www.Padasalai.Net www.CBSEtips.in

CLASS : 10 COMMON HALF YEARLY EXAMINATION-2022-23

Register Number: F 1 0 0 2

MATHEMATICS

Time Allowed : 3.00 Hours] SECTION – I [Max. Marks : 100

Note : Answer all the 14 questions.
Choose the correct answer from the given four alternataives and write the option code and the corresponding answer. **14x1=14**

1. If n (A x B) = 6 and A = {1, 3} then n (B) is --------
   (1) 1 (2) 2 (3) 3 (4) 6
2. If f : A → B is a bijective function and if n (B) = 7, then n (A) is equal to --------
   (1) 7 (2) 49 (3) 1 (4) 14
3. If the HCF of 65 and 117 is expressible in the form of 65m - 117, then the value of m is ---------
   (1) 4 (2) 2 (3) 1 (4) 3
4. If 1 + 2 + 3 + ... + n = K, then $1^3 + 2^3 + 3^3 + ... + n^3$ is equal to -------
   (1) k^2 (2) k^3 (3) $\frac{k(k+1)}{2}$ (4) $(k+1)^3$
5. If (x - 6) is the HCF of $x^2 - 2x - 24$ and $x^2 - kx - 6$, then the value of k is -------
   (1) 3 (2) 5 (3) 6 (4) 8
6. If A is a 2 x 3 matrix and B is a 3 x 4 matrix, how many columns does AB have
   (1) 3 (2) 4 (3) 2 (4) 5
7. If $\frac{a^3}{a-b}$ is added with $\frac{b^3}{b-a}$, then the new expression is ---------
   (1) $a^2 + ab + b^2$ (2) $a^2 - ab + b^2$ (3) $a^3 + b^3$ (4) $a^3 - b^3$
8. The perimeters of two similar triangles ΔABC and ΔPQR are 36 cm and 24 cm respectively. If PQ = 10 cm, then the length of AB is -------
   (1) $6\frac{2}{3}$ cm (2) $\frac{10\sqrt{6}}{3}$ cm (3) $66\frac{2}{3}$ cm (4) 15 cm
9. The area of triangle formed by the points (-5, 0), (0, -5) and (5, 0) is -------
   (1) 0 sq. units (2) 25 sq. units (3) 5 sq. units (4) 50 sq. units
10. If $\sin\theta = \cos\theta$, then $2\tan^2\theta + \sin^2\theta - 1$ is equal to -------
    (1) $\frac{-3}{2}$ (2) $\frac{3}{2}$ (3) $\frac{2}{3}$ (4) $\frac{-2}{3}$
11. If the ratio of the height of a tower and the length of its shadow is $\sqrt{3}$: 1 then the angle of elevation of the sun has measure
    (1) 45° (2) 30° (3) 90° (4) 60°
12. The height of a right ciruclar cone whose radius is 5 cm and slant height is 13 cm will be -------
    (1) 12 cm (2) 10 cm (3) 13 cm (4) 5 cm
13. The range of the data 8, 8, 8, 8, 8, ...,8 uis
    (1) 0 (2) 1 (3) 8 (4) 3
14. The probability that a student will score centum in mathematics is $4/5$. The probability that he will not score centum is -------
    (1) $\frac{1}{5}$ (2) $\frac{2}{5}$ (3) $\frac{3}{5}$ (4) $\frac{4}{5}$

SECTION - II

Answer any 10 questions.
Question No. 28 is compulsory. select any 9 questions from the first 13 questions. **10x2=20**

15. A Relation R is given by the set { (x, y) / y = x + 3, x ∈ {0, 1, 2, 3, 4, 5}} Determine its domain and Range.
16. Find k if fo f(k) = 5, where f (k) = 2k - 1
17. If $13824 = 2^a \times 3^b$, then find a and b.
18. In a G.P 729, 243, 81, ... find t_7
19. Find the excluded values of $\frac{t}{t^2 - 5t + 6}$

Kindly send me your questions and answerkeys to us : Padasalai.net@gmail.com

www.Padasalai.Net www.CBSEtips.in

20. If $A = \begin{bmatrix} 5 & 2 & 2 \\ -\sqrt{17} & 0.7 & 5/2 \\ 8 & 3 & 1 \end{bmatrix}$ then verify $(A^T)^T = A$

21. In ΔABC, if DE || BC, AD = x, DB = x - 2, AE = x + 2 and EC = x - 1 then find the lengths of the sides AB and AC

22. If the three points (3, -1), (a, 3) and (1, -3) are collinear, find the value of 'a'

23. Find the equation of a straight line which is parallel to the line 3x - 7y = 12 and passing through the point (6,4)

24. Prove that $\sqrt{\frac{1+\cos\theta}{1-\cos\theta}} = \text{cosec}\theta + \cot\theta$

25. If the total surface area of a cone of radius 7 cm is 704 cm^2, then find its slant height?

26. A right circular cylinder just enclose a sphere of radius r units. find the curved surface area of the cylinder.

27. Find the standard deviation of first 21 natural numbers.

28. In a two children family. find the probability that there is at least one girl in a family

SECTION - III

Answer the following any 10 questions.

Q.No.42 is compulsory select any 9 questions from the first 13 questions. **10x5=50**

29. Let $A = \{x \in N \mid 1 < x < 4\}$, $B = \{x \in W \mid 0 \le x < 2\}$ and $C = \{x \in N \mid x < 3\}$ then verify that $A \times (B \cup C) = (A \times B) \cup (A \times C)$

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

i) f(3) ii) f(0) iii) f(-1.5) iv) f(2) + f(-2)

31. The sum of three consecutive terms that one in A.P is 27 and their product is 288. Find the three terms

32. Find the sum to n terms of the series 5 + 55 + 555 + ...

33. If $9x^4 + 12x^3 + 28x^2 + ax + b$ is a perfect square. find the values of a and b

34. If $A = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$ and $I = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$ show that $A^2 - (a + d)A = (bc - ad)\, I_2$

35. state and prove pythagoras theorem.

36. Find the area of the quadrilateral fromed by the points (-9, -2), (-8, -4), (2, 2) and (1,-3)

37. Find the equation of the altitude of ΔABC through A where the vertices are A (6, 2), B(-5, -1) and C(1, 9)

38. From the top of a lighthouse, the angle of depression of two ships on the opposite sides of it are observed to be 30^o and 60^o. If the height of the lighthouse is h m and the line joining the ships passes through the foot of the lighthouse. Show that the distance between the ships is $4h/\sqrt{3}$ m

39. A container open at the top is in two form of a frustum of a cone of height 16 cm with radii of its lower and upper ends are 8 cm and 20 cm respectively. Find the cost of milk which can completely fill a container at the rate of ₹ 40 per litre.

40. A right circular cylinderical container of base raidus 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.

41. Two dice are rolled once. Find the probability of getting an even number on the first die or a total of face sum 8.

42. Simplify: $\frac{1/p + 1/q + r}{1/p - 1/q + r} \times \left(1 + \frac{q^2 + r^2 - p^2}{2qr}\right)$

SECTION - IV

Note: Answer both the questions choosing either of the alternatives. **2x8=16**

43. a) A bus is travelling at a uniform speed of 50 km/hr. Draw the distance-time graph and hence find (i) the constant of variation (ii) How far will it travel in $1\frac{1}{2}$ hour (iii) the time required to cover a distance of 300 km from the graph

OR

b) Draw the graph of $y = x^2 + 3x - 4$ and hence use it to solve $x^2 + 3x - 4 = 0$

44. a) Construct a ΔPQR such that QR = 6.5 cm, $\angle P = 60^o$ and the altitude from P to QR is of length 4.5 cm

OR

b) Take a point which is 11 cm away from the centre of a circle of radius 4 cm and draw the two tangents to the circle from the points.

