Date: 20.02.2023 **Class: IX**

MATHEMATICS (041) – SET A

Time: 3 hrs **M. M: 80**

General Instructions:
➢ This Question Paper has 5 Sections A-E.
➢ Section A has 20 questions carrying 01 mark each.
➢ Section B has 5 questions carrying 02 marks each.
➢ Section C has 6 questions carrying 03 marks each.
➢ Section D has 4 questions carrying 05 marks each.
➢ Section E has 3 case based integrated units of assessment (04 marks each) with subparts of the values of 1, 1 and 2 marks each respectively.
➢ All Questions are compulsory. However, an internal choice in 2 Qs of 2 marks, 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.
➢ Draw neat figures wherever required. Take $\pi = 22/7$ wherever required if not stated.

SECTION – A

1 If x-2 is a factor of polynomial $2x^2 + kx – 15$, then find the value of k ? 1

2 Without plotting the point indicate the quadrant in which it will lie if: 1
abscissa is -4 and ordinate is -8**.**

3 The angles of Quadrilateral are in the ratio 1:2:3:4, find the measure of the largest angle? 1

4 In Δ ABC, BC = AB and $\angle B = 80°$. Then $\angle A$ is equal to _____. 1

5 If $\angle ABC = 45^0$, find the measure of $\angle AOC$. Also state the property used. 1
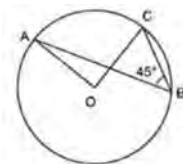
6 Write a rational number between $\sqrt{2}$ and $\sqrt{3}$. 1

7 Write one postulate and one axiom given by Euclid. 1

8 In the given figure, by which congruence criterion are the 1
triangles ACB and ADB congruent?
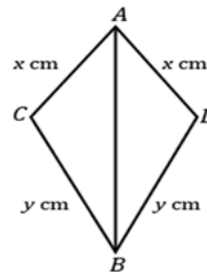
9 Find the coefficient of y in the expansion of $(5-y)^2$. 1

10 Subtract $(6\sqrt{2} + 3\sqrt{5})$ from $(3\sqrt{2} - 5\sqrt{5})$. 1

11 If the graph of equation 2x + ky = 10k, intersects the x axis at the point (5,0), then find the value of 1
k.

12 If the radius of Sphere is 2r, then find its volume in terms of π. 1

13 If an angle is 14° more than its complement, then find its measure. 1

14 The class mark of the class 85-90 is _____. 1

15 Determine the degree of the polynomial $(x^3 – 1)(x^3 + 1)$. 1

16 The perimeter of an equilateral triangle is 180 cm. Find its area? 1

17 Find one solution for the equation 4x – 5y = 6. 1

18 If each side of an equilateral triangle of area A is doubled, then the area of the new triangle is_____ times the first triangle.   1

Instructions: Choose the correct option in question no 19 and 20.

19 **Assertion:** The area of a triangle is $9cm^2$ whose sides are 3 cm, 4 cm and 5 cm respectively.   1

Reason: Area of 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 but 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.

20 **Assertion-** If POQ is a diameter of a circle and R is a point on the circle then   1

$ar (\Delta PQR) = \frac{1}{2} (PR \times QR)$ **.**

Reason – Angle in a semi - circle is a right angle .

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 but 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

21 Lines PQ and RS intersect each other at point O.   2
If $\angle POR : \angle ROQ = 5 : 7$, find all the angles.
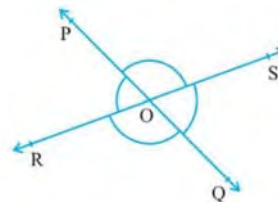
22 If $p(y) = y^2 - 5y + 1$, evaluate $p (2) - p (1) + p \left(\frac{1}{3}\right)$.   2

OR

Expand: $(a + 2b – c)^2$ using suitable algebraic identity.

23 The heights of 30 students, measured to the nearest centimetre, have been found to be as follows: 2

161	150	154	165	168	161	154	162	150	151
162	164	171	165	158	154	156	172	160	170
153	159	161	170	162	165	166	168	165	164

Represent the data given above by a grouped frequency distribution table, taking the class intervals as $145 – 150, 150 – 155$,etc.

24 Frame two linear equations in two variables passing through (-1,4).   2

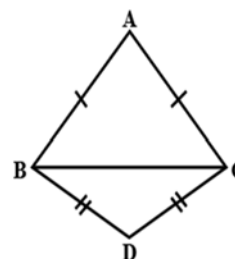25 Prove that a cyclic parallelogram is a rectangle.   2

OR

A, B, C, D are four points on a circle. AC and BD intersect at a point E such that $\angle BEC = 130^0$ and $\angle ECD = 20^0$. Find $\angle BAC$.
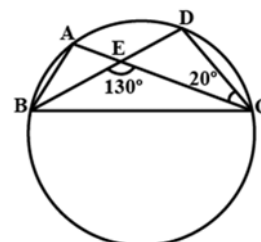
SECTION – C

26 △ABC and △DBC are two isosceles triangles on the same base BC. 3
Show that ∠ABD = ∠ACD.

27 Write the coordinates of the vertices of a rectangle whose length and breadth are 5 and 3 units 3
respectively, one vertex at the origin, the longer side lies on the *x*-axis and one of the vertices lies in
the third quadrant**.** Also, represent it graphically.

