CLASS X (2019-20)
MATHEMATICS BASIC(241)
SAMPLE PAPER-18

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

General Instructions :

(i) All questions are compulsory.
(ii) The questions paper consists of 40 questions divided into four 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. It is given that $\Delta ABC \sim \Delta PQR$ with $\frac{BC}{QR} = \frac{1}{3}$, then $\frac{ar(\Delta PRQ)}{ar(\Delta BCA)}$ is equal to [1]

(a) 9 (b) 3
(c) $\frac{1}{3}$ (d) $\frac{1}{9}$

Q2. If ABC is an isosceles right triangle, right angled at C, then [1]

(a) $AC^2 = 2AB^2$ (b) $AB^2 = 2BC^2$
(c) $AB^2 + BC^2 = AC^2$ (d) $2AB^2 = BC^2$

Q3. The diameters of the two circular ends of a bucket are 44 cm and 24 cm. The height of the bucket is 35 cm. The capacity of the bucket is [1]

(a) 32.7 litres (b) 33.7 litres
(c) 34.7 litres (d) 31.7 litres

Q4. If a solid circular cylinder of iron whose diameter is 15 cm and height 10 cm is melted and recasted into a sphere, then the radius of the sphere is [1]

(a) 15 cm (b) 10 cm
(c) 7.5 cm (d) 5 cm

Q5. The pair of linear equations $x + 2y + 5 = 0$ and $-3x - 6y + 1 = 0$ have [1]

(a) unique solution
(b) exactly two solutions
(c) infinitely many solutions
(d) no solutions

Q6. The zeroes of the quadratic polynomial $x^2 + 99x + 127 = 0$ are [1]

(a) both positive
(b) both negative
(c) one positive and one negative
(d) none of these

Q7. In an AP, if $a = -5$, $l = 21$ and $S = 200$, then n is equal to [1]

(a) 50 (b) 40
(c) 32 (d) 25

Q8. The points (-4, 0), (0, 3) are the vertices of a [1]

(a) right triangle (b) isosceles triangle
(c) equilateral triangle (d) scalene triangle

Q9. The end points of a diameter of a circle are (-2, 3) and (4, -5), then the coordinates of its centre are [1]

(a) (2, –2) (b) (1, –1)
(c) (–1, 1) (d) (–2, 2)

Q10. If θ and $\theta + 36^\circ$ are acute angles and $\sin(\theta + 36^\circ) = \cos\theta$, then the value of θ is [1]

(a) 27° (b) 18°
(c) 54° (d) 36°

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

Q11. The base radii of a cone and a cylinder are equal. If their volumes area also equal, then the ratio of height of cone to height of cylinder is ..... [1]

Q12. The (directed) distance of a point from the y-axis is called its ..... [1

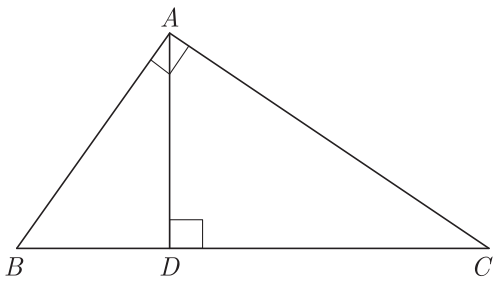
Q13. The graph of a linear equation in two variables is always a ..... [1]

Q14. There is no tangent to a circle passing through a point lying ..... the circle. [1]

OR

From a point Q, the length of the tangent to a circle is 24 cm and the distance of Q from the centre is 25 cm. The radius of the circle is .....

Q15. In the adjoining figure, $\angle BAC = 90^\circ$ and $AD \perp BC$, then $AD^2 = BD \times$ ..... . [1]



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

Q16. a and b are two positive integers such that the least prime factor of a is 3 and least prime factor of b is 5. Then calculate the least prime factor of $(a + b)$. [1]

Q17. Find the value of k, so that system of linear equations $2x + 3y = 4$ and $(k+2)x + 6y = 3k + 2$ has an infinite number of solutions. [1]

Q18. Find the common difference of the following AP: [1]

$\frac{1}{2b}, \frac{1-6b}{2b}, \frac{1-12b}{2b}, \ldots$

Q19. If ΔABC is right angled at B, what is the value of $\sin(A + C)$? [1]

OR

If $\sqrt{3}\sin\theta = \cos\theta$, find the value of $\frac{3\cos^2\theta + 2\cos\theta}{3\cos\theta + 2}$.

