CLASS X (2019-20)
MATHEMATICS BASIC(241)
SAMPLE PAPER-16

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 one zero of the quadratic polynomial x^2+3x+k is 2, then the value of k is [1]

(a) 10 (b) -10
(c) 5 (d) -5

Q2. Which of the following equations has two distinct real roots? [1]

(a) $2x^2-3\sqrt{2x}+\frac{9}{4}=0$ (b) $x^2+x-5=0$
(c) $x^2+3x+2\sqrt{2}=0$ (d) $5x^2-3x+1=0$

Q3. If 2nd term of an A.P. is 13 and the 5th term is 25, then its 7th term is [1]

(a) 30 (b) 33
(c) 37 (d) 38

Q4. Which of the following can be the probability of an event? [1]

(a) -0.04 (b) 1.004
(c) $\frac{18}{23}$ (d) $\frac{8}{7}$

Q5. A bag contains 3 red balls, 5 white balls and 7 black balls. The probability that a ball drawn from the bag at random will be neither red nor black is [1]

(a) $\frac{1}{5}$ (b) $\frac{1}{3}$
(c) $\frac{7}{15}$ (d) $\frac{8}{15}$

Q6. One ticket is drawn at random from a bag containing tickets numbered 1 to 40. The probability that the selected ticket has a number which is a multiple of 5 is [1]

(a) $\frac{1}{5}$ (b) $\frac{3}{5}$
(c) $\frac{4}{5}$ (d) $\frac{1}{3}$

Q7. The volume of the largest right circular cone that can be carved out from a cube of edge 4.2 cm is [1]

(a) $9.7\ \text{cm}^3$ (b) $77.6\ \text{cm}^3$
(c) $58.2\ \text{cm}^3$ (d) $19.4\ \text{cm}^3$

Q8. The area of a sector of an angle p(in degrees) of a circle with radius R is [1]

(a) $\frac{p}{360^\circ} \times 2\pi R$ (b) $\frac{p}{180^\circ} \times \pi R^2$

(c) $\frac{p}{720^\circ} \times 2\pi R$ (d) $\frac{p}{720^\circ} \times 2\pi R^2$

Q9. It is given that $\triangle ABC \sim \triangle DFE, \angle A = 30^\circ, \angle C = 50^\circ, AB = 5\text{cm}, AC = 8\text{cm}$, and $DF = 7.5\text{cm}$. Then which of the following is true? [1]

(a) $DE = 12\text{cm}, \angle F = 50^\circ$ (b) $DE = 12\text{cm}, \angle F = 100^\circ$

(c) $EF = 12\text{cm}, \angle D = 100^\circ$ (d) $EF = 12\text{cm}, \angle D = 30^\circ$

Q10. If the radii of two concentric circles are 4 cm and 5 cm, then the length of each chord of one circle which is tangent to the other is [1]

(a) 3 cm (b) 6 cm

(c) 9 cm (d) 1 cm

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

Q11. A coin and a dice are thrown together, then the number of possible outcomes is ..... . [1]

Q12. The length of a minute hand of a wall clock is 7 cm, then the area swept by it in 30 minutes is ..... [1]

Q13. If a real number α is a zero of a polynomial $f(x)$, then $x - \alpha$ is a ..... of $f(x)$. [1]

Q14. If one root of a quadratic equation $ax^2 + bx + c = 0$ with rational coefficients is $2 + \sqrt{3}$, then the other root is ..... [1]

OR

If a and b are the roots of the quadratic equation $ax^2 - bx + c = 0$, then $\alpha + \beta =$ .....

Q15. If $\triangle ABC \sim \triangle DEF$ and $\angle A = 47^\circ, \angle E = 83^\circ$, then $\angle C =$ ..... [1]

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

Q16. If $\frac{p}{q}$ is a rational number $(q \neq 0)$, what is the condition on q so that the decimal representation of $\frac{p}{q}$ is terminating? [1]

