

Indian School Muscat
First Mid Term Examination

Class: IX

Subject: Mathematics.

24.09.18

Answer Key

Marks : 80

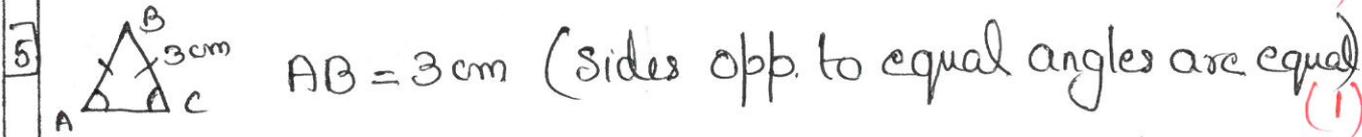
Section - A

1 $7 + \sqrt{2} - 4 - \sqrt{2} = 3$, a rational number. (1)

2 Degree = 5 (1)

3 $5y + 3y + 2y = 180^\circ$
 $10y = 180^\circ$
 $y = \underline{\underline{18}}$ (1)

4 IInd and IIIrd (1)



6 Side = $3\sqrt{2} \text{ cm}$
Area = $\frac{\sqrt{3}}{4} a^2 = \frac{\sqrt{3}}{4} (3\sqrt{2})^2 = \frac{\sqrt{3}}{4} \times 9 \times 2 = \frac{9\sqrt{3}}{2} \text{ cm}^2$ (1)

Section - B

7 $\left(\frac{32}{243}\right)^{\frac{4}{5}} = \left(\frac{2^5}{3^5}\right)^{\frac{4}{5}} = \frac{2^4}{3^4} = \underline{\underline{\frac{16}{81}}}$ — $\left(\frac{1}{2} \times 4 = 2\right)$

8 Let $x = 0.\underline{4}\overline{7}$ — (1/2)

$10x = 4.\underline{7}\overline{7}$ — (1)

$100x = 47.\underline{7}\overline{7}$ — (2)

② - ① $\Rightarrow 90x = 43$ — (1/2)

$x = \frac{43}{90}$ — (1/2)

9 $101 \times 99 = \underline{\underline{(100+1)(100-1)}}$ — (1)

$= 100^2 - 1^2$ — (1/2)

$= 10000 - 1$

$= \underline{\underline{9999}}$ — (1/2)

10 (-1) is a zero of $p(x) = ax^3 - x^2 + x + 4$

$$\therefore p(-1) = 0 \quad \text{--- (1/2)}$$

$$\text{ie; } a(-1)^3 - (-1)^2 + (-1) + 4 = 0 \quad \text{--- (1)}$$

$$-a - 1 - 1 + 4 = 0$$

$$-a = -2 \quad \text{--- (1/2)}$$

$$a = \underline{\underline{2}}$$

11 $AC = BC$ (given)

$$AC + AC = BC + AC \quad \text{(Adding equals on both sides) --- (1)}$$

$$2AC = AB \quad \text{(from the fig) --- (1/2)}$$

$$\underline{\underline{AC = \frac{1}{2} AB}} \text{. Hence proved. --- (1/2)}$$

12 $a = 17 \text{ cm}$

$$b = 15 \text{ cm}$$

$$s = 20 \text{ cm}$$

$$s = \frac{a+b+c}{2}$$

$$20 = \frac{17+15+c}{2}$$

$$40 = 32 + c$$

$$\therefore c = 40 - 32$$

$$= 8 \text{ cm} \quad \text{(1)}$$

$$\text{Area} = \sqrt{20(20-17)(20-15)(20-8)}$$

$$= \sqrt{20(3)(5)(12)}$$

$$= \sqrt{4 \times 5 \times 3 \times 5 \times 4 \times 3}$$

$$= 4 \times 5 \times 3$$

$$= \underline{\underline{60 \text{ cm}^2}} \quad \text{(1)}$$

13 Section-c

$$a = 9 - 4\sqrt{5}$$

$$\frac{1}{a} = \frac{1}{(9-4\sqrt{5})(9+4\sqrt{5})} \times (9+4\sqrt{5}) = \frac{9+4\sqrt{5}}{81-80} = 9+4\sqrt{5} \quad \text{--- (2)}$$

$$\therefore \left(a - \frac{1}{a}\right)^2 = \left(\cancel{9} - 4\sqrt{5} - \cancel{9} - 4\sqrt{5}\right)^2 \quad \text{--- (1/2)}$$

$$= (-8\sqrt{5})^2$$

$$= 64 \times 5$$

$$= \underline{\underline{320}} \quad \text{--- (1/2)}$$

14 (a) Representing $\sqrt{5}$ on a no. line.

