# Mathematics Standard - 041

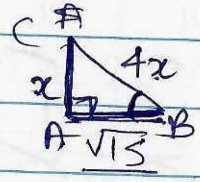
Space for writing Question Number

Rough work.

$x = -5$

$x = \frac{1}{2}.$

$\sec B = \frac{H}{B}$




$\sin B = \frac{1}{4} = \frac{P}{H}$

$x = -5$

$\frac{4}{\sqrt{15}}$

$(4x)^2 - (x)^2$

$16x^2 - x^2$

$\sqrt{15x^2}$

$\sec B = \frac{4x}{\sqrt{15}x}.$

$8 \times 8 = 64$

$2(-5) - 1 = 0$

$-10 - 1 = 0$

$\cancel{-4}\ -11 \neq 0.$

$a^2 + b^2 - 2ab$

$-2 \times x \times 15 \, 12$

$\frac{c}{a} = 1$

$\frac{2\cancel{a}}{b \times \cancel{a}} = 1$

$2 = b$

$8^2 = 64$

$64 \times 8 = 2$

$2 \times 8 = 6$

(1) $(x-1)^2 = 1 - 2x$

$x^2 + 1 - 2x = 1 - 2x$

$x^2 - 2x + 2x + 1 - 1 = 0$

$x^2 = 0.$

$\frac{2a}{ba} = 1$

$x^2 + x + 1 = 0.$

$b = 1 \quad c = 1 \quad a = 1$

$(1)^2 - 4 \cancel{= 0}$ ×

$2x^2 + x + 1$ ×

$x^2 + 2x = 0$

$b^2 - 4ac$

$(2)^2 - 4(1)(0) = 0$

$4$

$x(x+2) = 0$

$x = -2 \quad x = 0.$

$x^2 + 2x = 0$

$a = 1 \quad b = 2 \quad c = 0,$

$b^2 - 4ac \cancel{= 0}$

$4 - 4(1)(0) \cancel{= 0}$

$\frac{c}{a} = 1$

$\frac{2\cancel{a}}{b \times \cancel{a}} = 1$

SECTION A

Ans 1. (A) No Solution

Ans 2. (D) $\frac{4}{\sqrt{15}}$

Ans 3. (D) irrational no.

Ans 4. (C) 0.

Ans 5. (A) $x^2+2x=0$

Ans 6. (A) 2

Ans 7. (C) b

Ans 8. (C) 3cm.

Ans 9. (C) 150°

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Ans 10. (C) $\frac{3}{4}$

Ans 11. (D) 6cm

Ans 12. (C) $x < y$

Ans 13. (B) Q

Ans 14. (B) $45°$

Ans 15. (A) $30°$

Ans 16. (C) 2:1

Ans 17. (B) 13 and 12.

Ans 18. (C) 52 is mode of the data

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Ans19. (D) Assertion (A) is false, but Reason, (R) is true.

Ans20. (D) Assertion (A) is false but Reason (R) is true.

~~Ans20. (B) Both Assertion and Reason are true, but Reason (R) is not the correct explanation of Assertion (A).~~

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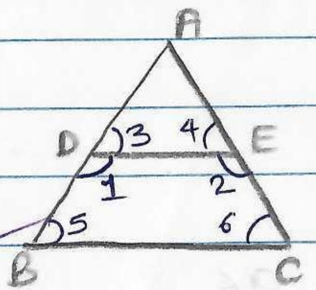
SECTION B.

Ans21.




given = $\Delta ABC$ and $\frac{AD}{BD} = \frac{AE}{EC}$ $\angle BDE = \angle CED$

To prove = $\Delta ABC$ is isosceles triangle

Proof = In $\Delta ABC$, $\frac{AD}{BD} = \frac{AE}{EC}$ then, $DE \parallel BC$ by converse of BPT.

now, $\angle 3 = \angle 5$ and $\angle 4 = \angle 6$ —① by corresponding angles ($DE \parallel BC$)

Also, $\angle 1 + \angle 3 = 180°$ (linear pair)

$\angle 3 = 180° - \angle 1$ —②

$\angle 2 + \angle 4 = 180°$ (linear pair)

$\angle 4 = 180° - \angle 2$ —③

As, $\angle 1 = \angle 2$, eq$^n$ ② = eq$^n$ ③ and $\angle 3 = 4$ — ④

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from eqⁿ ① and ④

$\angle 5 = \angle 6$

Then, $AB = AC$

(Sides opposite to equal angles are equal)

As, two sides are equal, $\Delta ABC$ is isosceles $\Delta$

Hence proved!

Ans 22. Probability P(E) of event E,

$$P(E) = \frac{\text{No. of favourable outcomes}}{\text{No. of all possible outcomes}}$$

No. of all possible outcomes = 100 − 5 + 1 = 96.

(i) Event = perfect square

favourable outcomes = 9, 16, 25, 36, 49, 64, 81, 100

No. of favourable outcomes = 8

$$\boxed{P(\text{perfect square}) = \frac{8}{96} = \frac{1}{12}}$$

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~~Event = a 2digit~~
~~(ii) No. of favourable outcomes = 100 − 10 + 1 = 91 − 1 = 90~~

(ii) event = a 2digit no.

No. of favourable outcomes = $100 - 10 + 1 - 1 = 90$

$$\boxed{P(\text{a 2digit no.}) = \frac{90}{96} = \frac{45}{48}}$$

R.W.

204
101
305.

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Ans 23. (a) $eq^n ① = 101x + 102y = 304$

$eq^n ② = 102x + 101y = 305$

$eq^n ② - eq^n ①$

$$\begin{aligned} 102x + 101y &= 305 \\ 101x + 102y &= 304 \\ \hline x - y &= 1 \quad - eq^n ③ \end{aligned}$$

$eq^n ① + eq^n ②$

$$\begin{aligned} 102x + 101y &= 305 \\ 101x + 102y &= 304 \\ \hline 203x + 203y &= \cancel{90}609 \end{aligned}$$

OR $x + y = 3 \quad - eq^n ④$

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$eq^n ③ = x - y = 1$
$eq^n ④ = x + y = 3$

$eq^n ③ + eq^n ④$

$$x - y = 1$$
$$x + y = 3$$
$$2x = 4$$
$$\boxed{x = 2}$$

putting $x = 2$ in $eq^n ③$

$$2 - y = 1.$$
$$y = 2 - 1$$
$$\boxed{y = 1}$$

Thus, $x = 2$ & $y = 1$ is solution of $eq^n s$.

