

C-3-X

Roll No..

Total No. of Questions : 40]

[Total No. of Printed Pages : 15

10thARM(HZ)JKUTL2024-25

403-X

MATHEMATICS

Time : 3 Hours]

[Maximum Marks : 80

General Instructions :-

- (i) This question paper comprises of four Sections–A, B, C and D and carries *forty* questions of 80 marks. All questions are compulsory.
- (ii) Section–A (Q. No. 1 to 20) comprises of *twenty* questions of 1 mark each.
- (iii) Section–B (Q. No. 21 to 26) comprises of *six* questions of 2 marks each. 32
- (iv) Section–C (Q. No. 27 to 34) comprises of *eight* questions of 3 marks each. 56

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Turn Over

- (v) Section-D (Q. No. 35 to 40) comprises of *six* questions of 4 marks each.
- (vi) There is no overall choice in the question paper. However, choice has been provided in two questions of 1 mark, two questions of 2 marks, two questions of 3 marks and four questions of 4 marks. Student has to attempt only one of the choice in such questions.

Section-A

1 each

1. In an A.P. if $d = -4$, $n = 7$, $a_n = 4$ then a is :
- (A) 6
- (B) 7
- (C) 20
- ☒ (D) None of these
2. The distance of the point P(2, 3) from the X-axis is :
- (A) 2
- ☒ (B) 3
- (C) 1
- (D) None of these

3. Prime factors of 156 are :

~~(A)~~ $2^2 \times 3 \times 13$

(B) $2^3 \times 3 \times 13$

(C) $2^1 \times 3 \times 13$

(D) None of these

4. For what value of (K) do the equations

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

and

$$6x - Ky + 16 = 0$$

represents coincident lines ?

(A) $\frac{1}{2}$

(B) $-\frac{1}{2}$

~~(C)~~ 2

(D) None of these

5. If triangle ABC is right angled at C, then the value of $\cos (A + B)$ is :
- ☒ (A) 0
- (B) 1
- (C) $\frac{1}{2}$
- (D) None of these
6. Factors of the quadratic equation $y^2 - 5y + 6 = 0$ are :
- ☒ (A) $(y - 2)(y - 3) = 0$
- (B) $(y - 2)(y - 4) = 0$
- (C) $(y - 5)(y - 1) = 0$
- (D) None of these
7. In the standard form of quadratic polynomial $ax^2 + bx + c$, a , b and c are :
- ☒ (A) All are real numbers
- (B) All are rational numbers
- ☒ (C) a is non-zero real number and b and c are any real numbers
- (D) None of these

8. A card is drawn from a pack of 52 cards. The probability of drawing a red face card is :

(A) $\frac{2}{13}$

☒ (B) $\frac{3}{26}$

(C) $\frac{1}{13}$

(D) None of these

9. Fundamental theorem of Arithmetic States that every composite numbers can be expressed as of prime factors.

(A) Sum

☒ (B) Product

(C) Difference

(D) None of these

10. If we change the shape of an object from a sphere to a cylinder, then the volume of cylinder will :
- (A) Increase
- (B) Decrease
- ☒ (C) Remain unchanged
- (D) None of these
11. If $P(\bar{E}) = 0.5$, then the value of $P(E) = 1$. (True/~~False~~)
12. The sum of first 22 terms of the A.P. 8, 3, -2, is :
- (A) -978
- (B) -977
- (C) -900
- ☒ (D) None of these
13. All circles are (Congruent/~~Similar~~)

14. The common point of the tangent and the circle is called the ~~.....~~
15. Write the general form of an A.P.
16. The equations $2x + 3y = 9$ and $4x + 6y = 18$ have infinitely many solutions. (True/False)
17. The value of $\sin \theta$ increases as θ increases. (True/False)

Or

$$\sin^2 50^\circ + \cos^2 50^\circ = \dots\dots\dots$$

18. The L.C.M. and H.C.F. of 6 and 20 are :

(A) 2, 60

~~(B) 60, 2~~

(C) 2, 30

(D) None of these

19. Calculate the mean of first 6 prime numbers.
20. Write the relationship between mean, median and mode.

Define mode of a grouped data.

