I

1) B) Equation have unique solution.

2) C) 2

3) B) 1

4) C) $\frac{12}{13}$

5) A) 1:2

6) A) a tangent

7) A) $\frac{\theta}{360^\circ} \times \pi r^2$

8) C) $220\,cm^3$

II

9) nonterminating decimal, according to Theorem 1.7

10) 3 zeroes

11) $1+1=2$

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

13) The ratio of any two corresponding sides in two equiangular triangles is always the same.

14)
$$180^\circ = \angle BOC + \angle BAC$$
$$180^\circ = 130^\circ + \angle BAC$$
$$180^\circ - 130^\circ = \angle BAC$$
$$\underline{50 = \angle BAC}$$

15)
$$\frac{x+1}{2} - \frac{1}{x} = 0$$
$$\frac{x^2+x-2}{2x} = 0$$
$$\underline{x^2+x-2 = 0}$$

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16) $\pi r(l+r)$

17) $2x+y=11$

$\underset{(-)}{x}+\underset{(-)}{\cancel{y}}\underset{(-)}{=}8$

$\underline{x=3}$

$x+y=8$

$3+y=8$

$y=8-3$

$\boxed{y=5}$

18) $a=5$

$d=8-5$

$=3$

$n=10$

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

$S_{10}=\frac{\cancel{10}^{5}}{\cancel{2}}[2(5)+(10-1)3]$

$=5[10+9(3)]$

$=5[10+27]$

$\underline{S_{10}=185}$

19) $2x-3y-8=0$

$2(k-4)x-ky-(k+3)=0$

$\frac{2}{2(k-4)}=\frac{-3}{-k}=\frac{-8}{-(k+3)}$

$\frac{+3}{+k}=\frac{+8}{+(k+3)}$ or $\frac{\cancel{2}}{\cancel{2}(k-4)}=\frac{+8}{+(k+3)}$

$3k+9=8k$ $\quad$ $k+3=8k-32$

$9=8k-3k$ $\quad$ $3+32=8k-k$

$9=5k$ $\quad$ $\cancel{35}^{5}=\cancel{7}k$

$\underline{k=9/5}$ $\quad$ $\underline{k=5}$

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20) $a=2,\ b=-5,\ c=3$

$= b^2 - 4ac$

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

$= 25 - 24$

$= 1 > 0$ two distinct real roots.

21) $a=1,\ b=-6,\ c=K$

(i) Sum of roots $(m+n) = \frac{-b}{a} = \frac{-(-6)}{1} = \underline{6}$

(ii) Product of roots $(mn) = c/a = \frac{K}{1} = K$

If one root is 'm' then twice the root is $2m$

$\therefore m = m$ and $n = 2m$

$m+n = 6 \quad \therefore m + 2m = 6$

$\cancel{3}m = \cancel{6}\,2$

$\underline{m = 2}$

W.K.T $K = mn$

$K = m(2m)$

$K = 2m^2 \Rightarrow K = 2(2)^2$

$\underline{K = 8}$

or

$$
\begin{array}{r|l}
 & x+1 \\
\hline
x^2-3x+1 & \cancel{x^3} - 2x^2 + 3x + 4 \\
 & \cancel{x^3} - 3x^2 + x \\
 & (-)\ (+)\ (-) \\
\hline
 & \cancel{x^2} + 2x + 4 \\
 & \cancel{x^2} - 3x + 1 \\
 & (-)\ (+)\ (-) \\
\hline
 & 5x + 3
\end{array}
$$

$\underline{5x+3}$ Should be Subtracted.

