



VIDHYALAKSHMI SENIOR SECONDARY SCHOOL

Chennangkuppam, Gudiyattam

Class 10 - Mathematics

Sample Paper 3

Maximum Marks: 80

Time Allowed: 3 hours

General Instructions:

- All the questions are compulsory.
- The question paper consists of 40 questions divided into 4 sections A, B, C, and D.
- Section A comprises of 20 questions of 1 mark each. Section B comprises of 6 questions of 2 marks each. Section C comprises of 8 questions of 3 marks each. Section D comprises of 6 questions of 4 marks each.
- There is no overall choice. However, an internal choice has been provided in two questions of 1 mark each, two questions of 2 marks each, three 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.
- Use of calculators is not permitted.

Section A

- For any positive integer 'a' and 3, there exist unique integers 'q' and 'r' such that $a = 3q + r$ where 'r' must satisfy 1
 - $1 < r < 3$
 - $0 < r \leq 3$
 - $0 \leq r < 3$
 - $0 < r < 3$
- The product of three consecutive positive integers is divisible by 1
 - 4
 - 6
 - 10
 - 5
- In the formula $\bar{x} = a + h \left(\frac{\sum f_i u_i}{\sum f_i} \right)$, for finding the mean, $u_i =$ 1
 - $\frac{a-x_i}{h}$
 - $h(x_i - a)$
 - $\frac{x_i - a}{h}$
 - $\frac{x_i + a}{h}$
- The roots of a quadratic equation $x^2 - 4px + 4p^2 - q^2 = 0$ are 1
 - $2p + q, 2p - q$
 - $p + 2q, p - 2q$
 - $2p + q, 2p + q$
 - $2p - q, 2p - q$
- An electric pole is tied from the top to a point (some distance away from the base) on the ground using a string. The ratio of the height of pole to the string is $\sqrt{3} : 2$, then the angle of elevation of the top from the point on the ground is 1
 - 60°
 - 45°
 - None of these
 - 30°
- The value of $\frac{\cos \theta \cos(90^\circ - \theta)}{\cot(90^\circ - \theta)}$ is 1
 - $\tan^2 \theta$
 - $\cos^2 \theta$
 - None of these
 - $\sin^2 \theta$
- If $\cot A + \frac{1}{\cot A} = 2$ then $\cot^2 A + \frac{1}{\cot^2 A} =$ 1

a) 1

b) -1

c) 2

d) 0

8. An unbiased die is thrown once. The probability of getting a prime number is

1

a) $\frac{1}{5}$

b) $\frac{1}{4}$

c) $\frac{1}{2}$

d) $\frac{1}{3}$

9. If points (a, 0), (0, b) and (1, 1) are collinear, then $\frac{1}{a} + \frac{1}{b}$ is

1

a) 2

b) 1

c) -1

d) 0

10. The co-ordinates of the mid-point of the line joining the points (3p, 4) and (-2, 4) are (5, p). The value of 'p' is

1

a) 1

b) 4

c) 2

d) 3

11. Fill in the blanks:

1

The volume of a spherical shell is given by _____.

12. Fill in the blanks:

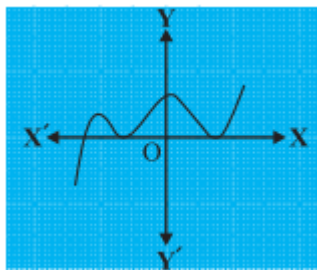
1

If 'x + a' is a factor (zero) of the polynomial $2x^2 + 2ax + 5x + 10$, the value of 'a' is _____.

OR

Fill in the blanks:

The graph of $y = p(x)$ are given in the fig. below, for some polynomial $p(x)$. The number of zeroes of $p(x)$ is _____.



13. Fill in the blanks:

1

Probability of an event E + Probability of the event 'not E' = _____.

14. Fill in the blanks:

1

If S_n and S_{n-1} is the sum of first n and (n - 1) term of an AP, then its n^{th} term, a_n is given by _____.

15. Fill in the blanks:

1

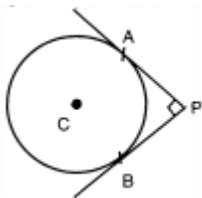
The length of the complete circle is called _____ of the circle.

16. State whether $\frac{619}{325}$ have terminating decimal expansion or non-terminating repeating decimal expansion.

1

17. In fig., PA and PB are two tangents drawn from an external point P to a circle with centre C and radius 4 cm. If $PA \perp PB$, then find the length of each tangent.

1



18. Two concentric circles are of radii 5 cm and 3 cm. Find the length of the chord of larger circle (in cm) which touches the smaller circle.

1

19. For the AP $\frac{3}{2}, \frac{1}{2}, \frac{-1}{2}, \frac{-3}{2}, \dots$ write the first term and the common difference.

1

OR

For the following APs, write the first term and the common difference: 0.6, 1.7, 2.8, 3.9

20. For what value of k are the roots of the quadratic equation $kx^2 + 4x + 1 = 0$ real and equal.

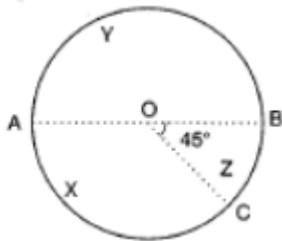
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Section B

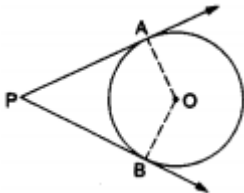
21. In the accompanying diagram, a fair spinner is placed at the centre O of the circle. Diameter AOB and radius OC divide the circle into three regions labelled X, Y and Z. If $\angle BOC = 45^\circ$. What is the probability

2

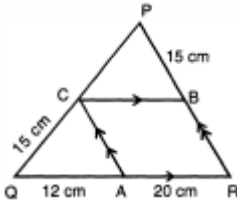
that the spinner will land in the region X? (See Fig).



