10TH MATHS PUBLIC EXAM QUESTIONS COLLECTIONS
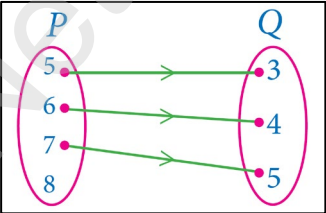
2 MARK QUESTIONS EM NEW (2024 - 2025)

CHAPTER -1.RELATIONS AND FUNCTIONS

1. If $A \times B = \{(3,2),(3,4),(5,2),(5,4)\}$ then find A and B.   **(Sep. 2019 a Aug. 2022)**

2. Show that the function $f : N \to N$ defined by $f(m) = m^2 + m + 3$ is one-one function.   **(Sep.2019)**

3. If $A = \{1,3,5\}$ and $B = \{2,3\}$ then find. Show that $n (A \times B) = n(B \times A) = n(A) \times n(B)$ **(Sep. 2021)**

4. Let A $\{1, 2,3,4, ... 45 \}$ and R Be the relation defined as "is square of' on A". write R as a subset of A $\times$ A. AIso, find the domain and range of R.   **(Sep. 2021)**

5. Let $A = \{1,2,3\}$ and $B = \{ x|x$ is a prime number less than $10\}$. Find A $\times$ B and $B \times A$ **(May 2022)**

6. The arrow diagram shows in figure a relationship between the sets P and Q.
   Write the relation in
   (i) Set builder form (ii) Roster form
   (iii) What is the domain and range of R.   **(May 2022)**

7. If $A = \{5,6\}$, $B = \{4,5,6\}$, $C = \{5,6,7\}$. Show that A $\times$ A $= (B \times B) \cap (C \times C)$.   **(Aug. 2022)**

8. If $B \times A = \{(-2,3),(-2,4),(0,3),(0,4),(3,3),(3,4)\}$ find A and B **(April 2023)**

9. Find $'k'$ if fof(k) = 5 where $f(k) = 2k - 1$.   **(April 2023)**

10. A Relation R is given by the set $\{ (x,y)/y = x + 3, x \in \{0,1,2,3,4,5$ Detrmine it is domain and the range.   **(June 2023)**

11. Check whether $(f \circ g) = (g \circ f)$ if $f(x) = x - 6$ and $g(x) = x^2$ **(June 2023)**

12. If A $\times$ B $= \{(3,2),(3,4),(5,2),(5,4)\}$ then find A and B.   **(April 2024)**
13. If $f(x) = 3x - 2, g(x) = 2x + k$ and $f \circ g = g \circ f$, then find value of k.   **(April 2024)**
14. If $B \times A = \{(-2,3),(-2,4),(0,3),(0,4),(3,3),(3,4)\}$ find A and B.   **(July 2024)**
15. Given $f(x) = 2x - x^2$. Find (i) $f(1)$ (ii) $f(x + 1)$.   **(July 2024)**

CHAPTER -2 .NUMBERS AND SEQUENCES

1. If m, n, are natural numbers, for what values of m, does $2^n \times 5^m$ ends in 5?   **(Sep. 2019)**

2. Find the 3rd and 4th terms of a sequence, if $a_n = \begin{cases} n^2 \ if \ n \ is \ odd \\ \frac{n^2}{2} \ if \ n \ is \ even \end{cases}$ **(Sep 2019)**

3. Find the value of $1^2 + 2^2 + 3^2 + \cdots +10^2$ and hence deduce $2^2 + 4^2 + 6^2 + ... + 20^2$ **(Sep. 2019)**

4. Find the number of terms in the A.P. 3, 6, 9, 12, ... 111.   **(Sep. 2021)**

5. If $3 + k, 18 - k, 5k + 1$ are in A.P. then find the value of 'k'.   **(Sep. 2021)**

6. Find the least number that is divisible by the first ten natural numbers.   **(Aug. 2022 a June 2023)**

7. Find the 19th term of an A.P. $-11, -15, -19,…$.   **(Aug. 2022)**

8. If $13824 = 2^a \times 3^b$ then find 'a' and 'b'   **(May 2022)**

9. Which term of an A.P. 16, 11, 6, 1,... is -54?.   **(July 2024) (May 2022)**

10. Find $'x'$ so that $x + 6, x + 12$ and $x + 15$ are consecutive terms of a Geometric Progression.**(April 2023)**

11. If $p^2 \times q^1 \times r^4 \times s^3 = 3,15,000$ then find the values of 'p', 'q', 'r' and 's' **(April2023)**

12. Find the 8th term of the G.P. 9, 3, 1,…. **(July 2024) (June 2023)**

13. 'a' and 'b' are two positive integers such that $a^b \times b^a = 800$. Find 'a' and 'b' **(April 2024)**

14. Find the HCF of 23 and 12. **(April 2024)**

CHAPTER -3 .ALGEBRA

1. Find the value of k for which the equation $9x^2 + 3kx + 4 = 0$ has real and equal roots. **(Sep. 2019)**

2. If $A = \begin{pmatrix} \sqrt{7} & -3 \\ -\sqrt{5} & 2 \\ \sqrt{3} & -5 \end{pmatrix}$ then find the transpose of $-A$. **(Sep. 2019)**

3. Determine the quadratic equation whose sum and product of roots are-9 and 20. **(Sep. 2021)**

4. Determine the nature of the roots for the quadratic equation $15x^2 + 11x + 2 = 0$ **(Sep. 2021)**

5. Find the value of 'x', in $x^2 - 4x - 12 = 0$ **(Aug. 2022)**

6. Find the square root of the following rational expressions. $\frac{400x^4 y^{12} z^{16}}{100x^8 y^4 z^4}$ **(Aug. 2022)**

7. If $P = \frac{x}{x+y}$, $Q = \frac{y}{x+y}$ then find $\frac{1}{(P^2 - Q^2)}$ **(May 2022)**

8. Find the excluded values of the following expression $\frac{7p+2}{8p^2 + 13p + 5}$ **(May 2022)**

9. Simplify: $\frac{x+2}{4y} \div \frac{x^2 - x - 6}{12y^2}$. **(April 2023)**

10. Determine the nature of roots for the following quadratic equation. $2x^2 - x - 1 = 0$ **(April 2023)**

11. Determine the nature of the roots for the quadratic equation $15x^2 + 11x + 2 = 0$. **(June 2023)**

12. If $A = \begin{pmatrix} 5 & 2 & 2 \\ -\sqrt{17} & 0.7 & \frac{5}{2} \\ 8 & 3 & 1 \end{pmatrix}$ then verify $(A^T)^T = A$ **(June 2023)**

13. Simplify- $\frac{4x^2 y}{2z^2} \times \frac{6xz^3}{20y^4}$. **(April 2024)**

14. Find the sum and product of the roots for following quadratic equation $x^2 + 8x - 65 = 0$. **(April 2024)**

15. Find the LCM of $9a^3 b^2, 12a^2 b^2 c$. **(July 2024)**

16. Determine the nature of the roots for the following quadratic equation $15x^2 + 11x + 2 = 0$. **(July 2024)**

CHAPTER -4 .GEOMETRY

1. Check whether AD is bisector of $\angle A$ of ΔABC in each of the following AB $= 5\ cm$, $AC = 10\ cm$ $BD = 1.5\ cm$ and CD $= 3.5$ cm **(Sep. 2019)**

2. In Δ ABC, D and E are points on the sidies AB and AC respectively such that DE || BC lf $\frac{AD}{DB} = \frac{3}{4}$ and AC$= 15cm$ find AE. **(Sep. 2021)**

3. ABCD is a trapezium in which AB || DC and P, Q are points on AD and BC respectively, such that PQ || DC if PD $= 18cm$, $BQ = 35cm$ and $QC = 15$ cm, find AD. **(Aug. 2022)**

4. In the figure AD is the bisector of $\angle A$. If $BD = 4cm$, $DC = 3cm$ and $AB = 6$ cm, find AC . **(May 2022)**

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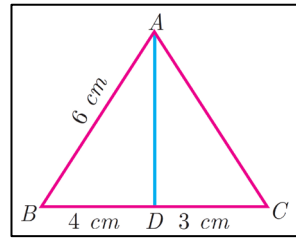
5. In the figure AD is the bisector of $\angle BAC$, if $AB = 10cm$, $AC = 14cm$ and $BC = 6cm$.
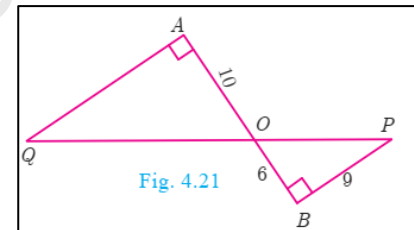
Find BD and DC.   **(April. 2023)**
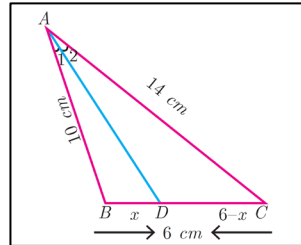
6. Check whether AD is bisector of $\angle A$ of ΔABC in each of the following $AB = 4cm$, $AC = 6cm$ $BD = 1.6$ cm and CD =2.4 cm . **(June 2023)**

7. A man goes to 18 m due east and then 24 m due North. Find the distance of his current position from the

starting point.   **(April 2024)**

8. In figure QA and PB are perpendicular to Ab. If $AO = 10 \ cm$,

$BO = 6 \ cm$ and $PB = 9 \ cm$. Find AQ.   **(July 2024)**

Fig. 4.21

CHAPTER -5 .CO-ORDINATE GEOMETRY

1. Find the slope of a line joining the points $(14, 10)$ and $(14, -6)$.   **(Sep. 2019)**

2. Show that the given points are collinear $(-3, -4)$, $(7,2)$ and $(12,5)$ **(Sep. 2021)**

3. Calculate the slope and y intercept of the straight line $8x - 7y + 6 = 0$ **(Sep. 2021)**

4. Find the intercepts made by the following lines on the coordinate axes. $3x - 2y - 6 = 0$ **(Sep. 2021)**

5. If area of triangle formed by vertices $A(-1,2)$, $B(k, -2) and C(7,4)$ is 22 sq. units.

find the value of $'k'$ **(Aug. 2022)**

6. The line p passes through the points $(3, -2)$, $(12,4)$ and the line q passes through the points $(6, -2)$ and

$(12, 2)$. ls p parallel to q?.   **(Aug. 2022)**

7. Find the slope of a line joining the given points $(5, \sqrt{5})$ with the origin   **(Aug. 2022)**

8. Show that the points $P(-1.5,3)$, $Q(6, -2)$, $R(-3,4)$ are collinear.   **(May 2022)**

9. The line p passes through the points $(3, -2)$, $(12,4)$ and the line q passses throught the points $(6, -2)$ and

$(12, 2)$. ls p parallel to q?   **(May 2022)**

10. Find the equation of a straight line which has slope $\frac{-5}{4}$ and passing through the point $(-1,2)$ **(May 2022)**