Kindly send me your questions and answerkeys to us : Padasalai.net@gmail.com

BKPA INSTITUTIONS

Answer – key for Maths

Common Half-yearly Examinations 2022-23

Admin
12/30/2022

For the classes 10th

I hope that this document is most useful for the students for learning the halfyearly question paper. While learning, especially for Mathematics, Please understand the given data and do the specific sum.This is my special and kindly request for the students what I tell.

www.PadasalaiNet

www.Padasalai.Net www.CBSEtips.in

Section - I

Choose the correct answer.

1).	3).	3
2).	1).	7
3).	2).	2
4).	3).	$\frac{k(k+1)}{2}$
5).	2).	5
6).	2).	4
7).	1).	$a^2 + ab + b^2$
8).	4).	15 cm.
9).	2).	25 Sq. units
10).	2).	$3/2$
11).	4).	60°
12).	1).	12 cm
13).	1).	0
14).	1).	$1/5$

Section - II

Answer all the questions.

15). A relation R is given

$$\{(x,y) / y = x+3, x \in \{0,1,2,3,4,5\}\}$$

Solution.

$$y = x + 3$$

when $x = 0$; $y = 0 + 3 = 3$
$x = 1$; $y = 1 + 3 = 4$
$x = 2$; $y = 2 + 3 = 5$
$x = 3$; $y = 3 + 3 = 6$
$x = 4$; $y = 4 + 3 = 7$
$x = 5$; $y = 5 + 3 = 8$

$$R = \{(0,3)\ (1,4)\ (2,5)\ (3,6)\ (4,7)\ (5,8)\}$$

Ans: Domain : $\{0,1,2,3,4,5\}$
Range : $\{3,4,5,6,7,8\}$.

Kindly send me your questions and answerkeys to us : Padasalai.net@gmail.com

www.Padasalai.Net www.CBSEtips.in

16). Given: $f(k) = 5$

$f(k) = 2k - 1$

to find: k.

Soln:

$f(k) = 2k - 1$

$\downarrow$

$5 = 2k - 1$

$2k - 1 = 5$

$2k = 5 + 1$

$2k = 6$

$k = \frac{6}{2}$

$k = 3$

Ans: $k = 3$.

17). Given: $2^a \times 3^b = 13824$

to find: a and b.

Soln:

$2^{(a)} \times 3^{(b)} = 13824$.

by solving $\uparrow$.

$2^{(9)} \times 3^{(3)}$.

equating a and b.

Ans:

$a = 9$; $b = 3$

2	13824
2	6912
2	3456
2	1728
2	864
2	432
2	216
2	108
2	54
3	27
3	9
3	3
	1

$2^9 \times 3^3$

Kindly send me your questions and answerkeys to us : Padasalai.net@gmail.com

www.Padasalai.Net www.CBSEtips.in

18). Given : G.P. 729, 243, 81, ...

to find : t_7. (7th term).

Sol :

$$r = \frac{243}{729} = \frac{1}{3}.$$

$$t_n = ar^{n-1}$$

$$t_7 = 729 \times \left(\frac{1}{3}\right)^6$$

$$= 729 \times 0.0013\ldots$$

$$t_7 = 1$$

19). to find : Excluded value for

$$\frac{t}{t^2 - 5t + 6}$$

$$\frac{t}{(t-2)(t-3)}$$

S	P
-5	6

$-2, -3$

$\frac{-2}{t}$ $\frac{-3}{t}$

$t - 2 = 0$ | $t - 3 = 0$

$t = 0 + 2$ | $t = 0 + 3$

$t = 2$ | $t = 3$

Ans : The excluded values are $t = 2$ or 3.

Kindly send me your questions and answerkeys to us : Padasalai.net@gmail.com

www.Padasalai.Net www.CBSEtips.in

20). Given: $A = \begin{bmatrix} 5 & 2 & 2 \\ -\sqrt{17} & 0.7 & 5/2 \\ 8 & 3 & 1 \end{bmatrix}$

to verify: $(A^T)^T = A$

Soln:

$$A^T = \begin{bmatrix} 5 & -\sqrt{17} & 8 \\ 2 & 0.7 & 3 \\ 2 & 5/2 & 1 \end{bmatrix}$$

$$(A^T)^T = \begin{bmatrix} 5 & 2 & 2 \\ -\sqrt{17} & 0.7 & 5/2 \\ 8 & 3 & 1 \end{bmatrix}$$

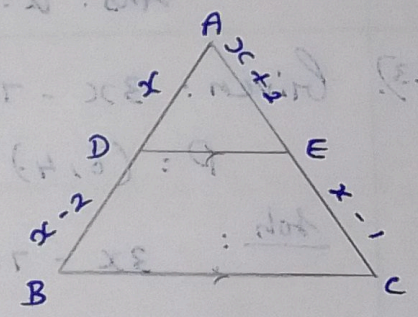
$(A^T)^T = A$.

Hence verified.

21).

Soln: In $\triangle ABC$ as $DE \parallel BC$.

By. BPT:



$$\frac{AD}{DB} = \frac{AE}{EC}$$

$$\frac{x}{x-2} = \frac{x+2}{x-1}$$

[Cross Product].

$$x^2 - x = x^2 - 4$$

$$-x = -4$$

$$x = 4 \text{ cm}.$$

to find:

$AB = x + x - 2$

$= 2x - 2$

$= 8 - 2$

$AB = 6$ cm.

$AC = x + 2 + x - 1$

$= 2x + 1$

$= 8 - 1$

$AC = 7$ cm.

Ans: AB = 6cm ; AC = 7cm.

Kindly send me your questions and answerkeys to us : Padasalai.net@gmail.com

www.Padasalai.Net www.CBSEtips.in

22) Given Points are: $(3,-1)\ (a,3)\ (1,-3)$ are collinear.

to find: a

Soln:

$$\frac{1}{2}\begin{bmatrix} 3 & a & 1 & 3 \\ -1 & 3 & -3 & -1 \end{bmatrix} = 0 \quad [\text{collinear} \Rightarrow 0]$$

$$[(9 - 3a - 1) - (-a + 3 - 9)] = 0$$

$$[(8 - 3a) - (-a - 6)] = 0$$

$$[8 - 3a + a + 6] = 0$$

$$14 - 2a = 0$$

$$+2a = +14$$

$$a = \frac{14}{2}$$

$$\underline{a = 7}$$

Ans: $a = 7$.

23) Given: $3x - 7y = 12$. to find: equation of st. line.

$P = (6,4)$

Soln:

$3x - 7y = 12$.

$a = 3 \ ; \ b = -7$.

Slope $m = \frac{-a}{b}$

$m = 3/7 \quad P(x_1, y_1) = (6,4)$

eqn. of st. line: $y - y_1 = m(x - x_1)$

$y - 4 = 3/7 (x - 6)$

$7y - 28 = 3x - 18$

$0 = 3x - 18 - 7y + 28$

Ans: $3x - 7y + 10 = 0$ is the required eqn.

