CLASS X (2019-20)
MATHEMATICS BASIC(241)
SAMPLE PAPER-14

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. If $\Delta ABC \sim \Delta QRP$, $\frac{ar(\Delta ABC)}{ar(\Delta PQR)} = \frac{9}{4}$ and $BC = 15$ cm, then the length of PR is equal to [1]

(a) 10 cm (b) 12 cm
(c) $\frac{20}{3}$ cm (d) 8 cm

Q2. Two tangents inclined at an angle of 60° are drawn to a circle of radius 3 cm, then the length of each tangent is [1]

(a) $\frac{3\sqrt{3}}{2}$ cm (b) 6 cm
(c) 3 cm (d) $3\sqrt{3}$ cm

Q3. Given that one zero of the cubic polynomial $x^3 - 7x + 6$ is 2. The [1]

(a) 2 (b) -2
(c) 3 (d) -3

Q4. The value of λ for which the pair of equations $\lambda x - y = 2$ and $6x - 2y = 3$ will have infinitely many solutions is [1]

(a) 3 (b) -3
(c) -12 (d) no value

Q5. If α and β are roots of the equation $2x^2 - 5x + 3 = 0$, then the value of $\frac{1}{\alpha} + \frac{1}{\beta}$ is [1]

(a) $\frac{5}{3}$ (b) $\frac{3}{5}$
(c) $-\frac{5}{3}$ (d) $-\frac{3}{5}$

Q6. The quadratic equation $2x^2 - \sqrt{5}\,x + 1 = 0$ has [1]

(a) two distinct real roots (b) two equal real roots
(c) no real roots (d) more than 2 real roots

Q7. In an AP, if $a = 1, a_n = 20$ and $S_n = 399$, then n is [1]

(a) 19 (b) 21
(c) 38 (d) 42

Q8. The volume of two spheres are in the ratio 64:27 [1]

(a) 3:4 (b) 4:3
(c) 9:16 (d) 16:9

Q9. The number of balls of radius 1cm that can be made form a sphere of radius 10 cm is [1]

(a) 100 (b) 1000

(c) 10000 (d) 100000

Q10. The area of the square that can be inscribed in a circle of radius $8\,\text{cm}$ is [1]

(a) $256\,\text{cm}^2$ (b) $128\,\text{cm}^2$

(c) $64\sqrt{2}\,\text{cm}$ (d) $64\,\text{cm}^2$

(Q11-Q15) : Fill in the blanks

Q11. The total surface area of a solid cylinder of radius $7\,\text{cm}$ and height $18\,\text{cm}$ is ..... [1]

Q12. If the corresponding sides of two similar triangles are in the ratio 5:7,then the ratio of their perimeters is ..... [1]

OR

If the sides of a rectangle are $12\,\text{cm}$ and $5\,\text{cm}$, then the length of its diagonal is .....

Q13. $x = a$ represents a line, which is parallel to ..... [1]

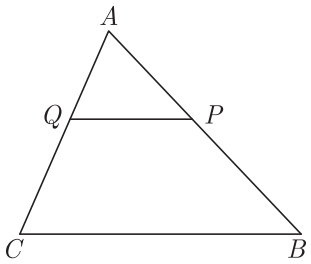
Q14. If the polynomial $x^4 - 2x^3 - 8x^2 + mx - 5$ is exactly divisible by $(x+3)$, the m, is equal to ..... [1]

Q15. The decimal expansion of the rational number $\frac{11}{2^3 \times 5^2}$ well terminate after..... places of decimal. [1]

(Q16-Q20):Answer the following questions:

Q16. Is $x = -2$ a solution of the equation $x^2 - 2x + 8 = 0$? [1]

Q17. In the given figure, P and Q are points on the sides AB and AC respectively of ΔABC such that $AP = 3.5\,\text{cm}, PB = 7\,\text{cm}, AQ = 3\,\text{cm}$ and $QC = 6\,\text{cm}$. Prove that $PQ \,||\, BC$. [1]



Q18. If $\tan\theta = \cot(30^\circ + \theta)$, find the value of θ? [1]

OR

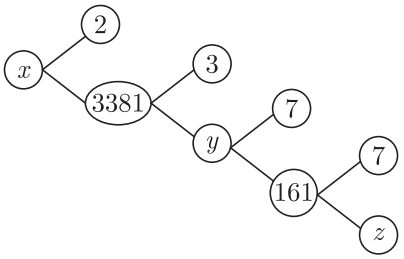
Find the value of $\sin^2 45^\circ + \cos^2 30^\circ - \tan^2 60^\circ$.

