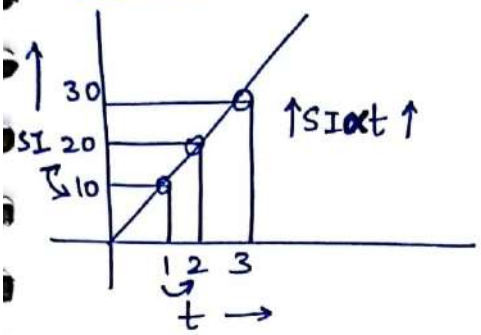
Simple Interest / Compound Interest

$SI = \frac{P \times R \times T}{100}$

$y = mx$

Rs 100 @ 10%

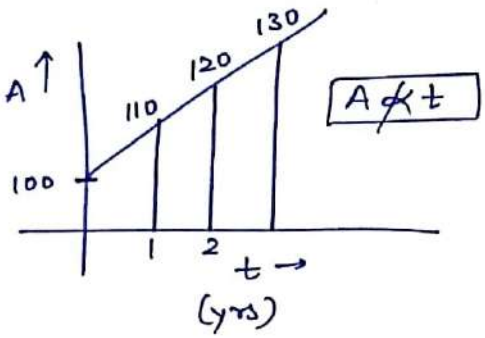


(A)

Amount = P + SI

$y = c + mx$

Rs 100 @ 100%.



Q certain sum of money becomes 25 times in 48 yr's at a S.I.. In how many yr's will it become 49 times at S.I. ?

Sol

Amount = P + SI (P → Principal)

$25P = P + 24P$

$25P = P + 24P$

$\checkmark 24P \propto 48y$

$\uparrow SI \propto t \uparrow$

$A = P + SI$

$49P = P + 48P$

↑ 8P → 96 yrs ↑

@ CI $P_1 + I_1 = A_1 = P_2$

$P + \frac{PR}{100} = P\left(1 + \frac{R}{100}\right)^1 = A_1 = P_2$

$$A_n = P\left(1 + \frac{R}{100}\right)^n$$

$$CI = A_n - P$$

Amount is compounded {half yearly (hy)}

P, R = 10% per year; t = 2 years

$A_2 = P\left(1 + \frac{5}{100}\right)^4$

~~(Amount is compounded Quately)~~ @ + 1 yr

P, R = 5% per half yearly (phy), t = 2y

$A_2 = P\left(1 + \frac{2.5}{100}\right)^8$

$*\ (CI - SI)_{2yr} = P\left(\frac{R}{100}\right)^2$

$*\ (CI - SI)_{3yr} = P\left(\frac{R}{100}\right)^3 + 3P\left(\frac{R}{100}\right)^2$

Rs 100 @ 10%.

	CI	SI
P	100	100
I_1	10	10
P_2	100 (+10)	100
I_2	10 (+1)	10

$$\left(\frac{PR}{100}\right)\times\frac{R}{100} = P\left(\frac{R}{100}\right)^2$$

Q Certain sum of money doubles itself in 5yrs at C.I. . In how many years will it become 8 times at C.I.

Sol CI

'm' times in 'y' years

(m^n) —"— $(n \times y)$ years

2 times in 5 years

$8 \approx 2^3$ (times) in $3 \times 5 = 15$ yrs

$$A = P\left(1+\frac{R}{100}\right)^n$$

$$2P = P\left(1+\frac{R}{100}\right)^5$$

$$8P = P\left(1+\frac{R}{100}\right)^{15}$$

cubing

$$8P = P\left(1+\frac{R}{100}\right)^{15}$$

Q49
Q79
than
Pg 52
Q2
Q10

(49) → ~~Smitha's~~ → ~~20% annually.~~

~~$A = (1.2)^n$~~

~~$f(n=3)$~~

$$A = P\left(1+\frac{R}{100}\right)^n$$

$$P\left(1+\frac{20}{100}\right)^n$$

$$A = (1.2)^n$$

$f(n=3) = 1.728\ P$

$f(n=4) = 2.07P$

$$A = P\left(1 + \frac{R}{100}\right)^n$$

$$2P = P\left(1 + \frac{R}{100}\right)^{10}$$

$$2^{1/10} = \left(1 + \frac{R}{100}\right)$$

Q2 $A = P + SI$

$3080 = P + \frac{PR \times 3}{100}$

$3400 = P + \frac{PR \times 5}{100}$

320 ← 2y (SI)

160 ← 1y (SI)

$2600 + (160 \times 3) = 3080$ ← interest

$2600 + 800 = 3400$

T10 $5324 = P\left(1 + \frac{R}{100}\right)^3$

$4840 = P\left(1 + \frac{R}{100}\right)^2$

Q A large cube was dipped in paint, taken out and then divided into 64 equal smaller cubes. how many cubes are painted on 3 sides, 2 sides, 1 side, 0 side.

Solution

every layer

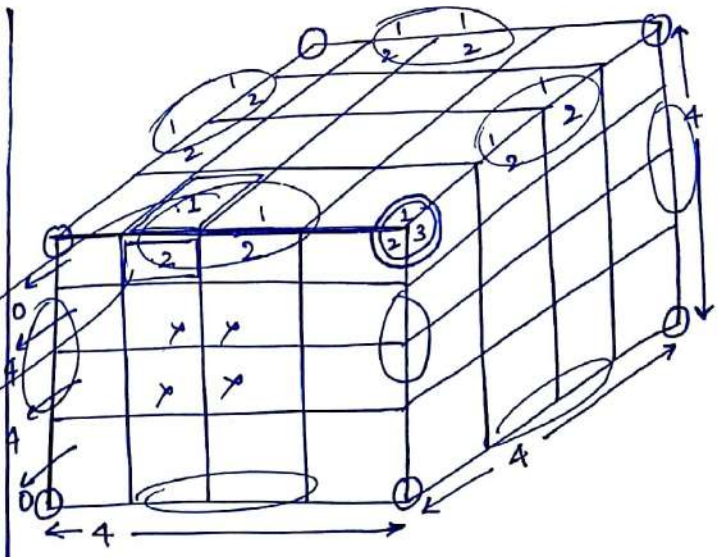
$T = (4 \times 4) \times 4 = 64$

$3S = 8$

↑ 3 side

$2S = 2 \times 12 = 24$

$1S = 4 \times 6 = 24$.



+ Top front of the same cube

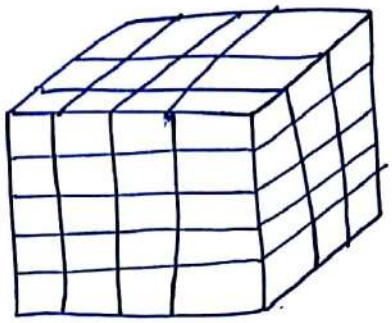
$0S$ = Remaining = 8

$2S = 2 \times 12 = 24$.

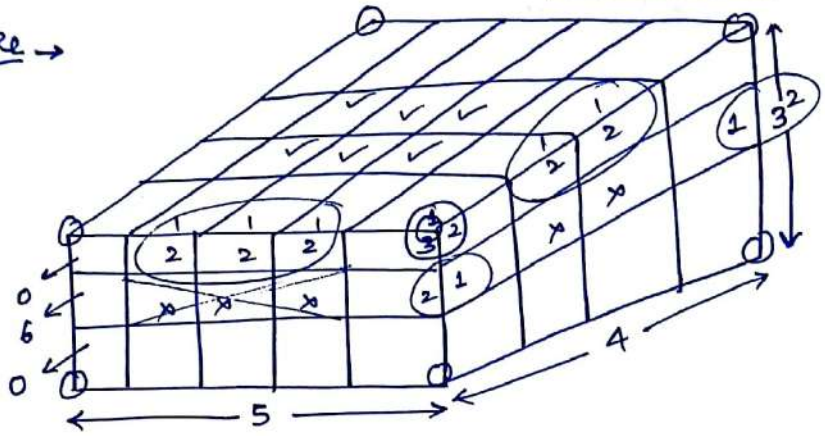
2 side

Q A large cube was dipped in paint, taken out and then its length was divided into 5, width was divided into 4, height → into 3 equal parts. then, how many cuboids are painted on 3s, 2s, 1s, 0s.

