CLASS : 10 **SECOND REVISION EXAMINATION - 2025** Register Number

Time Allowed : 3.00 Hours]

MATHEMATICS

[Max. Marks : 100

PART – I

I. Choose the best answer of the following: **14x1=14**

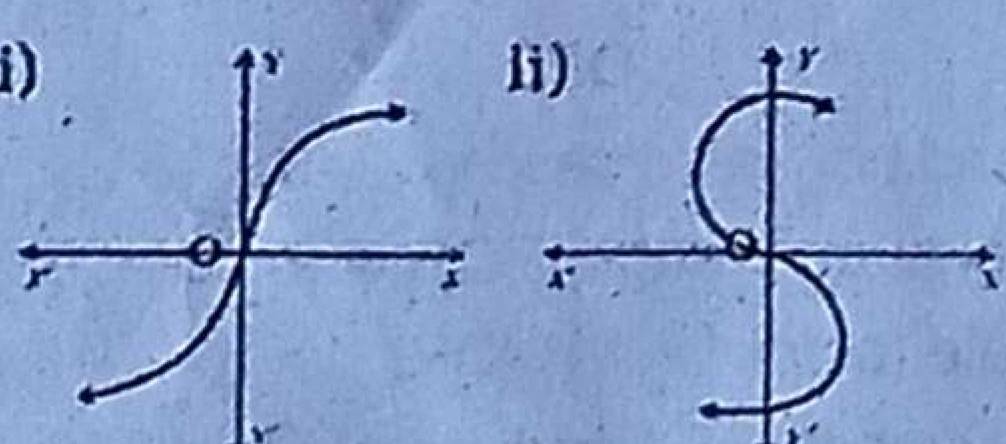
1. Let n(A)=m and n(B)=n then the total number of non-empty relations that can be defined from A to B is
   (a) m^n (b) n^m c) $2^{mn}-1$ d) 2^{mn}
2. $f(x)=(x+1)^3-(x-1)^3$ represents a function which is
   (a) Linear (b) Cubic (c) reciprocal (d) quadratic
3. Given $F_1=1$, $F_2=3$ and $F_n = F_{n-1} + F_{n-2}$ then F_5 is ———
   (a) 3 (b) 5 (c) 8 (d) 11
4. If a,b,c are in G.P. then $\frac{a-b}{b-c}$ is equal to
   (a) $\frac{a}{b}$ (b) $\frac{b}{a}$ (c) $\frac{a}{c}$ (d) $\frac{c}{b}$
5. Which of the following should be added to make x^4+64 a perfect square.
   (a) $4x^2$ (b) $16x^2$ (c) $8x^2$ (d) $-8x^2$
6. If number of columns and rows are not equal in a matrix then it is said to be a
   (a) diagonal matrix (b) rectangular matrix (c) square matrix (d) identity matrix
7. If ΔABC is an isosceles triangle with $\angle C=90^\circ$ and AC = 5cm then AB is
   (a) 2.5 cm (b) 5 cm (c) 10 cm (d) $5\sqrt{2}$ cm
8. If (5, 7), (3, P) and (6, 6) are collinear then the value of P is ———
   (a) 3 (b) 6 (c) 9 (d) 12
9. The angle of inclination of a straight line parallel to x-axis is equal to
   (a) 0° (b) 60° (c) 45° (d) 90°
10. If $5x = \sec\theta$ and $5/x = \tan\theta$, then $x^2 - 1/x^2$ is equal to
    (a) 25 (b) $1/25$ (c) 5 (d) 1
11. The curved surface area of a right circular cone of height 15 cm and base diameter 16 cm is
    (a) 60π cm² (b) 68π cm² (c) 120π cm² (d) 136π cm²
12. The total surface area of a solid hemisphere whose radius is a units is equal to
    (a) $2\pi a^2$ sq.units (b) $3\pi a^2$ sq.units (c) $3\pi a$ sq.units (d) $3a^2$ sq.units
13. Variance of first 20 natural numbers is
    (a) 32.25 (b) 44.25 (c) 33.25 (d) 30
14. If a letter is chosen at random from the English alphabets {a,b, c, ... z} then the probability that the letter chosen proceds x
    (a) $\frac{12}{13}$ (b) $\frac{1}{13}$ (c) $\frac{23}{26}$ (d) $\frac{3}{26}$

