# AllCanMath

CLASS 10 MATH TEST PAPER 20 (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 3 is the least prime factor of number 'a' and 7 is the least prime factor of number 'b', then the least prime factor of a + b, is **[1]**

   a) 3

   b) 10

   c) 5

   d) 2

2. If the diagram in Fig. shows the graph of the polynomial $f(x) = ax^2 + bx + c$, then **[1]**
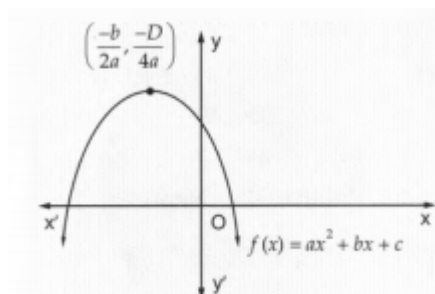
   a) a < 0, b < 0 and c < 0

   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 lines represented by the linear equations $y = x$ and $x = 4$ intersect at P. The coordinates of the point P are: **[1]**
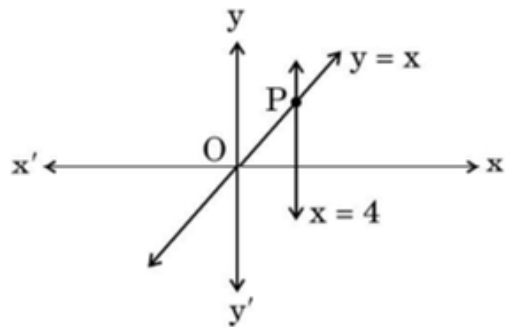
a) (4, 4)

b) (-4, 4)

c) (0, 4)

d) (4, 0)

4. The value(s) of k for which the equation $2x^2 - kx + 1 = 0$ has real and equal roots is/are: **[1]**

a) $\pm 2\sqrt{2}$

b) $-2\sqrt{2}$

c) $2\sqrt{2}$

d) 2

5. How many three-digit numbers are divisible by 9? **[1]**

a) 100
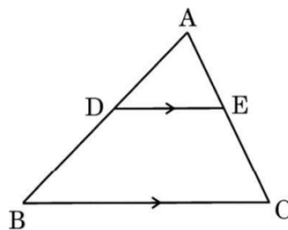
b) 90

c) 96

d) 86

6. Distance of the point (a cos θ, a sin θ) from origin is: **[1]**

a) $\pm a$

b) 1

c) a^2

d) a

7. Distance of point P(3, 4) from x-axis is **[1]**
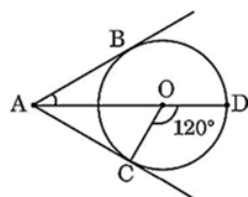
a) 5 units

b) 1 unit

c) 4 units

d) 3 units

8. In $\triangle ABC$, DE ∥ BC. If AD : DB = 2 : 3, then DE : BC is equal to: **[1]**

a) 2 : 5

b) 3 : 5

c) 3 : 2

d) 2 : 3

9. In the given figure, AC and AB are tangents to a circle centered at O. If $\angle COD = 120^o$, then $\angle BAO$ is equal to: **[1]**

a) 30°

b) 45°

c) 90°

d) 60°

10. The length of the tangent from an external point A to a circle, of radius 3 cm, is 4 cm. The distance of A from the centre of the circle is: **[1]**

    a) 7 cm

    b) 5 cm

    c) 25 cm

    d) $\sqrt{7}$ cm

11. $(\sec^2\theta - 1)(1 - \csc^2\theta)$ is equal to: **[1]**

    a) 2

   b) 1

    c) -2

    d) -1

12. If $\sec\theta - \tan\theta = \frac{1}{3}$, then the value of $(\sec\theta + \tan\theta)$ is: **[1]**

    a) $\frac{2}{3}$

    b) 3

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

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

13. A vertical tower stands on a horizontal plane and is surmounted by a vertical flag staff of height 5 m. From a point on the plane the angles of elevation of the bottom and top of the flagstaff are respectively 30° and 60°. The height of the tower is **[1]**

