SAMPLE PAPER 5

Class 10 - Mathematics

Time Allowed: 3 hours   **Maximum Marks: 80**
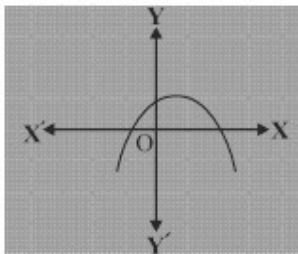
General Instructions:

1. This Question Paper has 5 Sections A, B, C, D and E.

2. Section A has 20 MCQs carrying 1 mark each

3. Section B has 5 questions carrying 02 marks each.

4. Section C has 6 questions carrying 03 marks each.

5. Section D has 4 questions carrying 05 marks each.

6. Section E has 3 case based integrated units of assessment (04 marks each) with sub- parts of the values of 1, 1 and 2 marks each respectively.

7. All Questions are compulsory. However, an internal choice in 2 Qs of 5 marks, 2 Qs of 3 marks and 2 Questions of 2 marks has been provided. An internal choice has been provided in the 2marks questions of Section E

8. Draw neat figures wherever required. Take $\pi = \frac{22}{7}$ wherever required if not stated.

Section A

1. The HCF of 95 and 152, is   **[1]**

   a) 57   b) 19

   c) 38   d) 1

2. Find the number of zeroes of p(x) in the graph given below.   **[1]**

   a) 3   b) 0

   c) 2   d) 1

3. The pair of equations 2x + y = 5, 3x + 2y = 8 has   **[1]**

    a) a unique solution   b) two solutions

    c) infinitely many solutions   d) no solution

4. $9x^2 - 6x - 4 = 0$ have **[1]**

    a) No Real roots   b) Real and Distinct roots

    c) Real roots   d) Real and Equal roots

5. Two APs have the same common difference. The difference between their 100th terms is 100, then the difference between their 1000th terms is **[1]**

    a) 10   b) 10000

    c) 100   d) 1000

6. The distance between the points (3, -2) and (-3, 2) is: **[1]**

    a) 40   b) $4\sqrt{10}$

    c) $2\sqrt{10}$ d) $\sqrt{52}$

7. If the centroid of the triangle formed by the points (3, -5), (-7,4), (10, -k) is at the point (k, -1), then k = **[1]**

    a) 2   b) 1

    c) 4   d) 3

8. Two vertices of $\triangle ABC$ are A (-1, 4) and B(5, 2) and its centroid is G(0, -3). Then, the coordinates of C are **[1]**

    a) (4, 3)   b) (4, 15)

    c) (-4, -15)   d) (-15, -4)

9. In what ratio does the x-axis divide the join of A(2, -3) and B(5, 6)? **[1]**

    a) 1 : 2   b) 3 : 5

    c) 2 : 1   d) 2 : 3

10. From a point P which is at a distance 13 cm from the centre O of a circle of radius 5 cm, the pair of tangents PQ and PR to the circle are drawn. Then the area of the quadrilateral PQOR is **[1]**

    a) 65 cm^2 b) 32.5 cm^2

    c) 30 cm^2 d) 60 cm^2

11. $(\operatorname{cosec}\theta - \sin\theta)(\sec\theta - \cos\theta)(\tan\theta + \cot\theta)$ is equal **[1]**

    a) 1   b) 0

    c) none of these   d) -1

12. $\dfrac{1-\tan^2 45°}{1+\tan^2 45°}$ **[1]**

a) $\tan 90^{\circ}$

b) 1

c) $\sin 45^{\circ}$

d) 0

13. The measure of the angle of elevation of the top of a tower $75\sqrt{3}$ m high from a point at a distance of 75 m from the foot of the tower in a horizontal plane is **[1]**

a) 15°

b) 30°

c) 45°

d) 60°

14. The area of a sector of a circle with radius 6 cm if the angle of the sector is 60°. **[1]**

a) $\frac{152}{7}$

b) $\frac{132}{7}$

c) $\frac{142}{7}$

d) $\frac{122}{7}$

15. The area of a sector of a circle with a sector angle θ is given by **[1]**

a) $\frac{\pi r \theta}{360}$

b) $\frac{\pi r^2 \theta}{360}$

c) $\frac{\pi r^2 \theta}{180}$

d) $\frac{2\pi r}{360}$

16. Two men are on opposite sides of a tower. They observe the angles of elevation of the top of the tower as 30° and 45° respectively. If the height of the tower is 100m, then the distance between them is **[1]**