11. A cat is located at the point $(-6, -4)$ in xy plane. A bottle of milk is kept at $(5, 11)$. The cat wishes to

consume the milk travelling through shortest possible distance. Find the equation of the path it needs to

take its milk.   **(April 2023)**

12. If the straight lines $12y = -(p + 3)x + 12, 12x - 7y = 16$ are perpendicular then find $'p'$ (April *2023*)

13. Find the equation of a straight line which is parallel to the line $3x - 7y = 12$ and passing through the point $(6, 4)$. **(June 2023)**

14. Find the slope of a line joining he given points $(5, \sqrt{5})$ with the origin. **(June 2023)**

15. If the points $A(-3,9), B(a, b)$ and $C(4, -5)$ are collinear and if $a + b = 1$, then find a and b. **(April 2024)**

16. Find the equation of a straight line which has slope $\frac{-5}{4}$ and passing through the points $(-1,2)$. **(April 2024)**

17. The line p passes through the points $(3, -2), (12,4)$ and the line q passses throught the points $(6, -2)$ and $(12, 2)$. ls p parallel to q? **(July 2024)**

18. Find the slope of the straight line $6x + 8y + 7 = 0$. **(July 2024)**

CHAPTER -6 .TRIGONOMETRY

1. Prove that $\sqrt{\frac{1+ \sin \theta}{1- \sin \theta}} = \sec \theta + tan\theta$ **(Sep. 2019)**

2. Find the angle of elevation of the top of a tower from a point on the ground, which is $30m$ away from the foot of a tower of height $10\sqrt{3}m$. **(Sep. 2021 a Aug. 2022)**

3. From the top of a rock $50\sqrt{3}m$ height, the angle of depression of a car on the ground is observed to be $30°$. Find the distance of the car from the rock. **(May.2022)**

4. Prove that $\frac{\sec \theta}{\sin \theta} - \frac{\sin \theta}{\cos \theta} = \cot \theta$ **(April 2023)**

5. Prove that $\tan^2\theta - \sin^2\theta = \tan^2\theta \sin^2\theta$ **(June 2023)**

6. Prove that $\sqrt{\frac{1+\cos \theta}{1-\cos \theta}} = \text{cosec } \theta + \cot \theta$. **(April 2024)**

7. Prove the following identity $\frac{1-\tan^2 \theta}{\cot^2 \theta - 1} = \tan^2 \theta$. **(July 2024)**

CHAPTER -7 .MESURATION

1. Find the volume of the iron used to make a hollow cylinder of height 9 cm and whose internal and external radii are $3cm$ and $5cm$ respectively. **(Sep. 2019)**

2. Find the diameter of a sphere whose surface area is $154 \ m^2$ **(Sep. 2019)**

3. If the base area of a hemispherical solid is $1386 \ sq.$ meters, then find its total surface area? **(Sep. 2019)**

4. The heights of two right circular cones are in the ratio $1: 2$ and the perimeters of their bases are in the ratio $3: 4$. Find the ratio of their volumes. **(Sep. 2021)**

5. Find the volume of a cylinder whose height is $2m$ and whose base area is $250 \ m^2$ **(Sep. 2021)**

6. Find its radius and height. radius $7cm$ is $704cm^2$, then find its slant height. **(Aug. 2022)**

7. If the total surface area of a cone of The radius and height of a cylinder are in the ratio $5: 7$ and its curved surface area is $5500 \ sq.$ cm. **(Aug. 2022)**

8. The radius of a spherical balloon increases from $12cm$ to $16cm$ as air being pumped into it. Find the ratio of the surface area of the balloons in the two cases.   **(May 2022)**

9. The volumes of two cones of same base radius are $3600 \ cm^3$ and $5040 \ cm^3$. Find the ratio of heights.   **(May 2022)**

10. The radius of a conical tent is $7m$ and height is $24m$. Calculate the length of the canvas used to make the tent if the width of the rectangular canvas is $4m$?   **(April 2023)**

11. If the ratio of radii of two spheres $is 4:7$, find the ratio of their volumes.   **(April 2023)**

12. The curved surface area of a right circular cylinder of height $14cm$ is $88cm^2$ Find the diameter of the cylinder.   **(June 2023)**

13. The volume of a solid right circular cone is $11088 \ cm^3$ If its height is $24cm$ then find the radius of the cone.   **(June 2023)**

14. If the base area of a hemispherical solid is $1386 \ sq.$ meters, then find its total surface area? **(April 2024)**

15. Find the volume of a cylinder whose height is $2m$ and whose base area is $250 \ m^2$ **(April 2024)**

16. A cylindrical drum has a height of 20 cm and base radius of 14 cm. Find its curved surface Area?.
    (July 2024)

17. The volumes of two cones of same base radius are $3600 \ cm^3$ and $5040 \ cm^3$. Find the ratio of heights.   **(July 2024)**

CHAPTER –8 .STATISTICS AND PROBABILITY

1. Find the range and coefficient of range of the following data 63, 89, 98, 125, 79, 108, 117, 68. **(Sep. 2019)**

2. A die is rolled and a coin is tossed simultaneously. Find the probability that the die shows and odd number and the coin shows a head.   **(Sep. 2021)**

3. A bag contains 5 red balls, 6 white balls, 7 green balls, 8 black balls. One ball is drawn at random from the bag. Find the probability that the ball drawn is (i) white ball (ii) black or red ball   **(Aug. 2022)**

4. Two coins are tossed together. What is the probability of getting different faces of the coins?   **(May. 2022)**

5. Find the range and coefficient of range of the following data 63, 89, 98, 125, 79, 108, 117, 68.
   (April 2023)

6. A and B are two candidates seeking admission to IIT. The probability that A getting selected is 0.5 and the probability that both A and B getting selected is 0.3. Prove that the probability of B being selected is atmost 0.8.   **(April 2023)**

7. Find the standard deviation of first 21 natural numbers.   **(June 2023)**

8. A die is rolled and a coin is tossed simultaneously. Find the probability that the die shows and odd number and the coin shows a head.   **(June 2023)**

9. Find the Range and Co-efficient of range of the following data : 25,67,48,53,18,39,44.   **(April 2024)**

10. What is the Probability that a leap year selected at random will contain 53 Saturdays?.   **(April 2024)**

11. A Coin is tossed thrice. What is the Probability of getting two Consecutive tails?.   **(July 2024)**

10TH MATHS PUBLIC EXAM QUESTIONS COLLECTIONS

5 MARK QUESTIONS EM NEW (2024 - 2025)

CHAPTER -1.RELATIONS AND FUNCTIONS

1. Let A =The set of all natural numbers less than 8, $B = The$ set of all prime numbers less than 8, C =The set of even prime number. Verify $(A \cap B) \times C = (A \times C) \cap (B \times C)$ **(July 2024) (Sep. 2019)**

2. Let $A = \{x \in W | x < 2\}$, $B = \{x \in N | 1 < x \leq 4\}$ and $C = \{3,5\}$. Verify that
   $A \times (B \cap C) = (A \times B) \cap (A \times C)$ **(Sep. 2021)**

3. Let A =The set of all natural numbers less than 8, $B = The$ set of all prime numbers less than 8, $C =$ The set of even prime number. Verify $A \times (B-C) = (A \times B) - (A \times C)$ **(May 2022)**

4. Let $A = \{1,2,3,4\}$ and $B = \{2,5,8,11,14\}$ be two sets. Let $f: A \to B$ be a function give by $f(x) = 3x - 1$.
   Represent this function **(Sep. 2019)**

   (i) by arrow diagram   (ii) in a table form

   (iii) as a set of ordered pairs   (iv) in a graphical form

5. Represent each of the given relations by (a) an arrow diagram, (b) a graph and (c) a set in roster from, wherever possible. $\{(x,y) | y = x + 3, x, y$ are natural numbers $< 10\}$ **(Aug. 2022)**

6. Let $f: A \to B$ be a function defined by $f(x) = \frac{x}{2} - 1$, wehre $A = \{2,4,6,10,12\}$, $B = \{0,1,2,4,5,9\}$.
   Represent f by **(April 2023)**

   (i) Set of ordered pairs, (ii) a table (iii) a graph (iv) an arrow diagram

7. Let $A = \{x \in W | x < 3\}$, $B = \{x \in N | 1 < x \leq 5\}$ and $C = \{3,5,7\}$.
   Verify that $A \times (B \cup C) = (A \times B) \cup (A \times C)$ **(April 2023)**

8. Let $A = \{x \in W | x < 2\}$, $B = \{x \in N | 1 < x \leq 4\}$ and $C = \{3,5\}$.
   Verify that $A \times (B \cup C) = (A \times B) \cup (A \times C)$ **(Sep. 2023)**

9. Let $A = \{x \in N | 1 < x < 4\}$, $B = \{x \in W | 0 \leq x < 2\}$ and $C = \{x \in W | x < 3\}$. **(April 2024)**
   Verify that $A \times (B \cup C) = (A \times B) \cup (A \times C)$

10. Let $A = \{0,1,2,3\}$ and $B = \{1,3,5,7,9\}$ be two sets. Let $f: A \to B$ be a function give by $f(x) = 2x - 1$.
    Represent this function **(April 2024) (Sep. 2019)**

    (i) by arrow diagram   (ii) in a table form

    (iii) as a set of ordered pairs   (iv) in a graphical form

11. A function $f: [-5,9] \to \mathbb{R}$ is defined as follows: **(July 2024)**
$$f(x) = \begin{cases} 6x + 1; & -5 \leq x < 2 \\ 5x^2 - 1; & 2 \leq x < 6 \\ 3x - 4; & 6 \leq x \leq 9 \end{cases}$$
    Find (i) $f(-3) + f(2)$ (ii) $f(7) - f(1)$ (iii) $2f(4) + f(8)$ (iv) $\frac{2f(-2) - f(6)}{f(4) + f(-2)}$

CHAPTER -2 .NUMBERS AND SEQUENCES

1. Find the sum of all natural numbers between 100 and 1000 which are divisible by 11. **(Sep. 2019)**

2. The sum of three consecutive terms that are in A.P. is 27 and their product is 288.

   Find the three terms. **(Sep. 2021)**

3. Find the HCF of 396, 504, 636 **(Sep. 2021)**

4. Find the largest number which divides 1230 and 1926 leaving remainder 12 in each case. **(Aug. 2022)**

5. In an A.P nine times ninth term is equal to the fifteen times fifteenth term, show that six times twenty

   fourth term is zero. **(Aug. 2022)**

6. If l^{th}, m^{th} and n^{th} terms of an A.P. are, x, y, z respectively, then show that **(May 2022)**

   (i) $x(m-n) + y(n-l) + z(l-m) = 0$ (ii) $(x-y)n + (y-z)l + (z-x)m = 0$

7. The ratio of 6th and 8th term of an A.P. is 7: 9. Find the ratio 9th term to 13th term. **(May 2022)**

8. The houses of a street are numbered from 1 to 49. Senthil's house is numbered Such that the sum of

   numbers of the houses prior to Senthil's house is equal to the sum of numbers of the houses following

