

Time allowed : 3 hrs

Mathematics

Maximum marks : 80

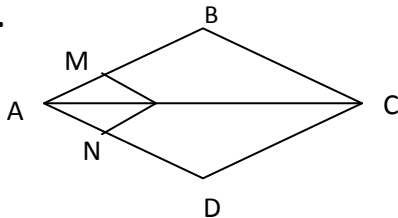
General Instructions :

- I. All questions are compulsory
- II. The question paper consists of 30 questions divided into four sections A,B,C,D
- III. Section A contains 6 questions of 1 marks 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
- IV. There is no overall choice. However an internal choice has been provided in four questions of 3 marks each. You have to attempt only one of the alternatives in all such questions.
- V. Use of calculator is not permitted

SECTION – A

1. Without performing actual division, state whether the rational number $\frac{13}{125}$ will have a terminating decimal expansion or a Non-terminating repeating decimal expansion.
2. Find the 10th term from the last term of the A.P : 3,8,13,.....,253
3. Find the value(s) of k, for which the quadratic equation $kx(x - 2) + 6 = 0$ has two equal roots.
4. Find the coordinates of the point on y-axis which is nearest to the point (5,-2).

5.



In this given figure $LM \parallel CB$ and $LN \parallel CD$ prove that $\frac{AM}{AB} = \frac{AN}{AD}$

6. Express $\sin 67^\circ + \cos 75^\circ$ in terms of trigonometric ratios of angles between 0° and 45° .
7. If two positive integers p and q are written as $p = a^2b^3$ and $q = a^3b$; a,b are prime numbers, then verify $\text{LCM}(p, q) \times \text{HCF}(p, q) = pq$
8. For which value of 'k' will the following pair of linear equations have no solution?

$$3x + y = 1$$

$$(2k - 1)x + (k - 1)y = 2k + 1$$
9. Find the sum of first 24 terms of the list of numbers whose n-th term is given by : $a_n = 3 + 2n$
10. If $(1, \frac{p}{3})$ is the midpoint of the line segment joining the points (2,0) and $(0, \frac{2}{9})$, then show that the line $5x + 3y + 2 = 0$ passes through the point $(-1, 3p)$
11. An Integer is chosen between 0 and 100. What is the probability that it's not divisible by 7.

12. A bag contains 5 red balls and some blue balls. The probability of drawing a blue ball from the bag is thrice that of a red ball, find the number of blue balls in the bag.

SECTION – C

13. Show that exactly one of the numbers $n, n+2, n+4$ is divisible by 3.
 14. Find all the zeroes of $2x^4 - 3x^3 - 3x^2 + 6x - 2$, if you know that two of its zeroes are $\sqrt{2}$ and $-\sqrt{2}$
 15. The students of a class are made to stand in rows. If 3 students are extra in a row, there would be 1 row less. If 3 students are less in a row, there would be 2 rows more. Find the number of students in the class.
 16. In what ratio does the x-axis divide the line segment joining the points $(-4, -6)$ and $(-1, 7)$? Find the coordinates of the point of division?

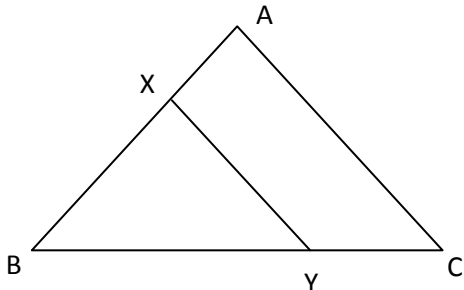
OR

16. The points $A(4, -2), B(7, 2), C(0, 9)$ and $D(-3, 5)$ form a parallelogram. Find the length of the altitude of the parallelogram on the base AB.

17. $\triangle ABC$ is right angled at C. If $BC = a, CA = b$ and $AB = c$ and P is the length of perpendicular drawn from C on AB, then prove that:

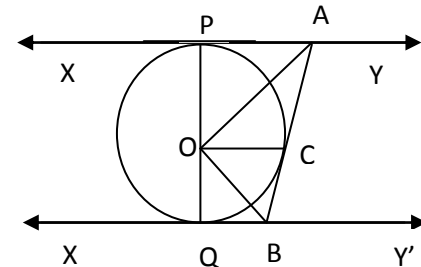
- i. $PC = ab$
 ii. $\frac{1}{p^2} = \frac{1}{a^2} + \frac{1}{b^2}$

OR



In figure, the line segment XY is parallel to side AC of $\triangle ABC$ and it divides the triangle into two parts of equal areas. Find the ratio $\frac{AX}{AB}$

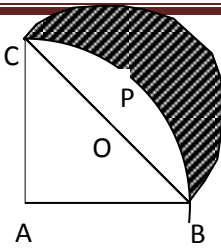
18. In the given figure, XY and X'Y' are two parallel tangents to a circle with centre O and another tangent AB with point of contact C intersecting XY at A and X'Y' at B. Prove that $\angle AOB = 90^\circ$.