Sol



Re →



$T = (5 \times 4) \times 3 = 60$

$3s = 8 \cdot +$

$2s = 4[(3)+(2)+(1)] = 24 \cdot$

$+$

$1s = 2[(3)+(2)+6] = 22$

$0s = 6$

Q159 (56) ✓

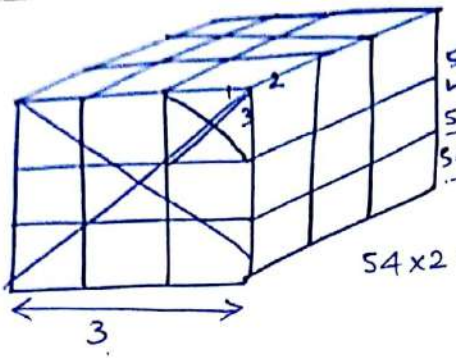
$T.S.A. = 6(side)^2$

$6(4)^2$

$TSA = 96$ ✓

Q121

(121)



54×3
54×1
54×2

$54 \times 2 = 108$ ——— = No V.A.

$6(\text{side})^2 = \text{TSA}$

$6(1)^2 \times 27 = \text{T.S.A.}$

$6(3)^2 = \text{V.A.}$

$+, -, \times, \div$

$\uparrow \downarrow \times \div$

Rule on Averages → ① If each and every obsr. in a set is $\uparrow, \downarrow, \times, \div$ by an constant, then their arithmetic mean is also $\uparrow, \downarrow, \times, \div$ by the same constant.

② Sum of the deviations taken from arithmetic mean is equal to zero.

(19) Pg 71

$$\text{Standard deviation} = \frac{\sqrt{d_1^2 + d_2^2 + \cdots + d_n^2}}{n}$$

* $d_1 = -2$ $d_2 = 0$ $d_3 = 2$
* 1 3 5 $\bar{x} = 3$
* 8 10 12 $\bar{x} = 10$
* $d_1 = -2$ $d_2 = 0$ $d_3 = +2$

Q47

a ✓
b ✗ avg atleast.
c ✓
d ✗ avg every.

(b) ✓

* 'T' → 95% ile → 94.3, 94, 95 → consistency high
  5% ile → 92.3, 92, 91
  Avg 93

('α') → 95% ile → 5.3, 5, 6
  Avg 4
  5% ile → 2, 3, 3.3

B	95, 97, 96	highly inconsistent
95/ile	Avg 12	
5/ile	2, 1, 3	

Gate 2016

(181)

37) Q (Pg 73)

2012 → M - W → 41°C

T - T → 43°C

T → 15% > M

15% of 41

SIR

$\frac{M+T+W}{3} = 41$

$\frac{T+W+Th}{3} = 43$

$M + T + W = 123$

$T + W + Th = 129$

$Th - M = 6$

$Th = 1.15M$

2. The average weight of 25 students was 42 kg's. Two new student having weight 54 and 66 kg joins the class. What's the new average.

Sol

$\frac{\text{Sum}}{N} = \bar{x}$ ← average

N → No.

$\text{Sum} = N\bar{x}$

$\text{Sum} = 42 \times 25$

$= 1050 + 54 + 66$

07

12 ← 54
24 ← 66

$\frac{26}{273} = 1.33$

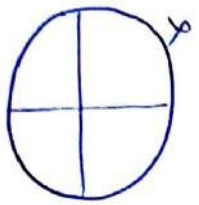
43.3

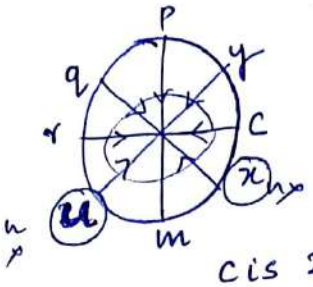
68	-2
75	+5
77	+3
62	-8
69	-1
74	+4

70 + 1/6

70.66

* Seating Arrangement





c is 2 places right of m.

r is → → → left → → o

① equal parts.

② @ centre.

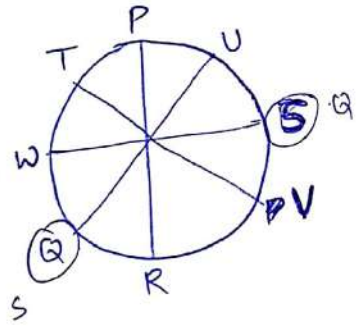
③ R → Immediate Right.
L → Immediate left.

④ $\begin{bmatrix} ACB \\ BCA \end{bmatrix}$

⑤ (m u)
(n m)

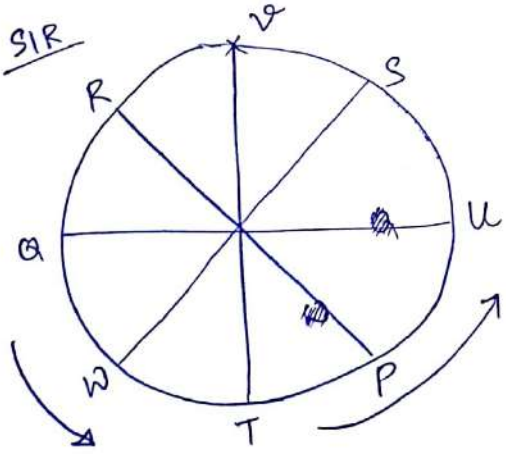
⑥ (u n p)

Q3
Q4
Q5



T ① ⑤ P ④
⑥ W ②

SIR



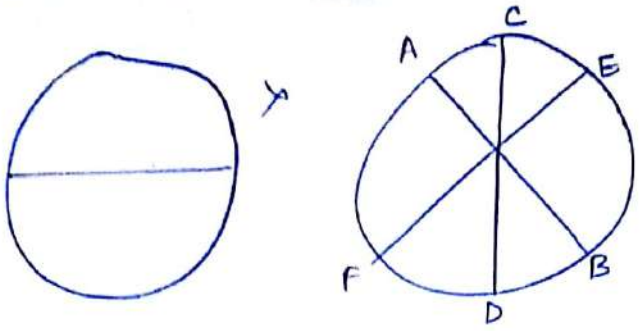
or $\begin{bmatrix} \cancel{TWQ} \\ QWT \end{bmatrix}$ → not allowed

, Q ↔ V

$\overrightarrow{TP}$, P ↔ R

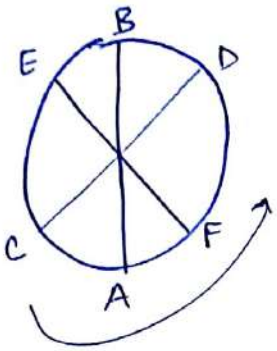
$\begin{bmatrix} RS \\ SR \end{bmatrix}$

(9)



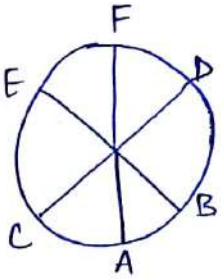
br
ar

SIR



[GDB]
[BDE]