   Senthil's house. Find Senthil's house number?. **(April 2023)**

9. Find the sum to n terms of the series 5+55+555+⋯ **(April 2023)**

10. Find the sum to n terms of the series 3+33+333+⋯ **(July 2024)(June 2023)**

11. Rekha has 15 square Colour papers of sizes $10\ cm$, 11 cm, $12\ cm$, …$24\ cm$. How much area can be

    decorated with these Colour papers. **(July 2024)(June 2023)**

12. Find the Sum of $9^3 + 10^3 + ⋯ + 21^3$. **(April 2024)**

13. Find the sum to n terms of the series 7+77+777+⋯ **(April 2024)**

CHAPTER -3 .ALGEBRA

1. Solve: $6x + 2y - 5z = 13, 3x + 3y - 2z = 13, 7x + 5y - 3z = 26$ **(Sep. 2019)**

2. Find the GCD of the given polynomials $x^4 + 3x^3 - x - 3$ and $x^3 + x^2 - 5x + 3$ **(Sep. 2019)**

3. Find the square root of the following polynomials by division method. $\frac{x^2}{y^2} - \frac{10x}{y} + 27 - \frac{10y}{x} + \frac{y^2}{x^2}$

4. If $A = \begin{pmatrix} 1 & 2 & 1 \\ 2 & -1 & 1 \end{pmatrix}$, and $B = \begin{pmatrix} 2 & -1 \\ -1 & 4 \\ 0 & 2 \end{pmatrix}$ then show that $(AB)^T = B^T A^T$ **(Sep. 2019)**

5. If the equation $(1 + m^2)x^2 + 2mcx + c^2 - a^2 = 0$ has equal roots, then prove that

   $c^2 = a^2(1 + m^2)$ **(Sep. 2021)**

6. Solve $x + y + z = 5, 2x - y + z = 9, x - 2y + 3z = 16$ **(Sep. 2021)**

7. Find the square root of $64x^2 - 16x^3 + 17x^2 - 2x + 1 = 0$ **(Sep. 2021)**

8. Simplify: $\frac{b^2+3b-28}{b^2+4b+4} \div \frac{b^2-49}{b^2-5b-14}$ **(Aug. 2022)**

9. Find the square root of $x^4 - 12x^3 + 42x^2 - 36x + 9$ **(Aug. 2022)**

10. Solve $x^2 + 2x - 2 = 0$ by Formula method. **(Aug 2022)**

11. If $36x^4 - 60x^3 + 61x^2 - mx + n$ is a perfect square, find the values of 'm' and 'n' **(May 2022)**

12. Solve $pqx^2 - (p + q)^2x + (p + q)^2 = 0$ **(May 2022)**

13. If α and β are the roots of $7x^2 + ax + 2 = 0$ and $\beta - \alpha = \frac{-13}{7}$. Find the values of a. **(May 2022)**

14. Solve: $x + 20 = \frac{3y}{2} + 10 = 2z + 5 = 110 - (y + z)$ **(April 2023)**

15. If $A = \begin{pmatrix} 5 & 2 & 9 \\ 1 & 2 & 8 \end{pmatrix}$, and $B = \begin{pmatrix} 1 & 7 \\ 1 & 2 \\ 5 & -1 \end{pmatrix}$ then show that $(AB)^T = B^T A^T$ **(July 2024) (April 2023)**

16. Solve $3x - 2y + z = 2$, $2x + 3y - z = 5$, $x + y + z = 6$. **(June 2023)**

17. Find the square root of the following polynomials by division method.

   $121x^4 - 198x^3 - 183x^2 + 216x + 144$ **(June 2023)**

18. If $A = \begin{pmatrix} 3 & 1 \\ -1 & 2 \end{pmatrix}$ show that $A^2 - 5A + 7I_2 = 0$ **(April 2024) (June 2023)**

19. Find the square root of $64x^2 - 16x^3 + 17x^2 - 2x + 1 = 0$. **(April 2024)**

20. If $9x^4 + 12x^3 + 28x^2 + ax + b$ is a perfect square, find the values of 'a' and 'b' **(July 2024)**

CHAPTER -4 .GEOMETRY

1. State and prove Angle Bisector Theorem. **(Sep. 2019, Aug. 2022 April 2023)**

2. State and prove Pythagoras Theorem. **(July 2024)(Sep. 2021 June 2023)**

3. Show that in a triangle, the medians are concurrent. **(Sep. 2021)**

4. A man goes $18\ m$ due east and then $24\ m$ due north. Find the distance of his current position from the starting point?. **(Aug. 2022)**

5. State and Prove Basic Proportionality Theorem (BPT) or Thales theorem. **(May 2022)**

6. An Aeroplane leaves an airport and flies due north at a speed of $1000\ km/hr$. At the same time, another Aeroplane leaves the same airport and flies due west at the speed of $1200\ km/hr$. How far apart will be the two planes after $1\frac{1}{2}$ hours?. **(May 2022)**

7. Two poles of height 'a' meters and 'b' meters are $'p'$ meters apart. Prove that the height of the point of intersection of the lines joining the top of each pole to the foot of the opposite pole is given by $\frac{ab}{a+b}$ meters. **(April 2023)**

8. State and Prove Thales Theorem. **(April 2024)**

CHAPTER -5 .CO-ORDINATE GEOMETRY

1. A straight line AB cuts the co-ordinate axes at A and B. If the mid-point of AB is $(2, 3)$, find the find the equation of AB. **(Sep. 2019)**
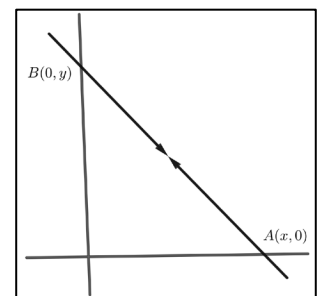
2. Find the value of 'k' if the area of quadrilateral is 28 sq. units, whose vertices are $(-4, -2), (-3, k), (3, -2)$ and $(2, 3)$ **(Sep. 2019)**

3. Find the equation of the median and altitude of ΔABC through A where the vertices are $A(6,2)$, $B(-5, -1)$ and $C(1,9)$ **(Sep. 2021)**

4. If the points $P(-1,-4)$, $Q(b,c)$ and $R(5,-1)$ are collinear and if $2b + c = 4$, then find the values of 'b' and 'c'   **(Sep. 2021)**

5. A cat is located at the point $(-6,-4)$ in xy plane. A bottle of milk is kept at $(5,11)$. The cat wishes to consume the milk travelling through shortest possible distance. Find the equation of the path it needs to take its milk.   **(Aug 2022)**

6. Find the area of the quadrilateral formed by the points $(8,6)$, $(5,11)$, $(-5,12)$ and $(-4,3)$ **(Aug. 2022)**

7. Find the equation of the line passing through $(22,-6)$ and having intercept on x —axis exceeds the intercept on Y-axis by 5 units.   **(May 2022)**

8. A quadrilateral has vertices $A (-4,-2)$, $B(5,-1)$, $C(6,5)$ and $D (-7,6)$. Show that the mid-points of its sides form a parallelogram.   **(May 2022)**

9. Find the area of the quadrilateral formed by the points $(8,6)$, $(5,11)$, $(-5,12)$ and $(-4,3)$ **(Apr. 2023)**

10. Find the equation of a straight line parallel to X —axis and passing through the point of intersection of the lines $7x - 3y = -12$ and $2y = x + 3$ **(April 2023)**

12. Find the area of the quadrilateral whose vertices are at $(-9,-2)$, $(-8,-4)$, $(2,2)$ and $(1,-3)$
                                                                                                (April 2024)   (June 2023)

13. Find the equation of the perpendicular bisector of the line joining the points $A (-4,2)$ and $B(6,-4)$.
(April 2024) (June 2023)

14. Find the area of the quadrilateral whose vertices are at $(-9,0)$, $(-8,6)$, $(-1,-2)$ and $(-6,-3)$.
(July 2024)

15. Find the equation of a straight line through the intersection of lines $7x + 3y = 10$, $5x - 4y = 1$ and parallel to the line $13x + 5y + 12 = 0$.   **(July 2024)**

CHAPTER -6 .TRIGONOMETRY

1. From the top of the tower $60m$ high the angles of depression of the top and bottom of a vertical lamp post are observed to be $38°$ and $60°$ respectively. Find the height of the lamp post. ($\tan 38°$ =0.7813, $\sqrt{3} = 1.732$)   **(Sep. 2019)**

2. Two ships are sailing in the sea on either sides of a lighthouse. The angle of elevation of the top of the lighthouse as observed from the ships are $30°$ and $45°$ respectively. lf the lighthouse is $200\ m$ high, find the distance between the two ships. ($\sqrt{3} = 1.732$)   **(Sep. 2021)**

3. To a man standing outside his house, the angles of elevation of the top and bottom of a window are $60°$ and $45°$ respectively. lf the height of the man is 180 cm and if he is $5m$ away from the wall, what is the height of the window ?.. ($\sqrt{3} = 1.732$)   **(Aug. 2022)**

4. From a point on the ground, the angles of elevation of the bottom and top of a tower fixed at the top of a $30\ m$ high building are $45°$ and $60°$ respectively. Find the height of the tower. ($\sqrt{3} = 1.732$)
(May 2022)

10. From the top of a lighthouse, the angle of depression of two ships on the opposite sides of it are observed to be $30°$ and $60°$. lf the height of the lighthouse is h meters and the linejoining the ships passes through the foot of the lighthouse, show that the distance between the ships is $\frac{4h}{\sqrt{3}}m$.