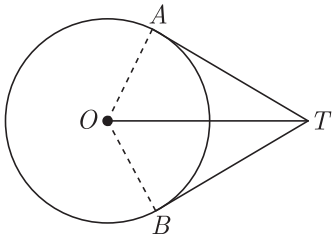
Q17. Find the value of k so that the following system has no solution [1]

$$\begin{aligned} 3x - y - 5 &= 0, \\ 6x - 2y - k &= 0 \end{aligned}$$

OR

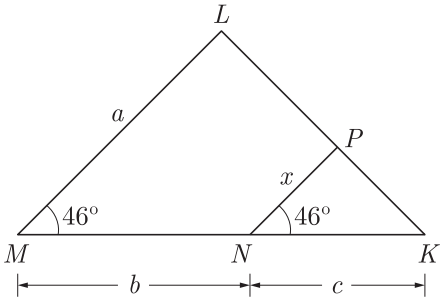
Find the 10th term of the $AP\ \sqrt{2}, \sqrt{8}, \sqrt{18}, ...$

Q18. In the given figure, if $\angle ATO = 40^\circ$, find $\angle AOB$. [1]



Q19. If $\cos A = \frac{3}{5}$, find $9\cot^2 A - 1$ [1]

Q20. In the given figure, $\angle M = \angle N = 46^\circ$. Express x in terms of a, b and c, where a, b and c are lengths of LM, MN and NK respectively. [1]



SECTION B

Q21. For any natural number n check whether 6^n end with digit 0. [2]

OR

Find the LCM and HCF of 26 and 91 using prime factorisation method.

Q22. Simplify: $\frac{\sin^3\theta+\cos^3\theta}{\sin\theta+\cos\theta}+\sin\theta\cos\theta$ [2]

Q23. If A, B and C are the interior angles of a triangle ABC, show that. [2]

$$\sin\frac{B+C}{2}=\cos\frac{A}{2}$$

Q24. The angles of a cyclic quadrilateral $ABCD$ are $\angle A=(6x+30)^\circ$, $\angle B=(5x)^\circ$, $\angle C=(x+10)^\circ$ and $\angle D=(3y-10)^\circ$. Find x and y. [2]

Q25. Find the middle term (s) of the following AP.

213, 205, 197, ..., 37 [2]

Q26. The centre of a circle is $[2a(a-7)]$. Find the values of a if the circle passes through the point $(11,-9)$ and has diameter $10\sqrt{2}$ units. [2]

OR

If the point $P(3,4)$ is equidistant from the points $A(-2,3)$ and $B(k,-1)$, find the values of k. Also, find the distance AB.

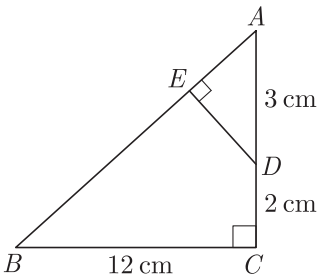
SECTION C

Q27. If the roots of the equation $(a-b)x^2+(b-c)x+(c-a)=0$ are equal, prove that $2a=b+c$. [3]

Q28. The sum of first 7 terms of an AP is 63 and sum of its next 7 terms is 161. Find 28th term of AP. [3]

Q29. Show that the square of any positive integer cannot be of the form $5m+2$ or $5m+3$ for some integer m. [3]

Q30. In the given figure, $\triangle ABC$ is right angled at C and $DE\perp AB$. Prove that $\triangle ABC\sim\triangle ADE$, and hence find the lengths of AE and DE. [3]



Q31. The average score of boys in the examination of a school is 71 and that of the girls is 73. The average score of the boys and girls in the examination is 71.8. Find the ratio of number of boys to the number of girls who appeared in the examination.[3]

OR

Given below is the distribution of weekly pocket money received by students of a class. Calculate the pocket money that is received by most of the students.

Pocket money (in ₹)	0-20	20-40	40-60	60-80	80-100	100-120	120-140
No. of students	2	2	3	12	18	5	2

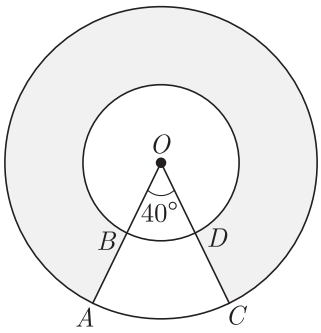
Q32. If $\sec\theta + \tan\theta = p$, prove that $\sin\theta = \dfrac{p^2-1}{p^2+1}$ [3]