Section-B

2 each

- ~~1.~~ 1. State whether the pair of linear equations

$$2x - 3y = 8$$

and

$$4x - 6y = 9$$

are consistent or inconsistent.

22. Find the discriminant of the equation

$$9x^2 - 6x + 1 = 0$$

and hence find the nature of its roots.

23. In a right triangle ABC, right angled at B, if $\tan A = 1$ then verify that $2 \sin A \cos A = 1$.

24. Find the total surface area of a hemisphere whose radius is 21 cm.

Or

Calculate the curved surface area of a cone whose slant height is 21 cm and diameter of its base is 24 cm.

25. Show that (4, 5), (7, 6), (4, 3), (1, 2) are the vertices of the parallelogram.

Or

Find a point on the Y-axis which is equidistant from the points A (6, 5) and B (-4, 3).

26. Find the zeroes of the quadratic polynomial $2x^2 - 8x + 6$.

Section-C

3 each

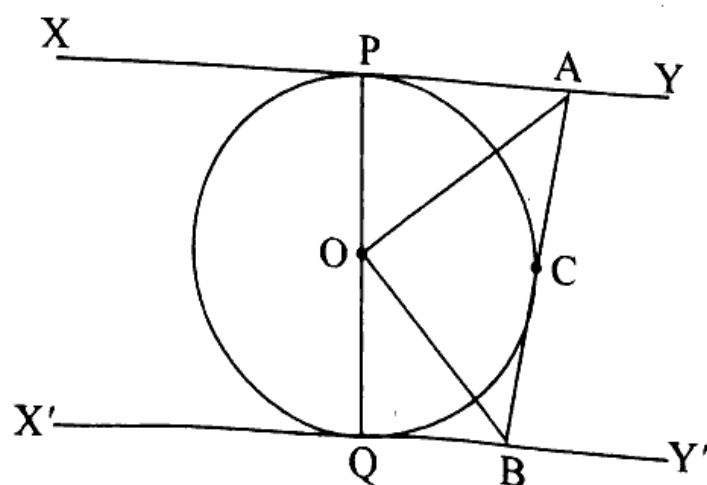
27. If A and B are $(-2, -2)$ and $(2, -4)$ respectively, find the co-ordinates of P such that $AP = \frac{3}{7}AB$ and P lies on the line segment AB.

28. The length of the minute hand of a clock is 14 cm. Find the area swept by the minute hand in 5 minutes.

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

Or

XY and X'Y' are two parallel tangents to a circle with centre O and another tangent AB with point of contact C intersecting XY at A and X'Y' at B. Prove that $\angle AOB = 90^\circ$.

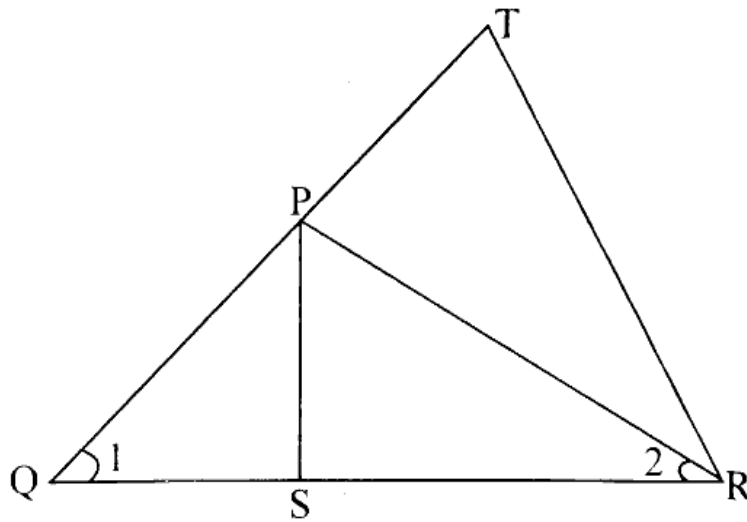


30. State and prove converse of Basic proportionality theorem.

31. In figure

$$\frac{QR}{QS} = \frac{QT}{PR}$$

and $\angle 1 = \angle 2$. Prove that ΔPQS is similar to ΔTQR .



