MATHEMATICS

Time : 3 hours *Maximum Marks : 80*

I. This question paper comprises of four sections A, B, C and D and carries 40 questions of 80 marks. All questions ar compulsory.
II. Section-A - Q. No. 1 to Q. 20 comprises of 20 questions of one mark each.
III. Section-B - Q. No. 21 to Q. 26 comprises of 6 questions of two marks each.
IV. Section-C - Q. No. 27 to Q. 34 comprises of 8 questions of three marks each.
V. Section-D - Q. No. 35 to Q. 40 comprises of 6 questions for four marks each.
VI. There is no overall choice in the questions paper. However, choice has been provided in 2 questions of one marks, 2 questions for two marks, 2 questions of three marks and 4 questions of four marks. Student has to attempt only one of the choice in such questions. Section-A-Q.No. 1 to Q.20 comprises of 20 questions of one mark each.

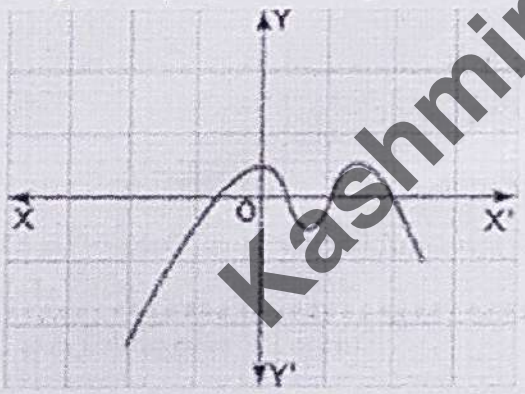
SECTION - A

(20 Q × 1 M = 20 Marks)

Q.1. The number $1-\sqrt{3}$ is:

(a) an even number (b) an irrational number
(c) odd number (d) a rational number

Q.2. Graph of a polynomial is given below:



(a) 1 (b) 2 (c) 3 (d) 4

Q.3. The pair of linear equations $2x-y+9=0$ and $6x-3y+10=0$ are:

(a) paralle (b) intersecting (c) coincident (d) none

Q.4. 30th term of the AP = 10, 7, 4, ... is

(a) 97 (b) 77 (c) -77 (d) –87

Q.5. $\sin^2(25°) + \cos^2(25°)$ is equal to

(a) sin (30°) (b) sin (90°) (c) cos (90°) (d) sin (0°)

Q.6. The abscissa of any point of *y*-axis is

(a) 0 (b) 2 (c) –1 (d) none

Q.7. HCF (0, 2) is

(a) 0 (b) 2 (c) not possible to find (d) none

Q.8. Getting a natural number greater than zero is an example of
(a) impossible event (b) sure event (c) simple event (d) none

Q.9. Three times volume of right circular cone of given height (h) and radius r is equal to:
(a) twice volume of cylinder of height h and radius r
(b) volume of cylinder of height h and radius r
(c) half of volume of cylinder of height h and radius r
(d) none

Q.10. Which of the following is quadratic equation
(a) $1+x^2+\sqrt{x}=0$ (b) $(x-1)^2=(x-2)^2$
(c) $(x-1)(x-2)=x^2+2$ (d) $x^2+2=5$

Q.11. Prime factorization of 1001 is 7.11.13. (True/False)

Q.12. The sum of first n natural number is .....

Q.13. If P (A) = $\frac{1}{2}$ then P (not A) = $\frac{1}{2}$

Q.14. All ..... triangles are similar.

Q.15. A circle can have ..... parallel tangents at the most.

Q.16. Write formula for sum to n terms of an A.P.

Q.17. $\sqrt{2x}+\sqrt{3y}=4$ is an example of linear equation in two variables. (True/False)

Q.18. sin (30°) + cos (60°) is equal to tan (45°). (True/False)

Or

If sin A= cos A, where A is acute angle, then angle A is ..... .

Q.19. Calculate mean of first 10 natural numbers.

Q.20. Write the formula for Mean of Grouped data.

Or

Mode of observations 4, 2, 9, 2, 1, 3, 2, 5, 2 is ..... .

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Q.1. The common difference of an A.P. –5, –1, 3, 7, ...
(A) 4 (B) –4 (C) 2 (D) None of these

Q.2. $41\sqrt{2}$ is:
(A) Rational (B) Irrational (C) Even (D) None of these

Q.3. The zero of a linear polynomial ax + b is:
(A) $-\frac{b}{a}$ (B) $-\frac{a}{b}$ (C) $\frac{b}{a}$ (D) None of these

Q.4. Sum of the roots of the quadratic equation $3x^2-5x+2=0$ is:
(A) $-\frac{5}{3}$ (B) $\frac{3}{5}$ (C) $\frac{5}{3}$ (D) None of these

Q.5. A line intersecting a circle in two points is called a:

(A) Tangent (B) Chord (C) Secant (D) None of these

Q.6. Length of an arc of a sector is given by:

(A) $\frac{\theta}{360^\circ} \times 2\pi r$ (B) $\frac{\theta}{360^\circ} \times \pi r$ (C) $\frac{\theta}{180^\circ} \times 2\pi r$ (D) None of these

Q.7. the midpoint of the line segment joining the points (2, 3) and (–4, 7) is:

(A) (–1, 5) (B) (3, 5) (C) (5, –1) (D) None of these

Q.8. The probability of getting a number less than 4 in a single throw of a die is:

(A) $\frac{2}{3}$ (B) $\frac{3}{4}$ (C) $\frac{1}{2}$ (D) None of these

Q.9. The value of cos 72° – sin 18° is:

(A) –1 (B) 0 (C) 1 (D) None of these

Q.10. The graph of the equation x = 2 is:

(A) A line parallel to *x*-axis (B) A line parallel to y-axis

(C) *y*-axis (D) None of these

Q.11 Define Collinear Points.

Sol. Three or more points are said to be collinear if they lie on a single line.

Q.12 Write a formula for finding the area of a $\triangle ABC$ with Coordinates of the Vertices as $A(x_1, y_1)$, $B(x_2, y_2)$, $C(x_3, y_3)$.

Sol. Area = $\frac{1}{2} | x_1 (y_2 - y_3) + x_2 (y_3 - y_1) + x_3 (y_1 - y_2) |$

Q.13 Write One application of Trigonometry.

Sol. Trigonometry can be used to roof a house, to make the roof inclined and the height of the roof in building.

Q.14 State Pythagoras theorem?

Sol. In a right angled triangle, the square of the hypotenuse is equal to the sum of squares of the other two sides.

Q.15 If P(E) = 0.5, find (not Es)?

Sol. P(not E) = 1–P (E) = 1–0.5 = 0.5

Q.16 Given r = 1 unit, find the volume of sphere?

Sol. $V = \frac{4}{3}\pi r^3$ $r = 1$

$$V = \frac{4}{3} \times \frac{22}{7} \times (1)^3 = \frac{88}{21} = 4.2 \text{ cm}^3.$$

Q.17 Write the co-ordinates of the point P (x, y) which divide the line segment joining the points A (x_1, y_1) and B (x_2, y_2) internally in the ratio of $m_1 : m_2$.

Ans. $x = \dfrac{m_2x_1 + m_1x_2}{m_1m_2}$, $y = \dfrac{m_2y_1 + m_1y_2}{m_1 + m_2}$

Q.18 The mid-point of line segment joining the points (x_1, y_1) and (x_2, y_2) is ..... . (Fill in the blan

Ans. $x = \dfrac{x_1 + x_2}{2}$, $y = \dfrac{y_1 + y_2}{2}$

Q.19 Define the term "Angle of elevation."

Ans. When an observer views the top of the object from the horizontal.

Q.20 State Pythagoras theorem.

Ans. In a right angled triangle, the square of the hypotenuse is equal to the sum of squares of the oth two sides.

* If P(A) = .7, find P (not A).

Ans. 0.3 {P(not A) = 1–P(A)}

* If R denotes radius of a sphere, write the formula for volume of sphere.

Ans. $V = \dfrac{4}{3}\pi R^3$

* Write the formulae for finding the area of a triangle A (x_1, y_1), B (x_2, y_2) and C(x_3, y_3).

Ans. Area $= \dfrac{1}{2}\left|x_1(y_2 - y_2) + x_2(y_3 - y_1) + x_3(y_1 - y_2)\right|$

* State Section Formula.

Ans. The co-ordinate of point P(x, y) which divide the line segment joining the points A(x_1, y_1) and (x_2, y_2) internally in the ratio $m_1 : m_2$ are

$$\left(\frac{m_1x_2 + m_2x_1}{m_1 + m_2}, \frac{m_1y_2 + m_2y_1}{m_1 + m_2}\right)$$ This is known as section-formula.

* Define the term "Angle of depression".

Ans. The angle formed by the line of sight and the horizontal plane for an object below the horizon

* Give two different examples of pair of "Similar figures".

Ans. 1. Pairs of Equilateral Triangles.

2. Pairs of Square.

* If P(A) = .3, find P (not A).

Ans. P(not A) = 0.7

* If r denotes radius of base of cone and h denotes height of cone and l denotes slant height th l = ... (Fill in the blank)

Ans. $\sqrt{r^2 + h^2}$

* The distance between $P(x_1, y_1)$, and $Q(x_2, y_2)$ is ..... (Fill in the blank)

Ans. $PQ = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

* Write the formula for find the area of a triangle whose vertices are $P(x_1, y_1)$, Q (x_2, y_2) and R (x_3, y_3).

