

SECOND REVISION TEST - 2025

Standard X

Reg.No.

MATHEMATICS

Time : 3.00 hrs

Part - I

Marks : 100

I. Choose the correct answer:

$14 \times 1 = 14$

1. $A = \{a, b, p\}$, $B = \{2, 3\}$, $C = \{p, q, r, s\}$ then $n[(A \cup C) \times B]$ is
 a) 8 b) 20 c) 12 d) 16
2. $f(x) = (x + 1)^3 - (x - 1)^3$ represents a function which is
 a) linear b) cubic c) reciprocal d) quadratic
3. $7^{4K} \equiv \underline{\hspace{2cm}} \pmod{100}$
 a) 1 b) 2 c) 3 d) 4
4. If the HCF of 65 and 117 is expressible in the form of $65m - 117$, then the value of m is
 a) 4 b) 2 c) 1 d) 3
5. The values of a and b IF $4x^4 - 24x^3 + 76x^2 + ax + b$ is a perfect square are
 a) 100, 120 b) 10, 12 c) -120, 100 d) 12, 10
6. Transpose of a column matrix is
 a) Unit matrix b) Diagonal matrix c) Column matrix d) Row matrix
7. A tangent is perpendicular to the radius at the
 a) Centre b) Point of contact c) Infinity d) Chord
8. If in triangles ABC and EDF, $\frac{AB}{DE} = \frac{BC}{FD}$ then they will be similar
 a) $\angle B = \angle E$ b) $\angle A = \angle D$ c) $\angle B = \angle D$ d) $\angle A = \angle F$
9. If $(5, 7)$, $(3, p)$ and $(6, 6)$ are collinear, then the value of p is
 a) 3 b) 6 c) 9 d) 12
10. $(2, 1)$ is the point of intersection of two lines
 a) $x - y - 3 = 0 ; 3x - y - 7 = 0$ b) $x + y = 3 ; 3x + y = 7$
 c) $3x + y = 3 ; x + y = 7$ d) $x + 3y - 3 = 0 ; x - y - 7 = 0$
11. The angle of elevation $\underline{\hspace{2cm}}$ as we move towards the foot of the vertical object like tower or building.
 a) decreases b) equal c) 45° d) increases

12. If the radius of the base of a cone is tripled and the height is doubled then the volume is
 a) made 6 times b) made 18 times c) made 12 times d) unchanged
13. The range of the data 8,8,8,8,8 8 is
 a) 0 b) 1 c) 8 d) 3
14. A, B are said to be mutually exclusive events If
 a) $A \cap B = \emptyset$ b) $A \cap B = A$ c) $A \cap B = B$ d) $A \cap A' = A'$

Part - II

II. Answer any 10 questions. (Q.No.28 is compulsory) $10 \times 2 = 20$

15. 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.
16. Let be a function $f : N \rightarrow N$ be defined by $f(x) = 3x + 2, x \in N$, find the images of 1,2,3
17. If $1 + 2 + 3 + \dots + k = 325$ then find $1^3 + 2^3 + 3^3 + \dots + k^3$
18. Simplify : $\frac{x-3}{x^2-9}$
19. If the difference between a number and its reciprocal is $\frac{24}{5}$, find the number.

20. In the matrix $A = \begin{pmatrix} 8 & 9 & 4 & 3 \\ -1 & \sqrt{7} & \frac{\sqrt{3}}{2} & 5 \\ 1 & 4 & 3 & 0 \\ 6 & 8 & -11 & 1 \end{pmatrix}$,

write (i) The number of elements (ii) The order of the matrix

21. State the Menelaus Theorem.
 22. Show that the points P(-1.5, 3) Q(6, -2), R(-3, 4) are collinear.

23. To prove : $\sqrt{\frac{1+\cos\theta}{1-\cos\theta}} = \cosec\theta + \cot\theta$

24. Calculate the slope and y-intercept of the straight line $8x - 7y + 6 = 0$.

25. If the ratio of radius of two spheres is 4 : 7; find the ratio of their volumes.
 26. Find the diameter of a sphere whose surface area is 154 m^2 .
 27. Write the sample space for tossing three coins using tree diagram.
 28. Find the standard deviation of first 21 natural numbers.