    (April 2023)

5. Prove that $\sqrt{\frac{1+\sin\theta}{1-\sin\theta}} + \sqrt{\frac{1-\sin\theta}{1+\sin\theta}} = 2\sec\theta$ **(June 2023)**

6. Two ships are sailing in the sea on either sides of a lighthouse. The angle of elevation of the top of the lighthouse as observed from the ships are $30°$ and $45°$ respectively. lf the lighthouse is $200\ m$ high, find the distance between the two ships. ($\sqrt{3} = 1.732$)   **(April 2024)**   **(June 2023)**

7. A pole 5 m high is fixed on the top of a tower. The angle of elevation of the top of the pole observed from a point 'A' on the ground is $60°$ and the angle of depression to the point 'A' from the top of the tower is $45°$. Find the height of the tower. ($\sqrt{3} = 1.732$)   **(July 2024)**

CHAPTER -7 .MESURATION

1. A cylindrical glass with diameter 20 cm has water to a height of $9cm$. A small cylindrical metal of radius $5cm$ and height $4cm$ is immersed it completely. Calculate the rise of the water in the glass.
    (Sep. 2019)

2. If the radii of the circular ends of a frustum which is 45 cm high are 28 cm and $7cm$, find the volume of the frustum.   **(April 2024)**   **(Sep. 2021)**

3. A toy is in the shape of a cylinder surmounted by a hemisphere. The height of the toy is $25cm$. Find the total surface area of the toy if its common diameter is $12cm$.   **(Sep. 2021)**

4. A cylindrical drum has height of $20cm$ and base radius of $14cm$. Find its curved surface area and the total surface area.   **(Aug. 2022)**

5. If the circumference of base of a conical wooden piece is 484 cm then find its volume when its height is $105cm$.   **(Aug. 2022)**

6. A container open at the top is in the form of a frustum of a cone of height $16cm$ with radii of its lower and upper ends are $8cm$ and $20cm$ respectively. Find the cost of milk which can completely fill a container at the rate of 540 per liter.   **(May 2022)**

7. Nathan, an engineering student was asked to make a model shaped like a cylinder with two cones attached at its two ends. The diameter of the model is $3cm$ and its length $12cm$. lf each cone has height $2cm$, find the volume of the model that Nathan made.   **(May 2022)**

8. The radius and height of a cylinder are in the ratio 5: 7 and its curved surface area is $5500\ sq.$ cm. Find its radius and height.   **(April 2023)**

9. Arul has to make arrangements for the accommodation of150 persons for his family function. For this purpose, he plans to build a tent which is in the shape of cylinder surmounted by cone. Each person occupies 4 sq. m of the space on ground and 40 cu. Meter of air to breathe. What should be the height of the conical part of the tent if the height of cylindrical part is $8m$?   **(April 2023)**

10. A metallic sphere of radius $16 cm$ is melted and recast into small spheres each of radius $2 cm$. How many small spheres can be obtained ?.   **(July 2024) (June 2023)**

11. A right circular cylindrical container of base radius 6 cm and height 15 cm is full of ice-cream. The ice-cream is to be filled in cones of height 9 cm and base radius 3 cm, having a hemispherical cap. Find the number of cones needed to empty the container.   **(April 2024)**

12. The internal and external diameters of a hollow hemispherical vessel are 20 cm and 28 cm respectively. Find the cost to paint the vessel all over at ₹0.14 per . cm^2 .   **(July 2024)**

CHAPTER -8 .STATISTICS AND PROBABILITY

1. The scores of a cricketer in 7 matches are 70, 80, 60, 60, 40, 90, 95. Find the standard deviation
   (Sep. 2019)

2. Two unbiased dice are rolled once. Find the probability of getting   **(Sep. 2019, Aug. 2022 a Apr. 2023)**
   (i) a doublet (equal numbers on both dice) (ii) the product as a prime number
   (iii) the sum as a prime number (iv) the sum as 1

3. Two dice are rolled. Find the probability that sum of outcomes is
   (i) equal to 4, (ii) greater than 10, (iii) less than 13   **(Sep. 2021)**

4. In a class of 50 students, 28 opted for NCC, 30 opted for NSS and 18 opted both NCC and NSS. One of the students is selected at random. Find the probability that
   (i) The student opted for NCC but not NSS. (ii) The student opted for NSS but not NCC.
   (iii) The student opted for exactly one of them.   **(May 2022)**

5. Two dice are rolled once. Find the probability of getting an even number on the first die or a total of face sum 8.   **(April 2024)   (June 2023)**

6. A teacher asked the students to complete 60 pages of a record note book. Eight students have completed only 32, 35, 37, 30, 33, 36, 35 and 37 pages. Find the standard deviation of the pages completed by them.
   (July 2024)

7. Two dice are rolled. Find the probability that the sum of outcomes is (i) equal to 4 (ii) greater than 10 (iii) less than 13.   **(July 2024)**

8. Find the coefficient of variation 24, 26, 33,37, 29, 31.   **(April 2024)**

10$^{\text{TH}}$ MATHS GEOMETRY QUESTIONS COLLECTIONS

8 MARK QUESTIONS EM NEW (2024 - 2025)

1.Construct a triangle similar to a given triangle ABC with its sides equal to $\frac{6}{5}$ of the corresponding sides of the triangle ABC (scale factor $\frac{6}{5} > 1$)   **(Sep. 2019)**

2. Draw the two tangents from a point which is $10cm$ away from the centre of a circle of radius $5cm$. Also, means re the lengths of the tangents.   **(July 2024)(Sep. 2019 a June 2023)**

3. Construct a Δ PQR which the base PQ $= 4.5cm$, $\angle R = 35°$ and the median from R to RG is $6cm$.
   (Sep. 2021) (April 2024)

4. Draw a circle of diameter $6cm$ from a point P, which $8cm$ away from its centre. Draw two tangents PA and PB to the circle and measure their lengths.   **(April 2024) (Sep. 2021 a Aug. 2022)**

5. Construct a triangle similar to a given triangle PQR with its sides equal to $\frac{7}{3}$ of the corresponding sides of the triangle PQR (scale factor $\frac{7}{3} > 1$)   **(Aug. 2022)**

6. Construct a ΔABC such that AB $= 5.5cm$, $\angle C = 25^0$ and the altitude from C to AB is $4cm$.**(May 2022)**

7. Draw two tangents from a point which is $5cm$ away from the center of a circle of diameter $6cm$. AIso, measure the lengths of the tangents.   **(May 2022)**

8. Take a point which is 11 cm away from the center of a circle of radius $4cm$ and draw the two tangents to the circle from the point.   **(April 2023)**

9. Construct a triangle similar to a given triangle PQR with its sides equal to $\frac{3}{5}$ of the corresponding sides of the triangle PQR (scale factor $\frac{3}{5} < 1$)   **(June 2023)**

10. Draw a triangle ABC of base $BC = 8cm$, $\angle A = 60°$ and the bisector of $\angle A$ meets BC at D such that $BD = 6cm$.   **(April 2023)**

11. Construct a $\Delta\ PQR$ in which $QR = 5$ cm, $\angle P = 40°$ and the Median PG from P to QR is 4.4 cm. Find the length of the Altitude from P to QR.   **(July 2024)**

10TH MATHS GRAPH PUBLIC QUESTIONS COLLECTIONS

8 MARK QUESTIONS EM NEW (2024 - 2025)

1. Graph the following quadratic equation $x^2 - 8x + 16 = 0$ and state their nature of solution. **(Sep. 2019)**

2. Draw the graph of $y = 2x^2 - 3x - 5$ and hence use it to solve $2x^2 - 4x - 6 = 0$

   (April 2024) (Sep. 2019)

3. Draw the graph of $x^2 + x - 12 = 0$ and state the nature of their solution. **(Sep. 2021)**

4. Draw the graph of $y = x^2 + 3x - 4$ and hence use it to solve $x^2 + 3x - 4 = 0$ **(Sep. 2021)**

5. Graph the following quadratic equation $x^2 - 9x + 20 = 0$ and state their nature of solution.**(Aug. 2022)**

6. Draw the graph of $y = x^2 - 4x + 3$ and use it solve $x^2 - 6x + 9 = 0$ **(Aug. 2022 & May 2022)**

7. Draw the graph of $x^2 - 4x + 4 = 0$ and state the nature of their solution **(May 2022)**

9. Varshika drew 6 circles with different sizes. Draw a graph for the relationship between the diameter and circumference of each circle as shown in the table and use it to find the circumference of a circle when its diameter is 6 cm. **(April 2023)**

Diameter (x)cm	1	23	3	4	5
Circumference (y) cm	3.1	6.2	9.3	12.4	15.5

10. Draw the graph of $y = x^2 - 5x - 6$ and hence use it to solve $x^2 - 5x - 14 = 0$ **(April 2023)**

11. Graph the following linear function $y = \frac{1}{2}x$. Identify the constant of variation and verify it with the graph. Also (i) find y when $x = 9$. (ii) find x when $y = 7.5$ **(June 2023)**

12. Draw the graph of $y = x^2 - 4$ and hence solve $x^2 - x - 12 = 0$ **(June 2023)**

13. Draw the graph of $xy = 24, x, y > 0$. Using the graph find, (i) y when $x = 3$ and (ii) x when $y = 6$. **(April 2024)**

14. Draw the graph of $y = x^2 + x - 2$ and hence solve $x^2 + x - 2 = 0$. **(July 2024)**

15. The following table shows the data about the number of pipes and the time taken to fill the same tank.

No. of. pipes x	2	3	6	9
Time Taken y (in mins)	45	30	15	10

Draw the graph for the above data and hence **(July 2024)**

(i) Find the time taken to fill the tank when five pipes are used.

(ii) Find the number of pipes when the time is 9 minutes.

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10TH MATHS COMPULSORY QUESTIONS COLLECTIONS

2 MARK QUESTIONS EM NEW (2024 - 2025)

1. Let $A = \{0,1\}$, $B = \{0,1\}$, $C = \{0,1\}$. Find $A \times B \times C$. **Book in Pg. No : 4**

2. Let $A = \{1,2,3\}$ and $B = \{a,b\}$. write any two functions from A to B in the form of set of ordered pairs. **Book in**

3. Find the diameter as well as radius of a sphere whose surface area is 154 m^2. **Example: 7.8**

4. Find the volume of cylinder whose height 2 m and base area 250 m^2. **Example: 7.15**

5. The volume of sphere is numerically equal to its surface area. Find its diameter. **P. Check: Q - 3**

6. A chess board contains 64 squares and the area of each square is 6.25 cm^2. A border around the board is 2 cm wide. Find the length of the side of the chess board. **Book in**

7. The T.S.A of cone radius 7 cm is 704 cm^2. Find its height. **Example: 7.6**

8. The distance S an object travels under the influence gravity in time t seconds is given by $S(t) = \frac{1}{2}gt^2 + at + b$ where a, b are constants. Verify the function S(t) is one – one or not. **Exercise: 1.4) 11**

9. Let $A = \{x \,\epsilon\, N \mid 1 < x < 4\}, B = \{x \,\epsilon\, W \mid 0 \le x < 2\}$. Verify distributive property of cartesian product over union and intersection respectively. **Example: 1.3**

10. Show that the square of an odd integer is of form $4q + 1$, for some integer q. **Example: 2.3**

11. If $P(A) = 0.37, P(B) = 0.42, P(A \cap B) = 0.09$ then find $P(A \cup B)$. **Example: 8.25**

12. If the area of triangle formed by the vertices $A(-1,2), (k,-2)$ and $(7,4)$ in order is 22. Sq. units. Find the value of k. **Example: 5.3**

13. Find the intercepts made by the line $4x - 9y + 36 = 0$ on the co-ordinate axes. **Example: 5.26**

14. If the straight lines $12y = -(p+3)x + 12$, $12x - 7y = 16$ are perpendicular then find p. **Exercise: 5.4) 4**

15. Let $f = \{(x,y) \mid x, y \in N$ and $y = 2x\}$ be a relation on N. Find the domain, Co-domain and range. Is this relation a function?. **Exercise: 1.3) 1**