22) $(-5, 7)\ (-1, 3)$

$(x_1, y_1)\ (x_2, y_2)$

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

$= \sqrt{(-1-(-5))^2 + (3-7)^2}$

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

$= \sqrt{4^2 + (-4)^2} = \sqrt{16+16} = \sqrt{32}$

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or

$(1,6)\ (4,3)\quad m:n = 1:2$

$$(x,y) = \left(\frac{mx_2+nx_1}{m+n}, \frac{my_2+ny_1}{m+n}\right)$$

$$= \left(\frac{1(4)+2(1)}{1+2}, \frac{1(3)+(2)(6)}{1+2}\right)$$

$$= \left(\frac{4+2}{3}, \frac{3+12}{3}\right) \Rightarrow \left(\frac{\cancel{6}^{\,2}}{\cancel{3}}, \frac{\cancel{15}^{\,5}}{\cancel{3}_{\,1}}\right).$$

$$(x,y) = \underline{\underline{(2,5)}}$$

23) $A=(1,1)$, $B=(3,2)$ $C=(5,3)$

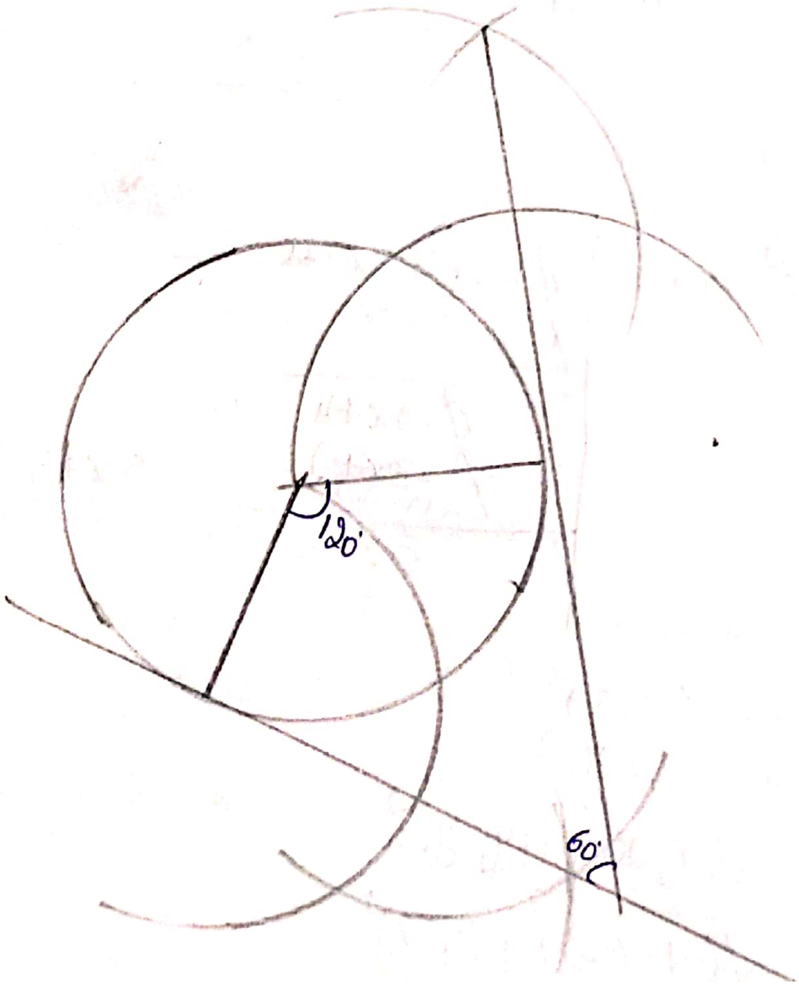
$AB = \sqrt{(x_2-x_1)^2+(y_2-y_1)^2} = \sqrt{(3-1)^2+(2-1)^2} = \sqrt{2^2+1^2} = \sqrt{5}$.

$BC = \sqrt{(5-3)^2+(3-2)^2} = \sqrt{2^2+1^2} = \sqrt{4+1} = \sqrt{5}$

$CA = \sqrt{(1-5)^2+(1-3)^2} = \sqrt{(-4)^2+(-2)^2} = \sqrt{16+4} = \sqrt{20} = 2\sqrt{5}$

$\therefore$ ABC is a triangle.

24)



25) Let us assume, to the contrary, that $\sqrt{5}$ is rational.
That is, we can find integers 'a' & 'b' ($\neq 0$) Such that $\sqrt{5} = a/b$
Suppose 'a' and 'b' have a common factor other than 1,
Then we can divide by the common factor, and assume that 'a' and 'b' are coprime.