OR

Evaluate the following

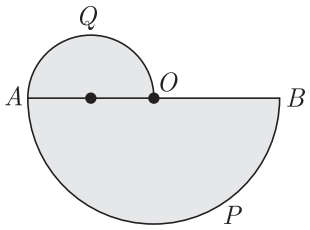
$\sec 41^\circ \sin 49^\circ + \cos 49^\circ \operatorname{cosec} 41^\circ - \dfrac{2}{\sqrt{3}}\tan 20^\circ \cdot \tan 60^\circ \tan 70^\circ - 3(\cos^2 45^\circ - \sin^2 90^\circ)$

Q33. In the given figure, find the area of the shaded region, enclosed between two concentric circles of radii 7 cm and 14 cm, where $\angle AOC = 40^\circ$ $\left[\text{Use } \pi = \dfrac{22}{7}\right]$ [3]



OR

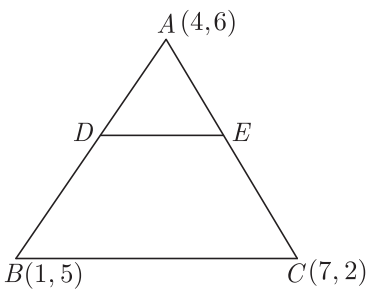
In the given figure, APB and AQO are semicircles and $OA = OB$. If the perimeter of the figure is 40 cm, find the area of the shaded region.



Q34. Construct a triangle with sides 5 cm, 5.5 cm and 6.5 cm. Now construct another triangle whose sides are $\frac{3}{5}$ times the corresponding sides of the given triangle. [3]

SECTION D

Q35. In the given figure, the vertices of $\triangle ABC$ are $A(4,6)$, $B(1,5)$ and $C(7,2)$. A line segment DE is drawn to intersect the sides AB and AC at D and E respectively such that $\dfrac{AD}{AB} = \dfrac{AE}{AC} = \dfrac{1}{3}$. Calculate the area of $\triangle ADE$ and compare it with area of $\triangle ABC$. [4]



OR

Find the point on the x-axis which is equidistant from the points $(5, 4)$ and $(-2, 3)$. Also find the area of the triangle formed by these points.

Q36. If α and β are the zeroes of the polynomial $p(x) = 2x^2 + 5x + k$ satisfying the relation $\alpha^2 + \beta^2 + \alpha\beta = \frac{21}{4}$, then find the value of k. Also find the zeroes of the polynomial $p(x)$. [4]

OR

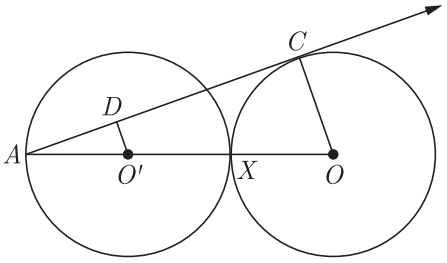
If the remainder on division of $x^3 + 2x^2 + kx + 3$ by $x - 3$ is 21, find the quotient and the value of k. Hence, find the zeroes of the cubic polynomial $x^3 + 2x^2 + kx - 18$

Q37. Due to heavy floods in a State, thousands were rendered homeless. 50 schools collectively offered to the State Government to provide place and canvas for 1500 tests to be fixed by the Government and decided to share the whole expenditure equally. The lower part of each tent is cylindrical of base radius 2.8m and height 3.5 m, with conical upper part of same base radius but of height 2.1 m. If the canvas used to make the tents costs ₹120 per sq. m, find the amount shared by each school to set up the tents. $\left[\text{Use } \pi = \frac{22}{7}\right]$ [4]

Q38. 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

Q39. In the adjoining figure, two equal circles with centres O and O', touch each other at X. OO' produced meets the circle with O' at A. AC is tangent to the circle with centre O, at the point C. $O'D$ is perpendicular to AC. Find the value of $\frac{DO'}{CO}$. [4]



OR

Prove that the tangent drawn at the mid-point of an arc of a circle is parallel to the chord joining the end points of the arc.

Q40. A bird is sitting on the top of a 80 m high tree. From a point on the gound, the angle of elevation of the bird is 45°. The bird flies away horizontally in such a way that it remained at a constant height from the ground. After 2 seconds, the angle of elevation of the bird from the same point is 30°. Find the speed of flying of the bird. $(\text{Take } \sqrt{3} = 1.732)$ [4]