32. Given that $\sqrt{7}$ is an irrational number, prove that $5 + 2\sqrt{7}$ is an irrational number.

33. In the following situation, does the list of numbers involved make an arithmetic progression and why ?

“The taxi fare after each km when the fare is ₹ 15 for first km and ₹ 8 for each additional km.”

Or

If the sum of first n terms of an A.P. is $4n - n^2$. What is the first term (that is S_1) ? What is the sum of first two terms ? What is the second term similarly find the 3rd, the 10th and the n^{th} term ?

34. Two dice one blue and one grey are thrown at the same time. What is the probability that the sum of two numbers appearing on the top of the dice is : (i) 8 (ii) less than or equal to 12 ?

Section-D

4 each

35. The altitude of a right triangle is 7 cm less than its base. If the hypotenuse is 13 cm, find the other two sides.

Or

Is it possible to design a rectangular mango grove whose length is twice its breadth and area is 800 m^2 ? If so, find its length and breadth.

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

Or

- A spherical glass vessel has a cylindrical neck 8 cm long, 2 cm in diameter; the diameter of the spherical part is 8.5 cm. By measuring the amount of water it holds, a child finds the volume to be 345 cm^3 . Check whether she is correct, taking the above as the inside measurements and $\pi = 3.14$. <https://www.jkboseonline.com>

37. Two poles of equal heights are standing opposite to each other on either side of the road which is 80 m wide. From a point between them on the road, the angles of-elevation of the top of the poles are 60° and 30° respectively. Find the height of the poles and distance of the point from the poles.

38. Write all other Trigonometric ratios of $\angle A$ in terms of $\sec A$.

Or

Prove that :

$$\frac{\cos A}{1 + \sin A} + \frac{1 + \sin A}{\cos A} = 2 \sec A.$$

39. If in two triangles corresponding angles are equal, prove that their corresponding sides are in the same ratio (proportional) and hence the two triangles are similar.

Or

The diagonals of a quadrilateral ABCD intersect each other at O such that :

$$\frac{AO}{BO} = \frac{CO}{DO}.$$

Show that ABCD is a trapezium.

40. The distribution given below gives the weight of 30 students of a class. Find the median weight of the students :

Weight (in kg)	No. of Students
40—45	2
45—50	3
50—55	8
55—60	6
60—65	6
65—70	3
70—75	2

A-3-Z

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10thARF(SZ)JKUT2024-25

103-Z

MATHEMATICS

Time : 3 Hours]

[Maximum Marks : 80

Section-A

1 each

1. Find zeroes of the polynomial $x^2 - 3$.
2. $P(E) + P(\bar{E}) = \dots\dots\dots$
3. 1.4 can be the probability of an event. (True/False)
4. Number of tangent/tangents can be drawn from a point on the circle
is/are $\dots\dots\dots$
5. Area of a circle with radius 'R' = $\dots\dots\dots$
6. $\sqrt{5}$ is a rational number. (True/False)

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Turn Over

A-3-Z

(2)

7. Which of the following is rational ?

(A) $(2 - \sqrt{3})^2$

(B) $2(\sqrt{2} + \sqrt{3})$

(C) $(2 - \sqrt{3})(2 + \sqrt{3})$

(D) $2\sqrt{7}$

8. HCF of (8, 9, 25) is

9. The graph of $x = -2$ is a line parallel to :

(A) X-axis

(B) Y-axis

(C) Passing through origin

(D) None of these

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A-3-Z

10. If the pair of linear equations has infinite many solutions, then the lines representing these equations :

- (A) Coincide
- (B) Intersecting at one point
- (C) Parallel to each other
- (D) None of these

11. 10th term of an A.P. : 2, 7, 12, is

12. If $a_n = 5n^2 + 2$, find a_3 .

13. Write the n th term of an A.P. whose 1st term is ' a ' and common difference is ' d '

(4)

