SQ.P – 6

Sec – A

1\. i) $y = 2$

$p(y) = y^2 - 5y + 6$

$p(2) = (2)^2 - 5\times2 + 6$

$= 4 - 10 + 6$

$= 10 - 10$

$= 0$

ii) $y = -2$

$p(-2) = (-2)^2 - 5\times-2 + 6$

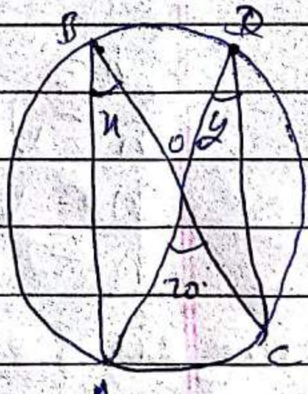
$= 4 + 10 + 6$

$= 20$

2\. $y = 10 + 2x$.

3\. Given, $\angle AOC = 70°$

Find x and y



Sol: $\angle ABC = \angle ADC$ [angle made by same arc]

$x = y$.

$\angle AOC = 2\angle ABC$ [Angle made by same arc at Centre and boundary double the boundary]

$70° = 2x$.

$x = 35°$

Hence, $\angle ABC = \angle ADC = 35°$

$x = y = 35°$

4. $S = 2\sqrt{3}$ cm.

Area of equilateral $\triangle = \frac{\sqrt{3}}{4} a^2$

$= \frac{\sqrt{3}}{4} \times (2\sqrt{3})^2$

$= \frac{\sqrt{3}}{\cancel{4}} \times \cancel{12}^{3}$ cm^2

$= 3\sqrt{3}$ cm^2

5. P(getting 0 head) $= \frac{\cancel{120}^{6}}{\cancel{500}_{25}} = \frac{6}{25}$.

6. $d = 32$cm , $r = 16$cm

$l = 34$.

$h = \sqrt{l^2 - r^2}$

$h = \sqrt{(34\text{ cm})^2 - (16\text{ cm})^2}$

$h = \sqrt{1056\text{ cm}^2 - 256\text{ cm}^2}$

$h = \sqrt{800\text{ cm}^2}$

$h = 20\sqrt{2}$ cm

Sec - B

$(-32)^3 + (18)^3 + (14)^3$

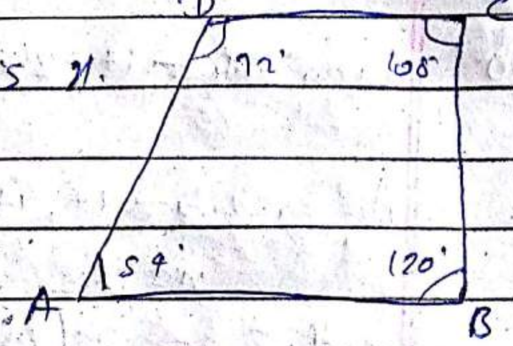
7. Let $-32 = a$, $18 = b$, $14 = c$.

$a^3 + b^3 + c^3 = 3abc$

$= 3 \times -32 \times 18 \times 14$

$= -24192$

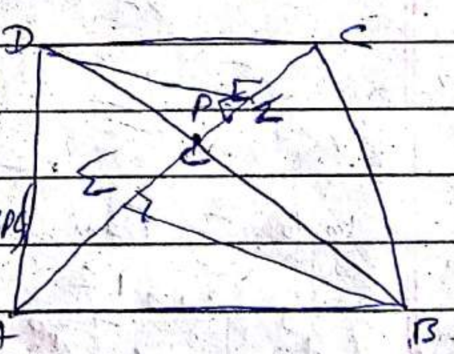
8. let the ratio of angle of quad is x.
then, $3x, 7x, 6x, 4x$.