Part - III

III. Answer any 10 questions. (Q.No.42 is compulsory)

$10 \times 5 = 50$

29. 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 numbers. Verify that $A \times (B - C) = (A \times B) - (A \times C)$

30. If the function f is defined by $f(x) = \begin{cases} x+2, & x > 1 \\ 2, & -1 \leq x \leq 1 \\ x-1, & -3 < x < -1 \end{cases}$, find the values of

- (i) $f(3)$
- (ii) $f(0)$
- (iii) $f(-1.5)$

31. Find the sum of all natural numbers between 300 and 600 which are divisible by 7

32. $A = \begin{pmatrix} 1 & 2 \\ 1 & 3 \end{pmatrix}$, $B = \begin{pmatrix} 4 & 0 \\ 1 & 5 \end{pmatrix}$, show that $(A - B)^T = A^T - B^T$.

33. Solve : $3x - 2y + z = 2$, $2x + 3y - z = 5$, $x + y + z = 6$

34. Show that in a triangle, the medians are concurrent.

35. Show that the given points form a parallelogram $A(2.5, 3.5)$, $B(10, -4)$, $C(2.5, -2.5)$, $D(-5, 5)$

36. A mobile phone is put to use when the battery power is 100%. The percent of battery power "y" (in decimal) remaining after using the mobile phone for x -hours is assumed as $y = -0.25x + 1$

- i) Find the number of hours elapsed if the battery power is 40%
- ii) How much time does it take so that the battery has no power?

37. If $\cosec\theta + \cot\theta = P$, then prove that $\cos\theta = \frac{P^2 - 1}{P^2 + 1}$

38. An aeroplane at an altitude of 1800 m finds that two boats are sailing towards it in the same direction. The angles of depression of the boats as observed from the aeroplane are 60° and 30° respectively. Find the distance between the two boats. ($\sqrt{3} = 1.732$)

39. A cylindrical drum has a height of 20 cm and base radius of 14 cm. Find its curved surface area and the total surface area.

40. Find the mean and variance of the first "n" natural numbers.

41. 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
- The student opted for NCC but not NSS
 - The student opted for NSS but not NCC
 - The student opted for exactly one of them
42. Find the sum to n terms of the series $5 + 55 + 555 + \dots$

Part - IV **$2 \times 8 = 16$** **IV. Answer all the questions.**

43. a) 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 $\frac{7}{3} > 1$)

(OR)

- b) Draw a circle of diameter 6 cm from a point P, which is 8 cm away from its centre. Draw the two tangents PA and PB to the circle and measure their lengths.
44. a) Draw the graph of $xy = 24$, $x, y > 0$, using the graph, find
- y when $x = 3$ and
 - x when $y = 6$

(OR)

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

கிருவர்தார் மாநாடு
பூஷ்டி கிருவர்தார் மாநாடு - இயங்குமினை
நடவடிக்கை - ஒன்றைக் கடிப்பிடிக்கை
பகுதி - 4

- ① ⑧) 12 ② ⑨) குறுப்புமிகு விவரம்.
 ③ ⑩) 1 ④ ⑪) 2 ⑤ ⑫) -120, 100.
 ⑥ ⑪) நூல்தாநி (Row Matrix)
 ⑦ ⑫) ஒத்துடுறை (Point of Contact)
 ⑧ ⑬) $L_8 = L_5$ ⑨ ⑭) $x+y=3$;
 $3x+y=7$ ⑩ ⑮) அத்தகவுடம் (TM)
 ⑪ d) increases. ⑫ ⑯) 18 சூவுகள் (made 18 times). ⑬ ⑰) 0 ⑭ ⑱) $A \cap B = \emptyset$