Ans. $\frac{1}{2}\left|x_1(y_2 - y_3) + x_2(y_3 - y_2) + x_3(y_1 - y_2)\right|$

* Write one application of Trigonometry.

Ans. Trigonometry can be used to measure the height of a building or Mountains.

* The common difference of an A.P. $\frac{1}{3}, \frac{5}{3}, \frac{9}{3}, \frac{13}{3}$, ... is:

(A) $\frac{4}{3}$ (B) 4 (C) $\frac{3}{4}$ (D) None of these

* 4 is:

(A) A prime number (B) A rational number

(C) An irrational number (D) None of these

* The zeroes of the quadratic polynomial $x^2 - 1$ are:

(A) 2, 1 (B) 1, 1 (C) 1, −1 (D) None of these

* How many tangents can a circle have?

(A) 1 (B) 2 (C) Infinitely many (D) None of these

* Product of the roots of the quadratic equation $5x^2 - 6x^2 - 2 = 0$ is:

(A) $\frac{2}{5}$ (B) $\frac{5}{2}$ (C) $\frac{6}{5}$ (D) None of these

* Circumference of a circle is given by:

(A) $2\pi r$ (B) $-2\pi r$ (C) πr (D) None of these

* The midpoint of the line segment joining the points (x_1, y_1) and (x_2, y_2) is:

(A) $\left(\frac{x_1 - x_2}{2}, \frac{y_1 - y_2}{2}\right)$ (B) $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

(C) $\left(\frac{x_1 x_2}{2}, \frac{y_1 y_2}{2}\right)$ (D) None of these

Which of the following cannot be the probability of an event:

(A) $\frac{2}{3}$ (B) 0.7 (C) −1.5 (D) None of these

$\sin(90 - \theta)$ is equal to:

(A) $\cos\theta$ (B) $-\cos\theta$ (C) $\sin\theta$ (D) None of these

* If the lines represented by the equations $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ are intersecting then:

(A) $\frac{a_1}{a_2} = \frac{b_1}{b_2}$ (B) $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$ (C) $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$ (D) None of these

* The common difference of an A.P. 2, $\frac{5}{2}$, 3, $\frac{7}{2}$, ... is:

(A) 2 (B) $-\frac{1}{2}$ (C) $\frac{1}{2}$ (D) None of these

* 5 is:

(A) An even number (B) A prime number
(C) A composite number (D) None of these

* $2 - x^3$ is:

(A) A linear polynomial (B) A quadratic polynomial
(C) A cubic polynomial (D) None of these

* Sum of the roots of the quadratic equation $ax^2 + bx + c = 0$, $a \neq 0$ is:

(A) $\frac{b}{a}$ (B) $\frac{b}{a}$ (C) $\frac{c}{a}$ (D) None of these

* A line which touches a circle at one point is called:

(A) Tangent (B) Secant (C) Chord (D) None of these

* Area of the sector is given by:

(A) $\frac{\theta}{180^\circ} \times \pi r^2$ (B) $\frac{\theta}{360^\circ} \times \pi r^2$ (C) $\frac{360^\circ}{\theta} \times \pi r^2$ (D) None of these

* The distance of the point A(x, y) from the origin O(0, 0) is:

(A) $\sqrt{x^2 - y^2}$ (B) $\sqrt{x^2 + y^2}$ (C) $\sqrt{x + y}$ (D) None of these

* The probability of getting a number less than 7 in a single throw of a die is:

(A) 1 (B) 0 (C) $\frac{6}{7}$ (D) None of these

* The value of $\frac{\tan 65^\circ}{\cot 25^\circ}$ is:

(A) 1 (B) –1 (C) 0 (D) None of these

* The solution of the pair of linear equations $x + 2y = 3$ and $x + y = 3$ is:

(A) $x = 0, y = 3$ (B) $x = -3, y = 0$ (C) $x = 3, y = 0$ (D) None of these

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Q.1. The HCF of 2 and 11 is

(a) 2 (b) 11 (c) 22 (d) 1

Sol. (d) 1

Q.2. A polynomial of degree '2' is called

(a) Quadratic poly (b) Zero poly (c) Quartic poly (d) None of these

Sol. (a) Quadratic poly

Q.3. A Quadratic Equation $ax^2 + bx + c = 0$, $a \neq 0$ has two equal roots if:

(a) $D > 0$ (b) $D = 0$ (c) $D < 0$ (d) N.O.T

Sol. (b) $D = 0$

Q.4. The common difference of the AP 6, 9, 12, 15 ..... is:

(a) 6 (b) –3 (c) 9 (d) 3

Sol. (d) 3

Q.5. The distance of the point $A(x, y)$ from the origin $0(0, 0)$ is

(a) $\sqrt{x^2 + y^2}$ (b) $\sqrt{x^2 - y^2}$ (c) x^2 (d) y^2

Sol. (a) $\sqrt{x^2 + y^2}$

Q.6. A line which touches a circle at one point is called

(a) Secant (b) Chord (c) tangent (d) N.O.T

Sol. (c) tangent

Q.7. Area of circle is given by:

(a) πr^3 (b) $2\pi r$ (c) πr^2 (d) N.O.T

Sol. (c) πr^2

Q.8. Which of the following cannot be the probability of an event:

(a) 2/3 (b) –1.5 (c) 15% (d) 0.7

Sol. (b) –1.5

Q.9. The value of sin 18/cos 72 is:

(a) –1 (b) 0 (c) 1 (d) $\sqrt{3}$

Sol. (c) 1

Q.10. The mean of the grouped data can be found by direct method as:

(a) $\sum \frac{fi}{f(x)}$ (b) $\sum \frac{xi}{f(x)}$ (c) $\sum \frac{fi\,xi}{xi}$ (d) $\sum \frac{xi}{fi}$

Sol. (d) $\sum \frac{xi}{fi}$

Q.11. The H.C.F of 5, 15 is:

(A) 5 (B) 15 (C) 75 (D) 1

Ans. (a) 5

Q.12. A polynomial of degree 2 is called:
(A) Linear polynomial (B) Quadratic polynomial
(C) Zero polynomial (D) None of these

Ans. (B) Quadratic polynomial

Q.13. A quadratic equation $ax^2 + bx + c = 0$ $(a \neq 0)$ has two distinct real roots if:
(A) $D = 0$ (B) $D < 0$ (C) $D > 0$ (D) None of these

Ans. (A) $D = 0$

Q.14. The common difference of the A.P. 3, 5, 6, 7, 9 ..... is
(A) –2 (B) 2 (C) 3 (D) None of these

Ans. (B) 2

Q.15. Middle point $A(x_1, y_1)$ and $B(x_2, y_2)$ is:

(A) $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$ (B) $\left(\frac{x_1 - x_2}{2}, \frac{y_1 - y_2}{2}\right)$

(C) $\left(\frac{x_1 + x_2}{3}, \frac{y_1 + y_2}{3}\right)$ (D) None of these

Ans. (A)

Q.16. A line cutting the circle at two different points is called:
(A) Chord (B) Secant (C) Tangent (D) None of these

Ans. (B)

Q.17. Area of a circle with radius 'r' is:
(A) πr^3 (B) πr^4 (C) $2\pi r$ (D) None of these

Ans. (D)

Q.18. Which of the following can not be the probability of an event?
(A) $\frac{2}{3}$ (B) $\frac{3}{5}$ (C) $-\frac{3}{5}$ (D) $\frac{4}{5}$

Ans. (C)

Q.19. The value of $\cos(90 - \theta)$ is:
(A) $\cos\theta$ (B) $\cos\theta$ (C) $\cos\theta$ (D) None of these

Ans. (D) None of these

Q.20. Mean value of 7, 5, 9 is:
(A) 5 (B) 7 (C) 9 (D) None of these

Ans. (B) 7

* The H.C.F. of 5 and 2 is :
(A) 2 (B) 5 (C) 10 (D) 1

Ans. (D) 1

* A polynomial of degree 1 is called:

(A) Linear polynomial (B) Quadratic polynomial

(C) Zero polynomial (D) None of these

Ans. (A) Linear polynomial

* A quadratic equation $ax^2 + bx + c = 0$ $(a \neq 0)$ has two equal roots if:

(A) $D = 0$ (B) $D > 0$ (C) $D < 0$ (D) None of these

Ans. (A) $D = 0$

* The common difference of the A.P. 2, 4, 6, 8, 10 ..... is

(A) – 2 (B) 4 (C) 2 (D) None of these

Ans. (C) 2

* The distance of the point $A(x_1, y_1)$ from the origin $O(0, 0)$ is

(A) $\sqrt{x_1^2 + y_1^2}$ (B) $\sqrt{x_1^2 - y_1^2}$ (C) x_1^2 (D) y_1^2

Ans. (A) $\sqrt{x_1^2 + y_1^2}$

* A line which cuts the circle at only one point is called:

(A) Chord (B) Tangent (C) Secant (D) None of these

Ans. (B) Tangent

* Circumference of a circle with radius 'r' is:

(A) πr^2 (B) πr^3 (C) $2\pi r$ (D) None of these

Ans. (C) $2\pi r$

* Which of the following can not be the probability of an event?

