INDIAN SCHOOL AL WADI AL KABIR
Mid-Term Question Paper (2023-24)

Class: IX   Sub: MATHEMATICS   Max Marks: 80
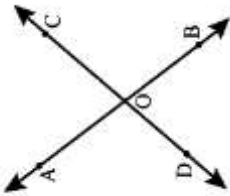Date: 26/09/23   (SET 1)   Time: 3 hours
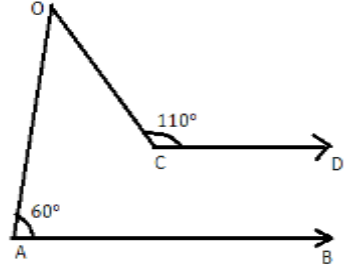
General Instructions:
1. This question paper is divided into 5 sections- A, B, C, D and E.
2. Section A-(MCQ) comprises of 18 questions of 1 mark each and 2 Assertion Reasoning questions of 1 mark each.
3. Section B-(Short answer) comprises of 5 questions of 2 marks each.
4. *Section C*-(Long answer) comprises of 6 questions of 3 marks each.
5. *Section* D- (Long answer) comprises of 4 questions of 5 marks each.
6. Section E- Comprises of 3 Case study-based questions of 4 marks each with sub parts of the values of 1, 1 and 2 marks each respectively.
7. All questions are compulsory. However, an internal choice in 2 Qs of 2marks, 2 Qs of 3 marks and 2 Questions of 5 marks has been provided. An internal choice has been provided in the 2 marks questions of Section E.
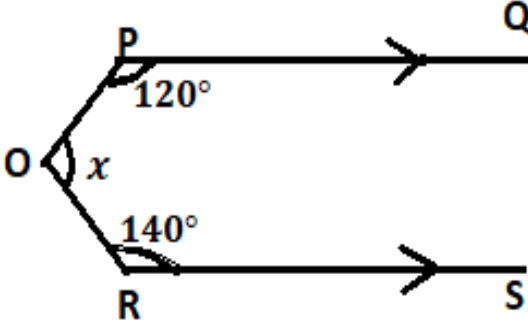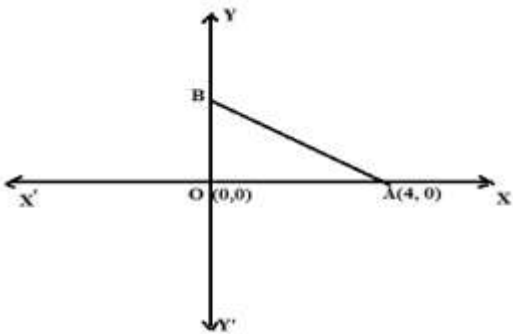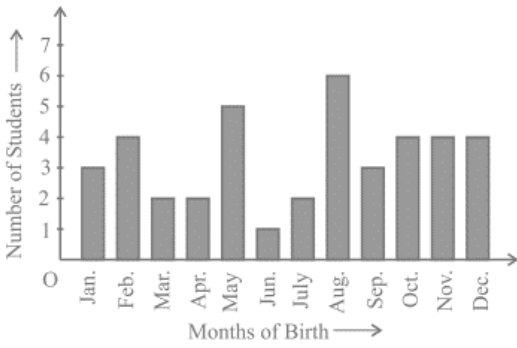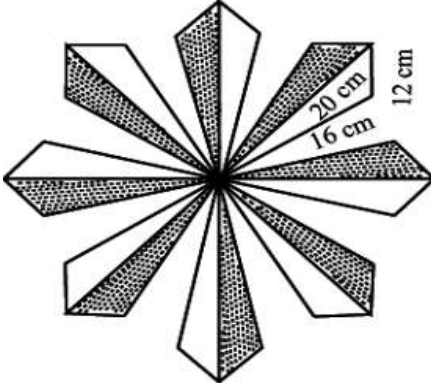
Section A
PART-1(MCQ-1 mark each)
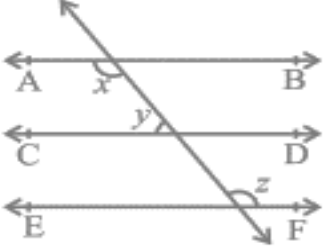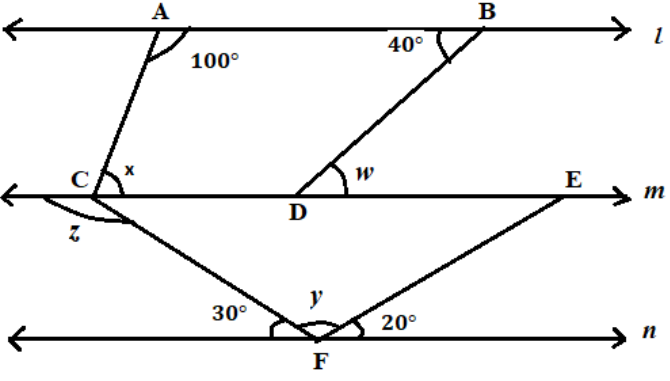
Q.1.	The value of $2^{\frac{2}{3}} \times 2^{\frac{1}{3}}$ is:						
	A	$2^{\frac{2}{3}}$	**B**	$2^{\frac{1}{3}}$	**C**	2	**D**	1

