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Std-10th

Paper - 3

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Date / /

Maths Solution

Paper : 3 [SEC-B]

25 $P(x) = x^2 + 8x + 15 = 0$

$\therefore x^2 + 5x + 3x + 15 = 0$

$\therefore x(x+5) + 3(x+5) = 0$

$\therefore (x+5)(x+3) = 0$

$\therefore x + 3 = 0$ $\therefore x + 5 = 0$

$\boxed{x = -3}$ $\therefore \boxed{x = -5}$

zeroes of $P(x)$ are -3 & -5

co-efficient α & β

$P(x) = x^2 + 8x + 15$

$a = 1$, $b = 8$, $c = 15$

Sum of zeroes

$\alpha + \beta = -3 - 5 = -8$

$\alpha + \beta = \frac{-b}{a} = \frac{-8}{1} = -8$

product : $\alpha \cdot \beta = (-3) \times (-5)$

$= 15$

$\alpha \cdot \beta = \frac{c}{a} = \frac{15}{1} = 15$

Hence, proved.

26 zeroes and Product (-3) & 2

let α & β are zeroes of $P(x)$

$\alpha + \beta = -3$

$\alpha \cdot \beta = 2$

$\alpha + \beta = \frac{-b}{a} = \frac{-3}{1}$ | $\alpha \cdot \beta = \frac{c}{a} = \frac{2}{1}$

let K be any non - zero

$a = K$, $b = 3K$, $c = 2K$

$P(x) = ax^2 + bx + c$

$= Kx^2 + 3Kx + 2K$

$= K\,(x^2 + 3x + 2]$

27 roots of Quadratic equation

$2x^2 - 5x + 3 = 0$

$\therefore 2x^2 - 3x - 2x + 3 = 0$

6 $\wedge$ -3 -2

$\therefore x\,(2x-3) - 1\,(2x-3) = 0$

$\therefore (2x-3)\,(x-1) = 0$

$\therefore 2x - 3 = 0$ $\quad x - 1 = 0$

$\therefore 2x = 3$ $\quad \boxed{x = 1}$

$\boxed{\therefore x = \frac{3}{2}}$

28 AP : 3, 8, 13, 18 --- 78

$a = 3$

$d = 8 - 3 = 5$

$a_n = 78$

$n = ?$

n^{th} term $a_n = a + (n-1)d$

$\therefore 78 = 3 + (n-1)5$

$\therefore 78 - 3 = (n-1)5$

$\therefore 75 = (n-1)5$

$\therefore \frac{75}{5} = n - 1$

$\therefore 15 = n - 1$

$n = 15 + 1$

$\underline{n = 16}$ th term

29 AP : 9, 17, 25, ...

$a = 9$

$d = 17 - 9 = 8$

$S_n = 636$

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

$\therefore 636 = \frac{n}{2}[2(9) + (n-1)8]$

$\therefore 636 \times 2 = n[18 + 8n - 8]$

$\therefore 1272 = n(10 + 8n)$

$\therefore 1272 = 2n(5 + 4n)$

$\frac{1272}{2} = 5n + 4n^2$

$\therefore 636 = 5n + 4n^2$

$\therefore 0 = 5n + 4n^2 - 636$

$\therefore 4n^2 + 5n - 636 = 0$

$\therefore 4n^2 + 53n - 48n - 636 = 0$

$\therefore n(4n + 53) - 12(4n + 53) = 0$

$\therefore (4n + 53)(n - 12) = 0$

$\therefore 4n + 53 = 0$ & $n - 12 = 0$

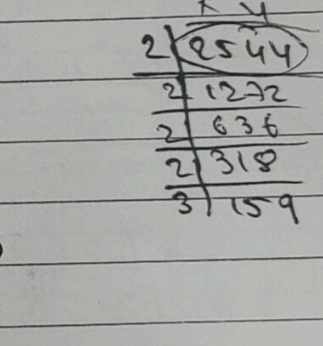
$n = -\frac{53}{4}$ × $\boxed{\therefore n = 12}$

