INDIAN SCHOOL AL WADI AL KABIR

Mid Term Examination (2024-25)

Class: IX Sub: MATHEMATICS Max Marks: 80

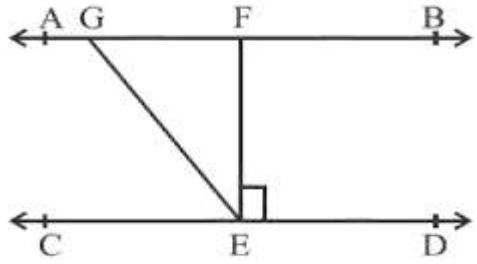
Time:3 hours

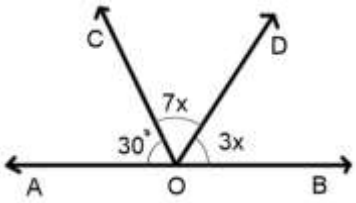
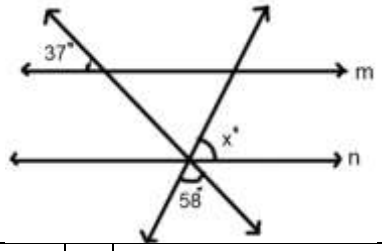
General Instructions:

1. This question paper has 5 sections- A, B, C, D and E.
2. Section A- PART-1 (MCQ) comprises of 18 questions of 1 mark each
3. Section A- PART-2 (Assertion and Reason) comprises of 2 questions of 1 mark each.
4. *Section B*- (Short answer) comprises of 5 questions of 2mark each.
5. Section *C*- (Long answer) comprises of 6 questions of 3 marks each.
6. Section D- (Long answer) comprises of 4 questions of 5 marks each.
7. Section E – comprises of 3 Case study-based questions of 4 marks each with sub parts of the values 1, 1 and 2 marks each respectively.
8. All Questions are compulsory. However, an internal choice has been provided for certain questions.

Section A

PART-1 MCQ (1 mark each)

Q. 1.	If AB ‖ CD, EF ⊥ CD and ∠GED = 145° as per the figure given below. The value of ∠FGE is: 							
	A		**B**		**C**		**D**	35°
Q. 2.	The simplest rationalizing factor of $\frac{1}{\sqrt{98}}$ is							
	A	$\sqrt{2}$	**B**		**C**		**D**	
Q. 3.	In a frequency distribution, the mid value of a class is 15 and the class size is 4. The lower limit of the class is							

	A		**B**		**C**	13	**D**	
Q. 4.	In the given figure, AOB is a straight line, then, the value of x is: 							
	A		**B**		**C**		**D**	15°
Q. 5.	The points (3, -5) and (-5, 3) lie in _____respectively.							
	A		**B**	IV and II quadrant	**C**		**D**	
Q. 6.	Euclid stated that all right angles are equal to each other in the form of							
	A		**B**		**C**		**D**	a postulate
Q. 7.	In the figure, if m‖n, then the value of x is 							
	A		**B**	85°	**C**		**D**	
Q.8.	The co-ordinates of a point whose ordinate is 6 and which lies on y-axis are:							
	A	(0, 6)	**B**		**C**		**D**	
Q. 9.	The base of a right triangle is 6 cm and hypotenuse is 10 cm. Its area is:							
	A		**B**		**C**	$24\ cm^2$	**D**	
Q. 10.	In ΔABC and ΔDEF, AB = DE, $\angle A = \angle D$. The two triangles will be congruent by SAS congruence if							
	A		**B**		**C**		**D**	AC=DF

Q.11. In order to draw a histogram which is represented by the following frequency distribution, the adjusted frequency for the class 25 – 45 is:

Class interval	0 - 5	5 - 10	10 - 20	20 - 25	25 - 45
Frequency	8	12	7	23	20

A | **B** | **C** | **D** 5

Q.12. The value of $\left[\left((81)^{\frac{-1}{2}}\right)^{\frac{-1}{4}}\right]^2$ is