So $b\sqrt{5} = a$ (Squaring on both side)

$5b^2 = a^2$

$\therefore$ a^2 is divisible by 5

So we can write $a = 5c$ for some integer c.

Substituting for 'a' we get $5b^2 = 25c^2$ that is $b^2 = 5c^2$

This means that b^2 is divisible by 5 and also 'b' divisible by 5.

$\therefore$ 'a' and 'b' have at least 5 as a common factor

But this contradiction has arisen because of our incorrect assumption that $\sqrt{5}$ is rational

So we conclude that $\sqrt{5}$ is irrational.

28)

C.I	F	cf
20-40	07	07
40-60	15	22
60-80	20	42
80-100	08	50
	N = 50	

$\frac{N}{2} = \frac{50}{2} = 25$

$l = 60$ $h = 20$

$cf = 22$

$f = 20$

$$\text{median} = l + \left[\frac{\frac{N}{2} - cf}{f}\right] \times h$$

$$= 60 + \left[\frac{25 - 22}{\cancel{20}}\right] \times \cancel{20}$$

$$= 60 + 3$$

$$= 63$$

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or

CI	f	cf
1-3	6	
3-5	9	
5-7	15	
7-9	9	
9-11	1	

$N = 40$

$l = 5$
$f_0 = 9$
$f_1 = 15$
$f_2 = 9$
$h = 3$

$$\text{mode} = l + \left[\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right] \times h$$

$$= 5 + \left[\frac{15-9}{2(15)-9-9}\right] \times 3$$

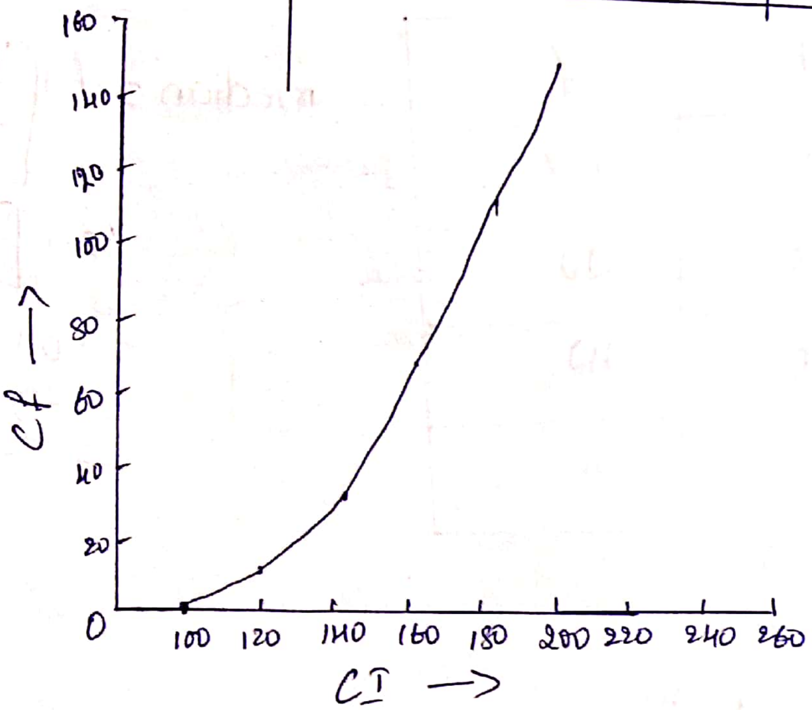
$$= 5 + \left[\frac{6}{30-18}\right] \times 3$$

$$= 5 + \left[\frac{\cancel{6}^{3}}{\cancel{12}_{\cancel{4}\,2}}\right] \times \cancel{3}^{1}$$

$$= 5 + \frac{3}{2} = \frac{10+3}{2} = 13/2 = \underline{\underline{7.5}}$$

29)

Daily Income	number of workers.	cf
Less than 100	0	0
" 120	8	8
" 140	20	28
" 160	34	62
" 180	44	106
" 200	50	156