; E — A — D



* BLOOD RELATIONS

There are 5 Rules :-

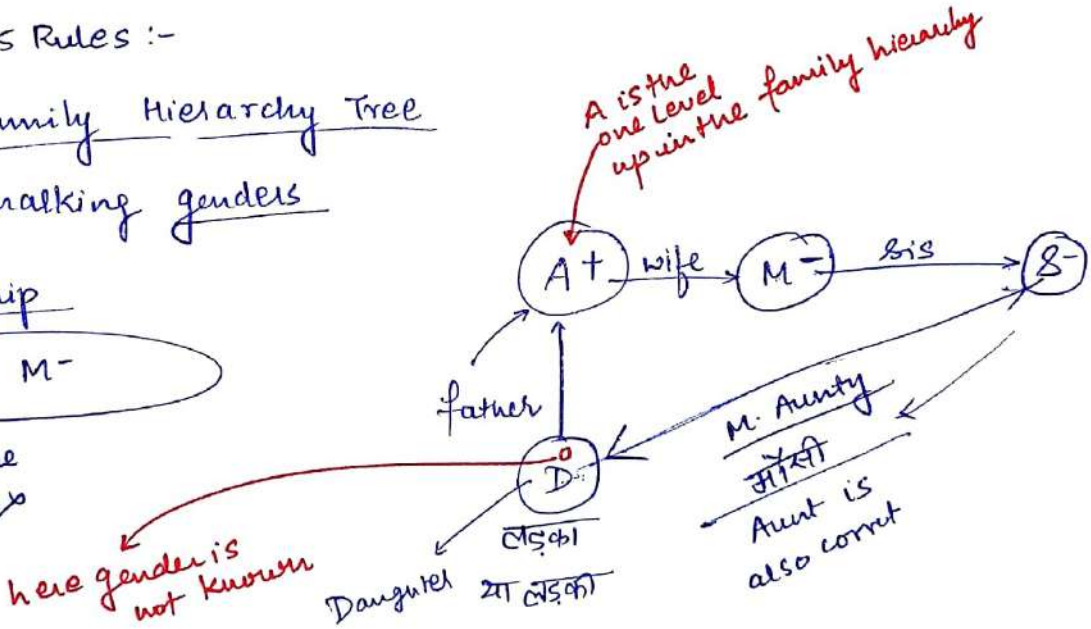
(1) Draw family Hierarchy Tree

(2) keep on making genders

(3) Relationship

(4) A+ wife ⇄ M−

(5) dont Assume dont Names



Either Nephew or Niece (D with S−)

or

C · B · D

↓

cannot be determined.

but Nephew ✗ Neice ✗

Q1 (M) woman

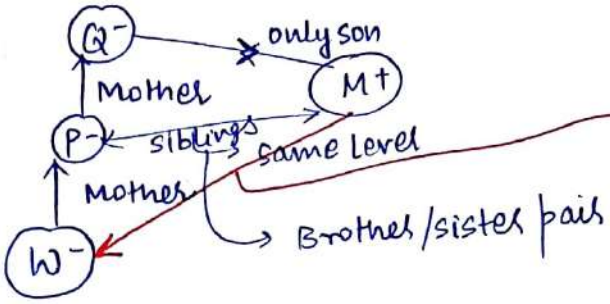
B A (mother)

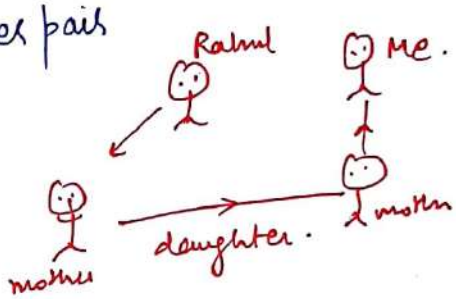
B (Mother)

(C) ✓

Q2

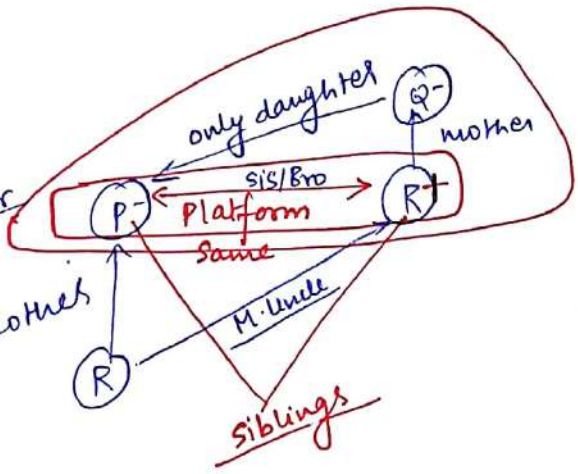
Q1 Sir



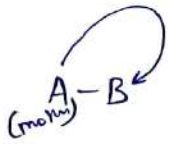


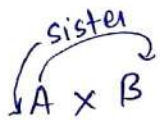
Women related to Man

Q2 Sir



Q9





Analytical Reasoning

Pg 66

(3) A B C D E F

Support

DS support → Finance

E, F → marketing

F → operations ← C & E

support support

support

A → Finance & IT

main

(3) C ✓

(4) Oper (a) ✓ ✗

(5) A & (a) ✓ ✗

(9) (a) M + K + R

K Bro → M +

Mother

M. uncle

R

(10) X × M → + T

M + Sist → S -

father

P. Aunt

T

(11) P × Q → S

Q - wife → S +

son

husband

father

P +

Pg no. 66

categories 6

	Hock.	volley	cricket	base	foot
R	✓	✓		✓	
K	✓	✓	✓		
S	✓			✓	✓
G		✓	✓	✓	✓
M				✓	✓

Q1

Q2

(3) C ✓

(4) Strg

SIR

categories here are only 2

	co-ordinat	support
A	Finance	IT
B	Finance	Strg (4)
C	Finance	opr
D	IT (3)	Fin
E	mktg	opr
F	opr.	mktg

[3 people - Co-ordinate - Fin]

K → E → mktg

K → F

A → K → Fin ← K ← D

A → K → IT

⑥ Pg67 7 books

please write in short

① Socio.
② Educ.
③ Acc.
④ < English
⑤ Eco
⑥ Ssycho
⑦ Hindi

Eco ✗

Eco → साथमें होंगी
Psycho
Hindi

⑥ ✓

Rules (ध्यान दें कृपया) :-

B follow A
OR
A is followed by B

8AM → A
8:15AM → B

A > B
B > C
C > F
shortest

⑦ 5 Girls

K → 2nd height

Ⓐ → K < R ✓
Ⓑ → P > R ✓
Ⓒ → P > M
Ⓓ → R & M
Ⓔ → R > M
Ⓕ → N > P
Ⓖ → R > N

1
2
3 --
4 Ⓐ < K ✓ - - —
5

↑ ascending

P > R
P > M
R > M
N > P

N < P > R > M

d) 7 ✓

K < R
R & M = R = M
R > N

K < R = M > N ✓
d)

⑧ A < B
C < D
B < C
A > E ✓

C > B > A > E

WB Pg67 5 girls

R
K
P

R > P ✗

P > R
P > M
N > P

SIR solutions

⑦ Height
1 2
K

P > R ← shortest one have to come from R and P
P > M
R > M
N > P

3 2 1
N > K > P > M > M

दो एक बार भी left side आ गया तो count वहीं होगा shortest भी

ascd ↑

Age

K ≠ Younger

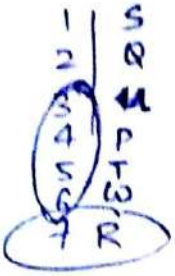
R < R ✗
P < M
R ≠ M
R < N

youngest one to have come from R P P R

> P

N > R = M > K > P
1 2 3 4
3 2
↓ desc

(11)



(20 to 22)

A K S, R N

R Y W G B

R P O S W

K → S → Y

S → R → R* & W*

N → P → B & Y

A → W

R → Y or G

(d)

	Red	Yellow	Blue	white	Green	
Amar						reading
kap						playing
Sas						outing
Roh						giving
Nag						writing

(21)

	Red	Yellow	Blue	white	Green	Read	Play	outing	Sing	writing
Amal		✗			✗					✓
kapil	—	✗	—	—					✓	
Salvesh	✓					✗				✗
Rohan										
Nagesh	✗	✗	✗	✗			✓			

N.P.

