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

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. The number of polynomials having zeroes as -2 and 5 is [1]

(a) 1 (b) 2
(c) 3 (d) more than 3

Q2. If α and β are roots of the equation $2x^2+3\sqrt{3}\,x-6=0$, then the value of $\alpha^2+\beta^2$ is [1]

(a) $\frac{3}{4}$ (b) $\frac{51}{4}$
(c) $\frac{33}{4}$ (d) $\frac{39}{4}$

Q3. If the equation $2x^2-5x+(k+3)=0$ has equal roots, then the value of k is [1]

(a) $\frac{9}{8}$ (b) $-\frac{9}{8}$
(c) $\frac{1}{8}$ (d) $-\frac{1}{8}$

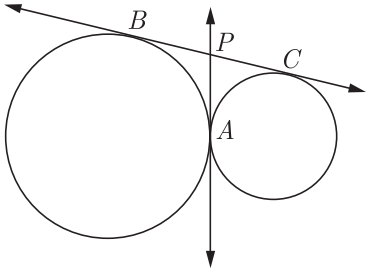
Q4. The famous mathematician associated with finding the sum of first 100 natural numbers is [1]

(a) Pythagoras (b) Newton
(c) Gauss (d) Euclid

Q5. From a point which is at a distance of 13 cm from the centre O of a circle of radius 5 cm, the pair of tangents PQ and PR to the circle are drawn. Then the area of the quadrilateral $PQOR$ is [1]

(a) 60 cm^2 (b) 65 cm^2
(c) 30 cm^2 (d) 32.5 cm^2

Q6. In the given figure, two circles touch each other at A. BC and AP are common tangents to these circles. If $BP=3.8$ cm , then the length of BC is equal to [1]



(a) 7.6 cm (b) 1.9 cm
(c) 11.4 cm (d) 5.7 cm

Q7. If ABC and BDE are two equilateral triangles such that D is mid-point of BC, then the ratio of areas of triangles ABC and BDE is [1]

(a) 2 : 1 (b) 1 : 2
(c) 1 : 4 (d) 4 : 1

Q8. If the sum of the circumferences of two circles with diameters d_1 and d_2 is equal to the circumference of a circle of diameter d, then [1]

(a) $d_1^2 + d_2^2 = d^2$ (b) $d_1 + d_2 = d$
(c) $d_1 + d_2 > d$ (d) $d_1 + d_2 < d$

Q9. The area of the circle that can be inscribed in a square of side 6 cm is [1]

(a) 36π cm^2 (b) 18π cm^2
(c) 12π cm^2 (d) 9π cm^2

Q10. The value of $\tan 1^\circ \tan 2^\circ \tan 3^\circ ..... \tan 89^\circ$ is [1]

(a) 0 (b) 1
(c) 2 (d) $\frac{1}{2}$

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

Q11. A shuttle cock used for playing badminton has the shape of the combination of ..... [1]

Q12. The value of $\frac{\sin 39^\circ}{\cos 51^\circ} + \frac{\sec 47^\circ}{\text{cosec } 43^\circ}$ is ..... . [1]

OR

The value of $(\sec^2\theta - 1)(1 - \text{cosec}^2\theta)$ is ..... .

Q13. The value of $\sqrt{3}\ \text{cosec } 60^\circ - \sec 60^\circ$ is ..... . [1]

Q14. The common point of a tangent to a circle and the circle is called ..... . [1]

Q15. A quadratic equation $ax^2 + bx + c = 0$ with rational coefficients $a \neq 0$ has real and distinct rational roots if its discriminant is ..... . [1]

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

Q16. Find the product of HCF and LCM of two numbers 50 and 20. [1]

Q17. Is the system of linear equations $2x + 3y - 9 = 0$ and $4x + 6y - 18 = 0$ consistent? Justify your answer. [1]

OR

What is the common difference of an AP in which $a_{21} - a_7 = 84$?

Q18. If $\Delta ABC \sim \Delta PQR$ and $\angle A = 32^\circ$, $\angle R = 65^\circ$, then find $\angle Q$. [1]

Q19. What is the probability of getting neither prime nor composite number, when an unbiased die is tossed? [1]

Q20. Following table shows sale of shoes in a store during one month: [1]

Size of shoe	3	4	5	6	7	8
Number of pairs sold	4	18	25	12	5	1

Find the modal size of the shoes sold.

SECTION B

Q21. The points $A(4, 7)$, $B(p, 3)$ and $C(7, 3)$ are the vertices of a right triangle, right angled at B. Find the value of p. [2]

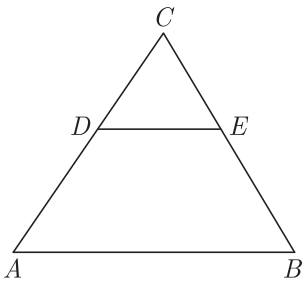
OR

ABC is a triangle and $G(4,3)$ is the centroid of the triangle. If A, B and C are the points (1, 3), $(4, b)$ and $(a, 1)$ respectively, find the values of a and b. Also, find the length of side BC.

Q22. Show that any positive even integer can be written in the form $6q$, $6q+2$ or $6q+4$, where q is an integer. [2]

OR

Q23. In the given figure, $\angle A = \angle B$ and $AD = BE$. Show that $DE \parallel AB$. [2]



Q24. In a quadrilateral $ABCD$, $\angle B = 90^\circ$. If $AD^2 = AB^2 + BC^2 + CD^2$, prove that $\angle ACD = 90^\circ$. [2]

Q25. If $\sqrt{3}\tan\theta = 3\sin\theta$, then find the value of $\sin^2\theta - \cos^2\theta$. [2]

OR

Prove that : $(1 + \cot A - \operatorname{cosec} A)(1 + \tan A + \sec A) = 2$

Q26. Prove that the tangents drawn at the ends of a diameter of a circle are parallel. [2]

SECTION C

Q27. Prove that $\sqrt[3]{6}$ is an irrational number. [3]

OR

Use Euclid's division algorithm to find HCF of 441, 567, 693.

