Blueprint of Maths Class 9 2023 - 2024

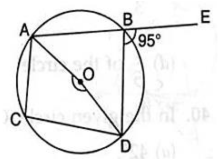
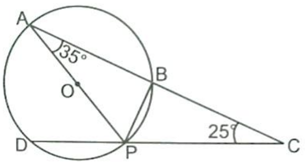
Unit No.	**Unit Name**	**Marks (M)**
1.	Number System	08
2.	Algebra	17
3.	Coordinate – Geometry	04
4.	Geometry	28
5.	Mensuration	13
6.	Statistics and Probability	10
Total		**80**
Internal Assessment		**20**

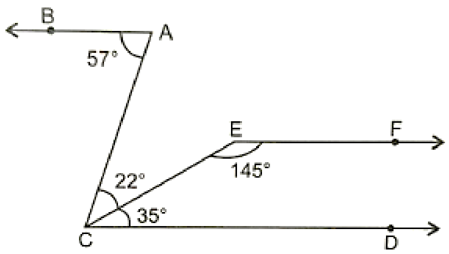
VIKAS BHARATI PUBLIC SCHOOL
SAMPLE PAPER (SESSION 2023-24)
CLASS: IX
SUBJECT: MATHEMATICS (041)

Time : 3 Hours **M.M: 80**

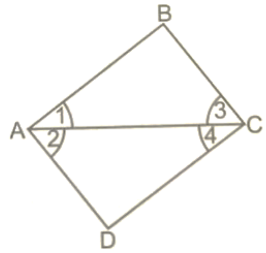
General Instructions:

- **This question paper has 5 Sections A - E.**
- **Section A has 20 MCQ's carrying 1 mark each, Section B has 5 questions carrying 2 marks each.**
- **Section C has 6 questions carrying 3 marks each, Section D has 4 questions of 5 marks each, Section E has 3 case based integrated units of assessment.**
- **Attempt all questions. Draw figures wherever required.**

Section-A		
Q No	**Questions**	**Marks**
01	If $x = 7 + 4\sqrt{3}$,then $\left(x + \frac{1}{x}\right) =$ (a) 10 (b) 12 (c) 14 (d) 16	**1**
02	An isosceles right triangle has area 8 cm^2.Then, the length of the hypotenuse is: (a) 2√2 cm (b) 4√2 cm (c) 6√2 cm (d) 8√2 cm	**1**
03	A linear equation such that each point on its graph has its ordinate equal to twice its abscissa is: (a) x+y=2 (b) y=2x (c) x=2y (d) x-y=2	**1**
04	In the given figure, O is the centre of the circle. ABE is a straight line. If ∠DBE= 95°, then ∠AOD is equal to: (a) 160° (b) 170° (c) 175° (d) 210° 	**1**
05	The radius of hemispherical balloon increases from 6 cm to 12 cm as air is being pumped into it. The ratio of the surface areas of the balloon in the two cases is : (a) 1 : 4 (b) 1 : 3 (c) 2 : 3 (d) 2 : 1	**1**
06	The value of the polynomial $5x - 4x^2 + 3$, when x = -1 is: (a) -6 (b) 6 (c) 2 (d) -2	**1**
07	The lateral surface area of a cone is 60π cm². If the slant height of the cone be 8 cm, then the diameter of the base is: (a) 25 cm (b) 18 cm (c) 12 cm (d) 15 cm	**1**
08	Angles x and y form a linear pair such that x + 2y = 254°, then value of y is : (a) 62° (b) 64° (c) 70° (d) 74°	**1**
09	In the given figure, AP is a diameter of the circle. ABC and DPC are straight lines. If ∠A = 35° and ∠C = 25°, then the measure of ∠BPD is: (a) 115° (b) 120° (c) 135° (d) 145 	**1**
10	If a, b and c are the sides of a triangle and *s* = semi perimeter, then is *s* is equal : (a) $\frac{a+b+c}{2}$ (b) 2(a + b + c) (c) 2(a – b + c) (d) $\frac{a+b-c}{2}$	**1**