22. In the given figure, O is the centre of the circle. PA and PB are tangents. Show that AOBP is a cyclic quadrilateral. 2

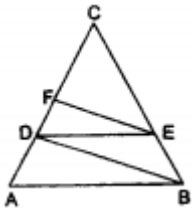


23. In the given figure, $CB \parallel QR$ and $CA \parallel PR$. If $AQ = 12$ cm, $AR = 20$ cm, $PB = CQ = 15$ cm, calculate PC and BR. 2



OR

In the given figure, $AB \parallel DE$ and $BD \parallel EF$ Prove that $DC^2 = CF \times AC$.



24. A man standing on the deck of a ship, which is 10 m and above the water level. He observes the angle of elevation of the top of a hill is 60° and the angle of depression of the base of the hill is 30° . Calculate the distance of the hill from the ship and height of the hill. 2

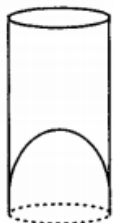
25. Solve the quadratic equation by factorization: 2

$$a(x^2 + 1) - x(a^2 + 1) = 0$$

OR

One fourth of a herd of camels was seen in forest. Twice of square root of the herd had gone to mountains and remaining 15 camels were seen on the bank of a river, find the total number of camels.

26. A juice seller was serving his customers using glasses of different shapes like the frustum of a cone shape and cylindrical shape glasses. On Monday a student of DAV school went there and ordered one glass of mix fruit juice while drinking the juice she found the inner diameter of the cylindrical glass was 5 cm, but the bottom of the glass had a hemispherical raised portion which reduced the capacity of the glass. She also found that the height of the glass was 10 cm. 2



By using the above-given information, find the following:

- i. The apparent capacity of the glass.
- ii. The actual capacity of the glass. (Use $\pi = 3.14$)

Section C

27. Prove $\frac{1}{2+\sqrt{3}}$ is an irrational number. 3

OR

Is product of a rational number and an irrational number, a rational number? Is product of two irrational numbers a rational number or irrational number? Justify giving examples.

28. Find the coordinates of points which trisect the line segment joining (1, -2) and (-3, 4). 3
29. The age of the father is twice the sum of the ages of his two children. After 20 years, his age will be equal to the sum of the ages of his children. Find the age of the father. 3

OR

Find the solution of the pair of equations $\frac{x}{10} + \frac{y}{5} - 1 = 0$ and $\frac{x}{8} + \frac{y}{6} = 15$. Hence, find λ , if $y = \lambda x + 5$.

30. One zero of the polynomial $x^2 - 2x - (7p + 3)$ is -1, find the value of p and the other zero. 3
31. In an A.P. the sum of first n terms is $\frac{3n^2}{2} + \frac{13n}{2}$. Find the 25th term. 3
32. When is an equation called 'an identity'. Prove the trigonometric identity $1 + \tan^2 A = \sec^2 A$. 3

OR

In figure, $\triangle PQR$ right angled at Q , $PQ = 6$ cm, $PR = 12$ cm, Determine $\angle QPR$ and $\angle PRQ$.

33. A circular pond is 17.5 m in diameter. It is surrounded by a 2 m wide path. Find the cost of constructing the path at the rate of Rs 25 per m^2 . 3
34. Cards marked with numbers 5 to 50 are placed in a box and mixed thoroughly. A card is drawn from the box at random. Find the probability that the number on the taken out card is 3
- i. a prime number less than 10
 - ii. a number which is a perfect square.

Section D

35. Draw a triangle ABC with side $BC = 6$ cm, $AB = 5$ cm and $\angle ABC = 60^\circ$. Then construct a triangle whose sides are $\frac{3}{4}$ of the corresponding sides of triangle ABC . 4

OR

Divide a line segment of length 8 cm internally in the ratio 3:4.

36. If the area of two similar triangles are equal, prove that they are congruent. 4
37. DDA wants to make a rectangular park in the colony. If the length and breadth of the park are decreased by 2 m, then the area will be decreased by 196 sq meters. Its area will be increased by 246 sq meters if its length is increased by 3 m and breadth is increased by 2 m. Find the length and breadth of the park. 4

OR

For which value (s) of λ , do the pair of linear equations $\lambda x + y = \lambda^2$ and $x + \lambda y = 1$ have

- i. no solution?
 - ii. infinitely many solutions?
 - iii. a unique solution?
38. A cylindrical pipe has inner diameter of 7 cm and water flows through it at 192.5 litres per minute. Find the rate of flow in kilometres per hour. 4

OR

A friction clutch is in the form of a frustum of a cone, the diameter of the ends being 32 cm and 20 cm and length 8 cm. Find its bearing surface and volume.

39. The angles of elevation and depression of the top and bottom of a tower from the top of a building 60m high are 30° and 60° respectively. Find the difference between the heights of the building and the tower and also the distance between them. 4
40. The annual rainfall record of a city for 66 days is given in the following table: 4

Rainfall (in cm):	0-10	10-20	20-30	30-40	40-50	50-60
Number of days:	22	10	8	15	5	6

Calculate the median rainfall using ogives of more than type and less than type.