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Ans 24. (a) $a\sec\theta + b\tan\theta = m$ — eqⁿ ①

~~squaring, a~~

$b\sec\theta + a\tan\theta = n$ — eqⁿ ②.

eqⁿ ① squared,

$(a\sec\theta + b\tan\theta)^2 = m^2$

$a^2\sec^2\theta + b^2\tan^2\theta + 2ab\sec\theta\tan\theta = m^2$ — ③ $((a+b)^2 = a^2+b^2+2ab)$

eqⁿ ② squared,

$(b\sec\theta + a\tan\theta)^2 = n^2$

$b^2\sec^2\theta + a^2\tan^2\theta + 2ab\sec\theta\tan\theta = n^2$ — ④

eqⁿ ③ − eqⁿ ④

$a^2\sec^2\theta + b^2\tan^2\theta + 2ab\sec\theta\tan\theta - b^2\sec^2\theta - a^2\tan^2\theta$

$-2ab\sec\theta\tan\theta = m^2 - n^2$

$a^2(\sec^2\theta - \tan^2\theta) + b^2(\tan^2\theta - \sec^2\theta) = m^2 - n^2$

$a^2 - b^2 = m^2 - n^2$ $\quad (\because \sec^2\theta - \tan^2\theta = 1,\ \tan^2\theta - \sec^2\theta = -1)$

$\boxed{a^2 + n^2 = b^2 + m^2}$

hence proved.

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Ans25 given points $A(7,1)$ $B(3,5)$
let coordinates of P be $(x,y)$

distance formula $= \sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$

now, as P is equidistant from A & B,

$$PB = PA$$

OR $PB^2 = PA^2$

$$\left(\sqrt{(x-3)^2+(y-5)^2}\right)^2 = \left(\sqrt{(x-7)^2+(y-1)^2}\right)^2$$

$$(x-3)^2 + (y-5)^2 = (x-7)^2 + (y-1)^2$$

$$\cancel{x^2}+9-6x+\cancel{y^2}+25-10y = \cancel{x^2}+49-14x+\cancel{y^2}+1-2y \quad \left(\because (a-b)^2 = a^2+b^2-2ab\right)$$

$$34-6x-10y = 50-14x-2y$$

$$-6x+14x-10y+2y = 50-34$$

$$8x-8y = 16$$

OR $x - y = 2$

$$x = y+2$$

hence proved! x coordinate (absisssa) is 2 more than y coordinate (ordinate)

SECTION C

Ans 26. (b) given, $\sin\theta + \cos\theta = x$

To prove:

$$\sin^4\theta + \cos^4\theta = \frac{2-(x^2-1)^2}{2}$$

LHS,

$\sin^4\theta + \cos^4\theta$

$(\sin^2\theta)^2 + (\cos^2\theta)^2$

$(\sin^2\theta + \cos^2\theta)^2 - 2\sin^2\theta\cos^2\theta$

RHS,

$\sin\theta + x\cos\theta = x$

$(\sin\theta + \cos\theta)^2 = x^2$

$\sin^2\theta + \cos^2\theta + 2\sin\theta\cos\theta = x^2$

$1 + 2\sin\theta\cos\theta = x^2$

$2\sin\theta\cos\theta = x^2 - 1$

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SECTION C.

Ans 26. (b) given, $\sin\theta + \cos\theta = x$

To prove, $\sin^4\theta + \cos^4\theta = 2 - \frac{(x^2-1)^2}{2}$

Let us work upon 'given'.

$\sin\theta + \cos\theta = x$

$(\sin\theta + \cos\theta)^2 = x^2$ (squaring)

$\sin^2\theta + \cos^2\theta + 2\sin\theta\cos\theta = x^2$ $((a+b)^2 = a^2 + b^2 + 2ab)$

$1 + 2\sin\theta\cos\theta = x^2$ $(\sin^2\theta + \cos^2\theta = 1)$

$2\sin\theta\cos\theta = x^2 - 1$

$\sin\theta\cos\theta = \frac{x^2-1}{2}$. —(1)

Let us work upon 'to prove.'

LHS,

$\sin^4\theta + \cos^4\theta$

$(\sin^2\theta)^2 + (\cos^2\theta)^2$

$(\sin^2\theta + \cos^2\theta)^2 - 2\sin^2\theta\cos^2\theta$ $(\because (a^2 + b^2) = (a+b)^2 - 2ab)$

$(1)^2 - 2(\sin\theta\cos\theta)^2$ $(\because \sin^2\theta + \cos^2\theta = 1)$

$1 - 2\left(\frac{x^2-1}{2}\right)^2$ (from eq^n ①)

$1 - 2\frac{(x^2-1)^2}{4}$

$1 - \frac{(x^2-1)^2}{2}$

$\frac{2-(x^2-1)^2}{2}$

LHS = RHS hence proved!

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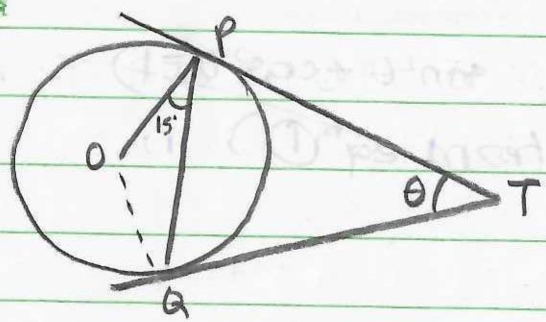
Ans 27.