28 Express $0.\overline{7} + 0.4\overline{7}$ in the form of $\frac{p}{q}$, where p and q are integers and q $\neq$ 0. 3

29 In a class, the marks obtained by students has the following distribution: 3

Marks	0 - 10	10-20	20-30	30-40	40-50
No.of students	8	32	18	10	12

Draw a histogram for the distribution. Hence draw the frequency polygon.

30 The sides of a triangular plot are in the ratio of 3:5:7 and its perimeter is 300m. Find its area. 3

OR

If the perimeter of an isosceles triangle is 32cm and the ratio of the equal side to its base is 3:2 ,
then find the area of the triangle?

31 A right triangle ABC with sides 5 cm, 12 cm and 13 cm is revolved about the side 5 cm. Next time 3
it is revolved about the side 12 cm. Find the ratio of volumes of the solid obtained in two cases.

OR

The diameter of the moon is approximately one-fourth of the diameter of the earth. What fraction of
the volume of the earth is the volume of the moon?

SECTION – D

32 Prove that the angle subtended by an arc at the centre is double the angle subtended by it at any 5
point on the remaining part of the circle**.**

33 Show that if the diagonals of a quadrilateral are equal and bisect each other at right angles, then it is 5
a square.

OR

In △ABC and △DEF, AB = DE, AB || DE, BC = EF and
 BC || EF. Vertices A, B and C are joined to vertices D, E and F,
respectively. Show that:
(i) quadrilateral ABED is a parallelogram
(ii) quadrilateral BEFC is a parallelogram
(iii) △ABC $\cong$ △DEF.
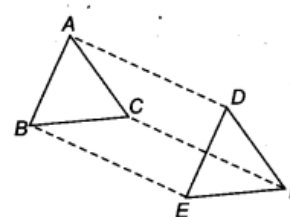
34 Simplify using suitable algebraic identities: 5
a) $(2x – 5y)^3 – (2x + 5y)^3$ b) $(-12)^3 + (7)^3 + (5)^3$

OR

Use long division method to factorise the polynomial: $2x^3 – x^2 – 13x – 6$.

35 Simplify: $\frac{7\sqrt{3}}{\sqrt{10}+\sqrt{3}} - \frac{2\sqrt{5}}{\sqrt{6}+\sqrt{5}} - \frac{3\sqrt{2}}{\sqrt{15}+3\sqrt{2}}$. 5

SECTION – E

36

Case Study based-1

Picnic in a tent

Four friends Rahul, Arun, Ajay and Vijay went for a picnic at a hill station. Due to peak season, they did not get a proper hotel in the city. The weather was fine so they decided to make a conical tent in a park. They were carrying 300 m² cloth with them. As shown in the figure they made the tent with height 8 m and diameter 12 m. The remaining cloth was used for the floor.(Take $\pi = 3.14$)

(i) What was the slant height of the tent? 1

(ii) What was the area of the canvas used for making the tent? 1

(iii) What was the volume of air present in the tent? 2

OR

Was the canvas sufficient for flooring. Justify your answer.
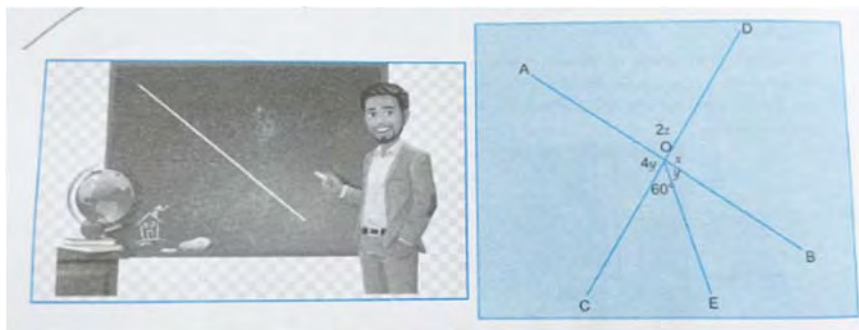
37

Case Study based-2

Angles in Classroom

Mathematics Teacher draws a straight line AB shown on the blackboard as per the following figure.

Now he told Afjal to draw another line CD as in the figure. The teacher told Ajay to mark ∠AOD as 2z.

Suraj was told to mark ∠AOC as 4y. Alive made an angle $\angle COE = 60^0$.

Bhupinder marked ∠BOE and ∠BOD as y and x respectively.Now, answer the following questions:

(i) Find the value of y. 1

(ii) Find the value of x. 1

(iii) Find the value of x + z. 2

OR

Write a pair of vertically opposite angles and a linear pair of angles from the given figure.

38

Case Study based-3

A match and the Old Age Home

In a one-day international cricket match between India and England, Sarita decided to donate as much money as to 'OLD AGE HOME' as the runs scored by the first pair of Indian batsmen. Sachin and Rahul were the opener batsmen. The runs scored by Sachin is thrice the run scored by Rahul.

(i) Taking x and y as the runs scored by Sachin and Rahul respectively, represent the given information algebraically as a linear equation in two variables. 1

(ii) If Sachin scored 180 runs then, the find the number of runs scored by Rahul? 1

(iii) If Rahul's score is 99, then how much money is donated to the old age home? 2

OR

If Sarita donates ₹ 180, then how many runs are scored by Rahul and Sachin respectively?