$(\frac{1}{2} \times 6 = 3)$

(OR)

(b) Representing $\sqrt{9.3}$ on a no. line.

15 $-32 + 18 + 14 = -32 + 32 = 0$ — (1)

$\therefore (-32)^3 + (18)^3 + (14)^3 = 3(-32)(18)(14)$ — (1)
 $= \underline{\underline{-24,192}}$ — (1)

(OR)

$x = 2y + 6$ (given) — (1)

$(x - 2y)^3 = 6^3$ — (1)

$x^3 - 3(x)(2y)^2 + 3(x)(2y)^2 - (2y)^3 = 216$ — (1)

$x^3 - 6x^2y + 12xy^2 - 8y^3 = 216$

$x^3 - 8y^3 - 6xy(x - 2y) = 216$

$x^3 - 8y^3 - 6xy(6) = 216$ — (2)

$x^3 - 8y^3 - 36xy - 216 = \underline{\underline{0}}$ — (2)

16 $p(x) = 4x^3 - kx^2 + 5$ } leaves same remainder
 $q(x) = x^2 + kx - 3$

$\therefore p(1) = q(1)$ — (1)

$4 - k + 5 = 1 + k - 3$ — (1)

$9 - k = k - 2$

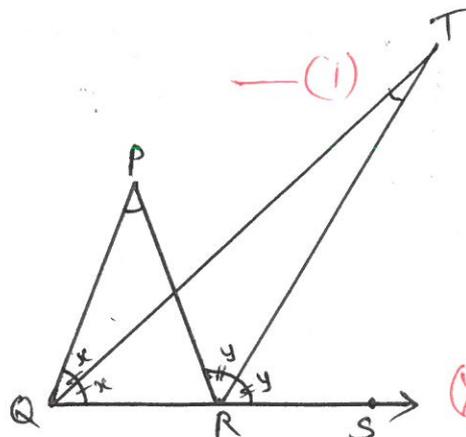
$-k - k = -2 - 9$

$-2k = -11$

$k = \underline{\underline{\frac{11}{2}}}$ — (1)

17 Given :- Bisectors of $\angle PQR$ and $\angle PRS$ meet at T.

To p.t. :- $\angle QTR = \frac{1}{2} \angle QPR$



Proof :- In ΔPQR , $\angle P + 2x = 2y$ (Ex. A.P) — (1)

In ΔTQR , $\angle T + x = y$ (") — (2) — (1)

(1) $\Rightarrow \angle P = 2y - 2x$ — (1)

$= 2(y - x)$

$= 2(\angle T)$ — (1/2)

$\therefore \angle QTR = \frac{1}{2} \angle QPR$

(Hence proved)

18 $\angle ABC = \angle ACB$ (given) — (1/2)

$\angle 3 = \angle 4$ (given) — (1/2)

$\angle ABC - \angle 4 = \angle ACB - \angle 3$

[Equals are subtracted from equals — (1) remainders are equal] — (1)

$\Rightarrow \angle 1 = \angle 2$

H.P

19 Const :- Draw $UV \parallel PQ \parallel RS$

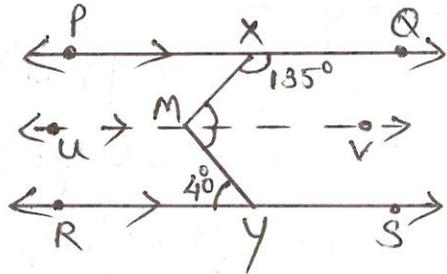
Proof :- $\angle XMY = 180^\circ - 135^\circ$ [Co.in] — (1)