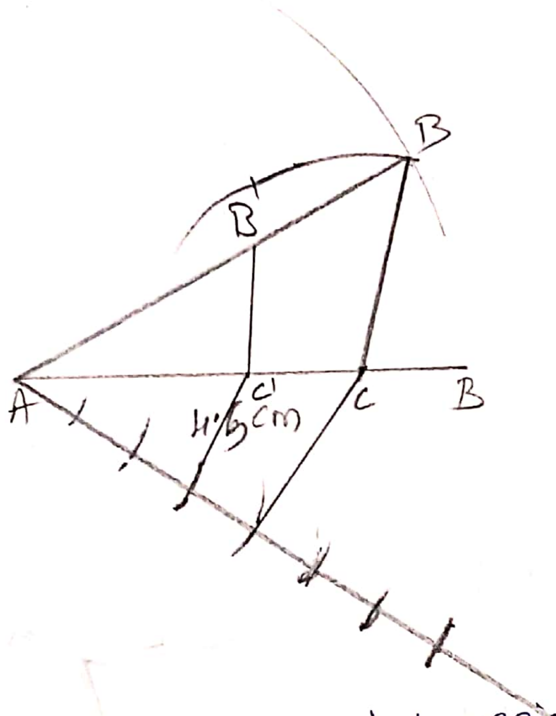


30) $P(R)=3$, $P(W)=5$, $P(B)=8$ $P(S)=16$

(i) $P(R)=\frac{P(E)}{P(S)}=\frac{3}{16}$

(ii) $P(\text{Not a white ball})=\frac{11}{16}$

32)



33) area of the Shaded region $=\frac{\theta}{360}\times\pi r^2-\frac{1}{2}bh$

$$=\frac{\cancel{90}}{\cancel{360}_{4}}\times\pi(10\sqrt{2})^2-\frac{1}{\cancel{2}}\times\cancel{20}^{10}\cdot 10$$

