Class: IX
SESSION : 2022-2023
SUBJECT: Mathematics
SAMPLE QUESTION PAPER - 2
with SOLUTION

ıe Allowed: 3 hours **Maximum Marks**
ıeral Instructions:

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

Section A

1. $x = 2, y = -1$ is a solution of the linear equation

   a) $2x + y = 0$ b) $x + 2y = 0$

   c) $x + 2y = 4$ d) $2x + y = 5$

2. The value of $(x^{a-b})^{a+b} \times (x^{b-c})^{b+c} \times (x^{c-a})^{c+a}$ is

   a) 3 b) 2

   c) 1 d) 0

3. Abscissa of a point is positive in:

   a) quadrant I and IV b) quadrant II and III

   c) quadrant I only d) quadrant IV only

4. The linear equation $3x - 5y = 15$ has

   a) no solution b) infinitely many solutions

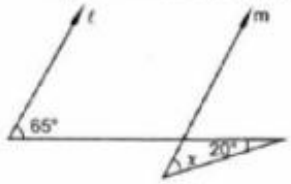
   c) a unique solution d) two solutions

5. The side faces of a pyramid are

   a) Squares b) Trapeziums

   c) Polygons d) Triangles

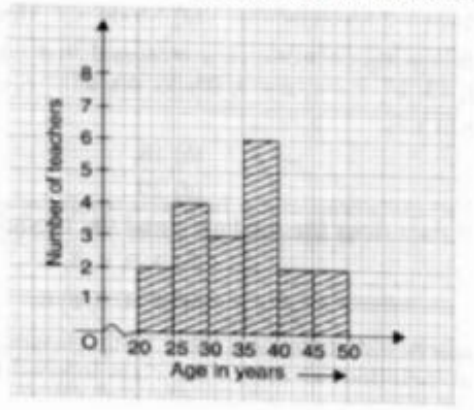
6. In Fig. if lines l and m are parallel, then $x =$ [1]



a) 85° b) 20°

c) 65° d) 45°

7. The graph given below shows the frequency distribution of the age of 22 teachers in a school. The number of teachers whose age is less than 40 years is [1]



a) 17 b) 16

c) 15 d) 14

8. If x-1 is the factor of $p(x) = x^3 - 23x^2 + kx - 120$, then the value of 'k' is [1]

a) 120 b) 124

c) 142 d) 140

9. The opposite sides of a quadrilateral have [1]

a) two common points b) no common point

c) one common point d) infinitely many common points

10. A linear equation in two variables is of the form $ax + by + c = 0$, where [1]

a) $a \neq 0$ and $b = 0$ b) $a = 0$ and $b = 0$

c) $a \neq 0$ and $b \neq 0$ d) $a = 0$ and $b \neq 0$

11. The bisectors of the angles of a Parallelogram enclose a [1]

a) Parallelogram b) Rectangle

c) Rhombus d) Square

12. In $\triangle ABC$, $\angle B = \angle C$ and ray AX bisects the exterior angle $\angle DAC$. If $\angle DAX = 70°$, then $\angle ACB =$ [1]

a) 55° b) 35°

c) 70° d) 90°

13. ABCD is a cyclic quadrilateral such that $\angle ADB = 30°$ and $\angle DCA = 80°$, then $\angle DAB =$ [1]

a) 125^o b) 70^o

c) 100^o d) 150^o

14. When $p(x) = x^3 - ax^2 + x$ is divided by $(x - a)$, the remainder is [1]

a) 0 b) a

c) 2a d) 3a

15. When simplified $(x^{-1} + y^{-1})^{-1}$ is equal to [1]

a) xy b) x + y

c) $\frac{xy}{x+y}$ d) $\frac{x+y}{xy}$

16. If the measures of angles of a triangle are in the ratio of 3 : 4 : 5, what is the measure of the smallest angle of the triangle? [1]

a) 60° b) 45°

c) 30° d) 25°

17. The value of $(a^2 - b^2)^3 + (b^2 - c^2)^3 + (c^2 - a^2)^3$ is [1]

a) $3(a + b)(b + c)(c + a)(a - b)(b - c)(c - a)$ b) $3(a - b)(b - c)(c - a)$

c) $3(a + b)(b + c)(c + a)$ d) none of these

18. **Assertion (A):** The side of an equilateral triangle is 6 cm then the height of the triangle is 9 cm. [1]