$= 45^\circ$

$\angle VMY = 40^\circ$ [Al.in. \angle 's] — (1/2)

$\therefore \angle XMY = 45^\circ + 40^\circ$ — (1/2)

$= \underline{85^\circ}$

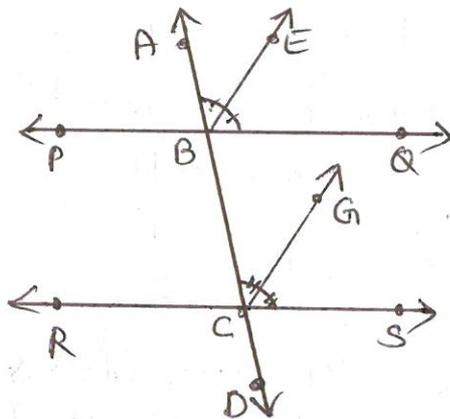


(OR)

Given :- AD transversal

- $PQ \parallel RS$.
- BE bisector of $\angle ABA$
- CG " " $\angle BCS$
- $BE \parallel CG$

To p.t :- $PQ \parallel RS$.



— (1/2)

Proof:- $\angle ABE = \frac{1}{2} \angle ABQ$ — (1) (given)

$\angle BCG = \frac{1}{2} \angle BCS$ — (2) (")

But $BE \parallel CG$, AD is the transversal $\therefore \angle ABE = \angle BCG$

(Corresponding angles are equal) (1/2)
 \hookrightarrow (3)

Substituting (1) and (2) in (3)

$$\Rightarrow \frac{1}{2} \angle ABQ = \frac{1}{2} \angle BCS$$

$$\angle ABQ = \angle BCS$$

\Rightarrow Corr. angles are equal.

$\Rightarrow PQ \parallel RS$ (Converse of Corres. angles axiom) (1/2)

Hence proved.

20 (i) A \rightarrow (4, 0)

B \rightarrow (-3, 0)

C \rightarrow (0, 1)

F \rightarrow (-3, -2)

(ii) ordinate of D is 3

(iii) abscissa of E is 1

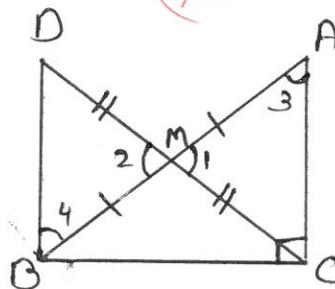
$$\left(\frac{1}{2} \times 6 = 3\right)$$

21 Given:- $\text{Rt } \triangle ABC$, $\angle C = 90^\circ$

• $AM = BM$

• $DM = CM$

• DB is joined.



To p.t.:- (i) $\triangle AMC \cong \triangle BMD$

(ii) $\angle OBC$ is a right angle.

Proof:- (i) In $\triangle AMC$ and $\triangle BMD$

$AM = BM$ (given)

$\angle 1 = \angle 2$ (VOA)

$MC = MD$ (given)

$\therefore \triangle AMC \cong \triangle BMD$ (SAS)

(1/2)

(ii) $\angle 3 = \angle 4$ (c.p.t)

\Rightarrow Alt. in angles are equal

$\Rightarrow AC \parallel BD$ (by converse of Alt in. \angle s prop)

$$\Rightarrow \angle ACB + \angle DBC = 180^\circ \text{ [Co. in. } \angle\text{'s]}$$

$$90^\circ + \angle DBC = 180^\circ$$

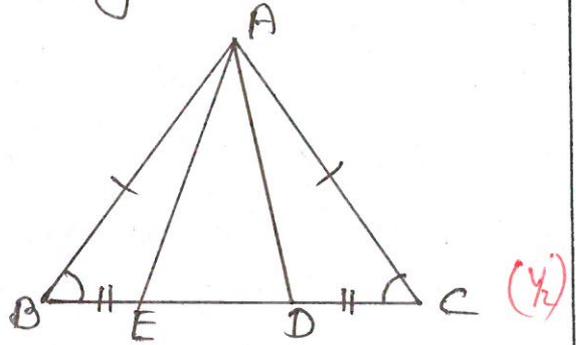
$$\begin{aligned} \angle DBC &= 180^\circ - 90^\circ \\ &= 90^\circ \end{aligned}$$

$\therefore \angle DBC$ is a right angle. - (1)

OR)

Given :- $\triangle ABC$ is an isos. \triangle .