A 3 | **B** | **C** | **D**

Q.13. If (a+7, −7) = (9, b+2), then the value of a and b respectively are:

A 2, −9 | **B** | **C** | **D**

Q.14. If the area of an equilateral triangle is$16\sqrt{3}\ cm^2$, then its perimeter is :

A | **B** 24 cm | **C** | **D**

Q.15. Each of the two equal sides of an isosceles right triangle is 10 cm long, its area is

A $50cm^2$ | **B** | **C** | **D**

Q.16. The class mark of the class 85-90 is

A | **B** | **C** 87.5 | **D**

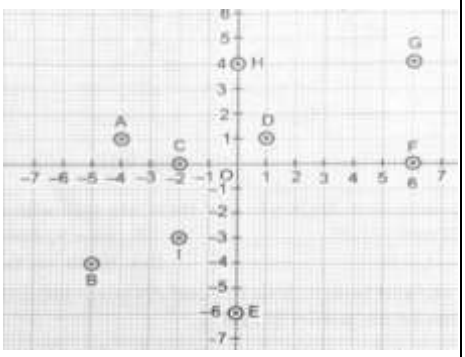
Q.17. Euclid divided his famous treatise "The Elements" into:

A 13 chapters | **B** | **C** | **D**

Q. 18. A rational number between -3 and 3 is

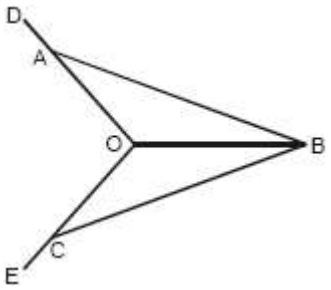
A 0 | **B** | **C** | **D**

PART-2 ASSERTION AND REASON (1 mark each)

Q.19	Statement A (Assertion): The area of an equilateral triangle with side 2 cm is $\sqrt{3}\ cm^2$. Statement R (Reason): If the side of an equilateral triangle is 'a' unit, then area of an equilateral triangle is $\frac{\sqrt{3}a^2}{4}$ sq units. A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).
Q.20	Statement A (Assertion): The rationalizing factor of $3\sqrt{2} - 2\sqrt{3}$ is $3\sqrt{3} - 2\sqrt{3}$ Statement R (Reason): If the product of two irrational numbers is rational, then each one is called the rationalizing factor of the other. (D) Assertion (A) is false but Reason (R) is true.
	Section B Short answer questions (2 mark each)
Q. 21.	Ramesh and Rutuja have the same weight. If they each gain weight by 2 kg, how will their new weights be compared? State the axiom used. Let the weight of Ramesh be x kg So, weight of Rutuja = x kg When each gain weight by 2kg, Weight of Ram = (x + 2) kg Weight of Ravi = (x + 2) kg Axiom: If equals are added to the equals, the wholes are equal.
Q.22.	Based on the below given figure, answer the following questions: a) Coordinates of the point F. (6,0) b) If the coordinates of G and A is written as G(a, b) and A(x, y), then evaluate ax-by? -28 c) The perpendicular distance of the point D from the x-axis. 1 d) Ordinate of the point C. 0 

Q.23.

In the given figure, AB = BC and OB bisects ∠ABC, then prove that OA=OC.



Given, AB = BC and ∠ABO = ∠CBO

In ΔOAB and ΔOCB,

AB = BC (given)

∠ABO = ∠CBO (OB bisects ∠ABC)

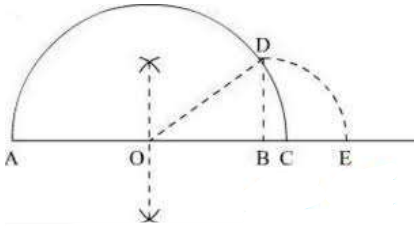
OB = OB (common side)

ΔOAB ≅ ΔOCB (SAS congruency)

∴ OA = OB cpct

Q.24.

Represent $\sqrt{8.5}$ on a number line.