Sum of $\angle$s of quad $= 360°$
$3x + 7x + 6x + 4x = 360°$
$20x = 360°$
$x = 18°$

$3x = 3 \times 18 = 54°$
$7x = 7 \times 18 = 126°$
$6x = 6 \times 18° = 108°$
$4x = 4 \times 18° = 72°$

9. Given, In quad ABCD, diagonals AC and BD meet at P.
To prove :- $ar(APB) \times ar(CPD) = ar(APD) \times ar(BPC)$



Constr :- Draw $BM \perp AP$
and $DN \perp CP$.

$$\frac{ar(\triangle APB)}{ar(\triangle BPC)} = \frac{\frac{1}{2} \times AP \times \cancel{BM}}{\frac{1}{2} \times PC \times \cancel{BM}} = \frac{AP}{PC} \quad \text{--- (i)}$$

$$\frac{ar(\triangle APD)}{ar(\triangle CPD)} = \frac{\cancel{\frac{1}{2}} \times AP \times \cancel{DN}}{\cancel{\frac{1}{2}} \times PC \times \cancel{DN}} = \frac{AP}{PC} \quad \text{--- (ii)}$$

from (i) and (ii), we get,
$ar(APB) \times ar(CPD) = ar(APD) \times ar(BPC)$

10. Given data – 14, 25, 14, 28, 18, 17, 18, 14, 23, 22, 14, 18.

Array data – 14, 14, 14, 14, 17, 18, 18, 18, 22, 23, 25, 28

$n = 12$

median $= \frac{1}{2}\left\{\left(\frac{n}{2}\right)^{th} \text{observation} + \left(\frac{n}{2}+1\right)^{th} \text{obser}\right\}$

$= \frac{1}{2}\left\{\left(\frac{12}{2}\right)^{th} \text{obser} + \left(\frac{12}{2}+1\right)^{th} \text{obser}\right\}$

$= \frac{1}{2}\left\{6^{th} \text{obser} + 7^{th} \text{obser}\right\}$

$= \frac{1}{2}\left\{18 + 18\right\}$

$= \frac{1}{2} \times 36$

$= 18$

Mode = Maximum no. of observation

$= 14$

11. In $\triangle BOC$,

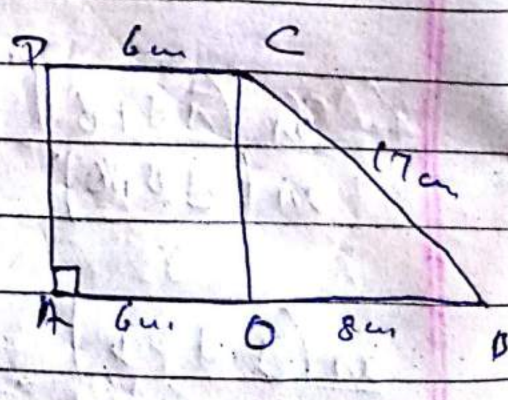
$OC = \sqrt{(BC)^2 - (OB)^2}$

$= \sqrt{(17cm)^2 - (8cm)^2}$

$= \sqrt{289cm^2 - 64cm^2}$

$= \sqrt{225cm^2}$

$= 15cm$



ar trap ABCD $= \frac{1}{2}$ (Sum of $\parallel$ side) h.

$= \frac{1}{2}(14+6)\, 15$

$= \frac{1}{\cancel{2}} \times \cancel{20}^{10} \times 15$

$= 150\ cm^2$

12. $h = 3.5m$ $r = 12m.$

C.S.A of Cone $= \pi r l$

$l = \sqrt{h^2 + r^2}$

$= \sqrt{(3.5)^2 + (12)^2}$

$= \sqrt{12.25\ m^2 + 144 m^2}$

$= \sqrt{156.25 m^2}$

$= 12.5\ m$

C.S.A (required Canvas) $= \frac{22}{7} \times \cancel{12}^{6} \times \frac{\cancel{125}^{25}}{\cancel{10}_{2}}$

$= \frac{3300}{7}\ m^2$

Date
Page

Sec – C

13. $\dfrac{2-\sqrt{5}}{2+3\sqrt{5}} = a\sqrt{5}+b.$

$\Rightarrow \dfrac{2-\sqrt{5}}{2+3\sqrt{5}} \times \dfrac{2-3\sqrt{5}}{2-3\sqrt{5}} = a\sqrt{5}+b$

$\Rightarrow \dfrac{4-6\sqrt{5}-2\sqrt{5}+15}{4-15} = a\sqrt{5}+b$

$\Rightarrow \dfrac{-8\sqrt{5}+19}{-11} = a\sqrt{5}+b$

$\Rightarrow \dfrac{\cancel{-}(8\sqrt{5}-19)}{\cancel{-}11} = a\sqrt{5}+b$

$\Rightarrow \dfrac{8\sqrt{5}-19}{11} = a\sqrt{5}+b$

$\Rightarrow \dfrac{8\sqrt{5}}{11} - \dfrac{19}{11} = a\sqrt{5}+b$

Hence, $a = \dfrac{8}{11}$ and $b = -\dfrac{19}{11}$

Or, $\left(\dfrac{x^a}{x^b}\right)^{a+b} \times \left(\dfrac{x^b}{x^c}\right)^{b+c} \times \left(\dfrac{x^c}{x^a}\right)^{c+a}$

