IX — Maths (9th); HALF YEARLY

I) (1) a) 5
(2) d) $\emptyset$
(3) b) $\sqrt{5}$
(4) c) $2\times10^{10}m^2$
(5) b) $-\frac{5}{2}$
(6) c) $3x+5=\frac{2}{3}$
(7) c) 1
(8) c) diameter
(9) b) interior Opposite angles
(10) d) 9 cm
(11) b) (0,4)
(12) d) (−9,0)
(13) b) 5
(14) a) $\frac{1}{2}$

II

15) $A=\{p,q,r,s\}$

$P(A)=\{\{\},\{p\},\{q\},\{r\},\{s\}$
$\{p,q\},\{p,r\}\{p,s\}\{q,r\}\{q,s\}\{r,s\}$
$\{p,q,r\}\{p,q,s\},\{p,r,s\}\{q,r,s\}$
$\{p,q,r,s\}\}$

16) $R-S=\{m,o,p\}$
$S-R=\{j,q\}$
$R\Delta S=(R-S)\cup(S-R)$
$=\{m,o,p\}\cup\{j,q\}$
$R\Delta S=\{m,o,p,j,q\}$

17) $\sqrt{8}=(8)^{1/2}\Rightarrow(2^3)^{1/2}\Rightarrow(2)^{3/2}$ //

18) $\sqrt[3]{40}\times\sqrt[3]{16}$
$=\sqrt[3]{8\times5}\times\sqrt[3]{8\times2}\Rightarrow 2\sqrt{5}\times2\sqrt{2}$
$\Rightarrow 4\sqrt[3]{10}$

19) $p(x)=x^3-2x^2-4x-1$, $g(x)=0$
$x+1=0$
$x=-1$

$p(-1)=(-1)^3-2(-1)^2-4(-1)-1$
$=-1-2+4-1$
$p(-1)=4-4=0$ $\therefore$ Remainder $=0$

20) GCD of $ab^2c^3, a^2b^3c, a^3bc^2$ is $\underline{abc}$.

21) $2x-y=3$ —— (1)
$3x+y=7$ —— (2)
(1)+(2) $\Rightarrow 5x=10$
$\boxed{x=2}$

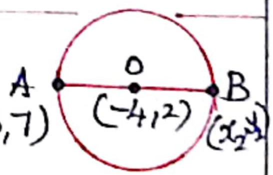
(1) $\Rightarrow 2(2)-y=3$
$4-3=y$
$\boxed{1=y}$

22) $x+2x+3x=180°$
$6x=180°$
$x=\frac{180°}{6}$
$\boxed{x=30°}$

$x:2x:3x$
$\Rightarrow 30°:60°:90°$

23) In Δxyz, $\angle z=90°$ (Angle in semi-circle).
$\angle x+\angle y+\angle z=180°$
$63°+x°+90°=180°$
$x°=180°-153°$
$x°=27°$

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



$\left(\frac{-3+x_2}{2},\frac{7+y_2}{2}\right)=(-4,2)$
$-3+x_2=-4(2)$; $7+y_2=2(2)$
$x_2=-5$; $y_2=-3$ $\boxed{B(-5,-3)}$

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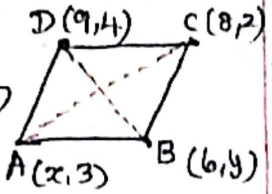
25) Mid-point of AC = Midpoint of BD



$\left(\frac{x+8}{2}, \frac{3+2}{2}\right) = \left(\frac{6+9}{2}, \frac{y+4}{2}\right)$

$\frac{x+8}{2} = \frac{15}{2}$ & $\frac{5}{2} = \frac{y+4}{2}$

$x+8=15$, $5=y+4$

$\therefore x=7$, & $y=1$.