Q.2.	The area of an equilateral triangle with perimeter $24\sqrt{3}$ is:						
	A	$36\sqrt{3}cm^2$	**B**	$48cm^2$	**C**	$18\sqrt{3}cm^2$	**D**	$48\sqrt{3}cm^2$

Q. 3.	The base and hypotenuse of a right triangle is respectively 5cm and 13cm and its area is:						
	A	$60cm^2$	**B**	$30cm^2$	**C**	$65cm^2$	**D**	$18cm^2$

Q. 4.	Simplified form of $8\sqrt{15} \div 2\sqrt{3}$ is:						
	A	$4\sqrt{5}$	**B**	$2\sqrt{3}$	**C**	$5\sqrt{3}$	**D**	$4\sqrt{3}$

Q. 5.	The semi-perimeter of a triangle having the length of its sides as 20cm, 15cm and 21cm is:							
	A	56cm	**B**	28cm	**C**	29cm	**D**	30cm

Q. 6.	The decimal expansion of the number $\sqrt{2}$ is:							
	A	Finite decimal	**B**	1.41421	**C**	Non-terminating recurring	**D**	Non-terminating non-recurring

Q. 7.	The point of intersection of the co-ordinate axes is:							
	A	Origin	**B**	Abscissa	**C**	Quadrant	**D**	Ordinate

Q.8.	The number of dimensions of a surface has:							
	A	3	**B**	1	**C**	0	**D**	2

Q.9.	The class mark of the interval 116.5 – 121.5 is:							
	A	5	**B**	119	**C**	238	**D**	120

Q.10.	Two straight lines AB and CD intersect one another at the point O. If $\angle AOC + \angle COB + \angle BOD = 246°$, then $\angle AOD$ is:							
	A	114°	**B**	90°	**C**	246°	**D**	104°

Q.11.	Two angles $(30° - a)$ and $(125° + 2a)$. If each one is the supplement of the other, then the value of a is:							
	A	35°	**B**	30°	**C**	155°	**D**	25°

Q.12.	Image of point (0 ,5) about x -axis is:							
	A	$(-5, 5)$	**B**	$(-5, 0)$	**C**	$(0, -5)$	**D**	$(5, 0)$

Q.13.	In the class intervals 100-300, 300-500, the number 300 is included in:							
	A	both the intervals	**B**	100 - 300	**C**	300-500	**D**	none of the intervals

Q.14.	If (a, −7) = (9, b), then the value of a and b respectively are:							
	A	$-2, 7$	**B**	$9, -7$	**C**	$-7, 9$	**D**	$-2, 9$

Q.15.	Which of the following needs a proof?							
	A	Theorem	**B**	Axiom	**C**	Definition	**D**	Postulates

Q.16.	To draw a histogram to represent the following frequency distribution, the adjusted frequency for the class 25-45 is:

Marks	5-10	10-15	15-25	25-45	45-75
No. of candidates	6	12	10	8	15

	A	2	**B**	3	**C**	5	**D**	6

Q.17.	The number of interwoven isosceles triangles in Sriyantra (in the Atharvaveda) is:							
	A	7	**B**	8	**C**	9	**D**	11

Q.18.	If two interior angles on the same side of transversal intersect two parallel lines are in the ratio 2:3, then the measure of the larger angle is:							
	A	36°	**B**	108°	**C**	72°	**D**	110°

DIRECTION: In the question number 19 and 20, a statement of assertion (A) is followed by a statement of Reason (R). Choose the correct option.

Q.19.	Statement A (Assertion): In figure. AB ∥ CD, $\angle BAO = 60°$ and $\angle OCD = 110°$, then $\angle AOC = 50°$. Statement R(Reason): If two parallel lines are intersected by a transversal, then each pair of consecutive interior angles are equal. (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A) (b) Both assertion (A) and reason (R) are true and reason (R) is not the correct explanation of assertion (A) (c) Assertion (A) is true but reason (R) is false. (d) Assertion (A) is false but reason (R) is true.

Q.20.	Statement A (Assertion): The area of an equilateral triangle with each side 'p' is $$\triangle = \frac{\sqrt{3}}{4}p^2 \text{ sq. Units}$$ Statement R(Reason): The area of a triangle with perimeter '2s' and sides a, b and c is given by $$\triangle = \sqrt{s(s-a)(s-b)(s-c)}$$ a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A) b) Both assertion (A) and reason (R) are true and reason (R) is not the correct explanation of assertion (A) (c) Assertion (A) is true but reason (R) is false. (d) Assertion (A) is false but reason (R) is true.

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Section B

(S.A-2 mark each)

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Q.21.	Simplify and find the value of $\left\{5\left(8^{\frac{1}{3}} + 27^{\frac{1}{3}}\right)^3\right\}^{\frac{1}{4}}$ OR If a = 2, b=3, then find the value of $(a^b + b^a)^{-1}$, write the answer with positive exponent.
Q.22.	Find the area of a triangle ABC in which then $\angle ABC = 90°$, then $\angle ACB = 45°$ and AB= $\sqrt{18}$ cm. OR The sides of a triangle are in the ratio 3: 4: 5 and its perimeter is 24cm. Find the length of its sides and identify what type of triangle it is.
Q.23.	Solve the equation $m - 15 = 32$ and state which axiom is used here.
Q.24.	In figure given below, $PQ \parallel RS$, find the value of x. State reasons for your answer.

