

AMRITA VIDYALAYAM

AMRITA PRE BOARD EXAMINATION 1 - 2017 - '18

Class : X

Marks : 80

Time : 3 hrs

MATHEMATICS

GENERAL INSTRUCTIONS:

1. All questions are compulsory.
2. The question paper consists of 30 questions divided into four sections A, B, C and D.
3. Section A contains 6 questions of 1 mark each. Section B contains 6 questions of 2 marks each. Section C contains 10 questions of 3 marks each. Section D contains 8 questions of 4 marks each.
4. There is no overall choice. However, an internal choice has been provided in four 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.
5. Use of calculators is not permitted.

SECTION - A

1. Without actually performing long division, state why $\frac{129}{6^2 \times 5^3}$ is a non terminating repeating decimal number.
2. If -2 is a common root of the equations $ax^2 - ax + 6 = 0$ and $x^2 - ax + b = 0$, find the value of b?
3. For what value of k, the numbers x, $2x + k$ and $3x + 6$ are three consecutive terms of an AP?
4. What is the distance of the point P(4, -2) from the x-axis?
5. In a ΔABC , $DE \parallel BC$. If $AD : DB = 3:5$ and $AC = 4.8$ cm, find AE.
6. If $\sin x + \cos x = 1$, then find the value of $\sin x \cos x$.

SECTION - B

7. Show that 8^n cannot end with digit zero for any natural number n.
8. How many terms of the AP: 18, 16, 14, be taken so that their sum is zero?
9. Find the value of k for which the pair of linear equations $kx + 3y = k - 3$ and $12x + ky = k$ are inconsistent.
10. If the points (x, y), (3, 6) and (-3, 4) are collinear, then show that $x - 3y + 15 = 0$.
11. A box contains cards bearing numbers from 6 to 70. If one card is drawn at random from the box, find the probability that it bears
 - a) a one digit number.
 - b) a number divisible by 5.
12. All cards of ace, jack and queen are removed from a deck of playing cards. One card is drawn at random from the remaining cards. Find the probability that the card drawn is
 - a) a face card.
 - b) not a face card.

SECTION - C

13. Using Euclid's division lemma show that the square of any odd integer is always of the form $4m + 1$, for some integer m.
14. In an equilateral triangle ABC, D is a point on the side BC such that $BD = \frac{1}{3} BC$. Prove that $9AD^2 = 7AB^2$.

OR

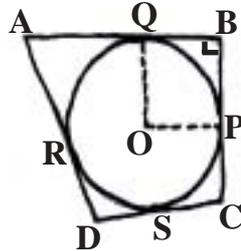
In a right triangle ABC, right angled at C, P and Q are the points on the sides CA and CB respectively which divide these sides in the ratio 1:2. Prove that $9(AQ^2 + BP^2) = 10AB^2$.

15. If the polynomial $6x^4 + 8x^3 + 17x^2 + 21x + 7$ is divided by another polynomial $3x^2 + 4x + 1$, the remainder is $ax + b$. Find a and b.
16. ₹ 6,500 is divided equally among certain number of persons. Had there been 15 more persons, each would have got ₹ 30 less. Find the original number of persons.
17. Determine the ratio in which the line $3x + 4y - 9 = 0$ divides the line segment joining the points (1, 3) and (2, -7).

OR

Find the area of ΔPQR with Q (3, 2) and the midpoints of the sides through Q being (2, -1) and (1, 2).

18. A circle is inscribed in a quadrilateral ABCD in which $\angle B = 90^\circ$. If $AD = 23$ cm, $AB = 29$ cm and $DS = 5$ cm, find the radius r of the circle.

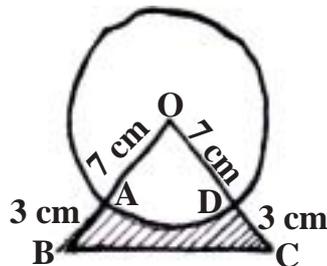


19. If $x = a \sec \theta + b \tan \theta$ and $y = a \tan \theta + b \sec \theta$, prove that $x^2 - y^2 = a^2 - b^2$.

OR

If $\tan \theta = \frac{a}{b}$, prove that $\frac{a \sin \theta - b \cos \theta}{a \sin \theta + b \cos \theta} = \frac{a^2 - b^2}{a^2 + b^2}$.

20. A memento is made as seen in the figure. Its base ABCD is silver plated on the front side. Find the area which is silver plated.



21. A farmer connects a pipe of internal diameter 20 cm from a canal into cylindrical tank in his field which is 10 m in diameter and 2m deep. If water flows through the pipe at the rate of 6 km per hour, in how much time will the tank be filled?

OR

A sphere of diameter 12 cm is dropped into a right circular cylindrical vessel partly filled with water. If the sphere is completely submerged in the water, the water level rises by $3 \frac{5}{9}$ cm. Find the diameter of the cylindrical vessel.

22. The marks obtained by 53 students, out of 100, in a Mathematics examination are given below.

Marks	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
No of students	5	3	4	3	3	4	7	9	7	8

Draw less than type ogive and hence find median mark.

SECTION - D

23. The median of the following data is 20.75. Find the missing frequencies x and y if the total frequency is 100.

Class Interval	Frequency
0 - 5	7
5 - 10	10
10 - 15	x
15 - 20	13
20 - 25	y
25 - 30	10
30 - 35	14
35 - 40	9

OR

The mode of the following frequency distribution is 65 and the sum of all the frequencies is 70. Find the missing frequencies x and y.

Class	0-20	20-40	40-60	60-80	80-100	100-120	120-140	140-160
Frequency	8	11	x	12	y	9	9	5

24. If two pipes work simultaneously, then the tank will be filled in 12 hours. One pipe fills the tank 10 hours faster than the other. Find the time in which each pipe can fill the tank separately?

OR

Solve the following equation $\frac{3x-4}{7} + \frac{7}{3x-4} = \frac{5}{2}, x \neq \frac{4}{3}$.

25. In an AP of 50 terms the sum of first 10 terms is 210 and the sum of its last 15 terms is 2565. Find the AP.
26. State and prove the Basic proportionality theorem.

OR

State and prove Pythagoras theorem.

27. Draw a pair of tangents which are inclined to each other at an angle of 60° to a circle of radius 5cm.

28. The angle of elevation of an aeroplane from a point on the ground is 30° . After a flight of 15 seconds, the elevation changes to 45° . If the aeroplane is flying at a constant height of 4500m, find the speed of the aeroplane.

29. Ram has a vessel of the form of an inverted cone, open at the top, of height 8cm and radius of top as 5cm, and full of water. Lead shots, each of which is a sphere of radius 0.5 cm, are put in the vessel due to which one-fourth of the water in the vessel flows out. Find how many balls were put in the vessel. Ram made the arrangement so that the water that flows out irrigates the flower beds. What value has been shown by Ram?

30. Prove that $(\operatorname{cosec} \theta - \sin \theta)(\sec \theta - \cos \theta) = \frac{1}{\tan \theta + \cot \theta}$.