636 × 4

2 | 2544
2 | 1272
2 | 636
2 | 318
3 | 159

30 A(3, 0), B(4, 5), C(-1, 4), D(-2, -1)

$x_1\ y_1$, $x_2\ y_2$, $x_3\ y_3$, $x_4\ y_4$



$AC = \sqrt{(x_1 - x_3)^2 + (y_1 - y_3)^2}$

$= \sqrt{(3+1)^2 + (0-4)^2}$

$= \sqrt{4^2 + (-4)^2}$

$= \sqrt{16 + 16}$

$= \sqrt{2 \times 16} = 4\sqrt{2}$ unit

$$BD = \sqrt{(x_2 - x_4)^2 + (y_2 - y_4)^2}$$

$$= \sqrt{(4+2)^2 + (5+1)^2}$$

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

$$= \sqrt{36 + 36}$$

$$= \sqrt{2 \times 36}$$

$$= 6\sqrt{2} \text{ unit}$$

$$= \frac{1}{2} \times AC \times BD$$

$$= \frac{1}{\cancel{2}} \times 4\cancel{\sqrt{2}} \times 6\cancel{\sqrt{2}}$$

$$= \underline{\underline{24}} \text{ sq. units}$$

<u>31</u> Co-ordinates

A $(6, 5)$ — $P(x, y)$ — B $(4, 5)$

$x_1\ y_1$ — $x_2\ y_2$ — $\cancel{x_3\ y_3}$

$$x = \frac{x_1 + x_2}{2} \quad \& \quad y = \frac{y_1 + y_2}{2}$$

$$= \frac{6+4}{2} \qquad\qquad = \frac{5+5}{2}$$

$$= \frac{10}{2} \qquad\qquad = \frac{10}{2}$$

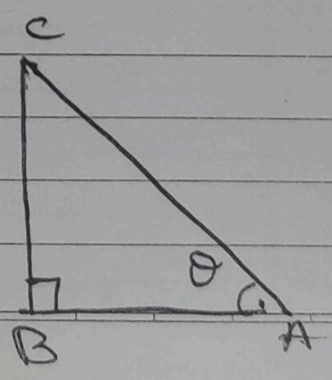
$$\boxed{x = 5} \qquad\qquad \boxed{y = 5}$$

$$P(x, y) = P(5, 5)$$

<u>32</u>

$$\text{Sec}\,\theta = \frac{13}{12}$$

$$\text{Sec}\,\theta = \frac{AC}{AB} = \frac{13}{12}$$



$AC = 13K$
$AB = 12K$
pythagorus
$BC^2 = AC^2 - AB^2$
$= (13K)^2 - (12K)^2$
$= 169K^2 - 144K^2$
$BC^2 = 25K^2$
$BC = \sqrt{25K^2} = 5K$

$\cos\theta = \frac{1}{\sec\theta} = \frac{1}{\frac{13}{12}}$

$= \frac{12}{13}$

$\operatorname{cosec}\theta = \frac{AC}{BC} = \frac{13\cancel{K}}{5\cancel{K}} = \frac{13}{5}$

33 $\sec A(1-\sin A)(\sec A + \tan A) = 1$
$LHS = \sec A[1-\sin A][\sec A + \tan A]$
$= \frac{1}{\cos A}[1-\sin A]\left[\frac{1}{\cos A} + \frac{\sin A}{\cos A}\right]$

$= \frac{1}{\cos^2 A}[1-\sin A][1+\sin A]$

$= \frac{1-\sin^2 A}{\cos^2 A}$

$= \frac{\cos^2 A}{\cos^2 A} = 1$ RHS

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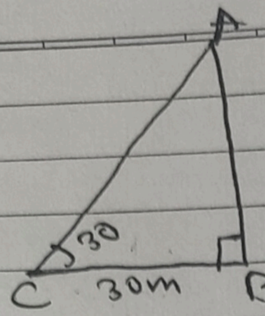


