AGYAT GUPTA

Class - X

MATHEMATICS

Time : **3 to 3½ hours**

समय : **3 से 3½ घण्टे**

AGYAT GUPTA (M.Sc.B.Ed.M.Phill) 89- LAXMI BAI COLNY DIRECTOR (TARGET MATHEMATICS)
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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 है। **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।
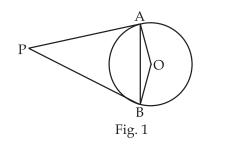
SECTION - A

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

1. For what value of k, the equation $kx^2 - 6x - 2 = 0$ has equal roots ?

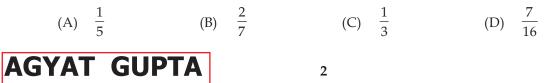   (A) $\dfrac{7}{2}$ (B) $\dfrac{-9}{2}$ (C) -3 (D) $\dfrac{-7}{2}$

2. A tree 6 m tall casts a 4 m long shadow. At the same time a pole casts a shadow 10 m long. The height of the pole is

   (A) 40 m   (B) 20 m   (C) 15 m   (D) 10 m

3. A solid piece of iron in the form of a cuboid of dimensions 49 cm × 33 cm × 24 cm is moulded to form a solid sphere. The radius of the sphere is

   (A) 25 cm   (B) 21 cm   (C) 19 cm   (D) 23 cm

4. In fig.1, if PA and PB are tangents to the circle with centre O such that $\angle APB = 50°$, then $\angle OAB$ is equal to

Fig. 1

   (A) 25°   (B) 30°   (C) 40°   (D) 50°

5. The tops of two poles of height 20 m and 14 m are connected by a wire. If the wire makes an angle of 30° with the horizontal, then the length of the wire is

   (A) 34 m   (B) 12 m   (C) 6 m   (D) 17 m

6. The sum of all natural numbers from 1 to 100 is

   (A) 4050   (B) 5050   (C) 6050   (D) 7050

7. Someone is asked to select a number from 1 to 30. The probability that the selected number is a prime number is

   (A) $\dfrac{1}{5}$ (B) $\dfrac{2}{7}$ (C) $\dfrac{1}{3}$ (D) $\dfrac{7}{16}$

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8. To draw a pair of tangents to a circle which are inclined to each other at an angle of 35°, it is required to draw tangents at the end points of those two radii of the circle, the angle between which is

(A)   105° (B)   70° (C)   140° (D)   145°

9. From a point P 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

(A)   60 cm^2 (B)   65 cm^2 (C)   30 cm^2 (D)   32.5 cm^2

10. To divide a line segment AB in the ratio 4 : 7, a ray AX is drawn first such that $\angle$ BAX is an acute angle and then points A_1, A_2, A_3 .... are located at equal distances on the ray AX and the point B is joined to

(A) A_{12} (B) A_{11} (C) A_{10} (D) A_9

SECTION - B

Question numbers 11 to 18 carry 2 marks each.

11. Solve for x : $10ax^2 - 6x + 15ax - 9 = 0,\ a \neq 0$

12. In fig. 2, a circle of radius 7 cm is inscribed in a square. Find the area of the shaded portion. $\left[\text{use } \pi = \dfrac{22}{7}\right]$
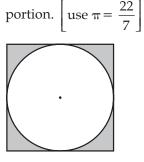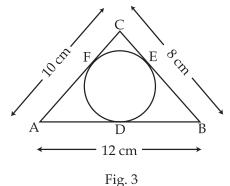

Fig. 2

13. Which term of the arithmetic progression 3, 10, 17 ...... will be 84 more than its 13th term.

14. In fig. 3, a circle is inscribed in a ΔABC. If AB = 12 cm, AC = 10 cm, BC = 8 cm, find AD, BE and CF.

Fig. 3

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15. A tower stands vertically on the ground. From a point on the ground which is 15 m away from the foot of the tower, the angle of elevation of the top of the tower is found to be 60°. Find the height of the tower.

16. Find a relation between x and y such that the point P(x, y) is equidistant from the points A(7, 1) and B(3, 5).

17. Geeta and Sita are friends. What is the probability that both will have

    (i)   different birthdays ?   (ii)   the same birthday ?

