Atul Tutorials Pvt. Ltd.

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PRELIMS 1

Class 10 - Mathematics

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

General Instructions:

Read the following instructions carefully and follow them:

1. This question paper contains 38 questions.
2. This Question Paper is divided into 5 Sections A, B, C, D and E.
3. In Section A, Questions no. 1-18 are multiple choice questions (MCQs) and questions no. 19 and 20 are Assertion- Reason based questions of 1 mark each.
4. In Section B, Questions no. 21-25 are very short answer (VSA) type questions, carrying 02 marks each.
5. In Section C, Questions no. 26-31 are short answer (SA) type questions, carrying 03 marks each.
6. In Section D, Questions no. 32-35 are long answer (LA) type questions, carrying 05 marks each.
7. In Section E, Questions no. 36-38 are case study-based questions carrying 4 marks each with sub-parts of the values of 1,1 and 2 marks each respectively.
8. All Questions are compulsory. However, an internal choice in 2 Questions of Section B, 2 Questions of Section C and 2 Questions of Section D has been provided. An internal choice has been provided in all the 2 marks questions of Section E.
9. Draw neat and clean figures wherever required.
10. Take $\pi = 22/7$ wherever required if not stated.
11. Use of calculators is not allowed.

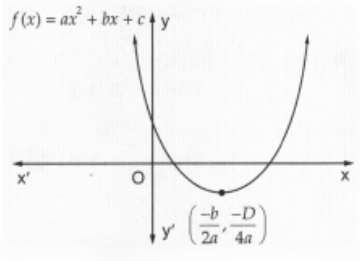
Section A

1. If $p^2 = \frac{32}{50}$, then p is a/an **[1]**

a) irrational number b) whole number

c) rational number d) integer

2. Figure show the graph of the polynomial $f(x) = ax^2 + bx + c$ for which **[1]**



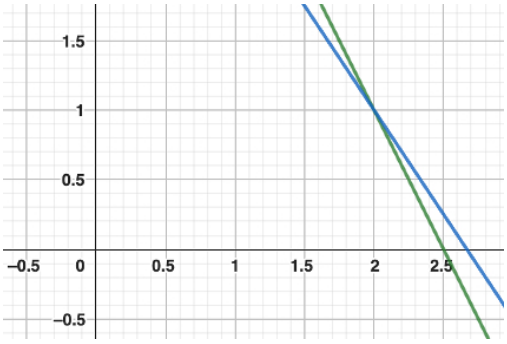
a) $a > 0, b < 0$ and $c > 0$

b) $a < 0, b < 0$ and $c < 0$

c) $a < 0, b > 0$ and $c > 0$

d) $a > 0, b > 0$ and $c < 0$

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. If $(a^2 + b^2)\, x^2 + 2(ac + bd)\, x + c^2 + d^2 = 0$ has no real roots, then **[1]**

a) $ab = cd$

b) $ad = bc$

c) $ad \neq bc$

d) $ac = bd$

5. The 6^{th} term from the end of the A.P. 5, 2, -1, -4, ..., -31, is **[1]**

a) -16

b) -22

c) -19

d) -25

6. The distance of the point (5, 0) from the origin is **[1]**

a) 5^2

b) 5

c) 0

d) $\sqrt{5}$

7. y-axis divides the line segment joining the points (-6, 2) and (2, -6) in the ratio: **[1]**

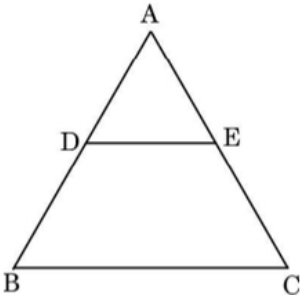
a) 3 : 2

b) 2 : 3

c) 1 : 3

d) 3 : 1

8. In the given figure, ABC is a triangle in which AD = 1.6 cm, BD = 4.8 cm, AE = 1.1 cm and EC = 2.2 cm. Then: **[1]**



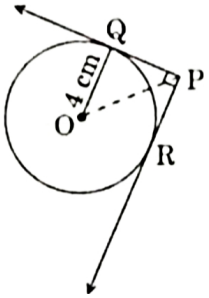
a) DE || BC

b) DE = $\frac{1}{2}$BC

c) DE is not parallel to BC (DE $\not\parallel$ BC)

d) DE = BC

9. In the given figure, from an external point P, two tangents PQ and PR are drawn to a circle of radius 4 cm with centre O. If $\angle$QPR = 90^{O}, then length of PQ is: **[1]**