    a) 10 m

    b) 5 m

    c) 2.5 m

    d) 2 m

14. In the figure, ABDCA represents a quadrant of a circle of radius 7 cm a with centre A. Find the area of the shaded portion. **[1]**
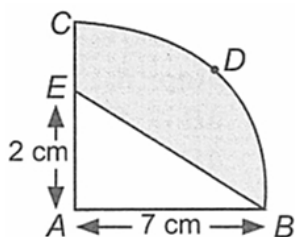
    a) 14 cm^2

    b) 31.5 cm^2

    c) 24.5 cm^2

    d) 38.5 cm^2

15. The minute hand of a clock is 10 cm long. Find the area of the face of the clock described by the minute hand between 8 am and 8.25 am. **[1]**

    a) 120 cm^2

    b) 125.5 cm^2

    c) 130.95 cm^2

    d) 100 cm^2

16. In a lottery, there are 5 prizes and 20 blanks. The probability of getting a prize is: **[1]**

    a) $\frac{1}{25}$

    b) $\frac{1}{4}$
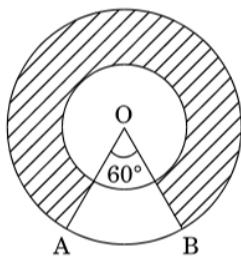
    c) $\frac{1}{5}$

    d) $\frac{1}{20}$

17. A number is chosen from the numbers 1, 2, 3 and denoted as x, and a number is chosen from the numbers 1, 4, 9 and denoted as y. Then P(xy < 9) is: **[1]**

    a) $\frac{7}{9}$

    b) $\frac{5}{9}$

    c) $\frac{3}{9}$

    d) $\frac{1}{9}$

18. The time, in seconds, taken by 150 athletes to run a 100 m hurdle race are tabulated below: **[1]**

Time (sec.)	13 - 14	14 - 15	15 - 16	16 - 17	17 - 18	18 - 19
Number of Athletes	2	4	5	71	48	20

The number of athletes who completed the race in less than 17 seconds is

a) 82

b) 71

c) 11

d) 68

19. **Assertion (A):** In the given figure, a sphere circumscribes a right cylinder whose height is 8 cm and radius of the base is 3 cm. The ratio of the surface area of the sphere and the cylinder is 6 : 11 **[1]**

Reason (R): Ratio of their surface area = $\frac{Surface\ area\ of\ sphere}{Surface\ area\ of\ cylinder}$

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):** The constant difference between any two terms of an AP is commonly known as common difference. **[1]**

Reason (R): The common difference of 2, 4, 6, 8 this A.P. is 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.

Section B

21. Two alarm clocks ring their alarms at regular intervals of 20 minutes and 25 minutes respectively. If they first beep together at 12 noon, at what time will they beep again together next time? **[2]**

22. If $\triangle ABC \cong \triangle DEF$, $\angle A = 47^\circ$, $\angle E = 83^\circ$, then find $\angle C$. **[2]**

23. In Fig., a circle is inscribed in a $\triangle ABC$ having sides BC = 8 cm, AB = 10 cm and AC = 12 cm. Find the lengths BL, CM and AN. **[2]**

24. Prove that : $\frac{(\sin^4\theta + \cos^4\theta)}{1 - 2\sin^2\theta\cos^2\theta} = 1$. **[2]**

OR

If x = 3 sinθ + 4 cosθ and y = 3 cosθ – 4 sinθ then prove that $x^2 + y^2 = 25$.

25. In Figure, two concentric circles with centre O, have radii 21 cm and 42 cm. If $\angle AOB = 60^o$, find the area of the shaded region. **[2]**

OR

Find the length of the arc of a circle of diameter 42 cm which subtends an angle of 60° at the centre.

Section C

26. Find the values of a and b if the HCF of the polynomials. **[3]**

$f(x) = (x + 3)\left(2x^2 - 3x + a\right)$

and $g(x) = (x - 2)\left(3x^2 + 10x - b\right)$ is $(x + 3)(x - 2)$

27. If α and β are the zeros of the polynomial f(x) = x² - 5x + k such that $\alpha - \beta = 1$, find the value of k. **[3]**

28. The sum of first 7 terms of an A.P. is 63 and sum of its next 7 terms is 161. Find 28th term of A.P. **[3]**

OR

The 4th term of an AP is zero. Prove that its 25th term is triple its 11th term.