    (ignoring a leap year)

18. If the points A(6, 1), B(8, 2), C(9, 4) and D(P, 3) are the vertices of a parallelogram taken in order, find the value of P.

    OR

    Find the co–ordinates of the points of trisection of the line segment joining the points A(2, −2) and B(−7, 4).

SECTION - C

Question numbers 19 to 28 carry 3 marks each.

19. Draw a right triangle in which the sides (other than hypotenuse) are of lengths 4 cm and 3 cm. Then construct another triangle whose sides are $\dfrac{3}{5}$ times the corresponding sides of the given triangle.

20. Prove that the parallelogram circumscribing a circle is a rhombus.

    OR

    Prove that the angle between the two tangents drawn from an external point to a circle is supplementary to the angle subtended by the line segment joining the points of contact at the centre.

21. A copper rod of diameter 1 cm and length 8 cm is drawn into a wire of length 18 m of uniform thickness. Find the thickness of the wire.

22. Find the roots of the following quadratic equation by the factorisation method.

    $4\sqrt{3}x^2 + 5x - 2\sqrt{3} = 0$

    OR

    Find the roots of the following quadratic equation :

    $-x^2 + 7x - 10 = 0$

23. Two identical cubes each of volume 64 cm^3 are joined together at end. What is the surface area of the resulting cuboid ?

24. Find the value of the middle most term(s) of the arithmetic progression :

$-11, -7, -3, ...49.$

<center>**OR**</center>

The sum of first six terms of an arithmetic progression is 42. The ratio of its 10th term to its 30th term is 1 : 3. Find the first and the thirteenth term of the A.P.

25. Point P divides the line segment joining the points $A(2, 1)$ and $B(5, -8)$ such that $\dfrac{AP}{PB} = \dfrac{1}{3}$. If P lies on the line $2x - y + k = 0$ find the value of k.

26. A box contains 3 blue, 2 white and 4 red marbles. If a marble is drawn at random from the box, what is the probability that it will be

    (1) white   (2) blue   (3) red.

27. Area of a sector of a circle of radius 36 cm is $54\pi \text{cm}^2$. Find the length of the corresponding arc of the sector.

28. Find the area of the rhombus whose vertices taken in order are the points $A(3, 0)$, $B(4, 5)$, $C(-1, 4)$ and $D(-2, -1)$.

<center>**SECTION - D**</center>

Question numbers 29 to 34 carry 4 marks each.

29. Prove that the lengths of tangents drawn from an external point to a circle are equal.

30. The difference between the outer and inner curved surface areas of a hollow right circular cylinder 14 cm long, is 88 cm². If the volume of metal used in making the cylinder is 176 cm³, find the outer and inner diameter of the cylinder.
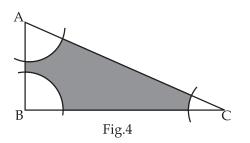
<center>**OR**</center>

A bucket is in the form of a frustum of a cone of height 30 cm with radii of its lower and upper ends as 10 cm and 20 cm respectively. Find the capacity and surface area of the bucket. Also find the cost of milk which can completely fill the container at the rate of Rs.25 per litre. (use $\pi = 3.14$)

31. A train travels at a certain average speed for a distance of 63 km and then travels a distance of 72 km at an average speed of 6 km/hour more than its original speed. If it takes 3 hours to complete the total journey, what is its original average speed ?

32. If m times the mth term of an A.P. is equal to n times its nth term, show that the (m+n)th term of the A.P. is zero. $(m \neq n)$.

33. With the vertices A, B and C of a triangle ABC as centres, arcs are drawn with radii 5 cm each as shown fig.4. If AB = 14 cm, BC = 48 cm and CA = 50 cm, then find the area of the shaded region (use $\pi = 3.14$).

Fig.4

34. A straight highway leads to 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.

OR

A vertical tower stands on a horizontal plane and is surmounted by a vertical flag staff of height 'h'. At a point on the plane, the angles of elevation of the bottom and the top of the flag staff are 45° and 60° respectively. Find the height of the tower.

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