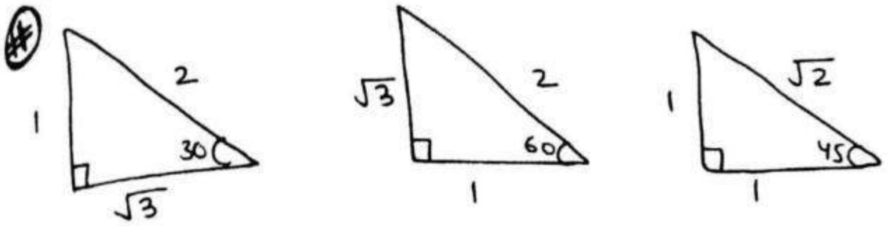
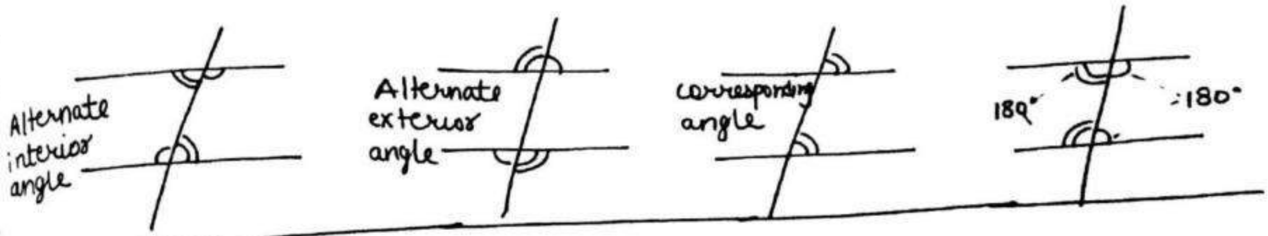
GEOMETRY

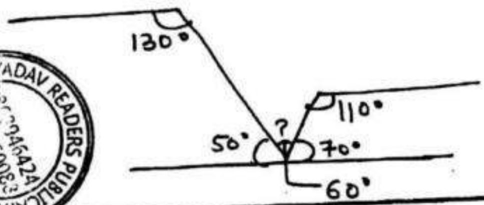
CLASS 48

#

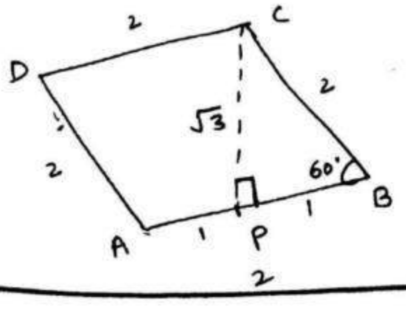




(1)

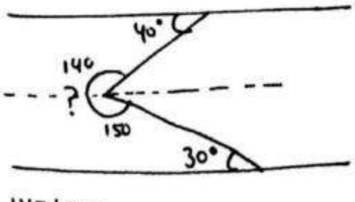


(2) A, B, C, D are the vertex of a Rhombus and P,Q,R,S are the mid points of AB, BC, CD & DA. find the largest angle of the rhombus? & $CP \perp AB$



$\angle DAB = 180 - 60° = 120°$

(3)



140+150
= 290°

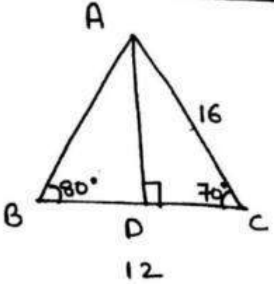
(4)

$x+y+z = ?$

$180-x+180-y = z$

$x+y+z = 360^\circ$

(5)



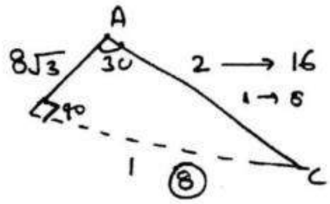
$\angle B = 80$

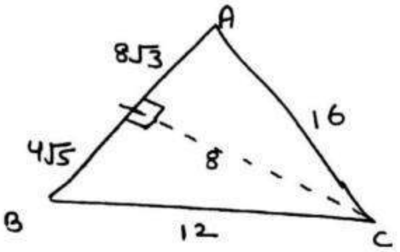
$\angle C = 70$

$AD = ?$

$AC = 16$

$BC = 12$



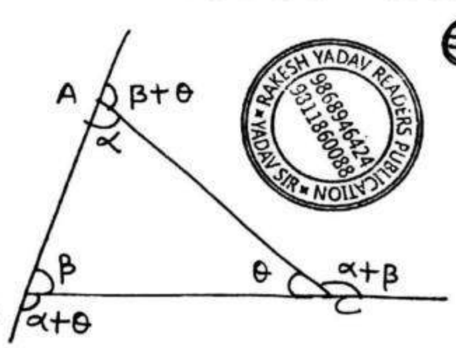


Area $(\triangle ABC)$

$\cancel{\frac{1}{2}}(8\sqrt{3}+4\sqrt{5})\times 8 = \cancel{\frac{1}{2}}\times 12\times AD$

$AD = \frac{2}{3}(8\sqrt{3}+4\sqrt{5})$

(##)



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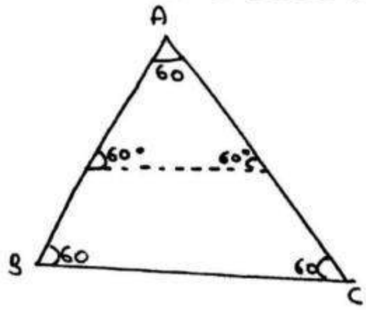
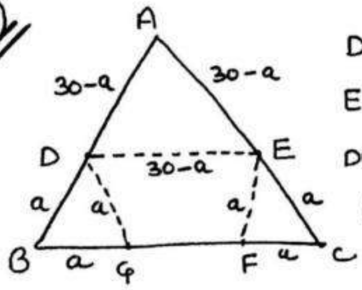


(6)



$DE \parallel BC$

$EF \parallel AB$

$DG \parallel AC$

$AB = 30$

$GD+DE+EF = 42$

$GF = ?$

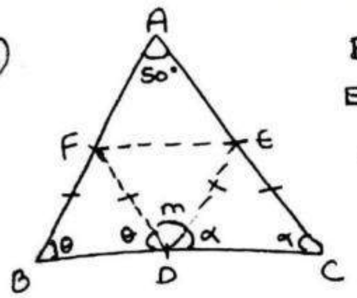
$AB = BC = CA$

$\cancel{a+}\,30-\cancel{a}+a = 42$

$\boxed{a=12}$

$GF = 30-12-12 = 6$ cm

(7)



BF = FD

ED = EC

∠FDE = ?

∠A = 50°

$\angle A + \angle B + \angle C = 180°$

$50° + \theta + \alpha = 180°$

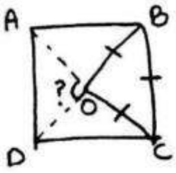
$\theta + \alpha = 130°$

$\therefore \theta + \alpha + m = 180°$

$130 + m = 180°$

$\boxed{m = 50°}$

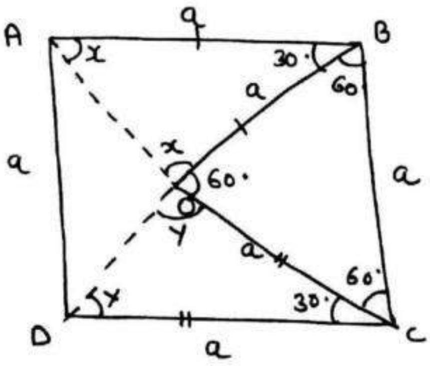
(8)



ABCD is a square.

OBC is equilateral Δ

find angle ∠AOD.



Δ ABO

$x + x + 30° = 180°$

$x = 75°$

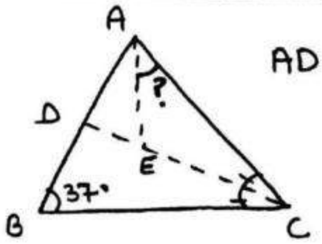
Δ CDO

$y = 75°$

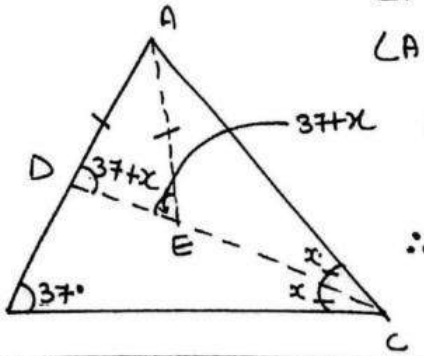
$\therefore \angle AOD = 75 + 75 + 60 + \angle AOD = 360$

$\boxed{\angle AOD = 150°}$

(9)



AD = AE



$\angle ADE = 37 + x$

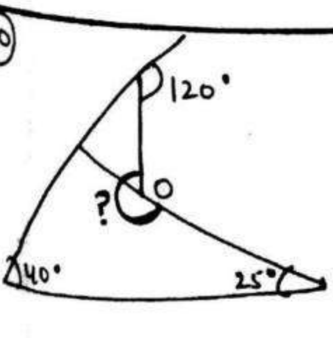
$\angle AED = 37 + x$

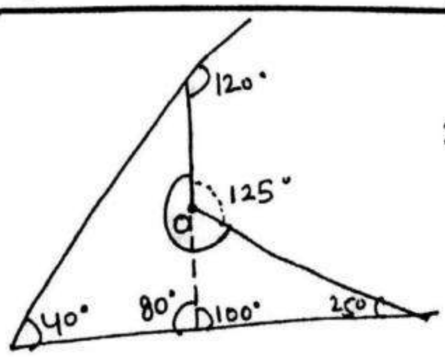
↓

External angle of Δ ACE

$\therefore \angle EAC = 37°$

(10)





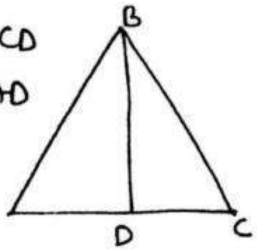
$360 - 125°$

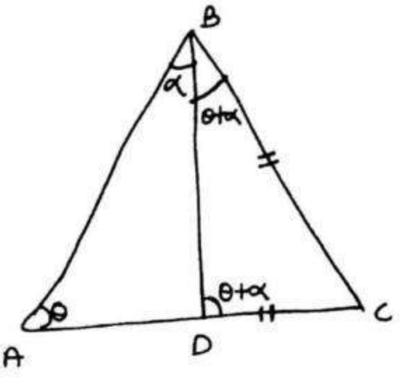
$= 235°$ Ans.

(11) BC=CD

$\angle ABC - \angle BAD = 30°$

$\angle ABD = ?$





$\angle B = \alpha$, $\angle A = \theta$

$\angle BDC = \theta + \alpha$

$\angle DBC = \theta + \alpha$

$\angle ABC - \angle BAD = 30°$

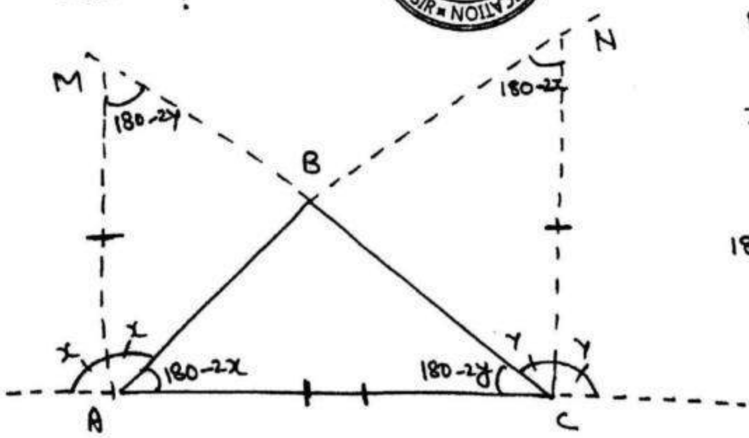
$2\alpha + \cancel{\theta} - \cancel{\theta} = 30°$

$\boxed{\alpha = 15°}$

(12) In an obtuse angle ΔABC the external angle bisector of $\angle A$ intersect the extended part of line CB at M and the external angle bisector of $\angle C$ intersect the extended part of line AB at N.

MA = AC = CN

$\angle B = ?$



$x + 4y = 360°$

$4x + y = 360°$

$5(x+y) = 720°$

$x + y = 144°$

ΔMAC

$180 - 2y + 180 - 2y + x + 180 - 2x = 18$

$x + 4y = 360°$

ΔNAC

$180 - 2x + 180 - 2x + 180 - 2y + y = \cancel{360}\ 180°$

$4x + y = 360°$

ΔABC

$\angle B + 180 - 2x + 180 - 2y = 180°$

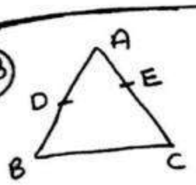
$B = 2(x+y) - 180°$

$B = 288 - 180$

$\boxed{B = 108°}$

CLASS 49

(13)

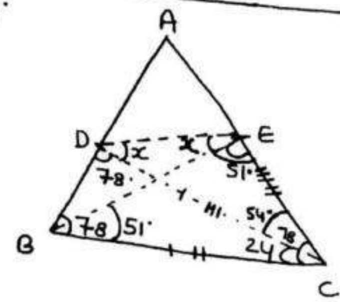


$\angle B = \angle C = 78^\circ$

$\angle BCD = 24$

$\angle EBC = 51$

$\angle DEB = ?$



$DC = BC$

$BC = EC$

$\therefore DC = BC = EC$

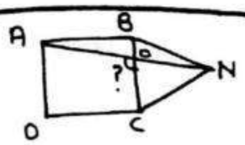
in $\triangle CDE$

$x + x + 54 = 180^\circ$

$x = 63^\circ$

$\angle DEB = 63^\circ - 51^\circ = 12^\circ$

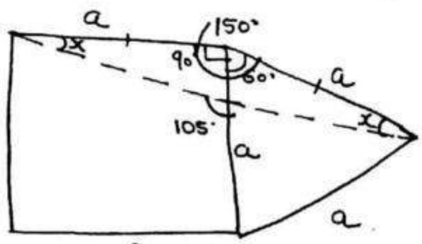
(14)



ABCD square

BCN equilateral $\triangle$.

$\angle AOC = ?$



$x + x + 150^\circ = 180^\circ$

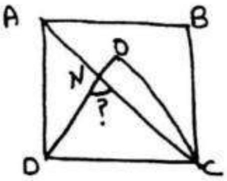
$x = 15^\circ$

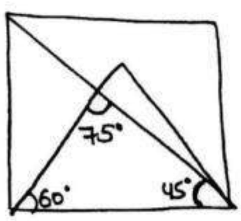
$\angle AOC = 90 + 15^\circ$

$= 105^\circ$

(external angle of $\triangle ABO$)

(15)





diagonal of the square is angle bisector

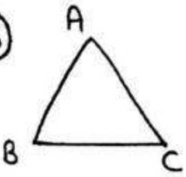
ABCD – square

AC – diagonal

COD – equilateral $\triangle$

$\angle DNC = ?$

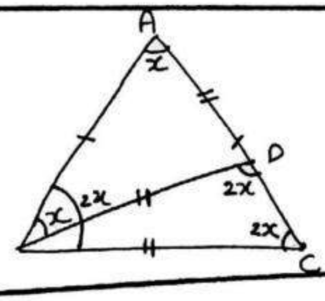
(16)



$AD = DB = BC$

$AB = AC$

$\angle B = ?$



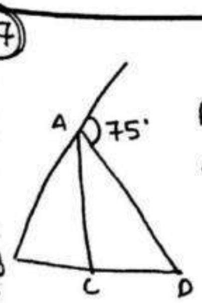
$\triangle ABC$

$2x + 2x + x = 180^\circ$

$x = 36^\circ$

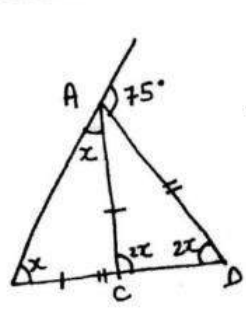
$\angle B = 72^\circ$

(17)



$AC = BC = AD$

$\angle D = ?$



$2x + x = 75^\circ$

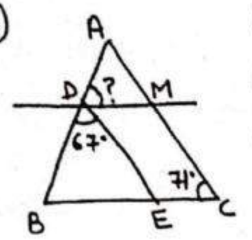
$x = 25^\circ$

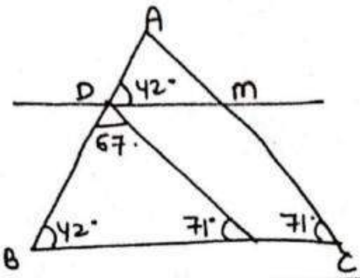
$\angle D = 2 \times 25^\circ = 50^\circ$

18) DE ∥ AC

DM ∥ BC

∠ADM = ?



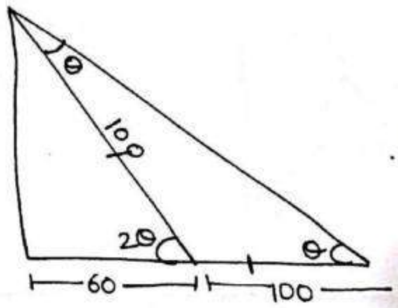


∠ADM = 42°

9) The angle of elevation from a point on the base w/c is 160 m away is θ. After moving 100 m towards the tower the angle of elevation becomes double. find the height of the tower.

20) The angle of elevation from a point on the ground to a top of tower is 15°. After moving 100 m towards the towards the tower the elevation becomes double. find the height of the tower.

(19)



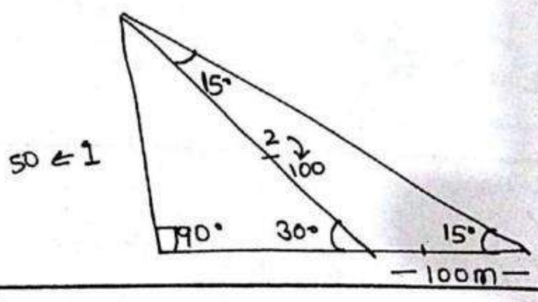
$H = \sqrt{100^2 - 60^2}$

$\sqrt{10000 - 3600}$

$\sqrt{6400}$

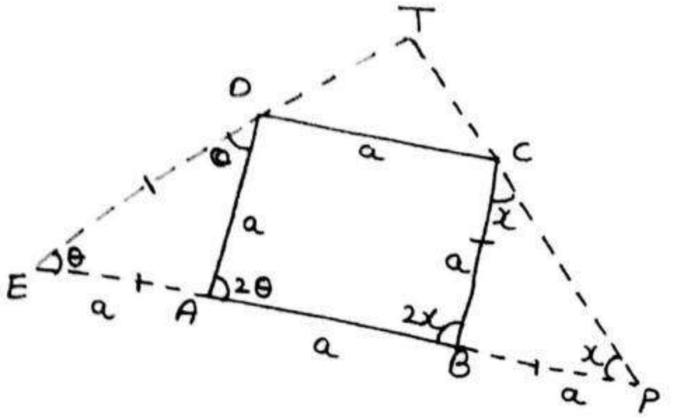
80 m.

(20)



50 m.

(21) A, B, C, D are the vertex of a Rhombus, the ~~extended part~~ ~~of~~ line AB & BA is extended to point P & E. The extended ~~part of~~ line EB & PC meets at T. find ∠T. EA = AB = BP



$2\theta + 2x = 180$

$\theta + x = 90°$

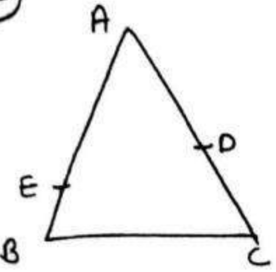
ΔTEP

$\angle T + \theta + x = 180°$

$\angle T = 180 - 90$

$\boxed{\angle T = 90°}$

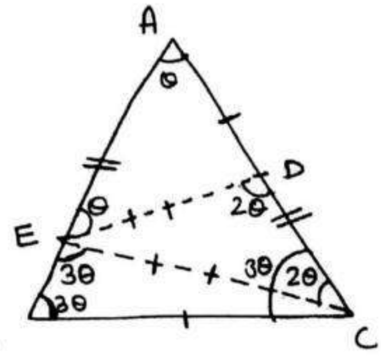
(22)



$AD = DE = EC = BC$

$AB = AC$

$\angle A = ?$



ΔABC

$3\theta + 3\theta + \theta = 180°$

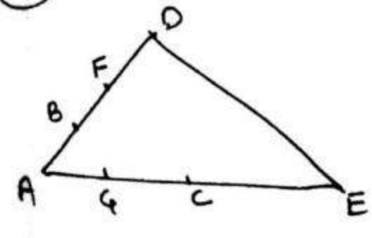
$7\theta = 180$

$\theta = \frac{180}{7}$

Important Triplets

3, 4, 5	18, 20, 30	9, 40, 41
6, 8, 10	5, 12, 13	8, 12, 15
9, 12, 15	10, 24, 26	
12, 16, 20	15, 36, 39	
15, 20, 25	7, 24, 25	

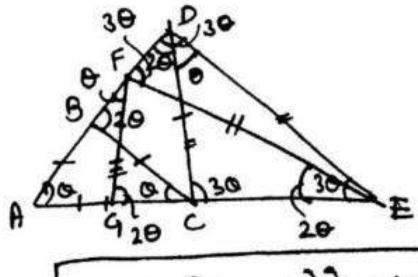
(23)



$AB = BC = CD = DE =$

$EF = FG = GA$

$\angle CDE = ?$



$\underline{\Delta ADE}$

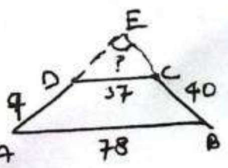
$\theta + 3\theta + 3\theta = 180°$

$7\theta = 180$

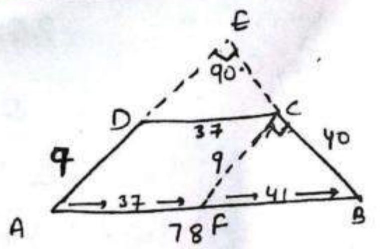
$\theta = \frac{180}{7}$

अगर figure ऐसे zig-zag हो, ये देखो कितनी side equal दे रखी है। यहाँ 7 sides equal दे रखी है तो angle होगा $\frac{180°}{}$

(24)



$\angle DEC = ?$



Δ BCF (right angle)

$\angle BCF = 90°$

$AD \parallel FC$

BE transversal line

$\therefore \angle DEC = \angle BCF$

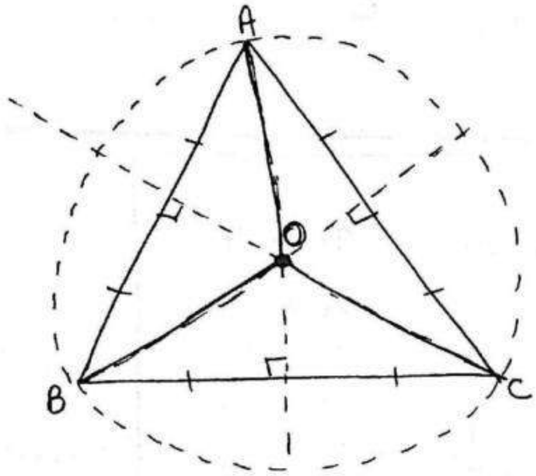
$\angle DEC = 90°$

Scanned by CamScanner

CENTERS

Circumcentre

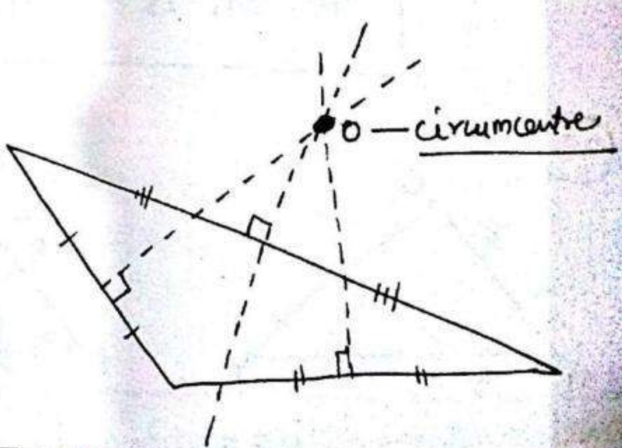
where perpendicular bisector of all sides meet.