26) $G\left(\frac{x_1+x_2+x_3}{3}, \frac{y_1+y_2+y_3}{3}\right)$

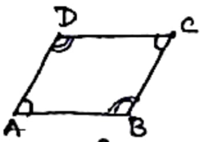
$G\left(\frac{6+8+10}{3}, \frac{-1+3-5}{3}\right) = G\left(\frac{24}{3}, \frac{-3}{3}\right)$

$\therefore G(8,-1)$

27) $\sin B = \frac{9}{41}$, $\cos B = \frac{40}{41}$, $\tan B = \frac{9}{40}$

$\operatorname{cosec} B = \frac{41}{9}$, $\sec B = \frac{1}{\cos B} = \frac{41}{40}$, $\cot B = \frac{40}{9}$

28) The opposite angles of a Parallelogram are equal



$\angle A = \angle C = 65^\circ$ & $\angle B = \angle D = x^\circ$

$\angle A + \angle B = 180^\circ$

$65^\circ + \angle B = 180^\circ$

$\angle B = 180^\circ - 65^\circ$

$\angle B = 115^\circ$

$\therefore \angle A = 65^\circ$, $\angle B = 115^\circ$, $\angle C = 65^\circ$, $\angle D = 115^\circ$

III

29) L.H.S

$(A \cup B) = \{4,7,8,11,12,15\}$

$(A \cup B)' = \{4,7,8,10,11,12,15,16\} - \{4,7,8,11,12,15\}$

$(A \cup B)' = \{10,16\}$

R.H.S $A' = U - A = \{4,10,15,16\}$

$B' = U - B = \{7,10,11,16\}$

$A' \cap B' = \{10,16\}$; L.H.S = R.H.S

Hence proved.

30) $n(A \cup B \cup C) = 100$, $n(A) = 85$, $n(B) = 40$, $n(C) = 20$, $n(A \cap B) = 32$, $n(B \cap C) = 13$, $n(A \cap C) = 10$.

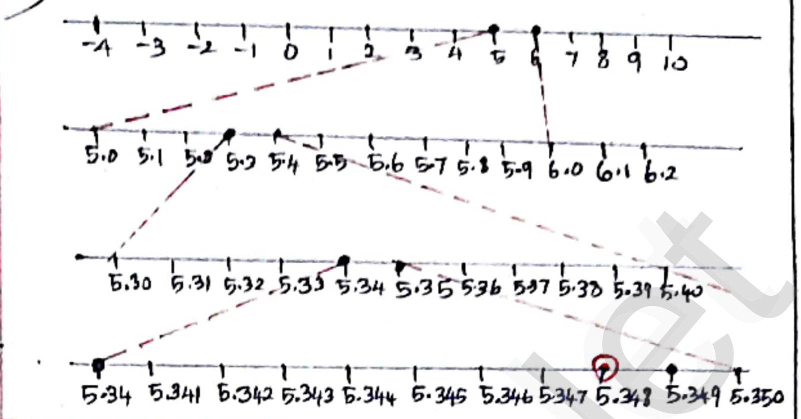
$n(A \cup B \cup C) = n(A) + n(B) + n(C) - n(A \cap B) - n(B \cap C) - n(A \cap C) + n(A \cap B \cap C)$

$100 = 85 + 40 + 20 - 32 - 13 - 10 + n(A \cap B \cap C)$

$n(A \cap B \cap C) = 100 - 90 = 10$

$\therefore$ 10 students speak all the three languages

31)



32) LCM of 3, 9, 6 is 18

$\sqrt[3]{5} \Rightarrow \sqrt[3\times6]{5^6} = \sqrt[18]{15625}$

$\sqrt[9]{4} \Rightarrow \sqrt[9\times2]{4^2} = \sqrt[18]{16}$

$\sqrt[6]{3} \Rightarrow \sqrt[6\times3]{3^3} = \sqrt[18]{27}$

$\sqrt[18]{15625} > \sqrt[18]{27} > \sqrt[18]{16}$

$\sqrt[3]{5} > \sqrt[6]{3} > \sqrt[9]{4}$

33)

−2	1	2	−1	−4
	0	−2	0	2
	1	0	−1	−2

$\therefore$ Quotient is $x^2 - 1$

Remainder is -2

34)

x	y	1		
5	−21	3	5	
−6	49	−7	−6	

$\frac{x}{5(49) - (-6)(-21)} = \frac{y}{(-21)(-7) - (49)(3)} = \frac{1}{3(-6) - (-7)(5)}$

$\boxed{x = 7}$, $\boxed{y = 0}$

35) Let the two digit number be x, y

$11x + 11y = 110$

$x + y = 10$ ——— (1)

$10x + y - 10 = 5x + 5y + 4$

$5x - 4y = 14$ ——— (2)

Solve by elimination method

$x = 6$, $y = 4$, $\therefore$ The first number is 64.

