

AMRITA VIDYALAYAM

AMRITA PRE BOARD EXAMINATION 2 - 2018 - '19

Class : X

Marks : 80

Time : 3 hrs

MATHEMATICS

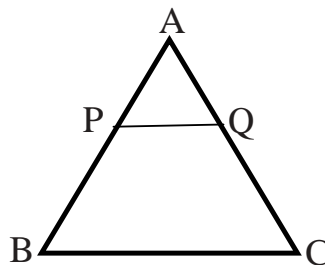
GENERAL INSTRUCTIONS:

1. All questions are compulsory.
2. This question paper consists of 30 questions divided into four sections; A, B, C and D.
3. Section A consists of 6 questions of 1 mark each, Section B consists of 6 questions of 2 marks each, Section C consists of 10 questions of 3 marks each and Section D consists of 8 questions of 4 marks each.

SECTION - A

1. Find the distance between the points $(a \cos r, a \sin r)$ and $(-a \cos r, -a \sin r)$
2. Which term of the AP 21, 42, 63 _____ is 210?
3. In the figure if $PQ \parallel BC$ and $AP : PB = 1 : 2$.

Find $\frac{\text{ar } \triangle APQ}{\text{ar } \triangle ABC}$



4. If $\text{HCF}(a, 8) = 4$, $\text{LCM}(a, 8) = 24$, then find the value of a .
5. If $\cos 9\alpha = \sin \alpha$ then find the value of α .
6. If one root of the polynomial $5x^2 + 13x + k$ is the reciprocal of the other, find the value of k .

SECTION - B

7. The sum of 3 consecutive terms of an AP is 3 and their product is -35. Find the numbers.

OR

The 9th term of an AP is 99 and 99th term is 9. Find 108th term.

8. The probability of selecting a boy from a class is $\frac{2}{7}$. Find the number of girls in the class 15 if the total number of students in the class is 56.
9. Prove that $5 + 2\sqrt{3}$ is irrational.
10. If the equation $(1 + m^2)x^2 + 2mcx + (c^2 - a^2) = 0$ has equal roots, prove that $c^2 = a^2(1 + m^2)$.
11. A card is drawn at random from a well shuffled deck of playing cards. Find the probability that the card drawn is
 - a) a card of spade or an ace.
 - b) either a King or a Queen.
12. Find the value of P for which the points $(-1, 3)$, $(2, P)$, $(5, -1)$ are collinear.

SECTION - C

13. If α and β are the zeroes of $x^2 + 7x + 12$, find the value of $\frac{1}{\alpha} + \frac{1}{\beta} - 2\alpha\beta$.

OR

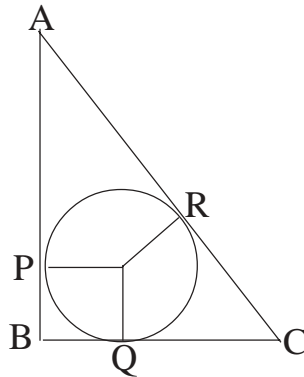
If the polynomial $x^4 + 2x^3 + 8x^2 + 12x + 18$ is divided by another polynomial $x^2 + 5$, the remainder comes out to be $px + q$. Find the values of p and q .

14. Find the values of a and b for which the following system of equations has infinite number of solutions. $2x - 3y = 7$, $(a + b)x - (a + b - 3)y = 4a + b$.
15. Prove that the square of any positive integer is of the form $5m$, $5m + 1$ or $5m + 4$ for some integer m .
16. In what ratio, the line $x - y - 2 = 0$ divides the line segment joining the points $(3, -1)$ and $(8, 9)$.

OR

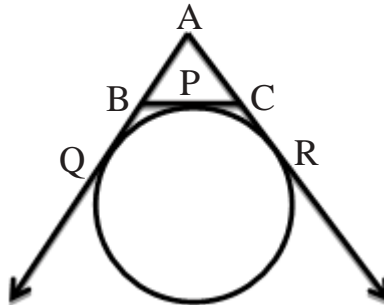
If $A(-2, -1)$, $B(a, 0)$, $C(4, b)$ and $D(1, 2)$ are the vertices of parallelogram, find the values of a and b .