Kindly send me your questions and answerkeys to us : Padasalai.net@gmail.com

www.Padasalai.Net www.CBSEtips.in

24) To Prove: $\sqrt{\frac{1+\cos\theta}{1-\cos\theta}} = \operatorname{cosec}\theta + \cot\theta$

Solution: Consider LHS.

$\sqrt{\frac{1+\cos\theta}{1-\cos\theta}}$ [Taking conjugates].

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

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

$= \frac{1+\cos\theta}{\sin\theta}$ [Splitting].

$= \frac{1}{\sin\theta} + \frac{\cos\theta}{\sin\theta}$

$= \operatorname{cosec}\theta + \cot\theta$

$=$ RHS.

Hence Proved.

25) Given: TSA of cone $= 704\ cm^2$.

$r = 7cm$.

to find: l.

Soln: $TSA = 704$

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

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

$22(l+7) = 704$

$l+7 = \frac{704}{22}$

$l+7 = 32$

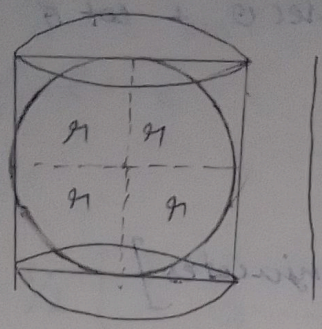
$l = 32-7$

~~Ans~~: $l = 25\ cm$.

Slant height (l) $= 25\ cm$.

Kindly send me your questions and answerkeys to us : Padasalai.net@gmail.com

26)



to find: CSA of cylinder

Soln:

$2\pi rh$.

$2\pi r \times 2r$

Ans: $4\pi r^2$ is the CSA of cylinder.

27) To find: S.D (σ) for 21 first Natural Numbers.

Soln:

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

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

$$= \sqrt{\frac{440}{12}}$$

$$= \sqrt{\frac{110}{3}}$$

$$= \sqrt{36.67} \quad [\text{taking root}].$$

$$= 6.055$$

Ans: $\sigma = 6.06$.

28)

$S = \{BB, BG, GB, GG\}$.

let B be the Boy and G be the girl in one Family.

$n(S) = 4$.

let A be the event for getting atleast one girl.

$A = \{BG, GB, GG\}$

$n(A) = 3$. $P(A) = \frac{3}{4}$.

Ans: $P(A) = 3/4$.

www.Padasalai.Net www.CBSEtips.in

Section - III

Answer all the Questions:

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

To verify : $A \times (B \cup C) = (A \times B) \cup (A \times C)$

Soln : Consider LHS. $A \times (B \cup C)$

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

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

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

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

Consider RHS : $(A \times B) \cup (A \times C)$.

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

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

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

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

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

From ① and ②:

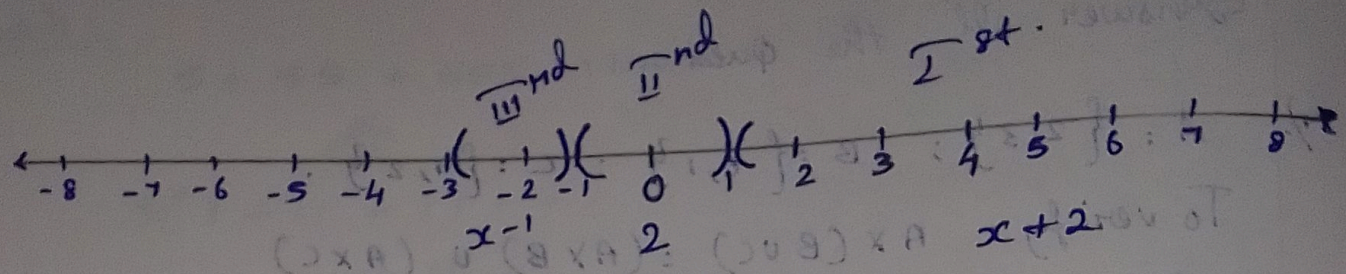
$A \times (B \cup C) = (A \times B) \cup (A \times C)$

Hence verified.

Kindly send me your questions and answerkeys to us : Padasalai.net@gmail.com

www.Padasalai.Net www.CBSEtips.in

30). Given:



To find: (i) $f(3)$ (ii) $f(0)$ (iii) $f(-1.5)$ (iv) $f(2) + f(-2)$

Soln: (i) $f(3) = x + 2$.

3 lies in I st.

$f(3) = x + 2$

$= 3 + 2 = 5$.

Ans: (ii). $f(3) = 5$.

$f(0)$.

0 lies in II nd.

Ans: $f(0) = 2$.

(iii) $f(-1.5)$ lies in III nd.

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

Ans: $f(-1.5) = -2.5$.

(iv) $f(2) + f(-2)$.

2 lies in I st.

$f(2) = 2 + 2 = 4$.

$f(2) = 4$.

$f(-2)$ lies in III nd.

$f(-2) = -2 - 1$

$f(-2) = -3$.

Now; $f(2) + f(-2) = 4 - 3$

Ans: $= 1$

Kindly send me your questions and answerkeys to us : Padasalai.net@gmail.com

www.Padasalai.Net www.CBSEtips.in

31) To find: The 3 Terms of an A.P:

Solution:

$$a - d + a + a + d = 27$$

$$3a = 27$$

$$a = 9$$

Now; Their Product = 288

$$a - d \times a \times a + d = 288$$

$$(a^2 - d^2)a = 288$$

$$81 - d^2 = \frac{288}{9} \quad 32$$

$$81 - d^2 = 32$$

$$-d^2 = 32 - 81$$

$$-d^2 = -49$$

$$d = \pm\sqrt{49}$$

$$d = \pm 7$$

when $a = 9$; $d = +7$.

Then the 3 terms are.

$a - d, a, a + d$

$9 - 7, 9, 9 + 7$

$\Rightarrow 2, 9, 16.$

(or)

when $a = 9$; $d = -7$.

Then the 3 terms are

$a - d, a, a + d$

$9 + 7, 9, 9 - 7$

$\Rightarrow 16, 9, 2$

The 3 consecutive terms of an A.P.

~~Ans~~: 2, 9, 16

or

16, 9, 2.

Kindly send me your questions and answerkeys to us : Padasalai.net@gmail.com

www.Padasalai.Net www.CBSEtips.in

32). Given : Series is $5 + 55 + 555 + \ldots\ldots$ n terms.

Soln :

$5 + 55 + 555 + \ldots\ldots$ n terms.

$5(1 + 11 + 111 + \ldots\ldots$ n terms).

Multiply and ÷ by 9

$\frac{5 \times 9}{9}(1 + 11 + 111 + \ldots\ldots$ n terms).

$\frac{5}{9}[9 + 99 + 999 + \ldots\ldots$ n terms$]$

Splitting.