36) Exterior angle $\angle C = \angle A + \angle B$

$4x - 15 = 2x - 5 - x + 35$ $\therefore \boxed{x = 45^\circ}$

$\therefore \angle A = x + 35 = 80^\circ$, $\angle B = 2x - 5 = 85^\circ$

$\angle C = 4x - 15 = 165^\circ$

37) $OC \perp AB$

In right $\triangle OAC$

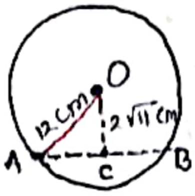
$AC^2 = OA^2 - OC^2$

$= 12^2 - (2\sqrt{11})^2$

$= 144 - 44$

$AC^2 = 100 cm$

$AC = 10 cm$



$\therefore$ Length of the chord $AB = 2AC$

$= 2 \times 10$

$= 20 cm$

38) $AB = \sqrt{(x_2-x_1)^2+(y_2-y_1)^2} = \sqrt{106}$; $AB^2 = 106$

$BC = \sqrt{106}$, $BC^2 = 106$

$AC = \sqrt{212}$, $AC^2 = 212$

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

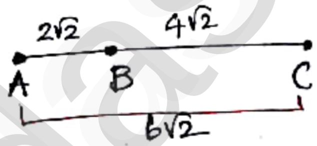
$106 + 106 = 212$

$\therefore \triangle ABC$ is a right angled triangle right angled at B.

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

$BC = \sqrt{(13-7)^2+(1+5)^2} = 4\sqrt{2}$

$\vec{AC} = 6\sqrt{2}$



$AB + BC = AC$

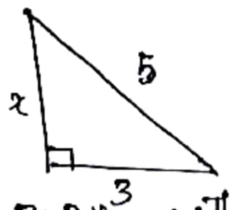
$2\sqrt{2} + 4\sqrt{2} = 6\sqrt{2}$

$\therefore$ B is Common point

$\therefore$ A, B, C are Collinear.

41) $\sin A = \frac{4}{5}$

$\tan A = \frac{4}{3}$



By Pythagoras Theorem

$x = \sqrt{5^2 - 3^2}$

$x = \sqrt{16} = 4$

$\therefore \frac{\sin A - \cos A}{2 \tan A} = \frac{\frac{4}{5} - \frac{3}{5}}{2 \times \frac{4}{3}}$