Reason (R): The height of an equilateral triangle is $\frac{\sqrt{3}}{2}a$.

a) Both A and R are true and R is the correct explanation of A. b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false. d) A is false but R is true.

19. The height of a conical vessel is 3.5 cm. If its capacity is 3.3 litres of milk, then [1]

the diameter of its base is

a) 35 cm.

b) 15 cm.

c) 30 cm.

d) 60 cm.

20. **Assertion (A):** For all values of k, $(\frac{-3}{2}, k)$ is a solution of the linear equation $2x + 3 = 0$. [1]

Reason (R): The linear equation $ax + b = 0$ can be expressed as a linear equation in two variables as $ax + y + b = 0$.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

Section B

21. Find the zeroes of the polynomial $g(x) = 3 - 6x$. [2]

22. If the area of an equilateral triangle is $81\sqrt{3}$ cm^2, find its perimeter. [2]

23. The volume of a hemisphere is $2425\frac{1}{2} cm^3$. Find its curved surface area. (Use $\pi = 22/7$) [2]

24. Express the linear equation in the form $ax + by + c = 0$ and indicate the values of a, b and c in $-2x + 3y = 6$. [2]

OR

Find whether (2, 0) is the solution of the equation $x - 2y = 4$ or not?

25. Give possible expressions for the length and breadth of the following rectangle whose area is given by $25a^2 - 35a + 12$. [2]

OR

If a, b, c are all non-zero and $a + b + c = 0$, prove that $\frac{a^2}{bc} + \frac{b^2}{ca} + \frac{c^2}{ab} = 3$.

Section C

26. Find the value of k, if x - 1 is a factor of p(x) in : $p(x) = 2x^2 + kx + \sqrt{2}$ [3]

27. Find the values of a and b in each of $\frac{\sqrt{2}+\sqrt{3}}{3\sqrt{2}-2\sqrt{3}} = 2 - b\sqrt{6}$ [3]

28. The cost of leveling the ground in the form of a triangle having the sides 51m, 37m and 20m at the rate of Rs.3 per m^2 is Rs.918. State whether the statement is true or false and justify your answer. [3]

OR

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

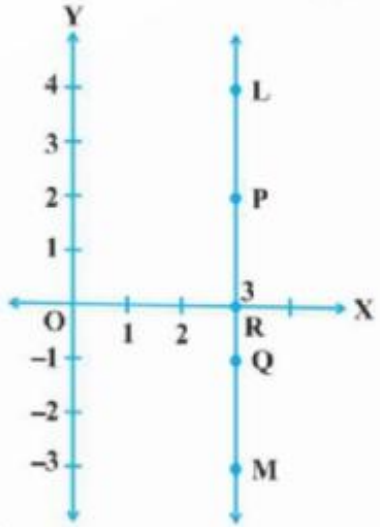
29. BE and CF are two equal altitudes of a triangle ABC. Using RHS congruence rule, prove that a triangle ABC is isosceles. [3]

OR

ABC is an isosceles triangle with AB = AC and BD and CE are its two medians. Show that BD = CE.

30. Find at least 3 solutions for the following linear equation in two variables: [3]
$2x + 3y = 4$

31. In Figure, LM is a line parallel to the y-axis at a distance of 3 units. [3]



i. What are the coordinates of the points P, R and Q?

ii. What is the difference between the abscissa of the points L and M?