$\Rightarrow x^{(a-b)(a+b)} \times x^{(b-c)(b+c)} \times x^{(c-a)(c+a)}$

$= x^{a^2-b^2} \times x^{b^2-c^2} \times x^{c^2-a^2}$

$= x^{a^2-b^2+b^2-c^2+c^2-a^2}$

$= x^0$

$= 1$

14. Given $2x + 3y = 12$ and $xy = 6$ find $8x^3 + 27y^3$

$2x + 3y = 12$

$\Rightarrow (2x+3y)^3 = (12)^3$ (Cubing both side)

$\Rightarrow 8x^3 + 27y^3 + 3 \times 2x \times 3y (2x + 3y) = 1728$

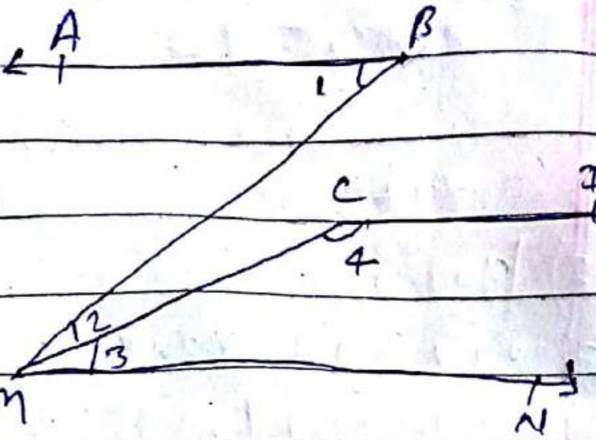
$\Rightarrow 8x^3 + 27y^3 + 18 \times 6 \times 12 = 1728$

$\Rightarrow 8x^3 + 27y^3 = 1728 - 1296$

$\Rightarrow 8x^3 + 27y^3 = 432$

15.

16. Given, $\angle 1 = 55^\circ$, $\angle 2 = 20^\circ$,
$\angle 3 = 35^\circ$ and $\angle 4 = 145^\circ$



To prove — $AB \parallel CD$.

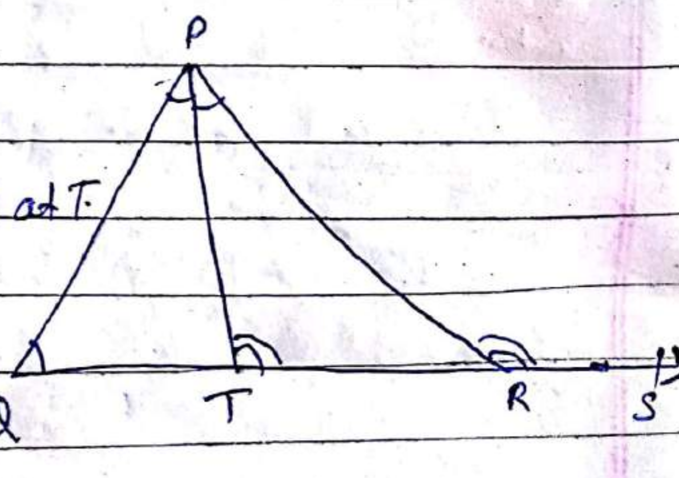
Proof:- $\angle BMN = \angle 2 + \angle 3$
$= 20 + 35^\circ = 55^\circ$

$\angle ABM = \angle BMN = 55^\circ$
$AB \parallel MN$ ——— (i)

Now $\angle 3 + \angle 4 = 35 + 145^\circ$
$= 180^\circ$
Therefore, $CD \parallel MN$. ——— (ii)

From (i) and (ii)
$AB \parallel CD$.

Q7. Given, in $\triangle PQR$,
bisector of P meet QR at T.



To prove:- $\angle PQR + \angle PRS = 2\angle PTR$.