Q.25.	In fig. AOB is a triangle with co-ordinates of A (4, 0) and O (0, 0) and AB= 5units. Find the coordinates of B.	(figure: coordinate axes with O(0,0), A(4,0), and B on the positive Y-axis)

<table>
<tr><td colspan="3" align="center">Section- C
(S.A-3 mark each)</td></tr>
<tr><td>Q.26.</td><td colspan="2">Find the values of a and b, when $\dfrac{5+2\sqrt{6}}{5-2\sqrt{6}} = a + b\sqrt{6}$

                    OR

Represent $\sqrt{9.3}$ on the number line.</td></tr>
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Q.27.	In a particular section of Class IX, 40 students were asked about the months of their birth and the following graph was prepared for the data so obtained:

(i) How many students were born from October to December?

(ii) In which month were the minimum number of students born and how many?

(iii) Compare the number of students were born in February and September.

Which month were maximum no. of students born and by how much?

(bar graph: Number of Students vs Months of Birth)

Q.28.	A floral design on a floor is made up of 16 tiles, each triangular in shape having sides 16 cm, 12 cm and 20 cm. Find the cost of polishing the tiles at ₹ 5 per cm².	(figure: floral design made of triangular tiles with sides 20 cm, 16 cm, 12 cm)

Q.29.	State any three Euclid's Axiom.
Q.30.	Three vertices of a triangle are P (− 4, 1), Q (4, 1) and R (0, 5). Plot these points on a graph sheet and find the area of the triangle so obtained.
Q.31.	If two lines intersect each other, prove that the vertically opposite angles are equal. OR In figure, if AB ∥ CD and CD ∥ EF and y: z = 3: 7, find the value of x, y and z.

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Section- D

(L.A-5 mark each)

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Q.32.	Rationalise the denominator and simplify $\dfrac{1}{3-\sqrt{8}} - \dfrac{1}{\sqrt{8}-\sqrt{7}} + \dfrac{1}{\sqrt{7}-\sqrt{6}} - \dfrac{1}{\sqrt{6}-\sqrt{5}} + \dfrac{1}{\sqrt{5}-2}$ OR Evaluate $\left[\dfrac{81}{16}\right]^{\frac{-3}{4}} \times \left\{ \left(\dfrac{9}{25}\right)^{\frac{3}{2}} \div \left(\dfrac{5}{2}\right)^{-3} \right\}$
Q.33.	Plot the points A (1,3), B (1, −1), C (−1, −1) and locate the fourth vertex D, if ABCD is a rectangle. Also, find the area of the rectangle.
Q.34.	If a transversal intersects two lines such that bisectors of a pair of corresponding angles are parallel, then prove that the two lines are parallel. OR If line $l \parallel m$ and $m \parallel n$, then find the values of x, y, w and z. State reasons for your answer. Also, find $x + y : \; y - x$

Q.35.	The following data which shows the monthly cost of living index of a city in a period of 2 years. Draw a histogram and a frequency polygon representing the given data.					
	Cost of living index:	480-500	500-520	520-540	540-560	560-580
	No. of months:	5	4	3	8	4

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Section- E

(CASE STUDY BASED QUESTIONS-4mark each)

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Q.36.	CASE STUDY-I

It is a type of online game that challenges the students to think fast. They will be bombarded with different types of numbers such as integers, rationals and irrational numbers and numbers in exponential form. Two friends Abhay and Arun played this game.They got the following list of numbers. $1.322222\ldots$, $(256)^{\frac{1}{4}}$, $\sqrt{28}$, $\frac{1}{3-2\sqrt{2}}$, $\frac{2}{11}$, $\frac{3}{13}$, $\sqrt{98}$ and $\sqrt{147}$.

Based on the above information, answer the following questions.

(i) Express the number $1.3222\ldots$ in $\frac{p}{q}$ form. (1m)

(ii) Simplify $\sqrt{27} + \sqrt{98} - \sqrt{48}$ (1m)

(iii) Find any two irrational numbers in between $\frac{2}{5}$ and $\frac{3}{5}$ (2m)

OR

If $x = 3 - 2\sqrt{2}$, find the value of $x + \frac{1}{x}$ (2m)