19.

Evaluate: $\frac{\cos^2 5^\circ + \cos^2 55^\circ}{\operatorname{cosec}^2 15^\circ - \tan^2 75^\circ} + \sqrt{3}(\tan 13^\circ \tan 23^\circ \tan 30^\circ \tan 67^\circ \tan 77^\circ)$

20.



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In the given figure, ABPC is a quadrant of a circle of radius 14cm and a semicircle is drawn with BC as diameter. Find the area of the shaded region.

21. In a rain water harvesting system, the rainwater from a roof of 22m x 20m drains into a cylindrical tank having diameter of base 2m and height 3.5m. If the tank is full, find the rainfall in cm. Write your views on the water conservation.

OR

A cubical block of side 10cm is surmounted by a hemisphere. What is the largest diameter that the hemisphere can have? Find the cost of painting the total surface area of the solid so formed, at the rate of Rs 5 per 100 sq.cm

22. Find the mode of the following distribution of marks obtained by the students in an examination:

Marks obtained	0 – 20	20 – 40	40 – 60	60 – 80	80 – 100
Number of students	15	18	21	29	17

Given the mean of the distribution is 53, using empirical relationship estimate the value of its median.

SECTION – D

23. A plane left 40 minutes late due to bad weather and in order to reach its destination 1600km away in time, it had to increase its speed by 400km/h from its usual speed. Find the usual speed of the plane.

OR

Check whether the equation $5x^2 - 6x - 2 = 0$ has real roots and if it as, find them by the method of completing the square. Also, verify that roots obtained satisfy the given equation.

24. If the ratio of the sum of the first n-terms of two A.P. is $7n+1 : 4n+27$, the find the ratio of their 9th terms.

25. State and prove Pythagoras theorem.

OR

State and prove the Basic Proportionality Theorem.

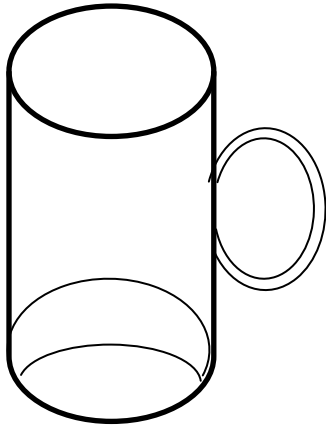
26. Draw a $\triangle ABC$ with side $BC = 7\text{cm}$, $\angle B = 75^\circ$, $\angle A = 105^\circ$. Then construct a triangle whose sides are $\frac{4}{3}$ times the corresponding sides of $\triangle ABC$. Write the steps of construction and justify your answer.

27. Prove that $\frac{\cos A - \sin A + 1}{\cos A + \sin A - 1} = \operatorname{Cosec} A + \cot A$ using the identity $\operatorname{Cosec}^2 A = 1 + \cot^2 A$.

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28. As observed from the top of a 75 m high light house from the sea – level, the angles of depression of two ships are 30° and 45° . If one ship is exactly behind the other on the same side of the light house, find the distance between the two ships.

29. Two dairy owners A and B sell flavoured milk filled to capacity in mugs of negligible thickness, which are cylindrical in shape with a raised hemispherical bottom.



The mugs are 14 cm high and have a diameter of 7 cm as shown in the given figure. Both A and B sell flavoured milk at the rate of Rs 80 per litre. The dairy owner A uses the formula $\pi r^2 h$ to find the volume of milk in the mug and charges Rs 43.12 for it. The dairy owner B is of the view that the price of the actual quantity of milk should be charged. What according to him should be the price one mug of milk ? Which value is exhibited by the dairy owner B ? (Use $\pi = \frac{22}{7}$).

30. In the retail market fruit vendors were selling apples kept in packing boxes. These boxes contained varying number of apples. If the median number of apples in a box was 42 and the total number of boxes was 550, then find the missing frequencies f_1 and f_2 in the following distribution table.

Number of apples in a box	25 - 30	30 - 35	35 - 40	40 - 45	45 - 50	50 - 55	55 - 60
Number of boxes	20	67	f_1	f_2	125	35	25

(OR)

Draw the more than type, give for the following data. Also, find the median from the graph.

Class Interval	Frequency
0 - 10	10
10 - 20	18
20 - 30	40
30 - 40	20
40 - 50	12