Join OQ

NOTE → $\angle P$ is short of $\angle OPQ$
$\angle Q$ is short of $\angle OQP$
$\angle O$ is short of $\angle POQ$

In $\Delta POQ$, $OP = OQ$ (radii of same circle)
Then, $\angle P = \angle Q$ (angles opposite to equal sides are equal)
$\therefore \angle P = \angle Q = 15^\circ$ (given $\angle OPQ = 15°$)

Now, In $\Delta POQ$, $\angle P + \angle Q + \angle O = 180^\circ$ (ASP of $\Delta$)
$15^\circ + 15^\circ + \angle O = 180^\circ$
$\angle O = 180^\circ - 30^\circ$
$\angle O = 150^\circ$

Also, $\angle OPT = \angle OQT = 90^\circ$ (tangents are perpendicular to radius)
now, In quadrilateral OPTQ,
$\angle POQ + \angle OPT + \angle OQT + \angle PTQ = 360^\circ$ (ASP of quad)
$150^\circ + 90^\circ + 90^\circ + \angle PTQ = 360^\circ$
$\angle PTQ = 360^\circ - 330^\circ$
$\angle \theta = 30^\circ$

now, $\boxed{\sin 2\theta = \sin 60^\circ = \frac{\sqrt{3}}{2}}$

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Ans28. (a) let us assume to the contrary that $\sqrt{5}$ is a rational no. of form $\frac{p}{q}$ where p and q are integers and co-prime and $q \neq 0$.

$\therefore \quad \sqrt{5} = \frac{p}{q}$

squaring, $\quad (\sqrt{5})^2 = \left(\frac{p}{q}\right)^2$

$$5 = \frac{p^2}{q^2}$$

$$q^2 = \frac{p^2}{5} \quad -①$$

Thus, 5 divides $p^2$

5 divides p as well. $-①$

let $p = 5a$.

putting $p = 5a$ in eq$^n$ ①

$$q^2 = \frac{(5a)^2}{5}$$

$$q^2 = \frac{25a^2}{5}$$

$$\frac{q^2}{5} = a^2$$

Thus, 5 divides $q^2$

5 divides q as well $-②$.

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from statement ① and ②, it is clear that 5 is common factor of p & q, but we assumed that p and q are co-prime! This contradiction has arisen due to our incorrect assumption that $\sqrt{5}$ is rational.

Hence proved, $\sqrt{5}$ is irrational.

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Ans 29. $q(x) = 8x^2 - 2x - 3$

~~$8x^2 - 2x - 3$~~

Let zeroes of q(x) be $\alpha$ and $\beta$.

$8x^2 - 2x - 3$

$8x^2 - 6x + 4x - 3$

$2x(4x-3) + 1(4x-3)$

$(2x+1)(4x-3)$

comparing with $k[(x-\alpha)(x-\beta)]$,

$\alpha = -\frac{1}{2}$, $\beta = \frac{3}{4}$

comparing q(x) with $ax^2+bx+c$,

$a=8$ $b=-2$ $c=-3$

now, $\alpha+\beta = -\frac{b}{a}$ $\qquad$ $\alpha\beta = \frac{c}{a}$

$\alpha+\beta = \frac{-(-2)}{8}$ $\qquad$ $\alpha\beta = \frac{-3}{8}$

$\alpha+\beta = \frac{1}{4}$

now, let the required polynomial be $p(x)$

Then, zeroes of $p(x) \rightarrow \alpha-2$ & $\beta-2$

Sum of zeroes $\rightarrow$ $\alpha-2+\beta-2 = \alpha+\beta-4$

$= \frac{1}{4} - 4 \qquad (\because \alpha+\beta = \frac{1}{4})$

$= \frac{1-16}{4}$

Sum of zeroes $= \frac{-15}{4}$

product of zeroes $\rightarrow$ $(\alpha-2)(\beta-2) = \alpha\beta - 2\alpha - 2\beta + 4$

$= (\alpha\beta) - 2(\alpha+\beta) + 4$

$= \frac{-3}{8} - \frac{2}{4} + 4 \qquad (\because \alpha\beta = \frac{-3}{8}\ \alpha+\beta = \frac{1}{4})$

$= \frac{-3-4+32}{8}$

$= \frac{25}{8}$

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now, ~~p(x) = k [x^2 - (α+β)x -~~

$p(x) = k[x^2 - \text{sum of zeroes} \times x + \text{product of zeroes}]$ where k is a constant

$= k\left[x^2 - \left(\frac{-15}{4}\right)x + \frac{25}{8}\right]$

$= k\left[\frac{8x^2 + 30x + 25}{8}\right]$

~~assu~~ Thus, $p(x) = k\left[\frac{8x^2+30x+25}{8}\right]$

OR if $k = \frac{1}{8}$, $p(x) = 8x^2 + 30x + 25$.

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Alternate → $\alpha = -\frac{1}{2}$, $\beta = \frac{3}{4}$