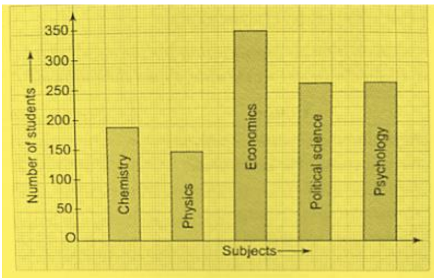
11	It is known that, if x + y = 10, then x + y + z = 10 + z. The Euclid's axiom that illustrates this statement is : (a) first axiom (b) second axiom (c) third axiom (d)fourth axiom	**1**
12	If AB = QR, BC = PR and CA = PQ, then: (a) $\Delta ABC \cong \Delta PQR$ (b) $\Delta CBA \cong \Delta PRQ$ (c) $\Delta BAC \cong \Delta RPQ$ (d) $\Delta PQR \cong \Delta BCA$	**1**
13	Which of the following is not true for a parallelogram? (a) opposite sides are equal (b) opposite angles are equal (c) opposite angles are bisected by the diagonals (d) diagonal bisect each other	**1**
14	0.9999…= (a) 1 (b) 2 (c) 3 (d) 4	**1**
15	If the surface area of two hemispheres are in the ratio 25:49. The ratio of their radii= (a) 3:7 (b) 4:7 (c) 5:7 (d) 5:9	**1**
16	Point on the graph of the equation 2x+5y=19 , whose ordinate is 3/2 times its absicssa: (a) (3,2) (b) (2,3) (c) (-3,2) (d) (2,-3)	**1**
17	The range of the data: 25.7,16.3,2.8,21.7,24.3,22.7 and 24.9 is : (a) 21.6 (b) 22.9 (c) 23.9 (d) 22.1	**1**
18	If the area of an equilateral triangle is $81\sqrt{3}cm^2$, then its perimeter is (a) 54 cm (b) 54m (c) 155cm (d) 44cm	**1**
19	DIRECTIONS: In the question number 19 and 20, a statement of **Assertion (A)** is followed by a statement of **Reason (R)**. Choose the correct option **Statement A (Assertion):** In the given figure, BA ∥ CD. **Statement R (Reason):** If two lines are intersected by a transversal and pair of alternate interior angles are equal, then lines are parallel. (a)Both (A) and (R) are true and reason (R) is the correct explanation of assertion (A) (b) Both (A) and (R) are true but (R) is not a correct explanation of (A) (c) (A) is true but (R) is false. (d) (A) is false but (R) is True.  	**1**
20	**Statement A (Assertion):** If x + y = 12 and xy = 27, then the value of $x^3 + y^3$ is 756. **Statement R (Reason)**: $x^3 + y^3 = (x + y)(x^2 - xy + y^2)$ (a) Both (A) and (R) are true and reason (R) is the correct explanation of assertion (A) (b) Both (A) and (R) are true but (R) is not a correct explanation of (A) (c) (A) is true but (R) is false (d) (A) is false but (R) true	**1**
	Section B	
21	Find all the angles of a parallelogram, if its one angle is four-fifth if its adjacent angle. Or, Show that each angle of a rectangle is a right angle.	**2**
22	If two lines are intersected by a transversal in such a way that the bisectors of a pair of corresponding angles are parallel, then prove that the two lines are parallel. Or, Prove that if two lines intersect each other, then vertically opposite angles are equal.	**2**

23 In the adjoining figure, we have, ∠1 = ∠3 and ∠2 = ∠4. Show that ∠A =∠C. **2**



24 If circles are drawn taking two sides of a triangle as diameters, prove that the point of intersection of these circles lie on the third side. **2**

25 Read the bar graph given below:
Answer the following questions:
(i) Which course has the most students enrolled in it?
(ii) How many more students are there in Economics than in Physics? **2**



Section –C

26 **3**

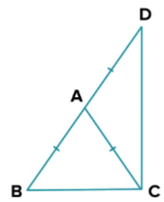
(i) If $x = 7 - 4\sqrt{3}$, then the value of $\sqrt{x} + \frac{1}{\sqrt{x}}$

(ii) Prove that :

$$\left(\frac{x^{q+1}}{x^{p+1}}\right)^{q+p} \cdot \left(\frac{x^{r+1}}{x^{q+1}}\right)^{r+q} \cdot \left(\frac{x^{p+1}}{x^{r+1}}\right)^{p+r} = 1$$

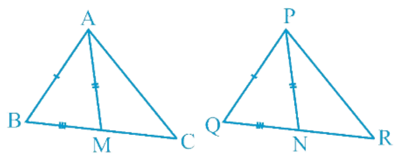
27 **3**

ΔABC is an isosceles triangle in which AB = AC. Side BA is produced to D such that AB = AD in the given figure. Show that ∠BCD is a right angle.



OR

Two sides AB and BC and median AM of one triangle ABC are respectively equal to sides PQ and QR and median PN of ΔPQR. Show that
(i) ΔABM ≅ ΔPQN (ii) ΔABC ≅ ΔPQR



