

AGYAT GUPTA (M.Sc.B.Ed.M.Phil)

89- LAXMI BAI COLNY

DIRECTOR (TARGET MATHEMATICS)

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Class - X

MATHEMATICS

Time : 3 to 3½ hours

समय : 3 से 3½ घण्टे

Maximum Marks : 80

अधिकतम अंक : 80

Total No. of Pages : 11

कुल पृष्ठों की संख्या : 11

General Instructions :

1. All questions are compulsory.
2. The question paper consists of 34 questions divided into four sections A, B, C and D. Section - A comprises of 10 questions of 1 mark each, Section - B comprises of 8 questions of 2 marks each, Section - C comprises of 10 questions of 3 marks each and Section - D comprises of 6 questions of 4 marks each.
3. Question numbers 1 to 10 in Section - A are multiple choice questions where you are to select one correct option out of the given four.
4. There is no overall choice. However, internal choice has been provided in 1 question of two marks, 3 questions of three marks each and 2 questions of four marks each. You have to attempt only one of the alternatives in all such questions.
5. Use of calculator is not permitted.
6. An additional 15 minutes time has been allotted to read this question paper only.

सामान्य निर्देश :

1. सभी प्रश्न अनिवार्य हैं।
2. इस प्रश्न-पत्र में 34 प्रश्न हैं, जो चार खण्डों × अ, ब, स व द में विभाजित हैं। खण्ड - अ में 10 प्रश्न हैं और प्रत्येक प्रश्न 1 अंक का है, खण्ड - ब में 8 प्रश्न हैं और प्रत्येक प्रश्न 2 अंकों का है, खण्ड - स में 10 प्रश्न हैं और प्रत्येक प्रश्न 3 अंकों का है, खण्ड - द में 6 प्रश्न हैं और प्रत्येक प्रश्न 4 अंकों का है।
3. खण्ड - अ में प्रश्न संख्या 1 से 10 बहुविकल्पीय प्रश्न हैं। दिए गए चार विकल्पों में से एक सही विकल्प चुनें।
4. इसमें कोई भी सर्वोपरि विकल्प नहीं है, लेकिन आंतरिक विकल्प 1 प्रश्न 2 अंकों में, 3 प्रश्न 3 अंकों में और 2 प्रश्न 4 अंकों में दिए गए हैं। आप दिए गए विकल्पों में से एक विकल्प का चयन करें।
5. कैलकुलेटर का प्रयोग वर्जित है।
6. इस प्रश्न-पत्र को पढ़ने के लिए 15 मिनट का अतिरिक्त समय दिया गया है। इस अवधि के दौरान छात्र केवल प्रश्न-पत्र को पढ़ेंगे और वे उत्तर-पुस्तिका पर कोई उत्तर नहीं लिखेंगे।

SECTION - A

Question numbers 1 to 10 carry 1 mark each. Each question is provided with four alternative choices of which only one is correct. You have to select the correct choice.

1. A frustum of a right circular cone of height 16 cm with radii of its circular ends as 8 cm and 20 cm has its slant height equal to
(A) 18 cm (B) 16 cm (C) 20 cm (D) 24 cm
2. Which of the following cannot be the probability of an event ?
(A) $\frac{2}{3}$ (B) -1.5 (C) 15% (D) 0.7
3. Which of the following is a solution of the quadratic equation $x^2 - b^2 = a(2x - a)$?
(A) $a + b$ (B) $2b - a$ (C) ab (D) $\frac{a}{b}$
4. The volume of a sphere of radius r is :
(A) $\frac{4}{3}\pi r^3$ (B) $2\pi r^2$ (C) $\frac{2}{3}\pi r^3$ (D) $4\pi r^2$
5. If the n^{th} term of an AP is $\frac{3 + n}{4}$, then its 8^{th} term is
(A) 11 (B) $\frac{11}{4}$ (C) $\frac{11}{2}$ (D) 22
6. A line that intersects a circle in two distinct points is called
(A) a diameter (B) a secant (C) a tangent (D) a radius
7. Two circles touch each other externally at C and AB is common tangent to the circles then $\angle ACB$ is :
(A) 60° (B) 45° (C) 30° (D) 90°
8. The angle of elevation of the sun, when the length of the shadow of a pole is equal to its height, is
(A) 30° (B) 45° (C) 60° (D) 90°
9. A child reshapes a cone made up of China clay of height 24 cm and radius of base 6 cm into a sphere. The radius of the sphere is
(A) 24 cm (B) 12 cm (C) 6 cm (D) 48 cm
10. The perpendicular distance of A(5, 12) from the y axis is
(A) 13 units (B) 5 units (C) 12 units (D) 17 units