Soln:- In $\triangle PQT$,
$\angle PQT + \angle TQPT = \angle PTR$. ——— (i)
~~$2\angle PQT + \angle PQ... = 2\angle PTR$~~

In ΔPTR,

$$\angle TPR + \angle PTR = \angle PRS.$$

$$\angle QPT + \angle PTR = \angle PRS \text{ ——— (ii)}$$

From (i) and (ii)

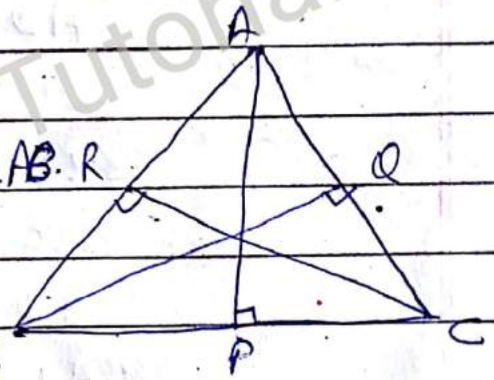
$$\angle PQT + \cancel{\angle QPT} + \angle PRS = \angle QPT + \angle PTR + \angle PTR$$

$$\angle PQR + \angle PRS = 2\angle PTR.$$

11. Given, $AP = BQ = CR$.

Show:- ABC is equilateral Δ.

Const:- $AP \perp BC$, $BQ \perp AC$ and $CR \perp AB$.



Proof! In ΔBQC and ΔBRC

$$\angle Q = \angle R = 90^\circ$$

$$BQ = CR \text{ \{given\}}$$

$$BC = BC \text{ \{Common\}}$$

$$\Delta BQC \cong \Delta BRC \text{ \{by RHS\}}$$

$$\angle B = \angle C \text{ ——— (i)}$$

Similarly; $\Delta ABP \cong \Delta ABQ$.

$$\angle B = \angle A \text{ ——— (ii)}$$

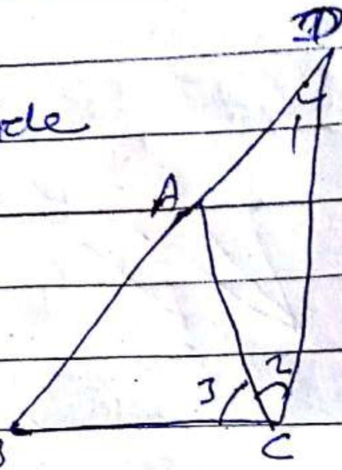
From (i) and (ii)

$$\angle A = \angle B = \angle C.$$

$$AB = BC = AC$$

Therefore ABC is a equilateral Δ.

Q17. Let ABC is a Δ in which side BA produced to D ~~and~~ such that AD = AC.



To prove :- $AB + AC > BC$

$AB + BC > AC$

$BC + AC > AB$.

Const :- Join CD.

Proof :- In Δ BCD,

$AD = AC$ [Const]

$\angle 1 = \angle 2$

$\angle 2 + \angle 3 > \angle 1$

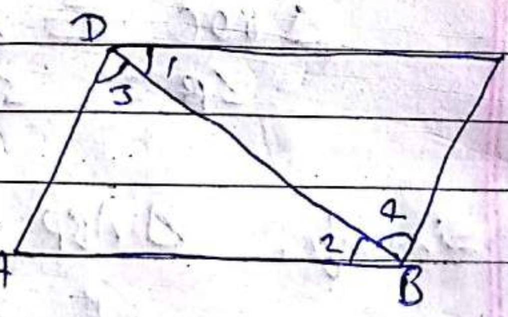
$\angle BCD > \angle D$

$BD > BC$

$BA + AD > BC$

$BA + AC > BC$ proved. [Put AC on AD]

18. Given, $\angle 1 = \angle 4$, $\angle 3 = \angle 2$ and $\angle 2 = \angle 4$



To prove :- $\angle 1 = \angle 3$.

Proof :- $\angle 1 = \angle 4$ ———— (i)

$\angle 3 = \angle 2$ ———— (ii)

and $\angle 2 = \angle 4$ ———— (iii)

From (i), (ii) and (iii)

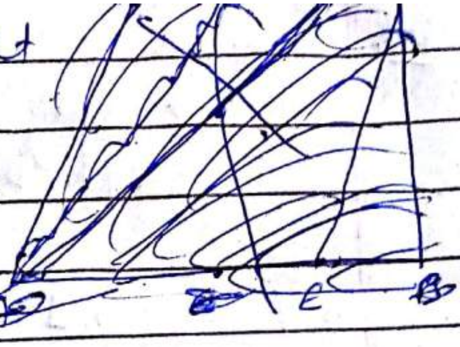
$\angle 1 = \angle 3$.