(A) $\frac{2}{3}$ (B) $\frac{3}{2}$ (C) 15% (D) 0.2

Ans. (B) $\frac{3}{2}$

* The value of $\sin(90 - \theta)$ is:

(A) $\sin\theta$ (B) $\cos\theta$ (C) $\tan\theta$ (D) None of these

Ans. (B) $\cos\theta$

* The mean of the grouped data can be determined by direct method as:

(A) $\frac{\Sigma f(x_i)}{\Sigma f_i x_i}$ (B) $\frac{\Sigma x_i}{\Sigma f_i}$ (C) $\frac{\sum f_i x_i}{\sum f_i}$ (D) None of these

Ans. (C) $\frac{\sum f_i x_i}{\sum f_i}$

The prime factors of 39 are:

(A) 3, 11 (B) 3, 13 (C) 9, 13 (D) None of these

Ans. (B) 3, 13

* A polynomial of degree 3 is called:
(A) Quadratic polynomial (B) Zero polynomial
(C) Linear polynomial (D) None of these

Ans. (D) None of these

* A quadratic equation $ax^2 + bx + c = 0$ $(a \neq 0)$ has two non-real roots is:
(A) D = 0 (B) D < 0 (C) D > 0 (D) None of these

Ans. (A) D = 0

* The common difference of the A.P. 1, 3, 5, 7 ..... is
(A) 2 (B) –2 (C) 0 (D) None of these

Ans. (A) 2

* A (–4, 5) lies in:
(A) 1st quadrant (B) 3rd quadrant (C) 4th quadrant (D) None of these

Ans. (D) None of these

* A tangent to a circle intersects it in:
(A) No point (B) One point (C) Two points (D) None of these

Ans. (B) One point

* Area of a circle of radius 2 cm is:
(A) 8π (B) 6π (C) 4π (D) None of these

Ans. (C) 4π

* tan A is not defined at:
(A) 45° (B) 30° (C) 90° (D) 0°

Ans. (C) 90°

* Define Concentric circles.

Ans. Concentric circles are circles with a common centre.

* If P(A) = 0, write (P(A) /P(Not A).

Ans. 0

* Length of an arc of a circle with radius r and angle with degree measure θ is ..... (Fi
the blank)

Ans. Length of arc $= \theta \times \left(\frac{\pi}{180^\circ}\right) \times r$ {θ = Degree Measure}

* Class mark is always equal to:

(A) $\frac{\text{Upper classmark} - \text{Lower classmark}}{2}$

(B) $\frac{\text{Upper classmark} + \text{Lower classmark}}{2}$

(C) $\frac{\text{Upper classmark} \times \text{Lower classmark}}{2}$

(D) None of these

Ans. (B) $\frac{\text{Upper classmark+Lower classmark}}{2}$

* LCM of 6 and 20 is ..... .(20, 60)
* If angle between two tangents drawn from a point P to a circle of radius a and centre O is 90°, then OP = $a\sqrt{2}$. (True/False)
* The 6th term of the A.P. 5, 8, 11, 14, ... is 21. (True/False)

Or

The sum of all natural numbers from 1 to 100 is 5050. (True/False)

* If Δ ABC is right angled at C, then the value of cos (A + B) is 1. (True/False)
* Any two ..... triangles are similar. (Isosceles/Equilateral)
* HCF of 6 and 20 is ..... . (2, 6)
* If angle between two tangents drawn from a point P to a circle of radius a and centre O is 60°, then OP = $a\sqrt{3}$. (True/False)
* If the first term of an A.P. is –5 and the common difference is 2, then the 10th term is –13. (True/False)
* The sum of first 10 odd natural numbers is 100. (True/False)
* sin θ = cos θ for all values of θ. (True/False)
* All circles are ..... . (Congruent/Similar)
* HCF of 42 and 63 is ..... .(42, 21)
* If angle between two radii of a circle is 130°, then angle between the tangents at the ends of the radii is 50°. (True/False)

The next term of the A.P. $\sqrt{27}$, $\sqrt{48}$, $\sqrt{75}$ ..... is $\sqrt{106}$. (True/False)

The sum of first 3 terms of the A.P. whose nth term is given by $a_n = 2n + 1$ is 15. (True/False)

$\sin^2\theta + \cos^2\theta = 1$ for all values of θ. (True/False)

Any two ..... are similar. (Triangles/Rectangles)

LCM (a, b) × HCF (a, b) = ... $(a \times b / a + b)$

ol. $a \times b$

$x = 1, y = 2$ is the solution of the pair of linear equation $x + 2y = 3$ and $x + y = 3$ .....
(Yes/No)

ol. No

$Q_n = q + (n + 1)\, d$ is the general term of an AP ..... (True/False)

ol. False

* Sum of first 'ϕ' term of an A.P is given by $S\phi = \phi/2\ [2a + (\phi - 1)d]$ ..... (True/Fals

Sol. True.

* $\sin\theta = \cos\theta$ for all values of θ (True/False)

Sol. False.

* All ..... triangles are similar (Isosceles/Equilateral).

