

Supplementary ExamJuly 2024 - Maths KeyPART - I

$14 \times 1 = 14$

(1)	(C) $\frac{2}{9x^2}$
(2)	(A) (8, 6)
(3)	(A) 1
(4)	(C) $\frac{x^2 - 7x + 40}{(x^2 - 25)(x + 1)}$
(5)	(D) Row matrix (நன்றி அணி)
(6)	(A) 13 m
(7)	(B) Point of contact (தொடு புள்ளி)
(8)	(B) Parallel to y-axis (y அச்சத்துக்கு இணை)
(9)	(C) $3x + 7y = 10$
(10)	(D) $\cot \theta$
(11)	(D) $60^\circ$
(12)	(A) 12 cm
(13)	(A) $P(A) > 1$
(14)	(A) 0

PART - II

10x2=20

(15)  $A = \{3, 4\}$   
 $B = \{-2, 0, 3\}$

(16)(i)  $f(1) = 2(1) - (1)^2 = 2 - 1 = 1$

(ii)  $f(x+1) = 2(x+1) - (x+1)^2$   
 $= 2x + 2 - (x^2 + 2x + 1)$   
 $= \cancel{2x} + 2 - x^2 - \cancel{2x} - 1$   
 $= \underline{\underline{-x^2 + 1}}$

(17)  $a = 9, r = \frac{3}{9} = \frac{1}{3}, n = 8$

$t_n = ar^{n-1}$   
 $= 9 \left(\frac{1}{3}\right)^{8-1}$   
 $= 9 \left(\frac{1}{3}\right)^7 \Rightarrow 3^2 \left(\frac{17}{3^7}\right) = \frac{17}{3^5}$   
 $= \frac{17}{243}$

(18) 
$$\begin{array}{r|rr} 3 & 9 & 36 \\ \hline & 3 & 12 \\ \hline & 1 & 4 \end{array}$$

$= 3 \times 3 \times 1 \times 4 = \underline{\underline{36a^3b^2c}}$

(19)  $a = 15, b = 11, c = 2$

$\Delta = b^2 - 4ac$   
 $= (11)^2 - 4(15)(2)$   
 $= 121 - 120 = 1 \quad \Delta > 0$

Roots are real and unequal

$$(20) \quad \Delta AOQ \sim \Delta BOP$$

$$\frac{AO}{BO} = \frac{OQ}{OP} = \frac{AQ}{BP}$$

$$\frac{10}{6} = \frac{AQ}{9}$$

$$AQ = \frac{10 \times 9}{6} = \frac{90}{6} = 15 \text{ cm}$$

$$AQ = \underline{\underline{15 \text{ cm}}}$$

$$(21) \quad m_1 = \frac{y_2 - y_1}{x_2 - x_1} \quad (3, -2) \quad (12, 4)$$

$x_1, y_1 \quad x_2, y_2$

$$= \frac{4 - (-2)}{12 - 3} = \frac{6}{9} = \frac{2}{3}$$

$$m_2 = \frac{2 - (-2)}{12 - 6} = \frac{4}{6} = \frac{2}{3} \quad (6, -2) \quad (12, 2)$$

$x_1, y_1 \quad x_2, y_2$

$$m_1 = m_2$$

P is parallel to Q

$$(22) \quad 6x + 8y + 7 = 0$$

$$\text{slope } m = \frac{-\text{coefficient of } x}{\text{coefficient of } y} = \frac{-6}{8} = \underline{\underline{-\frac{3}{4}}}$$

$$m = \underline{\underline{-\frac{3}{4}}}$$

$$(23) \quad \text{LHS} = \frac{1 - (\sec^2 \theta - 1)}{(\csc^2 \theta - 1) - 1}$$
$$= \frac{2 - \sec^2 \theta}{\csc^2 \theta - 2}$$

$$= \frac{\frac{2 \cos^2 \theta - 1}{\cos^2 \theta}}{\frac{1 - 2 \sin^2 \theta}{\sin^2 \theta}}$$

$$= \frac{2 \cos^2 \theta - 1}{1 - 2 \sin^2 \theta} \times \frac{\sin^2 \theta}{\cos^2 \theta} = \tan^2 \theta$$