PART - II

II. Answer any 10 questions. [Question No. 28 is compulsory]. **10x2=20**

15. Let A = {3, 4,7, 8} and B = {1,7,10}. Which of the following sets are relations from A to B?
    i) R_1 = {(3, 7), (4, 7), (7, 10), (8, 1)} ii) R_2 = {(3,1), (4,12)}
16. Determine whether the graph given below represent functions. Give reason for your answers concerning each graph.

i) ii)



17. Find the greastest number that will divide 445 and 572 leaving remainders 4 and 5 respectively.

18. If $1^3 + 2^3 + 3^3 + \dots + k^3 = 44100$ then find $1 + 2 + 3 + \dots + k$.
19. Find the LCM of $5x - 10$, $5x^2 - 20$.
20. If a matrix has 20 elements, what are the possible orders it can have? What if it has 8 elements.
21. A man goes 18m due east and then 24m due north. Find the distance of his current position from the starting point?
22. Show that the given points are collinear: (-3, -4), (7,2) and (12,5).
23. A kite is flying at a height of 75m above the ground. The string attached to the kite temporarily tied to apoint on the ground. The inclination of the string with the ground is 60 .Find the lenght of the string, assuming that there is no slck in the string.
24. Find the volume of a cylinder whose height is 2m and whose base area is 250 m^2.
25. If the total surface area of a cone of radius 7 cm is 704 cm^2, then find its slant height.
26. If the range and the smallest value of a set of data are 36.8 and 13.4 respectively, then find the largest value.
27. A die is rolled and a coin is tossed simultaneously. FInd the probability that the die shows an odd number and the coin shows a head.
28. Find the intercepts made by the line $4x - 9y + 36=0$ on the coordinate axes.

PART - III

III. Answer any 10 questions only [Q.NO: 42 is compulsory] **10x5=50**

29. Let A = {1, 2, 3, 4} and B = {2, 5, 8, 11, 14} be two sets. Let f: A→B be 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.
30. Find x if $gff(x) = fgg(x)$, given $f(x) = 3x+1$ and $g(x) = x+3$.
31. The sum of first n, 2n and 3n terms of an A.P. are S_1, S_2 and S_3 respectively prove theat $S_3=3(S_2-S_1)$.
32. Find the sum of $10^3+ 11^3+ 12^3+ \dots + 20^3$.
33. 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) $a^3+b^3+c^3=3abc$.
34. If $A = \begin{pmatrix} 3 & 1 \\ -1 & 2 \end{pmatrix}$ show that $A^2-5A+7I_2=0$.
35. State and prove : Angle Bisector Theorem.
36. Let A (3,-4), B(9,-4), C(5,-7) and D(7,-7) show that ABCD is a trpezium.
37. Find the equation of the perpendicular bisector of the line joining the points A(-4, 2) and B(6, -4).
38. From the top of a 12m high building the angle of elevation of the top of a cable tower is 60° and the angle of depression of its foot is 30°. Determine the height of the tower.
39. A 14 m deep well with inner diameter 10 m is dug and the earth taken out is evenly spread all around the well to form an embankment of width 5 m. Find the height of the embankment.
40. A metallic sphere of radius 16 cm is melted and recost into small spheres each of radius 2cm. How many small spheres can be obtained?
41. A coin is tossed thrice. Find the probability of getting exactly two heads or atleast one tail or two consecutive heads.
42. If $P = \frac{x}{x+y}$, $Q = \frac{y}{x+y}$, then find $\frac{1}{P-Q} - \frac{2Q}{P^2-Q^2}$

PART - IV

IV. Answer the following questions. **2x8=16**

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

(OR)

b) Draw the graph of $y=x^2+x-2$ and hence solve $x^2+x-2=0$.