- $AB = AC$
- $BE = CD$



To. st. :- $AD = AE$

Proof :- In $\triangle ABD$ and $\triangle ACE$

$$AB = AC \text{ (given)}$$

$$\angle B = \angle C \text{ (}\because AB = AC, \text{ angles opp to equal sides are equal)}$$

$$BE = CD \text{ (given)}$$

$$BE + ED = CD + ED \text{ (Adding equals ----)}$$

$$\Rightarrow BD = CE$$

$$\therefore \triangle ABD \cong \triangle ACE \text{ (SAS)}$$

$$\Rightarrow AD = AE \text{ (cpct)}$$

Hence proved. (2)

22) Given :- $\triangle PQR$, $PR > PQ$
 PS bisects $\angle QPR$.

To. p.t. :- $\angle PSR > \angle PSQ$.

Proof :- In $\triangle PQS$, $\angle 1 + x = \angle 3$ [Ex. A]

In $\triangle PRS$, $\angle 4 + x = \angle 2$ ["]

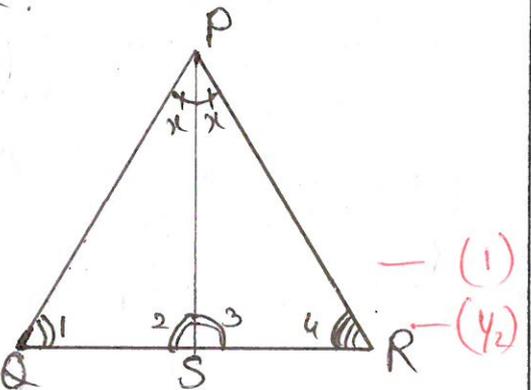
But $PR > PQ \Rightarrow \angle 1 > \angle 4$ (Angles opp to longer side is greater)

$$\angle 1 + x > \angle 4 + x$$

$$\angle 3 > \angle 2$$

$$\Rightarrow \angle PSR > \angle PSQ.$$

Hence proved. (4)



Section - D

$$23) \frac{(7+3\sqrt{5}) \times (7+3\sqrt{5})}{(7-3\sqrt{5}) \times (7+3\sqrt{5})} = \frac{(7+3\sqrt{5})^2}{49-45} = \frac{49+45+42\sqrt{5}}{4} = \frac{94+42\sqrt{5}}{4}$$

$$a \Rightarrow \frac{94}{4} \quad b = -\frac{42}{4} \quad (3)$$

$$a = \frac{47}{2} \quad b = -\frac{21}{2} \quad (1)$$

$$24) x^3 - 6x^2 + 3x + 10 = p(x)$$

$$p(1) = 1 - 6 + 3 + 10 \\ = -5 + 13 \\ \neq 0$$

$$p(-1) = -1 - 6 - 3 + 10 \\ = -10 + 10 \\ = 0$$

$\therefore (x+1)$ is a factor of $p(x)$ (1)

$$\begin{array}{r|rrrr} -1 & 1 & -6 & 3 & 10 \\ & & -1 & 7 & -10 \\ \hline & 1 & -7 & 10 & 0 \rightarrow R \end{array} \quad (1)$$

$$p(x) = (x+1)(x^2 - 7x + 10) \quad (1)$$

$$= (x+1)(x^2 - 5x - 2x + 10) \quad (1)$$

$$= (x+1)(x(x-5) - 2(x-5)) \quad (1)$$

$$= (x+1)(x-5)(x-2) \quad (1)$$

$$\text{OR) } x^3 - y^3 = (x-y)(x^2 + xy + y^2)$$

$$\therefore (2x-5y)^3 - (2x+5y)^3 = (2x-5y - 2x-5y)(2x-5y)^2 + (4x^2 - 25y^2) + (2x+5y)^2 \quad (2)$$