SIR's Solution

	colour		hobby
A	~~Blue~~ yellow		write ✓
K	Yellow ✗	Blue or green or white	Sing ✓
S	Red. ✓		Read ✗ out write ✗ ✓
R	yellow ✗ green ✗	Blue or white	Read ✓ ✓
N	Blue ✗ yellow ✗	white or green	Play ✓

Not single

(23) R → Blue

(24) Kapil → can't be determined. ✓

A → even

B → odd

Eswar doesnot live on floor number Bhola.

Don't tabulate.

Q44 → (Gate ??)

A	B	C	D	E	F
1					
2					
⋮					
soon.					

(b) ✓ Bullshit.

(50) 4 children

SOM < Riaz

Shiv < Ansu

Ansu < group

youngest

sir → SOM < Ria ✓

Ansu < Shiv

Shiv (or) Riaz

(a) ✓

Pg (80)
Q) 101

P Q R S T U

	H	P	D	T	F
P					
Q					
R					
S	✓				
T					
U					

dont Tabulate the data

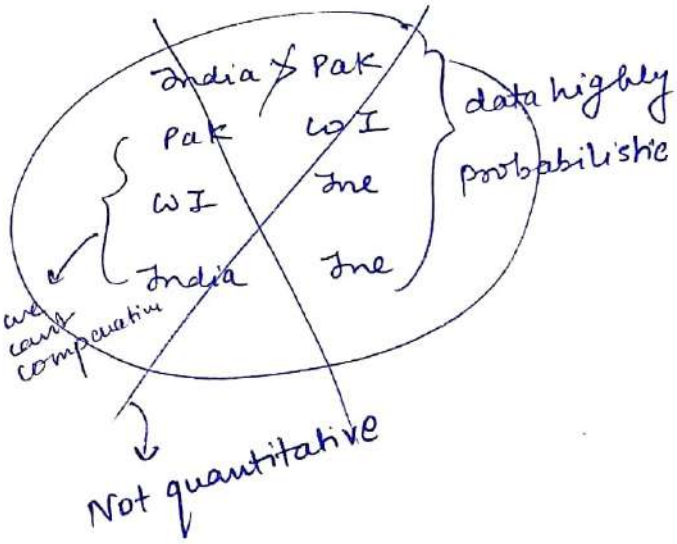
(a) ✗ R - Defence
(d) ✗ R - Telecom
(c) S & U cant be together

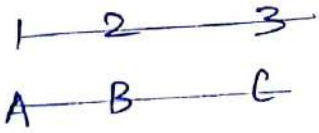
(b) ← Ans

Q161 Pg 88

A > B
B > C
A > B > C

} ~~if~~ Since data is quantitative





161 sir (4) ✓

copy cohen
↑
Book ✓

Lettering

A(1) B(2) C(3) D _ _ E(5) _ _ F _ _ G _ _ _ H I J(10) K

L M N O(15) P Q R S T(20) U W

V X Y(25) Z(26)

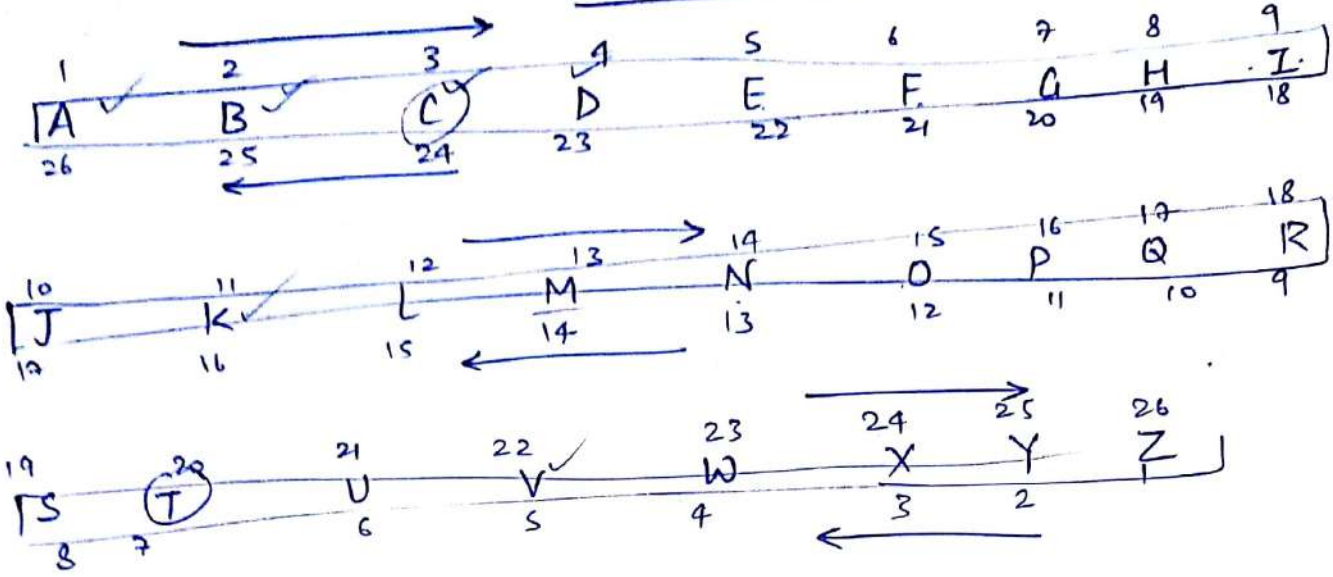
M = 13 + E | J | O | T | Y
5 10 15 20 25

Pg no. 64
Q5
Q8
Q12
Q16

(5) AB = E (1 2 5)
EA = Y (5 1 25)
CD = Y (3 4 25)
BC = M (13)

(6) CAT =

LETTERING



M = 13 + E | J | O | T | Y
5 10 15 20 25

8

(16) ABK : V :: BCD : _____ 10

(c) ✓

(12) CARPET : TCEAPR :: _____ : LNAANTOI
5 20 20 5

(6) ✓

(5) →

SIR (5)

A B = E $1^2 + 2^2$ = 5	E A = y $5^2 + 1^2$ = 26 = Z
C D = y $3^2 + 4^2$ = 25	LNAAN

(12) CARPET : TCEAPR

: TCEAPR

NATIONAL : LNAANTOI

A B K : 19
1 x 2 x 11 : 22

B C D
2 x 3 x 1 = 2X

B ← D (C) → E
O ← (R) P → E

Q21
22
24
25 | 27

(21) BOARD : CPBSE

CHAIR :

BHOPAL EERMDI

NAGPUR

SIR (21) (B H O P A L) : (E E R M D I)
2 8 15 16 1 5 5 18 13 4

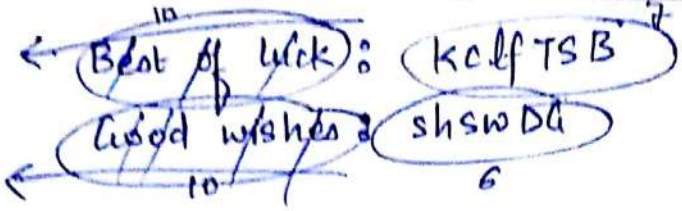
+3 | -3 | +3 | -3 | +3

(22) MONKEY ← Y : X D J M N L
-1 -1

YEKNOM

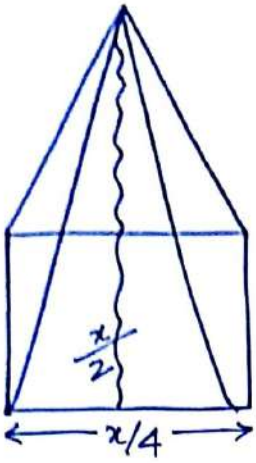
M O N K E Y : X D J M N L
-1 -1 -1 -1 -1

Tiger : Q
(-1)



NS
Alg
GateQns
Doubt

*



Q172 → $x \times \frac{x/2}{2}$

$\frac{x^2}{4}$

$\frac{1}{2} \times \left(\frac{x}{4}\right) \times \left(\frac{x}{2}\right)$

$\frac{x^2}{16} \times 4$

Q163 L↑ N↓ → e^x.