a) $100(\sqrt{3}-1)m$

b) $100(\sqrt{3}+1)m$

c) $100(1-\sqrt{3})m$

d) none of these

17. What is the probability that a leap year has 52 Mondays? **[1]**

a) $\frac{5}{7}$

b) $\frac{6}{7}$

c) $\frac{2}{7}$

d) $\frac{4}{7}$

18. The mean of the data when $\sum f_i d_i$ = 435, $\sum f_i$ = 30 and a = 47.5 is **[1]**

a) 47.5

b) 62

c) 30

d) 63

19. **Assertion (A):** The given figure represents a hemisphere surmounted by a conical block of wood. The diameter of their bases is 6 cm each and the slant height of the cone is 5 cm. The volume of the solid is 196 cm^3 **[1]**

Reason (R): The volume hemisphere is given by $\frac{2}{3}\pi r^3$

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

20. **Assertion (A):** Common difference of the AP -5, -1, 3, 7, ... is 4. **[1]**

Reason (R): Common difference of the AP a, a + d, a + 2d, ... is given by d = 2nd term - 1st term.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.   d) A is false but R is true.

Section B

21. There is a circular path around a sports field. Sonia takes 18 minutes to drive one round of the field, while Ravi **[2]** takes 12 minutes for the same. Suppose they both start at the same point and at the same time, and go in the same direction. After how many minutes will they meet again at the starting point?

22. In the figure, PQRS is a trapezium in which PQ ∥ RS. On PQ and RS, there are points E and F respectively such **[2]** that EF intersects SQ at G. Prove that $EQ \times GS = GQ \times FS$.
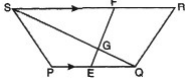
23. The line segment joining the points A (3, 2) and B (5,1) is divided at the point P in the ratio 1 : 2 and P lies on **[2]** the line 3x − 18y + k = 0, Find the value of k.

24. Prove the trigonometric identity: $(cosec\theta - \cot\theta)^2 = \frac{1-\cos\theta}{1+\cos\theta}$ **[2]**

<center>OR</center>

Prove: $\sqrt{\frac{1-\cos A}{1+\cos A}} = \csc A - \cot A$

25. Write the formula for the area of a segment in a circle of radius r given that the sector angle is θ (in degrees). **[2]**

<center>OR</center>

Find the area of the sector of a circle of radius 5 cm, if the corresponding arc length is 3.5 cm.

Section C

26. On morning walk, three persons step off together and their steps measure 40 cm, 42 cm and 45 cm, respectively. **[3]** What is the minimum distance each should walk so that each can cover the same distance in complete steps?

27. If α and β are the zeroes of the quadratic polynomial f(x) = ax^2 +bx + c, then evaluate: $\frac{1}{\alpha} - \frac{1}{\beta}$ **[3]**

28. Solve: **[3]**

x + 2y + z =7

x + 3z =11

2x − 3y =1

<center>OR</center>

By the graphical method, find whether the pair of equations

x + y = 3,

3x + 3y = 9

is consistent or not. If consistent, solve it.

29. In figure, OP is equal to diameter of the circle. Prove that △APB is an equilateral triangle. **[3]**
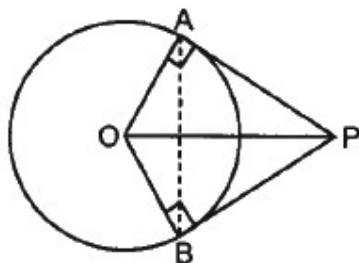
<center>OR</center>

In the given figure, PQ is a chord of length 8 cm of a circle of radius 5 cm and centre O. The tangents at TP and TQ intersect at point T. Find the length of TP.
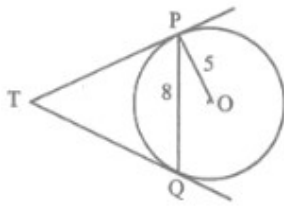
30. Given that 16 cot A = 12; find the value of $\frac{\sin A + \cos A}{\sin A - \cos A}$. **[3]**

31. A moving boat observed from the top of a 150 m high cliff, moving away from the cliff. The angle of depression **[3]** of the boat changes from 60^0 to 45^0 in 2 minutes. Find the speed of the boat.

Section D

32. The sum of the first three numbers in an Arithmetic Progression is 18. If the product of the first and the third **[5]** term is 5 times the common difference, find the three numbers.

OR

The 13th term of an AP is 4 times its 3rd term. If its 5th term is 16, find the sum of its first 10 terms.