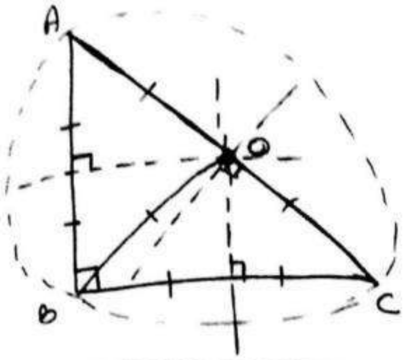


we can not calculate the length of perpendicular bisector because it has no end points.

$OA = OB = OC = R$ (circum-radius)

circumcentre in obtuse angle Δ →





$OA = OB = OC = R$

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Pardeep Chokker
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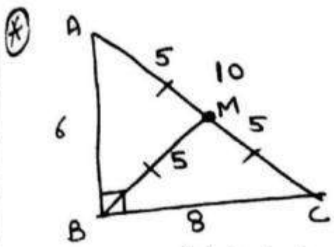
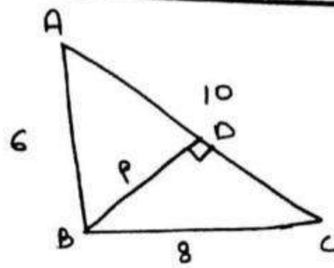


M is the mid point of AC.

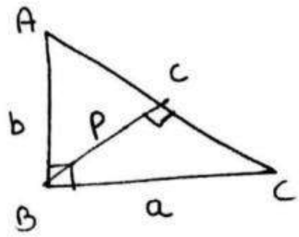
$\boxed{BM = AM = MC = R}$



$\frac{1}{2} \times 6 \times 8 = \frac{1}{2} \times 10 \times P$

$\boxed{P = 4.8}$

or $\frac{6 \times 8}{10} = 48$



$$\frac{P}{1} = \frac{ab}{c}$$

$$\frac{1}{P^2} = \frac{c^2}{a^2b^2}$$

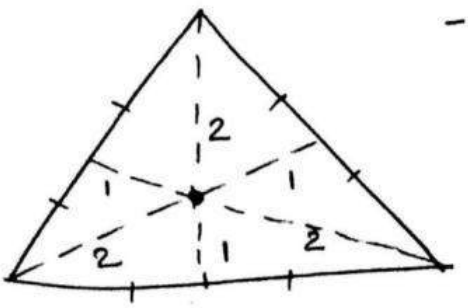
$$\frac{1}{P^2} = \frac{a^2+b^2}{a^2b^2}$$

$$\frac{1}{P^2} = \frac{1}{b^2} + \frac{1}{a^2}$$

Centroid

- where 3 medians intersect
- Median divide the side in two equal parts.

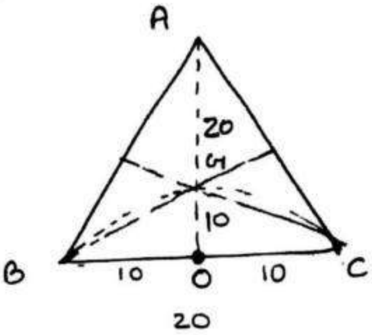
vertex : Base = 2:1



(25) In a ΔABC, G is centroid

$AG = BC$

$\angle BGC = ?$



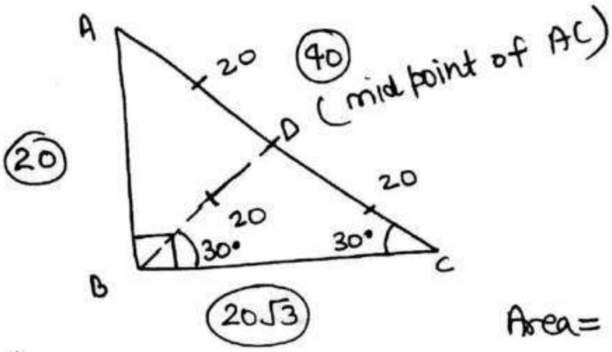
O → centre

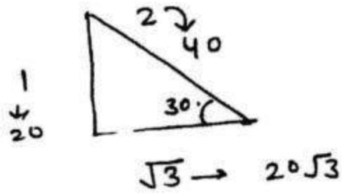
draw a semicircle

$\angle BGC = 90°$

(angle in semi-circle)

(26) find the area of a right angle Δ in w/c a median of length 20 cm intersect the right angle in the ratio 2:1



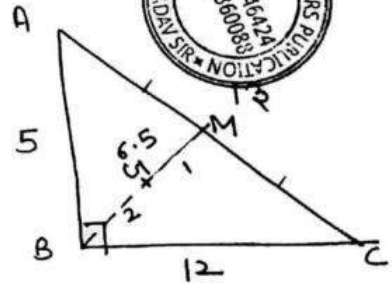


$\text{Area} = \frac{1}{2} \times 20\sqrt{3} \times 20 = 200\sqrt{3}$ Ans

(27) In a ΔABC, G is centroid

$AB = 5$, $BC = 12$

$CA = 13$, $BG = ?$



$AM = MC = BM$

$= 6.5$

2 : 1

$BG = \frac{\cancel{65}^{13}}{\cancel{10}_{5}} \times \frac{2}{3}$

$\frac{13}{3}$ Ans

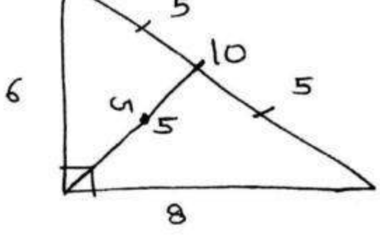
(28) In a ΔABC, G is centroid

$AB = 6$

$BC = 8$

$CA = 10$

$BG = ?$



5

2 : 1

$BG = 5 \times \frac{2}{3}$

$\frac{10}{3}$

Scanned by CamScanner

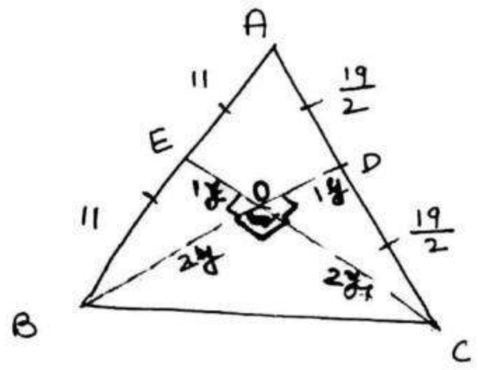
(29) In a Δ ABC, BD & CE are the two medians w/c intersects each other at right angle.

1 in 2

$AB = 22$

$AC = 19$

$BC = ?$



$4x^2 + y^2 = \frac{361}{4}$ (ΔCOD)

$\underline{x^2 + 4y^2 = 121}$ (ΔBOE)

$5(x^2+y^2) = \frac{845}{4}$

$x^2+y^2 = \frac{169}{4}$

$\therefore 4x^2+4y^2 = 169$

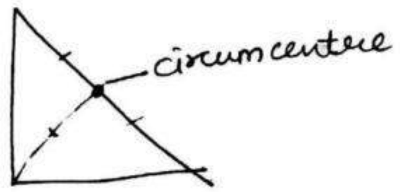
$BC^2 = 4x^2+4y^2$

$BC^2 = 169$

$BC = 13$

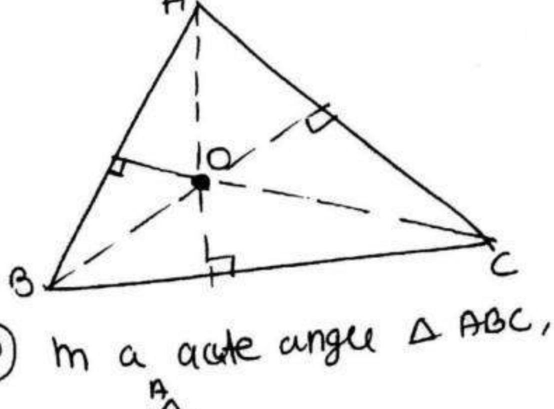
OR

$$\boxed{BC = \sqrt{\frac{AB^2 + AC^2}{5}}}$$



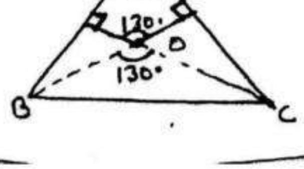
Orthocentre

Meeting point of three altitudes



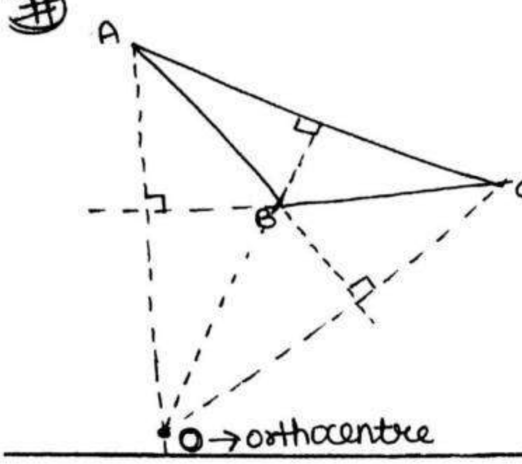
In $\angle A = 50$; $\angle BOC = ?$

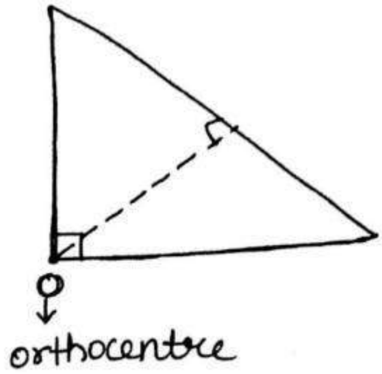
(30) In a acute angle Δ ABC, O is orthocentre.



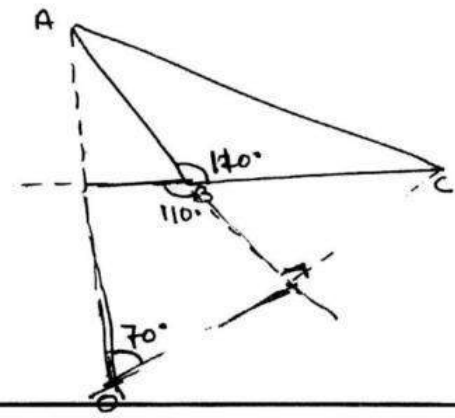
Scanned by CamScanner

#

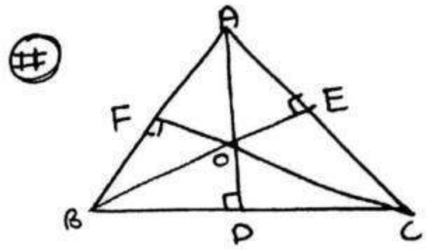




(31) In obtuse angle Δ, obtuse angle is 110°. find the angle made on its orthocentre-



#



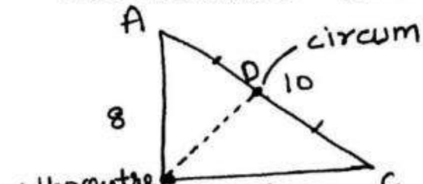
O → orthocentre

vertex E → is the orthocentre of 4 Δs

AOE , ABE , COE , BCE.

vertex B → orthocentre of Δ AOC

(32) The length of the sides of a Δ are 6, 8, 10 cm. find the distance from its orthocentre to circumcentre.



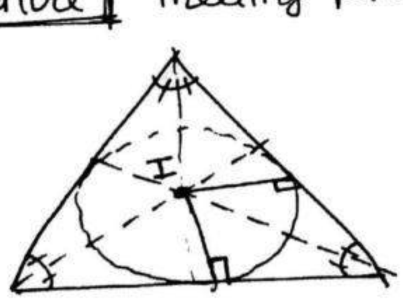
D → circumcentre

$AD = DC = 5$

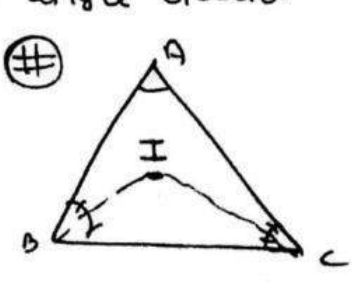
$AD = DC = BD = R$

$\therefore BD = 5$

$\boxed{\text{Incentre}}$ meeting point of angle bisector



#

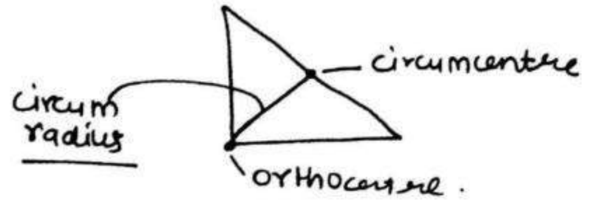


$\angle I = 90 + \frac{1}{2}\angle A$

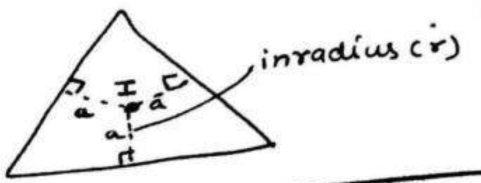
CLASS
50

(#) The same line represents the median from the right angle vertex and the circumcircle radius in a right angle Δ.

(#) In right angle Δ, the distance b/w orthocentre and circumcentre is equal to the circumradius of the Δ.

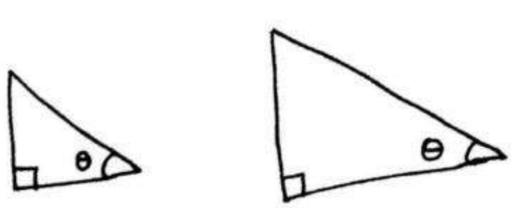


(#) Incentre is the only centre w/c is equi perpendicular distance from all the sides of the Δ and circumcentre is the only centre w/c have equal distance from all the vertex.



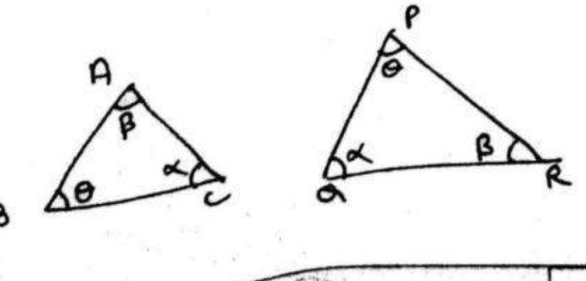
Similarity

(A)



if two angles are equal then Δ's are similar.

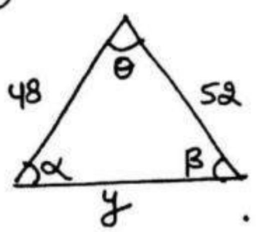
(B)

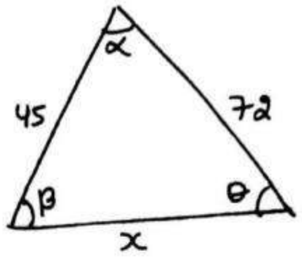


$$\frac{AC}{QR} = \frac{AB}{PR} = \frac{BC}{PQ} = \frac{P(\Delta ABC)}{P(\Delta PQR)} = \frac{\text{median}(\Delta}{\text{median}(\Delta}$$

$$= \frac{\text{Angle Bisector}(\Delta ABC)}{\text{Angle Bisector}(\Delta PQR)} = \frac{\text{Altitude}(\Delta ABC)}{\text{Altitude}(\Delta PQR)}$$

(33)





$x+y=?$

$$\frac{y}{\cancel{45}_{15}} = \frac{\cancel{48}^{2}}{\cancel{72}_{3}}$$

$$\boxed{y=30}$$

$$\frac{x}{\cancel{52}_{26}} = \frac{\cancel{72}^{3}}{\cancel{48}_{2}}$$

$$\boxed{x=78}$$

$x+y = 108$

$\frac{48}{72} = 2 : 3$

$2 \rightarrow 52$

$1 \rightarrow 26$

$3 \rightarrow 78 = x$

<u>Now</u> $3 — 45$

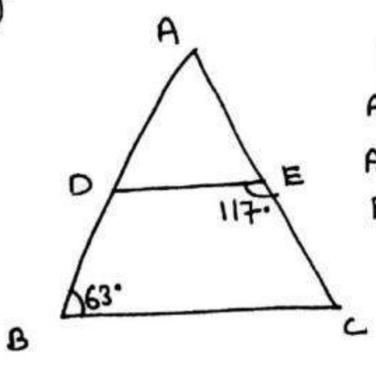
$1 — 15$

$2 \rightarrow 30 = y$

$x+y = 108$

---

(34)

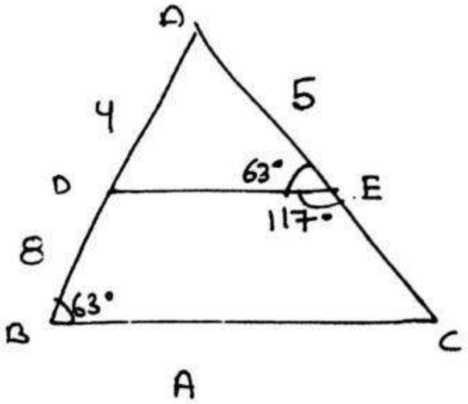


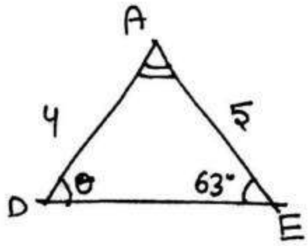
$AD=4$

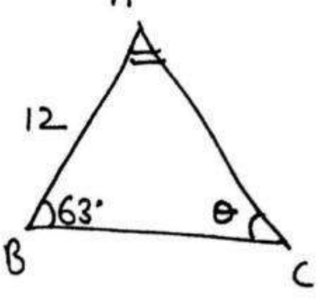
$AB=12$

$AE=5$

$EC=?$





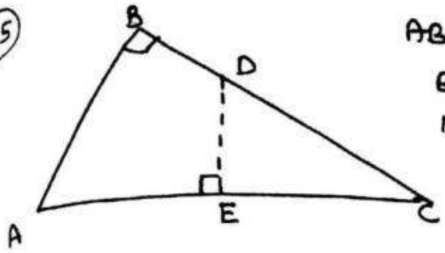


$$\frac{AC}{4} = \frac{12}{5}$$

$$AC = \frac{48}{5} = 9.6$$

$EC = 9.6-5 = 4.6$ <u>An</u>

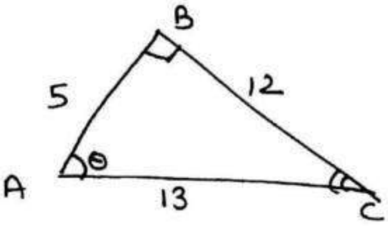
35

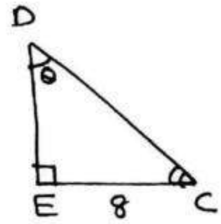


$AB = AE = 5$

$BC = 12$

$DE = ?$





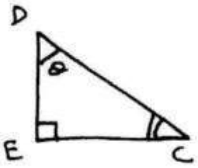
$AE = 5$

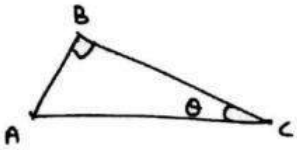
$AC = 13$

$EC = 8$

$$\frac{DE}{5} = \frac{\cancel{8}\,2}{\cancel{12}\,3} \qquad DE = \frac{10}{3}$$

OR

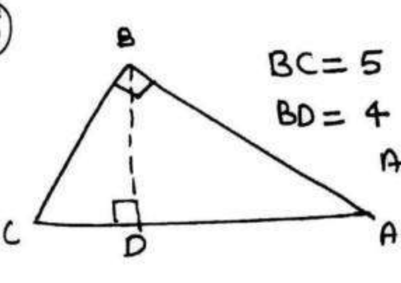




$$\frac{DE}{8} = \frac{5}{12}$$

$$\tan\theta = \frac{DE}{8} \qquad \tan\theta = \frac{5}{12} \qquad DE = \frac{10}{3}$$

36

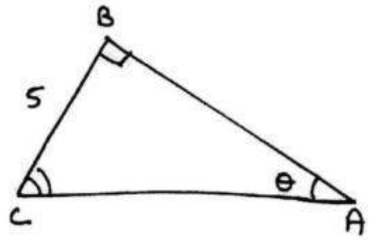


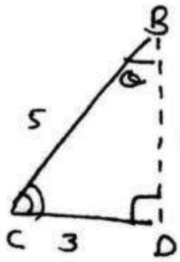
$BC = 5$

$BD = 4$

$AB = ?$

$AC = ?$

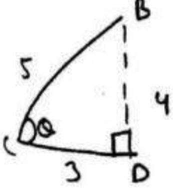


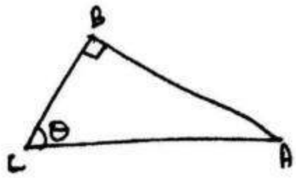


$$\frac{AB}{4} = \frac{5}{3} \qquad \boxed{AB = \frac{20}{3}}$$

OR

$$\frac{AC}{5} = \frac{5}{3} \qquad \boxed{AC = \frac{25}{3}}$$





$$\tan\theta = \frac{4}{3} \qquad \tan\theta = \frac{AB}{5}$$

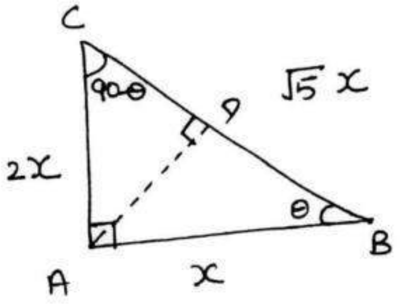
$$\boxed{AB = \frac{20}{3}}$$

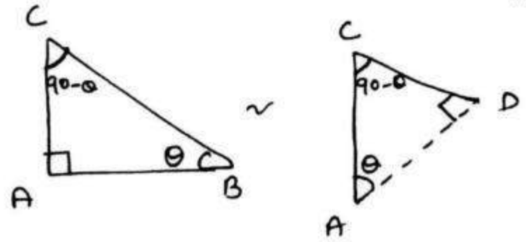
37) In a right angle ΔABC, $AD \perp BC$. BC is the hypotenuse.

