An intelligent ~~reader~~ trader is carrying three sacks having 30 coconuts each. None of the sacks can carry more than 30 coconuts. Now he has to pass through 30 check points and at each check point he has to give one coconut for each sack he is carrying. How many coconuts will be left?

Check point	Sack I	Check point	Sack II	Check point	Sack III
	30		30		30
1	3	11	2	26	1
2	3	12	2	27	1
3	3	13	2	↓	
↓		↓		30	
10		25	2		5
	30		30		

25 coconuts left

$$999\frac{1}{7} + 999\frac{2}{7} + 999\frac{3}{7} + 999\frac{4}{7} + 999\frac{5}{7} + 999\frac{6}{7}$$

$$\begin{array}{r} 999\,6 \\ 7 \\ \hline 6993 \end{array}$$

$$= 999+\frac{1}{7} + 999+\frac{2}{7} + 999+\frac{3}{7} + 999+\frac{4}{7} + 999+\frac{5}{7} + 999+\frac{6}{7}$$

$$= 999\times 6 + \left(\frac{1}{7}+\frac{2}{7}+\frac{3}{7}+\frac{4}{7}+\frac{5}{7}+\frac{6}{7}\right)$$

$$= 5994 + \left(\frac{21}{7}3\right) = 5997$$

TEST OF DIVISIBILITY.

Multiples -

what are the multiples of 3.

↓

3, 6, 9, 12, 15, 18, 21, 24, 27, 30.

↓

smallest number is the 3 itself.

Factors.

Factor of 12.

↓

1, 2, 3, 4, 6, 12.

Factor are those numbers which perfectly divide that number.

1 is the smallest.

12 greatest is the number itself.

DIVISIBILITY RULE :-

1: All number is divisible by 1.

2: 0/2/4/6/8

3: Sum of the digits must be divisible by 3.

eg: 597324 = 5+9+7+3+2+4

= 30 - divisible by 3.

what will be the remainder of 77777 if divided by 3 = 7+7+7+7+7 = 35.

$= \frac{35}{3} = 11\frac{5}{3}$.

11
3)35(
3
5

4: Last two digits must be divisible by 4.

$\frac{7300}{4} = 73 \times 100 - 25 \times 4$.

5: 0/5.

6 : if a number is divisible by 2 and 3.

7 : divisible by 7.

8 : Last 3 digits must be divisible by 8.

16 : Last 4 digits divisible by 16.

$2^4 = 16$.

32 : Last 5 digits divisible by 32

$2^5 = 32$.

64 : Last 6 digits divisible by 64

$2^6 = 64$.

79346125878

= 8 is divible by 2 by the last 2 digits not divisible by 4.

9 : Sum of the digits must be divisible by 9.

$4+5+3+2+1+7+8+6+5 = 41$.

not divisible by 9., remainder will be 5

$9\overline{)41}\,(4$
36
5

3 co-prime.

6 → (1) 2, 3, 6

8 → (1) 2, 4, 8

After 1, a if any other number are common, they are not co-prime

14 → (1) 2, 7, 14

15 → (1) 3, 5, 15

Apart from one, no other number common, they are co-prime.

(62939)
~~125878~~
~~64~~
32

10: last digit 0.

11: 0 or multiple of 11.

5 4 3 2 7 9 6 8
Odd, Odd
Even, Even

(Adding the odd) and the even)
then subtracting.

$(8+9+2+4) - (6+7+3+5)$

$23 - 21$

$= 2$

~~4 5 6 8 7 4 1 5 6 2~~ 4 5 6 8 7 4 1 5 6 2

~~4+6+7+1~~ $(4+6+7+1+6) = 24$

$(5+8+4+5+2) = 24$

$= 24 - 24$

$= 0$

Pairing.

8 8 8 8 8 8 8 8 ← 8 is not divible by 11.
odd number not divisible

Pairing

7 7 7 7 7 7 ← Even number divisible by 11.

12: if a number is divible by 3 and 4.

= 7943152,68 · = 7+9+4+3+1+5+2+68 = 45

= Last two digits divisible by 4.

= 45 is divisible by 3.

3) 45 (15
3
15
45

15 : 3 and 5.

18 : 2 and 9.

20 : 0, 2, 4, 6, 8.

22 : 2 and 11

24 : 3 and 8.

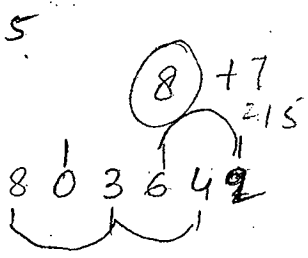
1739542 8 ← not divisible by 8.