AB=8.5, BC=1cm (½)

Getting point O (½)

Drawing semi circle (½)

Constructing perpendicular at B to get the point D

From B Drawing an arc to cut the number line at E (½)

Or

Simplify $3\sqrt{45}-\sqrt{125}-\sqrt{50}=9\sqrt{5}-5\sqrt{5}-5\sqrt{2}$ $(1\frac{1}{2})$

$=4\sqrt{5}-5\sqrt{2}$ (½)

Q.25.

The sides of a triangle are in the ratio 25:17:12 and its perimeter is 540 m. find the area if the triangle.

Let the sides of the triangle be 12a,25a,17a.

We know that perimeter of the triangle = Sum of all sides

⇒12a+25a+17a=54a

Given, perimeter of the triangle =540m

⇒54a=540m

a=10m (½)

So, the lengths of the sides of triangle are

12a=120m

25a=250m

17a=170m

We can use Heron's formula to get the area of triangle

Area of triangle s=√s(s−a)(s−b)(s−c).

and s=a+b+c/2

s=(120+250+170)/2

=270m (½)

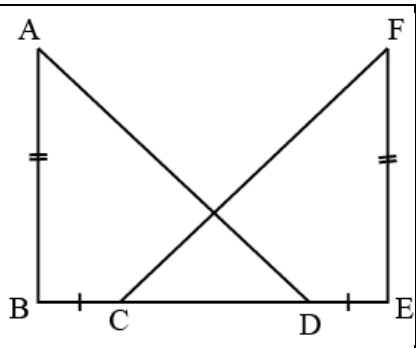
Substituting the sides 120 m, 250 m and 170 m in the Heron's formula, we get

√270(270−120)(270−250)(270−170) (½)

=√270×150×20×100

	=√9×30×30×5×20×20×5 =3×30×5×20 =9000m^2 (½)
	Section C Short Answer questions (3 mark each)
Q.26.	State any three Euclid's axiom.
Q.27.	Express $0.6 + 0.\overline{7} + 0.4\overline{7}$ in the form of $\frac{p}{q}$, where p and q are integers and $q \neq 0$. Let x = 0.6 10x = 6 x = 6/10 (½) Let y=$0.\overline{7}$ So, y = 0.7777 ---------- (1) Multiplying both sides by 10, 10y = 7.7777 ---------- (2) Subtracting (1) and (2), 10y - y = 7.7777 - 0.7777 9y = 7.0000 9y = 7 y = 7/9 (½) Let a=$0.4\overline{7}$ 10a= 4.777…_____(3) 100a=47.777…_____(4) (4)-(3), 90a=43 a=43/90 (1) $0.6 + 0.\overline{7} + 0.4\overline{7}$ =6/10 + 7/9 + 43/90= 167/90 (½ + ½) Or Simplify by rationalizing the denominator $\frac{7+3\sqrt{5}}{3+\sqrt{5}} + \frac{7-3\sqrt{5}}{3-\sqrt{5}}$ $\frac{7+3\sqrt{5}}{3+\sqrt{5}} \times \frac{3-\sqrt{5}}{3-\sqrt{5}} = \frac{21-7\sqrt{5}+9\sqrt{5}-15}{9-5} = \frac{6+2\sqrt{5}}{4} = \frac{3+\sqrt{5}}{2}$ (1$\frac{1}{2}$) $\frac{7-3\sqrt{5}}{3-\sqrt{5}} \times \frac{3+\sqrt{5}}{3+\sqrt{5}} = \frac{21+7\sqrt{5}-9\sqrt{5}-15}{9-5} = \frac{6-2\sqrt{5}}{4} = \frac{3-\sqrt{5}}{2}$ (1) $\frac{3+\sqrt{5}}{2} + \frac{3-\sqrt{5}}{2} = 3$ (½)

Q.28.