44. a) Construct a triangle similar to given triangle PQR with its sides equal to $^7/_3$ of the corresponding sides of the triangle PQR(scale factor $^7/_3>1$) **(OR)**

b) Construct a triangle ΔPQR Such that QR = 5 cm, ∠P = 30° and the altitude from P to QR is of length 4.2 cm.

SECOND REVISION EXAMINATION - 2025
TIRUPATTUR DT - 10^{th} Maths
5.2.2025

I.

1. (c) $2^{mn}-1$
2. (d) quadratic
3. (d) 11
4. (a) $\frac{a}{b}$
5. (b) $16x^2$
6. (b) rectangular matrix
7. (d) $5\sqrt{2}$ cm
8. (c) 9
9. (a) 0°
10. (b) $\frac{1}{25}$
11. (d) $136\pi\ cm^2$
12. (b) $3\pi a^2$ sq.units
13. (c) 33.25
14. (c) $\frac{23}{26}$

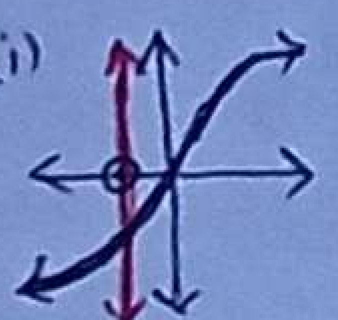
II.

15. (i) $R_1 \subseteq A\times B$, R_1 is a relation from A to B

(ii) $(4,12)\in R_2$, $(4,12)\notin A\times B$

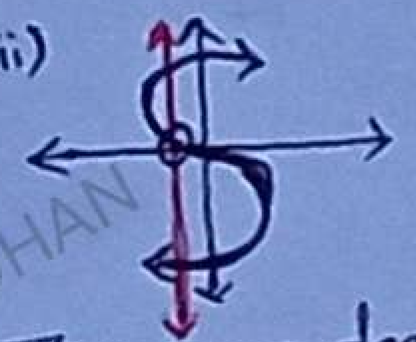
R_2 is not a relation from A to B.

16. (i)



The curve represent a function as the vertical line meet the curve in atmost 1 point

(ii)



The curve does not represent a function as the vertical line meet the curve in 3 points.

17. $445-4=441$, $572-5=567$

$567 = 441\times1+126$

$441 = 126\times3+63$

$126 = 63\times2+0$

$\therefore$ HCF of 441, 567 = 63

Required number = 63

18. $\left[\frac{n(n+1)}{2}\right]^2 = 44100$

$\frac{n(n+1)}{2} = \sqrt{44100} = 210$

$\therefore 1+2+\dots+k = 210$

19. $5x-10 = 5(x-2)$

$5x^2-20 = 5(x^2-4) = 5(x+2)(x-2)$

$LCM = 5(x+2)(x-2)$

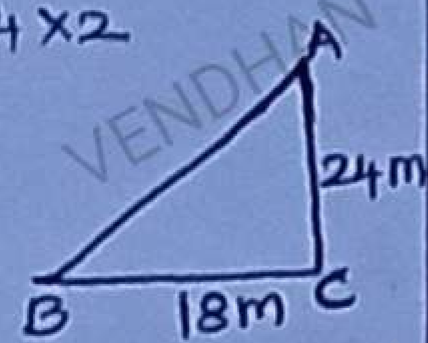
20. CQ possible orders (20 elements)

$= (1\times20, 20\times1, 2\times10, 10\times2, 4\times5, 5\times4)$

possible orders (8 elements)

$= (1\times8, 8\times1, 2\times4, 4\times2)$

21.