29. Prove that the angle between the two tangents drawn from an external point to a circle is supplementary to the **[3]** angle subtended by the line-segment joining the points of contact at the centre.

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.
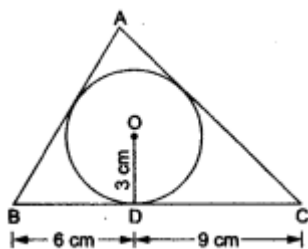
30. Prove: $\sin^6 A + 3 \sin^2 A \cos^2 A = 1 - \cos^6 A$ **[3]**

31. The median of following frequency distribution is 25. Find the value of x. **[3]**

Class:	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50
Frequency:	6	9	10	8	x

Section D

32. Sum of the areas of two squares is 452 m². If the difference of their perimeters is 8 m, find the sides of the two **[5]** squares.

OR

A person on tour has ₹ 4200 for his expenses. If he extends his tour for 3 days, he has to cut down his daily expenses by ₹ 70. Find the original duration of the tour.

33. A man on the top of a vertical tower observes a car moving at a uniform speed coming directly towards it. If it **[5]** takes 18 minutes for the angle of depression to change from 30° to 60°, how soon after this will the car reach the tower?

34. A hemispherical depression is cut out from one face of a cubical block of side 7 cm, such that the diameter of the **[5]**

hemisphere is equal to the edge of the cube. Find the surface area of the remaining solid.

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.
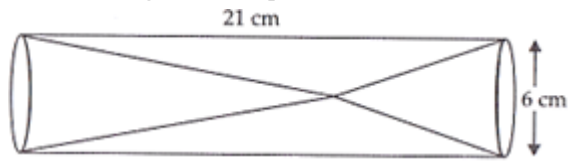
35. 250 apples of a box were weighed and the distribution of masses of the apples is given in the following table: **[5]**

Mass (in grams)	80 - 100	100 - 120	120 - 140	140 - 160	160 - 180
Number of apples	20	60	70	x	60

  i. Find the value of x and the mean mass of the apples.

 ii. Find the modal mass of the apples.

Section E

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

Two schools **P** and **Q** decided to award prizes to their students for two games of Hockey ₹ x per student and Cricket ₹ y per student. School **P** decided to award a total of ₹ 9,500 for the two games to 5 and 4 students respectively; while school **Q** decided to award ₹ 7,370 for the two games to 4 and 3 students respectively.

  i. Represent the following information algebraically (in terms of x and y). (1)

 ii. What is the prize amount for hockey? (1)

iii. Prize amount on which game is more and by how much? (2)

  OR

What will be the total prize amount if there are 2 students each from two games? (2)

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

Veena wants to make the curtains for her window as shown in the figure. The window is in the shape of a rectangle, whose width and height are in the ratio 2 : 3. The area of the window is 9600 square cm.
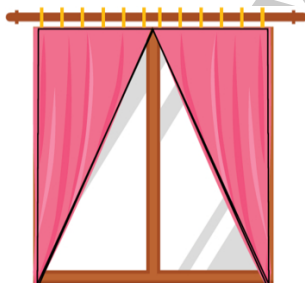
  i. What is the shape of the window that is uncovered? (1)

 ii. What will be the ratio of two sides of each curtain (other than hypotenuse)? (1)

iii. What are the dimensions of the window? (2)

  OR

What will be the perimeter of the window? (2)

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

In order to facilitate smooth passage of the parade, movement of traffic on certain roads leading to the route of the Parade and Tableaux ah rays restricted. To avoid traffic on the road Delhi Police decided to construct a rectangular route plan, as shown in the figure.
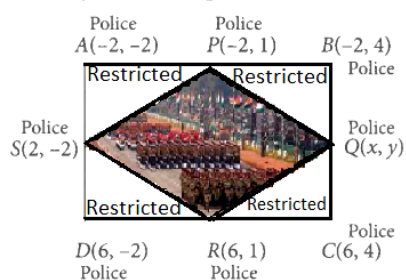
i. If Q is the mid point of BC, then what are the coordinates of Q? (1)

ii. What is the length of the sides of quadrilateral PQRS? (2)

iii. What is the length of route PQRS? (2)

OR

What is the length of route ABCD? (2)