let required polynomial be $p(x)$

The zeroes of $p(x) = \alpha - 2$ and $\beta - 2$

$= -\frac{1}{2} - 2$ and $\frac{3}{4} - 2$

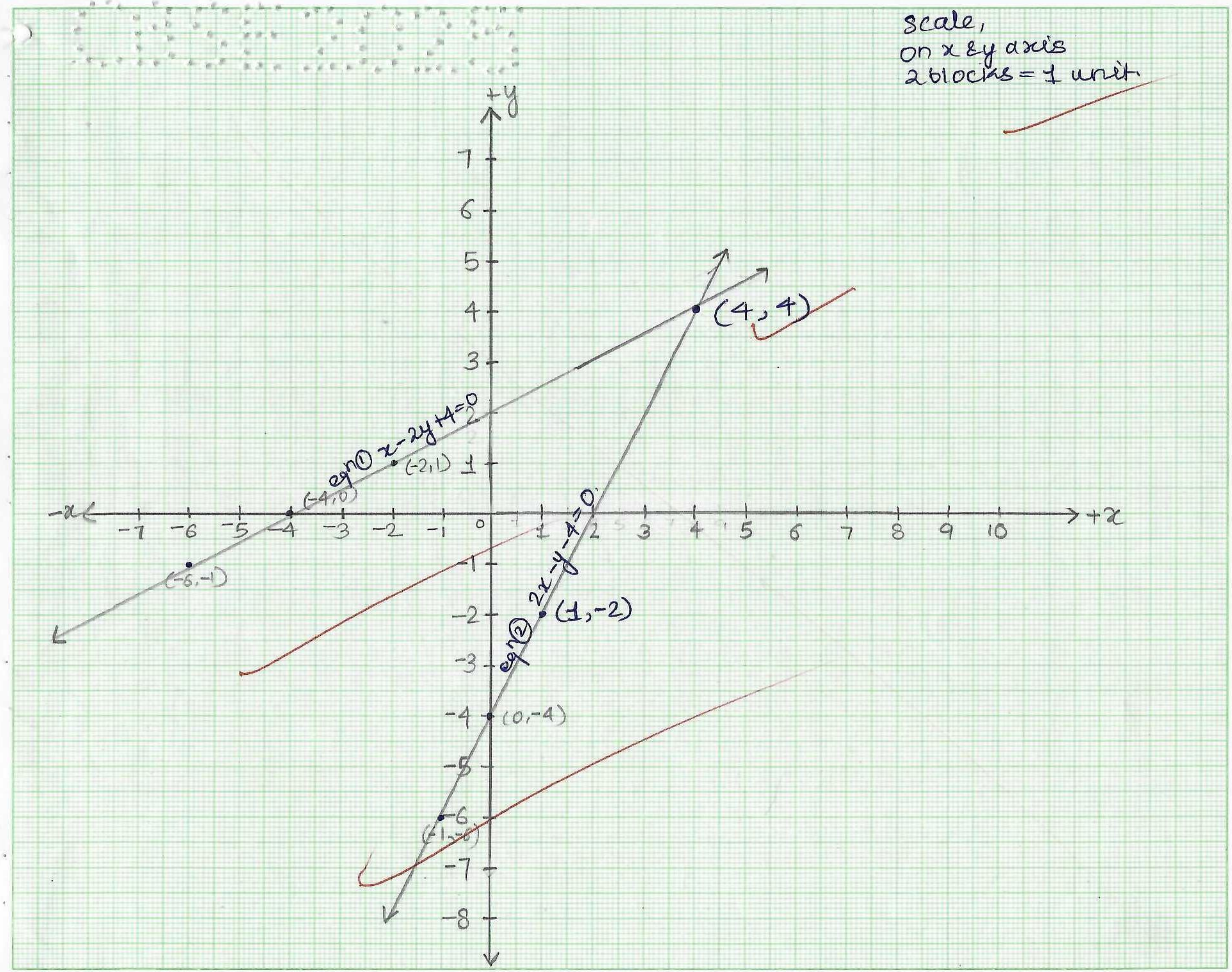
$= \frac{-1-4}{2}$ and $\frac{3-8}{4}$

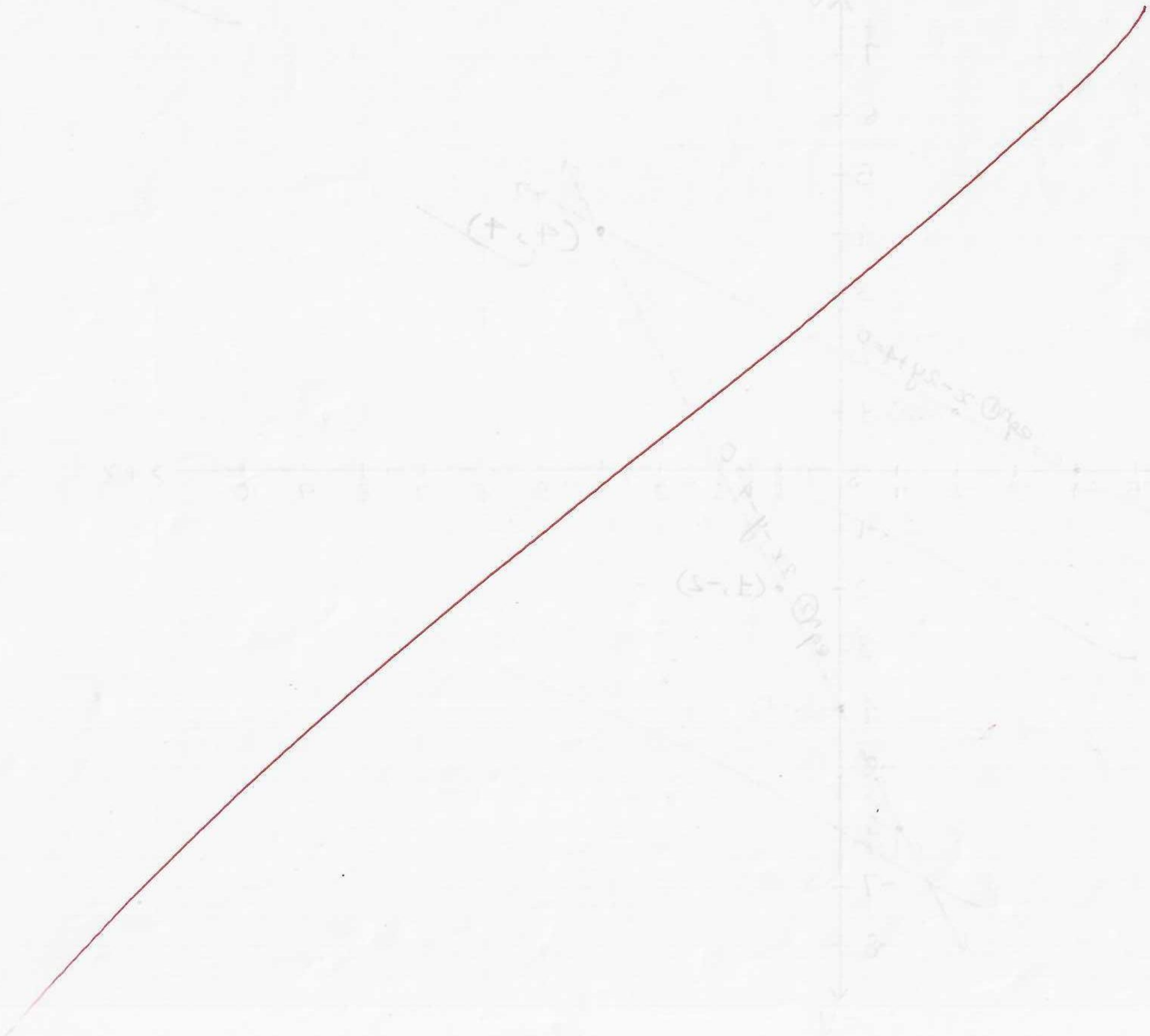
$= -\frac{5}{2}$ and $-\frac{5}{4}$

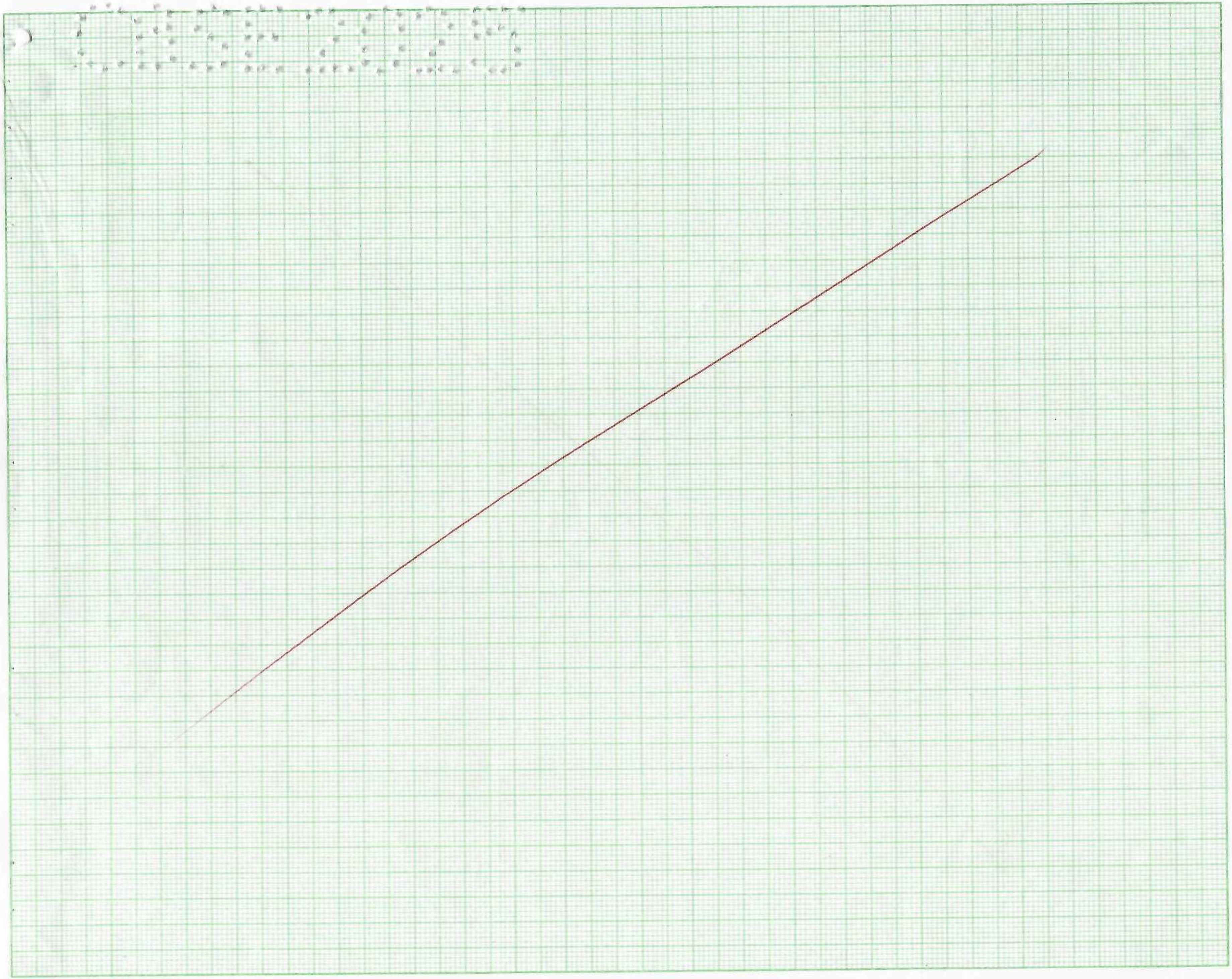
$q(x) = k\,[x^2 - \text{sum of zeroes} \times x + \text{product of zeroes}]$

$= k\left[x^2 - \left[-\frac{5}{2} - \frac{5}{4}\right]x + -\frac{5}{2} \times -\frac{5}{4}\right]$

$= k\,[8x^2 + 30x + 25]$ where $k = \frac{1}{8}$.


scale,
on x & y axis
2 blocks = 1 unit.
+y
-y
-x
+x
(4, 4)
eqn① x-2y+4=0
eqn② 2x-y-4=0
(-2,1)
(-4,0)
(-6,-1)
(1,-2)
(0,-4)
(-1,-6)





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Ans30. $eq^n ① = x - 2y + 4 = 0$

$eq^n ② = 2x - y - 4 = 0$

comparing $eq^n ①$ with $a_1x_1 + b_1 y_1 + c_1 = 0$, $a_1 = 1$ $b_1 = -2$ $c_1 = 4$

comparing $eq^n ②$ with $a_2x_2 + b_2y_2 + c_2 = 0$, $a_2 = 2$ $b_2 = -1$ $c_2 = -4$

$\frac{a_1}{a_2} = \frac{1}{2}$ $\frac{b_1}{b_2} = \frac{-2}{-1} = 2$ $\frac{c_1}{c_2} = \frac{4}{-4} = -1$

as $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$ equations are consistent with unique $sol^n$.

from $eq^n ①$,

$x - 2y + 4 = 0$

$x = 2y - 4$

when $y = -1$,

$x = 2(-1) - 4$

$x = -2 - 4$

$x = -6$

when $y = 0$,

$x = 2(0) - 4$

$x = -4$

when $y = 1$,

$x = 2(1) - 4$

$x = 2 - 4$

$x = -2$

$eq^n ①$

| | | | |
|---|---|---|---|
| $x$ | -6 | -4 | -2 |
| $y$ | -1 | 0 | 1 |

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from eq$^n$ 2,

$2x - y - 4 = 0$.