$AC = 2AB$, $BD = ?$

A) $\frac{BC}{2}$ C) $\frac{BC}{4}$

B) $\frac{BC}{3}$ D) $\frac{BC}{5}$





Imp

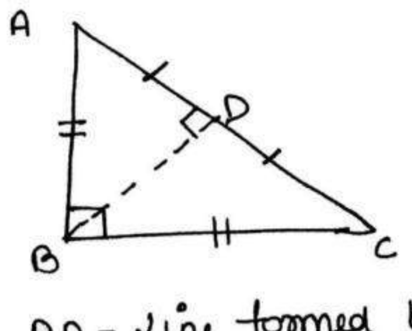
$$AC^2 = BC \times CD$$
$$AB^2 = BD \times BC$$
$$AD^2 = CD \times DB$$

$$\frac{AC}{CD} = \frac{BC}{AC} = \frac{AB}{AD}$$

$$AC^2 = BC \times CD$$
$$AB^2 = BD \times BC$$

$$AB^2 = BD \times BC$$
$$x^{\cancel{2}} = BD \times \sqrt{5}\cancel{x}$$
$$BD = \frac{x}{\sqrt{5}}$$
$$= \frac{x}{\sqrt{5}} \times \frac{\sqrt{5}}{\sqrt{5}} = \frac{\sqrt{5}x}{5} = \frac{BC}{5}$$
$$\boxed{BD = \frac{BC}{5}}$$

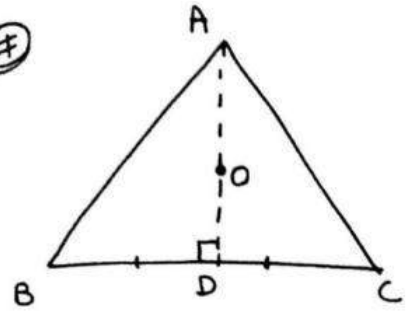
Right angle isosceles Δ



BD
- Median
- Altitude
- $\perp$ bisector
- Angle biscetor

BD = Line formed by joing orthocentre & circumcentre

#



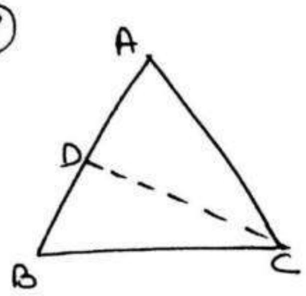
In equilateral Angle Δ

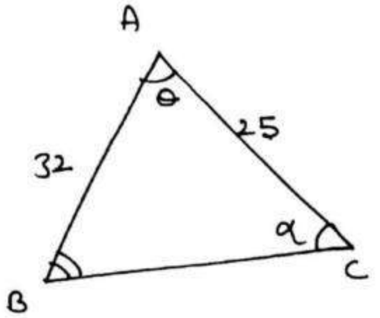
Any median. (AD) — median, ⊥ bisector, Altitude, Angle bisector

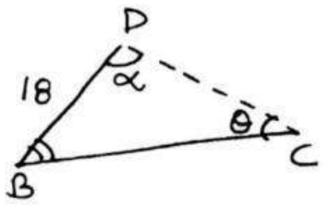
and all centre die on the same place

O — circumcentre, orthocentre, centroid, incentre.

(38)







$\angle BAC = \angle BCD$

$AD = 14$

$BD = 18$

$AC = 25$

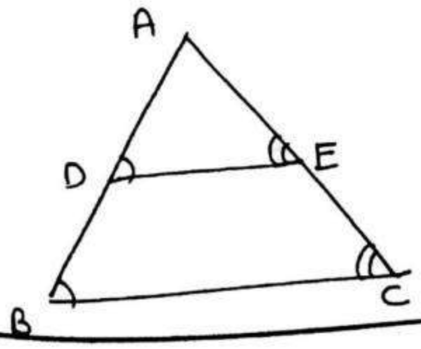
$BC = ?$

$$\frac{BC}{18} = \frac{32}{BC}$$

$$BC^2 = 576$$

$\boxed{BC = 24}$

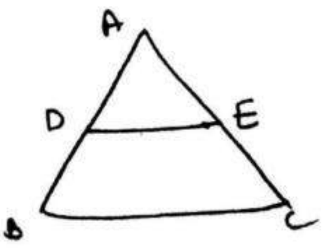
#



$$\frac{AD}{AB} = \frac{AE}{AC} = \frac{DE}{BC}$$

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

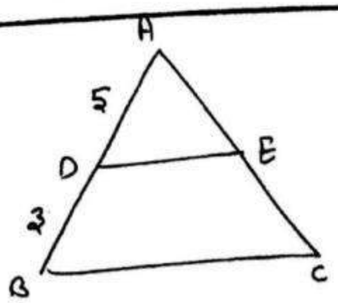
(39)



$\frac{AD}{DB} = \frac{5}{3}$

$BC = 72$

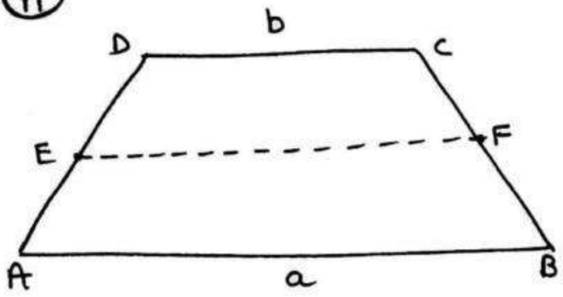
$DE = ?$



$$\frac{5}{\cancel{8}} = \frac{DE}{\cancel{72}\;9}$$

$\boxed{DE = 45}$

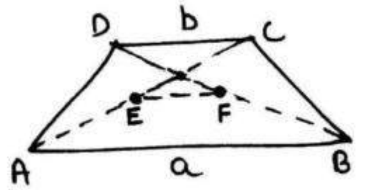
#



$$\frac{DE}{EA} = \frac{CF}{FB}$$

if E & F are mid points

$$EF = \frac{a+b}{2}$$



E & F are mid points of diagonals

$$EF = \frac{a-b}{2}$$

CLASS
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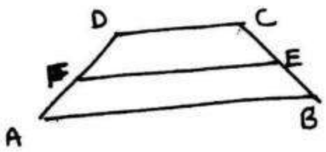
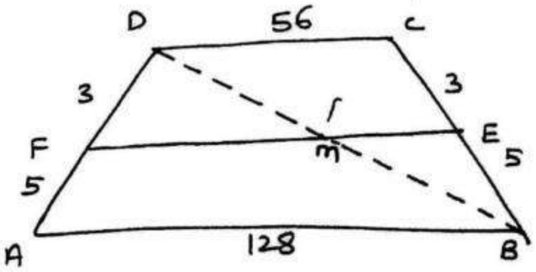
(40)



AB = 128
DC = 56
FE = ?



AB||DC||FE

$$\frac{DF}{FA} = \frac{3}{5}$$

$\Delta ADB \sim \Delta DFM$

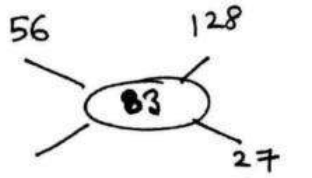
$$\frac{3}{8} = \frac{FM}{128} \qquad \boxed{FM = 48}$$

$\Delta BCD \sim \Delta BEM$

$$\frac{5}{\cancel{8}} = \frac{ME}{\cancel{56}\,7} = \boxed{ME = 35}$$

$$\boxed{FE = 48+35 = 83}$$ Ans.

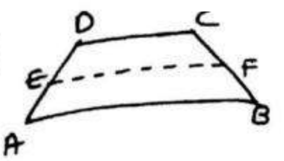
OR

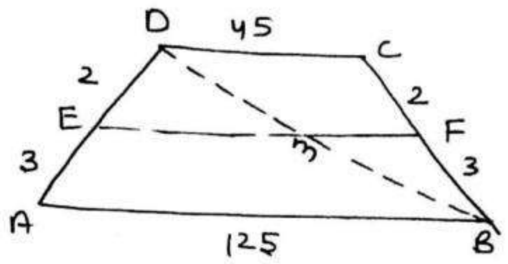


72
5 : 3
27

5 : 3

(41)





$DC = 45$

$AB = 125$

$EF = ?$

$\frac{DE}{EA} = \frac{2}{3}$

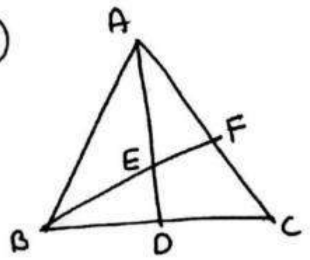
$\Rightarrow \frac{2}{\cancel{5}} = \frac{EM}{\cancel{125}_{25}}$ $\boxed{EM = 50}$

$\Rightarrow \frac{3}{\cancel{5}} = \frac{MF}{\cancel{45}_{9}}$ $\boxed{MF = 27}$

$\boxed{EF = 50 + 27 = 77}$ Ans

---

(42)

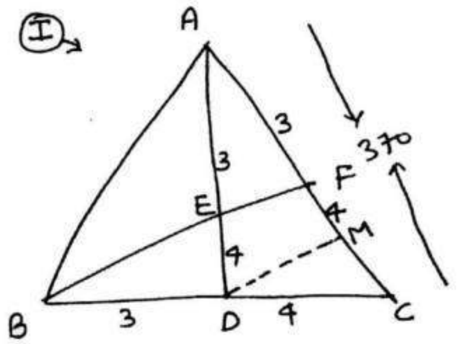


$AE : ED = BD : DC = 3 : 4$

$AC = 370$ cm

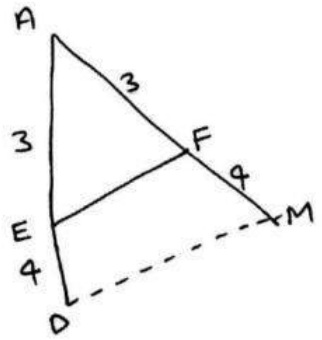
$AF = ?$

(I)



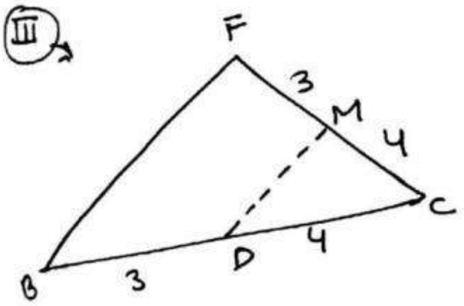
$BF \parallel DM$

(II)



$AF : FM = 3 : 4$

(III)



AF	:	FM	:	MC
3	:	4		4
3		3	:	4
$9x$		$12x$		$16x$

$37x = 370$

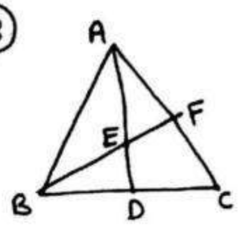
$\boxed{x = 10}$

$AF = 90$

$FM = 120$

$MC = 160$

(43)

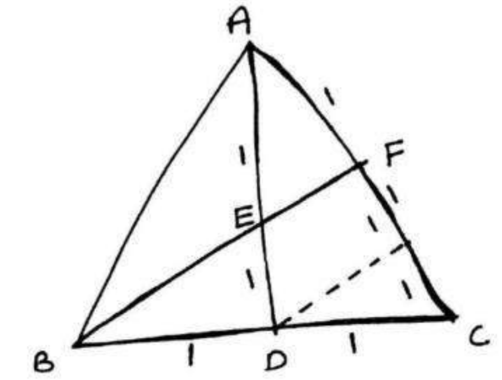


E is mid point of AD

D is mid point of BC

AC = 30 cm

AF = ?



AE	:	FM	:	MC
1	:	1		
1		1	:	1
1	:	1	:	1

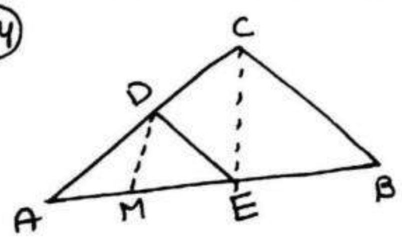
$3 \rightarrow 30$

$1 \rightarrow 10$

$\boxed{AF = 10}$

---

(44)

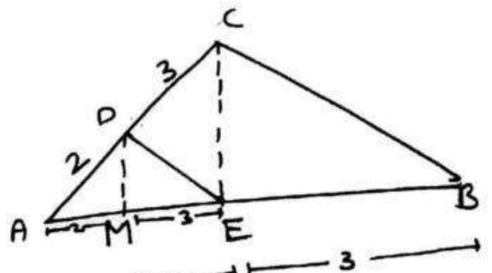


BC ∥ DE

CE ∥ DM

AE : EB = 2 : 3

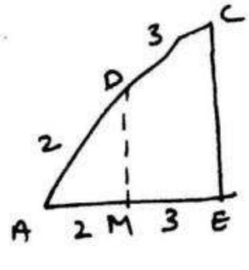
AM : MB = ?



2	3
↓	↓
20	30

AE = 20

EB = 30



$AE = 2+3 = 5 \longrightarrow 20$

$\quad\quad\quad\quad\quad 1 \longrightarrow 4$

AM = 8 , ME = 12 , EB = 30

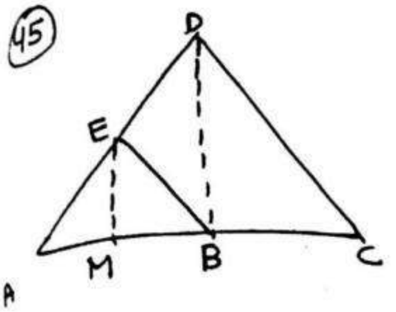
AM : MB

$\cancel{8}$: $\cancel{42}$

$\boxed{4 : 21}$ Ans

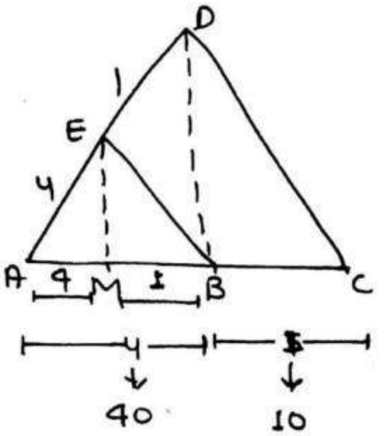
Scanned by CamScanner

45



$AB : BC = 4 : 1$

$MB : BC = ?$



$AM = 32$

$MB = 8$

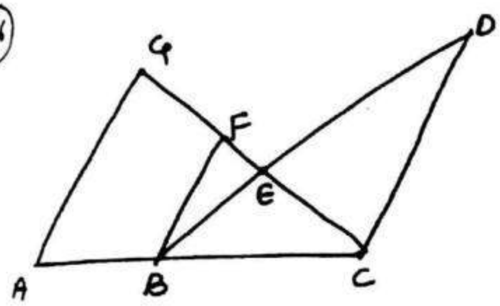
$BC = 10$

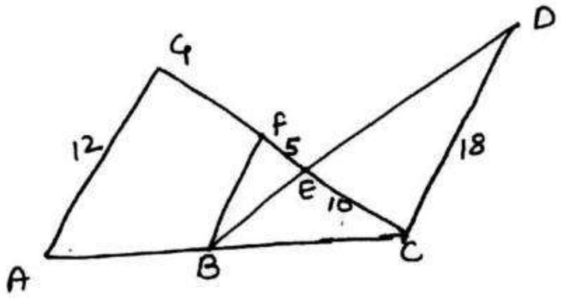
$MB : BC$

$\cancel{8} : \cancel{10}$

$\boxed{4 : 5}$

46





$FE = 5$

$EC = 10$

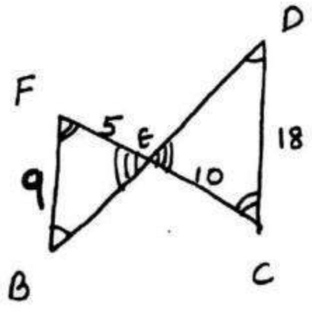
$DC = 18$

$AG = 12$

$GC = ?$

$AG \parallel BF \parallel CD$

(I)



$FB \parallel CD$

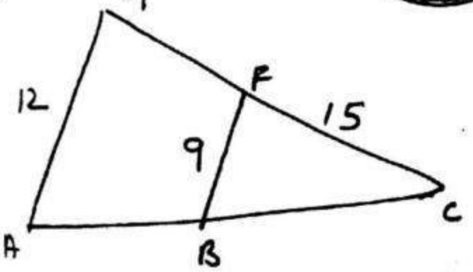
BD & FC

Transversal

$$\frac{FB}{18} = \frac{5}{10}$$

$\boxed{FB = 9}$

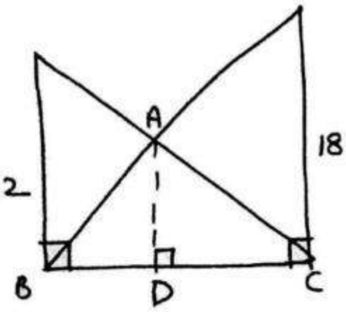
(II)

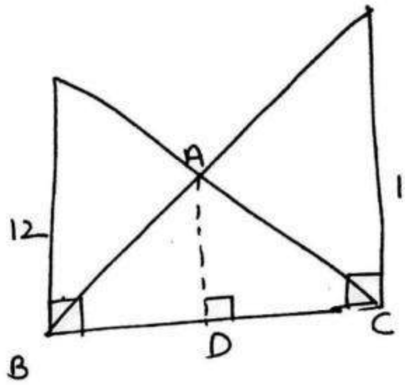


$$\frac{15}{CG} = \frac{9}{12}$$

$\boxed{CG = 20}$

(47)





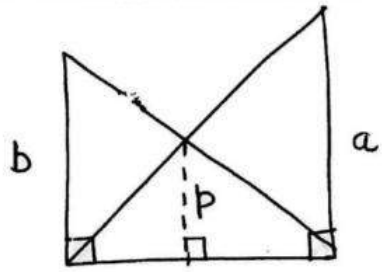
Area of $\triangle ABC = ?$

$BC = 6$

$$AD = \frac{12 \times \cancel{18}^{\,3}}{\cancel{30}_{\,5}} = \frac{36}{5}$$

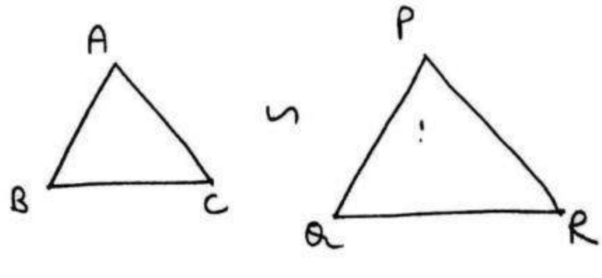
$$\text{Area } \triangle ABC = \frac{1}{\cancel{2}} \times \cancel{6}^{\,3} \times \frac{36}{5} = \frac{108}{5}$$

#



$$\boxed{p = \frac{ab}{a+b}}$$

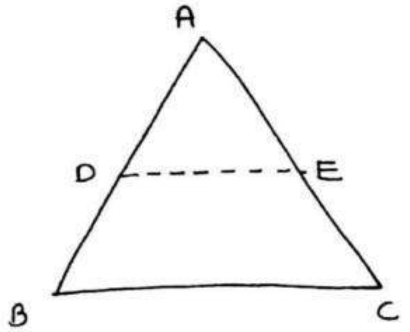
#



$$\frac{\text{Area}(\triangle ABC)}{\text{Area}(\triangle PQR)} = \left(\frac{AB}{PQ}\right)^2 = \left(\frac{BC}{QR}\right)^2 = \left(\frac{AC}{PR}\right)^2 = \left(\frac{\text{P. of } \triangle ABC}{\text{P. of } \triangle PQR}\right)^2 =$$

$$\left(\frac{\text{Median / Angle bisector / Altitude of } \triangle ABC}{\text{Median / Angle bisector / Altitude of } \triangle PQR}\right)^2$$