In $\triangle ABC$, $\angle B = 90^\circ$, $\angle C =$

$\therefore BC = 30m$

$$\cot C = \frac{BC}{AB}$$

$$\cot 30^\circ = \frac{30}{AB}$$

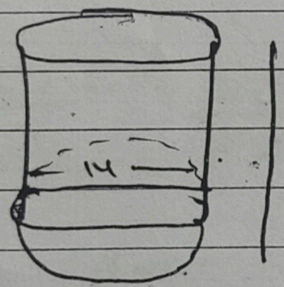
$$\therefore \sqrt{3} = \frac{30}{AB}$$

$$\therefore AB = \frac{30}{\sqrt{3}}$$

$$\therefore AB = \frac{30}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$$

$$\underline{AB = 10\sqrt{3}m}$$

35



$$r = \frac{14}{2} = 7cm$$

$$C.S.A = 2\pi r^2$$
$$= 2 \times \frac{22}{\cancel{7}} \times 7 \times \cancel{7}$$
$$= 44 \times 7$$
$$= \underline{308 \, cm^2}$$

for cylinder, $r = \frac{14}{2} = 7cm$

$$h = 13 - 7 = 6cm$$

C.S.A of cylinder $= 2\pi rh$
$$= 2 \times \frac{22}{\cancel{7}} \times \cancel{7} \times 6$$
$$= 44 \times 6$$
$$= 264 \, cm^2$$

Total Area = C.S.A of --- + C.S.A ---
$$= 308 + 264$$
$$= \underline{572 \, cm^2}$$

36 $r + h = 37$ cm
T.S.A of cyl $= 1628\ cm^2$
$V = ?$

T.S.A of cyl $= 2\pi r(r+h)$
$1628 = 2 \times \frac{22}{7} \times r(37)$

$\therefore \frac{\cancel{1628}^{\cancel{814}\ 74} \times 7}{2 \times \frac{\cancel{22}}{\cancel{7}} \times \cancel{37}} = r$

$\therefore 7 = r$
$\boxed{r = 7\ cm}$

$r + h = 37$
$\therefore h = 37 - r$
$\therefore h = 37 - 7$
$\boxed{\therefore h = 30\ cm}$

vol. of cyl $= \pi r^2 h$
$= \frac{22}{\cancel{7}} \times \cancel{7} \times 7 \times 30$

$= 22 \times 210$
$V = 4620\ cm^3$

37 $\Sigma f_i x_i = 625$
$\Sigma f_i = 100$
$\bar{x} = ?$

$\bar{x} = \frac{\Sigma f_i x_i}{\Sigma f_i}$

$= \frac{625}{100}$

$\boxed{\bar{x} = 6.25}$

[SEC-C]

38 eq (i) $x + y = 5$

$x = 5 - y$

Putting in eq (ii)

$= 2x - 3y = 4$

$2(5-y) - 3y = 4$

$\therefore 10 - 2y - 3y = 4$

$\therefore 10 - 5y = 4$

$= 10 - 4 = 5y$

$= 6 = 5y$

$= \frac{6}{5} = y$ $\quad \boxed{\therefore y = \frac{6}{5}}$

we have, $x = 5 - y$

$x = 5 - \frac{6}{5}$

$x = \frac{25-6}{5}$ $\quad \boxed{\therefore x = \frac{19}{5}}$

39 Cost of 1 pencil x ₹ & 1 pen y ₹

$5x + 7y = 50$ --- (i) $\times 7$

$7x + 5y = 46$ --- (ii) $\times 5$

eq (i) by 7 & eq (ii) by 5

$\cancel{35x} + 49y = 350$

$\underset{-}{\cancel{35x}} \underset{-}{+} 25y \underset{-}{=} 230$

$24y = 120$

$\therefore y = \frac{\cancel{120}^{10}}{\cancel{24}_{2}} = \frac{10}{2} = 5$

Eq (i) $5x + 7y = 50$

$\therefore 5x + 7(5) = 50$

$\therefore 5x + 35 = 50$

$\therefore 5x = 50 - 35$

$\therefore 5x = 15$

$\therefore x = \frac{15}{5}$ $\boxed{\therefore x = 3}$

1 pencil is ₹ 3

40 $a_{11} = 38$, $a_{16} = 73$

$a_{11} = 38$

$\therefore a + 10d = 38$ —— (i)