$AB^2 = BC^2+AC^2$

$= 18^2+24^2$

$= 324+576$

$= 900$

$\boxed{AB = 30m}$

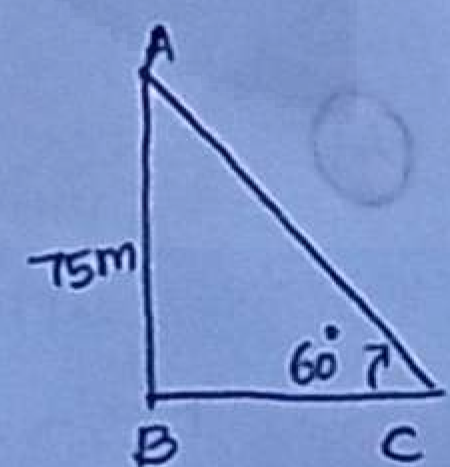
22. Slope $m_1 = \frac{y_2-y_1}{x_2-x_1} = \frac{2+4}{7+3} = \frac{6}{10} = \frac{3}{5}$

Slope $m_2 = \frac{5-2}{12-7} = \frac{3}{5}$

$m_1 = m_2$

$\therefore$ Given points are collinear

23.



$\sin\theta = \frac{AB}{AC}$

$\sin 60^\circ = \frac{75}{AC}$

$\frac{\sqrt{3}}{2} = \frac{75}{AC}$

$AC = \frac{150}{\sqrt{3}}$

$\boxed{AC = 50\sqrt{3}\ m}$

24. $h = 2m$

$\pi r^2 = 250\ m^2$

Volume $= \pi r^2 h$ cu.units

$= 250\times2 = 500\ m^3$

25. $r = 7cm$

$TSA = \pi r(l+r) = 704$

$\frac{22}{7}\times7(l+7) = 704$

$l+7 = 32$

$\boxed{l = 25cm}$

26. $R = 36.8$

$S = 13.4$

$L = R+S = 36.8+13.4 = 50.2$

$\boxed{L = 50.2}$

27. $S = \{1H, 1T, 2H, 2T, 3H, 3T, 4H, 4T, 5H, 5T, 6H, 6T\}$

$n(S) = 12$

$A = \{1H, 3H, 5H\}$

$P(A) = \frac{n(A)}{n(S)} = \frac{3}{12} = \frac{1}{4}$

28. $4x-9y+36=0$

$4x-9y = -36$

$\frac{x}{-9}+\frac{y}{4} = 1$

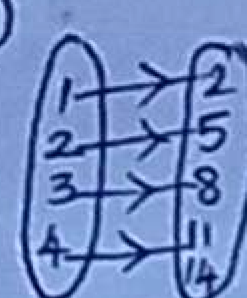
x intercept $a = -9$

y intercept $b = 4$

III.

29. $f(1)=1$, $f(2)=5$, $f(3)=8$, $f(4)=11$

(i)



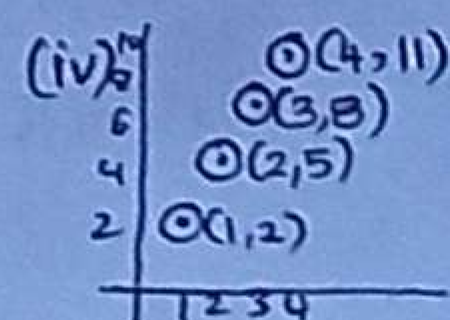
(ii)

x	1	2	3	4
$f(x)$	2	5	8	11

(iii)

$f = \{(1,2)(2,5)(3,8)(4,11)\}$

(iv)



30. $f(x) = 3x+1$, $g(x) = x+3$

$gff(x) = g[f\{f(x)\}]$

$= g[3(3x+1)+1]$

$= g[9x+4] = 9x+7$

$fgg(x) = f[g\{g(x)\}]$

$= f[(x+3)+3]$

$= f(x+6) = 3x+19$

$9x+7 = 3x+19$

$6x = 12 \Rightarrow \boxed{x=2}$

31. $S_1 = \frac{n}{2}[2a+(n-1)d]$

$S_2 = \frac{2n}{2}[2a+(2n-1)d]$

$S_3 = \frac{3n}{2}[2a+(3n-1)d]$

$S_2-S_1 = \frac{n}{2}[2a+(3n-1)d]$

$3(S_2-S_1) = \frac{3n}{2}[2a+(3n-1)d] = S_3$

32. $10^3+11^3+\dots+20^3 = [1^3+2^3+\dots+20^3] - [1^3+2^3+\dots+9^3]$

$= \left(\frac{n(n+1)}{2}\right)^2_{n=20} - \left(\frac{n(n+1)}{2}\right)^2_{n=9}$