14. The value of $\tan A$ is always less than 1. (True/False)

15. Evaluate :

$$\frac{2 \tan 30^\circ}{1 + \tan^2 30^\circ}$$

16. A quadratic equation $ax^2 + bx + c = 0$, $a \neq 0$ has no real roots

if :

(A) $D = 0$

(B) $D < 0$

(C) $D > 0$

(D) None of these

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A-3-Z

17. Find the distance between the points $(0, 0)$ and $(3, -4)$.

18. If the median and mean of a data is ' m ' and ' n ' respectively, then

mode is :

(A) $2m - 3n$

(B) $2m - n$

(C) $m + n$

(D) $3m - 2n$

(6)

19. Volume of a cone is :

(A) πrl

(B) $\pi r^2 h$

(C) $\frac{1}{3} \pi r^2 h$

(D) $\frac{4}{3} \pi r^3$

20. Find the mode of the given data :

2, 6, 4, 5, 0, 2, 1, 3, 2 and 3.

Section-B

2 each

21. Find whether the pair of linear equations

$$3x + 2y = 5$$

and

$$2x - 3y = 7$$

are consistent or inconsistent.

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A-3-Z

22. Find the nature of the roots of the quadratic equation :

$$3x^2 - 4\sqrt{3}x + 4 = 0$$

23. If

$$\sin A = \frac{3}{4}$$

find $\cos A$ and $\tan A$.

24. Find the point on X-axis which is equidistant from (2, -5) and (-2, 9).

Or

Find the value of 'y' for which the distance between the points

P(2, -3) and Q(10, y) is 10 unit.

25. Find the quadratic polynomial whose sum and product of zeroes respectively 1 and 1.
26. Find the area of sector of a circle with radius 6 cm and the angle of the sector is 60° .

Section-C

3 each

27. Find the area of a rhombus whose vertices are (3, 0), (4, 5), (-1, 4) and (-2, -1) taken in an order.
28. Prove that Parallelogram circumscribing a circle is a rhombus.

Or

Prove that in two concentric circles, the chord of the larger circle, which touches the smaller circle, is bisected at the point of contact.

29. The length of the minute hand of a clock is 14 cm. Find the area

swept by the minute hand in 5 minutes.

30. Show that $3\sqrt{2}$ is an irrational number.

31. If a line divides any two sides of a triangle in the same ratio, then

the line is parallel to the third side.

Or

ABCD is a trapezium in which $AB \parallel DC$ and its diagonals intersect

each other at point O. Show that :

$$\frac{AO}{BO} = \frac{CO}{DO}$$

32. Find the sum of odd numbers between 0 and 50.

33. One card is drawn from well shuffled deck of 52 cards. Find the probability of getting :

(i) a spade

(ii) a red face card

(iii) a jack.

34. D is a point on side BC of a triangle ABC such that :

$$\angle ADC = \angle BAC$$

Show that $CA^2 = CB.CD$.

(11)

Or

E is a point on the side AD produced of a parallelogram ABCD and

BE intersect CD at F. Show that :

$$\triangle ABE \sim \triangle CFB$$

Section-D

4 each

35. Find the value of K so that the quadratic equation

$$Kx(x - 2) + 6 = 0$$

has equal roots.

(12)

Or

The altitude of right triangle is 7 cm less than its base. If the hypotenuse is 13 cm, find the other two sides.

36. A spherical glass vessel has a cylindrical neck 8 cm long, 2 cm in diameter, the diameter of spherical part is 8.5 cm. Find the volume of the vessel.

Or

A medicine capsule is in the shape of a cylinder with two hemispheres stuck to each of its end, the length of the entire capsule is 14 mm. Find the surface area, if the diameter is 5 mm.

37. The shadow of a tower standing on a level ground is found to be 40 m longer when the sun's altitude is 30° than when it is 60° , find the height of the tower.

