CLASS X (2019-20)
MATHEMATICS BASIC(241)
SAMPLE PAPER-2

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. Ratio of lateral surface areas of two cylinders with equal height is [1]

(a) 1 : 2 (b) $H:h$
(c) $R:r$ (d) None of these

Q2. The sides of a triangle (in cm) are given below. In which case, the construction of triangle is not possible. [1]

(a) 8, 7, 3 (b) 8, 6, 4
(c) 8, 4, 4 (d) 7, 6, 5

Q3. If a regular hexagon is inscribed in a circle of radius r, then its perimeter is [1]

(a) $3r$ (b) $6r$
(c) $9r$ (d) $12r$

Q4. A can do a piece of work in 24 days. If B is 60% more efficient than A, then the number of days required by B to do the twice as large as the earlier work is [1]

(a) 24 (b) 36
(c) 15 (d) 30

Q5. An AP starts with a positive fraction and every alternate term is an integer. If the sum of the first 11 terms is 33, then the fourth term is [1]

(a) 2 (b) 3
(c) 5 (d) 6

Q6. The number $3^{13}-3^{10}$ is divisible by [1]

(a) 2 and 3 (b) 3 and 10
(c) 2, 3 and 10 (d) 2, 3 and 13

Q7. If the points $A(4,3)$ and $B(x,5)$ are on the circle with centre $O(2,3)$, then the value of x is [1]

(a) 0 (b) 1
(c) 2 (d) 3

Q8. Value (s) of k for which the quadratic equation $2x^2-kx+k=0$ has equal roots is/are [1]

(a) 0 (b) 4
(c) 8 (d) 0, 8

Q9. The areas of two similar triangles ABC and PQR are in the ratio $9:16$. If $BC = 4.5\text{ cm}$, then the length of QR is [1]

(a) 4 cm (b) 4.5 cm

(c) 3 cm (d) 6 cm

Q10. If $\sec 5A = \operatorname{cosec}(A + 30^\circ)$, where $5A$ is an acute angle, then the value of A is [1]

(a) 15° (b) 5°

(c) 20° (d) 10°

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

Q11. Numbers having non-terminating, non-repeating decimal expansion are known as .... [1]

Q12. A quadratic polynomial can have at most 2 zeroes and a cubic polynomial can have at most .... zeroes. [1]

OR

If α, β, γ are the zeroes of the cubic polynomial $ax^3 + bx^2 + cx + d = 0$, then $\alpha + \beta + \gamma = \frac{-b}{\text{..........}}$

Q13. If radius of a circle is 14 cm the area of the circle is .... [1]

Q14. If the heights of two cylinders are equal and their radii are in the ratio of 7 : 5, then the ratio of their volumes is .... [1]

Q15. If $P(E) = 0.05$, the probability of 'not E' is .... [1]

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

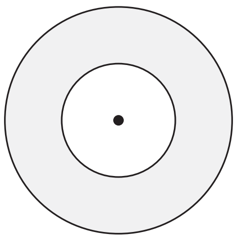
Q16. What is the ratio of the total surface area of the solid hemisphere to the square of its radius. [1]

OR

If the area of three adjacent faces of a cuboid are X, Y, and Z respectively, then find the volume of cuboid.

Q17. If one root of the quadratic equation $6x^2 - x - k = 0$ is $\frac{2}{3}$, then find the value of k. [1]

Q18. Two coins of diameter 2 cm and 4 cm respectively are kept one over the other as shown in the figure, find the area of the shaded ring shaped region in square cm. [1]



Q19. Find median of the data, using an empirical relation when it is given that Mode $=$ 12.4 and Mean $=$ 10.5. [1]

Q20. 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 and these are equally likely outcomes. Find the probability that the arrow will point at any factor of 8 ? [1]

SECTION B

Q21. In the figure given below, $ABCD$ is a rectangle. Find the values of x and y. [2]

Q22. Prove that the point $(3, 0)$, $(6, 4)$ and $(-1, 3)$ are the vertices of a right angled isosceles triangle. [2]

OR

Find the relation between x and y, if the point $A(x, y), B(-5, 7)$ and $C(-4, 5)$ are collinear.