$$= \tan^2 \theta = \underline{\underline{\text{RHS}}}$$

(24) - height = 20 cm

radius = 14 cm

CSA of cylinder =  $2\pi rh$  sq. units

2-கனவின் வளைபரப்ப്

$$= 2 \times \frac{22}{7} \times 14 \times 20$$

$$= \underline{\underline{1760 \text{ cm}^2}}$$

(25)  $r_1 = r_2$   $h_1 : h_2 = ?$

$$\frac{V_1}{V_2} = \frac{\frac{1}{3} \pi r_1^2 h_1}{\frac{1}{3} \pi r_2^2 h_2} = \frac{3600}{5040}$$

Volume of cone  
கூம்பின் கனவின்

$$\boxed{\frac{1}{3} \pi r^2 h}$$

$$= \frac{3600}{5040} = \frac{96}{126} = \frac{48}{63} = \frac{16}{21} = \frac{5}{7}$$

$$= \underline{\underline{5 : 7}}$$

(26) Standard deviation of first 'n'

natural numbers =  $\sqrt{\frac{n^2-1}{12}}$

முதல் இயல் எண்களின்  
தீட்டல் விலக்கம்

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

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

$$C = \{2\}$$

$$(A \cap B) \times C = (A \times C) \cap (B \times C)$$

LHS  $A \cap B = \{2, 3, 5, 7\}$

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

RHS  $A \times C = \{(1, 2), (2, 2), (3, 2), (4, 2), (5, 2), (6, 2), (7, 2)\}$

$$B \times C = \{(2, 2), (3, 2), (5, 2), (7, 2)\}$$

$$(A \times C) \cap (B \times C) = \{(2, 2), (3, 2), (5, 2), (7, 2)\} \rightarrow \textcircled{2}$$

$$\textcircled{1} = \textcircled{2} \quad \text{LHS} = \text{RHS}$$

Hence it is verified.

(i)  $f(-3) + f(2)$

$$f(-3) = 6x + 1 \Rightarrow 6(-3) + 1 = -18 + 1 = -17$$

$$f(2) = 5x^2 - 1 \Rightarrow 5(2)^2 - 1 = 20 - 1 = 19$$

$$f(-3) + f(2) = -17 + 19 = \underline{\underline{2}}$$

(ii)  $f(7) - f(1)$

$$f(7) = 3x - 4 = 3(7) - 4 = 21 - 4 = 17$$

$$f(1) = 6x + 1 = 6(1) + 1 = 6 + 1 = 7$$

$$f(7) - f(1) = 17 - 7 = \underline{\underline{10}}$$

(iii)  $2f(4) + f(8)$

$$f(4) = 5x^2 - 1 = 5(4)^2 - 1 = 5(16) - 1$$

$$2f(4) = 2 \times 79 = 158 \quad \cdot 80 - 1 = \underline{\underline{79}}$$

$$= \sqrt{\frac{(21)^2 - 1}{12}}$$

$$= \sqrt{\frac{441 - 1}{12}} = \sqrt{\frac{440}{12}}$$

$$= \sqrt{36.66} = 6.05$$

$$= \underline{\underline{6.05}}$$

6	36.66
	36
125	660
	625
	35

(27)

$$S = \{HHH, HTT, HHT, THH, TTH, HTH, THT, TTT\} \quad n(S) = 8$$

Two consecutive tails } = {HTT, TTH, TTT}

← இரண்டு தொடர்ச்சியான தலைகள்

A

$$n(A) = 3$$

$$P(A) = \frac{n(A)}{n(S)} = \underline{\underline{\frac{3}{8}}}$$

(28)  $a = 16, \quad d = -54, \quad d = -5$

$$n = \frac{l - a}{d} + 1$$

$$= \frac{-54 - 16}{-5} + 1$$

$$= \frac{14}{-5} + 1$$

$$n = \underline{\underline{15}} \quad \text{15th term is } \underline{\underline{-54}}$$