16. What will be the probability that a leap year will have 53 Saturdays?. **Example: 8.21**

17. In two concentric circle, a chord of length 16 cm of larger circle becomes a tangent to the smaller circle whose radius is 6 cm. Find the radius of the larger circle. **Exercise: 4.4) 7**

18. Find the quadratic equation whose roots are $3 + \sqrt{7}$ and $3 - \sqrt{7}$. **old book**

19. Prove that $\frac{\sec \theta}{\sin \theta} - \frac{\sin \theta}{\cos \theta} = \cot \theta$. **Example: 6.6**

20. Find the area of shaded region. **Activity Book Pg. No: 211**

21. Two dice are rolled together. Find the probability of getting a doublet?. **Example: 8.3) 7 (i)**

22. Find LCM $x^3 - 27, (x - 3)^2, (x^2 - 9)$. **Example: 3.12) (iv)**

23. State Ceva's Theorem. **Book Pg. No: 195**

24. Find the zeros of the quadratic expression $x^2 + 2x - 143$. **Own Question Same Eg: 3.23**

25. Find the number of spherical lead shots, each of diameter 6 cm that can made from a solid cuboids of lead having dimensions $24\,cm \times 22\,cm \times 12\,cm$. **Own Question Same Eg: 7.29**

26. Find the image of the point $(3, 8)$ with respect to the line $x + 3y = 7$ assuming the line to be plane mirror. `Own Question`

27. A coin is tossed thrice. What is the probability of getting exactly one head?. `Exercise: 8.3) 4 same`

28. Find the volume of the iron used to make a hollow cylinder of height 9 cm and whose internal and external radii are 3 cm and 5 cm respectively. `Example: 7.17`

29. The heights of two right circular cones are in the ratio $1 : 2$ and the perimeter of their bases are in the ratio $3 : 4$. Find the ratio of their volumes. `Old book`

30. Find the value of x in $x^2 - 4x - 12$. `Own Question`

31. A cat is located at the point $(-6, -4)$ in xy plane . A bottle of milk kept at $(5, 11)$. The cat wish to consume the milk travelling through shortest possible distance. Find the equation of the path it needs to take its milk. `Exercise: 5.3) 8`

32. Show that the straight lines $x - 2y + 3 = 0$ and $6x + 3y + 8 = 0$ are perpendicular. `Example: 5.33`

33. If $P = \frac{x}{x+y}$, $Q = \frac{y}{x+y}$ then find $\frac{1}{P^2 - Q^2}$. `Old book`

34. Find the HCF of 23, 12 (By Euclid's division). `Activity Book Pg. No: 41`

35. Find the HCF of 252525 and 363636. `Exercise: 2.2) 3`

36. Determine the nature of roots of quadratic equations $9x^2 - 24x + 16 = 0$. `Example: 3.40`

37. Determine the nature of roots of quadratic equation $9a^2b^2x^2 - 24abcdx + 16c^2d^2 = 0$. `Exercise: 3.13) (iv)`

38. A garden roller whose length is 3 m long and whose diameter is 2.8 m is rolled to level garden. How much area will it cover in 8 revolutions?. `Example: 7.3`

39. The radius of a spherical balloon increases from 12 cm to 16 cm as air being pumped into it. Find the ratio of the surface area of the balloons in the two cones. `Example: 7.9`

40. A metallic sphere of radius 16 cm is melted recast into small spheres each of radius 2 cm . How many small spheres can be obtained?. `Example: 7.29`

41. The arrow diagram relationship between sets P and write relation (i) set builder form (ii) Roster Form. `Example: 1.5`

42. If $p^2 \times q^1 \times r^4 \times s^3 = 3,15,000$. Find p, q, r, s. `Activity Book Pg. No: 45`

10TH MATHS COMPULSORY QUESTIONS COLLECTIONS

5 MARK QUESTIONS EM NEW (2024 - 2025)

1. Find the G.P in which the 2nd term is $\sqrt{6}$ and the 6th term is $9\sqrt{6}$. `Unit. Exercise: 2) 9`

2. A metallic sheet in form of sector of a circle of radius 21 cm has central angle of $216°$. The sector is made into a cone by bringing bounding radii together. Find the volume of cone formed. `Unit. Exercise: 7) 10`

3. The roots of the equation $x^2 + 6x + 4 = 0$ are α, β . Find the quadratic equation whose roots are

   (i) α^2 and β^2 (ii) $\dfrac{2}{\alpha}$ and $\dfrac{2}{\beta}$ (iii) $\alpha^2\beta$ and $\beta^2\alpha$ `Exercise: 3.14) 3`

4. Find x if $gff(x) = fgg(x)$. Given $f(x) = 3x + 1$ $g(x) = x + 3$. `Example: 1.24`

5. A passenger train takes 1 hr more than express train to travel a distance of 240 from Chennai to viruchalam. The speed of passenger train is less than that of an express train by 20 km / hr. Find the average speed of both the train. `Example: 3.39`

6. Calculate the weight of hollow brass sphere if the inner diameter is 14 cm and thickness is 1 mm whose density is 17.3 g / cm^2. `Example: 7.22`

7. Find the sum of n terms of series $7 + 77 + 777 + \cdots$ `Old book same 5+55+555`

8. Find the equation of a straight line parallel to y axis passing through the point of intersection of the lines $4x + 5y = 13$ and $x - 8y + 9 = 0$. `Example: 5.36`

9. A capsule is in the shape of a cylinder with two hemisphere stuck to each of its ends. If the length of the entire capsule 12 mm and the diameter of the capsule is 3 mm. How much medicine it can hold?.
   `Exercise: 7.3) 5`

10. Arul has ti make arrangement for the accommodation of 150 persons for his family function. For this purpose he plans to build a tent which in the shape of cylinder surmounted by a cone. Each person occupies 4 sq.m of space on ground and 40 cu.m of air to breathe. What should be the height of the conical part of the tent. If the height of cylindrical part is 8 m?. `Example: 7.26`

11. Two boats are sailing in the sea on either sides of a light house. The angle of elevation of the top of the light house as observed form the boats are $30°$ and $45°$ respectively. If the light house 700 m. Find the distance between the two boats . $(\sqrt{3} = 1.732)$. `Example: 6.21 same model`

12. If -4 is a root of the equation $x^2 + px - 4 = 0$ and if the equation $x^2 + px + q = 0$ has equal roots. Find the values of p and q. `Unit. Exercise: 3) 16`

13. An industrial metallic bucket is in the shape of the frustrum of a right circular cone whose top and bottom diameters are 10 m and 4 m and whose height is 4 m. Find the C.S.A and T.S.A of the bucket.
    `Example: 7.14`

14. If the polynomial $25x^4 - 10x^3 + ax^2 + bx + 81$ is a perfect square then find the value of a and b.
    `Old book model`

15. The frustrum shaped outer portion of the table lamp has to be painted including the top part. Find the total cost of painting the lamp if the cost of painting 1 sq.cm is ₹2. Exercise: 7.1) 10

16. The radius of a sphere increases by 25%. Find the % increase in its surface area. Exercise: 7.1) 8

17. A triangular shaped glass with vertices at $A(-5, -4)$ $B(1, 6)$ $C(7, -4)$ has to be painted. If one bucket of paint covers 6 sq. feet. How many buckets of paint will be required to paint the whole glass. If only one coat of paint is applied. Exercise: 5.1) 10

18. A line makes positive intercepts on co-ordinate axes whose sum is 7 and it passes through $(-3, 8)$. Find its equation. Example: 5.28

19. Given that $A = \{x \mid x$ is a prime factor of $42 \}$ $B = \{x \mid x < 2, x \epsilon W \}$ $C = \{1, 4, 5\}$. Verify the distributive property of cartesian product over union. Old book

20. The number of volleyball games must be scheduled in league with teams is given by $G(n) = \frac{n^2 - n}{2}$ where each team plays with every other team exactly once. A league schedules 15 games. How many teams are in league?. Exercise: 3.10) 2

21. Find the equation of straight line through the intersection of lines $5x - 6y = 2, 3x + 2y = 10$ and perpendicular to the line $4x - 7y + 13 = 0$. Exercise: 5.4) 10

22. From a window (h metres high above the ground) of a house in a street the angles of elevation and depression of top and the foot of another house on the apposite side of the street are θ_1, θ_2 respectively. Show that the height of the opposite house is $h(1 + \frac{\cot \theta_2}{\cot \theta_1})$. Example: 6.33

23. Two ships are sailing in the sea on either side of the lighthouse. The angles of depression of two ships are observed from the top of the lighthouse are $60°$ and $45°$ respectively. If the distance between the ships in $200 \left(\frac{\sqrt{3}+1}{\sqrt{3}}\right)$ metres. Find the height of the lighthouse. Unit. Exercise: 6) 8

24. If the 4th and 7th term of a G.P are 54 and 1458 respectively. Find the geometric progression. Same Example: 2.43

25. Solve the following quadratic equation by completing the square method $\frac{5x+7}{x-1} = 3x + 2$. Exercise: 3.11) 1 (ii)

26. If the roots of $(a - b)x^2 + (b - c)x + (c - a) = 0$ are equal. Prove that $2a = b + c$. Exercise: 3.13) 3

27. The base of a triangle is 4 cm longer than its altitude. If the area of a triangle is 48 sq. cm. then find its base and altitude. Old book PTA Q

28. If the equation $(1 + m^2)x^2 + 2mcx + c^2 - a^2 = 0$ has equal roots then prove that $c^2 = a^2(1 + m^2)$. Old book PTA Q

29. Rekha has 15 squares colour papers of sizes 10 cm, 11 cm, 12 cm, … 24 cm. How much area can be decoreded with these colour papers?. Exercise: 2.9) 6

30. Let $f: A \to B$ be a function defined by $f(x) = \frac{x}{2} - 1$, where $A = \{2, 4, 6, 10, 12\}$ $B = \{0, 1, 2, 4, 5, 9\}$. Represent f by (i) Set of ordered pairs (ii) A table (iii) An arrow diagram (iv) A graph. Exercise: 1.14) 2

31. Prove that $2^n + 6 \times 9^n$ is always divisible by 7 for any positive integer n. [Exercise: 2.3) 8]

32. Find the sum $\left[\frac{a-b}{a+b} + \frac{3a-2b}{a+b} + \frac{5a-3b+}{a+b} + \cdots to\ 12\ terms\right]$. [Exercise: 2.6) 12]

33. Find the sum of the series $(2^3 - 1^3) + (4^3 - 3^3) + (6^3 - 5^3) + \cdots$ to (i) n terms (ii) 8 terms.

     [Exercise: 2.9) 7]

34. The diagram shows a plan for constructing a new parking lot at campus. It is estimated that such construction would cost ₹ 1300 per sq. feet. What will be the total cost of making the parking lot?. [Example: 5.7]

35. A right circular cylindrical container of base radius 6 cm and height 15 cm is full of ice cream. The ice cream is to be filled in cones of height 9 cm and base radius 3 cm, having a hemispherical cap. Find the number of cones needed to empty the container. [Example: 7.31]

36. Find the equation of line passing through $(22, -6)$ and having intercept on X - axis exceeds the intercepts on Y - axis by 5 units**.** [Old Book.]