Sol. Equilateral

* L.C.M $(a, b) = \dfrac{a \times b}{\ldots\ldots\ldots\ldots}$ (Fill in the blank)

Ans. HCF (a, b)

* $x = 1, y = 3$ is the solution of $x + 2y = 7$ and $2x + y = 5$ (True/ False)

Ans. True

* $S_n = \dfrac{n}{2}[a + (n-1)d]$ is the sum to n terms of an A.P. Series. (True/ False)

Ans. False

* 30th term of the A.P 10, 7, 4 ..... is 77. (Fill in the blank)

Ans. False

* $\sin\theta = \cos\theta$ for all values of θ. (True/ False)

Ans. False

* All ..... triangles are similar. (isosceles/equilateral) (Choose correct word)

Ans. Equilateral

* H.C.F $(a, b) = \dfrac{\ldots\ldots\ldots\ldots}{\text{L.C.M.}(a.b)}$ (Fill in the blank)

Ans. $\dfrac{(a \times b)}{L.C.M\,(a.b)}$

* $x = 1, y = 5$ is the solution of $x + y = 6$ and $2x + y = 7$ (True/ False)

Ans. True

* $a_n = a + (n-1)d$ is the nth terms of an A.P. Series. (True/False)

Ans. True

* If $a_n = 4n + 1$, then a_5 is equal to 23. (Fill in the blank)

Ans. False

* $\sin^2\theta - \cos^2\theta = 1$ (True/False)

Ans. False

* All circles are ..... (congruent/similar). (Fill in the blank using correct word in brac

Ans. Similar

* $\sqrt{3}$ is an ..... number. (Fill in the blank)

Ans. irrational

* For unique solution in $a_1x + b_1y = c_1$ and $a_2x + b_2y = c_2$ if $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$. (True/ False)

Ans. True

* If $a_n = 5n + 2$. find a_2. (True/ False)

Ans. False

* What is the 10th term of the A.P. : 2, 7, 12. ..... ?

Ans. 47

* The value of cos θ increases as θ increases. (True/False)

Ans. False

* All squares are ..... (similar/congruent). (Choose correct word)

Ans. similar

* Define Collinear points.
* Write a formula for finding the distance between two points $A(x_1, y_1)$ and $B(x_2, y_2)$.
* What is the line of sight?
* State AA similarity criterion for two triangles.
* Define x-coordinate of a point.
* Write a formula for finding the coordinates of the point P(x, y) which divides the line segment joining the points $A(x_1, y_1)$ and $B(x_2, y_2)$, internally, in the ratio $m_1 : m_2$.
* What is the angle of depression?
* State SAS similarity criterion for two triangles.
* If P(E) = 0.5, what is the probabiiity of 'not E'?
* If r = 1 unit, find the volume of sphere.
* Define y-coordinate of a points.
* Write a formula for finding the area of a ΔABC with coordinates of the vertices as $A(x_1, y_1)$, $B(x_2, y_2)$, $C(x_3, y_3)$.
* What is the angle of elevation?
* State SSS similarity criterion for two triangles.
* If P(E) = 0.05, what is the probability of 'not E'?
* If r = 2 cm then find curved surface area of hemisphere in terms of π.

SECTION - B

(6 Q × 2 M = 12 Marks)

Q.21. Solve by substitution method

$$\sqrt{2x} + \sqrt{3y} = 0 \text{ and } \sqrt{3x} - \sqrt{8y} = 0$$

Q.22. Find discriminant of the quadratic equation $2x^2-4x+3=0$ and hence nature of roots.

Q.23. Given 15 cot A = 8, find sec A.

Q.24. Find volume of hemispher of radius 2 cm.

Or

Calculate volume of cylinder of radius 1 cm and height 1 cm.

Q.25. Find the point of the x-axis which is equidistant from (2, –5) and (–2, 9).

Or

Determine if the points (1, 5), (2, 3) and (–2, 11) are collinear.

Q.26. The sum and product of zeros of quadratic polynomial x^2-15 are?

* Find the H.C.F. of 26 and 91.

* 2 cubes each of volume $64cm^2$ are joined end to end. Find the surface area of the result cuboid.

* Solve the pair of equations by the substitution method:
$x + y = 14$
$x - y = 4$

* If $\sin A = \frac{3}{4}$, calculate cos A and tan A.

Or

Find the value of $\frac{1-\tan^2 45°}{1+\tan^2 45°}$

* A die is thrown once. Find the probability of getting: (i) a prime number (ii) an odd number

* The following table gives the literacy rate (in percentage) of 35 cities. Find the mean liter rate:

Literacy rate in %	45-55	55-65	65-75	75-85	85-95
Number of Cities	3	10	11	8	3

* Express 140 as a product of its prime factors.

* A drinking glass is in the shape of a frustum of a cone and height 14 cm. The diameter of its circular ends are 4 cm and 2 cm. Find the capacity of the glass.

* Express 156 as a product of its prime factors.

