CLASS 10 MATH TEST PAPER 22 (FULL SYLLABUS, 80 MARKS, PYQ BASED)

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.

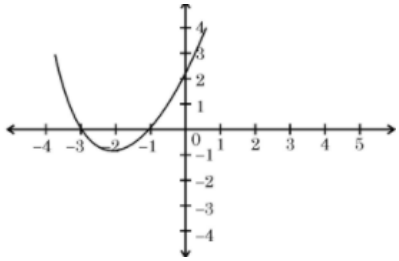
Section A

1. If $a = 2^3 \times 3, b = 2 \times 3 \times 5, c = 3^n \times 5$ and LCM (a, b, c) $= 2^3 \times 3^2 \times 5$, then n = **[1]**

   a) 1 b) 4

   c) 3 d) 2

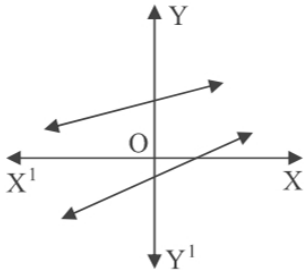
2. In the figure, the graph of the polynomial p(x) is given. The number of zeroes of the polynomial is: **[1]**



   a) 2 b) 1

   c) 0 d) 3

3. In the given figure, graphs of two linear equations are shown. The pair of these linear equations is: **[1]**



a) consistent with infinitely many solutions.

b) consistent with unique solution.

c) inconsistent but can be made consistent by extending these lines.

d) inconsistent.

4. The product of two consecutive even integers is 528. The quadratic equation corresponding to the above statement, is **[1]**

a) x (x + 2) = 528

b) 2x (2x + 1) = 528

c) (1 + x) 2x = 528

d) 2x (x + 4) = 528

5. In an A.P., if d = – 4, n = 7 and a_n = 4, then 'a' is **[1]**

a) 7

b) 6

c) 28

d) 20

6. The distance between the points (a cos θ, -a sin θ) and (a sin θ, a cos θ) is **[1]**

a) a

b) 2a

c) $a\sqrt{2}$

d) 0

7. The point P which divides the line segment joining the points A(2, -5) and B(5, 2) in the ratio 2 : 3 lies in the quadrant. **[1]**

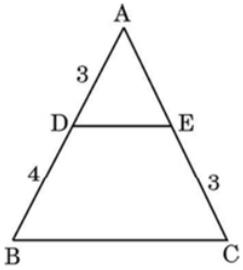
a) III

b) I

c) II

d) IV

8. In the given figure, DE || BC and all measurements are given in centimetres. The length of AE is: **[1]**



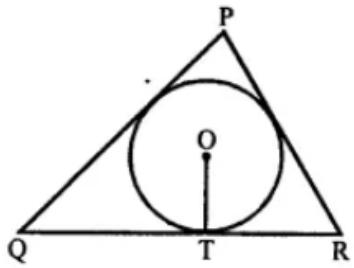
a) 2.75 cm

b) 2.5 cm

c) 2 cm

d) 2.25 cm

9. In the given figure, a triangle PQR is drawn to circumscribe a circle of radius 6 cm such that the segments QT and TR into which QR is divided by the point of contact T, are of lengths 12 cm and 9 cm respectively. If the area of $\triangle$PQR = 189 cm² then the length of side PQ is **[1]**



a) 17.5 cm

b) 20 cm

c) 22.5 cm

d) 25 cm

10. The length of the tangent from an external point P to a circle of radius 5 cm is 10 cm. The distance of the point from the centre of the circle is **[1]**

a) 12 cm

b) $\sqrt{125}$

c) $\sqrt{104}$cm

d) 8 cm

11. If $\sin^2\theta = \frac{1}{2}$, then the value of $\tan^2\theta$ is: **[1]**

a) $\frac{1}{\sqrt{3}}$

b) $\sqrt{3}$

c) 0

d) 1

12. sec θ when expressed in terms of cot θ, is equal to: **[1]**

a) $\frac{\sqrt{1-\cot^2\theta}}{\cot\theta}$

b) $\frac{1+\cot^2\theta}{\cot\theta}$

c) $\frac{\sqrt{1+\cot^2\theta}}{\cot\theta}$

d) $\sqrt{1+\cot^2\theta}$

13. If the height of a vertical pole is $\sqrt{3}$ times the length of its shadow on the ground, then the angle of elevation of the sun at that time is **[1]**

a) 30°

b) 75°

c) 60°

d) 45°

14. Three horses are tethered with 7-meter-long ropes at the three corners of a triangular field having sides 20 m, 34 m, and 42 m. The area of the plot which can be grazed by the horses is **[1]**