$a_{16} = 73$

$\therefore a + 15d = 73$ —— (ii)

$\cancel{a} + 15d = 73$

$\cancel{a} + 10d = 38$

$- \quad - \quad -$

$5d = 35$ $d = \frac{35}{5} = 7$

Eq (i) $a + 10d = 38$

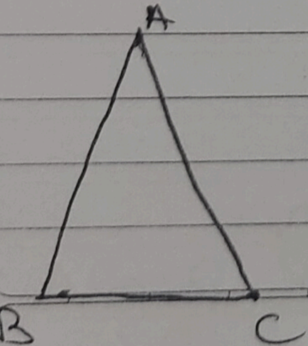
$\therefore a + 10(7) = 38$

$\therefore a + 70 = 38$

$a = 38 - 70$

$\boxed{a = -12}$

41 $(\underset{x_1}{5}, \underset{y_1}{-2})$ $(\underset{x_2}{6}, \underset{y_2}{4})$ $(\underset{x_3}{7}, \underset{y_3}{-2})$



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

$= \sqrt{(5-6)^2 + (-2-4)^2}$

$= \sqrt{(-1)^2 + (-6)^2}$

$= \sqrt{1 + 36}$ $= \sqrt{37}$ unit

$BC = \sqrt{(x_2 - x_3)^2 + (y_2 - y_3)^2}$
$= \sqrt{(6-7)^2 + (4+2)^2}$
$= \sqrt{(1)^2 + (6)^2}$
$= \sqrt{1+36}$
$= \sqrt{37}$ unit

$AC = \sqrt{(x_1 - x_3)^2 + (y_1 - y_3)^2}$
$= \sqrt{(5-7)^2 + (-2+2)^2}$
$= \sqrt{(-2)^2 + (0)^2}$
$= \sqrt{4}$
$= 2$ units

Here, $AB = BC \neq AC$
$\triangle ABC$ is an isosceles

42

A $(4, -3)$ — 3 — P(x, y) — 1 — B$(8, 5)$
$x_1\ y_1$; $x_2 y_2$

$x = \dfrac{m_1 x_2 + m_2 x_1}{m_1 + m_2}$

$= \dfrac{3(8) + 1(4)}{3+1} = \dfrac{24+4}{4}$

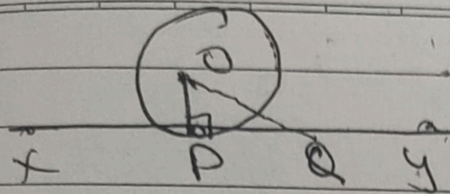
$= \dfrac{28}{4}$ $\boxed{=7}$

$y = \dfrac{m_1 y_2 + m_2 y_1}{m_1 + m_2}$

$= \dfrac{3(5) + 1(-3)}{3+1}$

$= \dfrac{15-3}{4} = \dfrac{12}{4} = 3$

$\therefore P(x, y)$
$= P(7, 3)$

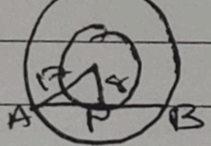
43 

Stat : The tangent at any point of a circle is perpendicular to the radius through the point of contact

prove : $XY \perp OP$

Prof : We are given circle with centre O & tangent $\overleftrightarrow{XY}$ to the circle at point of contact P.

- Taking any point Q on $\overleftrightarrow{XY}$ & join OQ
- The point Q lie outside the circle So, $OQ > OP$
- Since these happens for every point on $\overleftrightarrow{XY}$ except at point P So, OP is at shortest distance of O to the point XY