37. Let $A = \{x \,\epsilon\, W \mid x < 3\}, B = \{x \,\epsilon\, N \mid 1 < x \le 5\}$ and $C = \{3, 5, 7\}$. Verify $A \times (B \cup C) = (A \times B) \cup (A \times C)$. [Example: 1.3]

10TH MATHS PTA QUESTIONS COLLECTIONS

2 MARK QUESTIONS EM NEW (2024 - 2025)

1. A man has 532 flower pots. He wants to arrange them in rows such that each row contains 21 flower pots. Find the number of completed rows and how many flower pots are left over. [Exercise: 2.1) 2]

2. Solve $x^4 - 13x^2 + 42 = 0$. [Example: 3.28]

3. If A is of order $p \times q$ and B is order $q \times r$. What is the order of AB and BA?. [Exercise: 3.19) 2]

4. A relation f is defined by $f(x) = x^2 - 2$ where $x \in \{-2, -1, 0, 3\}$. (i)List the elements of f (ii) Is f a function?. [Example: 1.7]

5. Show that $\Delta\ PST \sim \Delta\ PQR$. [Example: 4.1]

6. A tower stands vertically on the ground. From a point on the ground, which is 48 m away from the foot of the tower, the angle of elevation of the top of the tower is 30°. Find the height of the tower. [Example: 6.19]

7. The volume of a solid right circular cone is 11088 cm^3. If its height is 24 cm then find the radius of the cone. [Example: 7.19]

8. If $P(A) = \frac{2}{3}, P(B) = \frac{2}{5}, P(A \cup B) = \frac{1}{3}$ then find $P(A \cap B)$. [Exercise: 8.4) 1]

9. Find $A \times B$ and $A \times A$ for $A = \{m, n\}, B = \emptyset$. [Exercise: 1.1) 1 (iii)]

10. Find the middle term(s) of an A.P 9, 15, 21, 27, ---, 183. [Exercise: 2.5)]

11. The product of Kumaran's age (in years) two years ago and his age four years from now is one more than twice his present age. What is his present age?. [Example: 3.36]

12. Find the equation of a line passing through the point $(-4, 3)$ and having slope $-\frac{7}{5}$. [Example: 5.21]

13. The standard deviation of 20 observations is $\sqrt{6}$. Is each observation is multiplied by 3, find the standard deviation and variance of the resulting observations. **Exercise: 8.1) 9 same**

14. An organization plans to plant saplings in 25 streets in a town in such a way that one sapling for the first street, three for the second, nine for the third and so on. How many saplings are needed to complete the work?. **Old book**

15. A relation R is given by the set $\{(x, y)/\, y = x^2 + 3x, x \in \{0, 1, 2, 3, 4, 5\}\}$. Determine its domain and range. **Exercise: 1.2) 3**

16. If $f(x) = x^2 - 1$, $g(x) = x - 2$ and a if you $g \circ f(a) = 1$. **Exercise: 1.5) 4**

17. If A and B are mutually exclusive events of a random experiment and $P(not\ A) = 0.45, P(A \cup B) = 0.65$ then find P(B). **Exercise: 8.4) 3**

18. Dividing the polynomial $P(x) = x^2 - 5x - 14$ by another polynomial q(x) yields $\frac{x-7}{x+2}$ then find q(x). **Exercise: 3.5) 5**

19. If $\begin{pmatrix} \sqrt{7} & -3 \\ -\sqrt{5} & 2 \\ \sqrt{3} & -5 \end{pmatrix}$ then fin the transpose of $-A$. **Exercise: 3.17) 5**

20. If $\Delta\ ABC$ is similar to $\Delta\ DEF$ such that $BC = 3\ cm, EF = 4\ cm$ and area of $\Delta\ ABC = 54\ cm^2$. Find the area of $\Delta\ DEF$. **Example: 4.8**

21. Find the slope of a line joining the points $(\sin\theta, -\cos\theta)$ and $(-\sin\theta, \cos\theta)$. **Exercise: 5.2) 3 (ii)**

22. The hill in the form of a right triangle has its foot at $(19, 3)$. The inclination of the hill to the ground is $45°$. Find the equation of the hill joining the foot and top. **Exercise: 5.3) 6**

23. Find x so that $x + 6, x + 12$ and $x + 15$ are three consecutive terms of a Geometric Progression. **Exercise: 2.7) 4**

24. If $1 + 2 + 3 + \cdots + n = 666$ then the find n. **Example: 2.58**

25. Find 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 a tower of height $10\sqrt{3}\ m$. **Exercise: 6.2) 1**

26. The ratio of the radii of two right circular cones of same height is $1:3$. Find the ratio of their curved surface area when the height of each cone is 3 times the radius of the smaller cone?. **Exercise: 7.1) 7**

27. If two positive integers p and q are written as $p = a^2b^3$ and $q = a^3b$, a, b are prime numbers then verify $LCM(p, q) \times HCF(p, q) = pq$. **Old book**

28. Find the number of spherical lead shots, each of diameter 6 cm that can be made from a solid cuboids of lead having dimensions $24\ cm \times 22\ cm \times 12\ cm$. **Example: 7.29 old book same**

29. Let f be a function $f: \mathbb{N} \to \mathbb{N}$ defined by $f(x) = 3x + 2, x \in N$. Find the pre - image of 29, 53. **Example: 1.5) (ii)**

30. Is $7 \times 5 \times 3 \times 2 \times 3$ a composite number?. Justify your answer. **Example: 2.9**

31. If $3 + k, 18 - k, 5k + 1$ are A.P, then find k. **Exercise: 2.5) 8**

32. If $1^3 + 2^3 + 3^3 + \cdots k^3 = 16900$ then find $(1 + 2 + 3 + \cdots + k)$. Exercise: 2.9) 3 same

33. If $A = \begin{pmatrix} 7 & 8 & 6 \\ 1 & 3 & 9 \\ -4 & 3 & -1 \end{pmatrix}, B = \begin{pmatrix} 4 & 11 & -3 \\ -1 & 2 & 4 \\ 7 & 5 & 0 \end{pmatrix}$, then find $2A + B$. Example: 3.63

34. If one root of the equation $3x^2 + kx + 81 = 0$(having real roots) is the square of the other, then find k. Exercise: 3.14) 6

35. If $x = \frac{a^2+3a-4}{3a^2-3}$ and $y = \frac{a^2+2a-8}{2a^2-2a-4}$ find the value of x^2y^{-2}. Exercise: 3.5) 4

36. In the figure, AD is the bisector of $\angle BAC$, if $AB = 10\ cm, AC = 14\ cm$ and $BC = 6\ cm$ find BD and DC. Example: 4.16

37. What is the inclination of a line whose slope is 1?. Exercise: 5.2) 2 (ii)

38. A player sitting on the top of a tower of height 20 m, observes the angle of depression of a ball lying on the ground as $60°$. Find the distance between the foot of the tower and the ball. ($\sqrt{3} = 1.732$). Example: 6.26

39. A cone of height 24 cm is made up of modelling clay. A child reshapes it in the form of a cylinder of same radius as cone. Find the height of the cylinder. Example: 7.30

40. If A is an event of a random experiment such that $P(A):P(\bar{A}) = 17:15$ and $n(S) = 640$ then find $P(\bar{A})$. Exercise: 8.3) 3

41. The mean of a data is 25.6 and its coefficient of variation is 18.75. find the standard deviation. Example: 8.15

42. Show that the straight lines $3x - 5y + 7 = 0$ and $15x + 9y + 4 = 0$ are perpendicular. Example: 5.33 same

43. Find k if $f \circ f(k) = 5$ where $f(k) = 2k - 1$. Example: 1.22

44. Let $A = \{1, 2, 3, \ldots .100\}$ and R be the relation defined as "is cube of" on A. find the domain and range of R. Exercise: 1.2) 2 same

45. In a theatre there are 20 seats in the front row and 30 rows were allotted. Each successive row contains two additional seats than its front row. How many seats are there in the last row?. Exercise: 2.5) 10

46. In a G. P $\frac{1}{4}, -\frac{1}{2}, 1, -2, \ldots$ find t_{10}. Example: 2.42 same

47. Which rational expression should be subtracted from $\frac{x^2+6x+8}{x^8+8}$ to get $\frac{3}{x^2-2x+4}$. Exercise: 3.6) 4

48. Determine the quadratic equation, whose sum and product of roots are $-\frac{3}{2}$ and -1. Exercise: 3.9) 1 (iii)

49. State Pythagoras theorem. Book in

50. In the figure $DE \parallel AC$ and $DC \parallel AP$. Prove that $\frac{BE}{EC} = \frac{BC}{CP}$ Example: 4.14

51. Show that the points $P(-1.5, 3), Q(6, -2), R(-3, 4)$ are collinear. Example: 5.2

52. Prove that $\frac{\cot A - \cos A}{\cot A + \cos A} = \frac{\cosec A - 1}{\cosec A + 1}$. Exercise: 6.1) 5 (ii)

53. The volumes of two cones of same base radius are 3600 cm^3 and 5040 cm^3. Find the ratio of their heights. Exercise: 7.2) 6

54. The range of a set of data is 13.67 and the largest value is 70.08. find the smallest value. **Example: 8.3**

55. Write the sample space for selecting two balls from a bag containing 6 balls numbered 1 to 6 using tree diagram. **Exercise: 8.3) 2**

56. Find the sum and product of the roots of the equation $8x^2 - 25 = 0$. **Example: 3.25**

57. Let $A = \{1, 2, 3, 4\}$ and $B = \mathbb{N}$. Let $f: A \to B$ be defined by $f(x) = x^2$, find (i) The range of f (ii) identify the type of function. **Exercise: 1.4) 6**

58. If $3 + k, 18 - k, 5k + 1$ are in A.P then find k. **Exercise: 2.5) 8**

59. Find the geometric progression whose first term $a = -7$ and common ratio $r = 6$. **Example: 2.41) (i)**

60. Find the square root of $\frac{144a^8 b^{12} c^{16}}{81 f^{12} g^4 h^{14}}$. **Example: 3.19) (ii)**

61. Which term of the A.P $21, 18, 15, ...$ is -81?. State with reason is three any term 0 in this A.P?. **Exercise: 2.5) 5 same**

62. A relation R is given by the set $\{(x, y)/y = x + 3, x \in \{0, 1, 2, 3, 4, 5\}\}$. Determine its domain and range. **Exercise: 1.2) 3**

63. If $A = \begin{pmatrix} 0 & 4 & 9 \\ 8 & 3 & 7 \end{pmatrix}$ and $B = \begin{pmatrix} 7 & 3 & 8 \\ 1 & 4 & 9 \end{pmatrix}$ find the value of $3A - 9B$. **Exercise: 3.18) 4 (ii)**