80 units — 100 cycles

Load ↑ — N ↑

40 units — 10,000 ← N

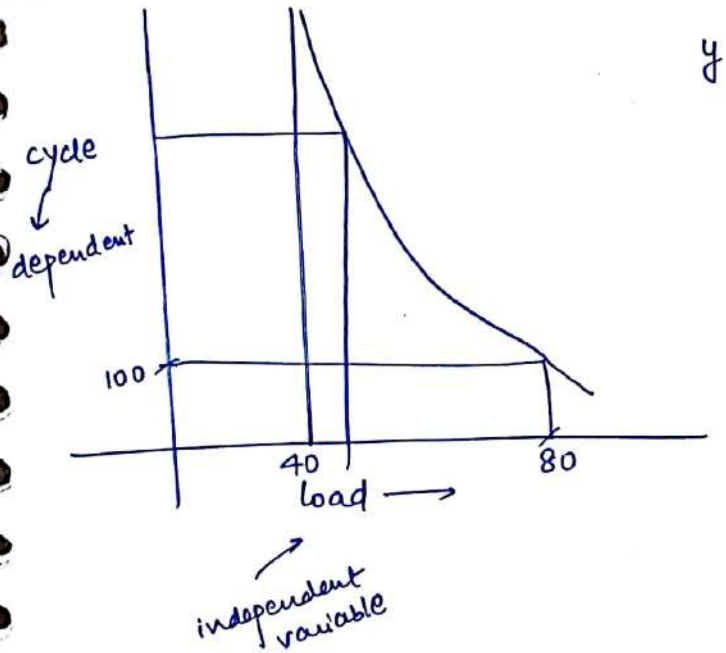
5,000 ← N

✓100 → 80 ✓

✓10000 → 40 ✓

✓5000 → —.

10,000 → 5000



$y = ke^x$

$y = e^{ax}$ | $y = ka^x$

$\frac{k a^{80}}{k a^{40}} = \frac{100}{10000}$

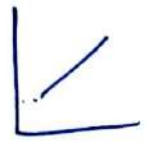
$a^{40} = 1/100$

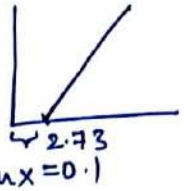
(169) $\frac{x}{100}y + \frac{y}{100}x$

$\frac{2xy}{100}$

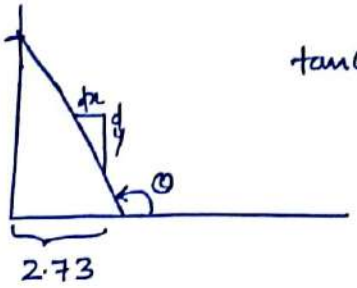
2% of xy

(157) $(\ln x, y)$





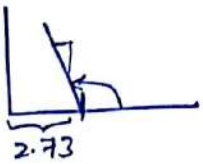
$\ln x = 0.1$



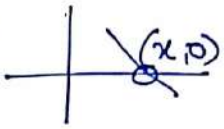
$\tan\theta = -0.02$

$\log_e x = 1$

$x = e^1$



(SIR) $(Y - y_1) = m(X - x_1)$



$(x_1, y_1) \longrightarrow m$

$\ln x$ — general

$\ln x = .1$

$(Y - 0) = m(X - .1)$

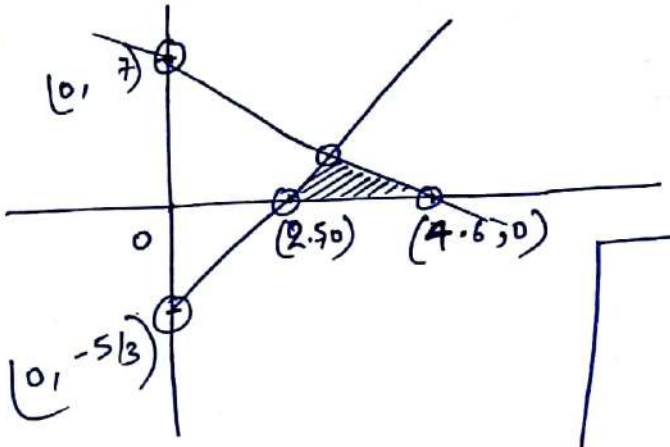
$(Y - 0) = -.02(X - .1)$

$Y = \frac{-2}{100}(X - .1)$

$Y = \frac{-2}{100}(\ln 5 - .1)$

(156) $3x+2y=14$

$2x-3y=5$



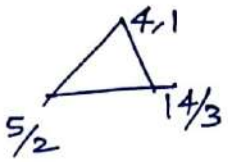
$3x+2y=14$

$x=0$	$y=0$ 4.66
$y=7$ ✓	$x=14/3$
	$x=4.\overline{6}$

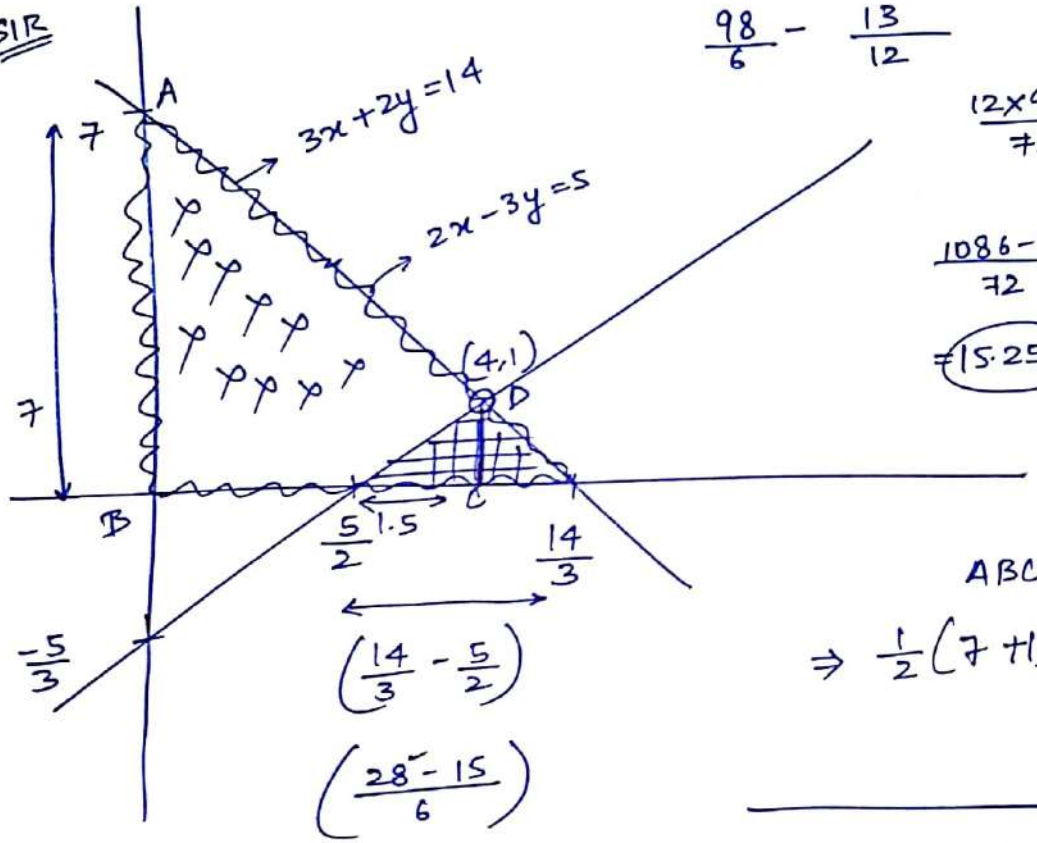
$2x-3y=5$

$x=0$	$y=0$ 2.5
$y=-5/3$	$x=5/2$

$\frac{1}{2} \times \frac{14}{3} \times 7 - \frac{1}{2}\left(\frac{14}{3} - \frac{5}{2}\right)1$