$y = 2x - 4$

when $x = -1$

$y = 2(-1) - 4$

$y = -2 - 4$

$y = -6$

when $x = 1$,

$y = (2)(1) - 4$

$y = 2 - 4$

$y = -2$

when $x = 0$

$y = 2(0) - 4$

$y = -4$

eq$^n$ 2

| | | | |
|---|---|---|---|
| $x$ | $-1$ | $0$ | $1$ |
| $y$ | $-6$ | $-4$ | $-2$ |

(Solved on graph 1 pg-18)

from graph, solution of equations,

$\boxed{x = 4 \quad y = 4}$

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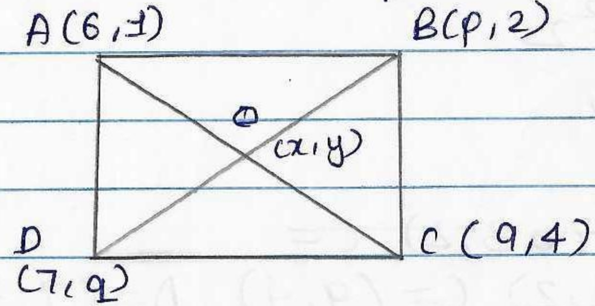
~~SECTION D~~

Ans31. given points ⇒ $A(6,1)$ $B(p,2)$ $C(9,4)$ $D(7,q)$




let diagonals AC & BD intersect at $O(x,y)$

~~we~~ we know, diagonals of parallelogram bisect eachother. Thus, O is midpoint of AC and BD.

midpoint formula, $(x,y) = \frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}$.

considering AC, $x,y = \frac{6+9}{2}, \frac{1+4}{2}$

$x,y = \frac{15}{2}, \frac{5}{2}$

considering BD, $x,y = \frac{7+p}{2}, \frac{q+2}{2}$

$\frac{15}{2}, \frac{5}{2} = \frac{7+p}{2}, \frac{q+2}{2}$

comparing x coordinates, $\frac{15}{2} = \frac{7+p}{2}$

$15 = 7+p$ $\boxed{p=8}$

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comparing y coordinates,

$$\frac{5}{2} = \frac{q+2}{2}$$

$$5 = q+2$$

$$\boxed{q=3}$$

Thus, ~~A = (6,1) B = (3,2) C =~~

$A = (6,1)$ $B(8,2)$ $C = (9,4)$ $D = (7,3)$

now distance formula $= \sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$

$AC = \sqrt{(9-6)^2+(4-1)^2} = \sqrt{(3)^2+(3)^2} = 3\sqrt{2}$ units

$BD = \sqrt{(8-7)^2+(2-3)^2} = \sqrt{(1)^2+(-1)^2} = \sqrt{2}$ units

As $AC \neq BD$, diagonals are not equal

hence, Parallelogram ABCD is not a rectangle.

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SECTION D.

Ans32. No. of members. No. of Bungalows. cfi

| CI. | fi | cfi |
|---|---|---|
| 0-2 | 10 | 10 |
| 2-4 | p | 10+p |
| 4-6 | 60 | 70+p |
| 6-8 | q | 70+p+q |
| 8-10 | 5 | 75+p+q |

$\Sigma fi = 120$

now, $75+p+q=120$.

$p+q=120-75$, $p+q=45$ —(1).

now, median $=5$,

median class $= 4-6$

$l=4$

$h=2$

$f=60$

$cf=10+p$

$\frac{n}{2}=60$

median $= l+h\left[\frac{\frac{n}{2}-cf}{f}\right]$

$5 = 4+2\left[\frac{60-10-p}{60}\right]$

$1 \ \cancel{5=} = 2\left[\frac{50-p}{60}\right]$

$60=100-2p$

$2p=40$

$\boxed{p=20}$

R.W.

$120 - 75 = 45$

$75 + 45 = 120$

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putting $p=20$ in eq$^n$ 1

$20+q=45$

$\boxed{q=25}$

Thus, $\boxed{p=20}$ $\boxed{q=25}$

Ans33. (b) eq$^n$ * $\Rightarrow$ $x^2-2(p+1)x+p^2=0$

comparing eq$^n$ with $ax^2+bx+c=0$

$a=1$ $b=-2(p+1)$ $c=p^2$

If roots are real, $D\geq 0$

$b^2-4ac\geq 0$

$[-2(p+1)]^2-4(1)(p^2)\geq 0$

$4(p^2+1+2p)-4p^2\geq 0$ $\quad ((a+b)^2=a^2+b^2+2ab)$

$4p^2+4+8p-4p^2\geq 0$

$8p+4\geq 0.$

$4(2p+1)\geq 0.$

$2p+1\geq 0$

$2p\geq -1$

$p\geq \frac{-1}{2}$

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smallest value of $p$ so obtained $= -\frac{1}{2}$

putting $p = -\frac{1}{2}$ in eq$^n$,

$$x^2 - 2\left(-\frac{1}{2}+1\right)x + \left(-\frac{1}{2}\right)^2 = 0$$

$$x^2 - 2\left(\frac{1}{2}\right)x + \frac{1}{4} = 0$$

$$x^2 - x + \frac{1}{4} = 0$$

$$\frac{4x^2 - 4x + 1}{4} = 0$$

$$4x^2 - 4x + 1 = 0.$$

$$4x^2 - 2x - 2x + 1 = 0$$

$$2x(2x-1) - 1(2x-1) = 0$$

$$(2x-1)(2x-1) = 0$$

$$x = \frac{1}{2}, \frac{1}{2}.$$

Thus, roots of equation $\Rightarrow$ $\boxed{x = \frac{1}{2}, \frac{1}{2}}$.