Q19. A cylinder and a cone are of same base radius and of same height. Find the ratio of volume of cylinder to that of the cone.[1]

Q20. Two coins are tossed simultaneously. Find the probability of getting exactly one head. [1]

SECTION B

Q21. Complete the following factor tree and find the numbers x, y and z. [2]



OR

Show that $2\sqrt{3}$ is an irrational number, given that $\sqrt{3}$ is irrational.

Q22. If α and β are zeroes of the polynomial $f(x) = x^2 - x - \mathrm{k}$ such that $\alpha - \beta = 9$, find k. [2]

Q23. The coordinates of the vertices of ΔABC are $A(4,1)$, $B(-3,2)$ and $C(0,\mathrm{k})$. Given that the area of ΔABC is $12\ \mathrm{unit}^2$, find the the value of k. [2]

Q24. Without using trigonometric tables, evaluate the following $\frac{\sin 18^\circ}{\cos 72^\circ} + \sqrt{3}\left[\tan 10^\circ \tan 30^\circ \tan 40^\circ \tan 50^\circ \tan 80^\circ\right]$ [2]

Q25. Prove that: $\frac{\cot A - \cos A}{\cot A + \cos A} = \frac{\mathrm{cosec}\, A - 1}{\mathrm{cosec}\, A + 1}$ [2]

OR

Prove that :
$\frac{1}{\mathrm{cosec}\, A - \cot A} - \frac{1}{\sin A} = \frac{1}{\sin A} - \frac{1}{\mathrm{cosec}\, A + \cot A}$.

Q26. Area of a sector of a circle of radius $36\ \mathrm{cm}$ is $54\pi\ \mathrm{cm}^2$. Find the length of the corresponding arc of the sector. [2]

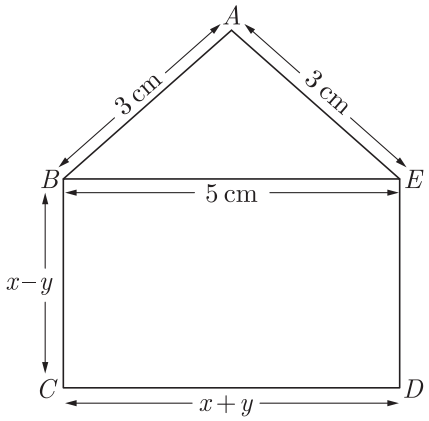
SECTION C

Q27. The HCF of 65 and 117 is expressible in the form $65\mathrm{m} - 117$ using prime factorisation. [3]

Q28. Solve the following pair of linear equation: $px + qy = p - q; qx - py = p + q$. [3]

OR

In the given figure, $ABCDE$ is a pentagon with $BE \,||\, CD$ and $BC \,||\, ED$. BC is perpendicular to CD. If the perimeter of pentagon $ABCDE$ is $21\ \mathrm{cm}$, find the values of x and y.



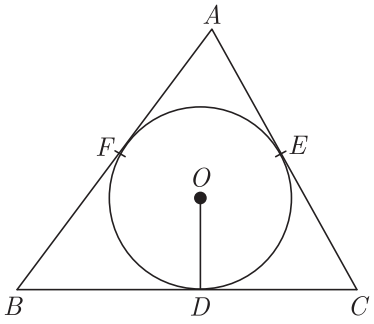
Q29. A contract on construction job specifies a penalty for delay of completion beyond a certain date as follows.₹ 200 for the first day,₹ 250 for the second day, ₹300 for the third day, etc., the penalty for each succeeding day being ₹50 more than for the preceding day. If the contractor pays ₹27750 as penalty, find for how many days he delayed the work. [3]