$$= (-10y)(4x^2 + 25y^2 - 20xy + 4x^2 - 25y^2 + 4x^2 + 25y^2 + 20xy) \quad (1)$$

$$= (-10y)(12x^2 + 25y^2) \quad (1)$$

25

$$a+b+c = 9$$

$$a^2+b^2+c^2 = 1$$

$$(a+b+c)^2 = a^2+b^2+c^2 + 2(ab+bc+ac)$$

$$9^2 = 1 + 2(ab+bc+ac)$$

$$81 - 1 = 2(ab+bc+ac)$$

$$\therefore ab+bc+ac = 40 \quad (2)$$

$$\begin{aligned} a^3+b^3+c^3 - 3abc &= (a+b+c)(a^2+b^2+c^2 - ab - bc - ac) \\ &= 9(1 - 40) \\ &= 9(-39) \\ &= \underline{\underline{-351}} \quad (2) \end{aligned}$$

26 Proof:- Angle sum property of a triangle. (2)

$$(ii) \quad 2x - 7 + x + 25 + 3x + 12 = 180^\circ \quad [ASP]$$

$$6x + 30 = 180^\circ$$

$$6x = 150$$

$$x = \frac{150}{6}$$

$$= \underline{\underline{25^\circ}} \quad (2)$$

(OR)