a) 77 m^2

b) 80 m^2

c) 100 m^2

d) 30 m^2

15. If the area of a sector of a circle is $\frac{7}{20}$ of the area of the circle, then the angle at the centre is equal to **[1]**

a) 110°

b) 100°

c) 130°

d) 126°

16. If three coins are tossed simultaneously, then the probability of getting at least two heads, is **[1]**

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

b) $\frac{3}{8}$

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

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

17. In a family of 3 children, the probability of having at least one boy is **[1]**

a) $\frac{1}{8}$

b) $\frac{7}{8}$

c) $\frac{3}{4}$

d) $\frac{5}{8}$

18. The median class for the data given below is: **[1]**

Class	20 - 40	40 - 60	60 - 80	80 - 100	100 - 120
Frequency	10	12	14	13	17

a) 80 - 100 b) 60 - 80

c) 20 - 40 d) 40 - 60

19. **Assertion (A):** If we join two hemispheres of same radius along their bases, then we get a sphere. **[1]**

Reason (R): A tank is made of the shape of a cylinder with a hemispherical depression at one end. The height of the cylinder is 1.45 m and radius is 30 cm. The total surface area of the tank is 3.3 m^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):** Three consecutive terms 2k + 1, 3k + 3 and 5k - 1 form an AP than k is equal to 6. **[1]**

Reason (R): In an AP a, a + d, a + 2d, ... the sum to n terms of the AP be $S_n = \frac{n}{2}(2a + (n-1)d)$

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.

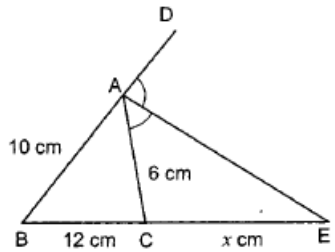
c) A is true but R is false.

d) A is false but R is true.

Section B

21. Prove that $2\sqrt{3} - 1$ is an irrational number. **[2]**

22. In Fig. AE is the bisector of the exterior ∠CAD meeting BC produced in E. If AB =10 cm, AC = 6 cm and BC = 12 cm, find CE. **[2]**



23. In the adjoining figure, a circle touches the side DF of △EDF at H and touches ED and EF produced at K and M respectively. If EK = 9 cm, then what is perimeter of △EDF? **[2]**

24. Prove that $\frac{\cot A - \cos A}{\cot A + \cos A} = \frac{\cos^2 A}{(1+\sin A)^2}$ **[2]**

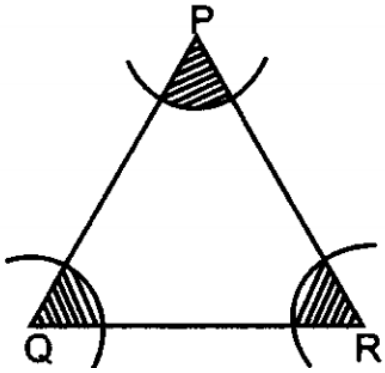
OR

If $3\cot\theta = 4$, show that $\frac{(1-\tan^2\theta)}{(1+\tan^2\theta)} = \left(\cos^2\theta - \sin^2\theta\right)$.

25. A sector is cut from a circle of radius 21 cm. The central angle of the sector is 150^o. Find the length of the arc of this sector and the area of the sector. **[2]**

OR

In figure, arcs have been drawn with radii 14 cm each and with centres P, Q and R. Find the area of the shaded region.



Section C

26. Show that $3\sqrt{2}$ is an irrational number. **[3]**

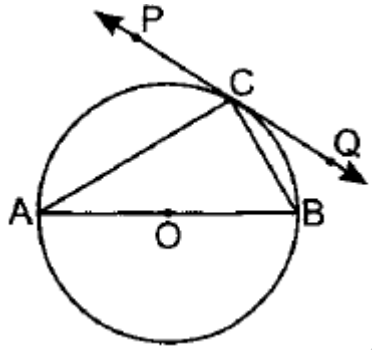
27. If α, β are zeroes of the quadratic polynomial $x^2 + 3x + 2$, find a quadratic polynomial whose zeroes are $\alpha + 1$, $\beta + 1$. **[3]**

28. The last term of an arithmetic progression consisting of 12 terms is 37. If the sum of the two middle terms of the progression is 41, then find the arithmetic progression and also the sum of the terms of the arithmetic progression. **[3]**

OR

The sum of three numbers in A.P. is 12 and sum of their cubes is 288. Find the numbers.