* A solid in the shape of a cone standing on a hemisphere with both their radii being equal to and the height of the cone is equal to its radius. Find the volume of the solid in terms of π.

* Find H.C.F. and L.C.M of 26 and 91 using prime factorisation.

* A toy is in the form of a cone of radius 3.5 cm mounted on a hemisphere of same radius. total height of the toy is 15.5 cm. Find the total surface area of the toy.

* Cubed each of volume 64 cm^3 are joined end to end. Find the surface area of the result Cuboid.

* Given that HCF (306, 657) = 9, find LCM (306, 657).

* A cubical block of side 7 cm is surmounted by a hemisphere. What is the greatest diameter hemisphere can have?

* Find the H.C.F. of 6, 72 and 120 using prime factorisation method.

* Find the values of $\frac{2\tan 45°}{1+\tan^2 45°}$?

* Evaluate $\sin 25^\circ \cos 65^\circ + \cos 25^\circ \sin 65^\circ$
* One A die is thrown Once. Find the probability of getting 'an odd number'.
* The marks obtained by 30 student of class 'X' of a certain school in a Mathematics paper consisting of 100 marks are presented in table below. Find the mean of the marks obtained by the students.

Marks Obtained (x_i)	10	20	36	40	50	56	60	70	72	80	88	92	95
Number of Students (f_i)	1	1	3	4	3	2	4	4	1	1	2	3	1

* 2 cubes each of volume 64 cm^3 are joined end to end. Find the surface area of the resulting cuboid.
* Find the H.C.F. of 96 and 404 by the prime factorisation method.
* Find whether the pair of linear equations are consistent or inconsistent:
  $2x-3y = 8$
  $4x - 6y = 9$
* Find the value of $\dfrac{2\tan 30^0}{1+\tan^2 30^0}$
* Find the value of $\dfrac{\tan 65^0}{\cot 25^0}$.
* One card is drawn from a well shuffled deck of 52 cards. Calculate the probability that the card will (i) be an ace (ii) not be an ace.

SECTION – C
(8 Q × 3 M = 24 Marks)

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

Q.28. Find the area of the sector of a circle with radius 4 cm and angle 30°. Also find the are aof the corresponding major sector.

Q.29. Prove that the tangent drawn at the ends of a diameter of a circle are parallel.

Or

Prove that the lengths of tangents drawn from an external paint to a circle are equal.

Q.30. Prove that if a line divides any two sides of a triangle in the same ratio, then the line is parallel to the third side.

Q.31. D is a point on the side BC of a triangle ABC such that $\angle ADC = \angle BAC$. Show that $CA^2 = CB.CD$.

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

Q.33. The 17th term of an AP exceeds it 10th term by 7. Find the common diffference.

Or

Find the sum of first 22 terms of an AP in which d = 7 and 22th terms is 149.

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

(a) a prime number

(b) a number lying between 2 and 6

* Find the zeroes of the quadratic polynomial $3x^2 - x - 4$ and verify the relationship between th zeroes and the coefficients.

* A drinking glass is in the shape of a frustum of a cone of height 14 cm the diameter of its tw circular ends are 4 cm and 2 cm. Find the capacity of the glass.

* Five years hence, the age of Jacob will be three times that of his son. Five years ago, Jacob's ag was seven times that of his son. What are their present age?

* Find the roots of the quadratic equation $2x^2 - 7x + 3 = 0$ by applying the quadratic formula.

* How many multiples of 4 lie between 10 and 250?

* Find the sum of first 51 terms of an A.P. whose second and third terms are 14 and 18 respectively

* Prove the identity: $\frac{1+\sec A}{\sec A} = \frac{\sin^2 A}{1-\cos A}$

* The length of a tangent from a point A at distance 5cm from the centre of the circle is 4 cm. Find the radius of the circle.

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

$\angle PTQ = 2\angle OPQ$

* Prove that the tangents drawn at the ends of a diameter of a circle are parallel.

* A 20 m deep well with diameter 7 m is dug and the earth from digging is evenly spread out to form a platform 22 m by 14 m. Find the height of the platform.

* Find the zero's of the quadratic polynomial and verify the relationship between the zero's and the coefficient $4S^2 - 4S + 1$

* Divide $x^3 - 3x^2 + 5x - 3$ by $x^2 - 2$ and find the quotient and the remainder.

* Solve the pair of linear equation by substistution method.

$x + y = 14$

$x - y = 4$

* Find the value of K, so that the quadratic equation have two equal roots $2x^2 + kx + 3 = 0$.

* Which term of an AP: 3, 8, 13, 18 ..... is 78?

* Find the sum of the first 15 multiplies of 8.

* Evaluate $\frac{\sin^2 63° + \sin^2 27°}{\cos^2 17° + \cos^2 73°}$?