In the given figure, AB = FE, BC = ED, AB ⊥ BD, FE ⊥ EC. Prove that ΔABD ≅ ΔFEC

Given, BC = ED

BC+CD = ED+CD (½)

$\therefore BD = EC$ (½)

In ΔABD, ΔFEC

AB = FE (given) (½)

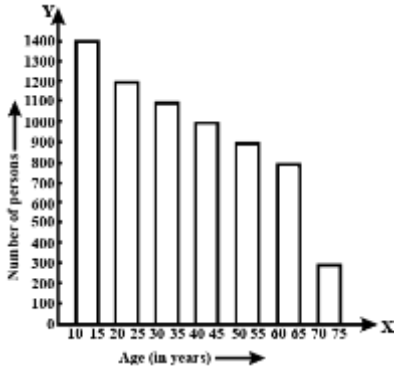
∠ABD = $\angle FEC$ (given) (½)

$BD = EC$ (from above) (½)

ΔABD ≅ ΔFEC SAS congruence (½)

Q.29.

Study the bar graph representing the number of persons age groups in a town. Observe the bar graph and answer the following questions:



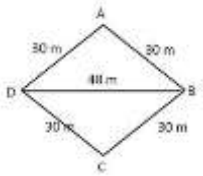
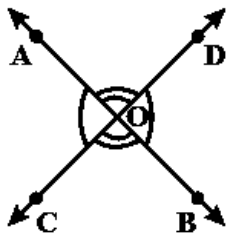
i) 6700
ii) 300
iii) 1:3

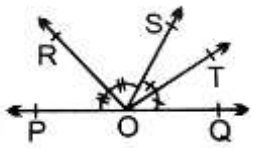
Q.30.

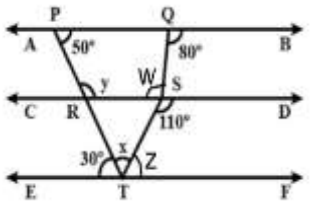
The lengths of the sides of a triangle are 7 cm, 13 cm and 12 cm. Find the area of the triangle. Also find the length of perpendicular from the opposite vertex to the side whose length is 12 cm.

Let, $a = 7$ cm, $b = 13$ cm, $c = 12$ cm

$\therefore s = \frac{a+b+c}{2} = \frac{7+13+12}{2} = \frac{32}{2} = 16$ cm (½)

	Area of $\triangle ABC = \sqrt{s(s-a)(s-b)(s-c)}$ $= \sqrt{16(16-7)(16-13)(16-12)}$ (½) $= \sqrt{16 \times 9 \times 3 \times 4} = 24\sqrt{3}\ \text{cm}^2$ (1) Let the length of perpendicular from opposite vertex to the side whose length is 12 cm be x. So, $\frac{1}{2} \times x \times 12 = 24\sqrt{3}$ (½) $\Rightarrow x = 4\sqrt{3}$ cm (½) Or  A rhombus shaped field has green grass for 18 cows to graze. If each side of the rhombus is 30 m and its longer diagonal is 48 m, how much area of grass field will each cow be grazing? Let ABCD be a rhombus of side 30m AB=BC=CD=DA=30m Also, diagonal BD=48m s= $\frac{a+b+c}{2} = \frac{30+30+48}{2} = \frac{108}{2} = 54\ m$ Area of triangle=√s(s−a)(s−b)(s−c) $=\sqrt{s(s-a)(s-b)(s-c)} = \sqrt{54(54-30)(54-30)(54-48)}$ $= \sqrt{54 \times 24 \times 24 \times 6} = 432m^2$ Area of rhombus = 2 x 432=864m^2 Area occupied by each cow = 864/18=48m^2
Q.31.	Prove that if two lines intersect each other, then the vertically opposite angles are equal. Given: If two lines i.e. AB & CD intersect each other. They have two pair of opp. Angles ∠AOC, ∠DOB; ∠AOD, ∠COB. To prove :- ∠AOC=∠DOB & ∠AOD=∠COB (½)  Proof :- ∠AOC+∠AOD=180° [linear pair] ___(1) ∠AOD+∠BOD=180° [linear pair] ___(2) (1) from eq. (1) & (2) ∠AOC+∠AOD=∠AOD+∠BOD (½) i.e. [∠AOC=∠BOD] (½)