$5/9[(10-1) + (100-1) + (1000-1) + \ldots\ldots$ n term$]$

$5/9[[10 + 100 + 1000 + \ldots\ldots$ n terms$] - n]$

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

$r = 10$ .. greater than 1 .. $[10 > 1]$

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

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

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

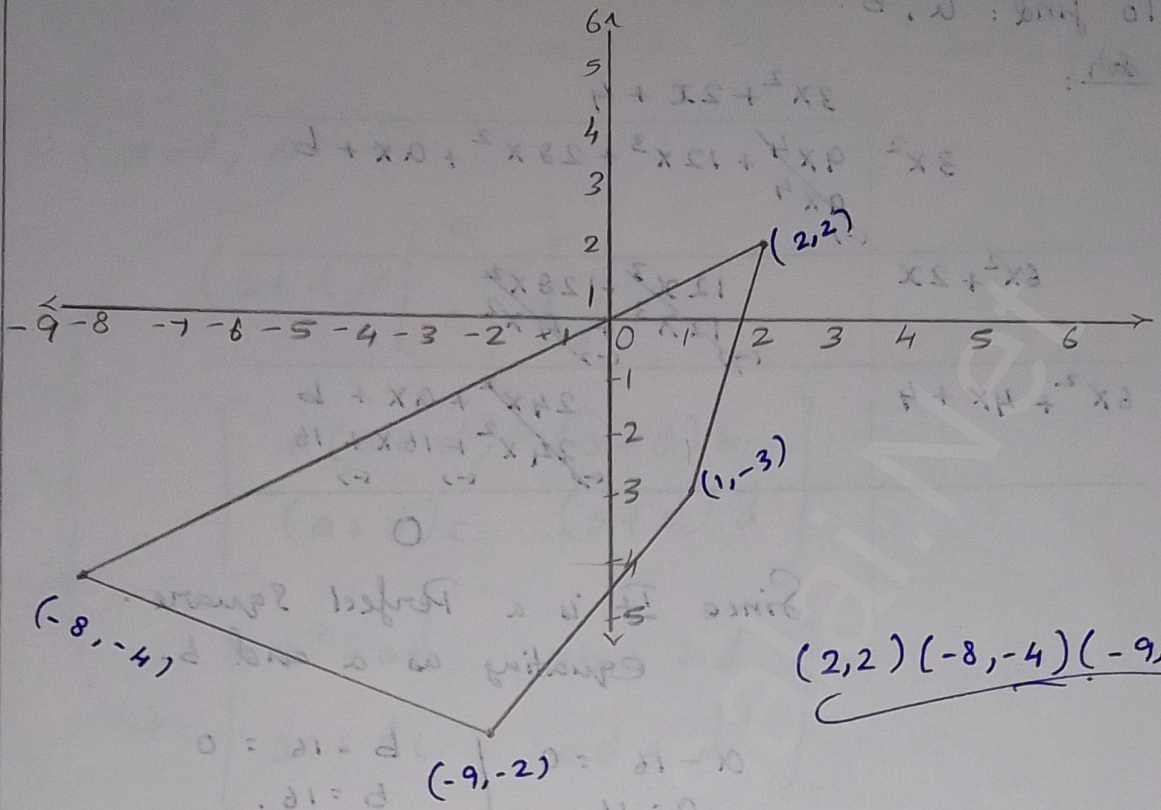
$S_n = \frac{50(10^n - 1)}{81} - \frac{5n}{9}$.

Ans :

Kindly send me your questions and answerkeys to us : Padasalai.net@gmail.com

36). Given: $(-9,-2)$ $(-8,-4)$ $(2,2)$ $(1,-3)$

Plot in graph.



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

to find: Area of This quadilateral.

Soh:

$$\frac{1}{2}\begin{bmatrix} 2 & -8 & -9 & 1 & 2 \\ 2 & -4 & -2 & -3 & 2 \end{bmatrix} \text{ units.}$$

$$\frac{1}{2}\left[(-8+16+27+2)-(-16+36-2-6)\right]$$

$$\frac{1}{2}\left[(37)-(12)\right]$$

$$\frac{1}{2}\left[37-12\right].$$

$$\frac{1}{2} \times 70^{35}$$

Ans:

Area of Quadilateral is 35 units.

33) Given : Polynomial is $9x^4 + 12x^3 + 28x^2 + ax + b$ is a Perfect Square.

To find : a, b.

Soln :

$3x^2 + 2x + 4$

$3x^2$ | $9x^4 + 12x^3 + 28x^2 + ax + b$

$9x^4$ (−)

$6x^2 + 2x$ | $12x^3 + 28x^2$

$12x^3 + 4x^2$ (−) (−)

$6x^2 + 4x + 4$ | $24x^2 + ax + b$

$24x^2 + 16x + 16$ (−) (−) (−)

0

Since It is a Perfect Square. equating as a and b..

$a - 16 = 0$ | $b - 16 = 0$

$a = 16$. | $b = 16$.

Ans : $a = 16$; $b = 16$.

34). $A = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$. $I = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$.

To Prove : $A^2 - (a+d)A = (bc - ad) I_2$.

Soln : $A^2 = A \times A$

$= \begin{pmatrix} a & b \\ c & d \end{pmatrix} \begin{pmatrix} a & b \\ c & d \end{pmatrix}$

$= \begin{bmatrix} a & b \\ \hline c & \end{bmatrix} \begin{matrix} a \\ c \end{matrix} \quad \begin{bmatrix} a & b \\ \hline & d \end{bmatrix} \begin{matrix} b \\ d \end{matrix}$

$\begin{bmatrix} c & d \\ \hline & \end{bmatrix} \begin{matrix} a \\ c \end{matrix} \quad \begin{bmatrix} c & d \\ \hline & \end{bmatrix} \begin{matrix} b \\ d \end{matrix}$

$$A^2 = \begin{bmatrix} a^2+bc & ab+bd \\ ac+dc & cb+d^2 \end{bmatrix}$$

$(a+d)A$

$$(a+d)\times\begin{bmatrix} a & b \\ c & d \end{bmatrix}$$

$$\begin{bmatrix} a(a+d) & (a+d)b \\ (a+d)c & (a+d)d \end{bmatrix}$$

$$= \begin{bmatrix} a^2+ad & ab+bd \\ ac+dc & ad+d^2 \end{bmatrix}$$

Now; $A^2 - (A+d)A$

$$\begin{bmatrix} a^2+bc & ab+bd \\ ac+dc & cb+d^2 \end{bmatrix} - \begin{bmatrix} a^2+ad & ab+bd \\ ac+dc & ad+d^2 \end{bmatrix}$$

$$= \begin{bmatrix} a^2+bc-a^2-ad & ab+bd-ab-bd \\ ac+dc-ac-dc & cb+d^2-ad-d^2 \end{bmatrix}$$

$$= \begin{bmatrix} bc-ad & 0 \\ 0 & bc-ad \end{bmatrix}$$

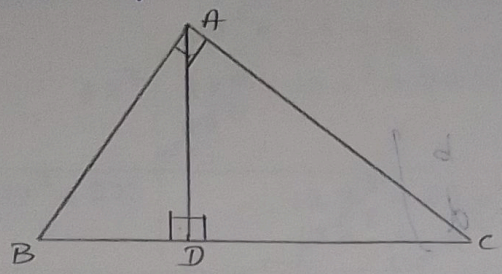
$$(bc-ad)\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

$$= I_2.$$

Hence Proved.

35) **Theorem 5 : 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.



Proof : Given : In ΔABC, $\angle A = 90^\circ$,

To Prove : $BC^2 = AB^2 + AC^2$

Construction : Draw $AD \perp BC$.

1). Compare ΔABC with ΔDBA

$\angle B$ is common.

