PART-III - MATHEMATICS

ANSWER KEY

PART-I

1. c) 3
2. a) 7
3. d) 2520
4. c) 31m
5. b) $16x^2$
6. a) straight line.
7. a) 1.4 cm
8. b) Two
9. b) 25 sq.units.
10. a) $\frac{y^2}{b^2} - \frac{x^2}{a^2} = 1$
11. a) 40π sq.units.
12. d) 3:1:2
13. c) 1.05
14. b) 1

PART-II

15. $A = \{3, 5\}$; $B = \{2, 4\}$

16. $fog = 6x + 3k - 2$

$gof = 6x - 4 + k$

$k = -1$

17.

2 | 800	$800 = 2^5 \times 5^2$
2 | 400	
2 | 200	$a = 2$ $b = 5$
2 | 100	(or)
2 | 50	$a = 5$ $b = 2$
5 | 25	
5	

18. $\frac{3x^3z^3}{5y^3}$

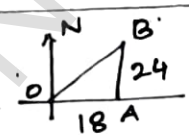
19. $x^2 + 8x - 65 = 0$

$a = 1$ $b = 8$ $c = -65$

Sum of roots $= -b/a = -8$

Product of roots $= c/a = -65$

20.



$OB^2 = OA^2 + AB^2$

$= (18)^2 + (24)^2 = 900$

$OB = 30m.$

21. $A(-3, 9)$ $B(a, b)$ $C(4, -5)$

Area of triangle $= 0$

$\frac{1}{2}(-14a - 7b + 21) = 0$

$14a + 7b = 21$

$2a + b = 3$

$a + b = 1$

$\therefore a = 2$; $b = -1$

22. $(-1, 2)$ $m = -5/4$

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

$y - 2 = -5/4\,(x + 1)$

$5x + 4y - 3 = 0$

23. $\sqrt{\frac{1+\cos\theta}{1-\cos\theta}} = \sqrt{\frac{1+\cos\theta}{1-\cos\theta} \times \frac{1+\cos\theta}{1+\cos\theta}}$

$= \sqrt{\frac{(1+\cos\theta)^2}{\sin^2\theta}}$

$= \frac{1}{\sin\theta} + \frac{\cos\theta}{\sin\theta} = \operatorname{cosec}\theta + \cot\theta$

24. $\pi r^2 = 1386$

TSA (hemis) $= 3\pi r^2$

$= 3 \times 1386 = 4158 m^2$

25. $\pi r^2 = 250$

Volume of cylinder $= \pi r^2 h$

$= 250 \times 2 = 500 m^3$

26. 18, 25, 39, 44, 48, 53, 67

Range $= L - S = 67 - 18 = 49$

co-eff., of range $= \frac{L-S}{L+S} = \frac{67-18}{67+18}$

$= \frac{49}{85} = 0.576$

27. 2/7

28. $23 = 12 \times 1 + 1$

$12 = 11 \times 1 + 1$

$1 = 1 \times 1 + 0$

HCF (23, 12) = 1

PART-III

29. $A = \{2, 3\}$ $B = \{0, 1\}$

$C = \{1, 2\}$

$B \cup C = \{0, 1, 2\}$

$A \times (B \cup C) = \{2, 3\} \times \{0, 1, 2\}$

$= \{(2,0), (2,1), (2,2), (3,0), (3,1), (3,2)\} \rightarrow (1)$

$A \times B = \{(2,0), (2,1), (3,0), (3,1)\}$

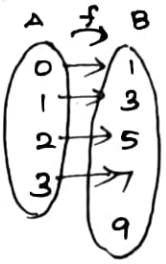
$A \times C = \{(2,1), (2,2), (3,1), (3,2)\}$

$(A \times B) \cup (A \times C) = \{(2,0), (2,1), (2,2), (3,0), (3,1), (3,2)\} \rightarrow (2)$

30. $f(0) = 1$; $f(1) = 3$; $f(2) = 5$

$f(3) = 7$

(i)

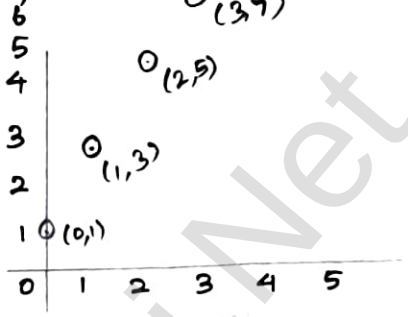


(ii)

x	0	1	2	3
f(x)	1	3	5	7

(iii) $\{(0,1), (1,3), (2,5), (3,7)\}$

(iv)



31. $9^3 + 10^3 + \ldots + 21^3$

$= (1^3 + 2^3 + \ldots + 21^3) - (1^3 + \ldots + 8^3)$

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

$= \left(\frac{(21)(22)}{2}\right)^2 - \left(\frac{8(9)}{2}\right)^2$

$= 53361 - 1296$

$= 52065$

32.