FIRST CLASS TUITION CENTRE  
9788334479, 9786334479

$$f(8) = 3x - 4 = (3 \times 8) - 4 = 24 - 4 = 20$$

$$2f(4) + f(8) = 158 + 20 = \underline{\underline{178}}$$

$$(iv) \frac{2f(-2) - f(6)}{f(4) + f(-2)} = 2$$

$$f(-2) = 6x + 1 = 6(-2) + 1 = -12 + 1 = -11$$

$$f(6) = 3x - 4 = 3(6) - 4 = 18 - 4 = 14$$

$$f(4) = 5x^2 - 1 = 5(4)^2 - 1 = 80 - 1 = 79$$

$$f(-2) = 6x + 1 = 6(-2) + 1 = -12 + 1 = -11$$

$$\frac{2(-11) - 14}{79 - 11} = \frac{-22 - 14}{68} = \frac{-36}{68} = \frac{-9}{17}$$

$$\frac{-9}{17}$$

$3 + 33 + 333 + \dots$  to  $n$  terms

$$= 3(1 + 11 + 111 + \dots \text{ to } n \text{ terms})$$

$$= \frac{3}{9}(9 + 99 + 999 + \dots \text{ to } n \text{ terms})$$

$$= \frac{1}{3}[(10 - 1) + (100 - 1) + (1000 - 1) + \dots \text{ to } n \text{ terms}]$$

$$= \frac{1}{3}[(10 + 100 + 1000 + \dots) + (-1)n]$$

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

$$a = 10$$

$$r = \frac{100}{10} = 10$$

$$r > 1$$

$$= \frac{1}{3} \left[ \frac{10(10^n - 1)}{9} - n \right]$$

$$= \frac{10}{27}(10^n - 1) - \frac{n}{3}$$

32.

$$\begin{array}{r}
 3x^2 \quad 3x^2 + 2x + 4 \\
 \hline
 9x^4 + 12x^3 + 28x^2 + ax + b \\
 \hline
 9x^4 \\
 \hline
 12x^3 + 28x^2 \\
 \hline
 12x^3 + 4x^2 + \dots \\
 \hline
 24x^2 + ax^2 + b \\
 \hline
 24x^2 + 16x + 16 \\
 \hline
 ax^2 = 16x \quad b = 16 \\
 \boxed{a = 16, \quad b = 16}
 \end{array}$$

33.

$$10^2 + 11^2 + 12^2 + \dots + 24^2$$

$$\begin{aligned}
 & (1^2 + 2^2 + 3^2 + \dots + 24^2) - (1^2 + 2^2 + \dots + 9^2) \\
 & \quad n = 24 \qquad \qquad \qquad n = 9
 \end{aligned}$$

$$\sum n^2 = \frac{n(n+1)(2n+1)}{6}$$

$$\begin{aligned}
 &= \frac{24 \times 25 \times 49}{6} - \frac{9 \times 10 \times 19}{6} \\
 &= 4900 - 385
 \end{aligned}$$

$$= 4615 \text{ cm}^2$$

34.

$$(AB)^T = B^T A^T$$

$$\text{LHS} = AB = \begin{bmatrix} 5 & 2 & 9 \\ 1 & 2 & 8 \end{bmatrix} \begin{bmatrix} 1 & 7 \\ 1 & 2 \\ 5 & -1 \end{bmatrix}$$

$$= \begin{bmatrix} 5+2+45 & 35+4-9 \\ 1+2+40 & 7+4-8 \end{bmatrix} = \begin{bmatrix} 52 & 30 \\ 43 & 3 \end{bmatrix}$$



$$(AB)^T = \begin{bmatrix} 52 & 43 \\ 30 & 3 \end{bmatrix} \rightarrow \textcircled{1}$$

$$\text{RHS} = B^T = \begin{bmatrix} 1 & 1 & 5 \\ 7 & 2 & -1 \end{bmatrix} \quad A^T = \begin{bmatrix} 5 & 1 \\ 2 & 2 \\ 9 & 8 \end{bmatrix}$$

$$B^T A^T = \begin{bmatrix} 5+2+45 & 1+2+40 \\ 35+4-9 & 7+4-8 \end{bmatrix}$$

$$= \begin{bmatrix} 52 & 43 \\ 30 & 3 \end{bmatrix} \rightarrow \textcircled{2}$$