$\angle ABD = \angle DBA = 90^\circ$

Given $\angle BAC = 90^\circ$ & by construction $\angle BDA = 90^\circ$.

By AA Similarity.

$\Delta ABC \sim \Delta DBA$

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

$AB^2 = BC \times BD$ —— ①.

2). Compare ΔABC with ΔDAC

$\angle C$ is common.

$\angle ACB = \angle DCA = 90^\circ$

Given $\angle BAC = 90^\circ$ & by construction $\angle ADC = 90^\circ$

By AA Similarity.

$\Delta ABC \sim \Delta DAC$

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

$AC^2 = BC \times DC$ —— ②.

From ① and ② Adding.

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

$= BC(BD + DC)$

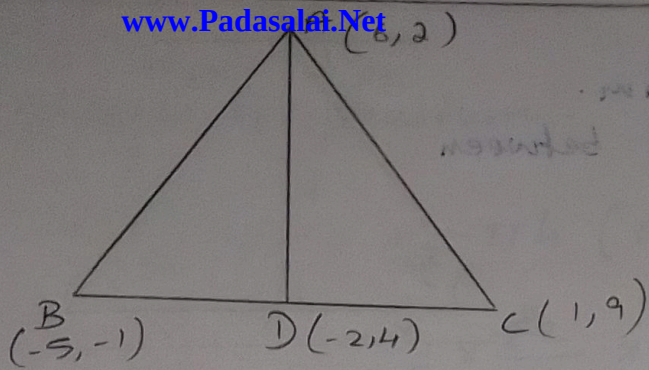
$AB^2 + AC^2 = BC^2$

Hence Proved.

Kindly send me your questions and answerkeys to us : Padasalai.net@gmail.com

www.Padasalai.Net www.CBSEtips.in

37)



Solution: $B(-5, -1)$ $C(1, 9)$.
$x_1 \; y_1$ $x_2 \; y_2$

Midpoint of BC : $\left[\frac{-5+1}{2}, \frac{-1+9}{2}\right]$

$= \frac{-4}{2}, \frac{8}{2}$

(D). BC. : $(-2, 4)$

To find : The equation of the straight line of A through D.

A : $(6, 2)$ $D(-2, 4)$
$x_1 \; y_1$ $x_2 \; y_2$

Slope $m = \left[\frac{Y-2}{4-2} = \frac{X-6}{-2-6}\right]$

$= \left[\frac{Y-2}{2} \times \frac{X-6}{-8}\right]$

$-8y + 16 = 2x - 12$

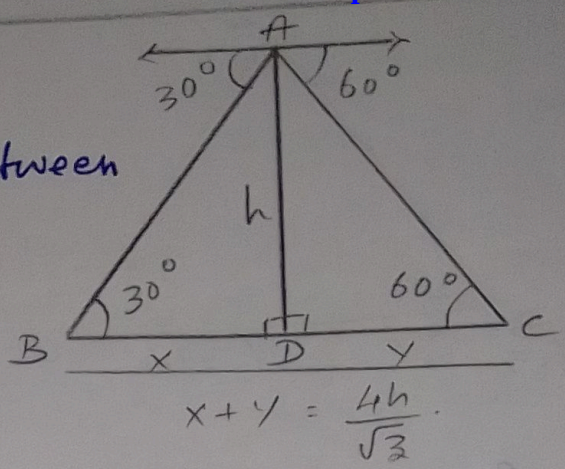
$0 = 2x + 8y - 16 - 12$

Ans = $2x + 8y - 28 = 0$ is the required equation.

Kindly send me your questions and answerkeys to us : Padasalai.net@gmail.com

www.Padasalai.Net www.CBSEtips.in

38). Given: lighthouse AD = h m.
let BC be the distance between 2 Ships.



to prove: $x + y = \frac{4h}{\sqrt{3}}$ m.

Soln: In ΔADB;

$\tan 30^\circ = \frac{h}{x}$

$\frac{1}{\sqrt{3}} = \frac{h}{x}$

$x = h\sqrt{3}$ — ①.

In ΔADC;

$\tan 60^\circ = \frac{h}{y}$

$\sqrt{3} = \frac{h}{y}$

$y = \frac{h}{\sqrt{3}}$ — ②.

To Prove: $x + y = \frac{4h}{\sqrt{3}}$

$h\sqrt{3} + \frac{h}{\sqrt{3}}$

$\frac{3h + h}{\sqrt{3}} = \frac{4h}{\sqrt{3}}$ m.

Hence Proved.

Kindly send me your questions and answerkeys to us : Padasalai.net@gmail.com

www.Padasalai.Net www.CBSEtips.in

39)

Volume of frustum.

$$V. = \frac{1}{3}\pi h\left(R^2 + r^2 + Rr\right)$$

$$= \frac{1}{3} \times \frac{22}{7} \times 16 \left[20^2 + 8^2 + 20 \times 8\right]$$

$$= \frac{1}{3} \times \frac{22}{7} \times 16 \left[400 + 64 + 160\right]$$

$$= \frac{1}{3} \times \frac{22}{7} \times 16 \times \overset{208}{\cancel{624}}$$

$$= \frac{73216}{7}$$

Volume. $= 10459.43 \text{ cm}^3$.

$1000 \text{ cm}^3 = 1 \text{ lt.}$

$\div$

$$\frac{10459.43}{1000}$$

10.459 litres.

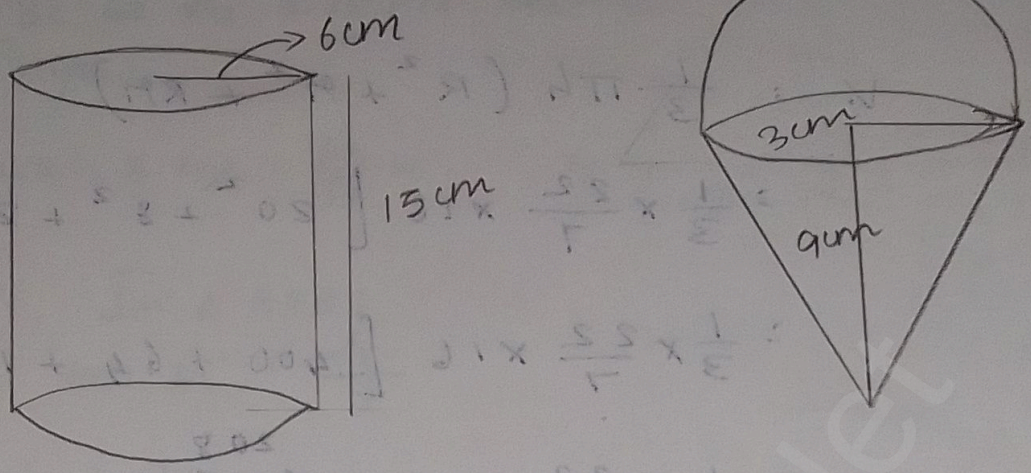
To find: Cost of milk.

₹ 10.459×40

Ans: = ₹ 418.36

Kindly send me your questions and answerkeys to us : Padasalai.net@gmail.com

40).