Q.37.	CASE STUDY-II
	An angle is formed by two rays joining at a point having one common endpoint.
	There are several types of angles like an acute angle, obtuse angle, right angle etc. Further, these types of angles are divided into a pair of angles like supplementary angles, complementary angles, linear pair of angles, opposite angles, adjacent angles etc. However, position, direction, precision, and optimization are some ways in which people use angles in their daily life. Carpenters use them to measure precisely to build doors, chairs, tables, etc. Athletes use them to gauge the distances of a throw and to enhance their performance in sports.
	In the given figure, two straight lines PQ and RS intersect each other at O.
	Based on the above information, answer the following questions with reasons.
	(i) Find the measurement of $\angle SOQ$. (1m)
	(ii) Find the measurement of $\angle ROQ$. (1m)
	(iii) Find the value of y + z.
	OR (2m)
	Find the value of reflex angle $\angle ROT$.
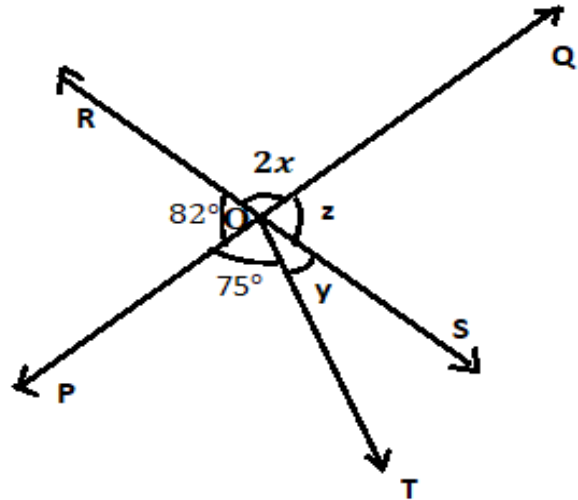
Q.38.	CASE STUDY-III
	Playgrounds are safe spaces where kids develop crucial physical, social, emotional and imaginative skills necessary to gain self-confidence, improve coordination, and advance critical thinking capabilities. Amal went to a play ground along with his friends Ravi, Raju and Rahul. They were passing the volleyball to each other. Amal allotted different positions for his friends where they have to be. After returning to his room, he plotted a graph by assuming that foot of the long pole as origin and marked four places on the graph as per the direction of movement of the ball.
	Based on the above information, answer the following questions.
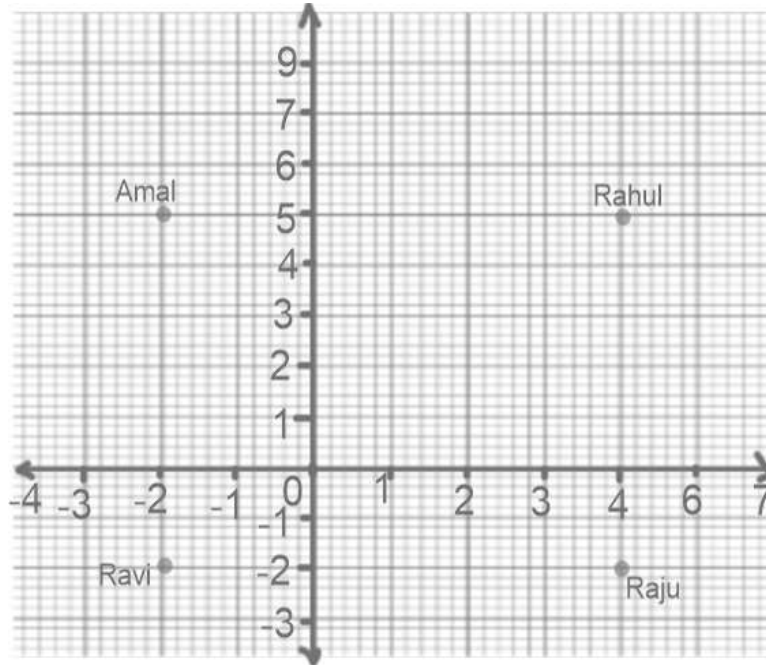
(i)   Find the coordinates of the position of Rahul and Amal.   (1m)

(ii)   Find the distance between Ravi and Raju.   (1m)

(iii)   Identify the quadrant or axis on which the following points lie.
$(-1, -2), (3, 0), (-3, 4), (3, -2)$

OR   (2m)

Find the value of
(Ordinate of the position of Amal − Abscissa of the position of Raju.)
Also, find the distance of Raju from Y-axis.

INDIAN SCHOOL AL WADI AL KABIR
Mid-Term Answer Key (2023-24)

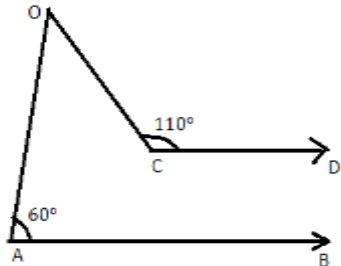Class: IX   Sub: MATHEMATICS   Max Marks: 80
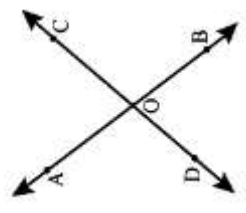
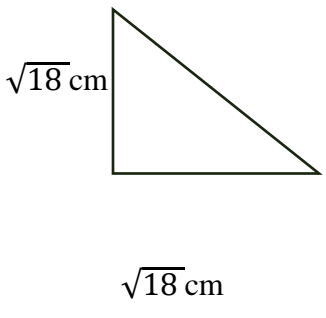Date: 26/09/23   (SET 1)   Time:3 hours
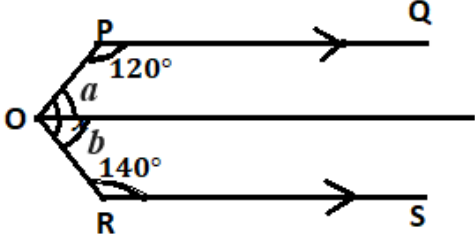
Section A
PART-1(MCQ-1 mark each)
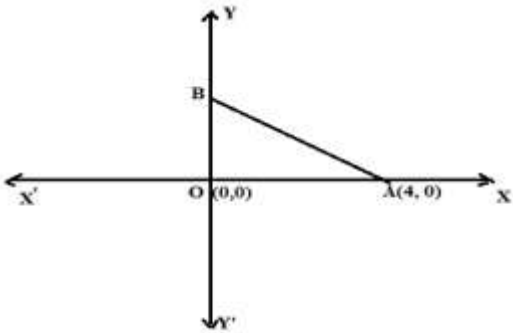
Q.1. The value of $2^{\frac{2}{3}} \times 2^{\frac{1}{3}}$ is:

A		B		C	2	D	

Q.2. The area of an equilateral triangle with perimeter $24\sqrt{3}$ is:

A		B		C		D	$48\sqrt{3}cm^2$

Q. 3. The base and hypotenuse of a right triangle is respectively 5cm and 13cm and its area is:

A		B	$30cm^2$	C		D	

Q. 4. Simplified form of $8\sqrt{15} \div 2\sqrt{3}$ is:

A	$4\sqrt{5}$	B		C		D	

Q. 5. The semi-perimeter of a triangle having the length of its sides as 20cm, 15cm and 21cm is:

A		B	28cm	C		D	

Q. 6. The decimal expansion of the number $\sqrt{2}$ is:

A		B		C		D	Non-terminating non-recurring

Q. 7. The point of intersection of the co-ordinate axes is:

A	Origin	B		C		D	

Q.8. The number of dimensions of a surface has:

A		B		C		D	2
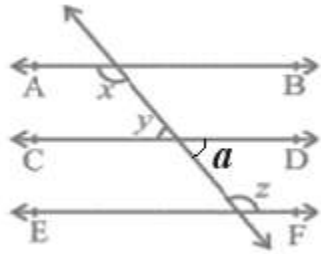
Q.9.	The class mark of the interval 116.5 – 121.5 is:							
	A		**B**	119	**C**		**D**	

Q.10.	Two straight lines AB and CD intersect one another at the point O. If $\angle AOC + \angle COB + \angle BOD = 246°$, then $\angle AOD$ is:							
	A	114°	**B**		**C**		**D**	

Q.11.	Two angles $(30° - a)$ and $(125° + 2a)$. If each one is the supplement of the other, then the value of a is:							
	A		**B**		**C**		**D**	25°

Q.12.	Image of point (0 ,5) about x -axis is:							
	A		**B**		**C**	$(0, -5)$	**D**	

Q.13.	In the class intervals 100-300, 300-500, the number 300 is included in:							
	A		**B**		**C**	300-500	**D**	

Q.14.	If (a, −7) = (9, b), then the value of a and b respectively are:							
	A		**B**	$(9, -7)$	**C**		**D**	

Q.15.	Which of the following needs a proof?							
	A	Theorem	**B**		**C**		**D**	

Q.16.	To draw a histogram to represent the following frequency distribution, the adjusted frequency for the class 25-45 is:

Marks	5-10	10-15	15-25	25-45	45-75
No. of candidates	6	12	10	8	15

	A	2	**B**		**C**		**D**	

Q.17.	The number of interwoven isosceles triangles in Sriyantra (in the Atharvaveda) is:							
	A		**B**		**C**	9	**D**	

Q.18.	If two interior angles on the same side of transversal intersect two parallel lines are in the ratio 2:3, then the measure of the larger angle is:						
	A		**B**	108°	**C**		**D**	

DIRECTION: In the question number 19 and 20, a statement of assertion (A) is followed by a statement of Reason (R). Choose the correct option.

Q.19.	Statement A (Assertion): In figure. AB ∥ CD, $\angle BAO = 60°$ and $\angle OCD = 110°$, then $\angle AOC = 50°$.

Statement R(Reason): If two parallel lines are intersected by a transversal, then each pair of consecutive interior angles are equal.

    (a) Both assertion (A) and reason (R) are true and
      reason (R) is the correct explanation of assertion (A)
    (b) Both assertion (A) and reason (R) are true and
      reason (R) is not the correct explanation of assertion (A)

  (c) Assertion (A) is true but reason (R) is false

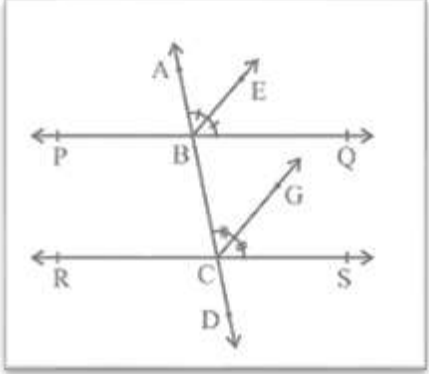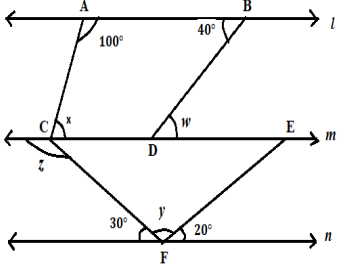   (d) Assertion (A) is false but reason (R) is true.

Q.20.	Statement A (Assertion): The area of an equilateral triangle with each side 'p' is

$$\triangle = \frac{\sqrt{3}}{4}p^2 \text{ sq. Units}$$

Statement R(Reason):   The area of a triangle with perimeter '2s 'and sides a, b and c is given by

$$\triangle = \sqrt{s(s-a)(s-b)(s-c)}$$

  a) Both assertion (A) and reason (R) are true and
    reason (R) is the correct explanation of assertion (A)
    b) Both assertion (A) and reason (R) are true and
      reason (R) is not the correct explanation of assertion (A)

    (c) Assertion (A) is true but reason (R) is false.