$8x^2 - x + 1$

$8x^2 \;|\; 64x^4 - 16x^3 + 17x^2 - 2x + 1$

$(-)\; 64x^4$

$-16x^3 + 17x^2$

$16x^2 - x \;|\; -16x^3 + x^2$

$(+)\; -16x^3 \quad (-)$

$16x^2 - 2x + 1$

$16x^2 - 2x + 1 \;|\; 16x^2 - 2x + 1$

$(-) \quad (+) \quad (-)$

0

$\sqrt{64x^4 - 16x^3 + 17x^2 - 2x + 1} = |8x^2 - x + 1|$

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

$A^2 = \begin{bmatrix} 8 & 5 \\ -5 & 3 \end{bmatrix}$ $\quad 5A = \begin{bmatrix} 15 & 5 \\ -5 & 10 \end{bmatrix}$

$7I = \begin{bmatrix} 7 & 0 \\ 0 & 7 \end{bmatrix}$

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

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

34. Statement:

Proof:

35. $(-9, -2)$ $(-8, -4)$, $(2, 2)$ $(1, -3)$

$$\text{Area} = \frac{1}{2}\begin{vmatrix} x_1 & x_2 & x_3 & x_4 & x_1 \\ y_1 & y_2 & y_3 & y_4 & y_1 \end{vmatrix}$$

$$= \frac{1}{2}\begin{vmatrix} -9 & -8 & 1 & 2 & -9 \\ -2 & -4 & -3 & 2 & -2 \end{vmatrix}$$

$= \frac{1}{2}\{58 + 12\} = 70/2 = 35$ sq. units.

36. Mid point $(1, -1)$

Slope $m = -3/5$

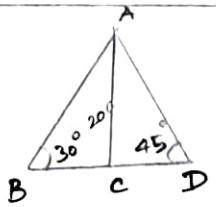
Slope of $\perp^{lar}$ line $= 5/3$

eqn. of the $\perp^{lar}$ bisector

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

$5x - 3y - 8 = 0$

37.



ΔABC

$\tan 30^\circ = \frac{AC}{BC}$

$\frac{1}{\sqrt{3}} = \frac{200}{BC}$

$BC = 200\sqrt{3}$ -- (1)

ΔACD

$\tan 45^\circ = AC/CD$

$1 = 200/CD$

$CD = 200$ ... (2)

$BD = BC + CD = 200\sqrt{3} + 200$

$= 200(2.732)$

$= 546.4$ m.

38) Volume $= \frac{1}{3}\pi(R^2 + Rr + r^2)h$

$= 48510\ cm^3$

39). $h = 15$ cm $\quad r = 6$ cm

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

$= \frac{22}{7} \times 6 \times 6 \times 15$

$r_1 = 3$cm $\quad h_1 = 9$cm.

Volume of one ice cream $= \frac{1}{3}\pi r_1^2 h_1 + \frac{2}{3}\pi r_1^3$

$= \frac{22}{7} \times 45$

Number of cones $= \frac{\text{Volume of cylinder}}{\text{Volume of 1 ice}}$

$= 12$

Thus 12 ice cream required.

40) 24, 26, 29, 31, 33, 37

$n = 7$

$\bar{x} = 30$ $\quad n = 6$

$\Sigma d = 0$ $\quad \Sigma d^2 = 112$

$\sigma = \sqrt{\frac{\Sigma d^2}{n}} = \sqrt{112/6} = \sqrt{18.66}$

$\sigma \simeq 4.32$

$C.V = \frac{\sigma}{\bar{x}} \times 100\% = 14.4\%$.