SECTION - B

Question numbers 11 to 18 carry 2 marks each.

11. Which term of the AP : 6, 13, 20, 27, is 98 more than its 24th term ?
12. Sum of the areas of two squares is 468 m². If the difference of their perimeters is 24 m, find the sides of the two squares.
13. In Fig.1, two circles touch each other externally at C. Prove that the common tangent at C bisects the other two common tangents.

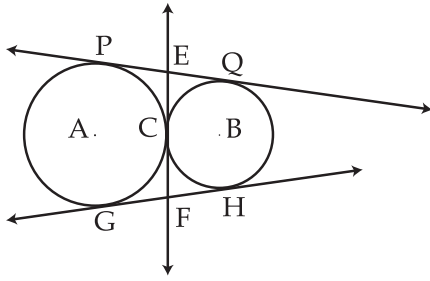


Fig.1

OR

In Fig. 2, a circle touches the side BC of triangle ABC at P and touches AB and AC produced at Q and R respectively. Show that $AQ = \frac{1}{2}(\text{Perimeter of } \triangle ABC)$

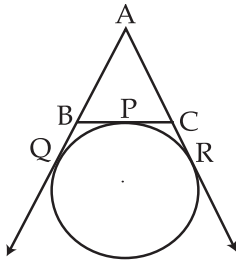


Fig.2

14. If A(1, 2), B(4, y), C(x, 6) and D(3, 5) are the vertices of a parallelogram ABCD taken in order, find the values of x and y.
15. In what ratio does the y-axis divide the line segment joining the points (-4, 5) and (3, -7).
16. Cards marked with numbers 3, 4, 5,, 50 are placed in a box and mixed thoroughly. One card is drawn at random from the box. Find the probability that the number on the drawn card is
 - (i) divisible by 7.
 - (ii) is a perfect square.

17. A toy is in the form of a cone mounted on a hemisphere of common base radius 7 cm. The total height of the toy is 31 cm. Find the total surface area of the toy.
18. A horse is tied to a peg at one corner of a square shaped grass field of side 25 m by means of a 14 m long rope. Find the area of the part of the field in which the horse can graze $\left[\text{Take } \pi = \frac{22}{7} \right]$

SECTION - C

Question numbers 19 to 28 carry 3 marks each.

19. Solve the following quadratic equation for x :
 $p^2x^2 + (p^2 - q^2)x - q^2 = 0$
20. The 4th term of an AP is equal to 3 times the first term and the 7th term exceeds twice the 3rd term by 1. Find the first term and the common difference.
21. Draw a ΔABC with $BC = 8$ cm, $\angle ABC = 45^\circ$ and $\angle BAC = 105^\circ$. Then construct a triangle whose sides are $\frac{2}{3}$ times the corresponding sides of the ΔABC .
22. A circle is inscribed in a triangle ABC having sides $AB = 8$ cm, $BC = 10$ cm and $CA = 12$ cm as shown in Fig. 13. Find AD , BE and CF .