Given:-

To p.t:- $\angle BOC = 90^\circ - \frac{1}{2} \angle BAC$

Proof:- $x + y + \angle O = 180^\circ \quad [ASP]$

$$180^\circ - 2x + 180^\circ - 2y + \angle A = 180^\circ \quad [ASP]$$

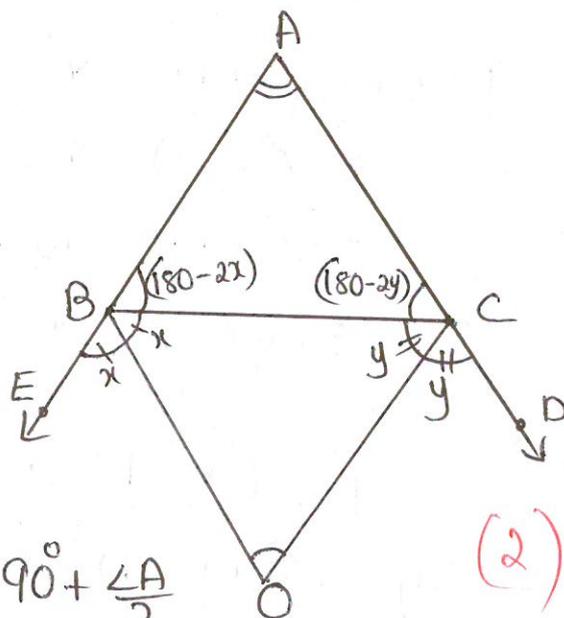
$$180^\circ + \angle A = 2(x+y)$$

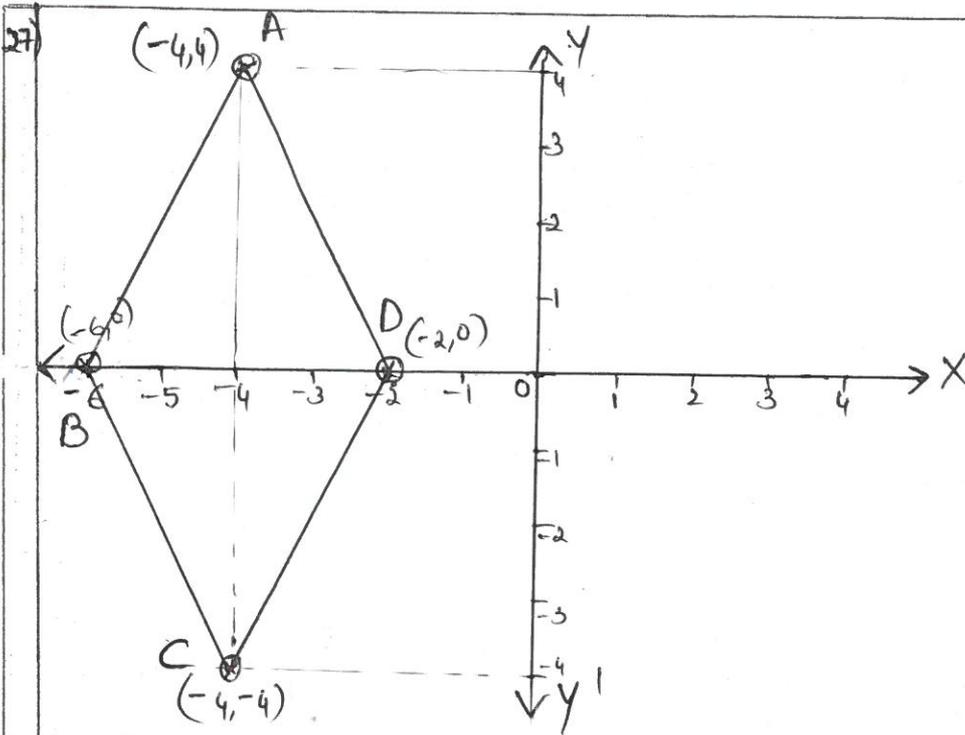
$$\therefore x+y = \frac{180^\circ + \angle A}{2} = 90^\circ + \frac{\angle A}{2}$$

$$\therefore \angle O = 180^\circ - (x+y)$$

$$= 180^\circ - 90^\circ - \frac{\angle A}{2}$$

$$= 90^\circ - \frac{\angle A}{2} \quad (HP) \quad (2)$$





Graph - (2)

Figure \rightarrow Rhombus

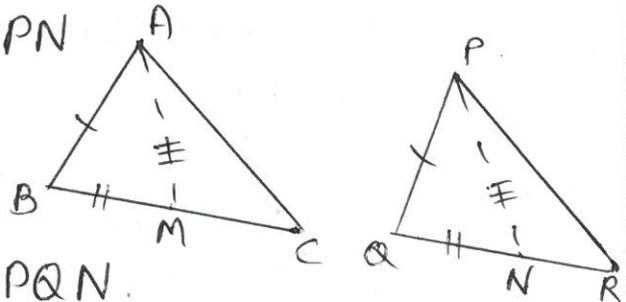
$$\begin{aligned} \text{Area of the Rhombus} &= \frac{1}{2} d_1 d_2 \\ &= \frac{1}{2} \times 8 \times 4 \\ &= \underline{\underline{16 \text{ sq. units.}}} \end{aligned}$$

— (1)

— (1)

28) Given:- $AB = PQ, BC = QR, AM = PN$

To p.t:- (i) $\triangle ABM \cong \triangle PQN$
(ii) $\triangle ABC \cong \triangle PQR$



Proof:- (i) In $\triangle ABM$ and $\triangle PQN$.

$$AB = PQ \text{ (given)}$$

$$BM = QN \text{ (} \because BC = QR, \frac{1}{2}BC = \frac{1}{2}QR \text{)}$$

$$AM = PN \text{ (given) } \quad \text{AM, PN are medians}$$

$$\triangle ABM \cong \triangle PQN \text{ (SSS)}$$

— (2)

(ii) In $\triangle ABC$ and $\triangle PQR$

$$AB = PQ \text{ (given)}$$

$$\angle B = \angle Q \text{ (CPCT, proved in (i))}$$

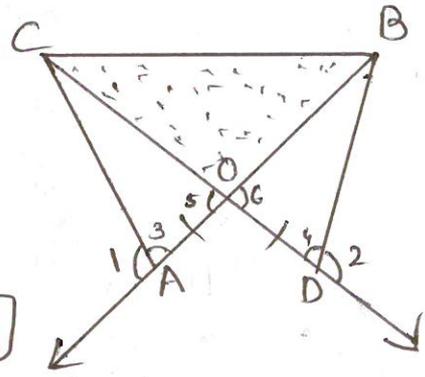
$$BC = QR \text{ (given)}$$

$$\therefore \triangle ABC \cong \triangle PQR \text{ (SAS)}$$

— (2)

H.P

29) Given:- $OA = OD$
 $\angle 1 = \angle 2$



To.p.t:- $\triangle OCB$ is an iso \triangle .