(48) In a ΔABC a line DE is drawn parallel to BC in such a way that it divide the Δ in two equal areas find $\frac{AD}{DB}$



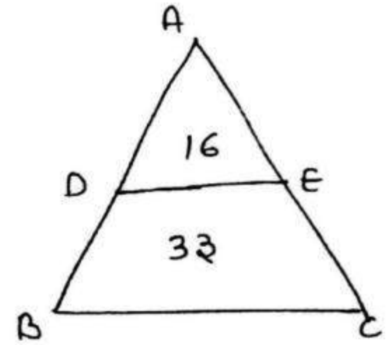
	Small Δ (ΔADE)		Larger Δ (ΔABC)
Area	1		2
Side	1	:	$\sqrt{2}$

$AD = 1$

$AB = \sqrt{2}$ $\quad DB = \sqrt{2} - 1$

$$\frac{AD}{DB} = \frac{1}{\sqrt{2}-1}$$

(49) In ΔABC a line DE is drawn parallel to BC in such a way that



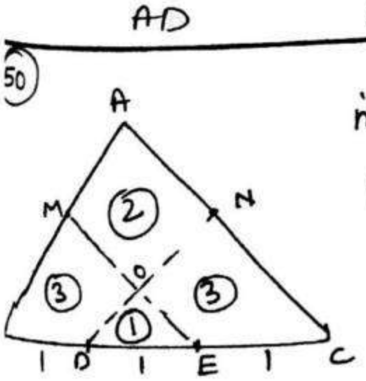
Area ΔADE : Area $\square BCED = 16:33$

$\frac{AD}{DB} = ?$

	ΔADE	ΔABC
Area	16	49
Side	4	7
	↓	↓
	AD	AB

$DB = 7 - 4 = 3$ $\quad \boxed{\frac{AD}{DB} = \frac{4}{3}}$

(50)

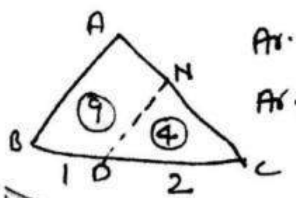


In ΔABC, D & E are two points on BC such that they trisect the line BC

$DN \parallel AB$

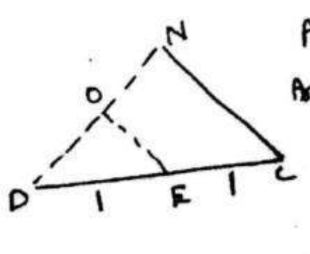
$EM \parallel AC$

$$\frac{\text{Area } \Delta ODE + \text{Area } \square AMON}{\text{Area } \Delta ABC} =$$



Ar. $\Delta ABC = 9$

Ar. $\Delta DNC = 4$



Ar $\Delta DNC = 4$

Ar $\Delta ODE = 1$

Ar $\Delta EMB = 4$

$\frac{1+2}{9} = \frac{1}{3}$

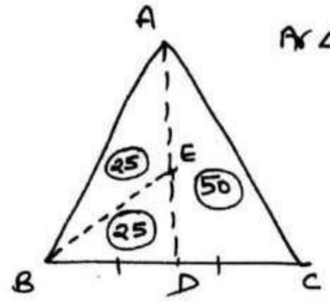
Ans

CLASS
52

#

(51) in ΔABC, D is the mid point of BC. And E is the mid point of line ~~AB~~ AD.

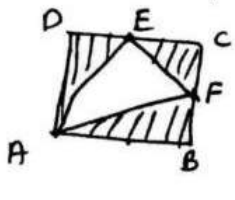
Ar. Δ ABE : Ar Δ ABC = ?

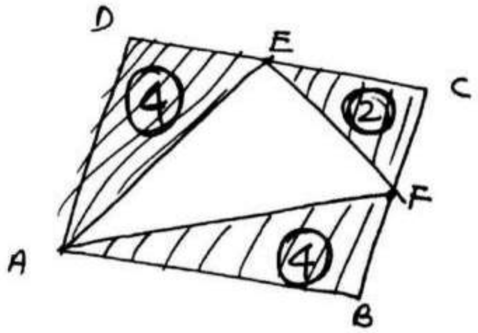


ArΔ ABC = 100 (let)

$$\frac{Ar.\Delta ABE}{Ar\Delta ABC} = \frac{25}{100} = \frac{1}{4}$$

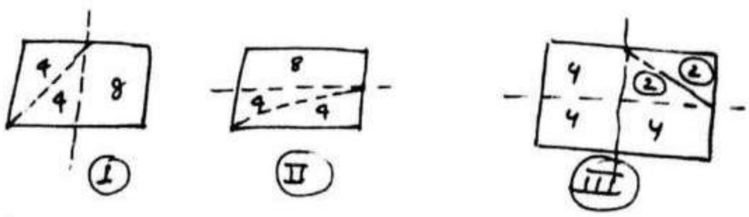
(52) ABCD is ||gm. E & F are mid point of DC & BC. find the ratio of area of shaded portion to the area of unshaded portion.





16 इसलिए लेते है क्योंकि बार-बार Half करना पड़ रहा है, so fraction ना बने।

Let area of $\square$ ABCD = 16

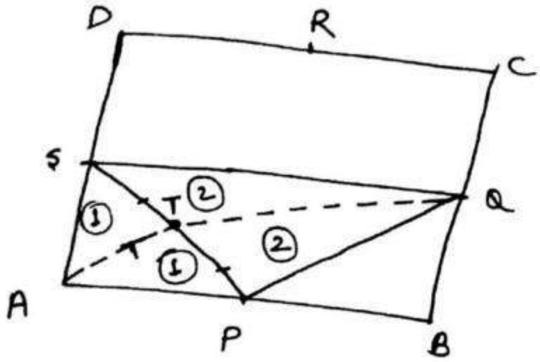


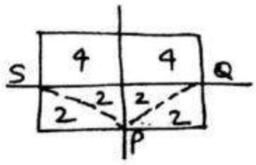
$$\frac{\text{Area shaded}}{\text{unshaded}} = \frac{\cancel{10}}{\cancel{6}} = \frac{5}{3}$$ Ans.

(53) A, B, C, D are the vertex of a ||gm. P, Q, R, S are the mid point of AB, BC, CD & DA. T is the mid point of line PS.

Area Δ ATS : Area Δ PTQ

let area $\square$ ABCD = 16



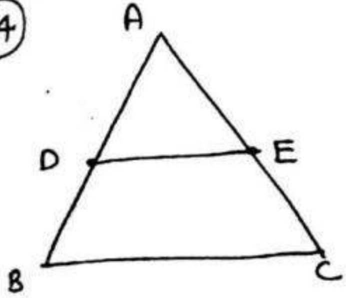


Ar Δ SPQ = 4

$$\frac{\text{Ar}\cdot\Delta ATS}{\text{Ar}\,\Delta PTQ} = \frac{1}{2}$$ Ans

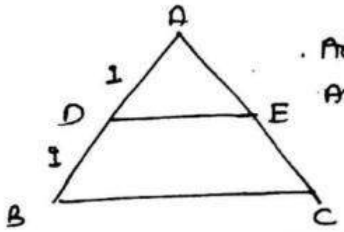
---

(54)



D & E are mid points.

find area ΔADE : Area Δ ABC

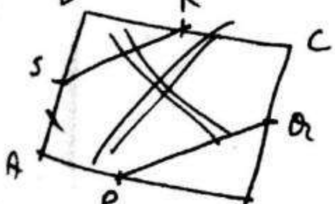


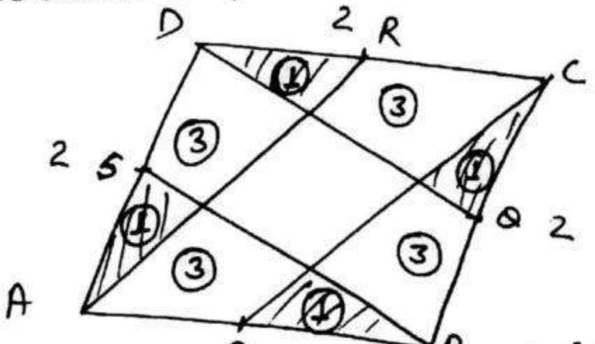
$$\frac{\text{Ar}\ \Delta ADE}{\text{Ar}\ \Delta ABC} = \frac{(1)^2}{(2)^2}$$

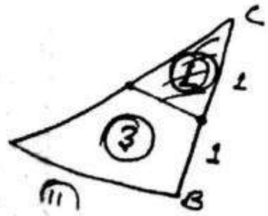
$$= \frac{1}{4}$$

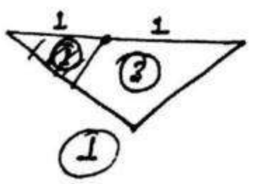
---

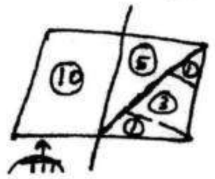
(55) A, B, C, D are the vertex of a ||gm. P, Q, R, S are the mid points of AB, BC, CD, DA. find the area of shaded portion : unshaded portion.











$\therefore$ Ar ABCD = 20

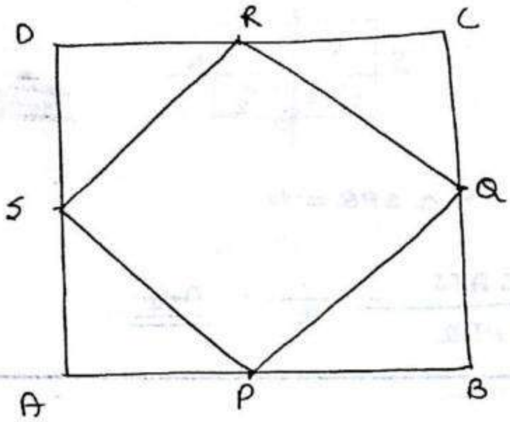
$$\frac{\text{Shaded}}{\text{unshaded}} = \frac{4}{16}$$

$= 1:4$

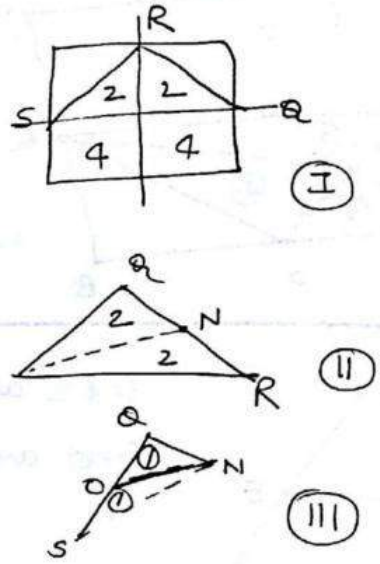
Ans

(56) A, B, C, D are the vertex of a ||gm. P, Q, R, S are the mid points of line AB, BC, CD & DA. M, N, O, E are the mid points of PQ, QR, RS & SP.

Area of Δ SON : Area of $\square$ ABCD

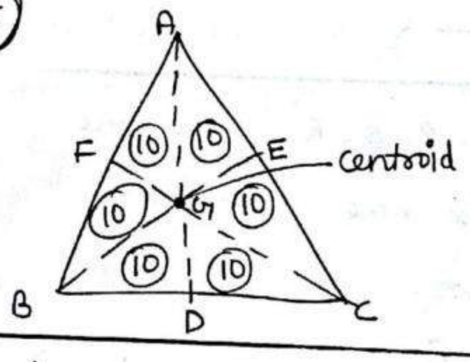


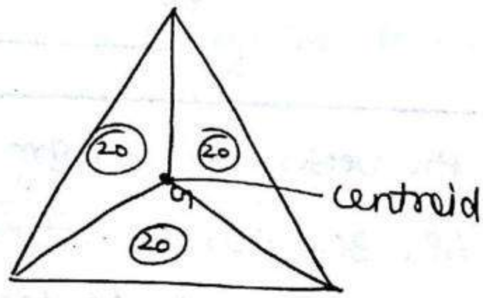
Area $\square$ ABCD = 16 (let)



$$\frac{\text{Ar } \Delta \text{ SON}}{\text{Ar } \square \text{ ABCD}} = \frac{1}{16}$$

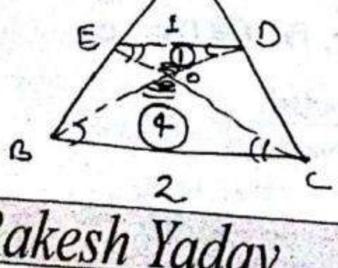
(#)

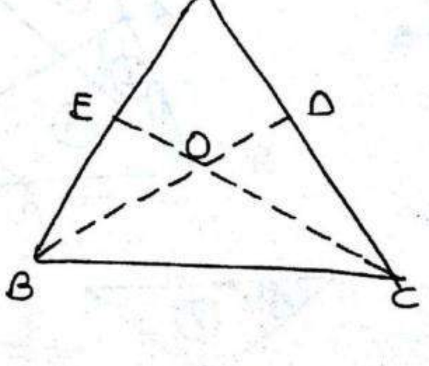




(57) In a Δ ABC BD & CE are two Medians, cut each other at point O.

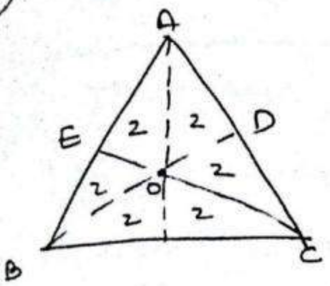
(A) Area Δ DOE : Area Δ BOC





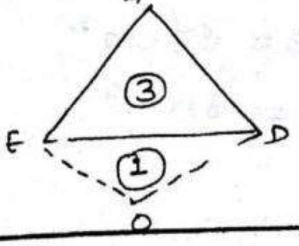
$$\frac{\text{Area } \Delta DOE}{\text{Area } \Delta ABC} = \frac{1}{4+4+4} = \frac{1}{12}$$

(B) Area Δ DOE : Area of Δ DOC



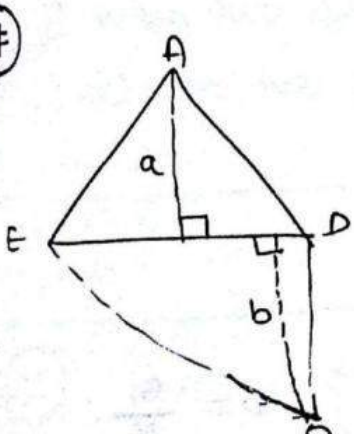
1 : 2

(C) Area ΔDOE : Area of Δ ADE.



$$\frac{\Delta DOE}{\Delta ADE} = \frac{1}{3}$$

(#)



$$\frac{Ar.\ \Delta AED}{Ar\ \Delta EOD} = \frac{\cancel{\frac{1}{2}} \times \cancel{ED} \times a}{\cancel{\frac{1}{2}} \times \cancel{ED} \times b} = \boxed{\frac{a}{b}}$$

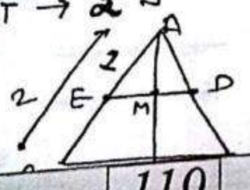
The ratio of area of two Δ's w/c are based on the same base is equal to the ratio of length of their altitudes drawn on the same base.

---

(58) In a Δ ABC, BD & CE are two medians w/c intersects each other on O. the line AO intersect the line ED at M. AM : MO = ?

$\because$ AO : OT = 2 : 1

$\left.\begin{array}{l} AO \to 4 \\ \therefore OT \to 2 \end{array}\right]$ let



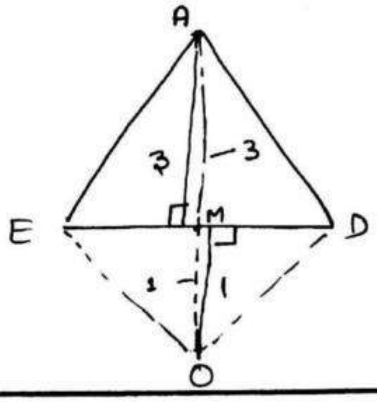
AT → 6

AM = 3

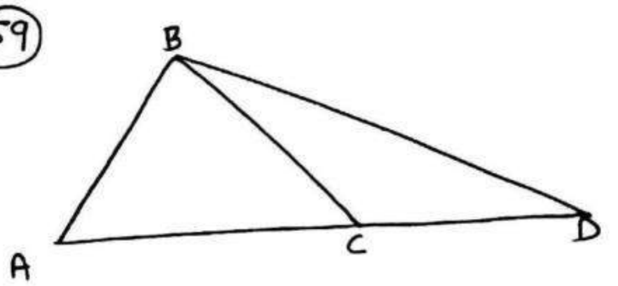
$\frac{AM}{MO} = \frac{3}{1}$ Ans

अगर दो Δ similar है तो उनकी sides

$$\therefore \frac{\text{Area } \Delta AED}{\text{Area } \Delta EOD} = \frac{3}{1}$$



59

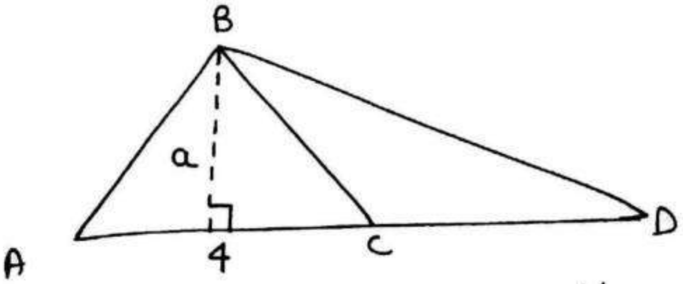


Area Δ ACB = 64 cm^2

Area Δ BCD = 81 cm^2

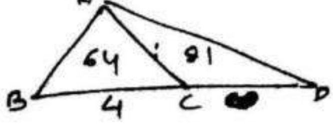
AC = 4

CD = ?



$$\frac{Ar\ \Delta ABC}{Ar\ \Delta BCD} = \frac{\cancel{\frac{1}{2}} \times AC \times \cancel{a}}{\cancel{\frac{1}{2}} \times CD \times \cancel{a}} \Rightarrow \frac{\overset{16}{\cancel{64}}}{81} = \frac{4}{CD} \qquad CD = \frac{81}{16}$$

If two Δ's have a common vertex and are based on a same straight line, have the area in the ratio as the length of their bases.



~~4 → 64~~

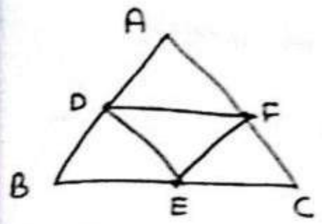
~~1 → 16~~

64 → 4

1 —— $\frac{1}{16}$

81 —— $\frac{81}{16}$

(#)



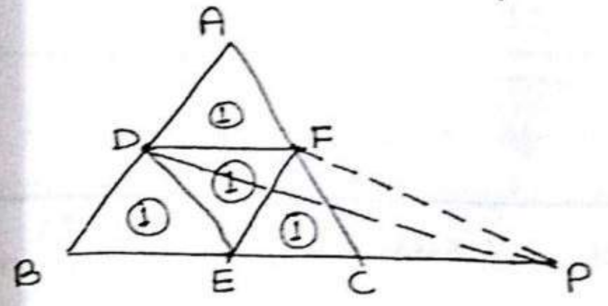
Ar. ΔDEF : Area ΔABC

1 : 4

D, E, F are mid points.

---

(60) In Δ ABC, the Length BC extended to point P.
D, F are the mid points of line AB & AC.
Ar Δ DFP : Ar Δ ABC = ?



1 : 4

Ar Δ DFE = Ar Δ DFP

$\therefore$ Ar Δ DFP = 1

Ar Δ ABC = 4

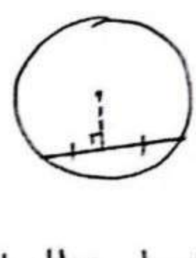
$\therefore$ ArΔDFP : ArΔABC = 1:4

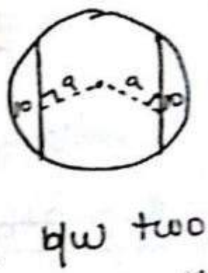
(#) When two Δ's have the same base and are present between two parallel lines, then their area will be same.

CLASS 53

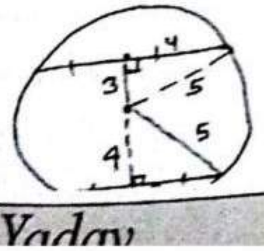
CIRCLE

(#)

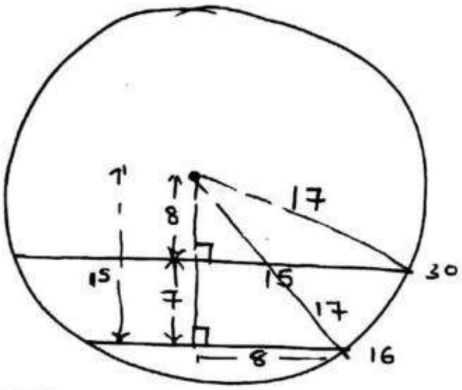




(61) find the $\perp$ distance b/w two parallel chords of length 6 cm and 8 cm w/c are on the opposite direction on the centre of circle of radius 5 cm.



(62) find the ⊥ distance b/w two ∥ chords of length 16 cm and 30 cm w/c are on the same side of the centre of the circle of radius 17 cm.



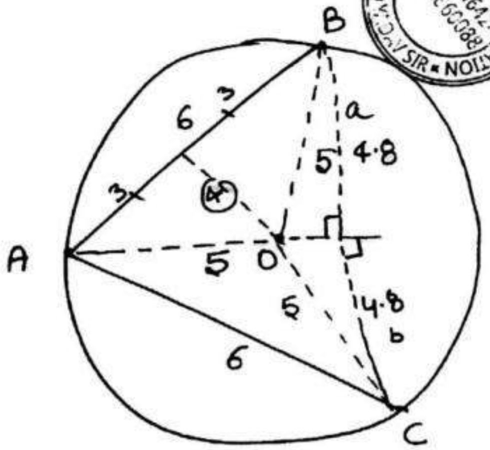
7 cm Ans

3) AB and AC are two chords of a circle of radius 5 cm

AB = AC = 6 cm

$r = 5$ cm

BC = ?