44 

$OP = 8$ cm

$AO = 17$ cm

$\triangle OPA$ is right Angle

$\angle P = 90$

Pythagorus : $AO^2 = OP^2 + AP^2$

$\therefore (17)^2 = (8)^2 + AP^2$

$289 = 64 + AP^2$

$\therefore 289 - 64 = AP^2$

$225 = AP^2$

$\sqrt{225} = AP$

$\therefore 15 = AP$

$\underline{AP = 15 \text{cm}}$

$AB = 2 \times AP$

$= 2 \times 15$

$\boxed{AB = 30 \text{cm}}$

૪૫

Class	F
0-20	10
20-40	35
40-60	52
$\boxed{60-80}$	61
80-100	38
100-120	29

$l = 60$
$h = 20$
$F_0 = 52$
$F_1 = 61$
$F_2 = 38$

$$\text{Mode} = l + \frac{F_1 - f_0}{2f_1 - f_0 - f_2} \times h$$

$$= 60 + \left[\frac{61-52}{2(61) - 52 - 38}\right] \times 20$$

$$= 60 + \left[\frac{9}{122-52-38}\right] \times 20$$

$$= 60 + \left[\frac{9}{32}\right] \times 20$$

$$= 60 + \frac{45}{8}$$

$$= 60 + 5.625$$

$$= 65.625 \text{ hours}$$

46 (i) 5 will come?

$$P(5) = \frac{\text{No. of outcomes 5 will not}}{\text{Total number}}$$

$$= \frac{25}{36}$$

$$P(5) = \frac{\text{5 will come ~~either~~ atlesat o}}{\text{Total number}}$$

$$= \frac{11}{36}$$

[SEC-D]

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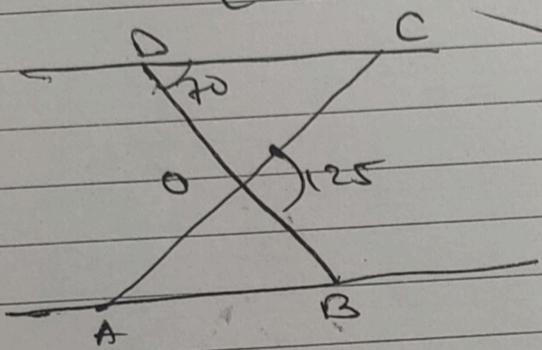


Given : $\Delta OBC \sim \Delta OBA$

$\angle BOC = 125$

$\angle CDO = 70$

$\angle DOC + \angle BOC = 180°$

$\therefore \angle DOC + 125 = 180$

$\therefore \angle DOC = 180 - 125$

$\boxed{\therefore \angle DOC = 55°}$

In ΔDOC $\quad \angle CDO + \angle DOC + \angle DCO = 180°$

$\therefore 70 + 55 + \angle DCO = 180°$

$\therefore 125 + \angle DCO = 180$

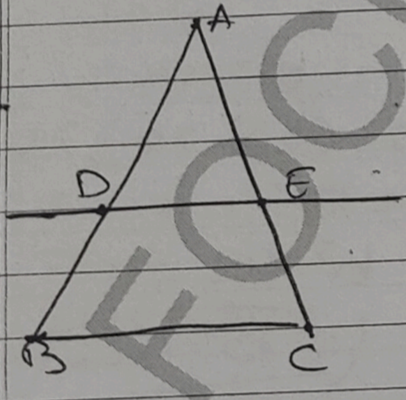
$\therefore \angle DCO = 180 - 125$

$\boxed{\angle DCO = 55°}$

$\angle OAB = \angle DCO$ $\quad [\Delta ODC \sim \Delta ODA]$

$\boxed{\therefore \angle OAB = 55}$

48



Given : In ΔABC, $\frac{AD}{DB} = \frac{AE}{EC}$

To prove : $DE \parallel BC$

Proof : DE is not parallel to BC

$DF \parallel BC$

$\frac{AD}{DB} = \frac{AF}{FC}$ -- (BPT)

also, $\frac{AD}{DB} = \frac{AE}{EC}$ [given]

from eq (i) & (ii)

$\frac{AF}{FC} = \frac{AE}{EC}$

$\therefore$ Add 1 on both side

$\frac{AF}{FC} + 1 = \frac{AE}{EC} + 1$

$\therefore \frac{AF + FC}{FC} = \frac{AE + EC}{EC}$

$= \frac{\cancel{AC}}{FC} = \frac{\cancel{AC}}{EC}$

$\therefore EC = FC$

$DF \parallel BC$ (construction)

