and T.

B. The length of the highway between C and S is three-fourth of the length of the highway between S and T.

C. The length of the highway between S and T is the sum of the lengths of the highway between CT and CS.

D. The length of the highway between C and T is the sum of the lengths of the highway between CS and ST.

5. A number Y is greater than a number X and another number $Z < 0$.

Which of the following relations can be true for a unique value of Z?

A. $X \times Z = Y \times Z$

B. $X \div Z = Y \div Z$

C. $X - Z = Y$

D. $X + Z = Y$

6. The area of a triangle is equal to the area of a rectangle.

The area of the rectangle is equal to the area of a parallelogram.

What is the relation between the area of the triangle and the area of the parallelogram?

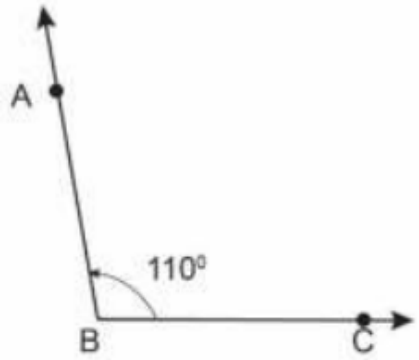
Ans. : 4. D. The length of the highway between C and T is the sum of the lengths of the highway between CS and ST

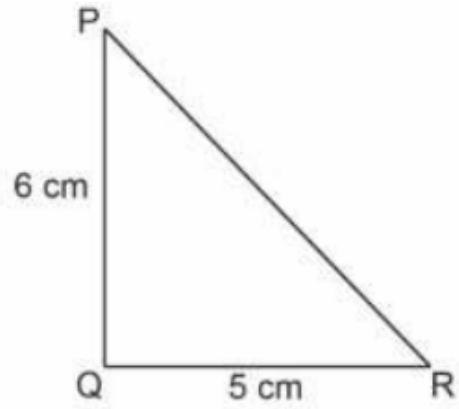
5. C. $X - Z = Y$

6. Explanation states equality in the area of the triangle and the parallelogram.

- Both have equal area.
- The area of the triangle is equal to the area of the parallelogram.

73. Raghvan claims that the magnitude of the angle ABC is greater than the magnitude of the area of the right triangle PQR.





7. Is his claim correct? Why?

8. Two lines intersect at a point P.

Which of the following is true for the distance between the two lines as they travel beyond point P?

A. The distance becomes constant.

B. The distance increases continuously.

C. The distance decreases continuously.

D. The distance increases and decreases depending upon the intersection point.

9. Balan says, 'The measure of all right angles cannot be equal as their arms can be of different lengths.'

Why is Balan's statement not true?

A. The measure of an angle depends upon its orientation.

B. The measure of an angle depends upon the instrument used to measure it.

C. The measure of an angle depends on the length of its angle arms.

D. The measure of an angle depends upon the rotation of one arm on another.

10. TAB is a straight line. C is the mid-point of AB. D is the mid-point of AC.

Which of the following shows the relation between the line segments?

A. $AD = \frac{1}{2}AB$

B. $AD = \frac{1}{2}CB$

C. $AD = 2AC$

D. $AD = 2DC$

Ans. : 7. No, with an explanation involving reasoning about magnitudes.

● No, the measure of an angle cannot be compared to the area of a triangle.

8. B. The distance increases continuously.

9. D. The measure of an angle depends upon the rotation of one arm with respect to the other.

10. B. $AD = \frac{1}{10}CB$

----- if talent doesn't work hard then hardwork beat the talent -----