Q30. Prove that: $\sin\theta(1 + \tan\theta) + \cos\theta(1 + \cot\theta) = \sec\theta + \mathrm{cosec}\,\theta$. [3]

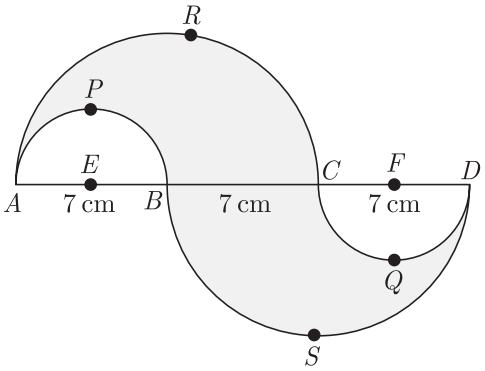
Q31. D and E are points on the sides CA and CB respectively of a triangle ABC right angled at C Prove that $AE^2 + BD^2 = AB^2 + DE^2$. [3]

OR

In the adjoining figure, a triangle ABC is drawn to circumscribe a circle of radius $2\mathrm{cm}$ such that the segments BD and DC into which BC is divided by the point of contact D are of lengths $4\mathrm{cm}$ and $3\mathrm{cm}$ respectively. If area of $\Delta ABC = 21\ \mathrm{cm}^2$, then find the lengths of sides AB and AC.



Q32. In the given figure, APB and CQD are semicircles of diameter 7cm each, while ARC and BSD are semicircles of diameter 14cm each. Find the perimeter of the shaded region.$\left[Use\pi = \frac{22}{7}\right]$ [3]



Q33. Two different dice are rolled together. Find the probability of getting:

1. the sum of numbers on two dice as 5.
2. even numbers on both dice. [3]

OR

The probability of selecting a red ball at random from a jar that contains only red, blue and orange balls is $\frac{1}{4}$. The probability of selecting a blue ball at random from the same jar is $\frac{1}{3}$. If the jar contains 10 orange balls, find the total number of balls in the jar.

Q34. Find the value of p for the following distribution whose mean is 10: [3]

x_i	5	7	9	11	13	15	20
f_i	4	4	p	7	3	2	1

SECTION D

Q35. If pth, qth and rth terms of an AP are a, b and c respectively, then show that $(a-b)\,r+(b-c)\,p+(c-a)\,q=0$. [4]

Q36. If the centroid of $\Delta\,ABC$, in which $A(a,b), B(b,c), C(c,a)$ is at the origin, then calculate the value of $(a^3+b^3+c^3)$ [4]

OR

The three vertices of a parallelogram $ABCD$ are $A(3,-4), B(-1,-3)$ and$C(-6,2)$. Find the coordinates of vertex D and find the area of parallelogram $ABCD$.

Q37. From the top of a tower 100m high, a man observes two cars on the opposite sides of the tower with angles of depression 30° and 45° respectively. Find the distance between the cars. $(Use\ \sqrt{3}=1.73)$ [4]

OR

A straight highway leads to the foot of a tower. A man standing at the top of the tower observes a car at an angle of depression of 30°, which is approaching the foot of the tower with a uniform speed. Six seconds later, the angle of depression of the car is found to be 60°. Find the time taken by the car to reach the foot of the tower from this point.

Q38. Prove that the lengths of tangents drawn from an external point to a circle are equal. [4]

OR

Two circles with centres O and O' of radii 3cm and 4cm, respectively intersect at two points P and Q such that OP and $O'P$ are tangents to the two circles. Find the length of the common chord PQ.

Q39. Draw an isosceles triangle ABC in which $AB = AC = 6\,\text{cm}$ and $BC = 5\text{cm}$. Construct a triangle PQR similar to ΔABC in which $PQ = 8\text{cm}$. Also justify the construction. [4]

Q40. Size of agriculture holding in a survey of 200 families is given in the following table. [4]

Size of agriculture holding (in ha)	0-5	5-10	10-15	15-20	20-25	20-30	30-35
Number of families	10	15	30	80	40	20	5

Compute the median and mode size of holding.