Q20. Form the following distribution, find the median class: [1]

Class interval	1400-1550	1550-1700	1700-1850	1850-2000
Frequency	8	15	21	8

SECTION B

Q21. If the zeroes of the polynomial $x^2 + px + q$ are double in value to the zeroes of $2x^2 - 5x - 3$, find the values of p and q.[2]

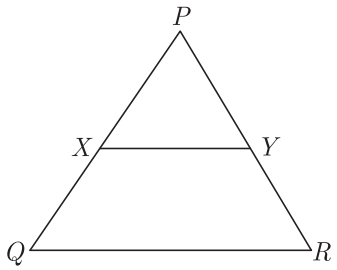
Q22. Find the prime factorisation of the denominator of rational number expressed as $6.\overline{12}$ in simplest form. [2]

OR

Prove that the sum of a rational number and an irrational number is always an irrational number.

Q23. Find the value, of p, for which one root of the quadratic equation $px^2 - 14x + 8 = 0$ is 6 times the other. [2]

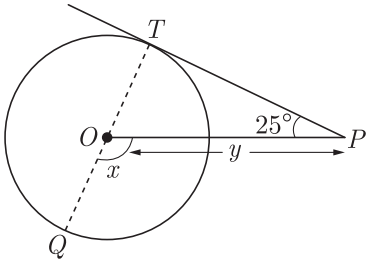
Q24. In the given figure, $XY || QR$. If $\frac{PQ}{XQ} = \frac{7}{3}$ and $PR = 6.3\,\text{cm}$, find YR. [2]



Q25. From an external point P tangents PA and PB are drawn to a circle with centre O. If $\angle PAB = 50^\circ$, then find $\angle AOB$.[2]

OR

In the given figure, PT is a tangent at T to the circle with centre O and radius 3 cm. If $\angle TPO = 25^\circ$ and $PT = 4\,\text{cm}$, then find the value of x and y.



Q26. Without using the trigonometric tables, evaluate the following: [2]

$$\frac{11\sin 70^\circ}{7\cos 20^\circ} - \frac{4}{7}\frac{\cos 53^\circ . \operatorname{cosec} 37^\circ}{\tan 15^\circ . \tan 35 . \tan 55^\circ . \tan 75^\circ}$$

SECTION C

Q27. Find the greatest number of six digits exactly divisible by 18, 24 and 36. [2]

Q28. If $(x + a)$ is a factor of two polynomials $x^2 + px + q$ and $x^2 + mx + n$, then prove that $\alpha = \frac{n - q}{m - p}$. [3]

Q29. Solve the following equation for x: [3]

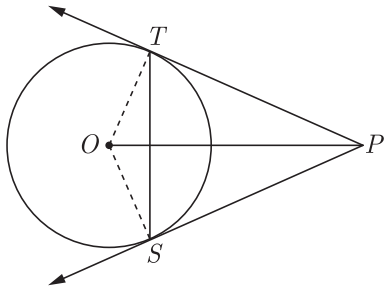
$$\frac{x+1}{x-1} + \frac{x-2}{x+2} = 4 - \frac{2x+3}{x-2}, x \neq 1, -2, 2.$$

Q30. Let P and Q be the points of trisection of the line segment joining the points $A(2, -2)$ and $B(-7, 4)$ such that P is nearer to A. Find the coordinates of P and Q. [3]

OR

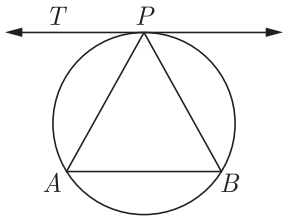
Point P divides the line segment joining the points $A(-1,3)$ and $B(9,8)$ such that $\frac{AP}{PB}=\frac{k}{1}$. If P lies on the line $x-y+2=0$, find the value of k.

Q31. In the given figure, from an external point P, two tangents PT and PS are drawn to a circle with centre O and radius r. If $OP=2r$, show that $\angle OTS=\angle OST=30^\circ$. [3]



OR

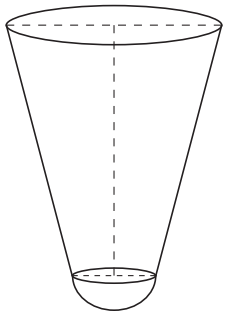
A tangent PT is drawn parallel to a chord AB of a circle. as shown in the adjoining figure. Prove that PAB is an isosceles triangle.