28 Find the percentage decrease in the area of a triangle, if each of its side is halved. **3**

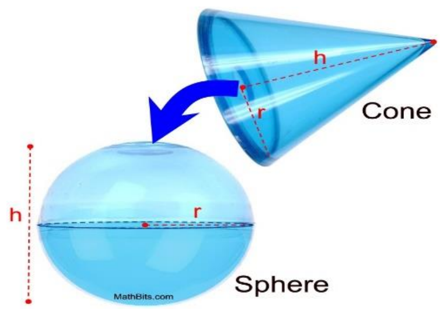
OR

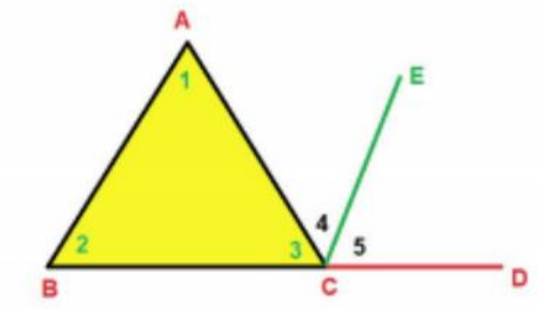
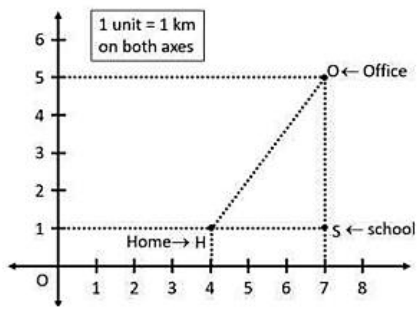
Find the area of the triangle whose perimeter is 180 cm and its two sides are 80 cm and 18 cm. Also, calculate the length of the longest altitude.

29 The following table gives the distribution of students of two sections according to the marks obtained by them: **3**

Section A		Section B	
Marks	**Frequency**	**Marks**	**Frequency**
0-10	3	0-10	5
10-20	9	10-20	19
20-30	17	20-30	15
30-40	12	30-40	10
40-50	9	40-50	1

Represent the marks of the students of both the sections on the same graph by two frequency polygons. From the polygons compare the performance of the two sections.

30	(i) Write a linear equation in two variables whose solution is x = 5 and y = 2. (ii) Find the value of m, so that (2, -7) satisfies the equation 4x + my = 22. (iii) Show that (4, 0) as well as (6, 1) is a solution of x – 2y = 4.	**3**
31	(i) If a, b, c are all non-zero and a + b + c = 0, Prove that: $\frac{a^2}{bc}+\frac{b^2}{ca}+\frac{c^2}{ab}=3$. (ii) Factorise: (a) $1 + 64x^3$ (b) $a^3-2\sqrt{2}b^3$	**3**
	Section –D	
32	Prove the following : $$\frac{1}{1+x^{b-a}+x^{c-a}}+\frac{1}{1+x^{a-b}+x^{c-b}}+\frac{1}{1+x^{b-c}+x^{a-c}}=1$$ **OR** Rationalise the following: $\frac{1}{\sqrt{7}+\sqrt{6}}+\frac{1}{\sqrt{6}-\sqrt{13}}$	**5**
33	If the non-parallel sides of a trapezium are equal, prove that it is cyclic. **OR** Prove that chords equidistant from the centre of a circle are equal in length.	**5**
34	(i) Write the equation 4x = 6(1 – y) + 3x in the form ax + by = c and also find the coordinate of the points where its graph cuts the two axes. (ii) Factorise: $2a^3 - 17a - 3a^2 + 30$	**5**
35	(i) If $a^2 + b^2 + c^2=250$ and ab + bc + ca=3, find a + b + c. (ii) If y = 2 and y = 0 are the zeroes of the polynomial $f(y) = 2y^3 - 5y^2 + ay + b$, find the value of a and b.	**5**
	Section –E	
36	Mr. Kumar, a Mathematics teacher brings some coloured clay in the classroom to teach the topic 'mensuration'. First, he forms cone of radius 6 cm and height 8 cm with the clay. Then, he moulds that cone into a sphere. Similarly, he moulds the sphere in other different shapes.  Based on the above information, answer the following questions: (i) What is the formula of finding total surface area of cone? (ii) What is the formula of volume of sphere? (iii) What is the volume of conical shape? OR Find the radius of the sphere thus formed.	 **1** **1** **2**

37	Once the Maths teacher of class IX D told students that today we will prove that the sum of all three angles is 180°. As shown in the figure, he told students to draw any triangle ABC in the notebook. Further side BC was extended to D.  Now the teacher said to draw CE||BA. Further angles were named 1 to 5 as shown in the figure. Now answer the following questions: (i) BA||CE and AC is the transverse line, so $\angle 1$ is equal to which angle? (ii) Find the sum of $\angle 5+\angle 4+\angle 3$. (iii) If $\angle 2=45^0$ and $\angle 1=75^0$ then find $\angle ACD$.	1 1 2
38	Saumya has to reach her office every day at 10:00 am. On the way to her office, she drops her son at school. Now, the location of Saumya's house, her son's school and her office are represented by the map below. Using the details given, answer the following questions.  Based on the above information, answer the following: (i) Find the coordinates of Saumya's house. (ii) Find the coordinates of Saumya's office. (iii) Find the coordinates of her son's school. **OR** Find the distance between Saumya's home and her son's school.	1 1 2