பகுதி - 5
 ⑮) முதிருச்சு (Domain) = {0, 1, 2, 3, 4, 5}
 மூல்கள் (Range) = {3, 4, 5, 6, 7, 8}

⑯) $f(1) = 5, f(2) = 8, f(3) = 11.$

⑰) $1+2+3+\dots+k = 325$

$$\frac{k(k+1)}{2} = 325$$

$$1^3 + 2^3 + 3^3 + \dots + k^3 = \left[\frac{k(k+1)}{2} \right]^2 = (325)^2$$

$$= 105625$$

⑱) $\frac{x-3}{x^2-9} = \frac{(x-3)}{(x+3)(x-3)} = \frac{1}{x+3}.$

⑲) $x + \frac{1}{x} = \frac{24}{5}$

$$\frac{x^2+1}{x} = \frac{24}{5}$$

$$5(x^2+1) = 24x.$$

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$$5x^2 - 24x + 5 = 0$$

$$(x-5)(5x+1) = 0$$

$$x = 5, x = -\frac{1}{5}$$

$$\begin{array}{r} 25 \\ \times 5 \\ \hline -25 \quad +1 \\ \hline \end{array}$$

$$-5 \quad \frac{1}{5}$$

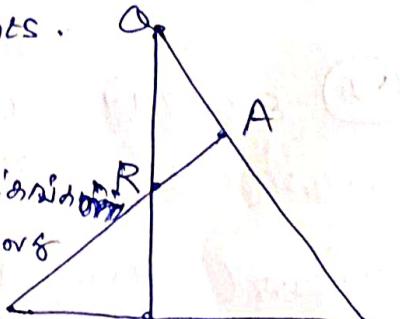
$$\text{என்ற முறை } 5 \text{ முடியும் } \frac{1}{5}.$$

⑳) (i) 16

(ii) $4 \times 4.$

㉑ A necessary and sufficient condition for points P, Q, R on the respective sides BC, CA, AB of a triangle ABC to be collinear is that

$\frac{BP}{PC} \times \frac{CQ}{QA} \times \frac{AR}{RB} = -1$, where all segments in this are directed segments.



ABC என்று
 கீழ்க்கண்டுள்ள நிலைமைகள்
 BC, CA, AB (ஒன்றாக
 அமைக்கப்படுகின்றன)
 ஆகையின் கீழ்க்கண்ட
 நிலைமை கீழ்க்கண்டுள்ள
 அமைப்பு போன்று உள்ளது
 என்று கீழ்க்கண்டுள்ள
 நிலைமைகளைப் போன்று
 அமைப்பது கீழ்க்கண்டுள்ள
 நிலைமைகளைப் போன்று
 அமைப்பது கீழ்க்கண்டுள்ள
 நிலைமைகளைப் போன்று
 அமைப்பது கீழ்க்கண்டுள்ள
 நிலைமைகளைப் போன்று

ஒன்றாக அமைப்பது கீழ்க்கண்டுள்ள
 நிலைமைகளைப் போன்று

ஒன்றாக அமைப்பது கீழ்க்கண்டுள்ள
 நிலைமைகளைப் போன்று

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$$\textcircled{22} \text{ slope of } PQ = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-2 - 3}{6 + 1.5} = \frac{-5}{7.5} = \frac{-2}{3}$$

$$\text{Slope of } QR = \frac{4 + 2}{-3 - 6} = \frac{6}{-9} = \frac{-2}{3}.$$

$m_1 = m_2$ என்பதின் P, Q, R கீழை
மேற்கூறு ஒரே கூட்டுறவு ஆகிறது.
If $m_1 = m_2$ then P, Q, R are
collinear.