SIR



$\left(\frac{14}{3} - \frac{5}{2}\right)$

$\left(\frac{28-15}{6}\right)$

$\left(\frac{13}{6}\right)$

$\frac{98}{6} - \frac{13}{12}$

$\frac{12 \times 98 - 13 \times 6}{72}$

$\frac{1086-78}{72}$

$= 15.25$

78

98 | 12
10 6
98 ×
1086

13
×6
78

ABCD (Trapezium)

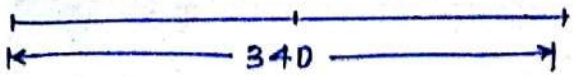
$\Rightarrow \frac{1}{2}(7+1) \times 4 = \frac{8}{2} \times 4$

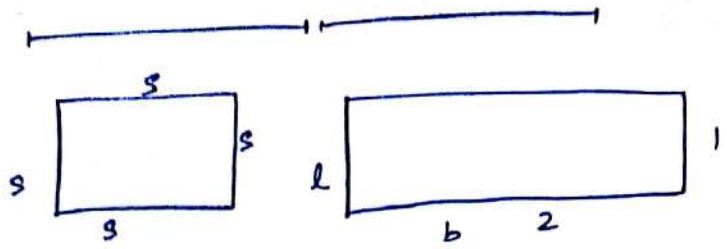
$= \frac{32}{2} = 16$

$\frac{1}{2} \times 1.5 \times 1 = -.75$

15.25

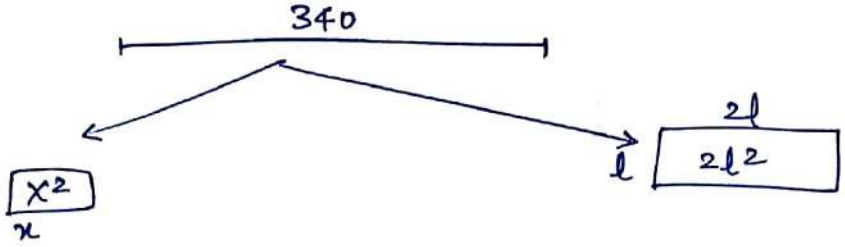
(150)





$A_S + A_R \rightarrow$ minm.

SIR



$4x + 6l = 340$

$\left[l = \frac{340 - 4x}{6} \right]$

$A = x^2 + 2l^2$

$A = x^2 + \left(\frac{340 - 4x}{6} \right)^2$.

(141)

50% ← prone TB → infection

30% ← ~~infected~~ → develops the disease.

70%. ✓ (c) ✓

(146) S, M, E, F

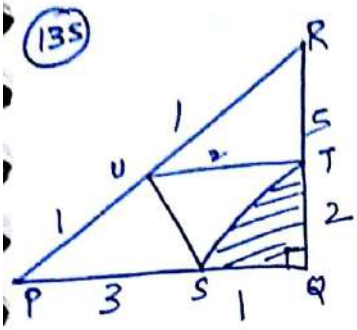
M → 2y → ½ E

S, M → 6 hr

E, F → 12 hr

Q135 Q132 Q138

(135)



$\frac{PS}{QS} = \frac{3}{1}$ $\frac{PU}{UR} = \frac{1}{1}$ $\frac{RT}{QT} = \frac{5}{2}$ $A_{QTS} = 20 \text{ um}^2$

$\frac{1}{2} \times UT \times RT + \frac{1}{2} UT \times TQ + \frac{1}{2} \times PS \times QT$

$\frac{1}{2} UT(RT + QT) + \frac{1}{2} PS(QT)$

$\frac{1}{2} \frac{UT}{QT} QT\left(\frac{RT}{QT} + 1\right) + \frac{1}{2} \frac{PS}{QS}(QT \times QS)$

$\frac{1}{2} UT\, QT\, (5/2 + 1) + \frac{1}{2} 3(QT \times QS)$

$\frac{1}{2} UT\, QT \left(\frac{7}{2}\right) + 60$

$\frac{1}{2} \frac{UT}{QS} \times (QT \times QS) \frac{7}{2} + 60$

$\frac{UT}{QS} \quad 35 + 60$

$\frac{UT}{QS} \quad 70 + 60$ ✓

$\frac{1}{2} QT \times QS = 20$

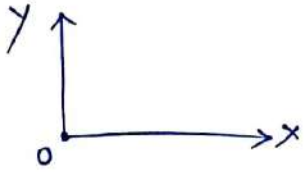
40

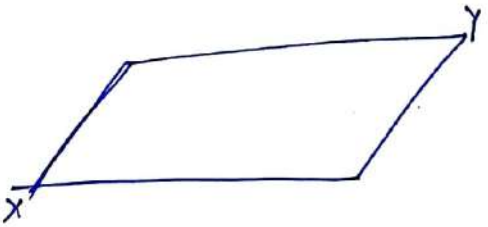
$1^2 = \sqrt{5^2 + b^2}$

$1 - 5^2 =$

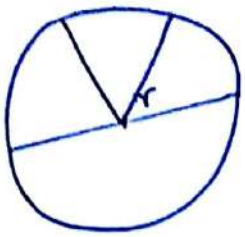
-4

(138)





132.



$r = 30\text{cm}$

Remaining area $= 0.9 \times \pi (30)^2$ = lateral surface area of the cone

$= \pi R (30)$ ← slant height (l)

$\Rightarrow R = 27$

$\Rightarrow r = 30$

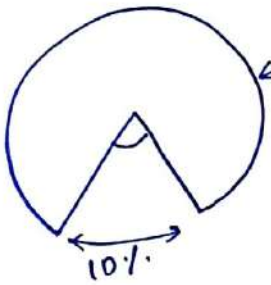
$h^2 + 27^2 = 30^2$

$h = \sqrt{30^2 - 27^2}$

$\frac{R}{h} = \frac{27}{13.076}$

$h = 13.076$

*



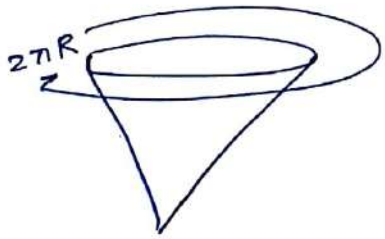
$\frac{\theta}{360^\circ}(2\pi R)$ area also 10% ↓

$\frac{\theta}{360^\circ}(\pi R^2)$

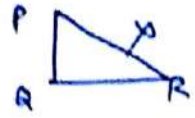
Linear dependency.