Or

The angle of elevation of the top of building from the foot of tower is 30° and the angle of elevation of the top of tower from the foot of the building is 60° . If the tower is 50 m high, find the height of building. <https://www.jkbosenonline.com>

38. Prove that :

$$\frac{\cos A}{1 + \sin A} + \frac{1 + \sin A}{\cos A} = 2 \sec A$$

39. If AD and PM are the medians of triangles ABC and PQR respectively such that :

$$\Delta ABC \sim \Delta PQR$$

Prove that :

$$\frac{AB}{PQ} = \frac{AD}{PM}$$

Or

Two tangents TP and TQ are drawn to a circle with centre O from an external point T. Prove that :

$$\angle PTQ = 2 \angle OPQ$$

40. The distribution below gives the weights of 30 students of a class.

Find the median weight of the students :

Weight (in kg)	Number of Students
40—45	2
45—50	3
50—55	8
55—60	6
60—65	6
65—70	3
70—75	2

A-3-Y

Roll No.

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10th ARF(SZ)JKUT2024-25

103-Y

MATHEMATICS

Time : 3 Hours]

[Maximum Marks : 80

Section-A

1 each

1. Find the zeroes of the polynomial $t^2 - 15$.
2. Define sure event.
3. -0.2 can be the probability of an event. (True/False)
4. Number of tangent/tangents can be drawn from a point outside the circle is/are
5. Circumference of a circle of radius 2 cm =
6. $\sqrt{2}$ is an irrational number. (True/False)

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Turn Over

1-3-Y

7. $(6 + 5\sqrt{3}) - (4 - 3\sqrt{3})$ is :

- (A) a rational number
- (B) an irrational number
- (C) a natural number
- (D) an integer

8. HCF of (6, 20) is

9. The graph of $y = 2$ is a line parallel to :

- (A) X-axis
- (B) Y-axis
- (C) Passing through origin
- (D) None of these

10. If the pair of linear equations has no solution, then the lines representing these equations :

- (A) Coincide
- (B) Intersecting at one point
- (C) Parallel to each other
- (D) None of these

11. 35th term of an A.P. : 21, 18, 15, is

12. If $a_n = 2 - 3n$, find a_5 .

13. Find the common difference of an A.P. in which

$$a_{18} - a_{14} = 32.$$

(4)

14. The value of $\cos A$ exceeds 1. (True/False)

15. Evaluate :

$$\frac{1 - \tan^2 45^\circ}{1 + \tan^2 45^\circ}$$

16. A quadratic equation $ax^2 + bx + c = 0$, $a \neq 0$ has two equal real

roots if :

(A) $D = 0$

(B) $D < 0$

(C) $D > 0$

(D) None of these

17. Find the distance between the points $(0, 0)$ and $(-1, 2)$.
18. Which of the following is not a measure of central tendency ?

(A) Mode

(B) Range

(C) Mean

(D) Median

19. Find the mode of the given data :

4, 8, 6, 7, 2, 4, 3, 5, 4 and 5.

20. Volume of a cylinder is :

(A) $\pi r^2 h$

(B) $\pi r l$

(C) $\frac{1}{3} \pi r^2 h$

(D) $\frac{4}{3} \pi r^3$

Section-B

2 each

21. Find whether the pair of linear equations

$$x + 3y = 6$$

and

$$2x - 3y = 12$$

are consistent or inconsistent.

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A-3-Y

(7)

22. Find the nature of the roots of the quadratic equation :

$$2x^2 - 3x + 5 = 0$$

23. If

$$\sin A = \frac{3}{4}$$

find $\cos A$ and $\tan A$.

24. Find the point on X-axis which is equidistant from $(2, -5)$ and $(-2, 9)$.

Or

Find the value of 'y' for which the distance between the points

$P(2, -3)$ and $Q(10, y)$ is 10 unit.

25. Find the quadratic polynomial whose sum and product of zeroes respectively 1 and 1.
26. Find the area of sector of a circle with radius 6 cm and the angle of the sector is 60° .

Section-C

3 each

27. Find the area of a rhombus whose vertices are (3, 0), (4, 5), (-1, 4) and (-2, -1) taken in an order.
28. Prove that Parallelogram circumscribing a circle is a rhombus.

Or

Prove that in two concentric circles, the chord of the larger circle, which touches the smaller circle, is bisected at the point of contact.

