

CLASS X (2019-20)
MATHEMATICS STANDARD(041)
SAMPLE PAPER-5

Time : 3 Hours**Maximum Marks : 80****General Instructions :**

- (i) All questions are compulsory.
- (ii) The questions paper consists of 40 questions divided into 4 sections A, B, C and D.
- (iii) Section A comprises of 20 questions of 1 mark each. Section B comprises of 6 questions of 2 marks each. Section C comprises of 8 questions of 3 marks each. Section D comprises of 6 questions of 4 marks each.
- (iv) There is no overall choice. However, an internal choices have been provided in two questions of 1 mark each, two questions of 2 marks each, three questions of 3 marks each, and three questions of 4 marks each. You have to attempt only one of the alternatives in all such questions.
- (v) Use of calculators is not permitted.

SECTION A

Q.1-Q.10 are multiple choice questions. Select the most appropriate answer from the given options.

- Q1. Two positive numbers have their HCF as 12 and their product as 6336. The number of pairs possible for the numbers, is [1]
(a) 2 (b) 3
(c) 4 (d) 5
- Q2. If α and β are zeroes and the quadratic polynomial $f(x) = x^2 - x - 4$, then the value of $\frac{1}{\alpha} + \frac{1}{\beta} - \alpha\beta$ is [1]
(a) $\frac{15}{4}$ (b) $-\frac{15}{4}$
(c) 4 (d) 15
- Q3. The 2 digit number which becomes $(5/6)$ th of itself when its digits are reversed. The difference in the digits of the number being 1, then the two digits number is [1]
(a) 45 (b) 54
(c) 36 (d) None of these
- Q4. If one root of the quadratic equation $ax^2 + bx + c = 0$ is the reciprocal of the other, then [1]
(a) $b = c$ (b) $a = b$
(c) $ac = 1$ (d) $a = c$
- Q5. If the common difference of an AP is 5, then what is $a_{18} - a_{13}$? [1]
(a) 5 (b) 20
(c) 25 (d) 30
- Q6. If $f(x) = \cos^2 x + \sec^2 x$, then $f(x)$ [1]
(a) ≥ 1 (b) ≤ 1
(c) ≥ 2 (d) ≤ 2
- Q7. A sector is cut from a circular sheet of radius 100 cm, the angle of the sector being 240° . If another circle of the area same as the sector is formed, then radius of the new circle is [1]
(a) 79.5 cm (b) 81.5 cm
(c) 83.4 cm (d) 88.5 cm
- Q8. A slab of ice 8 inches in length, 11 inches in breadth, and 2 inches thick was melted and re-solidified in the form of a rod of 8 inches diameter. The length of such a rod, in inches, is nearest to [1]
(a) 3 (b) 3.5

- (c) 4 (d) 4.5

- Q9. If the difference of mode and median of a data is 24, then the difference of median and mean is [1]
 (a) 12 (b) 24
 (c) 08 (d) 36

- Q10. A bag contains 3 red and 2 blue marbles. If a marble is drawn at random, then the probability of drawing a blue marble is:[1]
 (a) $\frac{1}{5}$ (b) $\frac{2}{5}$
 (c) $\frac{3}{5}$ (d) $\frac{4}{5}$

(Q.11-Q.15) Fill in the blanks.

- Q11. If $a = bq + r$, least value of r is [1]

- Q12. Area of a rhombus if its vertices are (3, 0), (4, 5), (-1, 4) and (-2, -1) taken in order is [1]

OR

Points (3, 2), (-2, -3) and (2, 3) form a triangle.