B. Given, E is point on AB such that

$BE = 2AE$

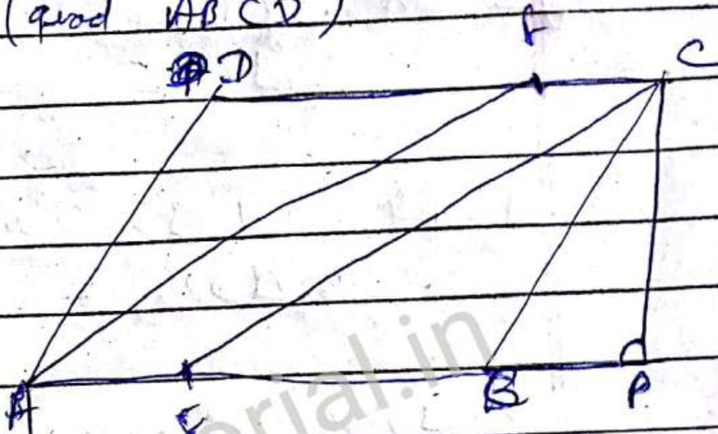
And F is point on CD such that

$DF = 2CF$.



To prove :- AECF is ||gm and

$ar(AECF) = \frac{1}{3} ar(\text{quad } ABCD)$



Proof :-

(i) $BE = 2AE$

$\therefore AE = \frac{1}{3} AB$. —— (i)

$DF = 2CF$

$\therefore CF = \frac{1}{3} CD$. —— (ii)

But, $AB = CD$. [ABCD is a ||gm]

From (i) and (ii)

$AE = CF$

and $AE \parallel CF$ [$AB \parallel CD$].

$\therefore$ AECF is a ||gm.

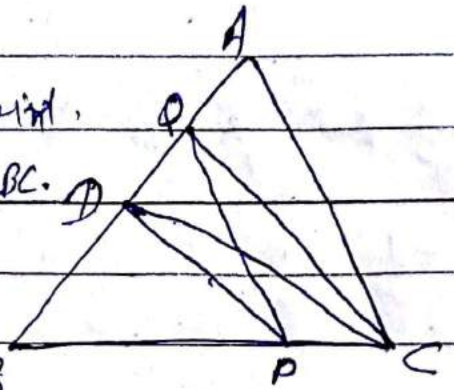
(ii) Draw $CP \perp AB$.

$$\frac{ar(AECF)}{ar(ABCD)} = \frac{AE \times \cancel{h}}{AB \times \cancel{h}} = \frac{\frac{1}{3}\cancel{AB}}{\cancel{AB}}$$

$$\Rightarrow \frac{ar(AECF)}{ar(ABCD)} = \frac{1}{3}.$$

$\Rightarrow ar(ABCD) = 3(ar\ AECF)$.

Q7, Given, In $\triangle ABC$, D is mid-point of AB and Q is point on BC. And $CQ \parallel PD$.



To prove:- $ar(\triangle BPQ) = \frac{1}{2} ar(\triangle ABC)$.

Proof:- ~~In $\triangle ABC$, D is mid-point of AB.~~
~~$ar(\triangle BDC) = ar(\triangle ADC)$~~

$\triangle DPQ$ and $\triangle DPC$ are on same base DP and b/w $DP \parallel$

$\therefore ar(\triangle DPQ) = ar(\triangle DPC)$

In $\triangle ABC$, D is mid-point of AB.

$ar(\triangle BDC) = ar(\triangle ADC)$

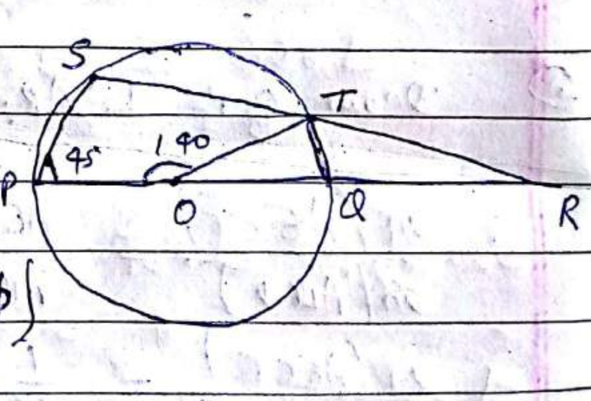
$ar(\triangle BDP) + ar(\triangle DPC) = \frac{1}{2} ar(\triangle ABC)$.