$$\textcircled{23} \sqrt{\frac{(1+\cos\theta)}{(1-\cos\theta)}} = \sqrt{\frac{(1+\cos\theta)(1+\cos\theta)}{(1-\cos\theta)(1+\cos\theta)}} \\ = \sqrt{\frac{(1+\cos\theta)^2}{1-\cos^2\theta}} = \frac{1+\cos\theta}{\sin\theta} = \frac{1}{\sin\theta} + \frac{\cos\theta}{\sin\theta} \\ = \csc\theta + \cot\theta.$$

$$\textcircled{24} 8x - 7y + 6 = 0$$

$$\text{பிரிவு (slope)} = -\frac{a}{b} = -\frac{8}{-7} = \frac{8}{7}$$

$$y \text{ நிலை (y intercept)} = \frac{-c}{b} = \frac{-6}{7} = \frac{6}{7}$$

$$\textcircled{25} r_1 : r_2 = 4 : 7$$

$$r_1 : r_2 = \frac{4}{3}\pi r_1^3 : \frac{4}{3}\pi r_2^3$$

$$= 4^3 : 7^3 = 64 : 343.$$

$$\textcircled{26} 4\pi r^2 = 154$$

$$4 \times \frac{22}{7} \times r^2 = 154$$

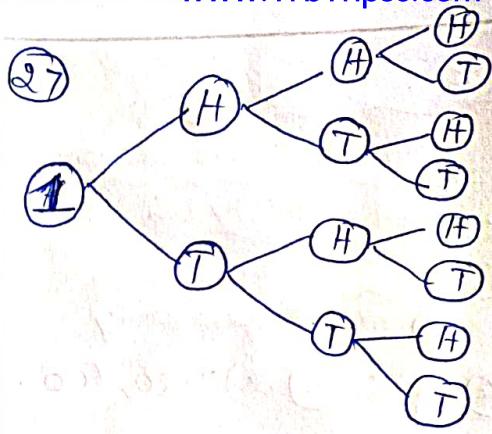
$$r^2 = 154 \times \frac{1}{4} \times \frac{7}{22} = \frac{7 \times 7}{4}$$

$$r = \frac{7}{2} \quad \text{நிலை} \quad \text{Diameter} \quad \} = 2r = 7 \text{ cm.}$$

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

$$n(S) = 8.$$

$$\textcircled{28} r = \sqrt{\frac{n^2 - 1}{12}} = \sqrt{\frac{21^2 - 1}{12}} = \sqrt{\frac{440}{12}} = \sqrt{36.67} = 6.05.$$

~~A \oplus B \ominus C~~

$$A = \{1, 2, 3, 4, 5, 6, 7, 8\}$$

$$B = \{2, 3, 5, 7\} \quad C = \{2\}$$

$$\text{LHS } B - C = \{3, 5, 7\}$$

$$AX(CB-C) = \{C1, 3), C1, 5), C1, 7), C2, 3), C2, 5), C2, 7), C3, 3), C3, 5), C3, 7), C4, 3), C4, 5), C4, 7), C5, 3), C5, 5), C5, 7), C6, 3), C6, 5), C6, 7), C7, 3), C7, 5), C7, 7\} \rightarrow ①$$

$$C6, 5), C6, 7), C7, 3), C7, 5), C7, 7\}$$

$$\text{RHS } AXB = \{(1, 2), C1, 3), C1, 5), C1, 7), C2, 2), C2, 3), C2, 5), C2, 7), C3, 2), C3, 3), C3, 5), C3, 7), C4, 2), C4, 3), C4, 5), C4, 7), C5, 2), C5, 3), C5, 5), C5, 7), C6, 2), C6, 3), C6, 5), C6, 7), C7, 2), C7, 3), C7, 5), C7, 7\}$$

$$AXC = \{C1, 2), C2, 2), C3, 2), C4, 2), C5, 2), C6, 2), C7, 2\}$$

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$$(A \times B) - (A \times C) = \{(1,3), (1,5), (1,7), \\ (2,3), (2,5), (2,7), (3,3), (3,5), (3,7), \\ (4,3), (4,5), (4,7), (5,3), (5,5), (5,7), \\ (6,3), (6,5), (6,7), (7,3), (7,5), (7,7)\} \\ \rightarrow \textcircled{2}$$