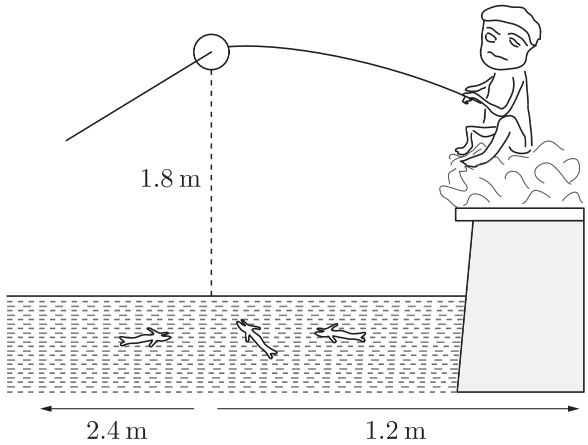
Q23. In $\Delta\, ABC, AD \perp BC$, such that $AD^2 = BD \times CD$. Prove that $\Delta\, ABC$ is right angled at A. [2]

Q24. The mean and median of 100 observation are 50 and 52 respectively. The value of the largest observation is 100. It was later found that it is 110. Find the true mean and median. [2]

OR

There are 30 cards of the same size in a bag in which the numbers 1 to 30 are written. One card is taken out of the bag at random. Find the probability that the number on the selected card is not divisible by 3.

Q25. Pawan is fly fishing in a stream as shown in the figure. The tip of her fishing rod is 1.8 m above the surface of the water and the fly at the end of the string rests on the water 3.6 m away and 2.4 m from a point directly under the tip of the rod. [2]

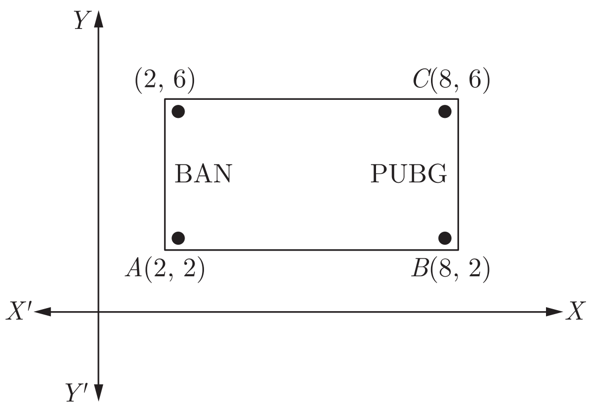


Assuming that her string (from the tip of her rod to the fly) is taut, how much string does she have out?

Q26. Read the following passage and answer the questions that follows:

One tends to become lazy. Also, starting at your mobile screen for long hours can affect you eyesight and give you headaches. Those who are addicted to playing PUBG can get easily stressed out or face anxiety issues in public due to lack of social interaction.

To raise social awareness about ill effects of playing PUBG, a school decided to start "BAN PUBG: campaign, students are asked to prepare campaign board in the shape of rectangle (as shown in the figure). [2]



(i) Find the area of the board.

(ii) It cost of $1\,\text{cm}^2$ of board is ₹8, then find the cost of board.

SECTION C

Q27. A part of monthly hostel charge is fixed and the remaining depends on the number of days one has taken food in the mess. When Swati takes food for 20 days, she has to pay Rs. 3,000 as hostel charges whereas Mansi who takes food for 25 days Rs. 3,500 as hostel charges. Find the fixed charges and the cost of food per day. [3]

Q28. If α and β are the zeroes of the polynomial $6y^2 - 7y + 2$, find a quadratic polynomial whose zeroes are $\frac{1}{\alpha}$ and $\frac{1}{\beta}$. [3]

OR

If α, β and γ are zeroes of the polynomial $6x^3 + 3x^2 - 5x + 1$, then find the value of $\alpha^{-1} + \beta^{-1} + \gamma^{-1}$.