$\therefore DE \parallel BC$

Hence proved

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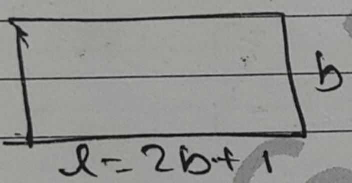

$l = 2b + 1$

Area $= l \times b$

$\therefore 300 = (2b+1) \times b$

$\therefore 300 = 2b^2 + b$

$0 = 2b^2 + b - 300$

$\therefore 2b^2 + b - 300 = 0$

$\therefore 2b^2 + 25b - 24b - 300 = 0$

$\therefore b(2b + 25) - 12(2b + 25) = 0$

$\therefore (2b + 25)(b - 12) = 0$

$2b + 25 = 0$ $\quad$ $b - 12 = 0$

$b = \frac{-25}{2}$ X $\quad$ $\boxed{\therefore b = 12 m}$

$l = 2b + 1$

$= 2(12) + 1$

$= 24 + 1$

$\boxed{l = 25 m}$

50) $a = 17$ $\quad n = ?$
$a_n = 350$ $\quad S_n = ?$
$d = 9$

$a_n = a + (n-1)d$
$350 = 17 + (n-1)9$
$350 - 17 = (n-1)9$
$\frac{333}{9} = n-1$
$37 = n-1$
$n = 37 + 1$
$\boxed{n = 38}$

$S_n = \frac{n}{2}[a + a_n]$
$= \frac{38}{2}[17 + 350]$
$= 19[367]$
$\boxed{S_n = 6973}$

51)

Class	f	x_i	$d_i = x_i - A$	u_i	f_iu_i
49.5-52.5	15	51	-6	-2	-30
52.5-55.5	110	54	-3	-1	-110
55.5-58.5	135	A $\boxed{57}$	0	0	00
58.5-61.5	115	60	3	1	115
61.5-64.5	25	63	6	2	50
	400				25

$A = 57$, $h = 3$
$\Sigma f_iu_i = 25$, $\Sigma f_i = 400$

$$\bar{x} = A + \frac{\Sigma f_i u_i}{\Sigma f_i} \times h$$

$$= 57 + \frac{25}{400} \times 3$$

$$= 57 + \frac{3}{16}$$

$$= 57 + 0.187$$

$$= \underline{\underline{57.187}} \text{ mangoes}$$

52

class	f	cf
below 140	4	4
140 - 145	7	11
145 - 150	18	29
150 - 155	11	40
155 - 160	6	46
160 - 165	5	51

$n = 51$

$\therefore \frac{n}{2} = \frac{51}{2} = 25.5$

$l = 145$
$f = 18$
$cf = 11$
$h = 5$

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

$$= 145 + \frac{25.5 - 11}{18} \times 5$$

$$= 145 + \frac{14.5}{18} \times 5$$

$$= 145 + \frac{72.5}{18}$$

$$= 145 + 4.03$$

$$m = \underline{\underline{149.03}}$$

53 (i) $P(8) = \dfrac{\text{No. of times is 8}}{\text{Total no. of outcomes}}$

$= \dfrac{5}{36}$

(2) $P(13) = \dfrac{\text{No. of times is 13}}{\text{Total outcomes}}$

$= \dfrac{0}{36} = \underline{\underline{0}}$

(3) P (less than 12)

$= \dfrac{\text{No. of times less than 12}}{\text{Total outcomes}}$

$= \dfrac{36}{36} = \underline{\underline{1}}$

4 (i) Possible : [H, H] [T, T] [H, T] [T, H]

$P(H) = \dfrac{\text{at least one head}}{\text{Total outcomes}}$

$= \dfrac{3}{4}$

(2) P (~~one~~ most one head)

$= \dfrac{\text{most one head}}{\text{Total outcomes}} = \dfrac{3}{4}$

3) $P(\text{two tails}) = \dfrac{\text{No. of two tails}}{\text{Total outcomes}} = \dfrac{1}{4}$