$BC = 4.8 + 4.8 = 9.6$

Δ AOB = obtuse isosceles Δ

Ar Δ AOB =

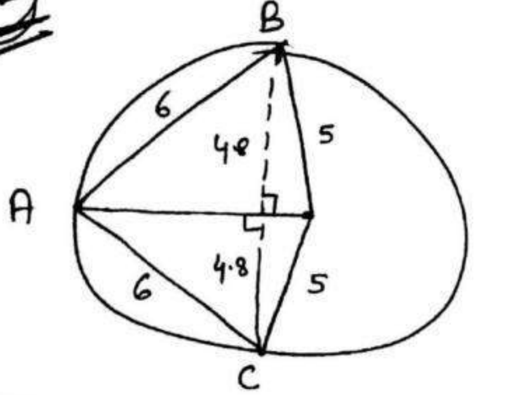
$\frac{1}{2} \times 6 \times 4 = \frac{1}{2} \times 5 \times a$

$\boxed{a = 4.8}$

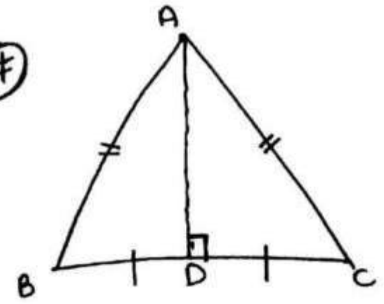
similarly $\boxed{b = 4.8}$

$BC = a+b = 9.6$

OR



Δ obtuse या acute कैसी भी बन सकती है।



In an isosceles Δ, if a $\perp$ is drawn from the common vertex of two equal sides on the opposite side, then it will bisect the opposite side.

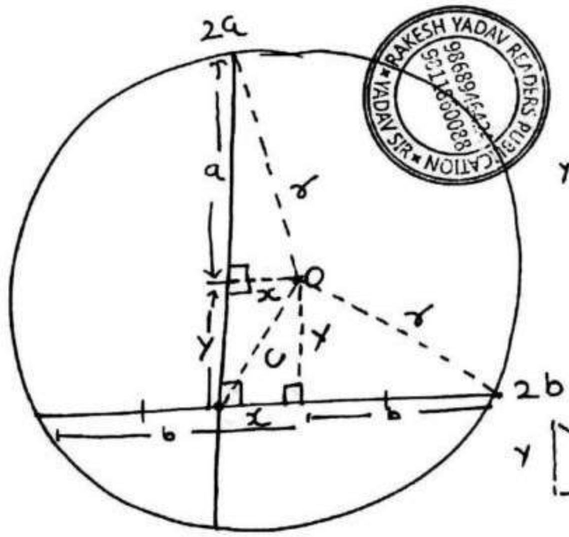
$AB = AC$ (common vertex = A)

$AD \perp BC$

$\therefore$ $\boxed{BD = DC}$

---

(64) 2a, 2b are the length of two chords w/c intersects each other at right angle. find the radius of the circle and the distance from their intersecting point to the centre of circle is c, c < radius.



$a, r \rightarrow x^2 = r^2 - a^2$

$x, y, c \rightarrow y^2 = c^2 - x^2$

$y^2 = c^2 - (r^2 - a^2)$

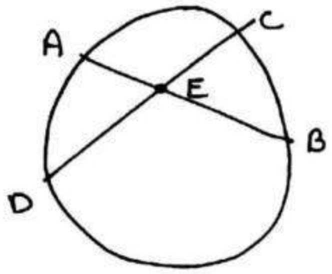
$\boxed{y^2 = c^2 - r^2 + a^2}$

$y, b, r \rightarrow r^2 = y^2 + b^2$

$r^2 = c^2 - r^2 + a^2 + b^2$

$r^2 = \dfrac{a^2 + b^2 + c^2}{2}$

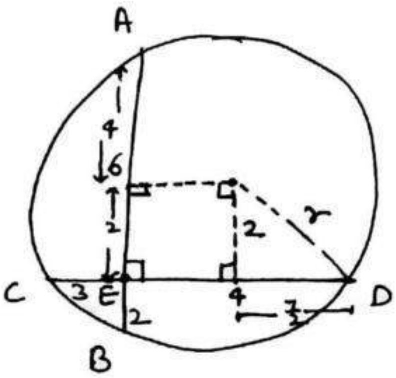
$r = \sqrt{\dfrac{a^2 + b^2 + c^2}{2}}$



$AE \times EB = CE \times ED$

65) AB and CD are two chords of a circle w/c intersects each other at right angle at E

$AE = 6$, $EB = 2$, $CE = 3$, $r = ?$



$6 \times 2 = 3 \times ED$

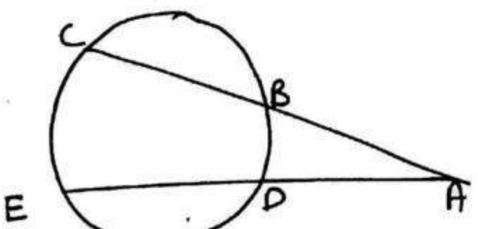
$ED = 4$

$r^2 = 4 + \frac{49}{4}$

$r^2 = \frac{16+49}{4}$

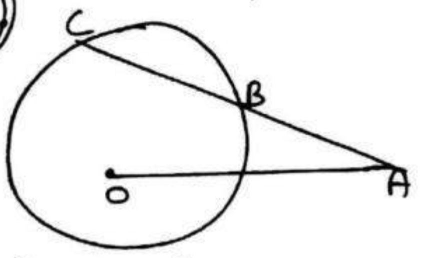
$r^2 = \frac{65}{4}$

$r = \frac{\sqrt{65}}{2}$



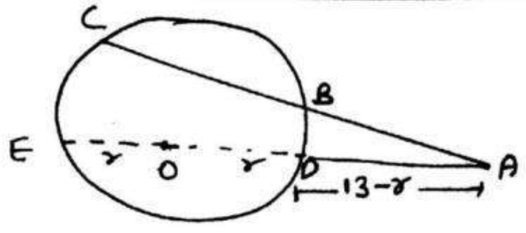
$\boxed{AB \times AC = AD \times AE}$

66)



$AB = 9$, $BC = 7$

$AO = 13$, $r = ?$



$AD = 13 - r$

$AE = 13 + r$

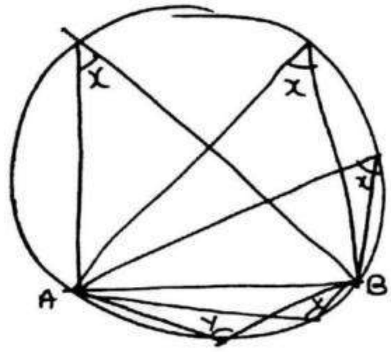
$9 \times 16 = (13-r)(13+r)$

$144 = 169 - r^2$

$25 = r^2$

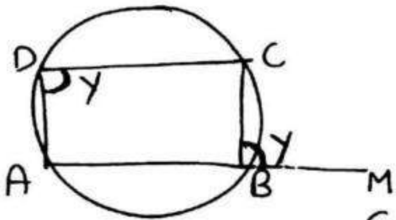
$\boxed{r = 5}$

#



angle made by the same chord on the same side of the circle are equal.

#



cyclic Quadrilateral

$A + C = 180$

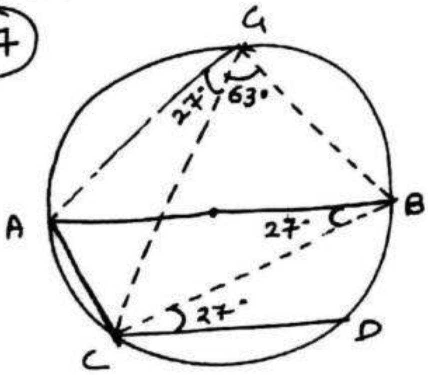
$B + D = 180°$

External angle is equal to opposite internal angle.

$\boxed{\angle CBM = \angle CDA = Y}$

---

(67)



$AB \parallel CD$

$\angle BCD = ?$

$AB \rightarrow$ diameter

angle made by diameter $= 90°$

$90 - 63° = 27°$

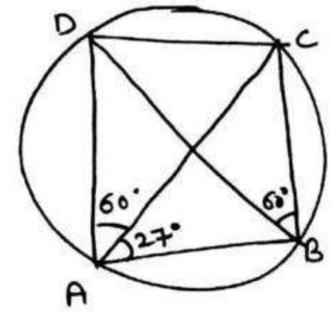
angle made by same chord AC

$\therefore \angle ABC = 27°$

$AB \parallel CD$

$\therefore \angle BCD = 27°$

(68) $\angle BCD = ?$



$\angle DBC = \angle DAC = 60°$ (angle made by same chord DC)

$A + C = 180°$

$87 + C = 180°$

$\boxed{C = 93°}$

---

(69) In a Δ ABC, the angle bisector of angle A, B & C intersect the circumcircle at D, E & F.

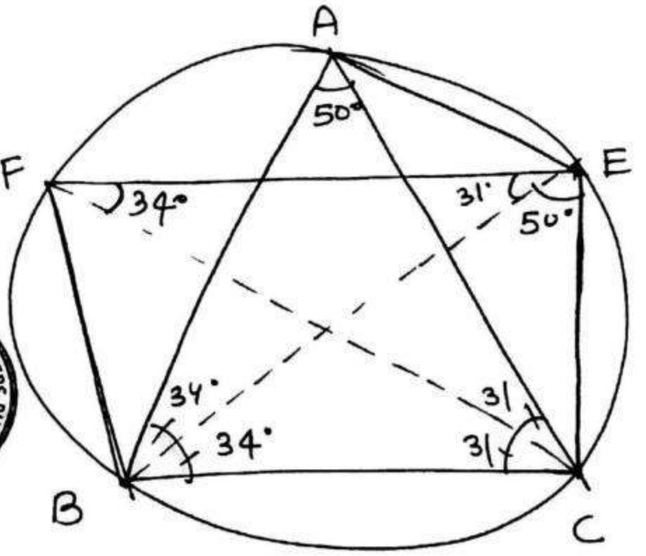
$\angle A = 50°$

$\angle EFC = 34°$

$\angle FEB = ?$

$\angle FEC = ?$

$\angle AEC = ?$



$\angle EFC = \angle EBC = 34°$ (Angle made by same chord EC)

$\angle B + \angle E = 180°$

$68° + \angle E = 180°$

$\therefore \boxed{\angle FEC = 112°}$

$\angle C = 62°$ $(\because \angle A = 50, \angle B = 68°)$

$\angle FEB = \angle FCB = 31°$ (Angle made by same chord FB)

$\angle BAC = \angle BEC = 50°$ (" " " " " BC)

CLASS
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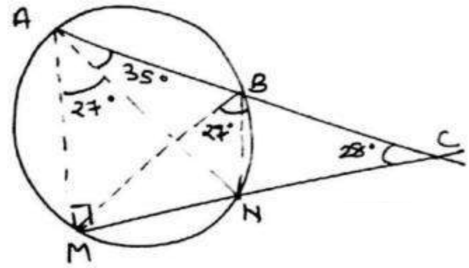
(70) ~~A, B, C and M~~ ABC & MNC are two secants of a circle cut at point C outside circle. AN is the diameter of the circle

$\angle C = 28^\circ$
$\angle NAB = 35^\circ$
$\angle MBN = ?$



AN → diameter

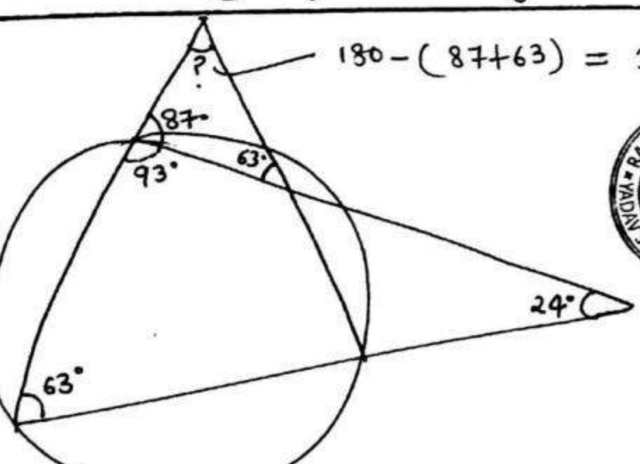
$\angle AMC = 90^\circ$ (angle in the Half circle)

$\angle MAN = 180^\circ - (90 + 28 + 35^\circ) = 27^\circ$

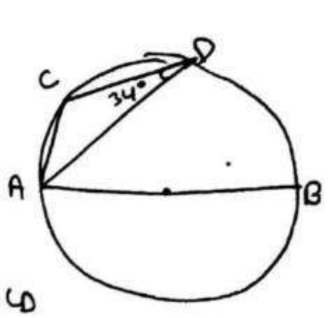
$\angle MBN = 27^\circ$ (Angle made by the same chord MN).

(71)

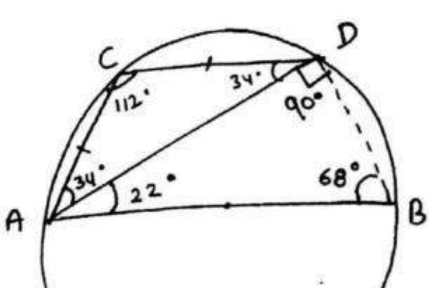
$180 - (87 + 63) = 30^\circ$



(72)



CA = CD
$\angle DAB = ?$



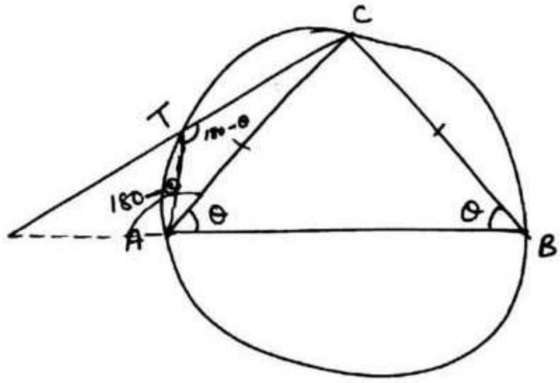
(73) AC & BC are the length of two chords, the line BA is produced to any point P & when line CP is joined it cuts the circle at T.

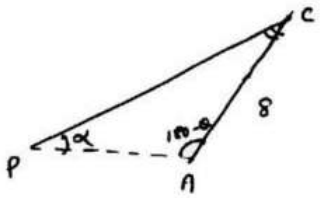
AC = BC

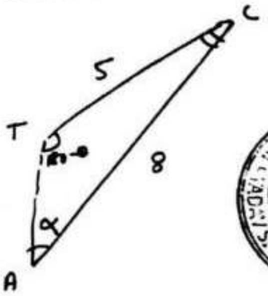
CP = ?

CT = 5

BC = 8







$\frac{CP}{8}$

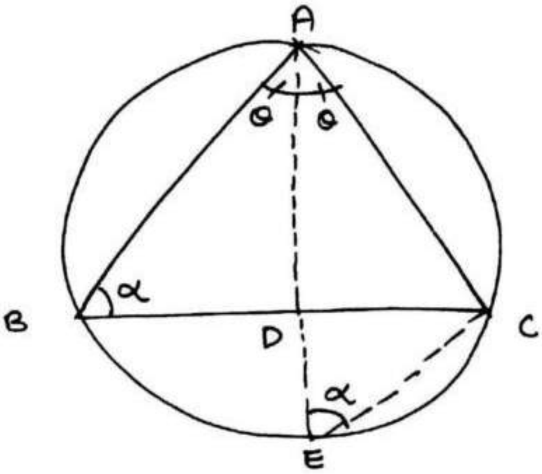
$\therefore$ $\boxed{CP = \frac{64}{5} = 12.8}$

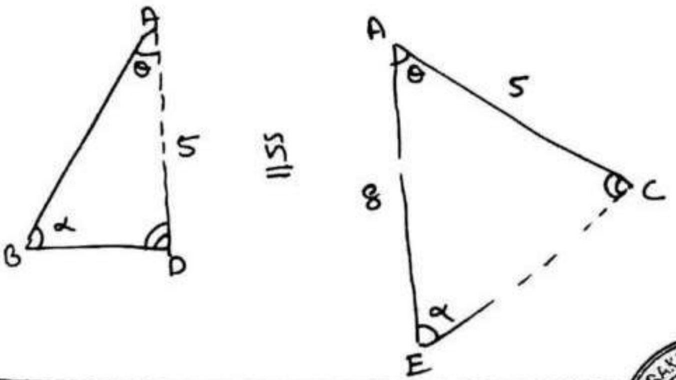
(74)

a circle of centre O. BOC is a ... from a point D on the circle producing at C.

(73) The bisector of angle ∠A of a Δ ABC cuts BC at and the circumcircle of the Δ at E.

DE = 3
AC = 4
AD = 5
AB = ?

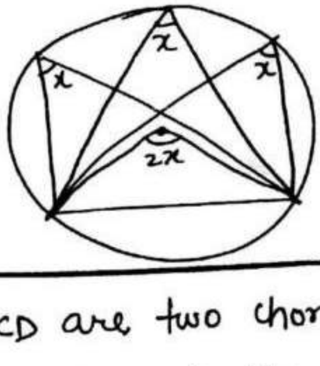




$$\frac{AB}{\cancel{8}_2} = \frac{5}{4}$$

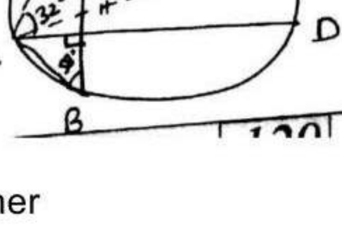
$\boxed{AB = 10}$

#



(76) AB & CD are two chords of a circle w/c intersects each other at 90°. O is the centre of the circle.

∠CAO = 32°
∠BCD = ?

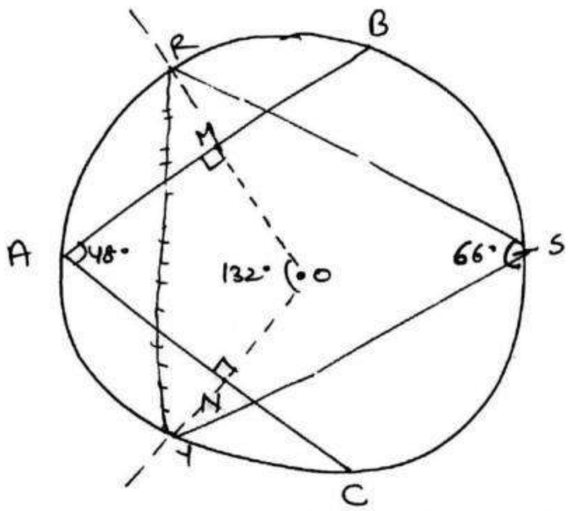


∠CBA = 58°
(Half of the angle made by the same chord AC at centre)
∠BCD = 180 − (90 + 58°)

(77) AB & AC are two chords of a circle of centre O M & N are their mid points. The line OM and ON are extended w/c intersects the circumcircle at R & Y. S is a point on Major arc RY

$\angle A = 48^\circ$

$\angle RSY$.



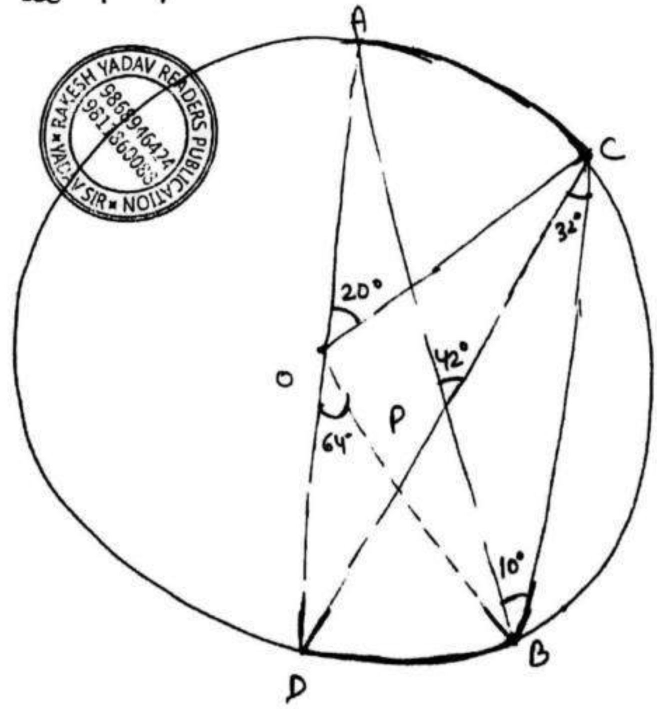
$\angle RSY = 66^\circ$

(78) AB & CD are two chords of a circle w/c intersects each other at P.