	Similarly [∠AOD=∠COB] Hence proved. (½) Or In the given figure, Ray OS stands on a line PQ. Ray OR and ray OT are angle bisectors of ∠POS and ∠SOQ respectively. If ∠S0Q=x, find ∠ROT.  Ray OS stands on the line PQ. Therefore, ∠POS+∠SOQ=180° (Linear pair) (½) Let ∠SOQ=x° Thus ∠POS=180°−∠SOQ ∠POS=180°−x° (½) Now, as ray OR and ray OT are angle bisectors so $\angle SOT=\frac{1}{2}\times\angle SOQ$ Thus, $\angle SOT=\frac{1}{2}\times x°$ (½) And $\angle ROS=\frac{1}{2}\times\angle POS$ Thus, $\angle ROS=\frac{1}{2}\times(180°-x°)$ $\angle ROS=90°-\frac{x°}{2}$ (½) Here ∠ROT=∠ROS+∠SOT $\angle ROT=90°-\frac{x°}{2}+\frac{x°}{2}$ (½) ∠ROT=90° (½)
	Section D Long answer questions (5 mark each)
Q. 32.	If $\frac{2+\sqrt{3}}{2-\sqrt{3}}+\frac{2-\sqrt{3}}{2+\sqrt{3}}+\frac{\sqrt{3}-1}{\sqrt{3}+1}=a+b\sqrt{3}$, find the values of a and b. $\frac{2+\sqrt{3}}{2-\sqrt{3}}\times\frac{2+\sqrt{3}}{2+\sqrt{3}}+\frac{2-\sqrt{3}}{2+\sqrt{3}}\times\frac{2-\sqrt{3}}{2-\sqrt{3}}+\frac{\sqrt{3}-1}{\sqrt{3}+1}\times\frac{\sqrt{3}-1}{\sqrt{3}-1}$ $(1\frac{1}{2})$ $\frac{4+4\sqrt{3}+3}{4-3}+\frac{4-4\sqrt{3}+3}{4-3}+\frac{3-2\sqrt{3}+1}{3-1}=7+4\sqrt{3}+7-4\sqrt{3}+\frac{4-2\sqrt{3}}{2}$ $(1\frac{1}{2})$ $16-\sqrt{3}=a+b\sqrt{3}$ (1) $a=16, b=-1$ (½ + ½) Or Evaluate: $\frac{4}{(216)^{\frac{-2}{3}}}-\frac{5}{(256)^{\frac{-3}{4}}}+\frac{2}{(243)^{\frac{-1}{5}}}$

	$\frac{4}{(6^3)^{\frac{-2}{3}}} - \frac{5}{(4^4)^{\frac{-3}{4}}} + \frac{2}{(3^5)^{\frac{-1}{5}}}$ $(1\frac{1}{2})$ $\frac{4}{6^{-2}} - \frac{5}{4^{-3}} + \frac{2}{3^{-1}}$ $(1\frac{1}{2})$ $=4 \times 6^2 - 5 \times 4^3 + 2 \times 3$ (½) =144 - 320+6= -170 (1 + ½)
Q. 33.	Plot the following points in a graph paper. Join the points in order and write the name of the figure obtained: A (−3, 2), B (−7, −3), C (6, −3), D (2,2). Plotting points (3) Joining points (1) Figure: trapezium (1)
Q. 34.	Construct a histogram with a frequency polygon on the same graph from the following distribution of total marks obtained by 55 students of class IX in the final examination. Marks: 140 - 150 | 150 - 160 | 160 - 170 | 170 - 180 | 180 - 190 | 190 - 200 Number of students: 8 | 10 | 15 | 12 | 7 | 3 6 bars (3) Frequency polygon (2)
Q.35.	In the given figure, AB∥CD, CD∥EF. Find the value of x, y, z and w.  AB∥CD , AT is the transversal y=130° (co interior angles) (1) AB∥CD , QS is the transversal w=80° (alternate interior angles) (1) CD∥EF, ST is the transversal z=70° (co interior angles) (1) x+z+30° = 180° Angles on a straight line (1) x+70°+30° = 180° x=80° (1)
	Section E **CASE STUDY BASED QUESTIONS(4 mark each)**