    (d) Assertion (A) is false but reason (R) is true.

Section B

(S.A-2 mark each)

Q.21.	Simplify and find the value of $\left\{ 5\left(8^{\frac{1}{3}} + 27^{\frac{1}{3}} \right)^3 \right\}^{\frac{1}{4}}$

$\left\{ 5\left(2^{3 \times \frac{1}{3}} + 3^{3 \times \frac{1}{3}} \right)^3 \right\}^{\frac{1}{4}}$

$= \left\{ 5(2 + 3)^3 \right\}^{\frac{1}{4}}$ (1 ½)

$= \left\{ 5(5)^3 \right\}^{\frac{1}{4}} =$

$= 5^{4 \times \frac{1}{4}} = 5$ (½)

OR

If a = 2, b=3, then find the value of $(a^b + b^a)^{-1}$, write the answer with positive exponent.

$(2^3 + 3^2)^{-1} = (8 + 9)^{-1}$ (1m)

$= 17^{-1} = \frac{1}{17}$ (1m)

Q.22.	Find the area of a triangle ABC in which then $\angle ABC = 90°$, then $\angle ACB = 45°$ and AB= $\sqrt{18}$ cm

Sol:

$\angle ABC = 90°$, then $\angle ACB = 45°$

$\therefore \angle ACB = \angle BAC = 45° \implies$ AB=BC= $\sqrt{18}$ cm (1m)

Area $= \frac{1}{2}$ bh $= \frac{1}{2} \times \sqrt{18} \times \sqrt{18}$

$= \frac{1}{2} \times 18 = 9$cm (1m)

OR

The sides of a triangle are in the ratio 3: 4: 5 and its perimeter is 24cm. Find the length of its sides and identify what type of triangle it is.

Sol: Let the sides be 3x, 4x and 5x

3x + 4x + 5x = 24
12 x =24 $\implies x = 2$ (1m)
3×2 =6, 4 ×2=8cm, 5 ×2=10cm.

$6^2 + 8^2 = 10^2$, Right triangle or Scalene triangle (1m)

Q.23.	Solve the equation $m - 15 = 32$ and state which axiom is used here.
	Sol. $m - 15 + 15 = 32 + 15$ $(add\ 15\ on\ both\ sides)$ m = 47 (1m) Axiom: If equals are added to equals the wholes are equal. (1m)
Q.24.	In figure given below, $PQ \parallel RS$. find the value of x . State reasons for your answer. Sol: a=180-120=60 b= 180-140 =40{co-interior angles are supplementary} (1m) x = 60+40 =100 (1m)
Q.25.	In fig. AOB is a triangle with co-ordinates of A (4, 0) and O (0, 0) and AB= 5units. Find the coordinates of B. Sol: $5^2 - 4^2 = 3^2$ (1m) Coordinates of B=(0,3) (1m)

Section- C

(S.A-3 mark each)

Q.26.	Find the values of a and b, when $\dfrac{5+2\sqrt{6}}{5-2\sqrt{6}} = a + b\sqrt{6}$
	$\dfrac{5+2\sqrt{6}}{5-2\sqrt{6}} \times \dfrac{5+2\sqrt{6}}{5+2\sqrt{6}} = \dfrac{(5+2\sqrt{6})^2}{5^2-(2\sqrt{6})^2}$ (1m) $= \dfrac{25+20\sqrt{6})+24}{25-24} = 49+20\sqrt{6}) == a + b\sqrt{6}$ (1m)

	A = 49, b= 20 (1m) OR Represent $\sqrt{9.3}$ on the number line. *No. line (1m) *Perpendicular bisector +semi-circle (2m)

Q.27.	In a particular section of Class IX, 40 students were asked about the months of their birth and the following graph was prepared for the data so obtained:
	
	   (i) How many students were born from October to December?
	         4+4+4 =12 (1m)
	
	   (ii) In which month were the minimum number of students born and how many? **June, 1** (1m)
	
	   (iii) Compare the number of students were born in February and September. Which month were maximum no. of students born and by how much?
	         February -4 > September-3 by 4-3 = 1 (1m)

Q.28.	A floral design on a floor is made up of 16 tiles, each triangular in shape having sides 16 cm, 12 cm and 20 cm. Find the cost of polishing the tiles at ₹ 5 per cm^2. Sol: $S = \dfrac{16\ cm + 12\ cm + 20\ cm.}{2} = 24cm$ $S-a = 24 - 16 = 8, s - b = 24 - 12 = 12,$ $s - c = 24 - 20 = 4$ (1m) Area $= \sqrt{s(s-a)(s-b)(s-c)}$ $\sqrt{24 \times 8 \times 12 \times 4} = 12 \times 8 = 96\ cm^2$ (1m)