$\angle AOC = 20^\circ$

$\angle APC = 42^\circ$

$\angle BOD = ?$



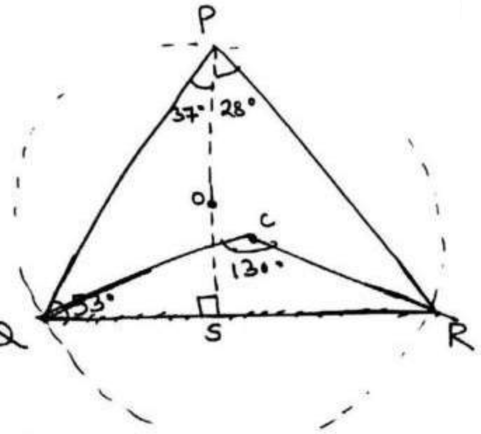
$\angle BOD = 64^\circ$

(79) O and C are respectively orthocentre & circumcentre of an acute angle Δ PQR. The point P and O are joined and produced to meet the side QR at S

$\angle QCR = 130°$

$\angle RPS = ?$

$\angle PQS = 53°$



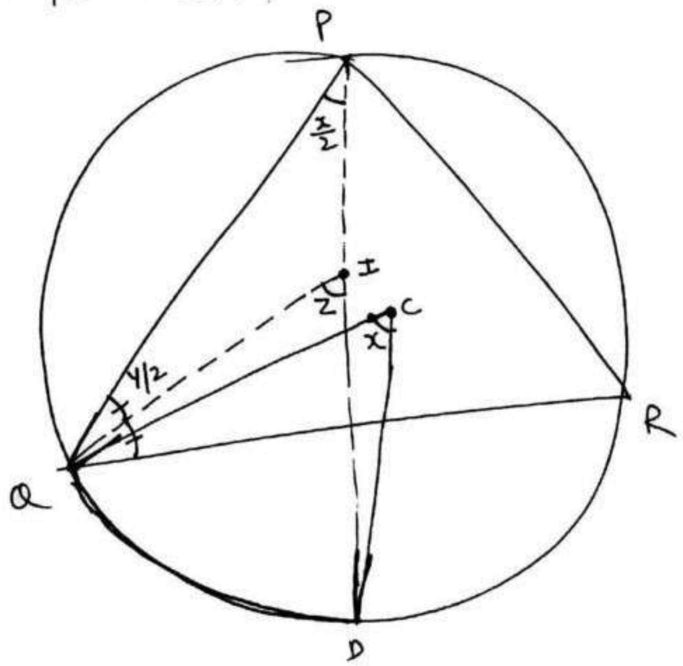
(80) In a Δ PQR, I & C are resp. incentre & circumcentre of the Δ. The line PI is extended w/c intersect the circumcircle at point D.

$\angle QCD = x°$

$\angle PQR = y°$

$\angle QID = z°$

$\frac{5x+5y}{3z} = ?$

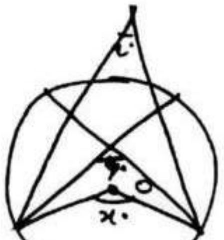


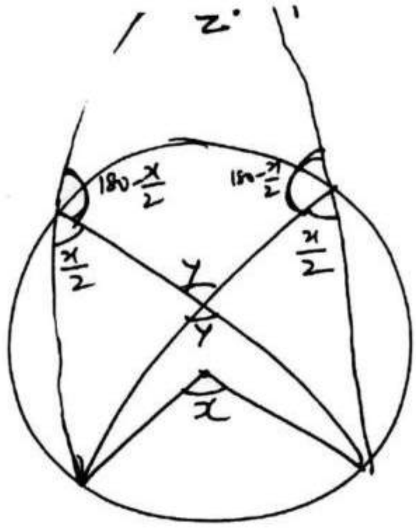
$z = \frac{x}{2} + \frac{y}{2}$

$\boxed{2z = x+y}$

$\frac{5x+5y}{3z} = \frac{5(x+y)}{3z} = \frac{5\times 2z}{3z} = \frac{10}{3}$ Ans

(81)





$\frac{4y+4z}{3x}$

$y+z+180-\frac{x}{2}+180-\frac{x}{2} = 360°$

$y+z-x = 0$

$\boxed{y+z=x}$

$\frac{4(y+z)}{3x}$

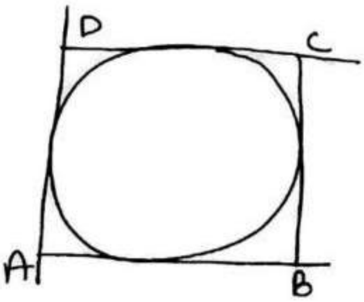
$\frac{4x}{3x}$

$= \frac{4}{3}$ Ans.

CLASS

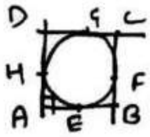
55.

(#)



$\boxed{AB+DC = AD+BC}$

(82)

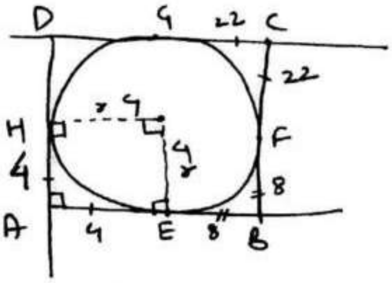


$CG = 22$

$BC = 30$

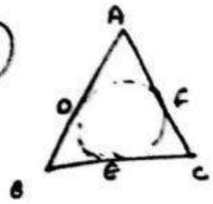
$AB = 12$

$r = ?$

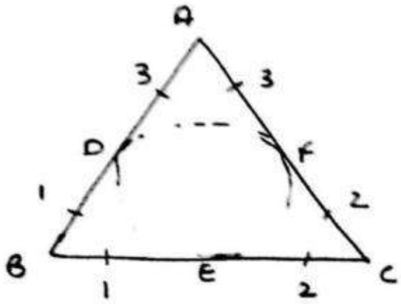


$r = 4$ Ans

(85)



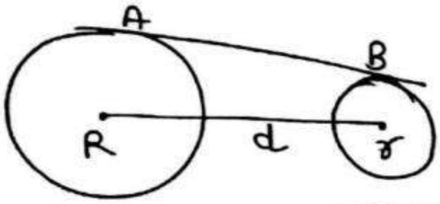
BE = 1 what type of Δ it is
CF = 2
AD = 3



sides of Δ = 3, 4, 5
so: ABC is right angle Δ.

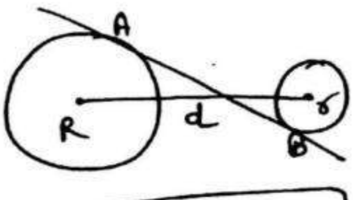
TANGENTS

#



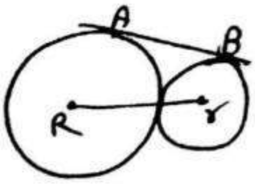
$$\boxed{DCT\ (AB) = \sqrt{d^2 - (R-r)^2}}$$

#



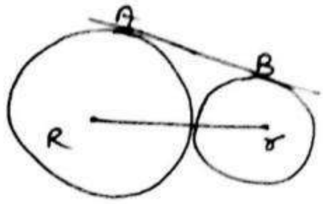
$$\boxed{T.C.T = AB = \sqrt{d^2 - (R+r)^2}}$$

#



$$\boxed{AB = 2\sqrt{Rr}}$$

(84) find the area of ... common direct ~~an~~ tangent of two circle of radius 9cm and 4 cm touch each other externally.

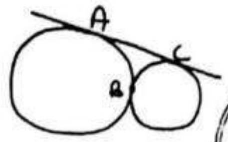


$AB = 2\sqrt{9 \times 4} = 12$

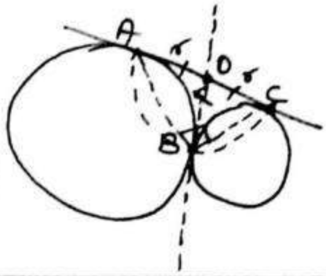
Area of square of side AB $= 12^2 = 144\,cm^2$.

---

(85)



$\angle ABC = ?$



$\angle B = 90^\circ$

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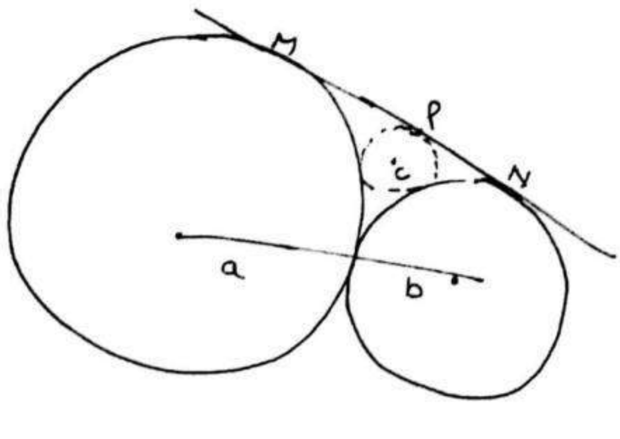
(86) Two circle of radius a cm and b cm touch each externally. Another circle of radius c touch both these circles externally & also touch their direct common tangent. find the relation b/w A, B and C



MN	MP	PN
$2\sqrt{ab}$	$2\sqrt{ac}$	$2\sqrt{bc}$

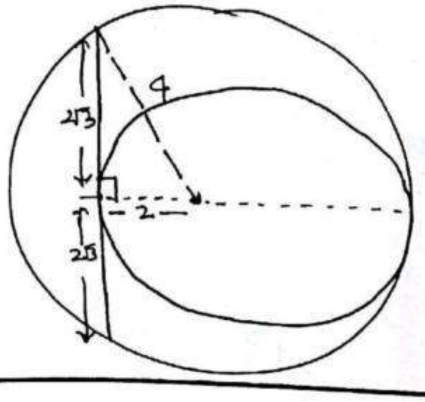
$MN = MP + PN$

$2\sqrt{ab} = 2\sqrt{ac} + 2\sqrt{bc}$

$$\frac{2\sqrt{ab}}{2\sqrt{abc}} = \frac{2\sqrt{ac}}{2\sqrt{abc}} + \frac{2\sqrt{bc}}{2\sqrt{abc}}$$

$$\boxed{\frac{1}{\sqrt{c}} = \frac{1}{\sqrt{b}} + \frac{1}{\sqrt{a}}}$$

(87) Two circle of radius 4 cm & 3 cm touch each other internally. find the length of largest chord of the larger circle w/c is just outside the smaller circle.



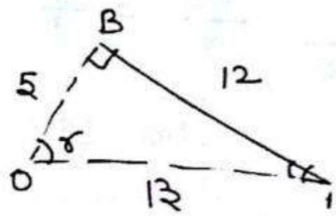
$$\sqrt{4^2 - 2^2} = \sqrt{12} = 2\sqrt{3}$$

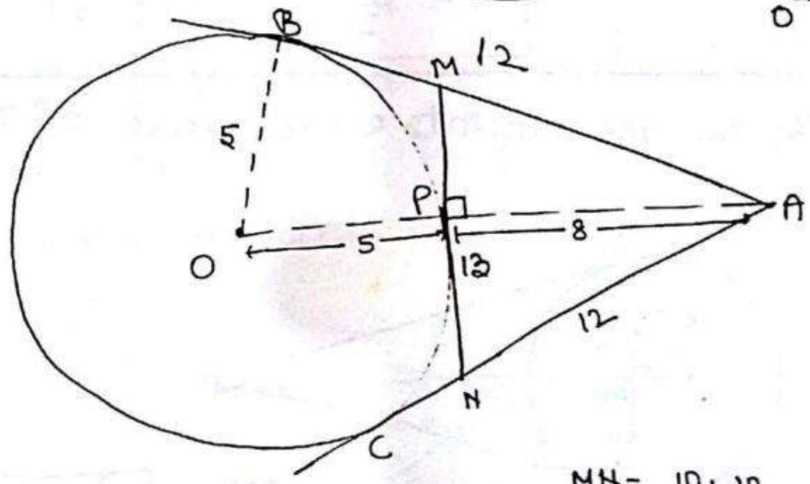
$$2\sqrt{3} + 2\sqrt{3} = 4\sqrt{3} \quad \underline{\text{Ans}}$$

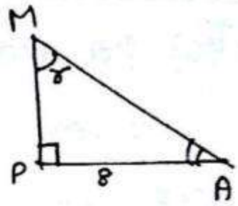
---

(88) ~~Two~~ AB and AC are the length of two tangents on a circle of radius 5 cm. find the length (minimum) of another tangent w/c intersects AB and AC at M & N.

$MN = ?$
$r = 5$
$AB = 12$







$$\frac{MP}{5} = \frac{8}{12}$$

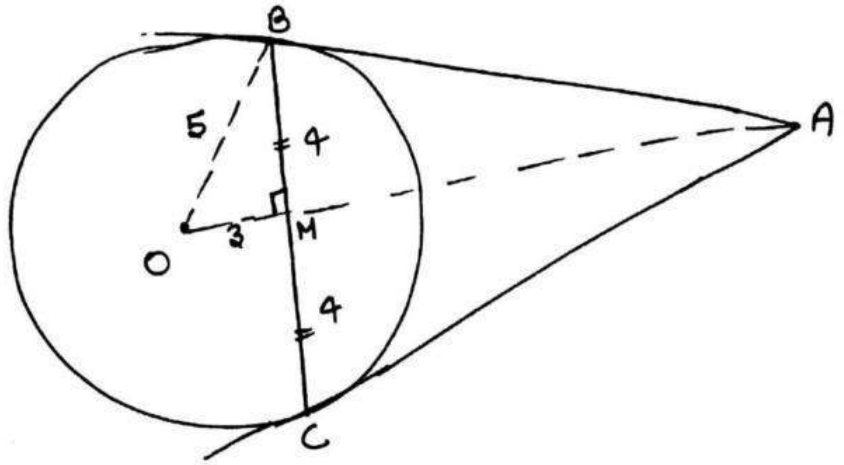
$$MP = \frac{10}{3}$$

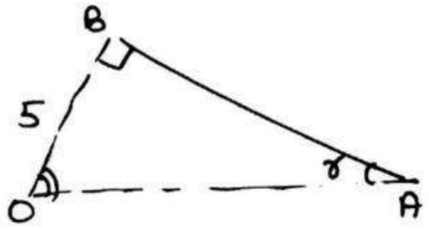
$$MN = \frac{10}{3} + \frac{10}{3} = \frac{20}{3}$$

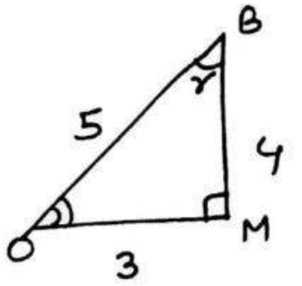
---

(89) AB & AC are two tangents of circle of radius 5 cm.

$r = 5$ cm
$AB = ?$
$AO = ?$
$BC = 8$







$$\frac{AB}{4} = \frac{5}{3}$$

$$\boxed{AB = \frac{20}{3}}$$

$$\frac{OA}{5} = \frac{5}{3}$$

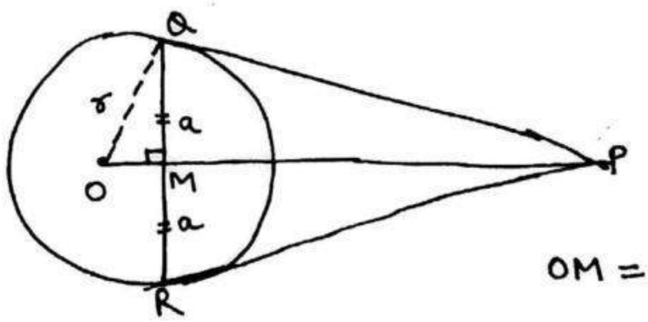
$$\boxed{OA = \frac{25}{3}}$$

---

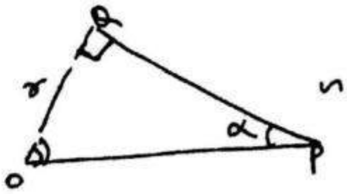
(90) PQ and PR are the tangents of a circle of radius r cm

$QR = 2a$

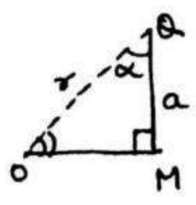
$PQ = ?$



$OM = \sqrt{r^2 - a^2}$



$\sim$



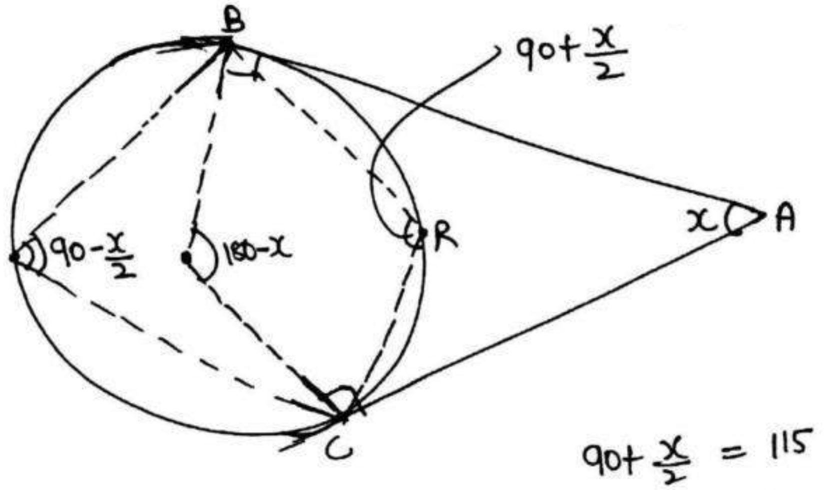
$$\frac{PQ}{a} = \frac{r}{\sqrt{r^2 - a^2}}$$

$$\boxed{PQ = \frac{ar}{\sqrt{r^2 - a^2}}}$$ **Ans.**

(91) AB and AC are two tangents of a circle. r is a point on minor arc BC

$\angle BRC = 115°$

$\angle A = ?$



$\angle BRC = 90 + \frac{x}{2}$

$90 + \frac{x}{2} = 115$

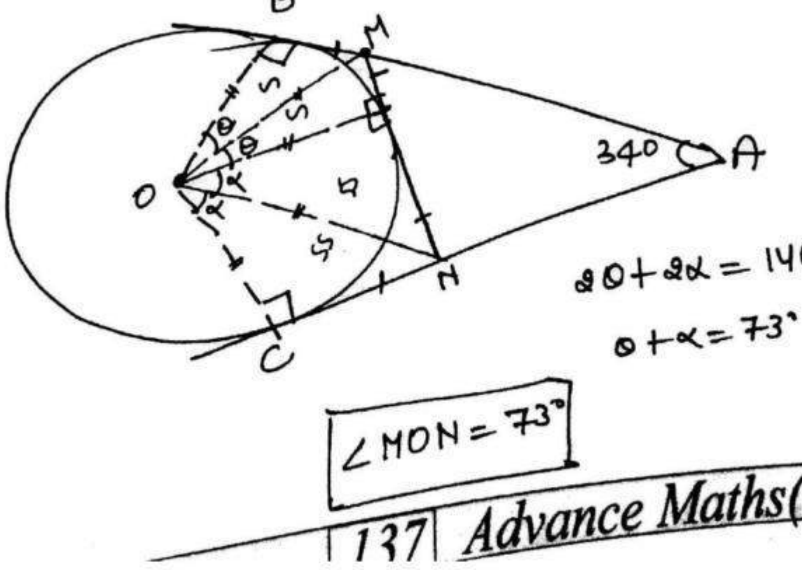
$\frac{x}{2} = 25$

$\boxed{x = 50°}$

(92) AB and AC are two tangents of a circle. O is the centre of the circle. MN is a tangent on the circle w/e of the circle. MN is a tangent on the circle w/e intersects AB & AC at M & N. The tangent MN does not touch the circle at the point where the line OA intersect the circle.

$\angle A = 34°$

$\angle MON = ?$

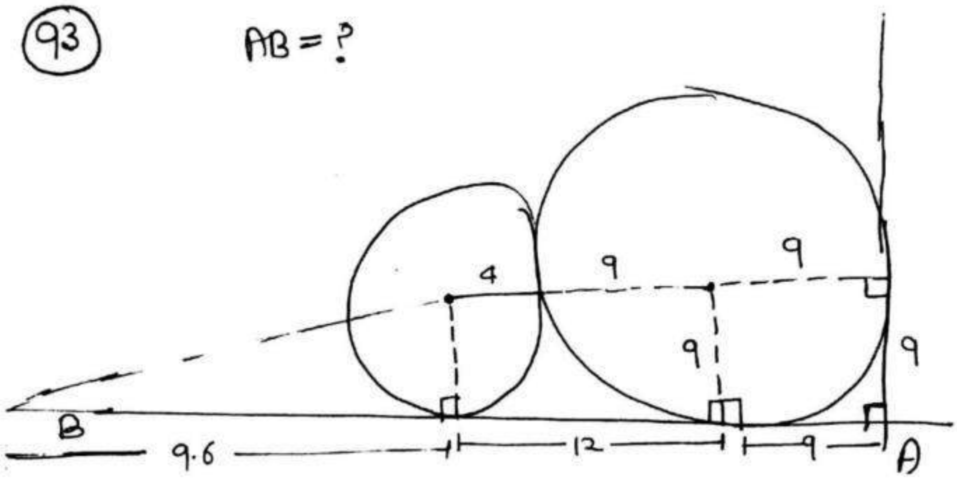


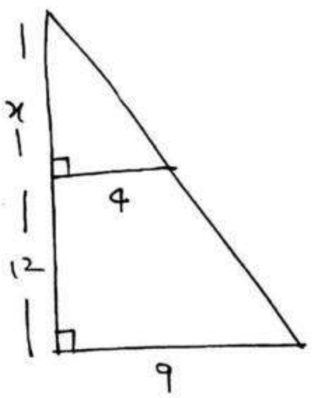
$2\theta + 2\alpha = 146°$

$\theta + \alpha = 73°$

$\boxed{\angle MON = 73°}$

(93) AB = ?





$$\frac{x}{x+12} = \frac{4}{9}$$

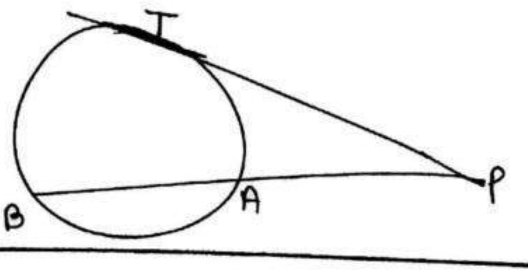
$$9x = 4x + 48$$

$$5x = 48$$

$$\boxed{x = \frac{48}{5}} = \underline{9.6 \text{ cm}}$$

$$AB = 9.6 + 12 + 9 = \underline{30.6} \text{ cm}$$

(#)

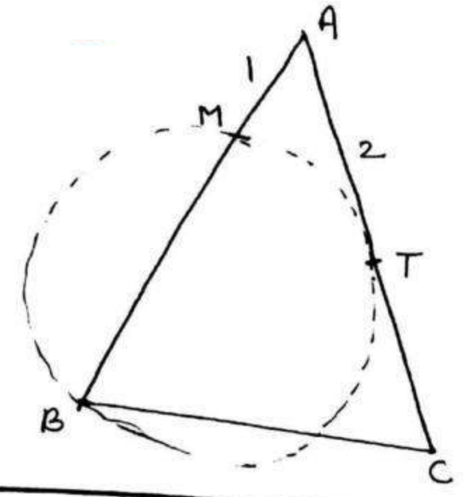


$$\boxed{PT^2 = PA \times PB}$$

---

(94) In a isosceles Δ ABC a circle go through from vertex B and touches the mid point of line AC and interest the line AB at M.