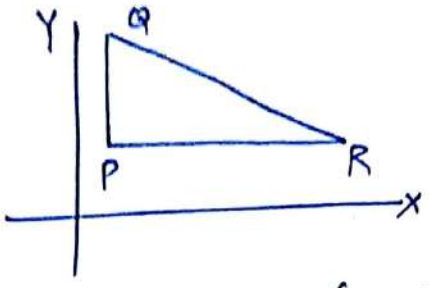
$\Rightarrow (2\pi R\theta)\ 0.9 = 2\pi R$

30 $R = 27$



138

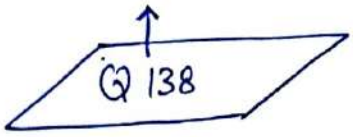




$P(x_1, y_1)$

$Q(x_2, y_2)$

$R(x_3, y_3)$



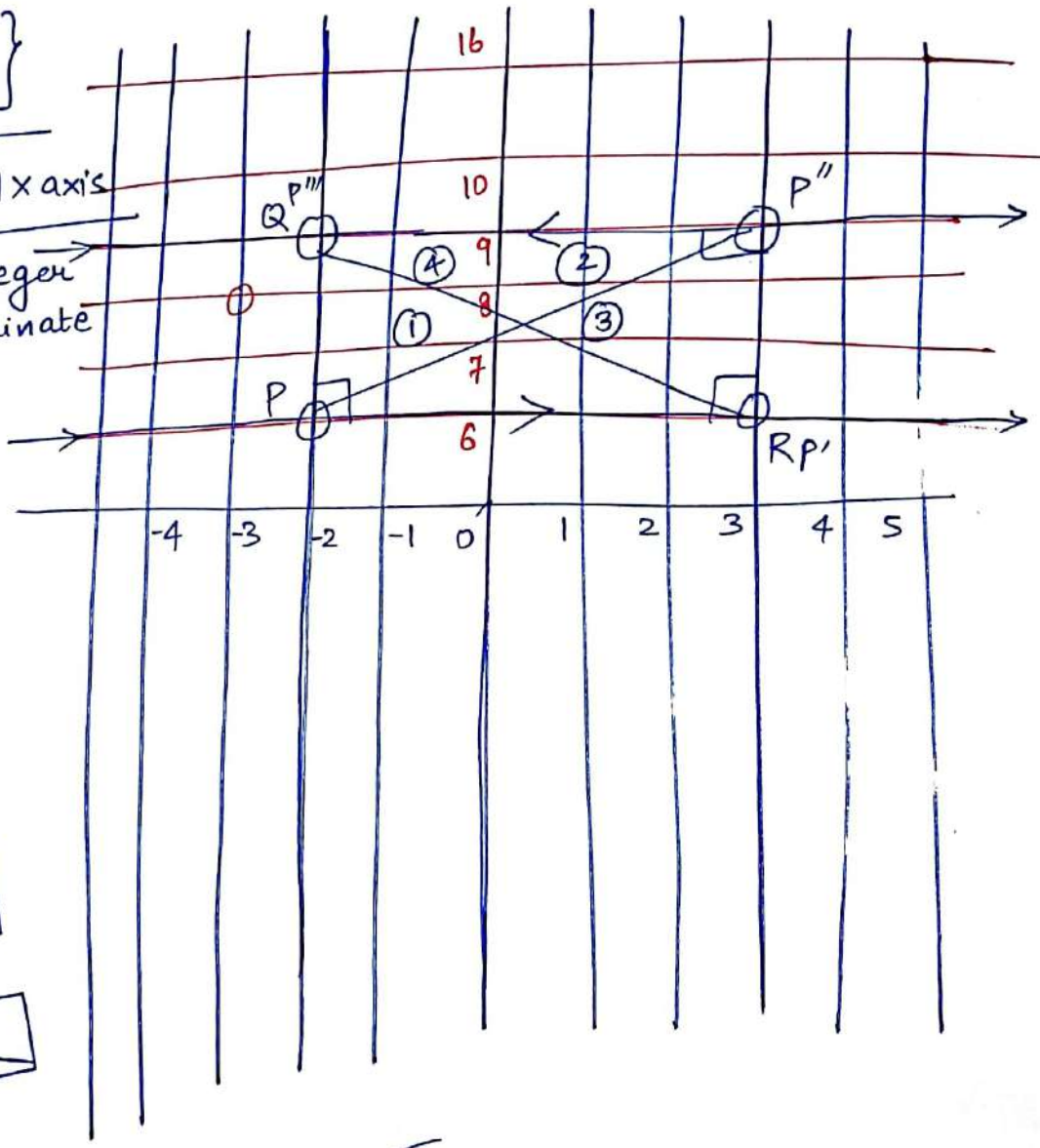
$-4 \le x \le 5$

$-6 \le y \le 16$

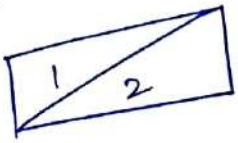
$\{-4 \le x \le 5\}$
$\{-6 \le y \le 16\}$

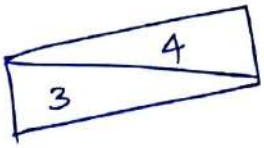
$\angle P = 90°$, PR || X axis

PQR → integer coordinate



$[{}^{11}C_2 \times {}^{10}C_2] \times 4$





126, 127, 136, ✓

126 $a^2+b^2+c^2 = 1$ $\quad ab+bc+ac$

$(a+b+c)^2 = \underbrace{a^2+b^2+c^2}_{1} + 2ab+2b+2ca$

$\underbrace{+2(ab+bc+ca)}$

1 + 2

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

$(-1) + (a+b+c)^2 = 2(ab+bc+ca)_{min}$ (+ve/0)

↳ min $(-1/2)$ (-b) ✓

1 for making min^m this value make =0

But

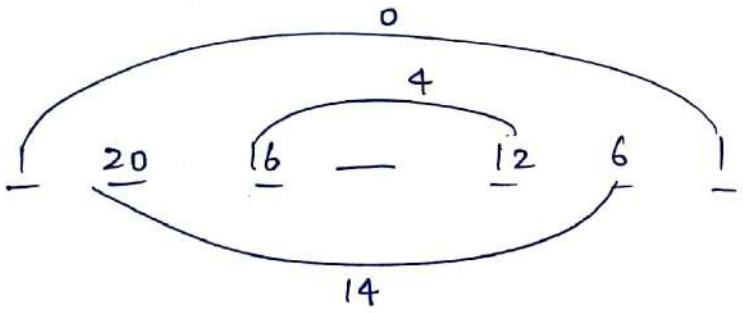
$[-1/2, 1/2]$

$[-1/2, 1]$ } in cat

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

$2(ab+bc+ca)_{max} = 2(1) - [(a-b)^2 + (b-c)^2 + (c-a)^2]$ (each ≥ 0)

122



15 ✓

$2 \times \frac{6}{21}$ ✓

$3 \times \frac{3}{24}$ ✓

$\frac{9}{15}$ ✓

$4 \times \frac{3}{41}$

SIR

(6) 5 ✓ (4)

(7+4) ✓ 7 (2+1)

(1+9+2) ✓ 8 (1+2+1)

118

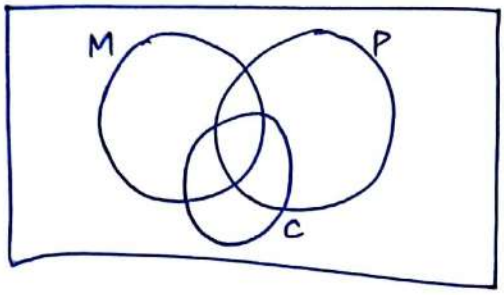
M → M
P → P
C → C

75% → atleast one
50% → atleast two
40% → exactly two

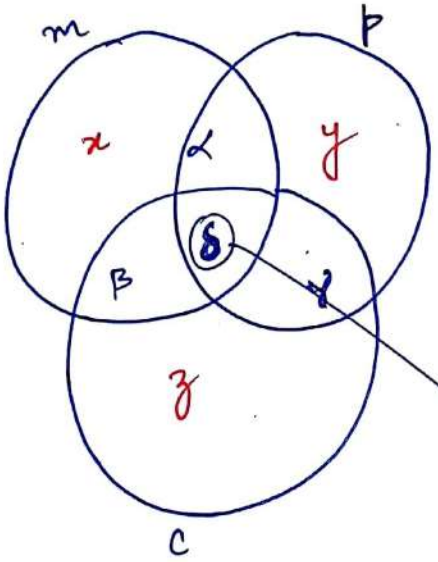
$p+m+c = 27/20$

$p+m+c = 13/20$

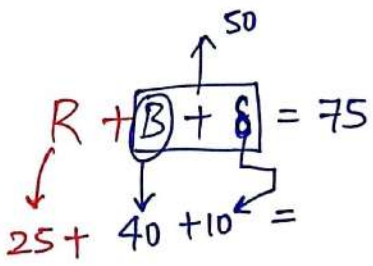
$p \times m \times c = 1/10$



SIR



$\delta = 10\% \cdot \frac{1}{10}$



$m \times p \times c = 1/10$

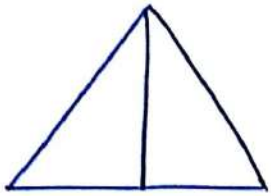
(2) $m+p+c = \frac{13}{20} = \frac{65}{100} = 65\%$ $\because < 75\%$