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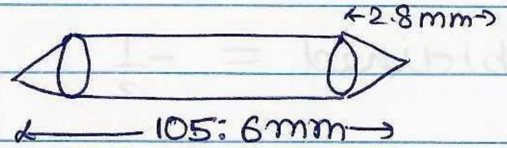
Ans 34.




given → diameter, $2r = 4.2mm$

radius, $r = 2.1 mm$

height of cone, $h = 2.8mm$

length of entire pencil $= 105.6mm$

Height of cylinder, $H = length - 2h$

$= 105.6 - 2 \times 2.8$

$= 105.6 - 5.6$

$= 100mm.$

Thus, $H = 100mm.$

now, slant height of cone, $l = \sqrt{r^2 + h^2}$

$l = \sqrt{(2.1)^2 + (2.8)^2}$

$l = \sqrt{12.25}$

$l = 3.5 mm$

Space for writing Question Number

Total surface area of pencil

$= \cancel{2}\ C.S.A \text{ of cylinder} + 2 \times C.S.A \text{ of cone}$

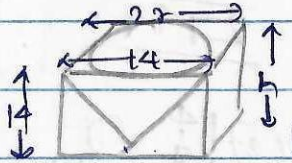
$= 2\pi r H + 2\pi r l$

$= 2 \times \frac{22}{7} \times 2.1 \times 100 + 2 \times \frac{22}{7} \times 2.1 \times 3.5$

$= 1320 + 46.2$

$\boxed{= 1366.2 mm^2}$

Ans35




side of cube, $a = 14cm$

If largest possible cone is carved out,

radius $= \frac{side}{2} = 7cm$

height $= side = 14cm$

now, slant height, $l = \sqrt{r^2 + h^2}$

$= \sqrt{(7)^2 + (14)^2}$

$= \sqrt{49 + 196}$

$= \sqrt{245}$

$= 7\sqrt{5} = 7 \times 2.2 = 15.4cm.$

volume of remaining solid

$= \text{volume of cube} - \text{volume of cone}$

$= a^3 - \frac{1}{3}\pi r^2 h$

$= (14)^3 - \frac{1}{3} \times \frac{22}{7} \times 7 \times 7 \times 14$

$= 2744 - \frac{2156}{3}$

$\cancel{= 2744 - 716.66}$ $\quad = 2744 - 718.66$

$\cancel{\boxed{= 2027.34 \text{ cm}^3}}$ $\quad \boxed{= 2025.34 \text{ cm}^3}$

now, surface area of remaining solid

$= \text{TSA of cube} - \text{base area of cone} + \text{CSA of cone}$

$= 6a^2 - \pi r^2 + \pi r l$

$= 6 \times (14)^2 - \frac{22}{7} \times 7 \times 7 + \frac{22}{7} \times 7 \times 15.4$

$\cancel{= 1176 - 154 + 48.4}$

$= 1176 - 154 + 338.8$

$\boxed{= 1360.8 \text{ cm}^2}$

R.W.

$14 \times 14 = 196$, $196 \times 14 = 2744$

$3 \overline{)2156}$ = 718.66

$2744 - 718.66 = 2025.34$

$196 \times 6 = 1176$

$154 \times 22 = 3388$

$1176 - 154 = 1022$, $1022 + 338.8 = 1360.8$

Space for writing Question Number

SECTION E.

RW.

Ans 36 (i) AP so formed = 400, 407.6, 415.2 . . .

$a = 400$

$d = 7.6$

now, 6th lane $= a_6$

$a_6 = a + 5d$

$a_6 = 400 + 5 \times 7.6$

$a_6 = 400 + 38$

$a_6 = 438\,m$

Thus, sixth lane is 438m long.

(ii) $a_8 = a + 7d$
$= 400 + 53.2$
$= 453.2\,m$

$a_4 = a + 3d$
$= 400 + 22.8$
$= 422.8$.

$\Rightarrow a_8 - a_4$

$\Rightarrow 453.2 - 422.8$

$\Rightarrow 30.4\,m$

Thus, 8th lane is 30.4m longer than 4th.

Rough work:
400 + 7.6 = 407.6; 407.6 + 7.6 = 415.2
7.6 × 5 = 38.0
7.6 × 7 = 53.2
7.6 × 3 = 22.8
49, 14, 53
7.6 × 7 = 53.2
415.2 + 7.6 = 422.8
453.2 − 422.8 = 30.4

Space for writing Question Number

RW

(iii) (a) Total distance covered = $S_6$.

$$S_6 = \frac{n}{2}[2a+(n-1)d]$$

~~OR~~ $\cancel{S_6 = \frac{n}{2}[a+l]}$ ~~(we know length of 6th lane from (i))~~

RW

$$S_6 = \frac{6}{2}[2 \times 400 + 5 \times 7.6]$$

$$S_6 = 3[800+38]$$

$$S_6 = 3(838)$$

$$S_6 = 2514m$$

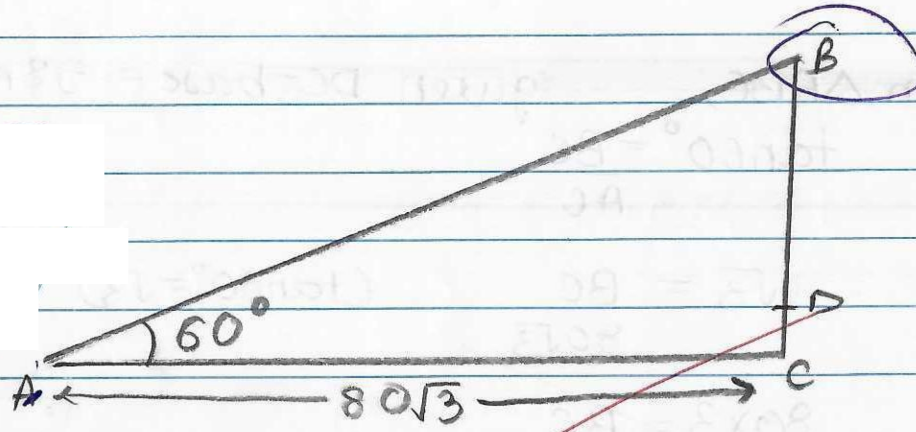
hence, she ran 2514m.