64. In the adjacent figure AD is the bisector of A. If $BD = 4\ cm, DC = 3\ cm$ and $AB = 6\ cm$. Find AC. **Example: 4.15**

65. Show that the straight lines $x - 2y + 3 = 0$ and $6x + 3y + 8 = 0$ are perpendicular. **Example: 5.33**

66. Show that $\sqrt{\frac{\sec\theta - \tan\theta}{\sec\theta + \tan\theta}} = \frac{1 - \sin\theta}{\cos\theta}$. **Old book conjucate model**

67. If the radii of the circular ends of a frustrum which is 45 cm high are 28 cm and 7 cm , find the volume of the frustrum. **Example: 7.23**

68. Find the range of the following distribution. **Example: 8.2**

Age	16 - 18	18 - 20	20 - 22	22 - 24	24 - 26	26 - 28
Number of students	0	4	6	8	2	2

69. Three fair coins are tossed together. Find the probability of getting (i) Atleast one tail **(ii)** atmost one hand. **Exercise: 8.3) 8 (ii) (iii)**

70. Find the value of p, when $px^2 + (\sqrt{3} - \sqrt{2})x - 1 = 0$ and $x = \frac{1}{\sqrt{3}}$ is one root of the equation. **Old book**

71. Let f be a function from $\mathbb{R}$ defined by $f(x) = 3x - 5$. Find the values of a and b given that $(a, 4)$ and $(1, b)$ belong to f. **Example: 1.17**

72. If $R = \{(x. -2), (-5, y)\}$ represents the identify function, find the values of x and y. **Old book**

73. Find the common difference of an A.P in which $t_{18} - t_{14} = 32$. **Old book**

74. Find the number of integer solutions of $3x \equiv 1\ (mod\ 15)$. **Example: 2.16**

75. Find the sum of $1 + 3 + 5 + \cdots + 55$. **Example: 2.55) (iii)**

76. Solve by factorization method : $2x^2 - 2\sqrt{6}\,x + 3 = 0$. Example: 3.26

77. If the difference between a number and its reciprocal is $\dfrac{24}{5}$, find the number. Exercise: 3.12) 1

78. If α, β are the roots of the equation $7x^2 + ax + 2 = 0$ and if $\beta - \alpha = -\dfrac{13}{7}$, then find the value of a. Exercise: 3.14) 4

79. The line through the points $(-2, 6)$ and $(4, 8)$ is perpendicular to the line through the points $(8, 12)$ and $(x, 24)$. Find the value of x. Exercise: 5.2) 8

80. From the top of a rock $50\sqrt{3}$ m high, the angle of depression of a car the ground is observed to be $30°$. Find the distance of the car from the rock. Exercise: 6.3) 1

81. A solid sphere and a solid hemisphere have equal total surface area. Prove that the ratio of their volume is $3\sqrt{3} : 4$. Exercise: 7.2) 8

82. Find the standard deviation of first 21 natural numbers. Exercise: 8.1) 7

83. A and B are two candidates seeking admission to IIT. The probability that A getting selected is 0.5 and the probability that both A and B getting selected is 0.3. prove that the probability of B being selected is at most 0.8. Example: 8.31

84. P and Q are points on sides AB and AC respectively of ΔABC. If $AP = 3\,cm, PB = 6\,cm, AQ = 5\,cm$ and $QC = 10\,cm$. Show that $BC = 3\,PQ$. Old book

10TH MATHS PTA QUESTIONS COLLECTIONS

5 MARK QUESTIONS EM NEW (2024 - 2025)

1. The function t which maps temperature in Celsius (C) into temperature in Fahrenheit (F) is defined by $t(C) = F$ where $F = \frac{9}{5}C + 32$. Find (i) $t(0)$. (ii) the value of C when $t(C) = 212$. (iii) the temperature when the Celsius value is equal to the Fahrenheit value. Exercise: 1.4) 12

2. Rekha has 15 square colour papers of sizes 10 cm, 11 cm, 12 cm, … 24 cm. How much area can be decorated with these colour papers?. Exercise: 2.9) 6

3. If $A = \begin{pmatrix} 1 & 1 \\ -1 & 3 \end{pmatrix}, B = \begin{pmatrix} 1 & 2 \\ -4 & 2 \end{pmatrix}, C = \begin{pmatrix} -7 & 6 \\ 3 & 2 \end{pmatrix}$ verify that $A(B + C) = AB + AC$. Example: 3.72

4. State and prove Pythagoras theorem. Book in

5. As observed from the top of a 60 m high light house from the sea level the angles of depression of two ships are $28°$ and $45°$. If one ship is exactly behind the other on the same side of the light house. Find the distance between the two ships . $(\tan 28° = 0.5317)$. Example: 6.29

6. Find the number of coins, 1.5 cm in diameter and 2 mm thick, to be melted to form a right circular cylinder of height 10 m and diameter 4.5 cm. Unit Exercise: 7) 5

7. The marks scored by the students in a slip test are given below. Find the standard deviation of their marks. Example: 8.12

x	4	6	8	10	12
f	7	3	5	9	5

8. Let $A = $ The set of all natural numbers less than 8, $B = $ The set of all prime numbers less than 8. $C = $ The set of all even prime numbers. Verify that $A \times (B - C) = (A \times B) - (A \times C)$. Exercise: 1.1) 7 (ii)

9. If $S_n = (x + y) + (x^2 + xy + y^2) + (x^3 + x^2y + xy^2 + y^3) + \cdots n$ terms the prove that $(x - y)S_n = \frac{x^2(x^n-1)}{x-1} - \frac{y^2(y^n-1)}{y-1}$. Exercise: 2.8) 10

10. Solve $\frac{1}{2x} + \frac{1}{4y} - \frac{1}{3z} = \frac{1}{4}, \frac{1}{x} = \frac{1}{3y}; \frac{1}{x} - \frac{1}{5y} + \frac{4}{z} = 2\frac{2}{15}$. Example: 3.8

11. A funnel consists of a frustrum of a cone attached to a cylindrical portion 12 cm long attached at the bottom. If the total height be 20 cm, diameter of the cylindrical portion be 12 cm and the diameter of the top of the funnel be 24 cm. find the outer surface area of the funnel. Example: 7.27

12. In a class of 50 students, 28 opted for NCC, 28 opted for NSS and 10 opted for both NCC and NSS. One of the students is selected at random. Find the probability that (i) the student opted for NCC but not NSS. (ii) The student opted for NSS but not NCC. (iii) The student opted for exactly one of them. Example: 8.30

13. The base of a triangle is 4 cm longer than its altitude. If the area of the triangle is 48 sq. cm. then find its base and altitude. Old book

14. The area of a triangle is 5 sq. units. Two of its vertices are $(2,1)$ and $(3,-2)$. The third vertex lies on the line $y = x + 3$. Find the third vertex. `Unit Exercise: 5) 2`

15. In the figure, the quadrilateral swimming pool shown is surrounded by concrete patio. Find the area of the patio. `Exercise: 5.1) 9`

16. State and prove Thales theorem. `Book in`

17. If $f(x) = x - 4, g(x) = x^2, h(x) = 3x - 5$ then show that $(f \circ g) \circ h = f \circ (g \circ h)$. `Exercise: 1.5) 8 (iii)`

18. (i) Find the least positive value of x such that $67 + x \equiv 1 (mod\ 4)$. `Example: 2.13) (i)`

    (ii) Solve $5x \equiv 4 (mod\ 6)$. `Exercise: 2.3) 3`

19. The houses of a street are numbered from 1 to 49. Senthil's house is numbered such that the sum of numbers of the houses prior to Senthil's house is equal to the sum of numbers of the houses following Senthil's house. Find Senthil's house number. `Example: 2.38`

20. A coin is tossed thrice. Find the probability of getting exactly two heads or atleast one tail or two consecutive heads. `Exercise: 8.4) 11`

21. The temperature of two cities A and B in a winter season are given below. `Old book`

Temperature of city A (in degree celsius)	18	20	22	24	26
Temperature of city B (in degree celsius)	11	14	15	17	18

22. Let $A = \{x \in W / x < 2\}, B = \{x \in N / 1 \le x \le 4\}$ and $C = \{3, 5\}$. Verify that $A \times (B \cup C) = (A \times B) \cup (A \times C)$. `Exercise: 1.1) 6 (i)`

23. Vani her father and her grand father have an average age of 53. One half of her grandfather's age plus one-third of her father's age plus one- fourth of Vani's age is 65. Four years ago if Vani's grandfather was four times as old as Vani then how old are they all now?. `Exercise: 3.1) 3`

24. If $A = \begin{pmatrix} \cos\theta & 0 \\ 0 & \cos\theta \end{pmatrix}, B = \begin{pmatrix} \sin\theta & 0 \\ 0 & \sin\theta \end{pmatrix}$ then show that $A^2 + B^2 = I$. `Exercise: 3.19) 8`

25. A metallic sheet in the form of a sector of a circle of radius 21 cm has central angle of $216°$. The sector is made into a cone by bringing the bounding radii together. Find the volume of the cone formed. `Unit Exercise: 7) 10`

26. A shuttle cock used for playing badminton has the shape of a frustrum of a cone is mounted on a hemisphere. The diameters of the frustrum are 5 cm and 2 cm. The height of the entire shuttle cock is 7 cm. Find its external surface area. `Old book`

27. A motor Boat whose speed is 18 km / hr in still water takes 1 hour more to go 24 km upstream than to return downstream to the same spot. Find the speed of the stream. `Old book`

28. A 1.2 m tall girls spots a balloon moving with the wind in a horizontal line at a height of 88.2 m from the ground. The angle of elevation of the balloon from the eyes of the girl at an instant is $60°$. After some time the angle of elevation reduces to $30°$. Find the distance travelled by the balloon during the interval. `Old book`

29. Let $A = \{1, 2, 3, 4\}$ and $B = \{2, 5, 8, 11, 14\}$ be two sets. Let $f : A \to B$ be a function given by $f(x) = 3x - 1$. Represent this function (i) by arrow diagram (ii) in a table form (iii) as a set of ordered pairs (iv) in a graphical form. **Example: 1.11**

30. An object travels under the influence of gravity in time t seconds is given by $s(t) = \frac{1}{2}gt^2 + at + b$ where (g is the acceleration due to gravity) a, b are the constants. Check if the function $s(t)$ is one - one. **Exercise: 1.4) 11**

31. Let $A = \{x \in W \ / \ 0 < x < 5\}, B = \{x \in W / 0 \le x \le 2\}$ and $C = \{x \in W \ / x < 3\}$. Verify that $A \times (B \cap C) = (A \times B) \cap (A \times C)$. **Example: 1.3) same**

32. Find the sum of the geometric series $3 + 6 + 12 + \cdots + 1536$. **Exercise: 2.8) 7**

33. Find the sum of all 3 digit natural numbers which are divisible by 9. **Example: 2.36) same**

34. Find the square root of the expression $\frac{4x^2}{y} + \frac{20x}{y} + 13 - \frac{30y}{x} + \frac{9y^2}{x^2}$. **Old book**