$= \left(\frac{20(20+1)}{2}\right)^2 - \left(\frac{9(9+1)}{2}\right)^2$

$= (210)^2-(45)^2 = 44100-2025$

$= 42075$

33. $a = c^2-ab$

$b = -2(a^2-bc)$

$c = b^2-ac$

$\Delta = 0 \Rightarrow b^2-4ac=0$

$a(a^3+b^3+c^3)-3a^2bc=0$

$a^3+b^3+c^3 = 3abc$

34 $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$

$$A^2 = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix} \times \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix} = \begin{bmatrix} 8 & 5 \\ -5 & 3 \end{bmatrix}$$

$$A^2 - 5A + 7I_2 = \begin{bmatrix} 8 & 5 \\ -5 & 3 \end{bmatrix} - \begin{bmatrix} 15 & 5 \\ -5 & 10 \end{bmatrix} + \begin{bmatrix} 7 & 0 \\ 0 & 7 \end{bmatrix}$$

$$= \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$$

$\therefore A^2 - 5A + 7I_2 = 0$

35 The internal bisector of an angle of a triangle divides the opposite side internally in the ratio of the corresponding sides containing the angle.

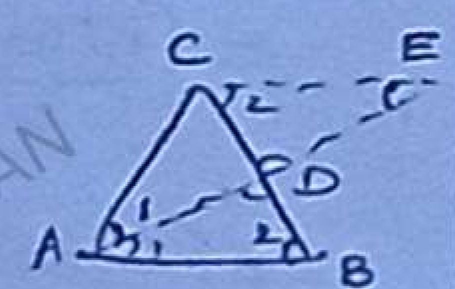
Proof:

Given: In ΔABC, AD is bisector

To prove: $\frac{AB}{AC} = \frac{BD}{CD}$

Construction: Draw c parallel to AB

Extend AD to meet line c at E.



$\angle AEC = \angle BAE = \angle 1$

$\angle ABD = \angle ECD = \angle 2$

ΔACE is isosceles

$AC = CE$

$\Delta ABD \sim \Delta ECD$

$$\frac{AB}{CE} = \frac{BD}{CD}$$

$$\boxed{\frac{AB}{AC} = \frac{BD}{CD}}$$

36 $A(3,-4)$, $B(9,-4)$, $C(5,-7)$, $D(7,-7)$

Slope of $AB = 0$

Slope of $BC = 3/4$

Slope of $CD = 0$

Slope of $AD = -3/4$

$\text{slope} = \frac{y_2 - y_1}{x_2 - x_1}$

Slope of AB = Slope of CD

$AB \parallel CD$

Slope of BC $\neq$ slope of AD

BC is not parallel to AD.

$\therefore$ ABCD is a trapezium.

37 Slope of $AB = \frac{y_2-y_1}{x_2-x_1} = \frac{-4-2}{-6-(-4)} = \frac{-3}{5}$

Slope of the $\perp^r$ $AB = \frac{5}{3}$

mid point of $AB = \left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right) = (1,-1)$