$ar(\triangle BDP) + ar(\triangle DPQ) = \frac{1}{2} ar(\triangle ABC)$

$ar(\triangle BPQ) = \frac{1}{2} ar(\triangle ABC)$

20. Given, $\angle SPO = 45°$ and
$\angle POT = 140°$

Find:- $\angle RQT$ and $\angle RTQ$



Sol:- $\angle POT + \angle TOQ = 180°$ (LP)

$140° + \angle TOQ = 180°$

$\angle TOQ = 40°$

In $\triangle TOQ$, $OT = OQ$ [radius]

$\angle OTQ = \angle OQT$

$\angle OTQ + \angle OQT + \angle TOQ = 180$

$\angle OQT + \angle OQT + 40 = 180°$

$2\angle OQT = 140°$

$\angle OQT = 70°$

$\angle RQT = 180° - \angle OQT$

$= 180° - 70$

$= 110°$

In Cyclic quad PQTS.

$\angle P + \angle T = 180°$

$45° + \angle T = 180°$

$\angle STQ = 135°$

$\angle RTQ = 180° - \angle STQ$

$= 180° - 135$

$= 45°$

21. P(getting 1) = $179/1000$.

P(getting 2) = $150/1000 = 3/20$

P(getting 3) = $157/1000$

P(getting 4) = $149/1000$

P(getting 5) = $175/1000 = 7/40$.

P(getting 6) = $190/1000 = 19/100$.

22. Let the ratio of side of Δ be x. Then,

$a = 13x$, $b = 14x$, $c = 15x$.

P of Δ = 84 cm.

$13x + 14x + 15x = 84$ cm

$42x = 84$ cm

$x = 2$ cm.

$a = 13 \times 2$ cm $= 26$ cm

$b = 14 \times 2$ cm $= 28$ cm

$c = 15 \times 2$ cm $= 30$ cm

$S = P/2 = 84/2 = 42$ cm.