29. In figure, PQ is a tangent at a point C to a circle with centre O. If AB is a diameter and $\angle CAB = 30°$, find $\angle PCA$. **[3]**



OR

Prove that parallelogram circumscribing a circle is a rhombus.

30. Prove the following identity : $\frac{1}{\cot^2\theta} + \frac{1}{1+\tan^2\theta} = \frac{1}{1-\sin^2\theta} - \frac{1}{cosec^2\theta}$ **[3]**

31. For what value of x, is the median of the following frequency distribution 34.5? **[3]**

Class	Frequency
0 - 10	3
10 - 20	5
20 - 30	11
30 - 40	10
40 - 50	x
50 - 60	3
60 - 70	2

Section D

32. The sum of the ages of a father and his son is 45 years. Five years ago, the product of their ages (in years) was 124. Determine their present age. **[5]**

OR

If the roots of the quadratic equation $\left(c^2-ab\right)x^2-2\left(a^2-bc\right)x+b^2-ac=0$ in x are equal then show that either a = 0 or $a^3+b^3+c^3=3abc$

33. The angles of depression of the top and the bottom of a 50 m high building from the top of a tower are 45^o and 60^o, respectively. Find the height of the tower. (Use $\sqrt{3}$ = 1.73) **[5]**

34. A rocket is in the form of a circular cylinder closed at the lower end with a cone of the same radius attached to the top. The cylinder is of radius 2.5 m and height 21 m and the cone has the slant height 8 m. Calculate the total surface area of the rocket. **[5]**

OR

A vessel is in the form of a hollow hemisphere mounted by a hollow cylinder. The diameter of the hemisphere is 14 cm and the total height of the vessel is 13 cm. Find the inner surface area and the volume of the vessel.

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

Essel World is one of India's largest amusement parks that offers a diverse range of thrilling rides, water attractions and entertainment options for visitors of all ages. The park is known for its iconic ''Water Kingdom'' section, making it a popular destination for family outings and fun-filled adventure. The ticket charges for the park are ₹ 150 per child and ₹ 250 per adult.

On a day, the cashier of the park found that 300 tickets were sold and an amount of ₹ 55,000 was collected. Based on the above, answer the following questions:

i. If the number of children visited be x and the number of adults visited be y, then write the given situation algebraically. **(1)**

ii. a. How many children visited the amusement park that day? **(2)**

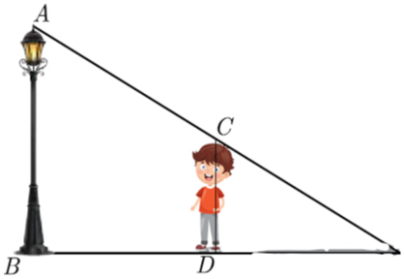
OR

b. How many adults visited the amusement park that day? **(2)**

iii. How much amount will be collected if 250 children and 100 adults visit the amusement park? **(1)**

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

Priyanshu is very intelligent in maths. He always try to relate the concept of maths in daily life. One day he is walking away from the base of a lamp post at a speed of 1 m/s. Lamp is 4.5 m above the ground.



i. If after 2 second, length of shadow is 1 meter, what is the height of Priyanshu? (1)

ii. What is the minimum time after which his shadow will become larger than his original height? (1)

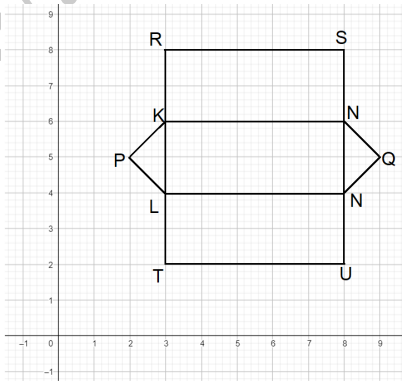
iii. What is the distance of Priyanshu from pole at this point? (2)

OR

What will be the length of his shadow after 4 seconds? (2)

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

The camping alpine tent is usually made using high-quality canvas and it is waterproof. These alpine tents are mostly used in hilly areas, as the snow will not settle on the tent and make it damp. It is easy to layout and one need not use a manual to set it up. One alpine tent is shown in the figure given below, which has two triangular faces and three rectangular faces. Also, the image of canvas on graph paper is shown in the adjacent figure.



i. What is the distance of point Q from y-axis? (1)

ii. What are the coordinates of U? (1)

iii. What is the distance between the points P and Q? (2)

OR

What is the Perimeter of image of a rectangular face? (2)