	Area of 16 tiles = 16 $\times$ 96 =1536 cm^2 Total cost = ₹ 5 $\times$ 1536 = ₹ 7680 **(1m)**
Q.29.	State any three Euclid's Axiom. Each axiom – 1m (1m $\times$ 3= 3m)
Q.30.	Three vertices of a triangle are P (− 4, 1), Q (4, 1) and R (0, 5). Plot these points on a graph sheet and find the area of the triangle so obtained. X and Y axis marking properly (1m) Plotting three points (1 ½ m), Area =8sq.unit (½ m)
Q.31.	If two lines intersect each other, prove that the vertically opposite angles are equal. Given: AB and CD are two lines intersect at O. To prove: ∠1 = ∠3, ∠2 = ∠4 (1 ½) Proof: Ray OB stands on line CD, ∠1 + ∠2 = 180 ----(1) [Linear pair] Ray OB stands on line CD, ∠2 + ∠3 = 180 ----(1) [Linear pair] From (1) and (2), ∠1 + ∠2 = ∠2 + ∠3 $\Rightarrow$ ∠1 = ∠3 (1m) Similarly, ∠2 = ∠4 (1 ½) **OR** In figure, if AB ‖ CD and CD ‖ EF and y: z = 3: 7,

find the value of x, y and z.

y = a (v.o.p)

let   a =3k   and   z= 7k,

a +z = 3k +7k = 10 k = 180° $\Rightarrow k = 18$ (1 + ½)

a = 3 ×18 =54° , a = y = 54°   (1m)

z = 7 ×18= 126°   (½)

<div align="center">Section- D</div>
<div align="center">(L.A-5 mark each)</div>

Q.32.	Rationalise the denominator and simplify $\dfrac{1}{3-\sqrt{8}} - \dfrac{1}{\sqrt{8}-\sqrt{7}} + \dfrac{1}{\sqrt{7}-\sqrt{6}} - \dfrac{1}{\sqrt{6}-\sqrt{5}} + \dfrac{1}{\sqrt{5}-2}$

$\dfrac{1}{3-\sqrt{8}} \times \dfrac{3+\sqrt{8}}{3+\sqrt{8}} = \dfrac{3+\sqrt{8}}{3^2-\sqrt{8}^2} = 3+\sqrt{8}$ (½)

$\dfrac{1}{\sqrt{8}-\sqrt{7}}$, after rationalise getting $\sqrt{8} +\sqrt{7}$ (½)

$\dfrac{1}{\sqrt{7}-\sqrt{6}}$, after Rationalise getting $\sqrt{7} +\sqrt{6}$ (½)

$\dfrac{1}{\sqrt{6}-\sqrt{5}}$, after Rationalise getting $\sqrt{6} +\sqrt{5}$ (½)

$\dfrac{1}{\sqrt{5}-2}$, after Rationalise getting $\sqrt{5} +2$ (½)

$3+\sqrt{8} -\sqrt{8} -\sqrt{7} +\sqrt{7} +\sqrt{6} -\sqrt{6} -\sqrt{5}+\sqrt{5} +2 = 3 + 2 =5$ (½ +½ + ½ + ½ +½)

<div align="center">OR</div>

Evaluate $[\dfrac{81}{16}]^{\frac{-3}{4}} \times \{ \left(\dfrac{9}{25}\right)^{\frac{3}{2}} \div \left(\dfrac{5}{2}\right)^{-3}\}$

$[\dfrac{16}{81}]^{\frac{3}{4}} \times \{ \left(\dfrac{9}{25}\right)^{\frac{3}{2}} \div \left(\dfrac{2}{5}\right)^{3}\}$ (1m)

$[\dfrac{2}{3}]^3 \times [\left(\dfrac{3}{5}\right)^3 \div \left(\dfrac{2}{5}\right)^3\}$ (1m +1m)

$=[\dfrac{2}{3}]^3 \times [\left(\dfrac{3}{5}\right)^3 \times \left(\dfrac{5}{2}\right)^3\}$ (1m)

$= \dfrac{2^3}{3^3} \times \dfrac{3^3}{5^3} \times \dfrac{5^3}{2^3} =1$ (1m)

Q.33.	Plot the points A (1,3), B (1, −1), C (−1, −1) and locate the fourth vertex D, if ABCD is a rectangle. Also, find the area of the rectangle.
	Sol: X-axis, Y -axis **(1m),** Plotting three points **(3m)**, Fourth vertex **(½)** and Area **(½)**
Q.34.	If a transversal intersects two lines such that bisectors of a pair of corresponding angles are parallel, then prove that the two lines are parallel.

Sol: Given: A transversal AD intersects PQ and RS at B and C respectively.

<center>BE and CG are the bisectors, BE ∥ CG</center>

To prove: PQ ∥ RS   (1m + 1 m)

Proof:

$\angle ABE = \frac{1}{2} \angle ABQ$-------(1) {BE is the bisector of $\angle ABQ$}

$\angle BCG = \frac{1}{2} \angle BCS$-------(2) {CG is the bisector of $\angle BCS$}

But $\angle ABE = \angle BCG$ {corresponding angles} ---------(3)

Use (1), (2) and (3)

$\frac{1}{2} \angle ABQ = \frac{1}{2} \angle BCS$

$\angle ABQ = \angle BCS$, but they are corresponding angles and they are equal.   (1m + 1m + 1m)

PQ ∥ RS

<center>OR</center>

If line l ∥ m and m ∥ n, then find the values of x, y, w and z. State reasons for your answer. Also, find $x + y : y - x$

X= 180-100 =80°(*cointerior angles are supplementary*)

w=40°(alternate interior angles)

z = 180-30 =150

30 +y + 20 =180 (angles on a straight line)

y=180-50 =130   (each one 1m×4= 4m)

x +y : y -x = 210 : 50 = 21: 5   (1m)

Q.35.	The following data which shows the monthly cost of living index of a city in a period of 2 years. Draw a histogram and a frequency polygon representing the given data.					
	Cost of living index:	480-500	500-520	520-540	540-560	560-580
	No. of months:	5	4	3	8	4

Histogram(3m), frequency polygon (2m)

Section- E
(CASE STUDY BASED QUESTIONS-4mark each)

Q.36.