$\textcircled{1} = \textcircled{2}$

(31) 300க்குடெ 600க்குடெ இலையே
7-க்கிள் உடுமுடு கிழவு ஏண்டன்

301, 308, ... 595

$$n = \left(\frac{l-a}{d}\right) + 1 = \left(\frac{595-301}{7}\right) + 1 = \\ = \left(\frac{294}{7}\right) + 1 = 42 + 1 = 43.$$

$$S_n = \frac{n}{2}(a+l) = \frac{43}{2}(301+595)$$

$$= \frac{43}{2} \times 896 = 43 \times 448 = 19264.$$

(30) $f(3) = 3+2 = 5$

$$f(0) = 2$$

$$f(-1.5) = -1.5 - 1 = -2.5$$

(32) $A - B = \begin{pmatrix} 1 & 2 \\ 1 & 3 \end{pmatrix} - \begin{pmatrix} 4 & 0 \\ 1 & 5 \end{pmatrix} = \begin{pmatrix} -3 & 2 \\ 0 & -2 \end{pmatrix}$

$$(A - B)^T = \begin{pmatrix} -3 & 0 \\ 2 & -2 \end{pmatrix} \rightarrow \textcircled{1}$$

$$A^T = \begin{pmatrix} 1 & 1 \\ 2 & 3 \end{pmatrix}, B^T = \begin{pmatrix} 4 & 1 \\ 0 & 5 \end{pmatrix}$$

$$A^T - B^T = \begin{pmatrix} 1 & 1 \\ 2 & 3 \end{pmatrix} - \begin{pmatrix} 4 & 1 \\ 0 & 5 \end{pmatrix} = \begin{pmatrix} -3 & 0 \\ 2 & -2 \end{pmatrix} \rightarrow \textcircled{2}$$

$$\textcircled{1} = \textcircled{2}$$

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$$\textcircled{3} \Rightarrow 3x - 2y + z = 2 \\ \textcircled{2} \Rightarrow 2x + 3y - z = 5 \\ \underline{\quad 5x + y = 7 \rightarrow \textcircled{4}}$$

$$\textcircled{2} \Rightarrow 2x + 3y - z = 5 \\ \textcircled{3} \Rightarrow x + y + z = 6 \\ \underline{\quad 3x + 4y = 11 \rightarrow \textcircled{5}}$$

$$\textcircled{4} \times 4 \Rightarrow 20x + 4y = 28$$

$$\textcircled{5} \Rightarrow -3x + 4y = 11 \\ \underline{\quad 17x = 17}$$

$$x = 1$$

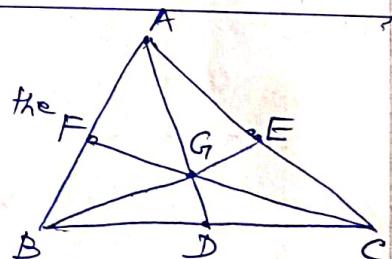
$$\text{Sub in } \textcircled{4} \quad 5 + y = 7 \\ y = 2$$

$$\text{Sub in } \textcircled{3} \quad 1 + 2 + z = 6 \\ 3 + z = 6$$

$$z = 3$$

(34)

Medians are the
cervians, where



D is the mid point of BC $\Rightarrow \frac{BD}{DC} = 1$
($BD = DC$)

E is the mid point of CA, $CE = EA$
 $\Rightarrow \frac{CE}{EA} = 1$

F is the mid point of AB, $AF = FB$
 $\Rightarrow \frac{AF}{FB} = 1$

$$\frac{BD}{DC} \times \frac{CE}{EA} \times \frac{AF}{FB} = 1.$$

Medians are concurrent.