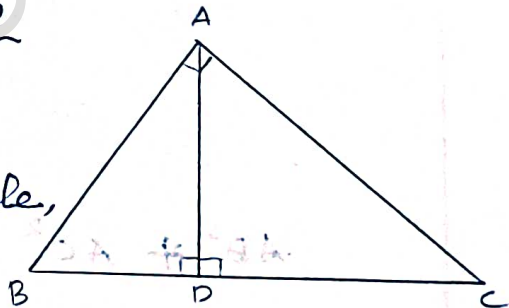
$$\textcircled{1} = \textcircled{2}$$

$(AB)^T = B^T A^T$  Hence it is proved.

### Pythagoras Theorem

Statement :-

In a right angle triangle, the square on the hypotenuse is equal to the sum of the squares of other two sides:



$$\Delta ABC \quad \angle A = 90^\circ$$

$$\text{To prove } AB^2 + AC^2 = BC^2$$

$$AD \perp BC$$

$$\Delta ABC \text{ and } \Delta DBA \quad \angle B \text{ is common}$$

$$\angle BAC = \angle BDA = 90^\circ$$

$$\Delta ABC \sim \Delta DBA$$

$$\frac{AB}{BD} = \frac{BC}{AB}$$

$$AB^2 = BC \times BD \rightarrow \textcircled{1}$$

$\Delta ABC$  and  $\Delta DAC$  LC is common

$$\angle BAC = \angle ADC = 90^\circ$$

$$\Delta ABC \sim \Delta DAC$$

$$\frac{BC}{AC} = \frac{AC}{DC}$$

$$AC^2 = BC \times DC \rightarrow \textcircled{2}$$

Adding  $\textcircled{1}$  and  $\textcircled{2}$

$$AB^2 + AC^2 = BC \times BD + BC \times DC$$

$$= BC(BD + DC)$$

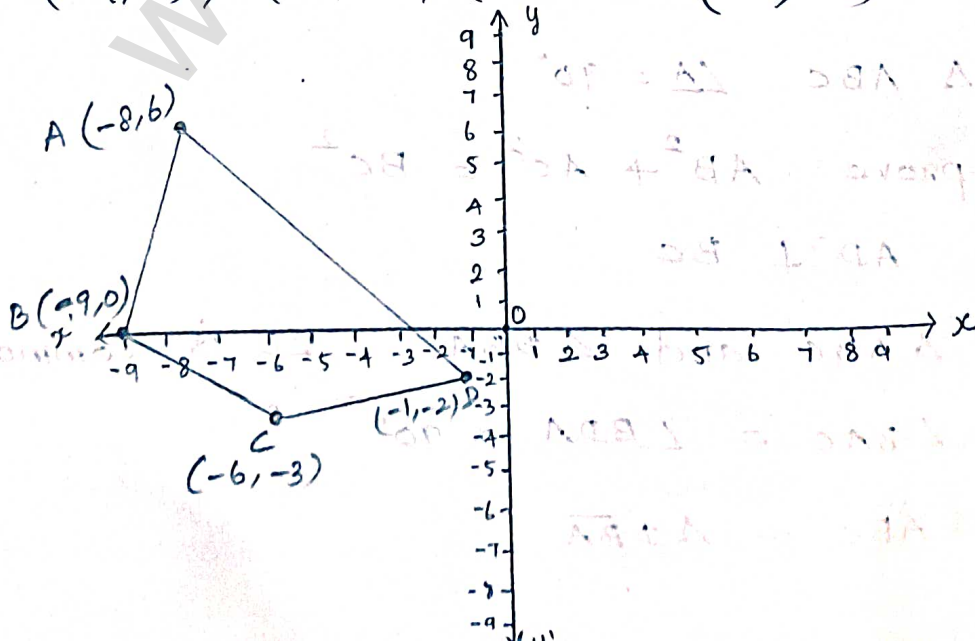
$$= BC \times BC$$

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

Hence it is proved

36

$(-9, 0), (-8, 6), (-1, -2), (-6, -3)$



$$A(-8, 6), B(-9, 0), C(-6, -3) D(-1, -2)$$

$$= \frac{1}{2} \begin{bmatrix} -8 & -9 & -6 & -1 & -8 \\ 6 & 0 & -3 & -2 & 6 \end{bmatrix}$$

$$= \frac{1}{2} \left[ (0 + 27 + 12 - 6) - (-54 + 0 + 3 + 16) \right]$$

$$= \frac{1}{2} [33 + 35]$$

$$= \frac{1}{2} \begin{bmatrix} 34 \\ 68 \end{bmatrix} = 34 \text{ sq. units}$$

7.