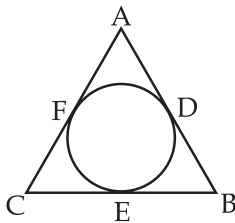


Fig.3

23. If the radius of the base of a right circular cylinder is halved, keeping the height same, find the ratio of the volume of the reduced cylinder to that of the original cylinder.
24. Find the area of the sector of a circle with radius 10 cm and of central angle 60° . Also, find the area of the corresponding major sector.

OR

A solid metallic sphere of diameter 21 cm is melted and recast into a number of smaller cones, each of diameter 3.5 cm and height 3 cm. Find the number of cones so formed.

25. A man standing on the top of a multi-storey building, which is 30 m high, observes the angle of elevation of the top of a tower as 60° and the angle of depression of the base of the tower as 30° . Find the horizontal distance between the building and the tower. Also find the height of the tower.

OR

An aeroplane, when 3000 m high, passes vertically above another plane at an instant when the angles of elevation of the two aeroplanes from the same point on the ground are 60° and 45° respectively. Find the vertical distance between the two aeroplanes.

26. A box contains 20 balls bearing numbers 1, 2, 3, 4,20. A ball is drawn at random from the box. What is the probability that the number on the drawn ball is
- (i) An odd number
 - (ii) Divisible for 2 or 3
 - (iii) Prime number
 - (iv) Not divisible by 10
27. The mid points of the sides AB, BC and CA of a triangle ABC are D(2, 1), E(1, 0) and F(-1, 3) respectively. Find the coordinates of the vertices of the triangle ABC.
28. ABCD is a rectangle formed by joining the points A(-1, -1), B(-1, 4), C(5, 4) and D(5, -1). P, Q, R and S are the mid points of AB, BC, CD and DA respectively. Is the quadrilateral PQRS a square, a rectangle or a rhombus? Justify your answer.

OR

The line segment joining the points A(2, 1) and B(5, -8) is trisected at the points P and Q where P is nearer to A. If point P lies on the line $2x - y + k = 0$, find the value of k.

SECTION - D

Question numbers 29 to 34 carry 4 marks each.

29. Some students arranged a picnic. The total budget for food was Rs. 240. Because four students of the group failed to go, the cost of food to each student got increased by Rs. 5. How many students went for the picnic?

OR

Raghav buys a shop for Rs. 1,20,000. He pays half of the amount in cash and agrees to pay the balance in 12 annual instalments of Rs. 5000 each. If the rate of interest is 12% per annum and he pays with the instalment the interest due on the unpaid amount; find the total cost of the shop.

30. If a, b and c be the sums of first p, q and r terms respectively of an AP, show that

$$\frac{a}{p}(q - r) + \frac{b}{q}(r - p) + \frac{c}{r}(p - q) = 0$$

31. From the top and foot of a tower 40 m high, the angle of elevation of the top of a light house are found to be 30° and 60° respectively. Find the height of the light house. Also find the distance of the top of the light house from the foot of the tower.
32. A solid is composed of a cylinder with hemispherical ends. If the whole height of the solid is 100 cm and the diameter of cylindrical part and the hemispherical ends is 28 cm, find the cost of polishing the surface of the solid at the rate of 5 paise per sq cm.

$$\left(\text{use } \pi = \frac{22}{7} \right)$$

OR

A container open from the top, made up of a metal sheet is in the form of a frustum of a cone of height 8 cm with radii of its lower and upper ends as 4 cm and 10 cm respectively. Find the cost of oil which can completely fill the container at the rate of Rs. 50 per litre. Also, find the cost of metal used, if it costs Rs. 5 per 100 cm² (Use $\pi = 3.14$)

33. Water is flowing at the rate of 3 km/h through a circular pipe of 20 cm internal diameter into a cylindrical cistern of diameter 10 m and depth 2 m. In how much time will the cistern be filled. $\left(\text{use } \pi = \frac{22}{7}\right)$
34. OABC is a rhombus whose three vertices A, B and C lie on a circle with centre O. If the radius of the circle is 10 cm, find the area of the rhombus.

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