$= \frac{1}{2} \times \frac{1}{5} \times \frac{3}{4}$

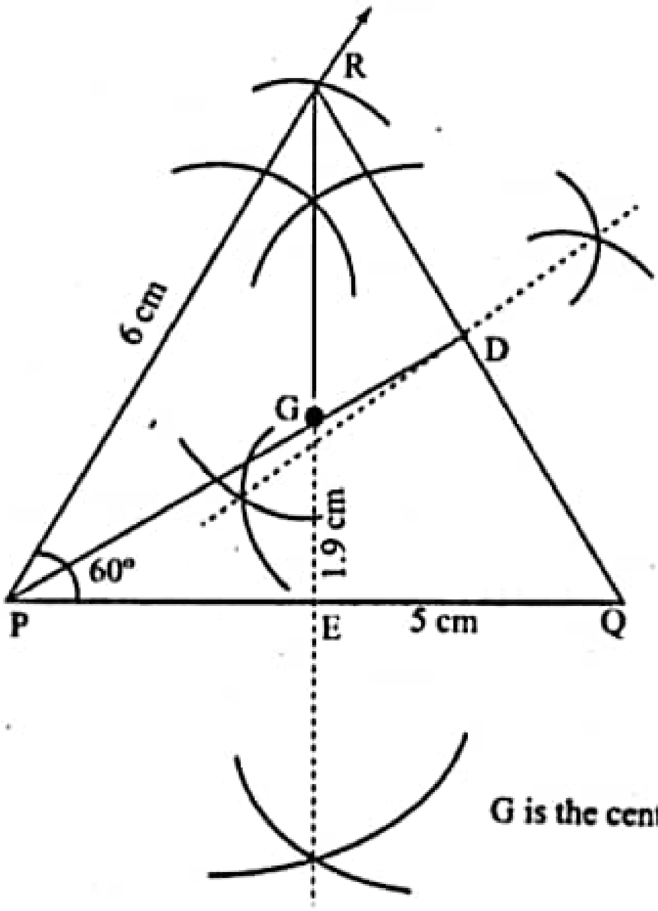
$= \frac{3}{4}$

42) $(Q \cap R) = \{3,5,7\}$, $P-(Q \cap R) = \{1,2,4,6,8,9\}$ —— (1)

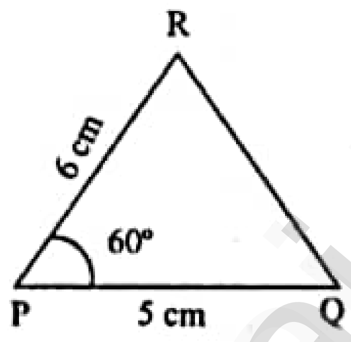
$P-Q = \{2,4,6,8\}$ & $P-R = \{1,4,6,8,9\}$

$(P-Q) \cup (P-R) = \{1,2,4,6,8,9\}$ —— (2)

(1) = (2) , It's Verified.



Rough diagram



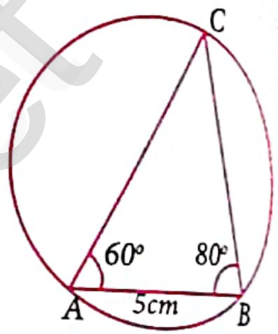
G is the centroid of the triangle

Construction :
Step 1 : Draw ΔPQR with the given measurement
Step 2 : Draw perpendicular bisectors of any two sides (PQ and QR) to find the mid points of PQ and QR.
Step 3 : Draw medians PD and RE. Let them meet at G.
Step 4 : G is the centroid of the given ΔPQR.

Question 5.
Draw ΔPQR with sides PQ = 7 cm, QR = 8 cm and PR = 5 cm and construct its Orthocentre.
Solution:
ΔPQR with sides PQ = 7 cm,
QR = 8 cm,
PR = 5 cm.

Example 4.14

Construct the circumcentre of the ΔABC with $AB = 5$ cm, $\angle A = 60^0$ and $\angle B = 80^0$. Also draw the circumcircle and find the circumradius of the ΔABC.



Rough Diagram

Solution

Step 1 Draw the ΔABC with the given measurements

Step 2

Construct the perpendicular bisector of any two sides (AC and BC) and let them meet at S which is the circumcentre.

Step 3

S as centre and $SA = SB = SC$ as radius,

draw the Circumcircle to passes through A,B and C.

Circumradius = 3.9 cm.

