

Mathematics Class 10 Board Sample paper-4

Time allowed: 3 hours Maximum Marks: 80

General Instructions:

- All questions are compulsory.
- The question paper consists of 30 questions divided into four sections – A, B, C and D.
- Section A contains 6 questions of 1 mark each which are multiple choice questions, Section B contains 6 questions of 2 marks each, Section C contains 10 questions of 3 marks each and Section D contains 8 questions of 4 marks each.
- 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 must attempt only one of the alternatives in all such questions
- Use of calculator is not permitted.

Section A

- The general term of a sequence is given by $a_n = -4n + 15$. Is the sequence an A. P.? If so, find its 15th term and the common difference.?
- If the circumference and area of the circle are numerically equal, the diameter of the circle is
 - π
 - $\pi/2$
 - 2
 - 4
- If $P(A) = 0.11$, what is the probability of 'not A'?
- The areas of two similar triangles ABC and PQR are in the ratio 9 : 16. If $BC = 4.5$ cm, find the length of QR.
- Write whether the rational number $133/125$ will have a terminating decimal expansion or a non-terminating repeating decimal expansion.
- Write the value of k for which the following pair of linear equations has unique solution: -

$$x + ky + 6 = 0$$

$$2x + 3y + 8 = 0$$

Section B

7. The length of a rectangle exceeds its width by 8 cm and the area of the rectangle is 240 sq. cm. Find the dimensions of the rectangle
8. Find the sum of the first 23 terms of the AP 7, $21/2$, 14.....?
9. Three coins are tossed together. Find the probability of getting of at least two heads?
10. Two circles touch externally. The sum of their areas is $130\pi\text{ cm}^2$ and the distance between their centers is 14cm. Find the radii of the circles
- 11 Examine if the below number is rational number or irrational number
i) $(\sqrt{5} - \sqrt{2})(\sqrt{5} + \sqrt{2})$
ii) $(\sqrt{3} - \sqrt{4})(\sqrt{3} + 4)$
12. What is the value $(1 + \tan^2 A) (1 + \sin A) (1 - \sin A)$

Section C

13. Find the roots of the quadratic equation

$$\frac{1}{x} - \frac{1}{x-2} = 3, x \neq 0, 2$$

14. Find all the positive integral values of p for which $p^2 + 16$ is a perfect square?
15. Find the area of the rhombus, if its vertices are (3,0), (4,5), (-1,4) and (-2,-1) taken in order.
16. From the top of a hill 200 m high, the angles of depression of the top and the bottom of a pillars are 30° and 60° respectively. Find the height of the pillar and its distance from the hill
17. In an AP, if $S_n = 3n^2 + 5n$ and $a_k = 164$, find the value of k.
18. Find the values of k so that the area of the triangle with vertices $(k+1, 1)$, $(4, -3)$ and $(7, -k)$ is 6 sq. units.
- Or**
Prove that the area of a triangle with vertices $(p, p-2)$, $(p+2, p+2)$ and $(p+3, p)$ is independent of p.
19. Prove that

If $\sec \theta - \tan \theta = x$, show that:

$$\sec \theta = \frac{1}{2} \left[x + \frac{1}{x} \right] \text{ and } \tan \theta = \frac{1}{2} \left[\frac{1}{x} - x \right]$$

Or

$$\text{If } \tan (A + B) = \sqrt{3} \text{ and } \tan (A - B) = \frac{1}{\sqrt{3}};$$

And $0 < A + B \leq 90$; $A > B$

find A and B

20. Prove that the tangents drawn at the ends of a diameter of a circle are parallel.

21. A well of diameter 4 m is dug 21 m deep. The earth taken out of it has been spread evenly all around it in the shape of a circular ring of width 3 m to form an embankment. Find the height of the embankment

Or

A hemispherical bowl of internal radius 9 cm is full of liquid. The liquid is to be filled into cylindrical shaped small bottles each of diameter 3 cm and height 4 cm. How many bottles are needed to empty the bowl?

22. In a quadrilateral ABCD, given that $\angle A + \angle D = 90^\circ$. Prove that $AC^2 + BD^2 = AD^2 + BC^2$

Section D

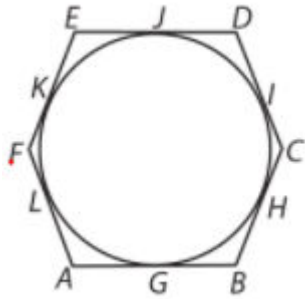
23. Solve for x:

$$\frac{1}{a} + \frac{1}{b} + \frac{1}{x} = \frac{1}{(a+b+x)}$$

Where $a \neq 0$, $b \neq 0$ and $a+b+x \neq 0$

24. Find the 60th term of the AP 8, 10, 12, ..., if it has a total of 60 terms and hence find the sum of its last 10 terms

25. if a hexagon ABCDEF circumscribe a circle, show that $AB - BC + CD - DE = AF - EF$



26.

The following shows the class interval and respective frequency

Class interval	5-15	15-25	25-35	35-45	45-55	55-65
Frequency	6	11	21	23	14	4

Following statement are made

- The mean is 33
- The modal class is 35-45
- The mode is 34
- The Frequency for less than is 35 is 38
- The median is 38

Please check the correctness of each of these

Or

The following data gives the information on the observed lifetimes (in hours) of 225 electrical components:

Lifetime (in hours)	0-20	20-40	40-60	60-80	80-100	100-120
Frequency	10	35	52	61	38	29

Determine the modal lifetimes of the components.

27. Two tangents TP and TQ are drawn to a circle with centre O from an external point T. Prove that $\angle PTQ = 2\angle OPQ$.

Or

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Prove that the tangent at any point of a circle is perpendicular to the radius through the point of contact.

Using the above result, find the length of PQ, if a tangent PQ at a point P of a circle of radius 5 cm meets a line through the centre O at a point Q so that $OQ = 12$ cm.

28. A right circular cylinder volume 540π cm³ is full of ice-cream. The ice-cream is to be filled in cones of height 12cm and radius 3 cm having a hemispherical shape on the top. Find the Number of such cones which can be filled with ice-cream

Or

The height of the cone is 30 cm. A small cone is cut off at the top by a plane parallel to the base. The ratio of the volume of small cone to the volume of the given cone is 1:27. Find the height of the Frustum Formed

29. The angle of elevation of an airplane from a point A on the ground is 60° . After a flight of 15 seconds, the angle of elevation changes to 30° . If the airplane is flying at a constant height of $1500\sqrt{3}$ m, find the speed of the plane in km/hr.?

30. True and False question

- Cards with numbers 2 to 101 are placed in a box. A card selected at random from the box. the probability that the card which is selected has a number which is a perfect square is $9/100$
- The probability of getting the letter A in the word "MATHEMATICS" is $2/11$