$$7x + 3y = 10, \quad 5x - 4y = 1$$

$$7x + 3y = 10 \rightarrow \textcircled{1}$$

$$5x - 4y = 1 \rightarrow \textcircled{2}$$

$$\textcircled{1} \times 4 = 28x + 12y = 40$$

$$\textcircled{2} \times 3 = 15x - 12y = 3$$

$$43x = 43$$

$$x = \frac{43}{43} = 1$$

$$x = 1 \text{ sub } \textcircled{1}$$

$$7(1) + 3y = 10$$

$$3y = 10 - 7 = 3$$

$$y = \frac{3}{3} = 1$$

$$x \quad y \\ (1, 1)$$

$$13x + 5y + 12 = 0$$

$$\text{slope (slope)} = -\frac{\text{co. eff } x}{\text{co. eff } y}$$

$$\textcircled{1} \rightarrow m = -\frac{13}{5}$$

$$m = -\frac{13}{5}, \quad (1, -1), \quad (2, 3)$$

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

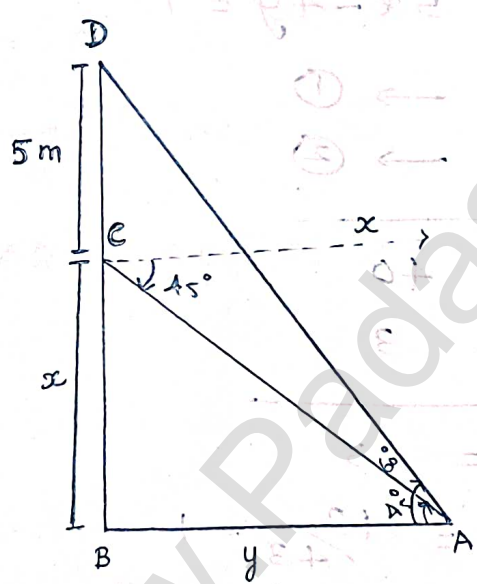
$$y - 1 = -\frac{13}{5}(x - 1)$$

$$5y - 5 = -13x + 13$$

$$13x + 5y - 5 - 13 = 0$$

$$13x + 5y - 18 = 0$$

8.



A - point of observation

$$BC = x \quad AB = y$$

$$\angle BAD = 60^\circ \quad \angle ECA = 45^\circ = \angle BAC$$

$$\triangle ABC \quad \frac{BC}{AB} = \tan 45^\circ$$

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

$$x = y \rightarrow \textcircled{1}$$

$$\Delta ABD, \frac{BD}{AB} = \frac{BC + CD}{AB} = \tan 60^\circ$$

$$\frac{x+5}{y} = \sqrt{3}$$

$$\sqrt{3}y = x+5$$

$$x=y \Rightarrow \sqrt{3}x = x+5$$

$$\sqrt{3}x - x = 5$$

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

$$x = \frac{5}{\sqrt{3}-1}$$

$$x = \frac{5}{\sqrt{3}-1} \times \frac{\sqrt{3}+1}{\sqrt{3}+1}$$

$$x = \frac{5(1.732+1)}{\sqrt{3}-1}$$

$$x = \frac{5 \times 2.732}{2}$$

$$x = \frac{13.66}{2} = 6.83 \text{ m}$$

$$\text{Height of tower} = \underline{\underline{6.83 \text{ m}}}$$

39.

$$R = 16 \text{ cm} \quad r = 2 \text{ cm}$$

$$\text{Volume of sphere} = \frac{4}{3} \pi r^3$$

(கனமான்கூற்றின் கனமானது)

$$\frac{\frac{4}{3} \pi R^3}{\frac{4}{3} \pi r^3} = \frac{(16)^3}{2^3} = \frac{16^8}{2^8}$$

$$n = \underline{\underline{512}}$$

10.