$AB = AC$ $\quad\quad$ $AM : MB = ?$



$AB = AC = 4$ (Ans)

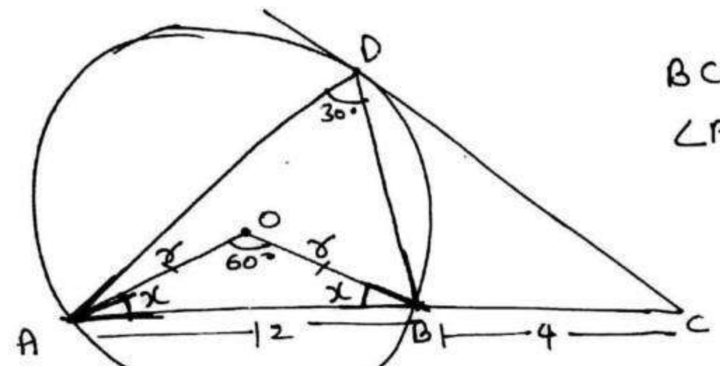
$AT^2 = AM \times AB$

$AM = 1$

$AM : MB$

$1 : 3$

(95)



$BC = 4$

$\angle ADB = 30°$

$r = 12$

$CD = ?$

$x + x + 60 = 180$

$\boxed{x = 60°}$ AOB is equilateral.

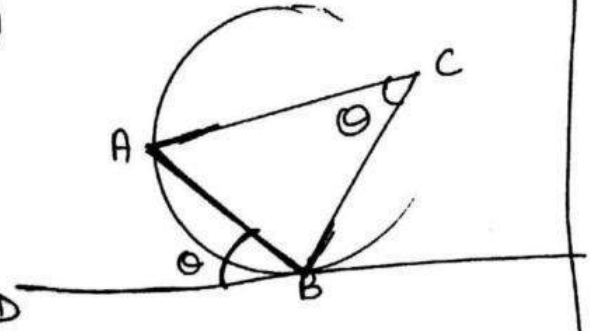
$CD^2 = CB \times CA$

$CD^2 = 4 \times 16 = 64$

$CD = \sqrt{64}$

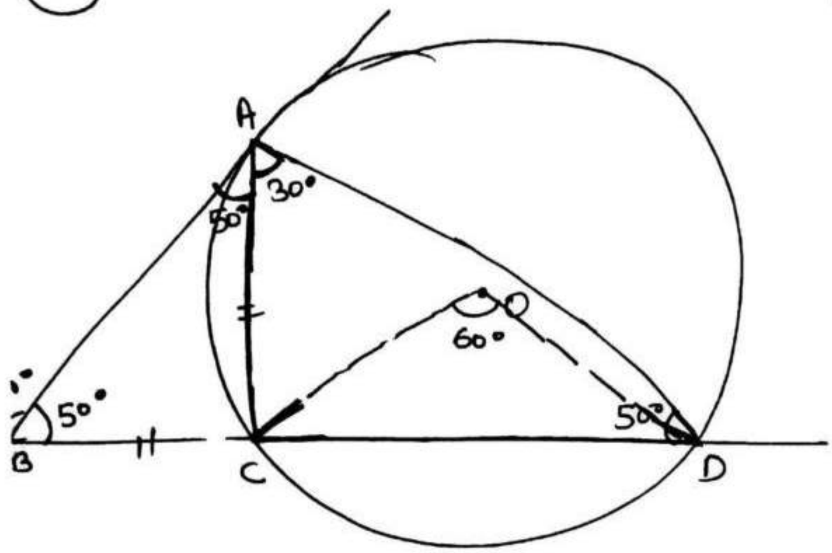
$\boxed{CD = 8 \text{ cm}}$

(#)



if angle θ is made from chord AB and tangent BD then the angle made by the chord AB in any part of the circle will be equal to θ.

(96)



BC = CA

$\angle COD = ?$

$\triangle ABD$

$\angle B = 50$, $\angle D = 50$

$\angle BAC = 50°$

$\therefore \angle CAD = 30°$

---

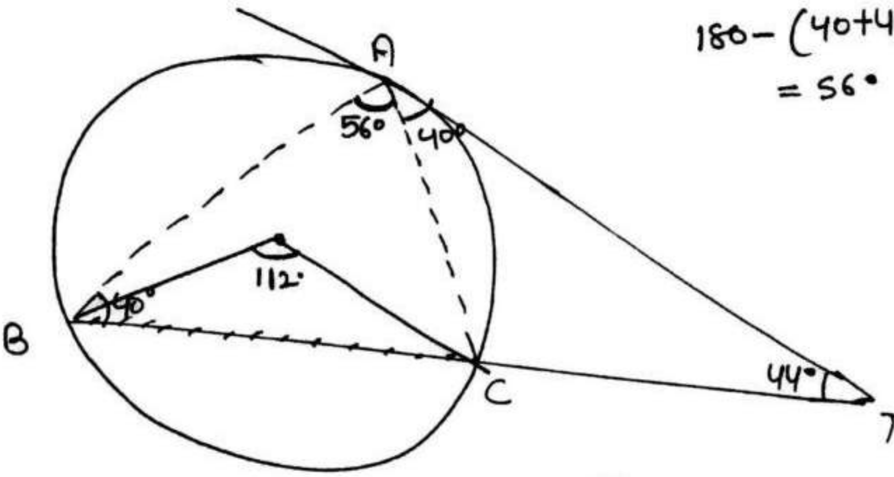
(97) A, B, C are three points on a circle. A tangent touches the circle at A and intersect the extended part of line BC at T. find the central angle made by chord BC.

$\angle ATC = 44°$

$\angle CAT = 40°$

$180 - (40 + 44 + 40)$

$= 56°$



$\underline{\angle BOC = 112°}$

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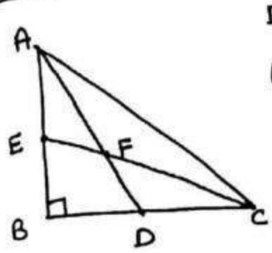
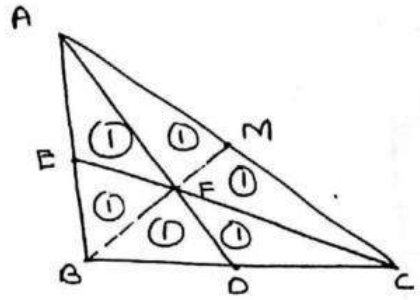
CLASS 56

(98) 

D is the mid point of BC

E is the mid point of AB

find Ar. Δ AFC : Ar $\square$ BDFE.



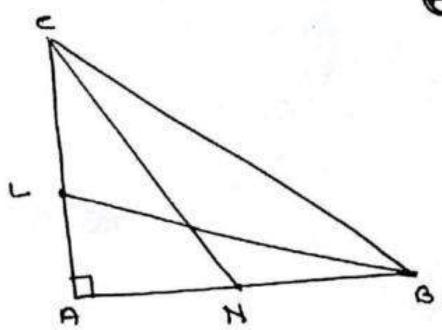
$$\frac{2}{2} = 1:1$$

(99) In a Δ ABC, $\angle A = 90^\circ$, BL and CN are two medians

$BC = 5$

$BL = \frac{3\sqrt{5}}{2}$

$CN = ?$



$\boxed{4(BL^2 + CN^2) = 5(BC)^2}$

$$4\left(\left(\frac{3\sqrt{5}}{2}\right)^2 + (CN)^2\right) = 5 \times 25$$

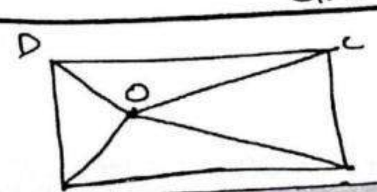
$$4\left(\frac{45}{4} + CN^2\right) = 125$$

$$45 + 4\,CN^2 = 125$$

$$4\,CN^2 = 80$$

$$CN^2 = 20$$

$$CN = 2\sqrt{5}$$

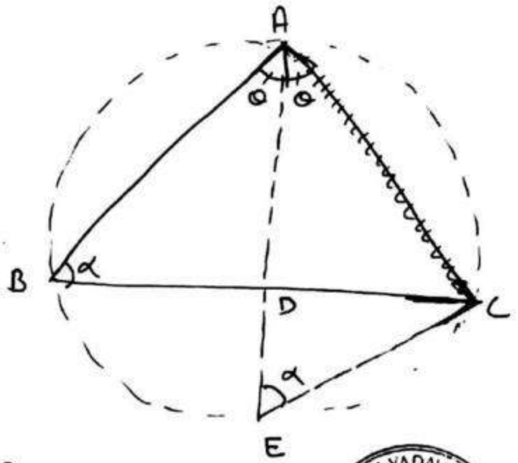


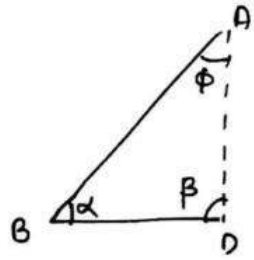
$\boxed{OD^2 + OB^2 = OA^2 + OC^2}$

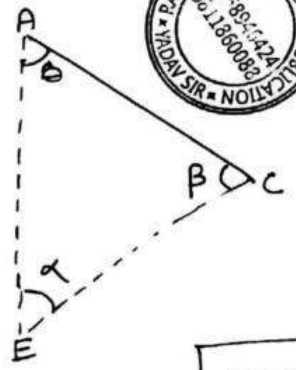
(100) The bisector of $\angle A$ of a Δ ABC

imp intersect the side BC at D and meets the circumcircle of the Δ ABC at E.

$AB \times AC + DE \times AE = ?$





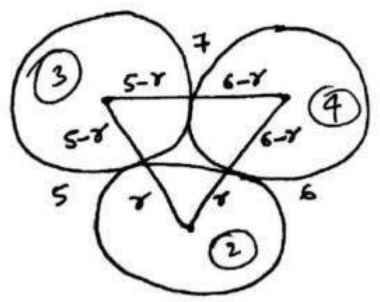


$$\frac{AB}{AE} = \frac{AD}{AC}$$

$$AB \times AC = (AE - DE) \times AE$$
$$= AE^2 - AE \times DE$$

$$\boxed{AB \times AC + AE \times DE = AE^2}$$ Ans.

(101) Three circle ~~of radius~~ touch each other externally and the distance b/w their centres is 5cm, 6cm & 7 cm. find the radius of all the centres.



$5 - r + 6 - r = 7$

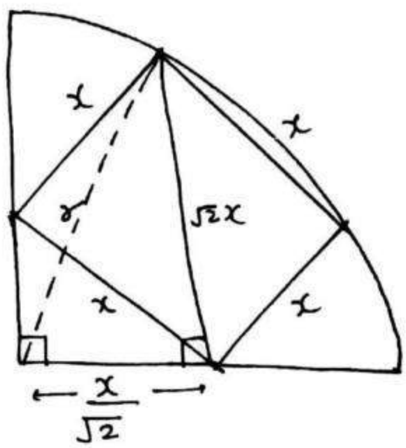
$-2r = -4$

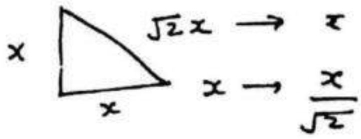
$\boxed{r = 2}$

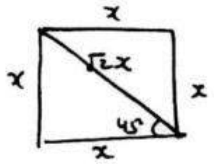
$6 - 2 = 4$

$5 - 2 = 3$

(102) A square is inscribed in a quarter circle in such a manner that ~~to~~ 2 vertex at equal distance from center while the other 2 vertices lies on the circular arc. If the square has side of the length x cm. find the radius of the circle.







$$r^2 = \frac{x^2}{2} + 2x^2$$

$$r^2 = \frac{5x^2}{2}$$

$$\boxed{r = \sqrt{\frac{5}{2}}\,x}$$

(103) In a ΔABC, D & E are two points on AC & BC

DE = 18

CE = 5

$\angle DEC = 90^\circ$

$\tan \angle ABC = 3.6$

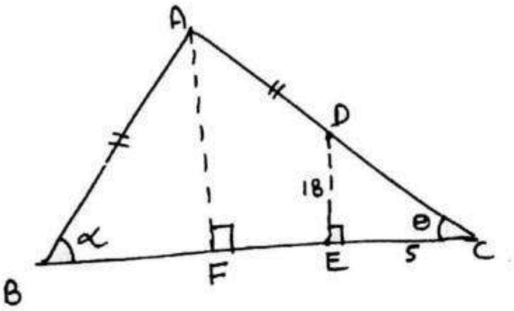
AC : CD = ?

(A) BC : 2CE

(B) 2CE : BC

(C) 2BC : CE

(D) CE : 2BC



$$\tan\theta = \frac{P}{B} = \frac{18}{5} = 3.6$$

$$\tan\alpha = 3.6$$

$$\tan\theta = \tan\alpha \Rightarrow \boxed{\theta = \alpha}$$

$\therefore AB = AC$

$BF = FC$

$FC = \frac{BC}{2}$

$\Delta AFC \sim \Delta DEC$

$$\frac{CD}{CA} = \frac{CE}{CF}$$

$$\frac{CD}{CA} = \frac{2CE}{BC}$$

CA : CD =

$\boxed{BC : 2CE}$

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(104) In a ΔABC, D is a point on line BC and E is a point on line AD in such a way —

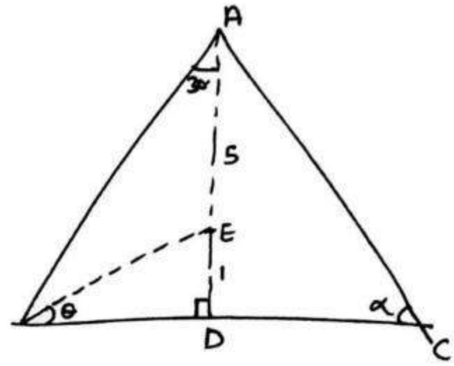
$AD \perp BC$

$AE : ED = 5 : 1$

$\angle BAD = 30°$

$\tan \angle ACB = 6 \tan \angle DBE$

$\angle ACB = ?$



$\angle B = 60°$

$\tan\theta = \frac{1}{BD}$

$\tan\alpha = \frac{6}{DC}$

$\tan\alpha = 6\tan\theta$

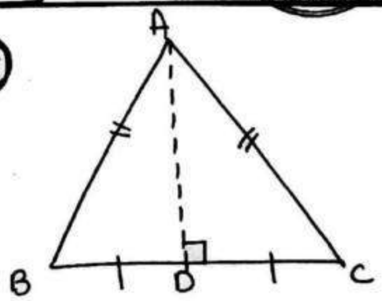
$\frac{\cancel{6}}{DC} = \frac{\cancel{6}}{BD}$

$\boxed{DC = BD}$

$\therefore AB = AC$

$\therefore \angle B = \angle C$

$\therefore \boxed{\angle C = 60°}$



In an isosceles Δ, if a $\perp$ is drawn from the common vertex of two equal sides on the opposite side then it will divide the opposite side in two equal parts.

ABC is isosceles Δ

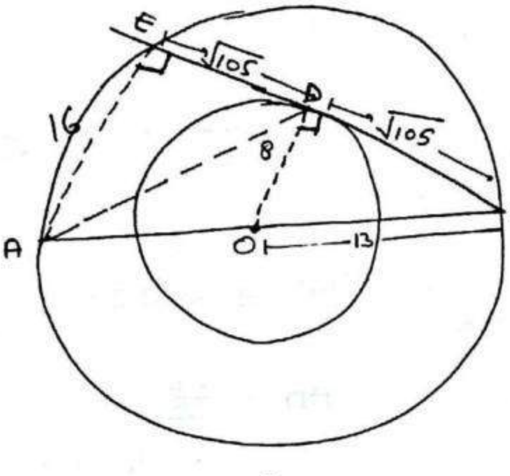
$AB = AC$

$AD \perp BC$

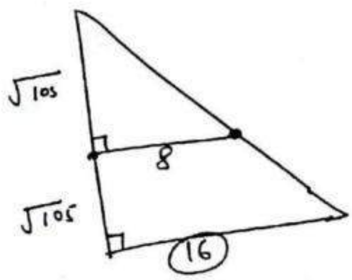
$\therefore \boxed{BD = DC}$

& vice-versa.

(105) The radius of two concentric circle are 13 cm & 8 cm. AB is the diameter of larger circle and BD is a tangent to the smaller circle touching it at D and the larger circle at E. Point A is joined to D. find AD.



$BD = \sqrt{105}$

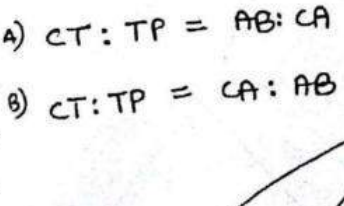


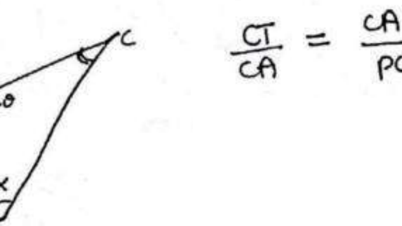
$AD = \sqrt{(\sqrt{105})^2 + 16^2}$

$= \sqrt{105 + 256} = \sqrt{361}$

$\boxed{AD = 19}$

(106) AC and BC are two chords.

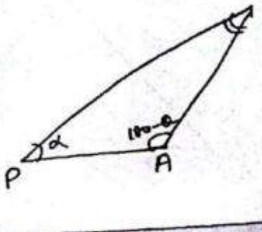


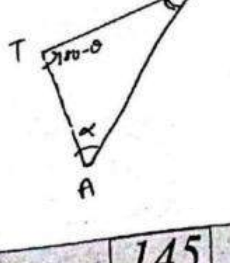


A) CT : TP = AB : CA

B) CT : TP = CA : AB

$\frac{CT}{CA} = \frac{CA}{PC}$





(107) In a isosceles Δ $\angle B$ is right angle. D is a point in Δ ABC and P & Q are points on AB and AC in such a way

$DP \perp AB$

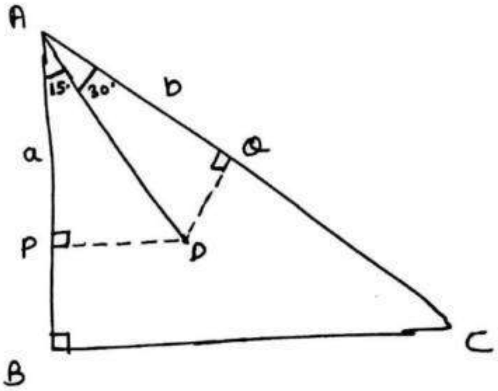
$DQ \perp AC$

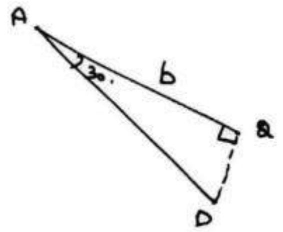
$AP = a$

$AQ = b$

$\angle BAD = 15^\circ$

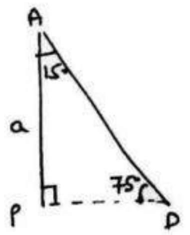
$\sin 75^\circ = ?$





$$\frac{AD}{b} = \sec 30^\circ$$

$$AD = \frac{2b}{\sqrt{3}}$$



$$\sin 75^\circ = \frac{a}{AD} = \frac{a}{\frac{2b}{\sqrt{3}}} = \frac{\sqrt{3}a}{2b}$$

$$\boxed{\sin 75^\circ = \frac{a\sqrt{3}}{2b}}$$

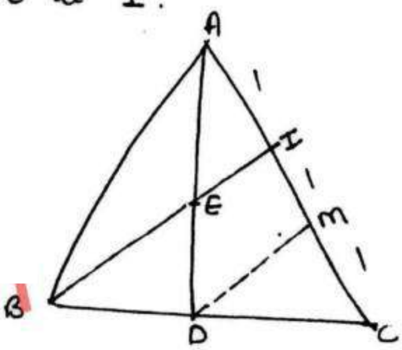
(108) E is the mid point of median AD of ΔABC. On extending BE it intersects AC at I.

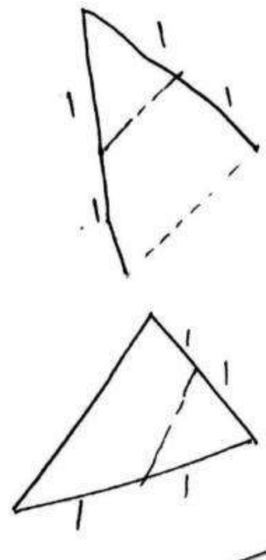
$AB = 18$

$AC = 15$

$BC = 20$

$CI = ?$





$3 \longrightarrow 15$

$1 \longrightarrow 5$

$\boxed{CI = 10}$

CLASS 57

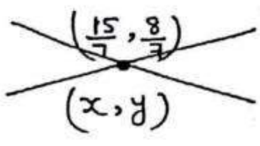
CO-ORDINATE Geometry.