area of $\Delta = \sqrt{s(s-a)(s-b)(s-c)}$

$= \sqrt{42(42-26)(42-28)(42-30)}$

$= \sqrt{42 \times 16 \times 14 \times 12}$

$= \sqrt{6 \times 7 \times 4 \times 4 \times 7 \times 2 \times 6 \times 2}$

$= 6 \times 7 \times 4 \times 2$ cm^2

$= 336$ cm^2

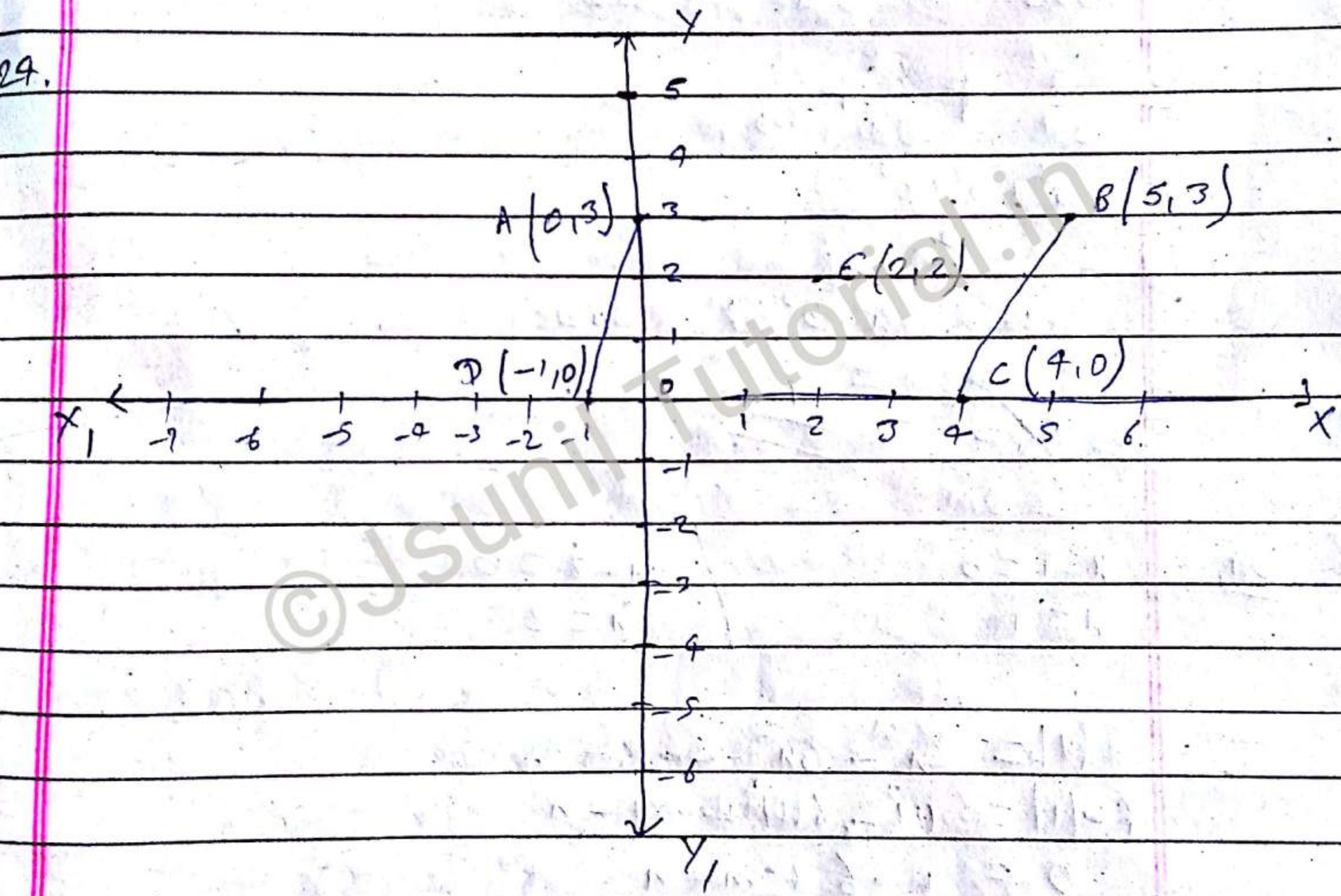
23. $\frac{1}{3-\sqrt{8}} - \frac{1}{\sqrt{8}-\sqrt{7}} + \frac{1}{\sqrt{7}-\sqrt{6}} - \frac{1}{\sqrt{6}-\sqrt{5}} + \frac{1}{\sqrt{5}-2} =$

$= 3+\sqrt{8} - (\sqrt{8}+\sqrt{7}) + (\sqrt{7}+\sqrt{6}) - (\sqrt{6}+\sqrt{5}) + (\sqrt{5}+2)$

$= 3 + \cancel{\sqrt{8}} - \cancel{\sqrt{8}} - \cancel{\sqrt{7}} + \cancel{\sqrt{7}} + \cancel{\sqrt{6}} - \cancel{\sqrt{6}} - \cancel{\sqrt{5}} + \cancel{\sqrt{5}} + 2$

$= 5$

24.



The figure is a parallelogram.
And the point E(2,2) lies inside the figure (||gm).

25. $a+b+c=0$

$a+b=-c$, $a+c=-b$, $b+c=-a$,

$$\frac{(b+c)^2}{3bc}+\frac{(c+a)^2}{3ca}+\frac{(a+b)^2}{3ab}$$

$$=\frac{(-a)^2}{3bc}+\frac{(-b)^2}{3ca}+\frac{(-c)^2}{3ab}$$

$$=\frac{a^2}{3bc}+\frac{b^2}{3ca}+\frac{c^2}{3ab}$$

$$=\frac{a^3+b^3+c^3}{3abc}$$

where $a^3+b^3+c^3=3abc$.

$$=\frac{\cancel{3abc}}{\cancel{3abc}}=\underline{1}$$

Or,

$x-1=0$ | $x-2=0$

$x=1$ | $x=2$

$f(x)=x^3-6x^2+mx-n$

$f(1)=(1)^3-6(1)^2+m\times1-n$

$0=1-6+m-n$

$0=-5+m-n$

$5=m-n$ ——— (i)

$f(2)=(2)^3-6(2)^2+m\times2-n$

$0=8-24+2m-n$

$0=-16+2m-n$

$16=2m-n$ ——— (ii)

From (I) and (II)

$$m - n = 5$$
$$2m - n = 16$$
$$-m = -11$$
$$m = 11$$

put the value of m in eq (I).