Volume of cylinder = Volume of cone + V. of Hemisphere

$$\pi r^2 h = n\frac{1}{3}\pi r^2 h + \frac{4}{3}\pi r^3$$

$$\pi \times 6 \times 6 \times 15 = n\frac{1}{3}\pi r^2 [h + 2r]$$

$$6 \times 6 \times 15 = n\frac{1}{3} \times 3 \times 3 [9 + 2 \times 3]$$

$$15 \times 6 \times 6 = n \times 3 [15]$$

$$\frac{15 \times 6 \times 6}{15 \times 3} = n$$

$$n = 12$$

Ans:

Number of cones = 12.

www.Padasalai.Net www.CBSEtips.in

41) When two dice are rolled once. Then:

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

$n(S) = 36$

Let A be the event of getting an even number on the first die.

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

$n(A) = 18$
$P(A) = \frac{18}{36}$.

Let B be the event of getting a total of sum as 8.

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

$n(B) = 5$
$P(B) = \frac{5}{36}$.

$A \cap B = \{(2,6)\ (6,2)\ (4,4)\}$

$n(A \cap B) = 3$
$P(A \cap B) = \frac{3}{36}$.

By Addition Theorem of Probability.

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

$= \frac{18}{36} + \frac{5}{36} - \frac{3}{36}$

$= \frac{20}{36}^{5}$
$= \frac{5}{9}$

Ans:

$P(A \cup B) = \frac{5}{9}$

Kindly send me your questions and answerkeys to us : Padasalai.net@gmail.com

www.Padasalai.Net www.CBSEtips.in

42) Solution:

$$\frac{\frac{1}{p}+\frac{1}{q+r}}{\frac{1}{p}-\frac{1}{q+r}} \times \left(1+\frac{q^2+r^2-p^2}{2qr}\right)$$

$$\frac{\frac{q+r+p}{p(q+r)}}{\frac{q+r-p}{p(q+r)}} \times \left(\frac{2qr+q^2+r^2-p^2}{2qr}\right)$$

$$\frac{q+r+p}{q+r-p} \times \left(\frac{2qr+q^2+r^2-p^2}{2qr}\right)$$

$$\frac{q+r+p}{q+r-p} \times \frac{(q+r)^2-p^2}{2qr}$$

$$\frac{q+r+p}{q+r-p} \times \frac{(q+r+p)(q+r-p)}{2qr}$$

$$\frac{(q+r+p)^2}{2qr}$$

Simplified.

Kindly send me your questions and answerkeys to us : Padasalai.net@gmail.com

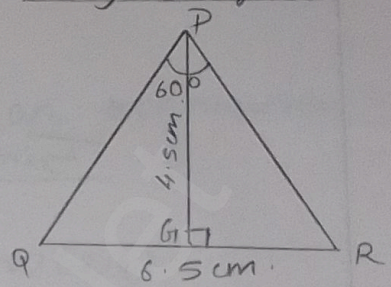
www.Padasalai.Net www.CBSEtips.in

Section - IV

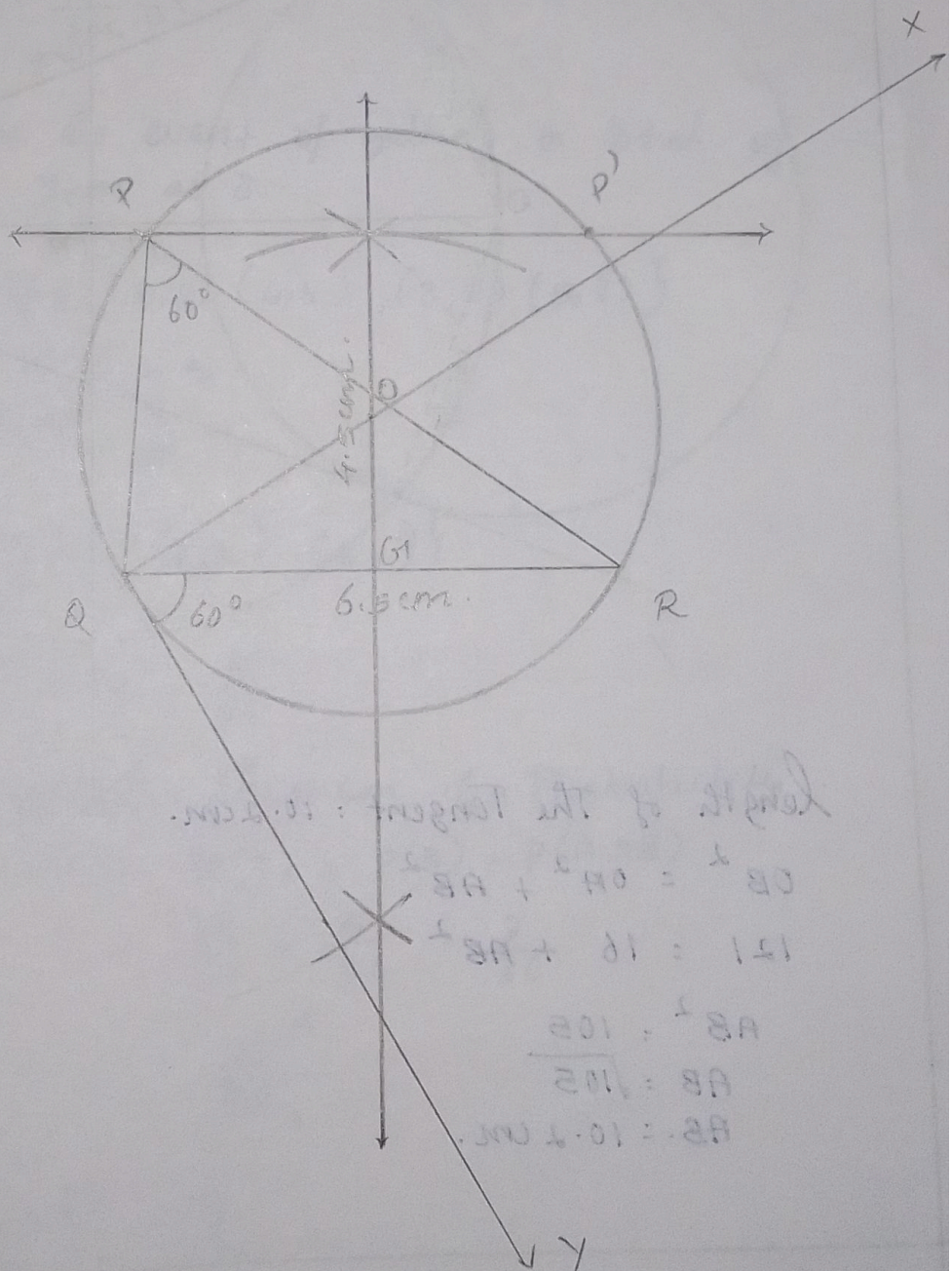
Answer all the questions :

44). a). Construct a $\triangle PQR$ such that $QR = 6.5$ cm, $\angle P = 60^\circ$ and the altitude from P to QR is of length 4.5 cm.