$$=\frac{3.14\times10\times10\times\cancel{2}}{\cancel{4}_{\cancel{2}\,1}}-100$$

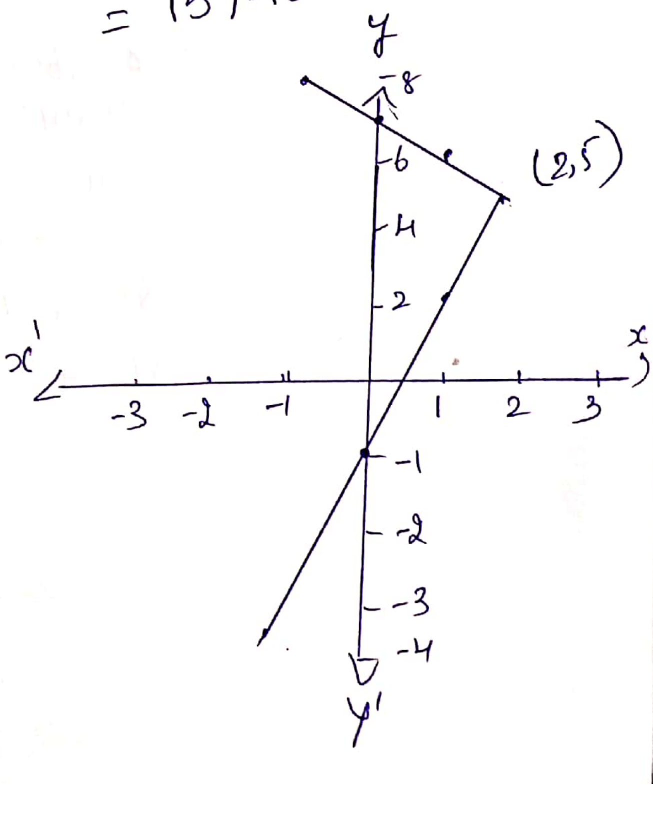
$$=157-100=57\,cm^2$$

34) $x+y=7$

x	0	1	-1	2	-2
y	7	6	8	5	9

$3x-y=1$

x	0	1	-1	2
y	-1	2	-4	5



35) $S_5 = 55$

$\frac{5}{2}[2a+4d] = 55^{11}$

$2a+4d = 22 \div 2$

$a+2d = 11$ —— ①

$a_6 + a_7 = a_4 + 5$

$a+5d+\cancel{a}+6d = \cancel{a}+3d+5$

$a+8d = 5$ —— ②

② - ①

$\cancel{a}+2d = 11$

$\cancel{a}+8d = 5$
$(-)\ (-)\ (-)$

$-6d = 6$

$d = -1$

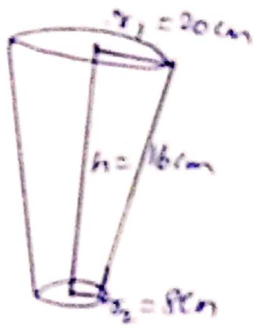
$d = -1$ in ①

$a+2(-1) = 11$

$a = 11+2 \Rightarrow a = 13$

$\therefore$ AP is 13, 12, 11, 10, 9, 8, ...

37) volume of container = vol of frustum



$h = 16cm$

$r_1 = 20cm$

$r_2 = 8cm$

$= \frac{1}{3}\pi h(r_1^2 + r_2^2 + r_1 r_2)$

$= \frac{1}{3} \times 3.14 \times 16[(20)^2 + 8^2 + 20\times 8]$

$= \frac{3.14\times 16}{3}[400+64+160]$

$= 16.74(624)$

$= 10445.76 cm^3$

$= \frac{10445.76}{1000} = 10.44576$ lit

cost of 1 liter milk = ₹20

cost of 10.44576 liter milk = ₹20 × 10.44576

$= ₹ 208.91$

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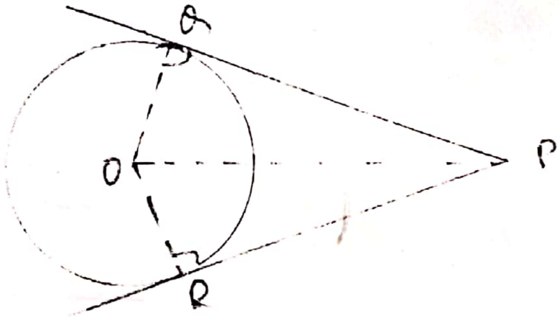
STATEMENT :

31) PROVE THAT THE LENGTHS OF TANGENTS DRAWN FROM AN EXTERNAL POINT TO A CIRCLE ARE EQUAL.

DATA : 'O' is the centre of the circle. PQ & PR are the tangents to the given circle from 'p'



TO PROVE : PQ = PR

CONSTRUCTION : Join OQ , OR and OP.

PROOF :

STATEMENT	REASON.
In Δ OQP and Δ ORP	
(i) $\angle OQP = \angle ORP = 90°$	Radius at the point of contact.
(ii) hyp OP = hyp OP	Common side
(iii) OQ = OR	Radii of the same circle.
$\Delta OQP \cong \Delta ORP$	RHS Postulate
PQ = PR	CPCT

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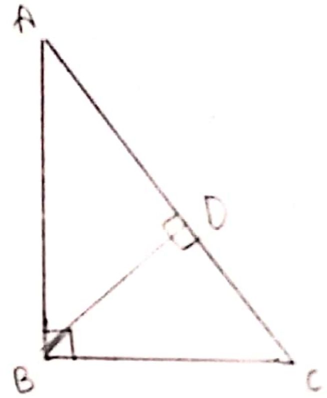
38) RIGHT ANGLED TRIANGLE THEOREM.

STATEMENT:

If a perpendicular is drawn from the vertex of the right angle of a right triangle to the hypotenuse then triangles on both sides of the perpendicular are similar to the whole triangle and to each other.

GIVEN:



In ΔABC, $\angle B = 90°$

$BD \perp AC$

TO PROVE:

ΔABC & ΔADB

i) $\angle ABC = \angle ADB = 90$

ii) $\angle A = \angle A$ (common Angle)

$\therefore \Delta ABC \sim \Delta ADB$ —— ① (AA criteria)

In ΔABC & ΔBDC

i) $\angle ABC = \angle BDC = 90°$

ii) $\angle C = \angle C$ (common Angle)

$\Delta ABC \sim \Delta BDC$ —— ② (AA criteria)

from ① & ②

$\Delta ABC \sim \Delta ADB \sim \Delta BDC$.

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