$= 1+7+3+9+5+4+2+8$.

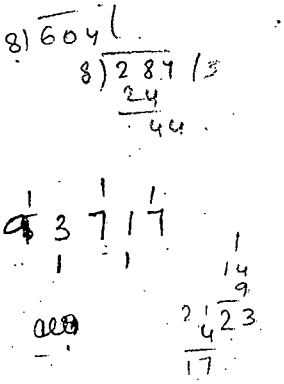
25 : 25, 50, 75, 00.

55 : 5 and 11

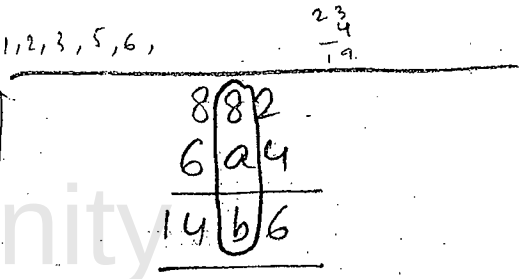
72 : 8 and 9.



15 - 15



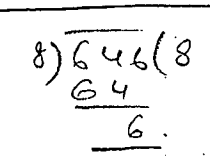
1, 2, 3, 5, 6,



Taking the smallest number to be 0. as value of a.

$$\begin{array}{ccc} 8 & 8 & 8 \\ +a & +0 & +1 \\ \hline b & 8 & 9 \end{array} \quad a = 10$$

$b = 6$.



1 2 3 4 5 6 7 8 9 10 11 12 13 .....

9 digits

111 digits.

110 + 1

↓

2 × 55

9 + 1 = 10

9 + 2 = 11.

9 + 3 = 12.

↓ ↓

9 + 55 = 64.

10, 11, 12, 13 ..... 63, 64,

119 digits complete only 1 digits is left after 64, we only take 6 of 65.

$10^{25} - 7$ & $10^{24} - x$

$[(10^{25} - 7) - (10^{24} - x)]$

$[10^{25} - 7 - 10^{24} - x]$

$[10^{25} - 10^{24} - 7 + x$

$10^{24}(10 - 1) - 7 + x$

$10^{24} \times 9 - 7 + x$

$-7 + x$

$x = 0, \quad -7 + 0 = -7$

$= 1, \quad -7 + 1 = -6.$

$(10^{25} - 7)$ & $(10^{24} - x)$

$10^1 - 7 = 3$

$10^2 - 7 = 93$

$10^3 - 7 = 993.$

$x = 0.$

$10 - 0 = 10.$

$10 - 1 = 9.$

$10 - 2 = 8.$

Induction Method.

FACTORS.

$18 \longrightarrow 1, 2, 3, 6, 9, 18.$

$90 \longrightarrow$

2	90
3	45
3	15
5	5
	1

$= 2^1 \times 3^2 \times 5^1$

Taken for eg.

$= a^p \times b^q \times c^r.$

No. of factors $(n) = (p+1) \times (q+1) \times (r+1)$

$= (1+1)(2+1)(1+1)$

$= 2 \times 3 \times 2$

$= 12$

144 , 375 , 270.

2	144
2	72
2	36
2	18
3	9
3	3
	1

$2^4 \times 3^2$

$a^p \times b^q$

$(1+4) \times (1+2)$

$= 5 \times 3$

$= 15.$

5	375
5	75
5	15
3	3
	1

$5^3 \times 3^1$

$a^p \times b^q$

$(1+3) \times (1+1)$

4×2

$= 8$

2	270
5	135
3	27
3	9
3	3
	1

$2^1 \times 5^1 \times 3^3$

$a^p \times b^q \times c^r.$

$(1+1)(1+1)(1+3)$

$2 \times 2 \times 4$

$= 16$

2	240
2	120
2	60
2	30
3	15
15	5
	1

$2^4 \times 3^1 \times 5^1$

$a^p \times b^q \times c^r$

$(1+4)(1+1)(1+1)$

$= 5 \times 2 \times 2$

$=$

Sum of the factors :

$$\frac{(a^{p+1}-1)(b^{q+1}-1)(c^{r+1}-1)\ldots\ldots}{(a-1)(b-1)(c-1)\ldots\ldots}$$