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(35) $A(2.5, 3.5), B(10, -4)$
 $AB \text{ की दूरी } = \frac{-4-3.5}{10-2.5} = \frac{-7.5}{7.5} = -1$

$B(10, -4), C(2.5, -2.5)$

$$BC \text{ की दूरी } = \frac{-2.5+4}{2.5-10} = \frac{1.5}{-7.5} = \frac{-1}{5}$$

$$CD \text{ की दूरी } = \frac{5+2.5}{-5-2.5} = \frac{7.5}{-7.5} = -1$$

$C(2.5, -2.5),$

$D(-5, 5)$

$DC = 5, A(2.5, 3.5)$

$$DA \text{ की दूरी } = \frac{3.5-5}{2.5+5} = \frac{-1.5}{7.5} = \frac{-1}{5}$$

$$m_1 = m_3 \quad \text{लियो } m_2 = m_4 \quad \text{लियो}$$

$(AB \parallel CD)$

$ABCD$ एक सम्पूर्ण चतुर्भुज है।

(36) $y = -0.25x + 1.$

(i) $y = 0.40$

$$0.40 = -0.25x + 1$$

$$-0.60 = -0.25x$$

$$x = \frac{0.6}{0.25} \Rightarrow x = 2.4 \text{ hours.}$$

(ii) Put $y = 0$

$$0 = -0.25x + 1$$

$$0.25x = 1 \Rightarrow x = \frac{1}{0.25} = 4 \text{ hours.}$$

After 4 hrs, the battery of the mobile will have no power.

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(37) $\text{GI} T \csc \theta + \cot \theta = p. \rightarrow ①$

$$\text{WKT } \csc^2 \theta - \cot^2 \theta = 1$$

$$(\csc \theta + \cot \theta)(\csc \theta - \cot \theta) = 1$$

$$p(\csc \theta - \cot \theta) = 1$$

$$\csc \theta - \cot \theta = \frac{1}{p}. \rightarrow ②$$

$$① + ② \quad 2\csc \theta = p + \frac{1}{p}$$

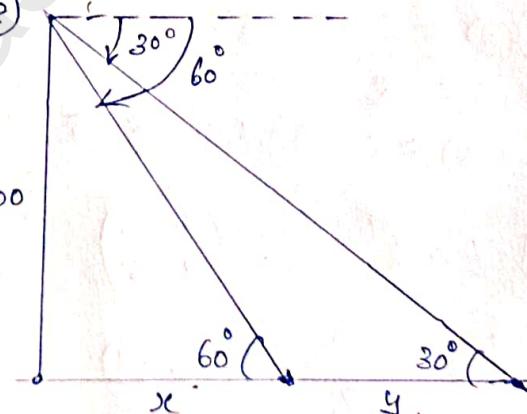
$$\frac{p^2 + 1}{p} = 2\csc \theta. \rightarrow ③$$

$$① - ② \quad p - \frac{1}{p} = 2\cot \theta$$

$$\frac{p^2 - 1}{p} = 2\cot \theta \rightarrow ④$$

$$\frac{④}{③} \Rightarrow \frac{p^2 - 1}{p^2 + 1} = \frac{2\cot \theta}{2\csc \theta} = \cos \theta.$$

(38)



$$\frac{1800}{x} = \tan 60^\circ$$

$$\frac{1800}{x} = \sqrt{3}$$

$$x = \frac{1800}{\sqrt{3}}$$

$$= \frac{1800\sqrt{3}}{3}$$

$$x = 600\sqrt{3} \text{ AB}$$

$$\frac{1800}{x+y} = \tan 30^\circ$$

$$\frac{1800}{x+y} = \frac{1}{\sqrt{3}}$$

$$x+y = 1800\sqrt{3}$$

$$y = 1800\sqrt{3} - 600\sqrt{3}$$

$$y = 1200\sqrt{3} \text{ AB}$$

$$= 1200 \times 1.732$$

$$y = 2078.4 \text{ AB}$$

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(39) $h = 20\text{cm}, r = 14\text{cm}$

$$\text{CSA} = 2\pi rh = 2 \times \frac{22}{7} \times 14 \times 20 \\ = 1760 \text{ sq.cm.}$$