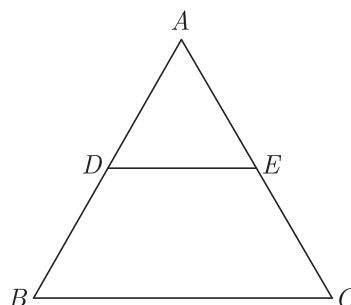
- Q13. In ΔABC , right-angled at B , $AB = 24$ cm, $BC = 7$ cm. $\sin A =$ [1]

- Q14. Length of an arc of a sector of a circle with radius r and angle with degree measure θ is [1]

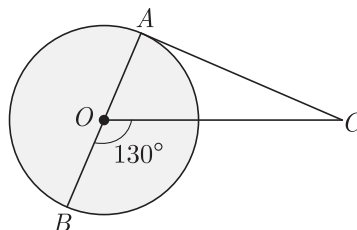
- Q15. The volume of a cube with diagonal d is [1]

(Q.16-Q.20) Answer the following

- Q16. In given figure $DE \parallel BC$. If $AD = 3$ cm, $DB = 4$ cm and $AE = 6$ cm, then find EC . [1]



- Q17. In the given figure, AOB is a diameter of the circle with centre O and AC is a tangent to the circle at A . If $\angle BOC = 130^\circ$, the find $\angle ACO$. [1]



- Q18. A ladder 15 m long leans against a wall making an angle of 60° with the wall. Find the height of the point where the ladder touches the wall. [1]

OR

An observer, 1.7 m tall, is $20\sqrt{3}$ m away from a tower. The angle of elevation from the eye of observer to the top of tower is 30° . Find the height of tower.

- Q19. To divide a line segment AB in the ratio 2:5, a ray AX is drawn such that $\angle BAX$ is acute. Then points are marked at equal intervals on AX . What is the minimum number of these points ? [1]

- Q20. What is the volume of a right circular cylinder of base radius 7 cm and height 10 cm ? (Use $\pi = \frac{22}{7}$) [1]

SECTION B

- Q21. For what value of k , the pair of linear equations $kx - 4y = 3$, $6x - 12y = 9$ has an infinite number of solutions ? [2]

- Q22. The x-coordinate of a point P is twice its y-coordinate. If P is equidistant from $Q(2, -5)$ and $R(-3, 6)$, find the co-ordinates of P . [2]

- Q23. Find the altitude of an equilateral triangle when each of its side is 'a' cm. [2]

OR

In an equilateral triangle of side $3\sqrt{3}$ cm find the length of the altitude.

- Q24. A hemisphere and a cone both have same diameter. These two metal solids are joined by putting their bases together. The height of the cone is equal to the diameter of the sphere. This solid is melted and recast into a sphere of a diameter equal to one third of the diameter of the hemisphere. [2]

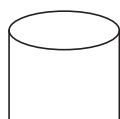
- (a) If radius of the hemisphere is r , find the volume of the combined solid.
 (b) Find the number of spheres.

- Q25. A sphere of maximum volume is cut out from a solid hemisphere of radius 6 cm. Find the volume of the cut out sphere. [2]

OR

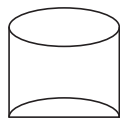
A cone of height 24 cm and radius of base 6 cm is made up of clay. If we reshape it into a sphere, find the radius of sphere.

- Q26. Ramesh, a juice seller has set up his juice shop. He has three types of glasses of inner diameter 5 cm to serve the customers. The height of the glasses is 10 cm. (Use $\pi = 3.14$). [2]



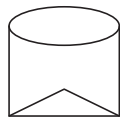
— A glass with a plane bottom

Type A



— A glass with hemispherical raised bottom

Type B



— A glass with conical raised bottom of height 1.5 cm.

Type C

He decided to serve the customer in "A" type of glasses. Find the volume of glass of type A and which glass has the minimum capacity.

SECTION C

- Q27. Verify whether 2, 3 and $\frac{1}{2}$ are the zeroes of the polynomial $p(x) = 2x^3 - 11x^2 + 17x - 6$. [3]

OR

Find the zeroes of the quadratic polynomial $5x^2 + 8x - 4$ and verify the relationship between the zeroes and the coefficients of the polynomial.

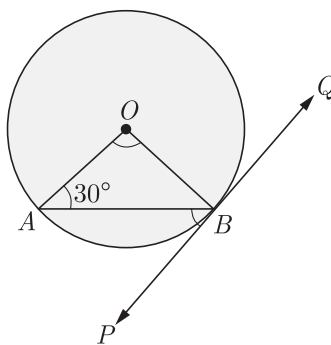
- Q28. If 7th term of an A.P. is $\frac{1}{9}$ and 9th term is $\frac{1}{7}$, find 63rd term. [3]

- Q29. If the co-ordinates of points A and B are $(-2, -2)$ and $(2, -4)$ respectively, find the co-ordinates of P such that $AP = \frac{3}{7}AB$, where P lies on the line segment AB . [3]

OR

If the distance of $P(x, y)$ from $A(6, 2)$ and $B(-2, 6)$ are equal, prove that $y = 2x$.