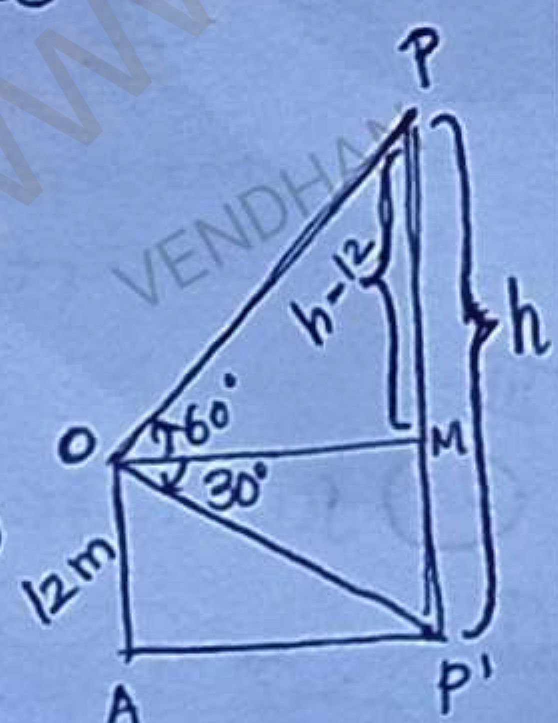
Equation of the perpendicular of bisector of CD is

$y - y_1 = m(x - x_1)$

$y - (-1) = \frac{5}{3}(x-1)$

$5x - 3y - 8 = 0$

38 In ΔOMP



$\tan 60° = \frac{h-12}{OM} = \sqrt{3}$

$OM = \frac{h-12}{\sqrt{3}} \rightarrow ①$

In $\Delta OMP'$

$\tan 30° = \frac{12}{OM} = \frac{1}{\sqrt{3}}$

$OM = 12\sqrt{3} \longrightarrow ②$

$\frac{h-12}{\sqrt{3}} = 12\sqrt{3}$

$h - 12 = 36$

$\boxed{h = 48\text{m}}$

39 Radius of the well $(r_1) = 5$m

Depth of the well $(h) = 14$m

Width of the embankment $= 5$m

Outer radius$(R) = 5+5 = 10$m

Volume of embankment = Volume of well

$\pi H(R^2 - r^2) = \pi r_1^2 h$

$H(10^2 - 5^2) = 5^2 \times 14$

$H \times 75 = 25 \times 14$

$H = \frac{14}{3}$

$\boxed{H = 4.67\text{m}}$

40 No. of small spheres = n.

$R = 16$cm, $r = 2$cm.

n × volume of small spheres = Volume of big metallic sphere

$n\left[\frac{4}{3}\pi r^3\right] = \frac{4}{3}\pi \times R^3$

$8n = 4096$

$\boxed{n = 512}$

41 $S = \{HHH, HHT, HTH, THH, HTT, THT, TTH, TTT\}$

$n(S) = 8$

$P(A) = \frac{3}{8}$, $P(B) = \frac{7}{8}$, $P(C) = \frac{3}{8}$

$P(A \cap B) = \frac{3}{8}$, $P(B \cap C) = \frac{2}{8}$, $P(A \cap C) = \frac{2}{8}$

$P(A \cap B \cap C) = \frac{2}{8}$

$P(A \cup B \cup C) = P(A) + P(B) + P(C) - P(A \cap B) - P(B \cap C) - P(C \cap A) + P(A \cap B \cap C)$

$= \frac{3}{8} + \frac{7}{8} + \frac{3}{8} - \frac{3}{8} - \frac{2}{8} - \frac{2}{8} + \frac{2}{8}$

$= \frac{3+7-2}{8}$

$\boxed{P(A \cup B \cup C) = 1}$

42 $P = \frac{x}{x+y}$, $Q = \frac{y}{x+y}$

$\frac{1}{P-Q} - \frac{2Q}{P^2 - Q^2} = \frac{P+Q-2Q}{(P+Q)(P-Q)}$

$= \frac{P-Q}{(P+Q)(P-Q)} = \frac{1}{P+Q}$

$\frac{1}{P+Q} = \frac{1}{\frac{x}{x+y} + \frac{y}{x+y}}$

$= \frac{1}{\frac{x+y}{x+y}}$

$\frac{1}{P+Q} = 1$

$\boxed{\therefore \frac{1}{P-Q} - \frac{2Q}{P^2 - Q^2} = 1}$

OLD TEXT BOOK 3.11 (EXERCISE) 4^{th} sum

S. PURATCHIVENDHAN

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