41. $S = \{(1,1) \ldots (6,6)\}$

$n(S) = 36$

$n(A) = 18 \quad P(A) = 18/36$

$n(B) = 5 \quad P(B) = 5/36$

$n(A \cap B) = 3 \quad P(A \cap B) = 3/36$

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

$= 5/9$

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42. $7 + 77 + 777 + \ldots$ n terms

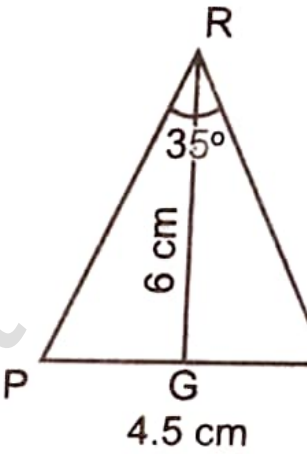
$= 7/9 [9 + 99 + \ldots + n \text{ terms}]$

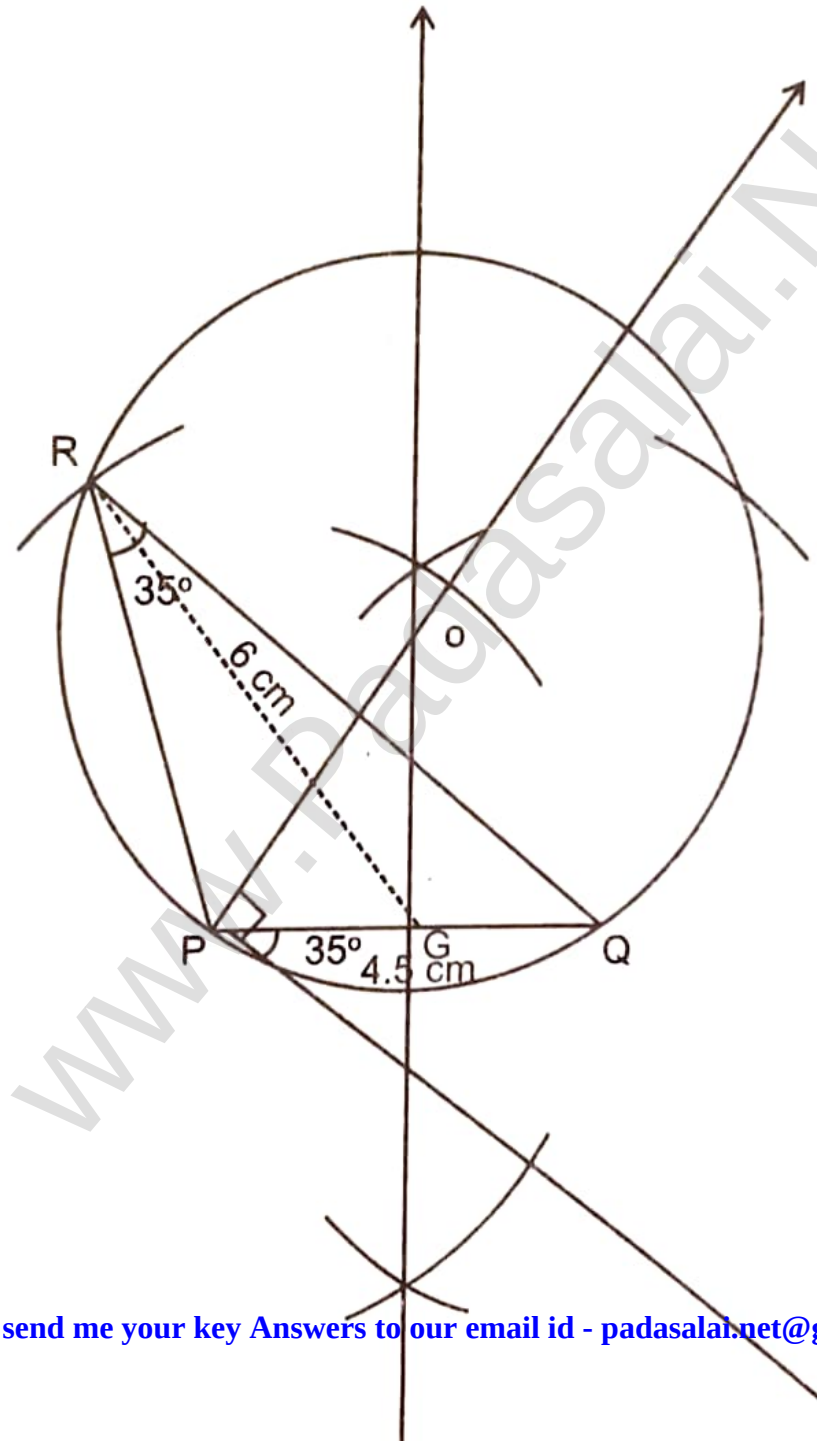
$= 7/9 \left[\frac{10(10^n - 1)}{9} - n\right]$