Section D

32. In a line segment AB point C is called a mid-point of line segment AB, prove that every line segment has one and only one mid-point. [5]

33. If $a = 3 + 2\sqrt{2}$, then find the value of: [5]

i. $a^2 + \frac{1}{a^2}$

ii. $a^3 + \frac{1}{a^3}$

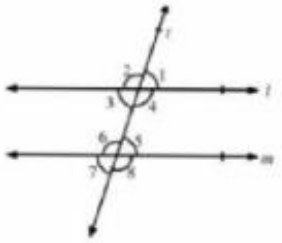
OR

It being given that $\sqrt{3} = 1.732$, $\sqrt{5} = 2.236$, $\sqrt{6} = 2.449$ and $\sqrt{10} = 3.162$, find upto three places of decimal, $\frac{3+\sqrt{5}}{3-\sqrt{5}}$.

34. Draw a histogram for the frequency distribution of the following data: [5]

Class interval	8-13	13-18	18-23	23-28	28-33	33-38	38-43
Frequency	320	780	160	540	260	100	80

35. In the given figure, $l \parallel m$ and a transversal t cuts them. If $\angle 1 : \angle 2 = 2 : 3$, find the measure of each of the marked angles. [5]



OR

If the $\angle XYZ = 64^\circ$ and XY is produced to point P. Draw a figure from the given information. If ray YQ bisects $\angle$ZYP, find $\angle$ XYQ and reflex $\angle$QYP.

Section E

36. **Read the text carefully and answer the questions:** **[4]**

In Agra in a grinding mill, there were installed 5 types of mills. These mills used steel balls of radius 5 mm, 7 mm, 10 mm, 14 mm and 16 mm respectively. All the balls were in the spherical shape.

For repairing purpose mills need 10 balls of 7 mm radius and 20 balls of 3.5 mm radius. The workshop was having 20000 mm^3 steel.

This 20000 mm^3 steel was melted and 10 balls of 7 mm radius and 20 balls of 3.5 mm radius were made and the remaining steel was stored for future use.

(i) What was the volume of one ball of 3.5 mm radius?

(ii) What was the surface area of one ball of 3.5 mm radius?

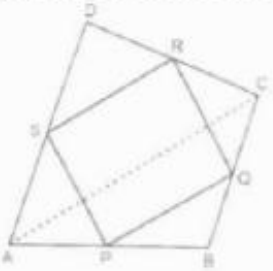
OR

How much steel was kept for future use?

(iii) What was the volume of 10 balls of radius 7 mm?

37. **Read the text carefully and answer the questions:** **[4]**

Modern curricula include several problem-solving strategies. Teachers model the process, and students work independently to copy it. Sheela Maths teacher of class 9^{th} wants to explain the properties of parallelograms in a creative way, so she gave students colored paper in the shape of a quadrilateral and then ask the students to make a parallelogram from it by using paper folding.



(i) How can a parallelogram be formed by using paper folding?

(ii) If $\angle RSP = 30^{O}$, then find $\angle RQP$.

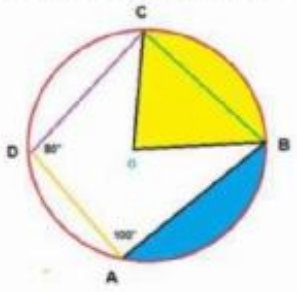
OR

If SP = 3 cm, Find the RQ.

(iii) If $\angle RSP = 50^{O}$, then find $\angle SPQ$?

38. **Read the text carefully and answer the questions:** **[4]**

There was a circular park in Defence colony at Delhi. For fencing purpose poles A, B, C and D were installed at the circumference of the park.
Ram tied wires From A to B, B to C and C to D, and he managed to measure the $\angle A = 100°$ and $\angle D = 80°$
Point O in the middle of the park is the center of the circle.



(i) Name the quadrilateral ABCD.

(ii) What is the value of $\angle C$?

(iii) What is the value of $\angle B$.

OR

Write any three properties of cyclic quadrilateral?