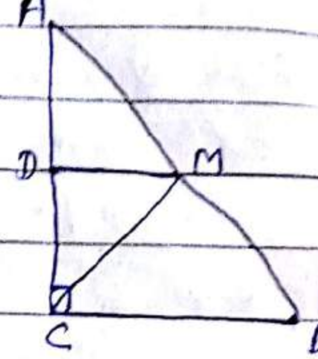
$$m - n = 5$$
$$11 - n = 5$$
$$-n = 5 - 11$$
$$-n = -6$$
$$n = 6$$

26. Total no. of girl = x.
Total no. of boys = y.

Again

No. of girl = 10 + no. of boy.
$$x = 10 + y.$$

27. Given, In rt. $\triangle$ ABC, M is mid-point of AB and a line through M pass do meet AC at D.



To prove: (i) D is mid-point of AC.

(ii) $DM \perp AC$

(iii) $CM = MA = \frac{1}{2} AB$.

Const :- Join CM.

Proof :- $DM \parallel CB$ and AC transversal.

$\angle ADM = \angle ACB$ [Corresponding $\angle$s]

$\angle ADM = 90°$

$\angle CDM = 180° - \angle ADM$

$= 180° - 90$

$= 90°$

Hence, $\angle ADM = \angle CDM = 90°$

Therefore, $DM \perp AC$.

(i) In $\triangle$ ABC, M is mid-point of AB and $DM \parallel BC$.

$\therefore$ D is mid-point of AC.

(iii) In $\triangle$ ADM and $\triangle$ CDM

$AD = CD$ [D is mid-point of AC]

$\angle D = \angle D = 90°$

$DM = DM$ (Common).

$\triangle ADM \cong \triangle CDM$ (by SAS).

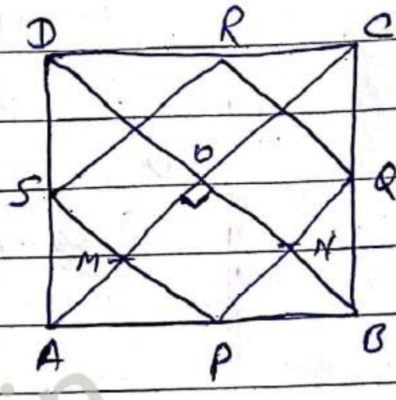
$AM = CM$ (by CPCT) —— (1)

But, $AM = BM$ [M is mid-point AB].

$AM = \frac{1}{2}AB$. —— (ii)

From (i) and (ii), we get,

$CM = AM = \frac{1}{2}AB$.



Q1, Let ABCD is a Sq. in which P, Q, R and S are mid-point of Side AB, BC, CD and DA respectively.

To-prove, PQRS is a Sq.

Const :- Join AC and BD.

Proof :- In $\triangle ABC$, P and Q are mid-point of AB and BC.

$\therefore PQ \parallel AC$ and $PQ = \frac{1}{2}AC$ {Converse of MPT}.

—— (i)

In $\triangle ACD$, R and S are mid-point of CD and DA.

$\therefore RS \parallel AC$ and $RS = \frac{1}{2}AC$ {Converse of MPT}.

—— (ii)

From (i) and (ii), we get:

$PQ \parallel RS$ and $PQ = RS$

Therefore, PQRS is a $\parallel$gm.

$\Rightarrow PS \parallel RQ \parallel BD$.

Diagonal of Square meet at rt. angle.

In quad, PMON,

PM || ON {PS || BD} —— (iii)

OM || PN {AC || PQ}. —— (iv)

From (iii) and (iv)

PMON is ||gm.

Now?

~~Angle~~ opposite angle of ||gm are equal.

$\angle MPN = \angle MON$

$\angle MPN = 90$.

~~In Square ABCD, AB = BC = CD = DA.~~

In Δ ASP and Δ BPQ.

AP = BP. {P is mid-point of AB}.

AS = BQ {S and Q are mid-points of AD and BC}

$\angle A = \angle B = 90$.

$\Delta ASP \cong \Delta BPQ$ (by SAS)

SP = PQ.

Hence, PQRS is a quadrilateral in which adjacent Sides are equal and one angle is 90.

Therefore PQRS is a ||gm.