$= \frac{70}{81}(10^n - 1) - \frac{7n}{9}$

43 a)

உதவிப்படம்





Solution Given, diameter $(d) = 6$ cm, we find radius $(r) = \frac{6}{2} = 3$ cm

43) b)

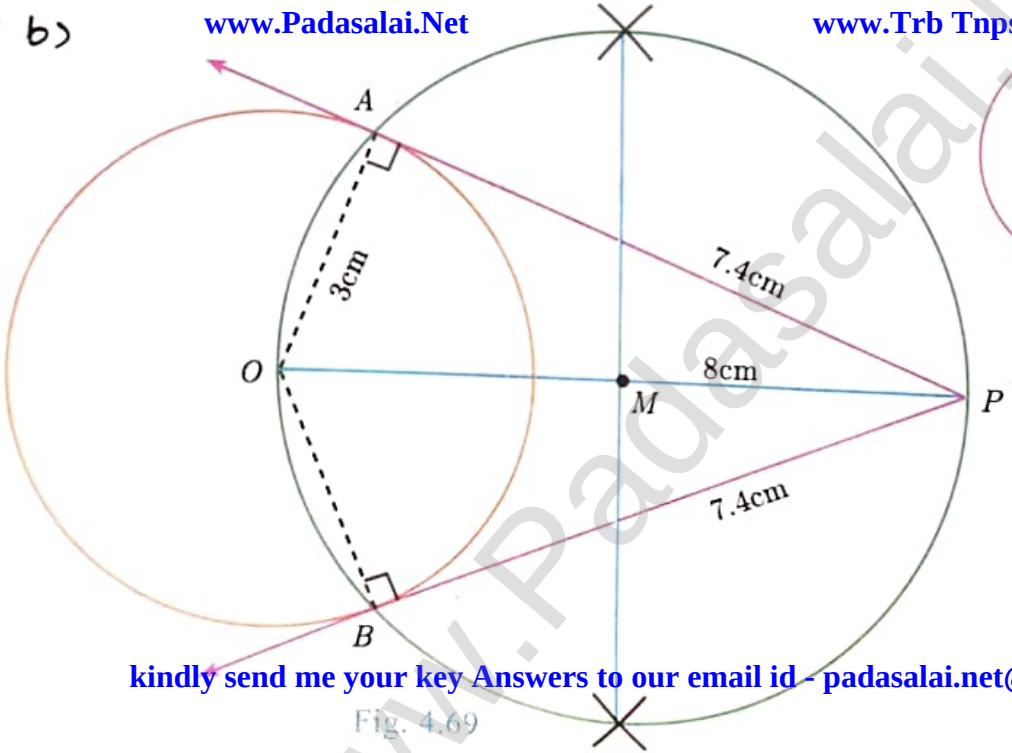
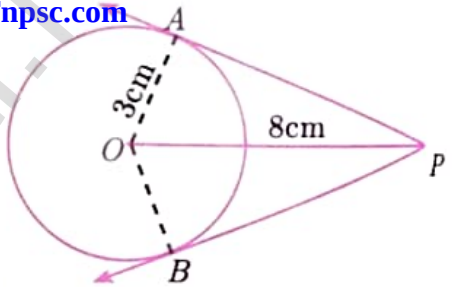


Fig. 4.69



Rough diagram

44

a)

x	-3	-2	-1	0	1	2	3
x^2	9	4	1	0	1	4	9
$-2x^2$	18	8	2	0	2	8	18
$-3x$	9	6	3	0	-3	-6	-9
-5	-5	-5	-5	-5	-5	-5	-5
+	27	14	-5	0	2	8	18
-	-5	-5	-5	-5	-8	-11	-14
y	22	9	0	-5	-6	-3	4