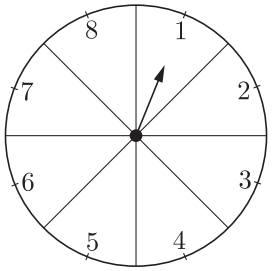
Q32. From a solid cylinder of height 7 cm and base diameter 12 cm, a conical cavity of same height and same base radius is hollowed out. Find the total surface area of the remaining solid. [3]

OR

A shuttle cock used for playing Badminton has the shape of a frustum of a cone mounted on a hemisphere (as shown in the adjoining figure). The diameters of the ends of the frustum are 7 cm and 2 cm, the height of the entire shuttle cock is 7 cm. Find the external surface area of the shuttle cock.



Q33. A game of chance consists of spinning an arrow which comes to rest pointing at one of the numbers 1, 2, 3, 4, 5, 6, 7, 8 (shown in the given figure) and these are equally likely outcomes. What is the probability that it will point at (i) an odd number? (ii) a number greater than 3? (iii) a number less than 9? [3]



Q34. Three digit numbers area made using the digits 4, 5, 9 (without repetition). If a number among them is selected at random, what is the probability that the number will [3]

(i) be a multiple of 5?
(ii) be multiple of 9?
(iii) end with 9?

SECTION D

Q35. A thief runs with a uniform speed of 100m/minute. After one minute a policeman runs after the thief to catch him. He runs with a speed of 100 m/minute in the first minute and increases his speed by 10 m/minute every succeeding minute. After how many minutes the policeman will catch the thief? [4]

OR

Find the 60th term of the AP 8, 10, 12, ..., if it has a total of 60 terms and hence find the sum of its last 10 terms.

Q36. Given a rhombus $ABCD$ in which $AB = 4\,\text{cm}$ and $\angle ABC = 60^\circ$. Divide it into two triangles say, ABC and ADC. Construct the triangle $AB'C'$ similar to $\Delta\, ABC$ with scale factor $\frac{2}{3}$. Draw a line $C'D'$ parallel to CD where D' lies on AD. Is $AB'C'D'$ a rhombus? Give reasons. [4]

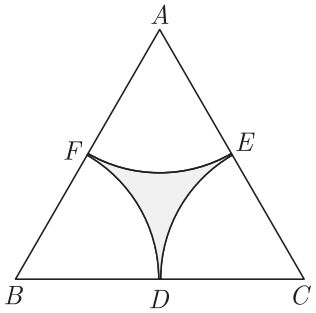
Q37. If $\sin\theta + \cos\theta = p$ and $\sec\theta + \text{cosec}\,\theta = q$, then prove that $q(p^2 - 1) = 2p$. [4]

Q38. The angles of depression of the top and bottom of a 50 m high building from the top of a tower are 45° and 60° respectively. Find the height of the tower and the horizontal distance between the tower and the building (Use $\sqrt{3} = 1.73$) [4]

OR

From the top of a vertical tower, the angles of depression of two cars, in the same straight line with the base of the tower, at an instant are found to be 45° and 60°. If the cars are 100 m apart and are on the same side of tower, find the height of the tower. (Use $\sqrt{3} = 1.732$)

Q39. In the given figure, arcs area drawn by taking vertices A, B and C of an equilateral triangle of side 14 cm to intersect the sides BC, CA and AB at their mid-pints D, E and F respectively. Find the area of the shaded region. $\left(\text{Take } \pi = \frac{22}{7} \text{ and } \sqrt{3} = 1.73\right)$ [4]



Q40. Mode of the following frequency distribution is 65 and the sum of all the frequencies is 70. Find the missing frequencies x and y. [4]

Class	0-20	20-40	40-60	60-80	80-100	100-120	120-140	140-160
Frequ-ency	8	11	x	12	y	9	9	5

OR

During the medical check-up of 35 students of a class, their weights were recorded as follows:

Weight (in kg.)	Number of students
Less than 38	0
Less than 40	3

Weight (in kg.)	Number of students
Less than 42	5
Less than 44	9
Less than 46	14
Less than 48	28
Less than 50	32
Less than 52	35

Draw a less than type ogive for the given data. Hence, obtain the median weight from the graph and verify the result by using the formula.