Rough Diagram :



Fair Diagram :

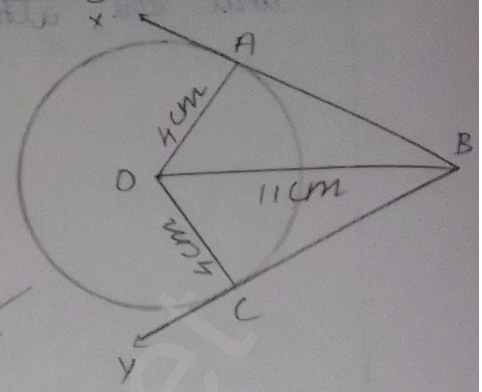


Kindly send me your questions and answerkeys to us : Padasalai.net@gmail.com

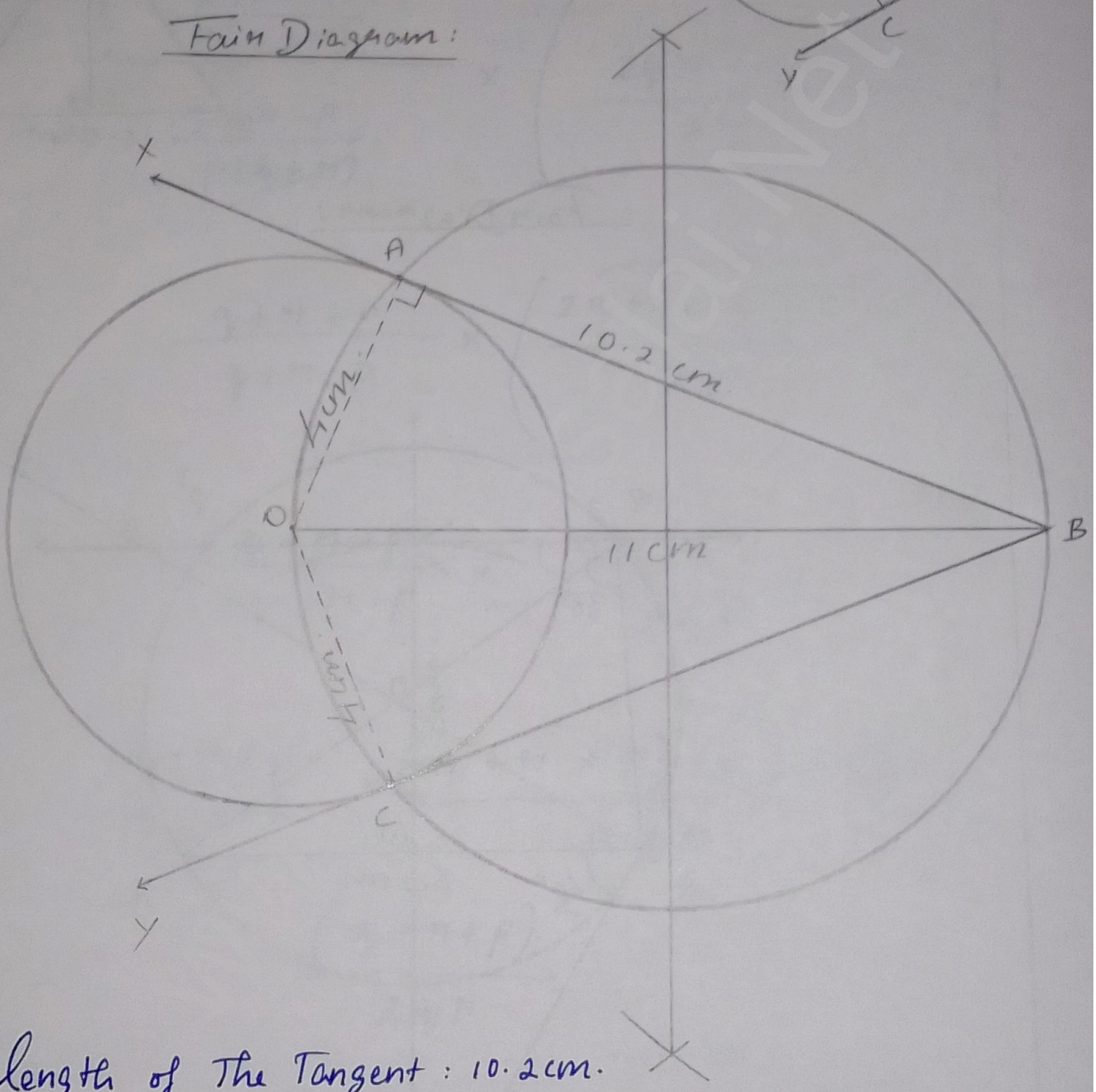
www.Padasalai.Net www.CBSEtips.in

b). Draw a point which is 11 cm away from the centre of a circle of radius 4 cm and draw the 2 Tangents to the circle from the points.

Rough Diagram



Fair Diagram:



Length of The Tangent : 10.2 cm.

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

$121 = 16 + AB^2$

$AB^2 = 105$

$AB = \sqrt{105}$

$AB = 10.2$ cm.

Kindly send me your questions and answerkeys to us : Padasalai.net@gmail.com

www.Padasalai.Net www.CBSEtips.in

43) a.

Time Taken (x).	60	120	180	240	300
Distance (y).	50	100	150	200	250

As x increases and y also increases.

So, it is in Direct Variation.

$y = kx$ — ①.

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

$k = \frac{50}{60} = \frac{100}{120} = \frac{150}{180} = \frac{200}{240} = \frac{250}{300} = 5/6.$

Plotting points are: (60, 50) (120, 100) (180, 150) (240, 200), (300, 250).

(i) Constant Variation $k = \frac{5}{6}$

Sub $5/6 = k$ in ①.

$y = kx$

$y = \frac{5}{6}x.$

(ii) In $1\frac{1}{2}$ hr it can travel 75 km.

Proof: 1 hr = 60 min

$\frac{1}{2}$ hr = 30 min.

90 min.