Q.36. **CASE STUDY-I**

i) Write the decimal form of $\frac{5}{8}$ and state if it is terminating or non terminating. (1)

$\frac{5}{8} = 0.625, terminating$ (½ + ½)

ii) Divide $4\sqrt{21} \div 2\sqrt{3}$ $= 2\sqrt{7}$ (1)

iii) a) If $x = \frac{\sqrt{7}+\sqrt{6}}{\sqrt{7}-\sqrt{6}}$, then find the value of $\left(x + \frac{1}{x}\right)^2$.

$= \frac{\sqrt{7}+\sqrt{6}}{\sqrt{7}-\sqrt{6}} \times \frac{\sqrt{7}+\sqrt{6}}{\sqrt{7}+\sqrt{6}} = \frac{7+2\sqrt{42}+6}{7-6} = 13 + 2\sqrt{42}$ (½)

$\frac{1}{x} = 13 - 2\sqrt{42}$ (½)

$\left(x + \frac{1}{x}\right)^2 = \left[13 + 2\sqrt{42} + 13 - 2\sqrt{42}\right]^2 = 26^2 = 676$ (½)+ (½)

Or

b) Find two irrational numbers between $\frac{1}{5}$ and $\frac{3}{4}$

any two

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

i) What will be the semi-perimeter of the flag for the above-mentioned dimension

S=$\frac{a+b+c}{2} = \frac{41+28+15}{2} = \frac{84}{2} = 42cm$ (½) +(½)

ii) Find the area of cloth required for making one flag. 126 cm^2 (1)

iii) a) If the rate of the cloth is ₹ 2 per cm^2, find the total cost of 300 flags.

Area=$126 \times 300cm^2 = 37800cm^2$ (1)

Cost = $37800cm^2 \times ₹\ 2 = ₹\ 75600$ (1)

Or

b) The perimeter of an isosceles triangle is 40 cm. The ratio of the equal side to its base is 3:4. Find the area of the triangle. (2)

Given, perimeter = 40 cm

Let the sides be 3x, 4x

3x+3x+4x=40

10x = 40

X=4

3x=12, 4x=16 (1)

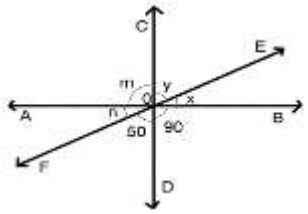
S=40/2=20

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

=$\sqrt{20(20-12)(20-16)(20-12)}$ =$32\sqrt{5}\ cm^2$ (½ + ½)

Q.38.

CASE STUDY-III



$\angle BOD = 90°$, $\angle DOF = 50°$.

Based on the above information answer the following question:

i) Find the value of m. 90° (1)

ii) Find the value of x. 40° (1)

iii) a) Find the value of reflex ∠COE. 310° (2)

Or

b) In the figure given PQ and RS intersect each other at a point O.
If ∠POR : ∠ROQ = 4:5, find ∠POS and ∠SOQ. (2)

let ∠POR , ∠ROQ be 4x, 5x

4x+5x=180° (linear pair)

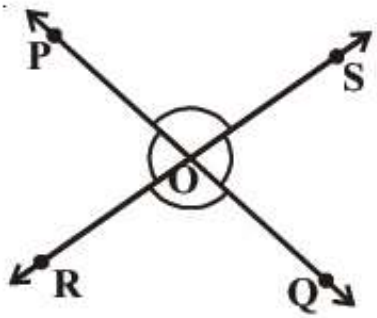
9x=180°

X=20° (½)

4x=80°, 5x=100° (½)

∠POS=100° voa (½)

∠SOQ=80° voa (½)



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