33. ABCD is a trapezium in which AB is parallel to DC and the diagonals AC, BD cut at X. A line is drawn through **[5]** C parallel to DA to cut DB, produced if necessary at Y. Prove that:

   1. $\triangle$AXD, $\triangle$BXC are equal in area
   2. $\triangle$AXD $\sim$ $\triangle$CXY
   3. $\frac{XB}{XY} = \frac{XA^2}{XC^2}$

34. An iron pillar consists of a cylindrical portion 2.8 m high and 20 cm in diameter and a cone 42 cm high is **[5]** surmounting it. Find the weight of the pillar, given that 1 cm^3 of iron weighs 7.5 g.

OR

Two solid cones A and B placed in a cylindrical tube as shown in the figure. The ratio of their capacities are 2 : 1. Find the heights and capacities of cones. Also, find the volume of the remaining portion of the cylinder.
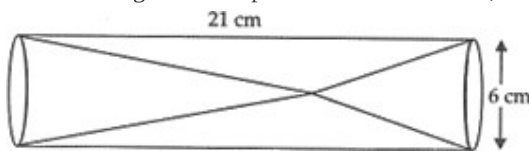
35. Calculate the mode of the following frequency distribution table : **[5]**

Marks	Number of students
25 or more than 25	52
35 or more than 35	47
45 or more than 45	37
55 or more than 55	17
65 or more than 65	8
75 or more than 75	2
85 or more than 85	0

Section E

36. **Read the text carefully and answer the questions:** **[4]**

The tradition of pottery making in India is very old. In fact, it is older than Indus Valley Civilization. The shaping and baking of clay articles has continued through the ages. The picture of a potter is shown below:

A potter makes a certain number of pottery articles in a day. It was observed on a particular day the cost of production of each article(in ₹) was one more than twice the number of articles produced on that day. The total cost of production on that day was ₹ 210.

   (i)   Taking number of articles produced on that day as x, form a quadratic equation in x.

  (ii)   Find the number of articles produced and the cost of each article.

 (iii)   Find the cost of production of 15 articles.

OR

Find the number of articles made by Potter in a day if the total cost of production is ₹ 1575.

37. **Read the text carefully and answer the questions:**   **[4]**

In an international school in Hyderabad organised an Interschool Throwball Tournament for girls just after the pre-board exam. The throwball team was very excited. The team captain Anju directed the team to assemble in the ground for practices. Only three girls Aarushi, Sarika and Avni showed up. The rest did not come on the pretext of preparing for pre-board exam. Anju drew a circle of radius 5 m on the ground. The centre A was the position of Aarushi. Anju marked a point N, 13 m away from centre A as her own position. From the point N, she drew two tangential lines NS and NR and gave positions S and R to Sarika and Avni. Anju throws the ball to Aarushi, Aarushi throws it to Sarika, Sarika throws it to Anju, Anju throws it to Avni, Avni throws it to Aarushi, Aarushi throws it to Sarika and so on.
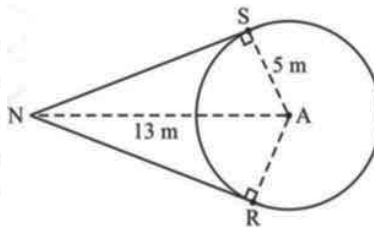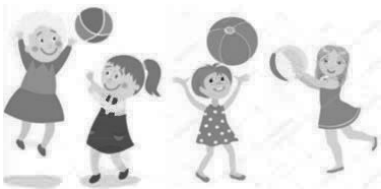
   (i)   Find the measure of $\angle$NSA.

  (ii)   Find the distance between Sarika and Anju.

 (iii)   If $\angle$SNR is equal to θ, then find $\angle$NAS.

38. **Read the text carefully and answer the questions:**   **[4]**

TERM INSURANCE PLAN

A particular term insurance company has two options in the application form before issuing the policy - Smoker or Non-smoker. As a smoker has more chance of getting lung disease and death chance is comparatively higher. So premium payment is more for a smoking person. Company gives a rider plan (i.e. for some critical diseases) along with normal term plan by paying some extra premium money. In a certain time period, company issues 100 policies of which 30% are for smokers and rest for non-smoker customers. Also, half the smokers and $\frac{2}{5}$th

of non-smoking customers have purchased a rider plan along with a normal plan.

    (i)   Find the probability that company issues policy for a smoker with rider plan.

    (ii)   Find the probability that company issues policy for a non-smoker without a rider plan.

    (iii)   Find the probability that company issues policy for a smoker without a rider plan.

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