$m+p+c = \frac{135}{100} = \frac{27}{20}$

$R + 2B + 3\delta$

$25 + 2(40) + 3(10) = 135$

(112)



113 only read h rem $\left(\frac{p \times q}{r \times s}\right)$ if $(p \times q) > (r \times s)$

SIR $h = Re\left(\frac{7 \times 3}{5 \times 2}\right) = 1$ ✓

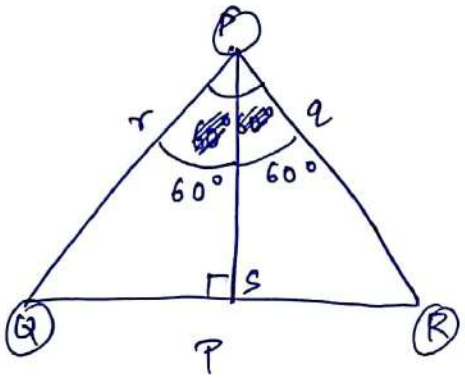
fg(1,4,6,8).

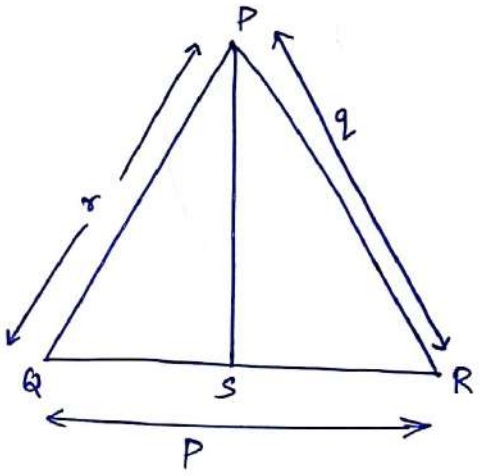
f(1,4,6,8) g(1,4,6,8)

max(p,q,r,s) min(p,q,r,s)

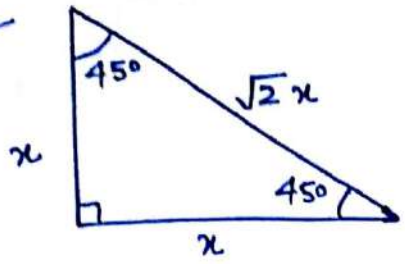
max (8) × (1) = (8)

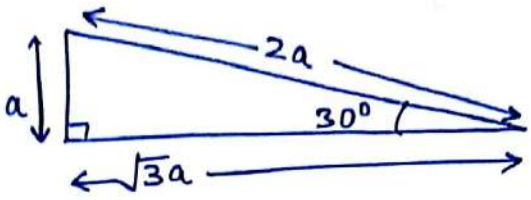
112

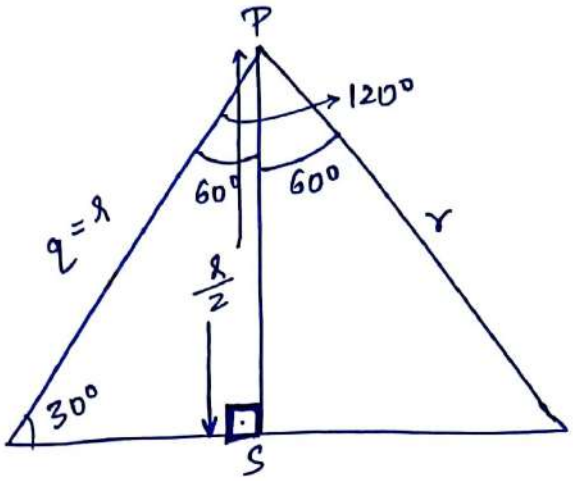


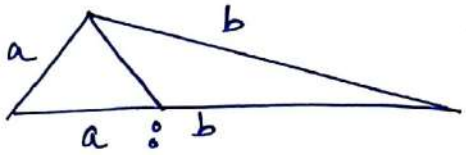


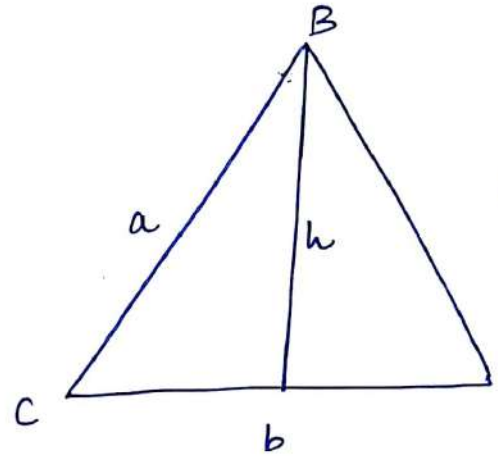
112







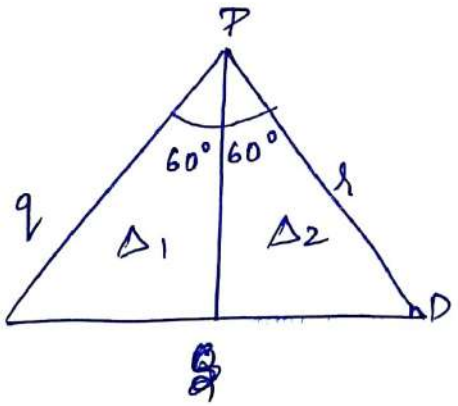




$\frac{h}{a} = \sin C$

$h = a \sin C$

$\frac{1}{2} \times b \times h = \frac{1}{2} \times ab \sin C$



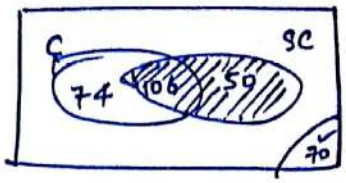
$\frac{1}{2} \times qPS \sin 60° + \frac{1}{2} rPS \sin 60°$

$\Delta = \frac{1}{2} qr \sin(120°)$

$PS(q+r) = rq$

89

Car	74
SC	50
Both	106
None	70



$\left[\frac{74+70}{300}\right] \times 100$

88 D → 10% → T. F.

SIR $(100 \times 2)\ 5 = 1000$

100 − 10 ✓
− 5 ✓
15 ✓

1 Ticket → 85/-

$(85 \times 2) \times 5 = 850$

76 100B ⟶ 4 B

R ⟶ 1B → defective

5 DB ✓

SIR $T = 100$

$D = 5$

$D = 95$

fc

$Tc = \frac{{}^{95}C_4}{{}^{100}C_4}$ ✓

Total chances

$(.95)^4$ ✓

73 Q Population

66 Q [HH] [HT] [~~TH~~]

$$\frac{\frac{1}{2} \times \frac{1}{2}}{\left[\frac{1}{2} \times 1 + \frac{1}{2} \times \frac{1}{2}\right]} = \frac{1/4}{3/4} = \frac{1}{3}$$