$$\bar{x} = \frac{32 + 35 + 37 + 30 + 33 + 36 + 35 + 37}{8}$$

$$\bar{x} = \frac{275}{8} = 34.3$$

~~(32 - 34.3)~~

$x$	$d = x - \bar{x}$	$d^2$
30	$30 - 34.3 = -4.3$	18.49
32	$32 - 34.3 = -2.3$	5.29
33	$33 - 34.3 = -1.3$	1.69
35	$35 - 34.3 = 0.7$	0.49
35	$35 - 34.3 = 0.7$	0.49
36	$36 - 34.3 = 1.7$	2.89
37	$37 - 34.3 = 2.7$	7.29
37	$37 - 34.3 = 2.7$	7.29
$\Sigma x = 275$		$\Sigma d^2 = 43.92$

Standard Deviation

தரவில்லையியல்

$$\sigma = \sqrt{\frac{\Sigma d^2}{n}}$$

$$\begin{array}{r} 2.34 \\ 2 \overline{) 5.49} \\ \underline{4} \phantom{00} \\ 149 \\ 129 \phantom{00} \\ \underline{2000} \\ 1856 \\ \underline{144} \end{array}$$

$$= \sqrt{\frac{43.92}{8}} = \sqrt{5.49}$$

$$= \underline{\underline{2.34}}$$

$$S = \{(1,1), (1,2), (1,3), (1,4), (1,5), (1,6), (2,1), (2,2), (2,3), (2,4), (2,5), (2,6), (3,1), (3,2), (3,3), (3,4), (3,5), (3,6), (4,1), (4,2), (4,3), (4,4), (4,5), (4,6), (5,1), (5,2), (5,3), (5,4), (5,5), (5,6), (6,1), (6,2), (6,3), (6,4), (6,5), (6,6)\}$$

$$n(S) = 36$$

(i) sum is equal to 4 (4 ൽ 6 കോഡുകൾ)

$$A = \{(1,3), (2,2), (3,1)\} \quad n(A) = 3$$

$$P(A) = \frac{n(A)}{n(S)} = \frac{3}{36} = \frac{1}{12}$$

(ii) greater than 10 (10 ൽ കൂടെ കോഡുകൾ)

$$B = \{(5,6), (6,5), (6,6)\}$$

(iii) less than 15 (15 ൽ കൂടെ കോഡുകൾ)

$$\frac{36}{36} = 1$$

External diameter (ബാഹ്യ ആർ) = 28 cm

radius (ആർ) = 14 cm

Internal diameter (അന്തർ ആർ) = 20 cm

radius (ആർ) = 10 cm

$$R = 14 \text{ cm}, \quad r = 10 \text{ cm}$$

$$\text{TSA of hemispherical vessel} = \pi(3R^2 + r^2)$$

അന്തർഭാഗത്തെ ചതുരക പരപ്പിന്റെ മൂന്നു മടങ്ങിനെ കൂട്ടി ബാഹ്യ പരപ്പിന്റെ മൂന്നു മടങ്ങിനെ കൂട്ടി

$$(i) = \frac{22}{7} \times (3 \times (14)^2 + (10)^2)$$

$$(ii) = \frac{22}{7} \times ((3 \times 196) + 100)$$

$$(iii) = \frac{22}{7} \times (588 + 100)$$

$$= \frac{22}{7} \times 688$$

$$= \frac{15136}{7} = 2162.28 \text{ cm}^2$$

$$\text{Cost of painting} = 2162.28 \times 0.14$$

$$= \text{₹ } 302.72$$

PART - IV

$$2 \times 8 = 16$$

43 (A) → Exercise 4.4 Sum No 13

43 (B) → Exercise 4.2 Sum No 12

44 (B) → Example 3.54

$$x^2 + x - 2 \quad \text{S.S. of } \{-2, 1\}$$

44 (A) → Exercise 3.15 Sum No 4

(i) 18 min

(ii) 10 pipes

FIRST CLASS TUITION CENTRE

Coimbatore - 19 K. PRAKASH

9788334479

9786334479