* Prove that the tangents drawn at the ends of a diameter of a circle are parallel.

* Prove that the ||gm circumscribing a circle is a rhombus.

* Find the area of a sector of a circle with radius 6 cm if angle of the sector is 60°.

* A drinking glass is in the shape of a frustum of a cone of height 14 cm the diameter of its two circular ends are 4 cm and 2 cm. Find the capacity of the glass.
* Find the zeroes of the quadratic polynomial $x^2 + 7x + 10$ and verify the relationship between zeroes and the coefficients.
* Divide $2x^2 + 3x + 1$ by $x + 2$ and find the quotient and the remainder.
* Solve the pair of linear equations by substitution method

  $7x - 15y = 2$

  $x + 2y = 3$
* How many terms of the A.P. 24, 21, 18, ... must be taken so that their sum is 78.
* Find the sum of the odd numbers between 0 and 50.
* Prove the identity: $\frac{\cos A}{1+\sin A} + \frac{1+\sin A}{\cos A} = 2\sec A$
* Prove that opposite sides of a quadrilateral circumscribing a circle subtend supplementary angles at the centre of the circle.
* Prove that the parallelogram circumscribing a circle is a rhombus.
* Find the area of the sector of a circle with radius 4 cm and of angle 300. Also the area of the corresponding major sector (using $\pi = 3.14$).

SECTION – D
(6 Q × 4 M = 24 Marks)

Q.35. 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.

Or

Find two consective positive integers, the sum of whos esquares is 365.

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

Or

A solid is in the shape of a cone standing on a hemisphere with both their radii being equal to 1 cm and the height of the cone is equal to its radius. Find the volume in terms of π.

Q.37. From the top of a 7 m high building, the angle of eleveation of the top of a cable tower is 60° and the angle of depression of its foot is 45°. Determine the height of the tower.

Q.38. If $\tan(A+B) = \sqrt{3}$ and $\tan(A-B) = \frac{1}{\sqrt{3}}$; $0° < A+B \leq 90°$, $A > B$, find A and B.

Or

Prove the identity $\frac{\sqrt{1+\sin A}}{1-\sin A} = \sec A + \tan A$

Q.39. State and prove Basic Proportionality theorem.

Or

The diagonls of a quadrilateral ABCD intersect each other at the point O such that $\frac{OA}{BO} = \frac{CO}{DO}$

Show that ABCD is a trapezium.

Q.40. The distribution below gives the weights of 3 students of a class. Find the median weight of the students.

Weigh (in kg)	40-45	45-50	50-55	55-60	60-65	65-70	70-75
No. of students	2	3	8	6	6	3	2

* Find two consecutive positive integers, sum of whose squares is 365.
* Find the value of 'K' for which the quadratic equation $Kx(x-2)+6=0$ has two equal roots.
* The angle of elevation of the top of a tower from a point on the ground, which is 30m away from the foot of the tower, is 30°. Find the height of the tower.
* If (1, 2), (4, y) (x, 6) and (3, 5) are the vertices of a parallelogram taken in order, find x and y.
* Find the area of the triangle whose vertices are (–5, –1), (3, –5) and (5, 2)
* In a right triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides. Prove it.
* Diagonals AC and BD of a trapezium ABCD with AB || DC intersect each other at the point O. Using a similarity criterion for two triangles, show that:

$$\frac{OA}{OC} = \frac{OB}{OD}$$

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

* Find two numbers whose sum is 27 and product is 182.
* The angle of elevation of the top of a tower from a point on the ground which is 30 m away from the foot of tower is 30°. Find the height of the tower.
* Find the points on the *x*-axis which is equidistant from (2, –5) and (–2, 9).
* Find the ratio in which the line segment joining the points (–3, 10) and (6, –8) is divided by (–1, 6).

* Prove that the ratio of the area of two similar Δs is equal to the square of the ratio of their corresponding sides.
* ABC is an isosceles Δ right angled at C. Prove that $AB^2 = 2AC^2$.
* The distribution below gives the weight of 3 students of a class. Find the median weight of the students.

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

* The difference of squares of two numbers is 180. The square of the smaller number is 8 times the larger number. Find the two numbers.
* From the top of a 7 m high building, the angle of elevation of the top of a cable tower is 60° and angle of depression of the foot is 45°. Determine the height of the tower.
* Find the point on the Y-axis which is equidistant from the points A (6, 5) and B (– 4, 3).
* Find the value of k if the points A(2, 3), B(4, *k*) and C(6,-3) are collinear.
* In a right angled triangle, the square of the hypotenuse is equal to the sum of the square of the other two sides. Prove it.
* A survey conducted on 20 households in a locality by a group of students resulted in the following frequency table for the number of family members in a household.

Family Size	1–3	3–5	5–7	7–9	9–11
Number of Families	7	8	2	2	1

Find the mode of this data.

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