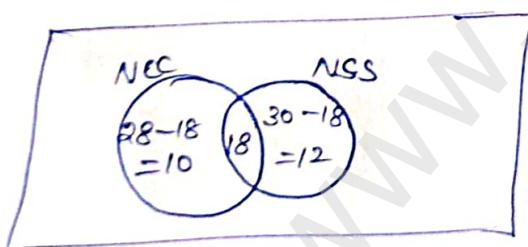
$$\text{TSA} = 2\pi(rh + r^2) \\ = 2 \times \frac{22}{7} \times 14 \times (20 + 14) \\ = 2992 \text{ sq.cm.}$$

(40) Mean = $\frac{1+2+\dots+n}{n}$

$$= \frac{n(n+1)/2}{n} = \frac{n+1}{2}$$

$$\begin{aligned} \text{Variance} &= \frac{\sum x_i^2}{n} - \left(\frac{\sum x_i}{n} \right)^2 \\ &= \frac{1^2 + 2^2 + \dots + n^2}{n} - \left(\frac{n+1}{2} \right)^2 \\ &= \frac{n(n+1)(2n+1)}{6n} - \frac{(n+1)^2}{4} \\ &= \frac{n^2 - 1}{12}. \end{aligned}$$

(41) $n(S) = 50$



$$P(\text{only NCC}) = \frac{10}{50} = \frac{1}{5}$$

$$P(\text{only NSS}) = \frac{12}{50} = \frac{6}{25}$$

$$P(\text{exactly one of them}) = \frac{10+12}{50} = \frac{22}{50} = \frac{11}{25}$$

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(42) $5+55+555+\dots$ upto n terms.

$$= 5(1+11+111+\dots \text{ upto } n \text{ terms})$$

$$= \frac{5}{9} [9+99+999+\dots \text{ upto } n \text{ terms}]$$

$$= \frac{5}{9} [(10-1)+(100-1)+(1000-1)+\dots \text{ upto } n \text{ terms}]$$

$$= \frac{5}{9} \left[\frac{10(10^n-1)}{9} - n \right]$$

(i) $a=10, r=10, n=n$

$$S_n = \frac{a(r^n-1)}{r-1} = \frac{10(10^n-1)}{9}$$

(ii) $a=1, r=1, n=n$

$$S_n = na = n.$$

N @ f - A.

(43) (a) similar Δ ie $\frac{7}{3} > 1$
(or)

(b) Tangent $r=3\text{cm}$, distance $= 8\text{cm}$,
Length of the tangent = $7\sqrt{2}\text{cm}$.

(44) (a) Indirect variation.

x	2	3	4	6	8	12
y	12	8	6	4	3	2

$x = 3$ or $y = 8$

$y = 6$ or $x = 4$. x -axis 1cm = 1unit
 y -axis 1cm = 1unit

$$y = x^3 + x - 2$$

$$x \text{ coordinate of vertex} = \frac{-b}{2a} = \frac{-1}{2} = -0.5$$

When $x=0, y=-2$.

When $x=-1, y=-2$.

x	-4	-3	-2	-1	0	1	2	3
y	10	4	0	-2	-2	0	4	10
	6	4	2			2	4	6

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Scale

 $x\text{-axis } 1\text{cm} = 1\text{unit}$ $y\text{-axis } 1\text{cm} = 1\text{unit}$.

$$y = x^2 + x - 2$$

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

(→ C → (+))

$$y = 0$$

 $y = 0$ means $x\text{-axis}$.

x	-2	-1	0	1	2
y	0	0	0	0	0

Hence the curve $y = x^2 + x - 2$
and the $x\text{-axis}$ meet at
 $x = -2$ and $x = 1$

Solve $x = -2, 1$

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