#

$4x + 3y = 12$

$2x + 5y = 10$

$x = \frac{15}{7}, \; y = \frac{8}{7}$



#

$a_1 x + b_1 y = c_1$

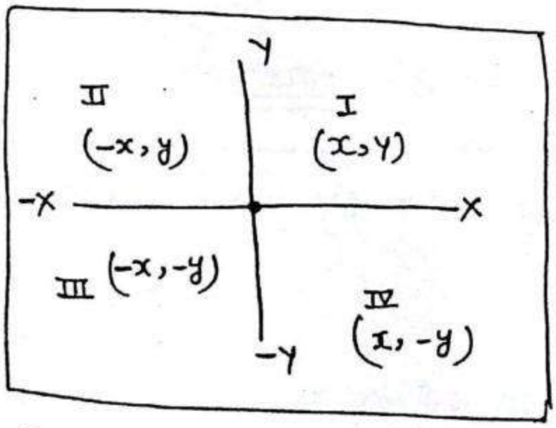
$a_2 x + b_2 y = c_2$

unique solution (meet at a point) $\Rightarrow \frac{a_1}{a_2} \neq \frac{b_1}{b_2}$

No solution (doesn't meet) $\Rightarrow \frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$

infinite many soln (one line on another line) $\Rightarrow \frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$

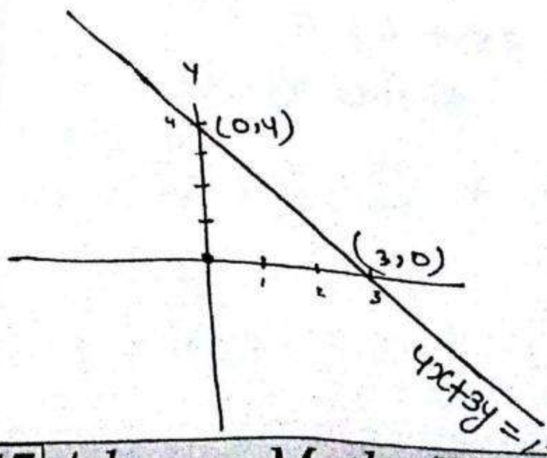
#



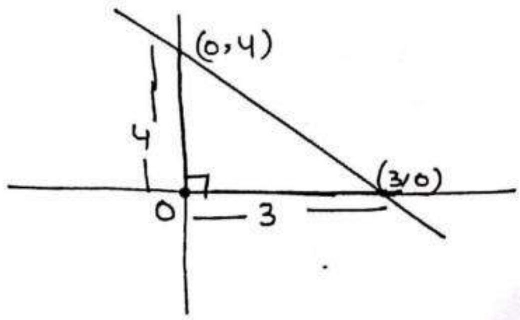
(1) $4x + 3y = 12$

$x = 0, \; y = 4 \Rightarrow (0, 4)$

$y = 0, \; x = 3 \Rightarrow (3, 0)$



(2) find area of Δ made by $4x+3y=12$, x-axis and Y-axis



Area of Δ =

$\frac{1}{2} \times 3 \times 4 = 6$ Ans.

OR

if two sides of a Δ are x-axis and y-axis then it will be a right angle Δ.

&. $4x + 3y = 12$

divide by 12

$$\frac{4x}{12} + \frac{3y}{12} = \frac{12}{12}$$

$$\frac{x}{3} + \frac{y}{4} = 1$$

Base — perpendicular

Area of $\Delta = \frac{1}{2} \times 3 \times 4 = 6$ Ans.

(3) find area of Δ made by $8x+6y=60$, x-axis and y-axis.

$8x + 6y = 60$

divide by 60

$$\frac{8x}{60} + \frac{6y}{60} = \frac{60}{60}$$

$$\frac{x}{7.5} + \frac{y}{10} = 1$$

B — P

Area of Δ =

$\Rightarrow \frac{1}{2} \times 7.5 \times 10$

$\Rightarrow 37.5$ Ans.

4) find the area of trapezium made by $8x+6y=60$ $4x+3y=12$, x-axis and y-axis.

$8x+6y = 60$

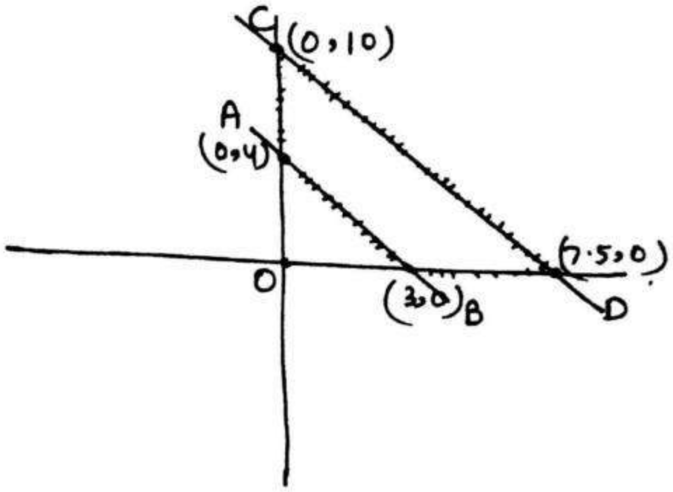
$x=0, y=10 \Rightarrow (0,10)$

$y=0, x=7.5 \Rightarrow (7.5,0)$

$4x+3y = 12$

$x=0, y=4 \Rightarrow (0,4)$

$y=0, x=3 \Rightarrow (3,0)$



Area of Δ OCD = $\frac{1}{2} \times 10 \times 7.5 = 37.5$

Area of Δ OAB = $\frac{1}{2} \times 4 \times 3 = 6$

Area of trapezium ABCD = Area of Δ OCD − Area of Δ OAB

$\Rightarrow 37.5 - 6 = 31.5$ Ans.

5) find the area ~~made~~ of the trapezium made by $5x+3y=15$, $15x+9y=270$, x-axis and y-axis.

Area of Δ made by line $15x+9y=270$

$$\frac{15x}{270} + \frac{9y}{270} = \frac{270}{270}$$

$$\underbrace{\frac{x}{(18)}}_{B} + \underbrace{\frac{y}{(30)}}_{P} = 1$$

$\Rightarrow \frac{1}{2} \times 18 \times 30 = 270$

Area of Δ made by line $5x+3y=15$

$$\frac{5x}{15} + \frac{3y}{15} = \frac{15}{15}$$

$$\frac{x}{3} + \frac{y}{5} = 1$$

$\Rightarrow \frac{1}{2} \times 3 \times 5 = 7.5$

Area of trapezium =

$270 - 7.5$

$= 262.5$ Ans.

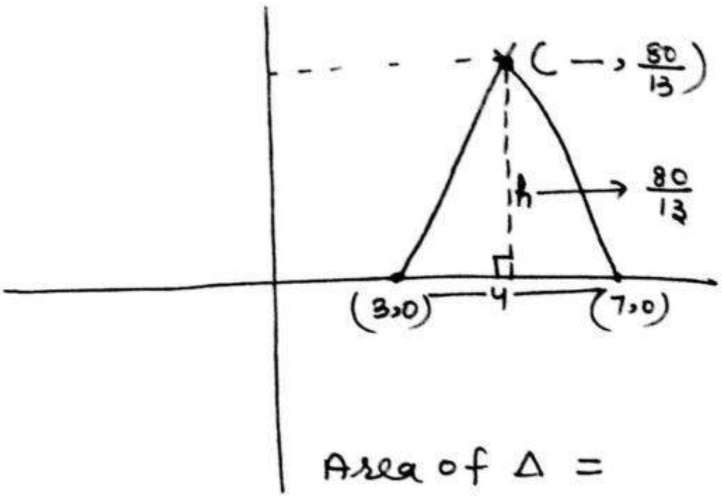
(6) find the area of Δ made by $4x+3y=12$, $5x+7y=35$ and x-axis.

$4x+3y=12$

$y=0,\ x=3 \Rightarrow (3,0)$

$5x+7y=35$

$y=0,\ x=7 \Rightarrow (7,0)$



$$4x+3y=12$$
$$5x+7y=35$$

$$y=\frac{80}{13}$$

Area of Δ =

$\frac{1}{2}\times 4\times \frac{80}{13}$

$=\frac{160}{13}$ Ans

---

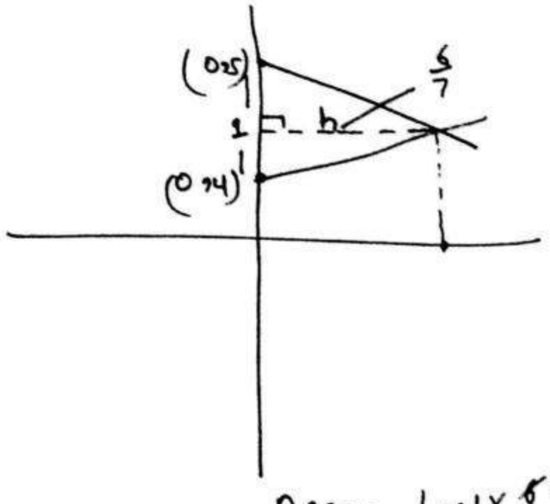
(7) find the area of Δ made by $x+2y=8$, $5x+3y=15$ and y-axis.

$x+2y=8$

$x=0,\ y=4 \Rightarrow (0,4)$

$5x+3y=15$

$x=0,\ y=5 \Rightarrow (0,5)$



$$x+2y=8$$
$$5x+3y=15$$

$$x=\frac{6}{7}$$

Area $=\frac{1}{2}\times 1\times \frac{6}{7}$

$=\frac{3}{7}$ Ans

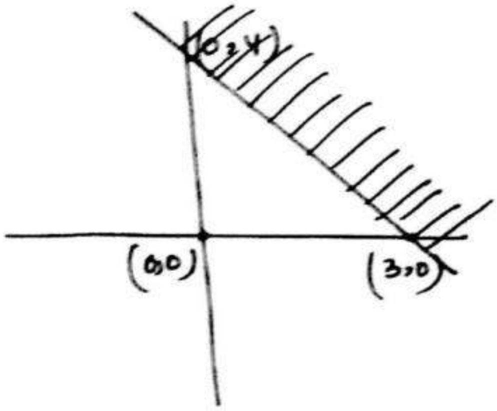
Linear Inequalities

(8) $4x+3y \geq 12$

$4x+3y = 12$

$x=0, y=4 \Rightarrow (0,4)$

$y=0, x=3 \Rightarrow (3,0)$



$4x+3y \geq 12$

put $x=0, y=0$

$0+0 \geq 12$ (Not satisfied means shadow will be away from the origin.

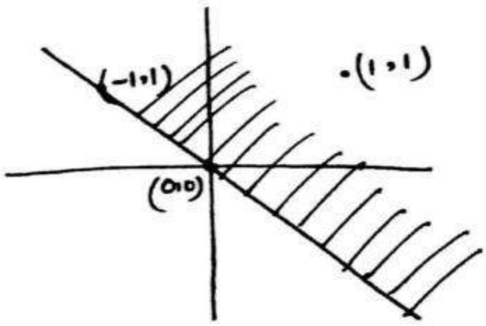
↓ if this condition satisfies then shadow will be towards the origin.

---

(9) $x \geq -y$

$x = -y$

x	y
0	0
−1	1



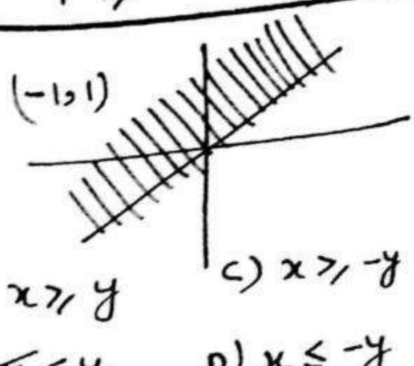
$x \geq -y$

put $x=1, y=1$

$1 \geq -1$ (true - so shadow will be towards (1,1)

---

(10)



A) $x \geq y$ C) $x \geq -y$

~~B) $x \leq y$~~ D) $x \leq -y$

In this line either both positive or both -ve. So, option C & D canc

option A → $x \geq y$

$-1 \geq 1$ (X)

Put $x=-1, y=$ (∵ in 2nd quad to check the condition).

Hence B ✓

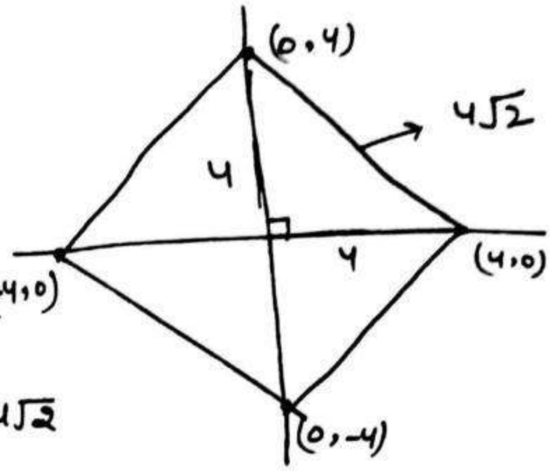
(11) find the area of the figure bounded by $|x| + |y| = 4$

$x + y = 4$

$-x + y = 4$

$x - y = 4$

$-x - y = 4$



square formed with side $4\sqrt{2}$

Area $= (4\sqrt{2})^2 = 32$ Ans

OR

Area $= 2(4)^2$

$= 32$ Ans.

(#) $\boxed{\begin{array}{l} \text{if } |x| + |y| = K \\ \text{Area} = 2K^2 \end{array}}$

(#) $\boxed{\begin{array}{l} x + |y| = K \\ |x| + y = K \\ \text{In both cases} \\ \text{Area} = K^2 \end{array}}$

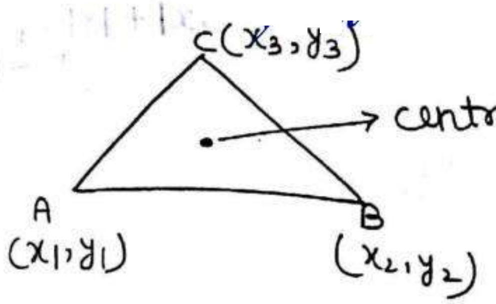
(#)

A ———————————— B

(x_1, y_1) (x_2, y_2)

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

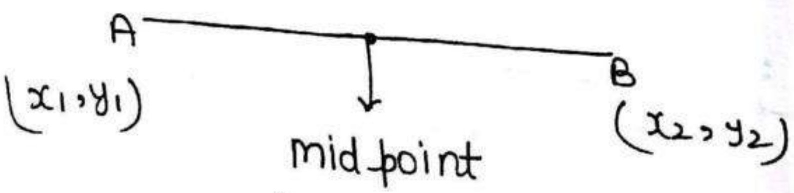
(#)



$$\text{Area}_{\Delta ABC} = \frac{1}{2}\left| x_1(y_2-y_3) + x_2(y_3-y_1) + x_3(y_1-y_2) \right|$$

vertex of centroid $= \left(\dfrac{x_1+x_2+x_3}{3}, \dfrac{y_1+y_2+y_3}{3} \right)$

(#)

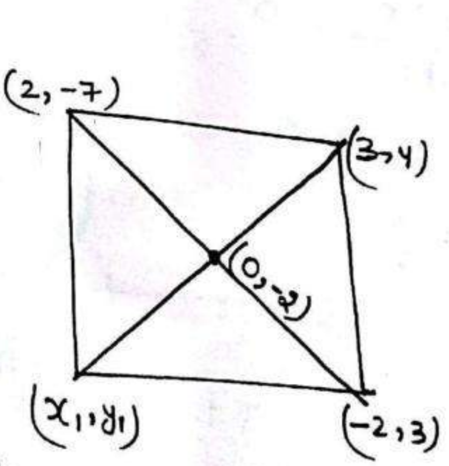


$$\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2} \right)$$

---

(12) Find 4th vertex of a rhombus whose 3 vertex are - $(-2,3)$, $(3,4)$, $(2,-7)$

mid point of diagonal $\Rightarrow$



$\dfrac{2-2}{2}, \dfrac{-7+3}{2}$

$(0, -2)$

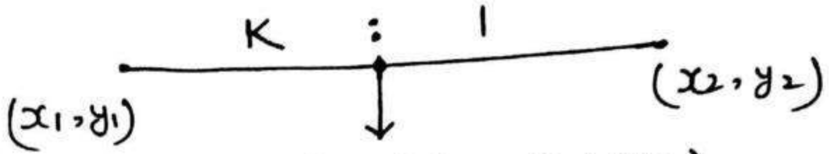
$\Rightarrow \because$ diagonals bisect each other

$\dfrac{x_1+3}{2} = 0 \Rightarrow x_1 = -3$

$\dfrac{y_1+4}{2} = -2 \Rightarrow y_1 = -8$

$(-3,-8)$ Ans.

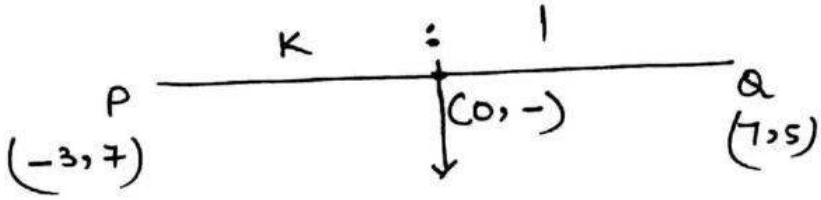
#



$$\left(\frac{x_1 + Kx_2}{K+1}, \frac{y_1 + Ky_2}{K+1}\right)$$

---

(13) find the ratio in w/c y-axis intersect the line PQ



$$\frac{-3 + K\times7}{K+1}, \quad \frac{7 + K\times5}{K+1}$$

$$\frac{-3+7K}{K+1} = 0 \qquad (\text{on y axis, x is zero})$$

$$-3 + 7K = 0$$

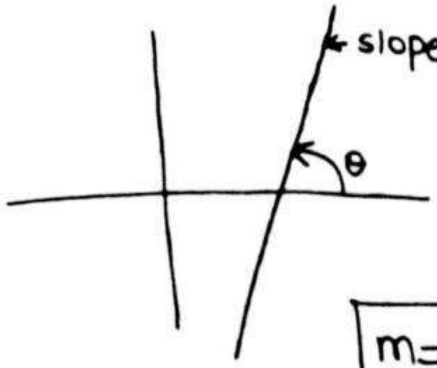
$$K = \frac{3}{7}$$

Ratio $\Rightarrow \quad \frac{3}{7} \quad : \quad 1$

$3 : 7$ Ans.

SLOPE

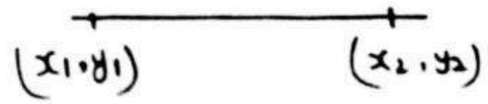
#



θ → always anticlockwise वाला लेना है ।

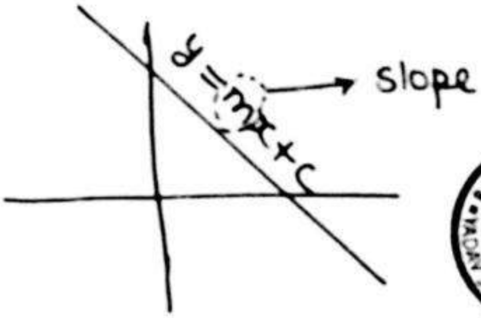
$$\boxed{m = \tan\theta}$$

#



$$\boxed{m = \frac{y_2 - y_1}{x_2 - x_1}}$$

#



$$\boxed{y = mx + c}$$

$4x + 3y = 12$

$3y = -4x + 12$

$y = -\frac{4}{3}x + \frac{12}{3}$

slope (m) = $-\frac{4}{3}$

---

(14) $\sqrt{3}y - 3x = 5$. find slope ($\theta = ?$)

$\sqrt{3}y = 3x + 5$

$y = \frac{3}{\sqrt{3}}x + \frac{5}{\sqrt{3}}$

$y = \sqrt{3}\,x + \frac{5}{\sqrt{3}}$

slope

$\tan\theta = \sqrt{3}$

$\tan\theta = \tan 60$

$\theta = 60^\circ$ Ans

(15) Find the angle between lines

$x - y\sqrt{3} = 5$

$\sqrt{3}x + y = 7$

$x - y\sqrt{3} = 5$

$y\sqrt{3} = x - 5$

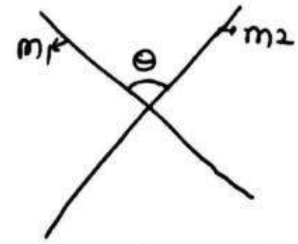
$y = \frac{1x}{\sqrt{3}} - \frac{5}{\sqrt{3}}$

$m_2 = \frac{1}{\sqrt{3}}$

$\sqrt{3}x + y = 7$

$y = -\sqrt{3}x + 7$

$m_1 = -\sqrt{3}$



$\tan\theta = \left|\frac{m_1 - m_2}{1 + m_1 m_2}\right|$

$\tan\theta = \left|\frac{-\sqrt{3} - \frac{1}{\sqrt{3}}}{1 + (-\cancel{\sqrt{3}})\frac{1}{\cancel{\sqrt{3}}}}\right|$

$\tan\theta = \infty = \tan 90^\circ$

$\theta = 90^\circ$

(16) Find the perpendicular distance b/w $4x + 3y = 16$ &

$8x + 6y = 18$

$4x + 3y = 16$

$4x + 3y = 9$

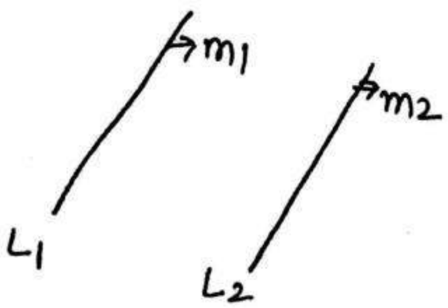
$ax + by = c_1$

$ax + by = c_2$

$\perp$ distance $= \left|\frac{c_1 - c_2}{\sqrt{a^2 + b^2}}\right|$

$\perp$ distance $= \left|\frac{16 - 9}{\sqrt{4^2 + 3^2}}\right| = \frac{7}{5}$ Ans

(17)



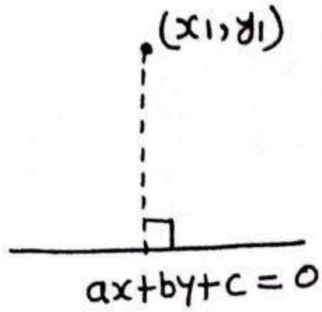
if $L_1 \parallel L_2$

$\boxed{m_1 = m_2}$

17) find the $\perp$ distance from a vertex $(-3, 2)$ to the line $3x+4y=16$.

$$\perp \text{distance} = \left| \frac{-9+8+16}{\sqrt{4^2+3^2}} \right|$$

$$= \frac{\cancel{15}}{\cancel{5}} = 3 \quad \underline{\underline{\text{Ans.}}}$$



$$\perp \text{distance} = \left| \frac{ax_1+by_1+c}{\sqrt{a^2+b^2}} \right|$$