29. The length of the minute hand of a clock is 14 cm. Find the area swept by the minute hand in 5 minutes.
30. Show that $3\sqrt{2}$ is an irrational number.
31. If a line divides any two sides of a triangle in the same ratio, then the line is parallel to the third side.

Or

ABCD is a trapezium in which $AB \parallel DC$ and its diagonals intersect each other at point O. Show that :

$$\frac{AO}{BO} = \frac{CO}{DO}$$

32. Find the sum of odd numbers between 0 and 50.

33. One card is drawn from well shuffled deck of 52 cards. Find the probability of getting :

(i) a spade

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10thARF(SZ)JKUT2024-25—103-Y
A-3-Y

Turn Over

(12)

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Find the surface area, if the diameter is 5 mm.

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Or

The angle of elevation of the top of building from the foot of tower is 30° and the angle of elevation of the top of tower from the foot of the building is 60° . If the tower is 50 m high, find the height of building.

38. Prove that :

$$\frac{\cos A}{1 + \sin A} + \frac{1 + \sin A}{\cos A} = 2 \sec A$$

39. If AD and PM are the medians of triangles ABC and PQR respectively such that :

$$\Delta ABC \sim \Delta PQR$$

Prove that :

$$\frac{AB}{PQ} = \frac{AD}{PM}$$

Or

Two tangents TP and TQ are drawn to a circle with centre O from an external point T. Prove that :

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103-X

MATHEMATICS

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[Maximum Marks : 80

Section-A

1 each

1. Find zeroes of the polynomial $4u^2 + 8u$.
2. Define impossible event.
3. 0.1 can be the probability of an event. (True/False)
4. How many tangents can a circle have ?
5. Circumference of a circle with radius ' r ' =
6. $\sqrt{3}$ is a rational number. (True/False)

10thARF(SZ)JKUT2024-25-103-X

Turn Over

A-3-X

7. Sum of a rational and irrational number is :
- (A) a rational
 - (B) a natural
 - (C) an irrational
 - (D) an integer
8. HCF of (12, 15, 21) is
9. The graph of $y = 4x$ is a line parallel to :
- (A) X-axis
 - (B) Y-axis
 - (C) Passing through origin
 - (D) None of these

10. If the pair of linear equations has unique solution, then the lines representing these equations :

- (A) Coincide
- (B) Intersecting at one point
- (C) Parallel to each other
- (D) None of these

11. 30th term of an A.P. : 10, 7, 4, is :

- (A) 97
- (B) -77
- (C) 77
- (D) -87

12. The value of $\cos \theta$ increases as θ increases. (True/False)

13. Evaluate :

$$\frac{2 \tan 30^\circ}{1 - \tan^2 30^\circ}$$

14. If $a_n = n^2 + 1$, find a_3 .

15. A quadratic equation $ax^2 + bx + c = 0$, $a \neq 0$ has two distinct roots

if :

(A) $D = 0$

(B) $D < 0$

(C) $D > 0$

(D) None of these

16. Find the sum of 1st five multiple of 3.

17. Find the distance between the points (2, 3) and (4, 1).

18. Mean of 1st 'n' natural numbers is :

(A) $\frac{n(n+1)}{2}$

(B) $\frac{n}{2}$

(C) $\frac{n^2+1}{2}$

(D) $\frac{n+1}{2}$

19. Find the mode of the given data :

3, 5, 7, 6, 1, 3, 2, 4, 3, 4

20. Volume of a sphere :

(A) πrl

(B) $\pi r^2 h$

(C) $\frac{1}{3}\pi r^2 h$

(D) $\frac{4}{3}\pi r^3$

Section-B

2 each

21. Find whether the pair of linear equations

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Show that $CA^2 = CB.CD$.

Or

E is a point on the side AD produced of a parallelogram ABCD and

BE intersect CD at F. Show that :

$$\triangle ABE \sim \triangle CFB$$

Section-D

4 each

35. Find the value of K so that the quadratic equation

$$Kx(x - 2) + 6 = 0$$

has equal roots.

Or

The altitude of right triangle is 7 cm less than its base. If the hypotenuse is 13 cm, find the other two sides.