Proof:- In $\triangle COA$ and $\triangle BOD$

$\angle 3 = \angle 4$ [$\because \angle 1 = \angle 2$ given
 $180 - \angle 1 = 180 - \angle 2$]

$AO = DO$ [given]

$\angle 5 = \angle 6$ [v.o.A]

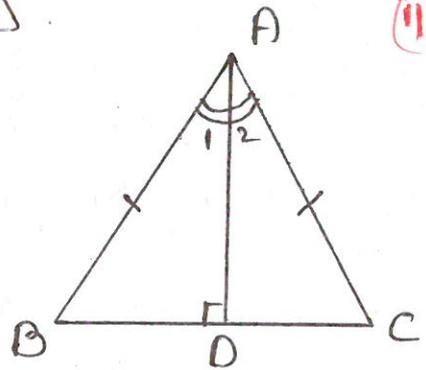
$\therefore \triangle COA \cong \triangle BOD$ [ASA] (3)

$\Rightarrow CO = BO$ [C.P.C.T] (1/2)

$\Rightarrow \triangle OCB$ is an iso. \triangle . (H.P) (1/2)

(OR)

Given:- $\triangle ABC$ iso. $AB = AC$
 AD altitude



To.p.t:- (i) AD bisects BC i.e; $BD = CD$
 (ii) AD bisects $\angle A$.

Proof:- (i) In $\triangle ADB$ and $\triangle ADC$

$AB = AC$ (given, hyp)

$\angle ADB = \angle ADC$ ($al = 90^\circ$, given)

$AD = AD$

$\therefore \triangle ADB \cong \triangle ADC$ (RHS) (3)

$\Rightarrow BD = CD$ (C.p.c.t)

$\Rightarrow AD$ bisects BC . (1)

Also $\angle 1 = \angle 2$ (C.p.c.t)

$\Rightarrow AD$ bisects $\angle A$.

30) Conot:- Draw $BE \parallel AD$
 such that $ABED$ is a llgm.

Also $BF \perp CD$

$AB = DE = 120$ cm

$AD = BE = 50$ cm

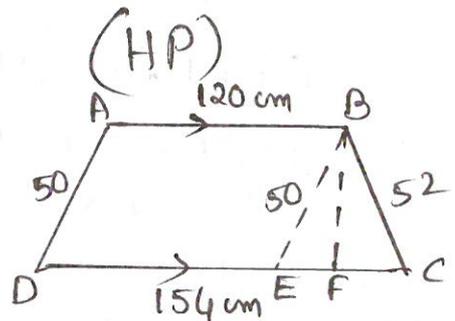


fig: (1/2)

Conot: (1)

$$EC = 154 - 120$$

$$= 34 \text{ cm}$$

(1/2)

$$\text{area of } \triangle BEC = \sqrt{68(68-50)(68-52)(68-34)}$$

$$= \sqrt{68(18)(16)(34)}$$

$$= \sqrt{2 \times 2 \times 17 \times 9 \times 2 \times 16 \times 17 \times 2}$$

$$= 2 \times 17 \times 3 \times 2 \times 4$$

$$= \underline{\underline{816 \text{ cm}^2}}$$

$$a = 50 \text{ cm}$$

$$b = 52 \text{ cm}$$

$$c = 34 \text{ cm}$$

$$s = \frac{136}{2} = 68 \text{ cm}$$

(1)

Also area of $\triangle BEC = \frac{1}{2} bh$

$$= \frac{1}{2} \times 17 \times 34 \times h$$

$$\therefore 17h = 816$$

$$h = 48 \text{ cm}$$

(1/2)

$$\therefore \text{Area of the trap} = \text{area of the llgm} + \text{area of the } \triangle$$

$$= bh + 816$$

$$= 120 \times 48 + 816$$

$$= 5760 + 816$$

$$= \underline{\underline{6576 \text{ cm}^2}}$$

(1/2)