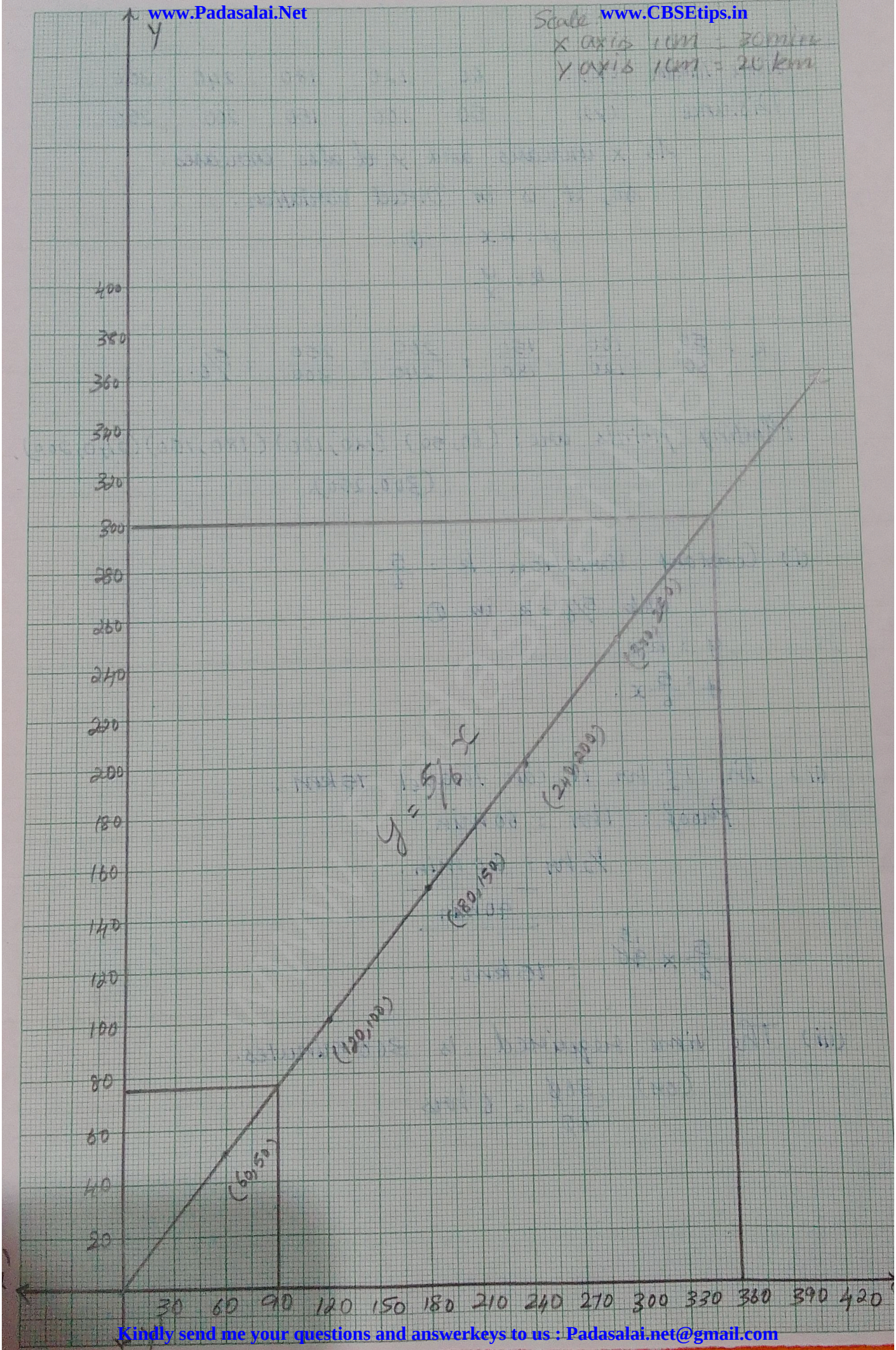
$\frac{5}{6} \times \overset{15}{\cancel{90}} = 75$ km.

(iii) The time required is 360 minutes.

(or) $\frac{360}{60} = 6$ hrs.

Kindly send me your questions and answerkeys to us : Padasalai.net@gmail.com

www.Padasalai.Net www.CBSEtips.in



Kindly send me your questions and answerkeys to us : Padasalai.net@gmail.com

43) b:

$y = x^2 + 3x - 4$.

x	-4	-3	-2	-1	0	1	2	3	4
x^2	16	9	4	1	0	1	4	9	16
$3x$	-12	-9	-6	-3	0	3	6	9	12
-4	-4	-4	-4	-4	-4	-4	-4	-4	-4
y	0	-4	-6	-6	-4	0	6	14	24

Plotting points are : (-4,0) (-3,-4) (-2,-6) (-1,-6) (0,-4) (1,0) (2,6) (3,14) (4,24)

Solve : $y = x^2 + 3x - 4$

$0 = x^2 + 3x - 4$

(-) (-) (+)

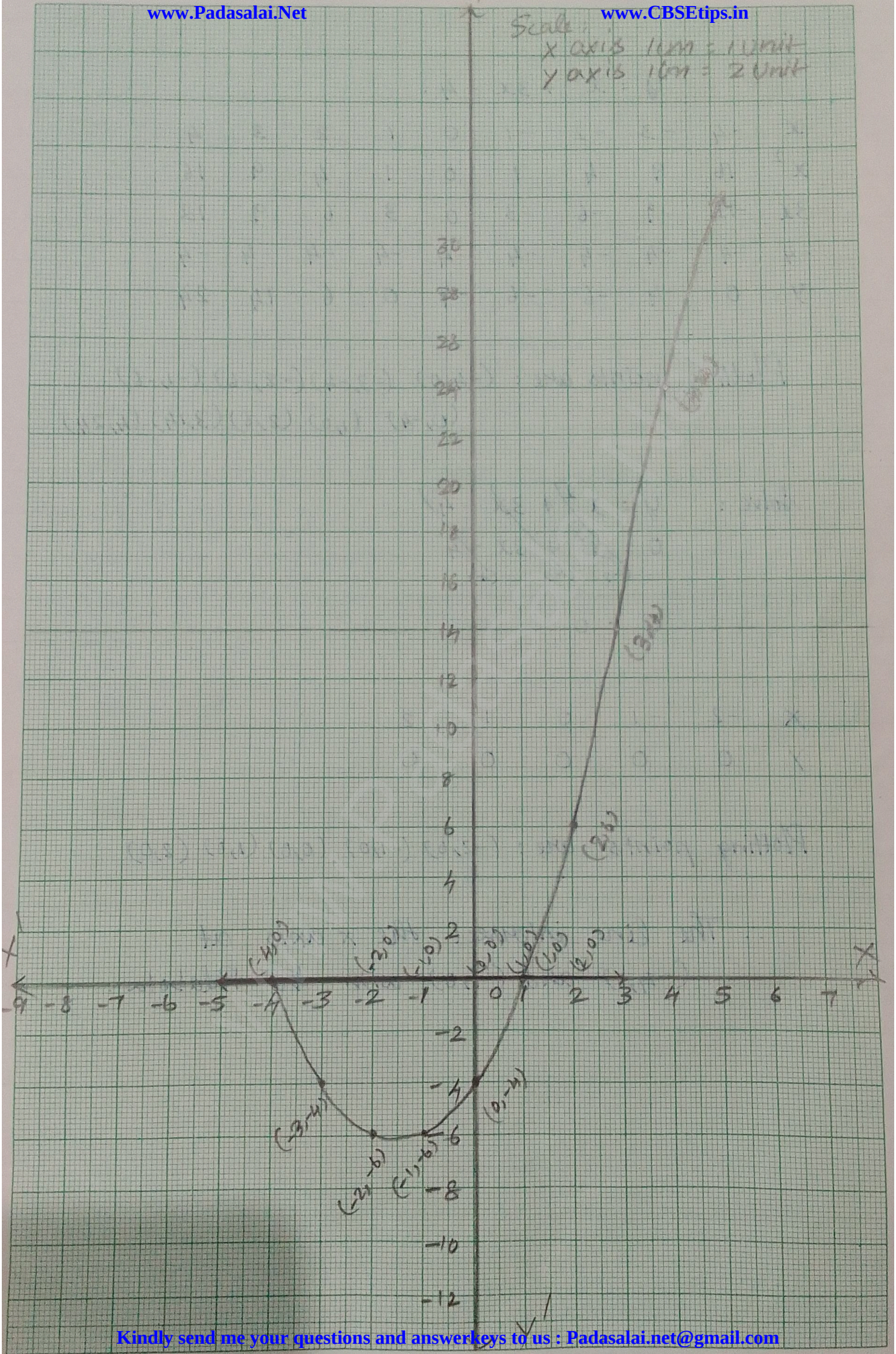
$y = 0$

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

Plotting points are : (-2,0) (-1,0) (0,0) (1,0) (2,0)

∴ The line intersect the x axis at (-4,0) and (1,0) with the Palabola.

www.Padasalai.Net www.CBSEtips.in



Kindly send me your questions and answerkeys to us : Padasalai.net@gmail.com

THANKYOU !!

www.Padasalai.Net