$y = 2x^2 - 3x - 5$

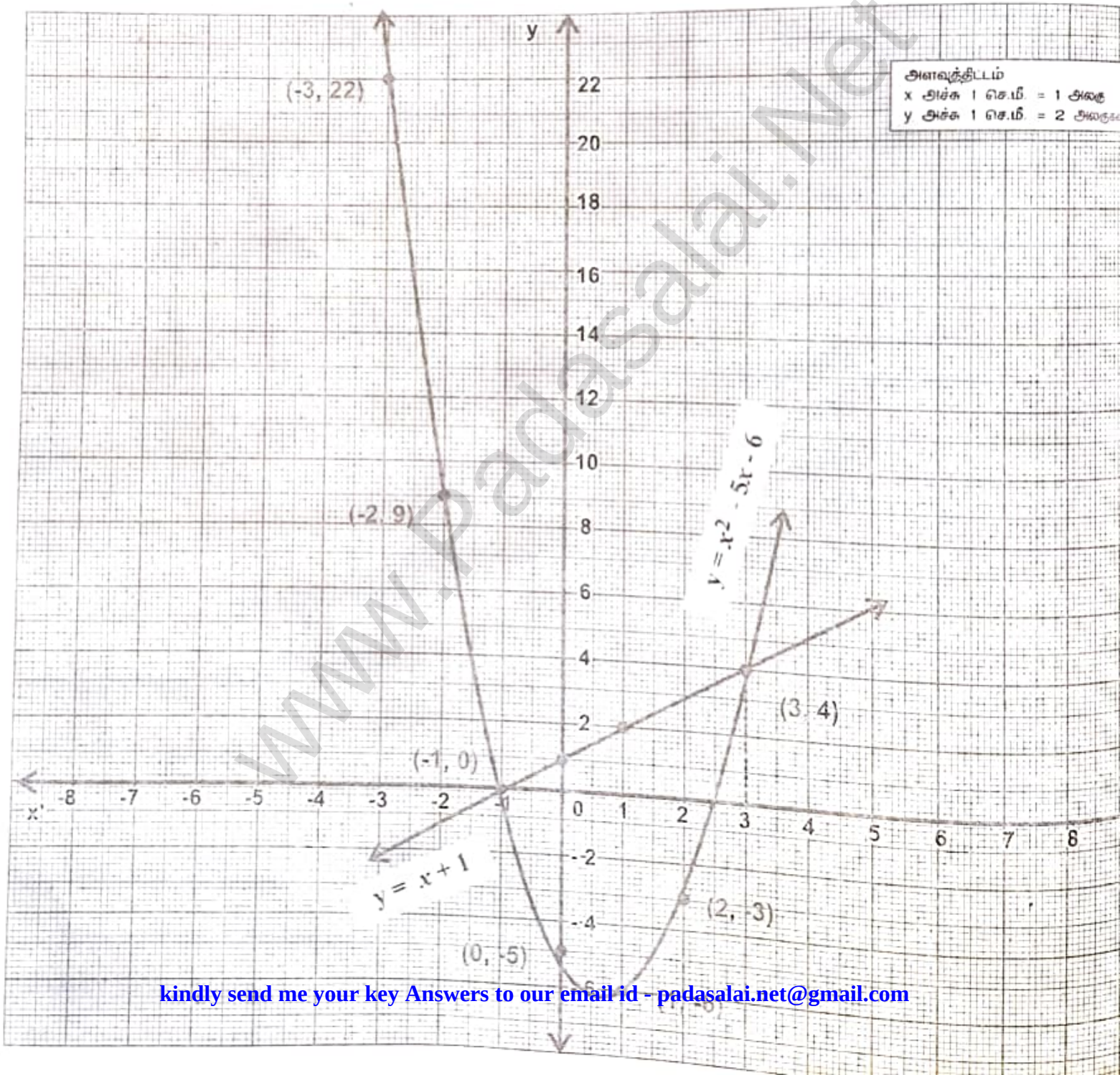
$0 = 2x^2 - 4x - 6$

$y = x + 1$

தீர்வு : $\{-1, 3\}$

செயல்பாடு 2

x	-1	0	1
$2x$	-1	0	1
-6	1	1	1
y	0	1	2



44)

b) $xy = 24$, $y = \frac{24}{x}$

$xy = k$ ∴ Indirect Variation

If $x = 1$ $y = 24$.