Q28. A man earns ₹ 600 per month more than his wife. One-tenth of man's salary and one-sixth of wife's salary amount to ₹ 1500, which is saved every month. Find their salaries. [3]

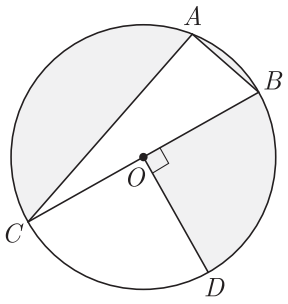
Q29. If the sum of first m terms of an AP is the same as the sum of its first n terms $(m \neq n)$, show that the sum of its first $(m+n)$ terms is zero. [3]

Q30. If $\sin\theta = \frac{1}{2}$, then show that $3\cos\theta - 4\cos^3\theta = 0$. [3]

Q31. The long and short hands of a clock are 6 cm and 4 cm long respectively. Find the sum of distances travelled by their tips in 24 hours. (Use $\pi = 3.14$) [3]

OR

In the given figure, O is the centre of a circle with $AC = 24\,\text{cm}$, $AB = 7\,\text{cm}$ and $\angle BOD = 90^\circ$. Find the area of the shaded region. (Use $\pi = 3.14$)



Q32. If 65% of the population have black eyes, 25% have brown eyes and the remaining have blue eyes, what is the probability that a person selected at random has [3]

(i) blue eyes
(i) brown or black eyes
(iii) neither blue nor brown eyes?

OR

A child's game has 8 triangles of which 3 are blue and rest are red and 10 squares of which 6 are blue and rest are red. One piece is lost. Find the probability that the lost piece is a
(i) triangle or square
(ii) square of blue colour
(iii) triangle of red colour.

Q33. The median class of a frequency distribution is 125-145. The frequency of the median class and the cumulative frequency of the class preceding the median class are 20 and 22 respectively. Find the sum of the frequencies, if the median is 137. [3]

Q34. Find the mode of the given distribution: [3]]

Class interval	0-10	10-20	20-30	30-40	40-50
Frequency	2	12	22	8	6

SECTION D

Q35. Given that the zeroes of the cubic polynomial $x^3 - 6x^2 + 3x + 10$ are of form $a, a+b, a+2b$ for some real numbers a and b, find the values of a and b as well as the zeroes of the given polynomial. [4]

OR

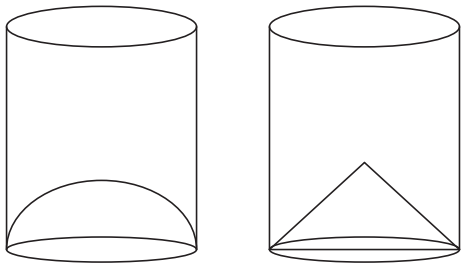
When a polynomial $p(x)$ is divided by $(x-1)$, the remainder is 5 and when it is divided by $(x-2)$, the remainder is 7. Find the remainder when $p(x)$ is divided by $(x-1)(x-2)$.

Q36. If the points $A(1,-2)$, $B(2,3)$, $C(a,2)$ and $D(-4,-3)$ form a parallelogram, find the value of a and the height of the parallelogram taking AB as base. [4]

Q37. Find the positive value(s) of k for which quadratic equations $x^2 + kx + 64 = 0$ and $x^2 - 8x + k = 0$ both have real roots.[4]

Q38. A milkman was serving his customers using two types of mugs A and B of inner diameter 5 cm and height 10 cm. The mug 'A' has hemispherical raised bottom and mug 'B' has conical raised bottom of height 1.5 cm as shown in given figure. [4]

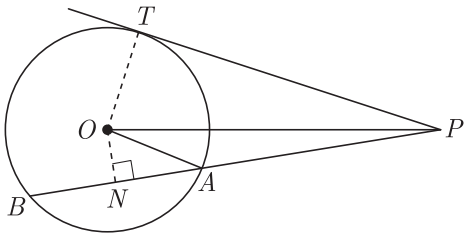
He decided to serve the customers in 'B' type of mugs.
(i) Find the volume of the mugs of both type.
(ii) Which mathematical concept is used in the above problem?



Mug A Mug B

Q39. In the given figure, from an external point P, a tangent PT and a line segment PAB is drawn to a circle with centre O. ON is perpendicular to the chord AB.

Prove that : [4]
(i) $PA \cdot PB = PN^2 - AN^2$
(ii) $PN^2 - AN^2 = OP^2 - OT^2$
(iii) $PA \cdot PB = PT^2$



OR

Let ABC be a right triangle in which $AB = 3\,\text{cm}$, $BC = 4\,\text{cm}$ and $\angle B = 90^\circ$. BD is the perpendicular from B on AC. The circle through B, C and D is drawn. Construct the tangents from A to this circle.

Q40. A ladder rests against a vertical wall at an inclination α to the horizontal. Its foot is pulled away from the wall through a distance p so that its upper end slides a distance q down the wall and then the ladder makes an angle β to the horizontal. Show that $\frac{p}{q} = \frac{\cos\beta - \cos\alpha}{\sin\alpha - \sin\beta}$. [4]

OR

A boy standing on a horizontal plane finds a bird flying at a distance of 100 m from him at an elevation of 330°. A girl standing on the roof of 20 metre high building, finds the angle of elevation of the same bird to be 45°. If the boy and the girl are on opposite sides of the bird, find the distance of the bird from the girl.