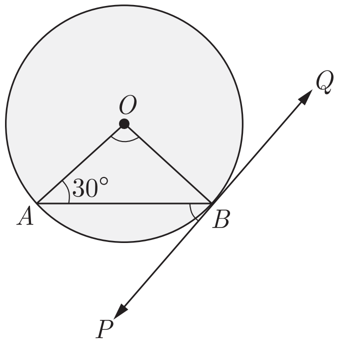
Q29. ΔABC is right angled at C. If p is the length of the perpendicular from C to AB and a, b, c are the lengths of the sides opposite $\angle A, \angle B$ and $\angle C$ respectively, then prove that $\frac{1}{p^2} = \frac{1}{a^2} + \frac{1}{b^2}$. [3]

Q30. Divide 56 in four parts in A.P. such that the ratio of the product of their extremes (1^{st} and 4^{rd}) to the product of means (2^{nd} and 3^{rd}) is $5:6$. [3]

OR

If the sum of the first n terms of an A.P. is $\frac{1}{2}[3n^2 + 7n]$, then find its n^{th} term. Hence write its 20^{th} term.

Q31. 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]



OR

A circle is inscribed in a ΔABC, with sides AC, AB and BC as 8 cm, 10 cm and 12 cm respectively. Find the length of AD, BE and CF.

Q32. Construct a triangle similar to a given equilateral ΔPQR with side 5cm such that each of its side is $\frac{6}{7}$ of the corresponding sides of ΔPQR. [3]

Q33. Read the following passage and answer the questions that follows:

From her elevated observation post 300 m away, a naturalist spots a troop of baboons high up in a tree. Using the small transit attached to her telescope, she finds the angle of depression to the bottom of this tree is 30°, while the angle of elevation to the top of the tree is 60°. The angle of elevation to the troop of baboons is 45°. Use this information to find (a) the height of the observation post, (b) the height of the baboons' tree, and (c) the height of the baboons above ground. [3]

Q34. Given the linear equation $2x + 3y - 8 = 0$, write another linear equation in two variables such that the geometrical representation of the pair so formed is :

(a) intersecting lines
(b) parallel lines
(c) coincident lines. [3]

SECTION D

Q35. Find x in terms of a, b and c : [4]

$$\frac{a}{x-a} + \frac{b}{x-b} = \frac{2c}{x-c}, x \neq a, b, c$$

Q36. Find HCF of 81 and 237 and express it as a linear combination of 81 and 237 i.e. HCF $(81, 237) = 81x + 237y$ for some x and y. [4]

OR

Show that there is no positive integer n, for which $\sqrt{n-1} + \sqrt{n-1}$ is rational.

Q37. Prove that opposite sides of a quadrilateral circumscribing a circle subtend supplementary angles at the centre of the circle. [4]

Q38. If $P(-5, -3)$, $Q(-4, -6)$, $R(2, -3)$ and $S(1, 2)$ are the vertices of a quadrilateral $PQRS$, find its area. [4]

OR

If $P(9a - 2, -b)$ divides the line segment joining $A(3a + 1, -3)$ and $B(8x, 5)$ in the ratio $3:1$. Find the values of a and b.

Q39. The angle of elevation of the top Q of a vertical tower PQ from a point X on the ground is 60°. From a point Y 40 m vertically above X, the angle of elevation of the top Q of tower is 45°. Find the height of the PQ and the distance PX. (Use $\sqrt{3} = 1.73$) [4]

OR

The tops of two towers of height x and y, standing on level ground, subtend angles of 30° and 60° respectively at the centre of the line joining their feet, then find $x:y$.

Q40. On the sports day of a school, 300 students participated. Their ages are given in the following distribution :

Age (in years)	5-7	7-9	9-11	11-13	13-15	15-17	17-19
Number of students	67	33	41	95	36	13	15

Find the mean and mode of the data. [4]