If $x = 2$ $y = \frac{24}{2} = 12$

If $x = 3$ $y = \frac{24}{3} = 8$

If $x = 4$ $y = \frac{24}{4} = 6$

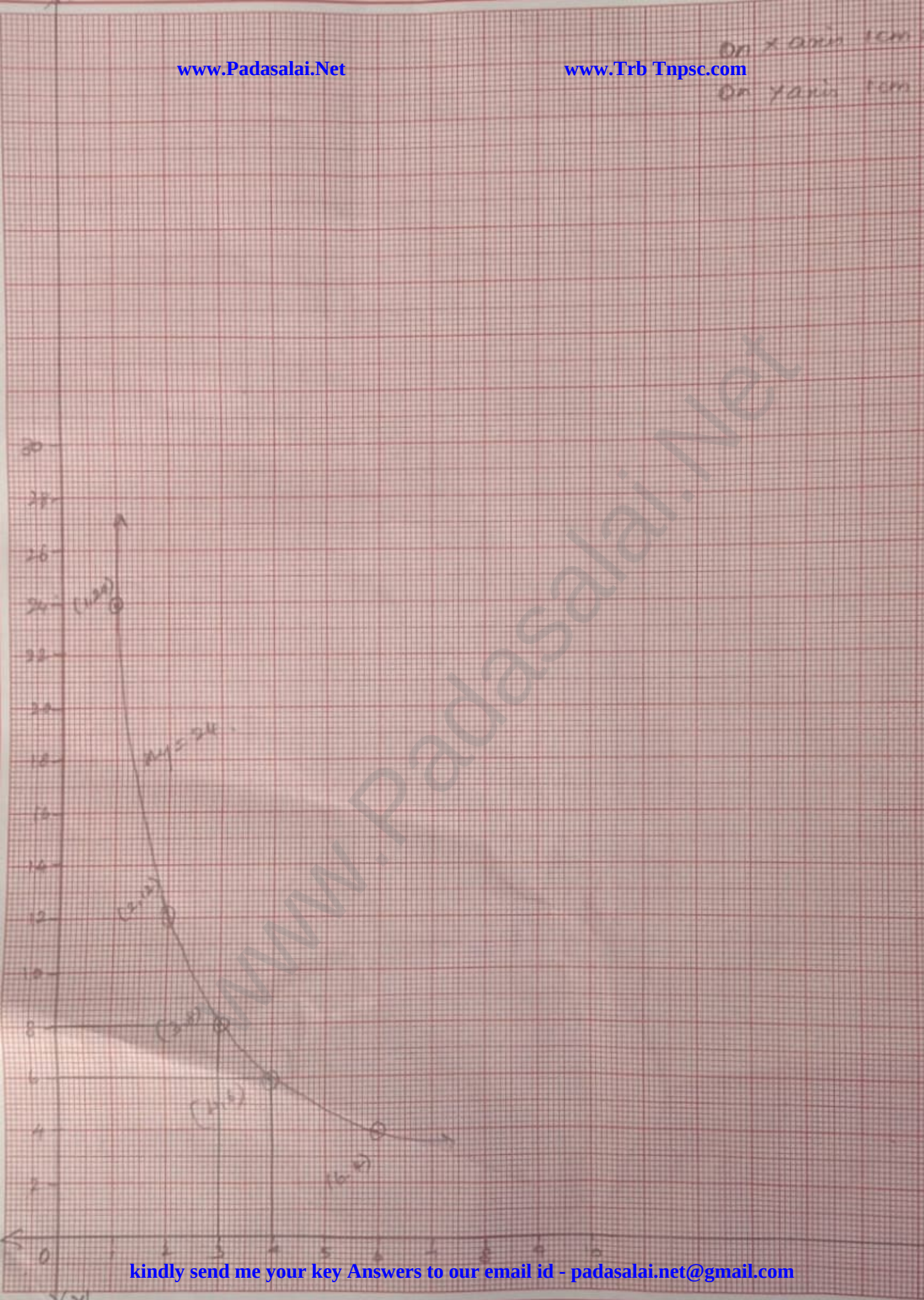
x	1	2	3	4
y	24	12	8	6

(1, 24) (2, 12) (3, 8) (4, 6)

(i) If $x = 3$ then $y = 8$.

(ii) $y = 6$ then $x = 4$.

On x axis 1 cm
On y axis 1 cm



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