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 rato 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) $\frac{2}{\alpha}$ and $\frac{2}{\beta}$ (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 $42 \}$ $B = \{x \mid x < 2, x \in W \}$ $C = \{1, 4, 5\}$. 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 $A = \{x \ \epsilon \ W \mid x < 3\}, B = \{x \ \epsilon \ N \mid 1 < x \leq 5\}$ 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 $A = \{1, 2, 3, \dots.100\}$ 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 $\frac{1}{4}, -\frac{1}{2}, 1, -2, \dots$ 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 $\frac{\cot A - \cos A}{\cot A + \cos A} = \frac{\csc A - 1}{\csc A + 1}$. 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 $\frac{144a^8 b^{12} c^{16}}{81f^{12} g^4 h^{14}}$. **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 $\frac{24}{5}$, find the number. Exercise: 3.12) 1

78. If α, β are the roots of the equation $7x^2 + ax + 2 = 0$ and if $\beta - \alpha = -\frac{13}{7}$, 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 $S_n = (x + y) + (x^2 + xy + y^2) + (x^3 + x^2 y + xy^2 + y^3) + \cdots n$ 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) $\frac{2f(-2) - f(6)}{f(4) + f(-2)}$. **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)
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

58. 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

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

60. 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)

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

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

63. State and prove Angle Bisector Theorem. Book in

64. 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

65. 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

66. 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

67. 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**

68. 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

69. 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**

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

71. 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**

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

73. 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**

74. 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**

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

76. 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**

77. 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**

78. 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**

79. 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**

80. 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**

81. 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**

82. 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

83. 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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