17. If $\frac{x}{a} \cos\theta + \frac{y}{b} \sin\theta = 1$ and $\frac{x}{a} \sin\theta - \frac{y}{b} \cos\theta = 1$, prove that $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 2$
18. In the given figure ABC is a right triangle right angled at B , such that $BC = 6$ cm and $AB = 8$ cm. Find the radius of its incircle.



OR

A circle is touching the side BC of ΔABC at P and touching AB and AC produced at Q and R respectively. Prove that $AQ = \frac{1}{2}$ (Perimeter of ΔABC).

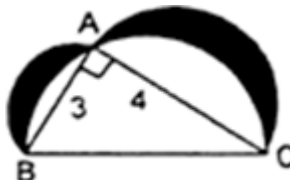


19. The diameter of a roller 120 cm long is 84 cm. If it takes 500 revolutions to level a playground, determine the cost of levelling it at the rate of 30 paise per square meter. ($\pi = \frac{22}{7}$)

OR

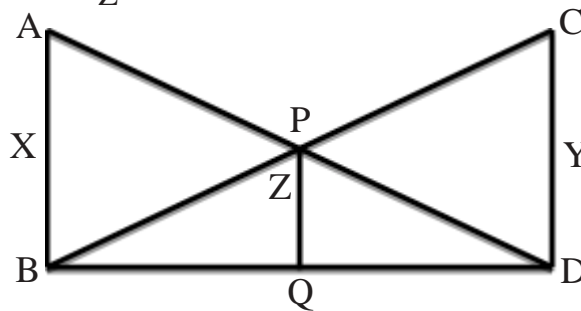
A solid metal cone with radius of base 12 cm and height 24 cm is melted to form spherical solid balls of diameter 6 cm each. Find the number of balls formed. ($\pi = \frac{22}{7}$)

20. In the figure ABC is a right angled triangle right angled at A . Semi circles are drawn on AB , AC and BC as diameters. Find the area of the shaded region.



21. In the figure $AB \parallel PQ \parallel CD$. If $AB = X$ unit, $CD = Y$ unit and $PQ = Z$ unit. Prove that

$$\frac{1}{X} + \frac{1}{Y} = \frac{1}{Z}$$



22. Find the mode of the following data.

Age	5-15	15-25	25-35	35-45	45-55	55-65
Number of patients	6	11	21	23	14	5

SECTION - D

23. Construct a $\triangle ABC$ in which $AB = 6.5$ cm $\angle B = 60^\circ$ and $BC = 5.5$ cm. Construct another triangle similar to $\triangle ABC$ such that its sides are $\frac{3}{2}$ times of the corresponding sides of $\triangle ABC$.

OR

Draw a pair of tangents to a circle of radius 4 cm inclined to each other at an angle of 60° .

24. Prove that the ratio of the areas of two similar triangles is equal to the ratio of squares of their corresponding sides. Using the above theorem, prove that if the areas of 2 similar triangles are equal, then they are congruent.

25. Find the sum of first twenty terms of an AP in which third term is 7 and seventh term is two more than thrice its third term.

OR

Find the sum of all multiples of 7 lying between 500 and 800.

26. ` 6,500 were divided equally among a certain number of persons. If there had been 15 more persons each would have got ` 30 less. Find the original number of persons.

27. If the angle of elevation of a cloud from a point h metres above a lake is α , and the angle of depression of its reflection in the lake is β , prove that the height of the cloud is $\frac{h(\tan \alpha + \tan \beta)}{\tan \beta - \tan \alpha}$

28. A farmer connects a pipe of internal diameter 20 cm from a canal into a cylindrical tank in his field, which is 10 m in diameter and 4 m deep. If water flows through the pipe at the rate of 5 km / hr, in how much time will the tank be filled?

29. Prove that $\frac{\cos A - \sin A + 1}{\cos A + \sin A - 1} = \operatorname{Cosec} A + \cot A$

OR

If $x = r \sin A \cos C$, $Y = r \sin A \sin C$, $Z = r \cos A$, prove that $r^2 = x^2 + y^2 + z^2$.

30. Find the median using less than and more than ogive of the following distribution.

Marks	0-10	10-20	20-30	30-40	40-50	50-60	Total
No. of students	5	8	20	15	7	5	60