a) 3 cm

b) 4 cm

c) 2 cm

d) $2\sqrt{2}$ cm

10. The length of tangent drawn to a circle of radius 9 cm from a point 41 cm from the centre is: **[1]**

a) 41 cm

b) 9 cm

c) 50 cm

d) 40 cm

11. If sec A + tan A = m and sec A - tan A = n, then the value of mn is **[1]**

a) 0

b) 1

c) -1

d) 2

12. If $2\sin 2\theta = \sqrt{3}$ then θ= ? **[1]**

a) 45° b) 90°

c) 60° d) 30°

13. A kite is flying at a height of 30 m from the ground. The length of string from the kite to the ground is 60 m. Assuming that there is no slack in the string, the angle of elevation of the kite at the ground is **[1]**

a) 30° b) 45°

c) 90° d) 60°

14. If the perimeter of a sector of a circle of radius 6.5 cm is 29 cm, then its area is **[1]**

a) 56 cm^2 b) 58 cm^2

c) 52 cm^2 d) 25 cm^2

15. Area of a segment of a circle of radius r and central angle 90^o is: **[1]**

a) $\frac{2\pi r}{4} - \frac{1}{2}r^2$ b) $\frac{\pi r^2}{4} - \frac{1}{2}r^2$

c) $\frac{\pi r^2}{2} - \frac{1}{2}r^2$ d) $\frac{2\pi r}{4} - r^2 \sin 90^o$

16. If a digit is chosen at random from the digits 1, 2, 3, 4, 5, 6, 7, 8, 9; then the probability that this digit is an odd prime number is: **[1]**

a) $\frac{2}{3}$ b) $\frac{4}{9}$

c) $\frac{5}{9}$ d) $\frac{1}{3}$

17. Two coins are tossed simultaneously. The probability of getting at most one tail is: **[1]**

a) $\frac{1}{2}$ b) $\frac{3}{4}$

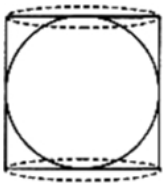
c) $\frac{1}{4}$ d) 1

18. The mean of 2, 7, 6 and x is 5 and the mean of 18, 1, 6, x and y is 10. What is the value of y? **[1]**

a) 30 b) 10

c) 5 d) 20

19. **Assertion (A):** In the given figure, a sphere is inscribed in a cylinder. The surface area of the sphere is not equal to the curved surface area of the cylinder. **[1]**



Reason (R): Surface area of sphere is $4\pi r^2$

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):** If S_n is the sum of the first n terms of an A.P., then its n^{th} term a_n is given by $a_n = S_n - S_{n-1}$ **[1]**

Reason (R): The 10^{th} term of the A.P. 5, 8, 11, 14, ... is 35.

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. Find the HCF and LCM of 108, 120 and 252 using prime factorisation method. **[2]**

22. In a $\triangle ABC$, AD is the bisector of $\angle A$, meeting side BC at D. If AB = 10 cm, AC = 6 cm and BC = 12 cm, find BD and DC. **[2]**

23. If the angle between two tangents drawn from an external point P to a circle of radius a and centre O, is 60° then find the length of OP. **[2]**

24. If x = a sinθ and y = b tanθ, then prove that $\frac{a^2}{x^2} - \frac{b^2}{y^2} = 1$ **[2]**

OR

If cos θ + sin θ = $\sqrt{2}$ cos θ, show that cos θ - sin θ = $\sqrt{2}$ sin θ.

25. The minute hand of a clock is 7.5 cm long. Find the area of the face of the clock described by the minute hand in 56 minutes. **[2]**

OR

To warm ships for underwater rocks, a lighthouse spreads a red coloured light over a sector of angle 80° to a distance of 16.5 km. Find the area of the sea over which the ships are warned. (use $\pi = 3.14$)

Section C

26. Mika exercises every 12 days and Nanu every 8 days. Mika and Nanu both exercised today. How many days will it be until they exercise together again? **[3]**

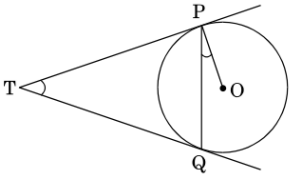
27. If α and β are the zeros of the polynomial f(x) = x^2 - 5x + k such that $\alpha - \beta$ = 1, find the value of k. **[3]**

28. Father's age is three times the sum of ages of his two children. After 5 years, his age will be twice the sum of ages of two children. Find the age of father. **[3]**

OR

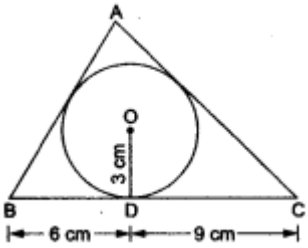
A and B have certain number of oranges. A said to B, " If you give me 10 of your oranges, I will have twice the number of oranges left with you " . B replies " If you give 10 of your oranges. I will have the same number of oranges as left with you". Find the number of oranges with A and B respectively.