35. Solve the quadratic equation by completing the square method $\frac{5x+7}{x-1} = 3x + 2$. **Exercise: 3.11) 1 (ii)**

36. If $A = \begin{pmatrix} 5 & 2 & 9 \\ 1 & 2 & 8 \end{pmatrix}, B = \begin{pmatrix} 1 & 7 \\ 1 & 2 \\ 5 & -1 \end{pmatrix}$, verify that $(AB)^T = B^T A^T$. **Exercise: 3.19) 12**

37. The hypotenuse of a right triangle is 6 m more than twice of the shortest side. If the third side is 2 m less than the hypotenuse. Find the sides of the triangle. **Exercise: 4.3) 5**

38. Find the equation of a straight line joining the point of intersection of $3x + y + 2 = 0$ and $x - 2y - 4 = 0$ to the point of intersection of $7x - 3y = -12$ and $2y = x + 3$. **Exercise: 5.4) 11**

39. If $\sqrt{3} \sin \theta - \cos \theta$, then show that $\tan 3\theta = \frac{(3 \tan \theta - \tan^3 \theta)}{1 - 3 \tan^2 \theta}$. **Exercise: 6.1) 7 (ii)**

40. The radius of a conical tent is 7 m and the height is 24 m. Calculate the length of the canvas used to make the tent. If the width of the rectangular canvas is 4 m. **Example: 7.5**

41. A card is drawn from a pack of 52 cards. Find the probability of getting a king or a heart or a red card. **Old book Card sum**

42. Find the co=efficient of variation of the data $18, 20, 15, 12, 25$. **Exercise: 8.2) 5**

43. The data in the adjacent table depicts the length of a woman's forehand and her corresponding height. Based on this data, a student finds a relationship between the height(y) and the forehead length (x) as $y = ax + b$, where a, b are constants (i) Check if this relation is a function (ii) Find a and b (iii) Find the height of a woman whose forehand length is 40 cm (iv) Find the length of forehand of a woman if her height is 53.3 inches. **Exercise: 1.3) 10**

Length x of forehand (in cm)	Height y (in inches)
35	56
45	65
50	69.5

55	74

44. A function $f: [-5, 9] \to \mathbb{R}$ is defined as follows $f(x) = \begin{cases} 6x + 1 \ if -5 \le x < 2 \\ 5x^2 - 1 \ if \ 2 \le x < 6 \\ 3x - 4 \ if \ 6 \le x \le 9 \end{cases}$.

    Find (i) $f(7) - f(1)$ (ii) $\dfrac{2f(-2) - f(6)}{f(4) + f(-2)}$. **Exercise: 1.4) 10**

45. Find the sum to n terms of the series $5 + 55 + 555 + \cdots$. **Example: 2.51**

46. A girl is twice as old as her sister. Five years hence, the product of their ages (in years) will be 375. Find their present ages. **Exercise: 3.12) 4**

47. Find the non-zero values of x satisfying the matrix equation $x \begin{pmatrix} 2x & 2 \\ 3 & x \end{pmatrix} + 2 \begin{pmatrix} 8 & 5x \\ 4 & 4x \end{pmatrix} = 2 \begin{pmatrix} x^2 + 8 & 24 \\ 10 & 6x \end{pmatrix}$. **Exercise: 3.18) 7**

48. Find the values of a and b if the polynomial $4x^4 - 12x^3 + 37x^2 + bx + a$ is a perfect square.

    Exercise: 3.8) 2) (i)

49. State and prove alternate segment theorem. **Book in**

50. $PQRS$ is a rhombus. Its diagonals PR and QS intersect at the point M and satisfy $QS = 2PR$. If the coordinates of S and M are $(1,1)$ and $(2, -1)$ respectively, find the coordinates of P. **Old book**

51. A building and a statue are in opposite side of a street from each other 35 m apart. From a point on the roof of building the angle of elevation of the top of statue is $24°$ and the angle of depression of base of the statue is $34°$. Find the height of the statue. $(\tan 24° = 0.4452, \tan 34° = 0.6745)$. **Unit Exercise: 6) 9**

52. A cylindrical bucket, 32 cm high and with radius of base 18 cm, is filled with sand completely. This bucket is emtied on the ground and a conical heap of sand is formed. If the height of the conical heap is 24 cm, find the radius and slant height of the heap. **Old book**

53. The consumption of number of guava and orange by a family on a particular week are given below. Which fruit is consistently consumed by the family? **Old book**

Number of Guavas	3	5	6	4	3	5	4
Number of Oranges	1	3	7	9	2	6	2

54. In a class of 50 students, 28 opted for NCC, 28 opted for NSS and 10 opted for both NCC and NSS. One of the students is selected at random. Find the probability that (i) the student opted for NCC but not NSS. (ii) The student opted for NSS but not NCC. (iii) The student opted for exactly one of them.

    Example: 8.30

55. By using slopes, show that the points $(1, -4)$, $(2, -3)$ and $(4, -7)$ form a right angled triangle.

    Exercise: 5.2) 9) (i)

56. A man saved ₹ 16,500 in ten years. In each year after the first he saved ₹ 100 more than he did in the preceding year. How much did he save the first year? **Unit Exercise: 2) 8**

57. Let $A = \{x \in W / x < 2\}, B = \{x \in N / 1 \le x \le 4\}$ and $C = \{3, 5\}$. Verify that

$A \times (B \cap C) = (A \times B) \cap (A \times C).$ **Exercise: 1.1) 6) (iii)**

58. If $f(x) = 2x + 3, g(x) = 1 - 2x, h(x) = 3x,$ then prove that $f \circ (g \circ h) = (f \circ g) \circ h.$ **Example: 1.23**

59. A man repays a loan of ₹ 65, 000 by paying ₹ 400 in the first month and then increasing the payment by D300 every month. How long will it take for him to clear the loan?. **Exercise: 2.6) 9**

60. Find the sum of $10^3 + 11^3 + 12^3 + \cdots + 20^3.$ **Exercise: 2.9) 1 (vi)**

61. Solve the system of linear equations in three variables: $x + y + z = 5, 2x - y + z = 9, x - 2y + 3z = 16.$ **Exercise: 3.1) 1) (i)**

62. If $9x^4 + 12x^3 + 28x^2 + ax + b$ is a perfect square, find the value of a and b. **Example: 3.22**

63. If $A = \begin{pmatrix} 1 & -1 \\ 2 & 3 \end{pmatrix}$. Show that $A^2 - 4A + 5I_2 = 0$. **Exercise: 3.19) 13 same**

64. State and prove Angle Bisector Theorem. **Book in**

65. Find the value of k, if the area of a quadrilateral is 28 sq. units, whose vertices are $(-4, -2), (-3, k), (3, -2)$ and $(2,3)$. **Exercise: 5.1) 6**

66. Two ships are sailing in the sea on either sides of a lighthouse. The angle of elevation of the top of the lighthouse as observed from the ships are $30°$ and $45°$ respectively. If the lighthouse is 200 m high, find the distance between the two ships. $\sqrt{3} = 1.732$. **Example: 6.2**

67. A right circular cylindrical container of base radius 6 cm and height 15 cm is full of ice cream. The ice cream is to be filled in cones of height 9 cm and base radius 3 cm, having a hemispherical cap. Find the number of cones needed to empty the container. **Example: 7.31**

68. A well of diameter 3 m is dug 14 m deep. The earth taken out of it has been spread evenly all around it in the shape of a circular ring of width 4 m to form an embankment. Find the height of the embankment. **Exercise: 7.2) 1**

69. The time taken by 50 students to complete a 100 meter race are given below. Find its standard deviation. **Exercise: 8.1) 13**

Time taken (seconds)	8.5- 9.5	9.5-10.5	10.5-11.5	11.5-12.5	12.5-13.5
Number of Students	6	8	17	10	9

70. A card is drawn from a pack of 52 cards. Find the probability of getting a Queen or a diamond or a black card. **Old book card sum**

71. Write the domain of the following functions: (i) $\frac{2x+1}{x-9}$ (ii) $g(x) = \sqrt{x - 2}$. **Unit Exercise: 1) 10**

72. If $f: \mathbb{R} \to \mathbb{R}$ and $g: \mathbb{R} \to \mathbb{R}$ are defined by $f(x) = x^5$ and $g(x) = x^4$ then check if f and g are one - one and $f \circ g$ is one - one?. **Exercise: 1.5) 7**

73. If the sum of the first p terms of an A.P is $ap^2 + bp$. Find its common difference. **Old book**

74. A man joined a company as Assistant Manager. The company gave him a starting salary of ₹ 60,000 and agreed to increase his salary 5% annually. What will be his salary after 5 years?. **Exercise: 2.7) 10**

75. If the roots of the equation $(c^2 - ab)x^2 - 2(a^2 - bc)x + b^2 - ac = 0$ are real and equal, prove that either $a = 0$ or $a^3 + b^3 + c^3 = 3abc$. **Exercise: 3.13) 5**

76. Find the LCM of the polynomials $a^2 + 4a - 12, a^2 - 5a + 6$ whose GCD is $a - 2$. **Exercise: 3.3) 2 (i)**

77. If $A = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}, B = \begin{pmatrix} 0 & 3 \\ -1 & 5 \end{pmatrix}, C = \begin{pmatrix} -1 & 5 \\ 1 & 3 \end{pmatrix}$. Prove that $A(BC) = (AB)C$. **Exercise: 3.19) 7 same**

78. The perpendicular PS on the base QR of a ΔPQR intersects QR at S, such that $QS = 3SR$. Prove that $2PQ^2 = 2PQ^2 + QR^2$. **Exercise: 4.3) 7**

79. Find the equation of the median and altitude of ΔABC through A where the vertices are $A(6,2), B(-5,-1)$ and $C(1,9)$. **Exercise: 5.3) 9**

80. Prove that $\left[\frac{\cos^3 A - \sin^3 A}{\cos A - \sin A}\right] - \left[\frac{\cos^3 A + \sin^3 A}{\cos A + \sin A}\right] = 2 \sin A \cos A$. **Example: 6.13**

81. If the slant height of the frustum cone is 10 cm and perimeters of its circular base are 18 cm and 28 cm respectively. What is the curved surface area of the frustum?. **Example: 7.13 same**

82. A right circular cylindrical container of base radius 6 cm and height 15 cm is full of ice cream. The ice cream is to be filled in cones of height 9 cm base radius 3 cm, having a hemispherical cap. Find the number of cones needed to empty the container. **Example: 7.31**

83. The following table gives the values of mean and variance of heights and weights of the 10th standard students of a school. Which is more varying than the other. **Example: 8.16**

	Height	Weight
Mean	155 cm	46.50 kg
Variance	72.25 cm^2	28.09 kg^2

84. A coin is tossed thrice. Find the probability of getting exactly two heads or at least one tail or two consecutive heads. **Exercise: 8.4) 11**

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