36. A spherical glass vessel has a cylindrical neck 8 cm long, 2 cm in diameter, the diameter of spherical part is 8.5 cm. Find the volume of the vessel. <https://www.jkboseonline.com>

Or

A medicine capsule is in the shape of a cylinder with two hemispheres stuck to each of its end, the length of the entire capsule is 14 mm.

Find the surface area, if the diameter is 5 mm.

37. The shadow of a tower standing on a level ground is found to be 40 m longer when the sun's altitude is 30° than when it is 60° , find the height of the tower.

Or

The angle of elevation of the top of building from the foot of tower is 30° and the angle of elevation of the top of tower from the foot of the building is 60° . If the tower is 50 m high, find the height of building.

38. Prove that :

$$\frac{\cos A}{1 + \sin A} + \frac{1 + \sin A}{\cos A} = 2 \sec A$$

39. If AD and PM are the medians of triangles ABC and PQR respectively such that :

$$\Delta ABC \sim \Delta PQR$$

Prove that :

$$\frac{AB}{PQ} = \frac{AD}{PM}$$

Or

Two tangents TP and TQ are drawn to a circle with centre O from an external point T. Prove that :

$$\angle PTQ = 2 \angle OPQ$$

40. The distribution below gives the weights of 30 students of a class.

Find the median weight of the students :

Weight (in kg)	Number of Students
40—45	2
45—50	3
50—55	8
55—60	6
60—65	6
65—70	3
70—75	2

Roll No

Total No. of Questions : 40]

[Total No. of Printed Pages : 15

10thARNKD(W/Z) JKLUT-2025

1003-A

MATHEMATICS

Time : 3 Hours]

[Maximum Marks : 80

Note:- "Attempt any 68 Marks out of 80 Marks".

SECTION-A

(1 mark each)

1. Which of the following is a rational number?

(a) π

(b) $\sqrt{2}$

(c) $\frac{3}{7}$

(d) None of these

2. Which of the following is a polynomial?

(a) $\frac{1}{x} + 2x$

(b) $3x^2 - 2x + 5$

(c) $2\sqrt{x} + 7$

(d) None of these

3. If $x + 2y = 10$, what is the value of y when $x = 4$?

(a) 2

(b) -3

(c) 3

(d) None of these

4. If the n^{th} term of an A.P is given by $a_n = 4n - 2$, what is the 3rd term?
- (a) 10
- (b) 14
- (c) 2
- (d) None of these
5. Which of the following is the ratio of opposite side to the hypotenuse in a right triangle for acute angle θ .
- (a) $\cos \theta$
- (b) $\tan \theta$
- (c) $\sin \theta$
- (d) None of these

6. What is the midpoint of the line segment joining the points (2, 1) and (6, 3) ?

(a) (2, 4)

(b) (2, 6)

(4, 2)

(d) None of these

7. L.C.M of 12 and 30 is :

(a) 120

60

(c) 30

(d) None of these

8. Probability of getting a head when a fair coin is tossed is :

0.5

(b) 1

(c) 0.25

(d) None of these

9. The volume of a cube with side 7cm is

(a) 49 cm^3

(b) 393 cm^2

343 cm^3

(d) None of these

10. The equation $ax^2 + 2x + a = 0$ has two equal roots, if

(a) $a = 0, 1$

$a = \pm 1$

(c) $a = 0$

(d) None of these

11. Prime factorization of 1771 is $7 \times 11 \times 13$. (True / False)

12. The common difference of the A.P. $\frac{1}{2b}, \frac{1-6b}{2b}, \frac{1-12b}{b}, \dots$ is

(a) -3

(b) 3

(c) $-2b$

(d) None of these

13. The probability of impossible event is 1. (True / False)
14. All triangles are similar. (isosceles, equilateral)
15. The angle between tangent at a point on a circle and the radius through the point is _____.
16. Write the first three terms of the sequence $a_n = \frac{n(n-2)}{2}$.
17. The pair of equations $x^2 = a$ and $y = b$ has unique solution.
(True/False)
18. $\cot A$ is the product of $\cot$ and A . (True/False)

Or

If $x = 2\sin^2 \theta$ and $y = 2\cos^2 \theta + 1$, then $x + y = \frac{\quad}{\text{for } 0^\circ \leq \theta \leq 90^\circ}$.