29. Two tangents TP and TQ are drawn to a circle with centre O from an external point T. Prove that ∠PTQ = 2∠OPQ. **[3]**



OR

In the given figure, a triangle ABC is drawn to circumscribe a circle of radius 3 cm such that the segments BD and DC into which BC is divided by the point of contact D, are of lengths 6 cm and 9 cm respectively. If the area of $\triangle ABC$ = 54 cm then find the lengths of sides AB and AC.



30. If tan A = n tanB and sin A = m sinB, then prove that $\cos^2 A = \frac{m^2-1}{n^2-1}$ **[3]**

31. Find the mean, median and mode of the following data: **[3]**

Class	0 - 20	20 - 40	40 - 60	60 - 80	80 - 100	100 - 120	120 - 140
Frequency	6	8	10	12	6	5	3

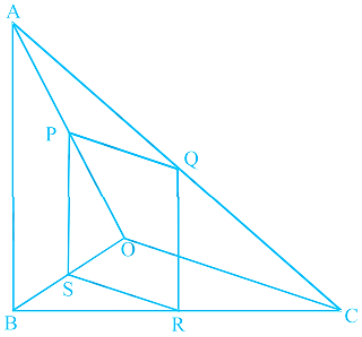
Section D

32. A shopkeeper buys a number of books for Rs.1200. If he had bought 10 more books for the same amount, each book would have cost him Rs.20 less. Find how many books did he buy? **[5]**

OR

Sum of the areas of two squares is 544 m^2. If the difference of their perimeters is 32 m, find the sides of the two squares.

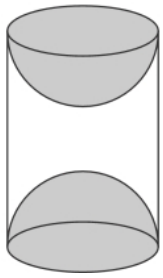
33. In the figure, if PQRS is a parallelogram and AB || PS, then prove that OC || SR. **[5]**



34. A vessel is in the form of a hemispherical bowl surmounted by a hollow cylinder of same diameter. The diameter of the hemispherical bowl is 14 cm and the total height of the vessel is 13 cm. Find the inner surface area of the vessel. Also, find the volume of the vessel. **[5]**

OR

A wooden article was made by scooping out a hemisphere from each end of a solid cylinder, as shown in the figure. If the height of the cylinder is 5.8 cm and its base is of radius 2.1 cm, find the total surface area of the article.



35. In the following data, find the values of p and q. Also, find the median class and modal class. **[5]**

Class	**Frequency(f)**	**Cumulative frequency(cf)**

100 - 200	11	11
200 - 300	12	p
300 - 400	10	33
400 - 500	q	46
500 - 600	20	66
600 - 700	14	80

Section E

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

Akshat's father is planning some construction work in his terrace area. He ordered 360 bricks and instructed the supplier to keep the bricks in such as way that the bottom row has 30 bricks and next is one less than that and so on.

The supplier stacked these 360 bricks in the following manner, 30 bricks in the bottom row, 29 bricks in the next row, 28 bricks in the row next to it, and so on.

i. In how many rows, 360 bricks are placed? (1)

ii. How many bricks are there in the top row? (1)

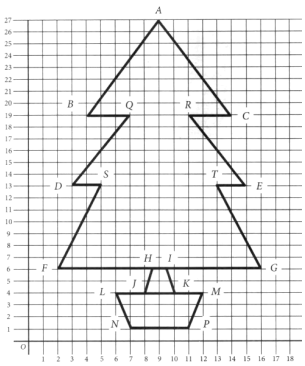
iii. How many bricks are there in 10^{th} row? (2)

OR

If which row 26 bricks are there? (2)

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

The design of Christmas tree is shown in the following graph:



i. What is the distance of point A from x-axis? (1)

ii. What is the Length of BC? (1)

iii. What is the Length of FG? (2)

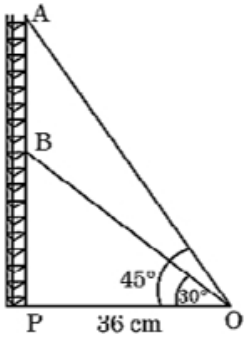
OR

What is the perimeter of its trunk LMPN? (2)

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

Radio towers are used for transmitting a range of communication services including radio and television. The tower will either act as an antenna itself or support one or more antennas on its structure. On a similar concept, a radio station tower was built in two Sections A and B. Tower is supported by wires from a point O.

Distance between the base of the tower and point O is 36 cm. From point O, the angle of elevation of the top of the Section B is 30^{o} and the angle of elevation of the top of Section A is 45^{o}.



i. Find the length of the wire from the point O to the top of Section B. (1)

ii. Find the distance AB. (1)

iii. Find the area of $\triangle$OPB. (2)

OR

Find the height of the Section A from the base of the tower. (2)