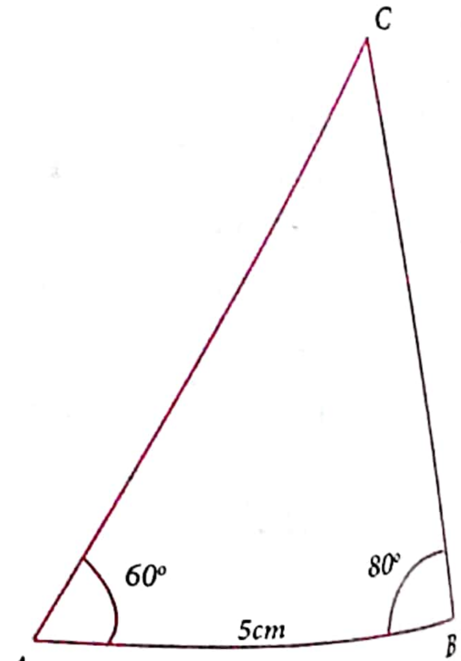


Fig. 4.92

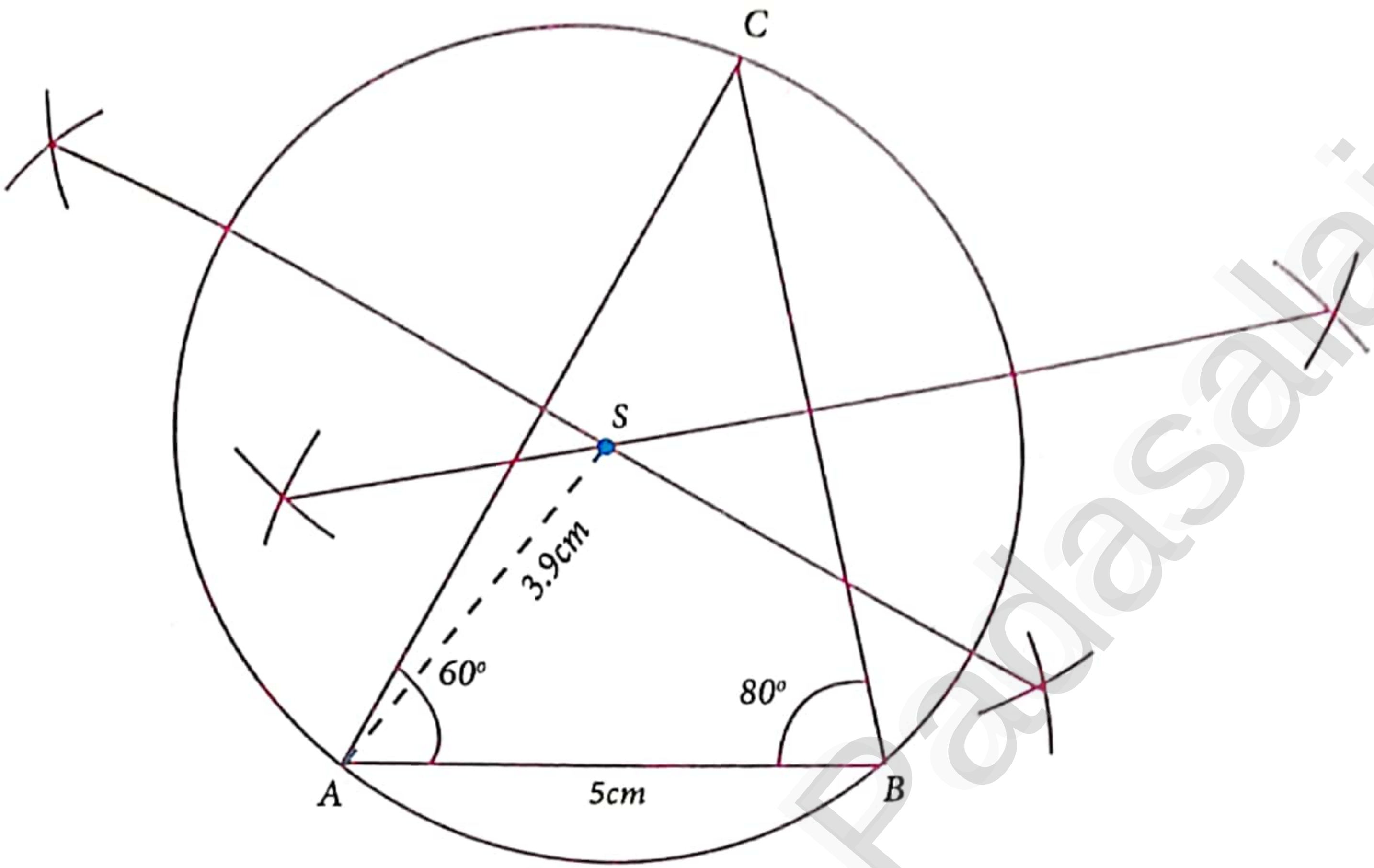


Fig. 4.93

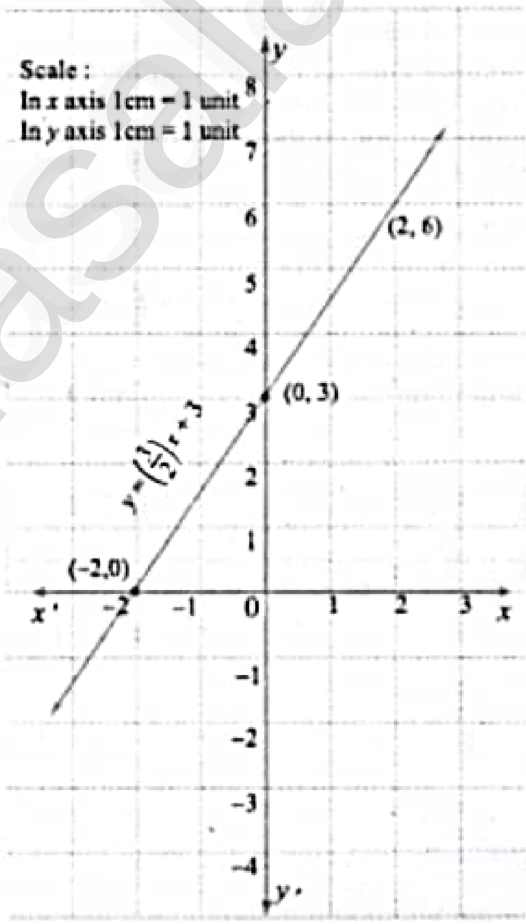
Note

(iii) $x = -2 \Rightarrow \quad y = \left(\frac{3}{2}\right)(-2) + 3 = -3 + 3 = 0$

$x = 0 \Rightarrow y = \left(\frac{3}{2}\right)(0) + 3 = 0 + 3 = 3$

$x = 2 \Rightarrow y = \left(\frac{3}{2}\right)(2) + 3 = 3 + 3 = 6$

x	-2	0	2
y	0	3	6



The points to be plotted: (-2, 0), (0, 3), (2, 6)

Example 3.44 Use graphical method to solve the following system of equations: $x + y = 5$; $2x - y = 4$.