19. Calculate mean of first 5 multiples of 2.

20. Write the formula for finding mean by direct method.

Or

If mean = 20, mode = 18, then median = _____.

SECTION-B

(2 marks each)

21. Half the perimeter of a rectangular garden, whose length is 4m more than its width, is 36m. Find the dimensions of the garden
22. Find the roots of the quadratic equation $6x^2 - x - 2 = 0$ by factorisation.
23. 2 cubes each of volume 64cm^3 are joined end to end. Find the surface area of the resulting cuboid.

Or

Find the slant height of a Cone of radius = 2.5cm and height = 6cm.

24. Given that $\tan A = \frac{4}{3}$, find the other trigonometric ratios of angle A.
25. Find the point on the x - axis which is equidistant from (2, -5) and (-2, 9).

Or

Find a relation between x and y such that the point (x, y) is equidistant from the points (3, 6) and (-3, 4).

26. Find the zeroes of the polynomial $6x^2 - 3 - 7x$ and verify the relationship between the zeroes and the coefficients.

SECTION-C

(3 marks each)

27. If A and B are $(-2, -2)$ and $(2, -4)$ respectively, find the coordinates of P such that $AP = \frac{3}{7} AB$ and P lies on the line segment AB.
28. A chord of a circle of radius 12 cm subtends an angle of 120° at the centre. Find the area of the corresponding segment of the circle.
(use $\pi = 3.14$ and $\sqrt{3} = 1.73$).
29. Two concentric circles are of radii 5cm and 3cm. Find the length of the chord of the larger circle which touches the smaller circle.

Or

PQ is a chord of length 8cm of a circle of radius 5cm. The tangents at P and Q intersect at a point T. Find the length TP.

30. D is a point on the side BC of a triangle ABC such that $\angle ADC = \angle BAC$.

Show that $CA^2 = CB \cdot CD$.

31. If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, the other two sides are divided in the same ratio. Prove it.

32. Prove that $3 + 2\sqrt{5}$ is irrational.

33. How many terms of the A.P:

9, 17, 25, must be taken to give a sum of 636 ?

Or

How many three-digit numbers are divisible by 7 ?

34. A die is thrown once. Find the probability of getting.

(i) a prime number

(ii) a number lying between 2 and 6.

SECTION-D

(4 marks each)

35. Rohan's mother is 26 years older than him. The product of their ages (in years) 3 years from now will be 360. Find Rohan's present age.

Or

The altitude of a right triangle is 7cm less than its base. If the hypotenuse is 13cm, find the other two sides.

36. A cubical block of side 7cm is surmounted by a hemisphere. What is the greatest diameter the hemisphere can have? Find the surface area of the solid.

Or

A Gulab Jamun, contains sugar syrup upto about 30% of its volume. Find approximately how much syrup would be found in 45 Gulab Jamuns, each shaped like a cylinder with two hemispherical ends with length 5cm and diameter 2.8 cm. <https://www.jkboseonline.com>

37. From a point on the ground, the angles of elevation of the bottom and the top of a transmission tower fixed at the top of a 20m high building are 45° and 60° respectively. Find the height of the tower.

38. Prove that $\frac{\sin \theta - \cos \theta + 1}{\sin \theta + \cos \theta - 1} = \frac{1}{\sec \theta - \tan \theta}$ using the identity $\sec^2 \theta = 1 + \tan^2 \theta$

Or

Write all the other trigonometric ratios of $\angle A$ in terms of $\sec A$.

39. A girl of height 90cm is walking away from the base of a lamp-post at a speed of 1.2m/s. If the lamp is 3.6m above the ground, find the length of her shadow after 4 seconds.

Or

If AD and PM are medians of triangles ABC and PQR, respectively where $\triangle ABC \sim \triangle PQR$,

Prove that $\frac{AB}{PQ} = \frac{AD}{PM}$.

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