$$90 \Rightarrow \frac{(2^{1+1}-1)(3^{2+1}-1)(5^{1+1}-1)}{(2-1)(3-1)(5-1)}$$

$$= \frac{(2^2-1)(3^3-1)(5^2-1)}{1 \times 2 \times 4}$$

$$\frac{3 \times 26 \times 243}{8}$$

$= 26 \times 3 \times 3$

$= 234.$

$15 \times 24 = 360$

$a^l \times b^q \times c^r$

$$\frac{(2^{3+1}-1)(3^{1+1}-1)}{(5^{1+1}-1)^{3-1}}$$

$$\frac{2^4-1 \times 3^2-1 \times 5^2-1}{(2-1)(3-1)(5-1)}$$

$$= \frac{15 \times 8 \times 24}{1 \times 2 \times 4}$$

2 | 120
2 | 60
2 | 30
3 | 15
5 | 5
1

$$\frac{15 \times 8 \times 24}{8}$$

144

2 | 144
2 | 72
2 | 36
2 | 18
3 | 9
3 | 3
1

$2^4 \times 3^2 = 403$

$a^l \times b^q$

$$\frac{(2^{4+1}-1)(3^{2+1}-1)}{(2-1)(3-1)}$$

$$= \frac{(2^5-1)(3^3-1)}{1 \times 2}$$

$$= \frac{9 \times 8}{3} = \frac{72}{3} = 24$$

480

2 | 480
2 | 240
2 | 120
2 | 60
2 | 30
3 | 15
5 | 5
1

$2^5 \times 3^1 \times 5^1 = 1512$

$a^p \times b^q \times c^r$

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

$$= \frac{(2^6-1)(3^2-1)(5^2-1)}{1 \times 2 \times 4}$$

$=$

420

2 | 420
2 | 210
5 | 105
3 | 21
7 | 7
1

$= 1344.$

210
105
2
210

Product of the factors :-

Product of the number

$= N^{n/2}$.

$\Rightarrow 90 \rightarrow N$.

Factor of $90 = 12 \rightarrow n$.

$90^{12/2} = 90^6$

$10^{25} - 7 - 10^{24} + n$

$10^{25} - 10^{24} - 7 + n$

$10^{24}(10-1) - 7 + n$

$10^{24} \times 9 \quad -7 + n$

A man decided to visit four temples one by one. As soon as he enters the first temple his money gets doubled. When he comes out he donates Rupees 100, then he enters the second temple ..... After the fourth temple, how much money was there with him, if he is left with zero rupees now.

1 — 100
2 — 100
3 — 100
4 — 100

$x \xrightarrow{\times 2} 2x \xrightarrow{-100}$

2 $2x - 100 \xrightarrow{\times 2} 4x - 200 - 100$.

2 $4x - 300 \xrightarrow{\times 2} 8x - 600 - 100$

2 $8x - 700 \xrightarrow{\times 2} 16x - 1400 - 100$

2 $16x - 1500 = 0$.

2 $x = \frac{1500}{16}$

$0 \xrightarrow{+100} 100 \xrightarrow{1/2} 50 \xrightarrow{+100} 150 \xrightarrow{1/2} 75$

$\downarrow +100$.

$\xleftarrow{112} 175$

Divisor — 7 — Quotient

11) 85 (

77

Dividend — 8 — Remainder

∴ Dividend = (Divisor × Quotient) + Remainder.

The difference b/w 11 − 8 = 3 added to 85 will be greater than Dividend perfectly divisible by 11.

The greatest 3 digit number perfectly divisible by 36.

$$\begin{array}{r} 27 \\ 36\overline{)999} \\ 72 \\ \hline 279 \\ 252 \\ \hline 27 \end{array}$$

$$\begin{array}{r} 27 \\ 36\overline{)999} \\ 72 \\ \hline 279 \\ 252 \\ \hline 27 \end{array}$$

$$\begin{array}{r} 999 \\ -\ 27 \\ \hline 972 \end{array}$$ — Perfectly divisible by 36.

Again adding +7 will leave a remainder of 5 not divisible.

The greatest 3 digit number perfectly divisible by 27 and 42.

$$\begin{array}{r} 2 \\ 42\overline{)999} \\ 84 \\ \hline 159 \\ 126 \\ \hline 33 \end{array}$$

$$\begin{array}{r} 37 \\ 27\overline{)999} \\ 81 \\ \hline 189 \\ 189 \\ \hline \times \end{array}$$

999 is perfectly divisible by 27.

In order 999 − 33 = 966 perfectly divisible by 42.

Find out the smallest four digit number perfectly divisible by 32.

$$\begin{array}{r} 31 \\ 32\overline{)1000} \\ 96 \\ \hline 40 \\ 32 \\ \hline 8 \end{array}$$

$32 - 8 = 24.$

$1000 + 24 = 1024$. is perfectly divisible by 24.