<u>CASE STUDY-I</u>

(i) Express the number $1.3222\ldots$ in $\frac{p}{q}$ form.

Le x = 1.3222… × 10

10x = 13.222…-----------------(1)

100x = 132.222…--------------(2)   (½ m)

(2) – (1)

90x = 132-13=119

x=119/90   (½ m)

(ii) Simplify $\sqrt{27} + \sqrt{98} - \sqrt{48}$

$3\sqrt{3}$ $+ 7\sqrt{27} - 4\sqrt{3}$ (1m)

$= 7\sqrt{27} - \sqrt{3}$

(iii) Find any two irrational numbers in between $\frac{2}{5}$ and $\frac{3}{5}$ (2m)

$\frac{2}{5}$ =0.4, $\frac{3}{5}$ = 0.6   (1m)

0.414114111…….

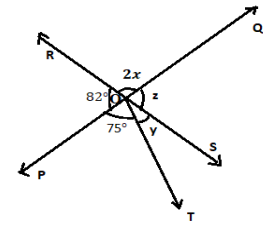0.424224222…….   (1m)

  OR

If $x = 3 - 2\sqrt{2}$, find the value of $x + \frac{1}{x}$

$\frac{1}{x}$ = $\frac{1}{3-2\sqrt{2}} \times \frac{3+2\sqrt{2}}{3+2\sqrt{2}}$ $= 3 + 2\sqrt{2}$ (1m)

$x + \frac{1}{x}$ = $3 - 2\sqrt{2} + 3 + 2\sqrt{2}$ = 6   (1m)

Q.37.	**CASE STUDY-II**

(i) Find the measurement of ∠SOQ.

∠SOQ = z = 82° (1m)

(ii) Find the measurement of ∠ROQ.

∠ROP + ∠ROQ = 180° (*linear pair*)
∠ROQ = 180° − 82 = 98° (1m)

(iii) Find the value of y + z.

75° + y + 82 = 180° (1m)
Y=180-157 =23 (1m)

     OR

Find the value of reflex angle ∠ROT.

∠ROT = 82 + 75 = 157° (1m)

Reflex angle ∠ROT =360-157 =203° (1m)

Q.38.	**CASE STUDY-III**
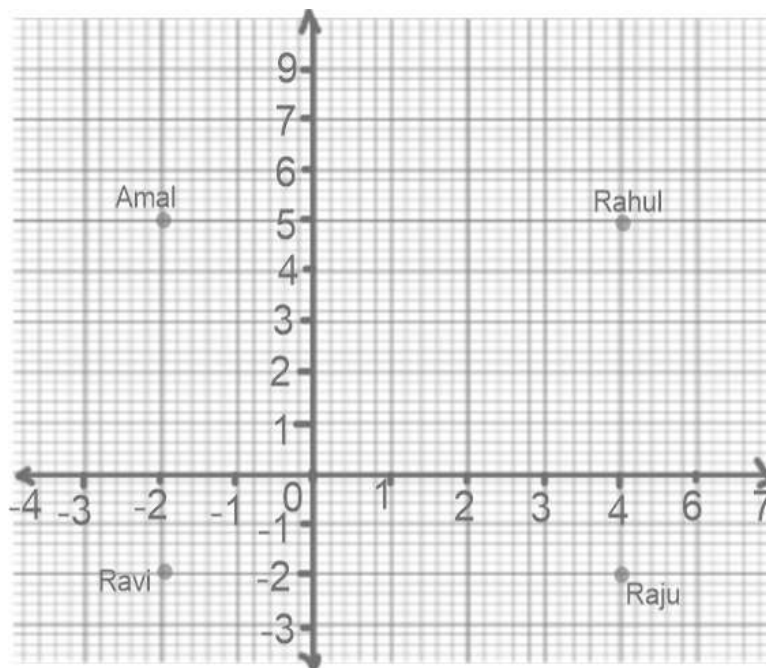
(i)	Find the coordinates of the position of Rahul and Amal. Rahul(4,5), Amal (-2,5) (1m)	
(ii)	Find the distance between Ravi and Raju. Distance between Ravi and Raju =6 units (1m)	

(iii)	Identify the quadrant or axis on which the following points lie.
	
	$(-1, -2)$ = III, $(3, 0)$ =X-axis, $(-3, 4)$ =II, $(3, -2)$ =IV (2m)
	
	 OR
	Find the value of
	(Ordinate of the position of Amal $-$ Abscissa of the position of Raju.)
	Also, find the distance of Raju from Y-axis.
	
	Sol: Ordinate of the position of Amal=5
	       Abscissa of the position of Raju =4 (1m)
	       Difference = 5$-$4 =1
	        From Y-axis: Raju is 4 units away (1m)	