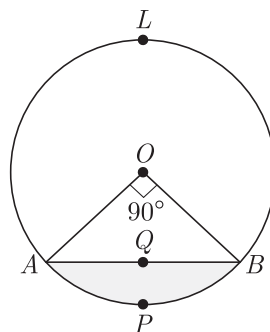
Q30. In the figure, PQ is a tangent to a circle with center O . If $\angle OAB = 30^\circ$, find $\angle ABP$ and $\angle AOB$. [3]



Q31. Rachel, an engineering student, was asked to make a model shaped like a cylinder with two cones attached at its two ends by using a thin aluminium sheet. The diameter of the model is 3 cm and its length is 12 cm. If each cone has a height of 2 cm. [3]

- (i) Find the volume of air contained in the model that Rachel made. (Assume the outer and inner dimensions of the model to be nearly the same).
- (ii) Which mathematical concept is used in the above problem ?

Q32. In the given figure, a chord AB of the circle with centre O and radius 10 cm, that subtends a right angle at the centre of the circle. Find the area of the minor segment AQB . Hence find the area of major segment $AQBPA$. (Use $\pi = 3.14$) [3]



OR

Find the area of minor segment of a circle of radius 14 cm, when its centre angle is 60° . Also find the area of corresponding major segment. Use $\pi = \frac{22}{7}$.

Q33. An electric pole is 10 m high. A steel wire tied to top of the pole is affixed at a point on the ground to keep the pole up right. If the wire makes an angle of 45° with the horizontal through the foot of the pole, find the length of the wire. [Use $\sqrt{2} = 1.414$] [3]

Q34. A man travels from home to town and back in a motor cycle. He travels to home from town at a speed which is 20 kilometer/hour more than his journey to the town from home. The average speed of his total journey was 48 kilometre/hour. [3]

- (a) If the distance from home to town is 5 kilometre, find his total journey time.
- (b) By taking the speed of his journey from home to town as x , form a second degree equations.

SECTION D

Q35. 4 chairs and 3 tables cost Rs 2100 and 5 chairs and 2 tables cost Rs 1750. Find the cost of none chair and one table separately. [4]

OR

If a bag containing red and white balls, half the number of white balls is equal to one-third the number of red balls. Thrice the total number of balls exceeds seven times the number of white balls by 6. How many balls of each colour does the bag contain ?

Q36. Find HCF and LCM of 378, 180 and 420 by prime factorization method. Is $HCF \times LCM$ of these numbers equal to the product of the given three numbers? [4]

Q37. The time taken by a person to cover 150 km was $2\frac{1}{2}$ hours more than the time taken in the return journey. If he returned at a speed of 10 km/hour more than the speed while going, find the speed per hour in each direction. [4]

OR

A motorboat whose speed in still water is 18 km/h, takes 1 hour more to go 24 km upstream than to return downstream to the same spot. Find the speed of the stream.

- Q38. In the right triangle, B is a point on AC such that $AB + AD = BC + CD$. If $AB = x$, $BC = h$ and $CD = d$, then find x (in term of h and d). [4]

OR

Prove that ratio of the areas of two similar triangles is equal to the square of the ratio of their corresponding sides.

- Q39. Evaluate : $\frac{\cos 65^\circ}{\sin 25^\circ} - \frac{\tan 20^\circ}{\cot 70^\circ} - \sin 90^\circ + \tan 5^\circ \tan 35^\circ \tan 60^\circ \tan 55^\circ \tan 85^\circ$. [4]
- Q40. The median of the following data is 525. Find the values of x and y if the total frequency is 100. [4]

Class Interval	Frequency
0-100	2
100-200	5
200-300	x
300-400	12
400-500	17
500-600	20
600-700	y
700-800	9
800-900	7
900-1000	4
	$N = 100$

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