Smallest four digit number perfectly divisible by 40 and 54.

$54 - 28 = 26$.

$1000 + 26 = 1026$.

perfectly divisible by 54.

$$\begin{array}{r|l} 54 & 1000 \\ 54 & 18 \\ \hline 460 & \\ 432 & \\ \hline 28 & \end{array}$$

$$\begin{array}{r|l} 40 & 1000 \\ 80 & 25 \\ \hline 200 & \\ 200 & \\ \hline \times & \end{array}$$

54×2, $54 \times 5 = 270$, $54 \times 2 = 108$

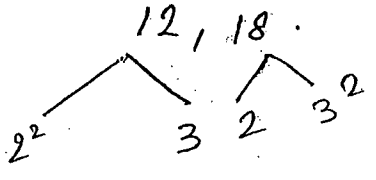
$54 \times 8 = 432$, 54×3

$972 + 7$

$= 979$.

LCM.

The smallest possible number which is perfectly divisible



$LCM = 2^2 \times 3^2$.

$= 36$.

$$\begin{array}{r|l} 2 & 12, 18 \\ 2 & 6, 9 \\ 3 & 3, 9 \\ 3 & 1, 3 \\ \hline & 1, 1. \end{array}$$

$2 \times 2 \times 3 \times 3$.

$= 36$.

Find out the LCM of 24, 35, 18.

$3 \times 3 \times 2 \times 2 \times 2 \times 5 \times 7$

$= 2520$

$$\begin{array}{r|l} 3 & 24, 35, 18. \\ 3 & 8, 35, 6 \\ 2 & 8, 35, 2 \\ 2 & 4, 35, 1 \\ 2 & 2, 35, 1 \\ 5 & 1, 35, 1 \end{array}$$

LCM of 27, 15, 6, 32.

$3 \times 3 \times 3 \times 2 \times 2 \times 2 \times 2 \times 2 \times 5$

$2 \quad 4320$.

160 | 1
27 | 4
120
20×
1320

3	27, 15, 6, 32
3	9, 5, 6, 32
3	3, 5, 2, 32
2	1, 5, 2, 32
2	1, 5, 1, 16
2	1, 5, 1, 8
2	1, 5, 1, 4
2	1, 5, 1, 2
5	1, 5, 1, 1
	1, 1, 1, 1

LCM of 12, 15.

2 60

Perfectly divisible by both 12 & 15.

$60 \times 2 = 120$.

$60 \times 3 = 180$.

$60 \times 4 = 240$.

Greatest 3 digit perfectly divisible by 12 and 15.

60) 999 (16
60
399
360
39

999.
−39.
960.

Smallest three digit number perfectly divisible by 8, 12, 15.

$2 \times 2 \times 2 \times 3 \times 5 = 120$.

1000 will be perfectly divisible by 8, 12, 15.

$120 \overline{)1000}$

2	8, 12, 15
2	4, 6, 15
2	2, 3, 15
3	1, 3, 15
1	1, 1, 5
	1, 1, 1

Find the greatest 3 digit number when divided by 12 and 15 leaves remainder 7.

LCM of 12 & 15.

$2 \mid 60$.

$999 - 39, 960$.

$+7$.

$= 967$.

$60 \overline{)999}$ (16, 39, 60, 6)

60
399
360
39

Smallest four digit number which when divided by 11, 12, 15, leaves remainder 3

LCM = 660.

$660 \times 2 = 1320$.

Perfectly divisible by 11, 12, 15.

$1320 + 3$.

$= 1323$.

$660 \overline{)1000}$

3	11, 12, 15
2	11, 4, 5
2	11, 2, 5
5	11, 1, 5
11	11, 1, 1
	1, 1, 1

11 × 20 = 220; 220 × 3 = 660.

66 × 2 = 132.

Smallest no, which when divided by 12 leaves remainder 10, and when divided by 15 leaves remainder 13.

LCM of 12, 15 = 60

1020 perfectly divisible = 60.

by 12 & 15.

$1020 - 10 = 1030$

$1020 + 13 = 1033$

$60) 1000 (16$
60
400
360
40

In case of common difference.

$2 - (12 \downarrow 10)$ $2 - (15 \downarrow 13)$

i) LCM = 60. ii) 60 is perfectly divisible.

$60 - 2$

$= 58$.