38 × 3 = 114

838 × 3 = 2514

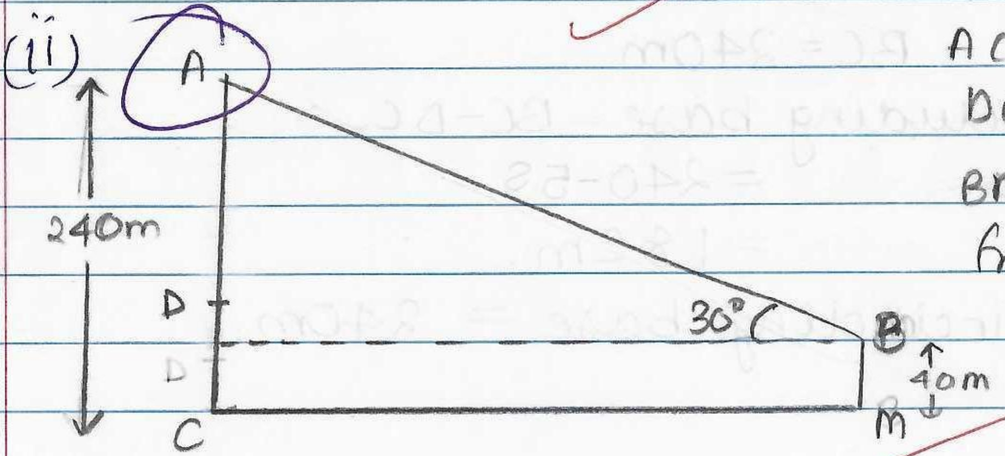
Space for writing Question Number

Ans37 (i)




BC is statue.
C is base.
AC is distance between A and base.
DC is base.

(ii)




AC is height of Statue.
DC is base
Bm is height of B from ground = 40m.

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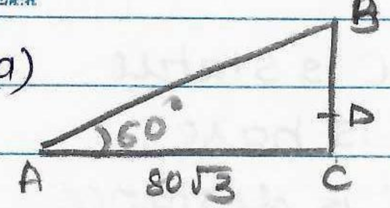
(iii) (a)




In $\Delta ABC$, given DC = base = 58m.

$\tan 60° = \frac{BC}{AC}$

$\sqrt{3} = \frac{BC}{80\sqrt{3}}$ $(\tan 60° = \sqrt{3})$

$80 \times 3 = BC$

$BC = 240m$

height of tower excluding base = BC − DC

$= 240 - 58$

$= 182m.$

height of tower including base = 240m.

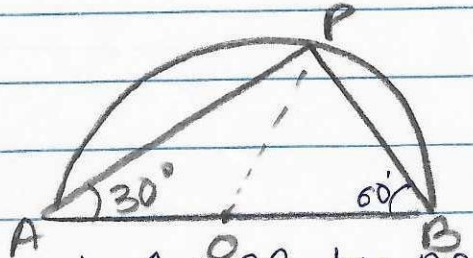
RW

240 − 58 = 182

Space for writing Question Number

RW

Ans38.




(i) $\angle P = 90°$ (angle in semicircle)

join OP

In $\Delta APB$, by ASP of $\Delta$, $\angle B = \cancel{\angle P}\ 180° - \angle PA - \angle P$

$\angle B = 60°$

now, $OP = OB =$ radii

Thus, $\angle OPB = \angle PBO = 60°$ (angles opposite to equal sides)

by ASP of $\Delta$, $\angle POB = 60°$

now, $\angle POA + \angle POB = 180°$ (linear pair)

$\angle POA = 180° - 60°$

$\boxed{\angle POA = 120°}$

(ii) If entire piece ~~is~~ of land is semicircle.

Length of wire needed = perimeter of semicircle.

diameter = 70m.

radius, $r = 35$ m.

Perimeter $= \frac{2\pi r}{2} + 2r$

$= \frac{22}{7} \times 35^{5} + 2 \times 35$

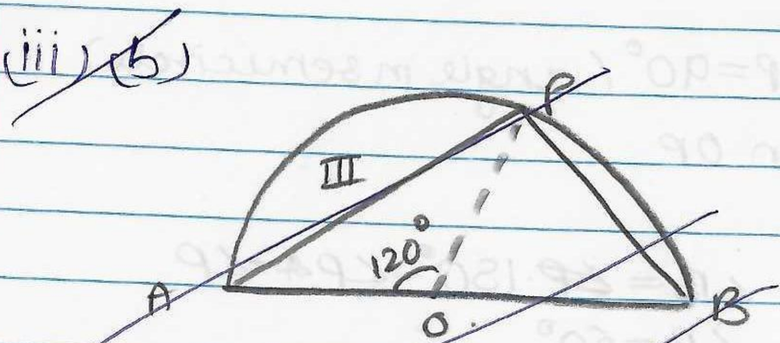
~~= 101+~~ $= 110 + 70$

$= 180$m

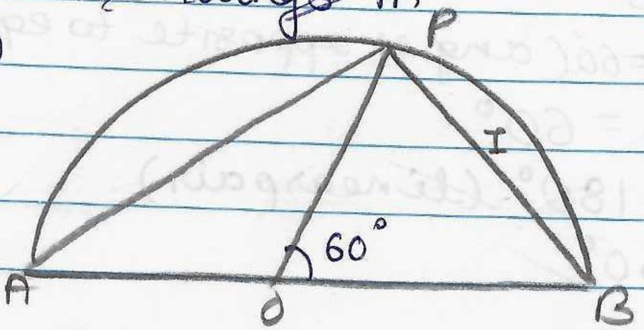
① $22 \times 5 = 110$

Space for writing Question Number

(iii) (b)




from our findings in
(iii) (a)




radius$^{r}$ = 35m.

from our findings in part (i) $\angle POB = 60°$.
now, As in $\Delta POB$, $\angle OPB = \angle PBO = \angle POB = 60°$ [from part (i)]
~~$\Delta A$~~ $\Delta POB$ is equilateral triangle with $a = r = 35m$.
Area of part I
= Area of sector POB − Area of equilateral $\Delta POB$
$= \frac{\theta}{360°} \times \pi r^2 - \frac{\sqrt{3}}{4} a^2$

Space for writing Question Number



$$= \frac{\cancel{60}\,1}{\cancel{360}\,\cancel{6}\,3} \times \frac{\cancel{22}\,11}{\cancel{7}} \times \cancel{35}\,5 \times 35 - \frac{\sqrt{3}}{4} \times 35 \times 35$$

$$= \left(\frac{1925}{3} - \frac{1225\sqrt{3}}{4}\right) m^2$$

OR $\left(641.66 - \frac{1225\sqrt{3}}{4}\right) m^2$

$$\begin{array}{r} 641.66 \\ 3\overline{)1925} \end{array}$$

$35 \times 35 = 1225$

$385 \times 5 = 1925$