Solution

Given $x + y = 5$ ...(1)

$2x - y = 4$ ...(2)

To draw the graph (1) is very easy. We can find the x and y values and thus two of the points on the line (1).

When $x = 0$, (1) gives $y = 5$.

Thus $A(0,5)$ is a point on the line.

When $y = 0$, (1) gives $x = 5$.

Thus $B(5,0)$ is another point on the line.

Plot A and B; join them to produce the line (1).

To draw the graph of (2), we can adopt the same procedure.

When $x = 0$, (2) gives $y = -4$.

Thus P(0,–4) is a point on the line.

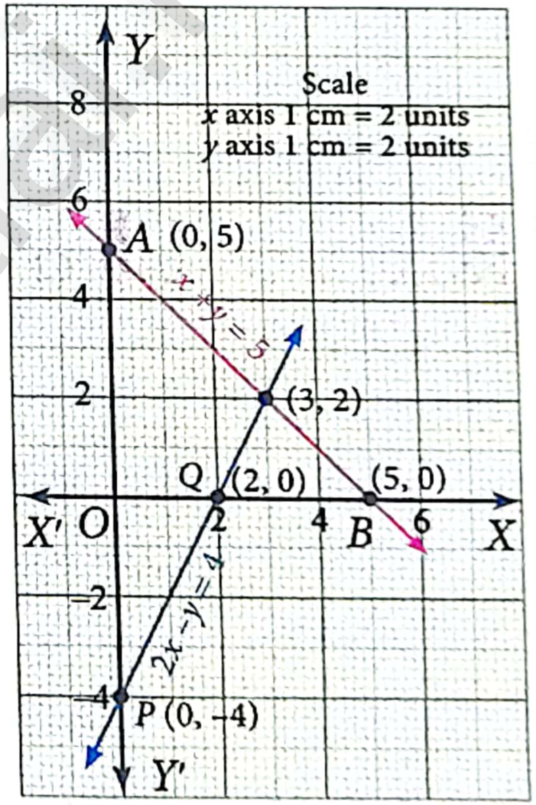


Fig. 3.21