$12) 58 (4$
48
10

$15) 58 (3$
45
13

In case of greatest 3 digit no.

i) LCM = 60 ii) 960 perfectly divisible.

Now substract the common difference.

$960 - 2 = 958$.

Find out the greatest 3 digit which when divided by 7, 8, 12, leaves respective remainder of 4, 5, 9.

$2 \times 2 \times 2 \times 3 \times 7$

$= 168$

Common diff. = 3

i) LCM = 168

ii) 840 - perfectly divisible.

iii) 840 - 3

= 837.

2 | 7, 8, 12

2 | 7, 4, 6

7, 2, 3

168) 1000 (5

840

160

$1018 - 3 = 1015$

$168 - 150 = 18$

60) 999 (5

840

59

Find out the smallest four digit number which when divided by 6, 7, 8, 9 leaves remainder of 3, 4, 5, 6.

Common Diff - 3.

LCM = 504.

$504 \times 2 = 1008$ perfectly divisible.

$1008 - 3$

$= 1005$.

1.

$2 \times 2 \times 3 \times 3 \times 5 \times 5$

550.

2	12, 15, 18, 25, 30
2	6, 15, 9, 25, 15
3	3, 15, 9, 25, 15
5	1, 5, 3, 25, 5
	1, 1, 3, 5, 1

$550 \overline{)1000(} \; 1$

550

450

$1000 - 100 = 900$

$550 - 450 = 100$

$2 \times 3 \times 12 = 72$

2.

$2 \times 2 \times 2 \times 3 \times 3$

$= 72$

LCM = 72.

Common remainder = 7.

$72 + 7 = 79$

2	18, 24, 36,
3	9, 12, 18
3	3, 4, 6
2	1, 4, 2
	1, 2, 1

$72 \times 2 = 144$

$72 \times 3 = 216$

$72 \times 5 = 360$

$72 - 36 = 36$

12

$72 \overline{)1000(}$

72

180

144

36

$1000 - 36 = 64$

$1036 + 7 = 1043$

3.

I – 36, 72, 108, 144 ....

II – 48, 96, 144 ....

III – 72, 144, 216 ....

IV – 108, 216, 324 ....

LCM – 36, 48, 72, 108.

2×432

$= 7$ mins 12 sec.

Seven thieves stole a few number of diamonds from a diamond merchant while returning they decided to take rest, while all were sleeping 2 of them got up and decided to divide all of the diamonds equally among them. They divided equally but one was left. So, they woke up the third thief.

LCM = 2, 3, 4, 5, 6 = 60.

Common Remainder = 1.

$60 + 1 = 61$

$60 \times 2 = 120 + 1 = 121$

$60 \times 3 = 180 + 1 = 181$

$60 \times 4 = 240 + 1 = 241$

$60 \times 5 = 300 + 1 = 301$

4)242(2
22

Home Assignment-

1.

40
3
120

2 | 5, 8, 12, 30
2 | 5, 4, 6, 15
5 | 5, 2, 3, 15
3 | 1, 2, 3, 3
1, 2, 1, 1

2 × 2 × 2 × 5 × 3
= 120

120
× 2
240
+ 2
242

38
- 66
62

66
80
86

2 | 38, 66, 80
2 | 19, 11, 40
2 | 19, 11, 20
19, 11, 10

880
× 19
792
88×
1672

2 × 2 × 2 × 2 × 5 × 19 × 11
= 16720

7. 15, 20, 25, 35
(+10) ↓ 5, ↓ 10, ↓ 15, ↓ 25

2 | 2, 3, 4, 5, 6
1, 3, 2, 5, 3

2 × 2 × 3 × 5
= 60
× 3
180

15, 20, 25, 35

L.C.M = 2100

(*) We substract the common diff.

2100 - 10 = 2090

13. LCM = 5, 6, 8, 9
= 360

(*) Common remainder we add = 360 + 3
= 363

6, 7, 8, 9, 12

19. I. — 2, 4, 6, 8 .....

II — 3, 9, 12, 15 .....

III — 4, 8, 12, 16 .....

IV — 5, 10, 15, 20 .....

V — 6, 12, 18, 24 .....

2, 3, 4, 5, 6 — LCM

= 60 days. 3 days.

— 1st time they are meeting on the 1st day. ✓

— 2nd time they will meeting on 61st days. ✓

— 3rd time they will be meeting on 121st days. ✓

— 4th time they will be meeting on 181st days.

Exam approach.

i) LCM = 60 days.

ii) 180 (3) days

60 days

If it was 181 then it would have been 1st 3.5 then would have

H.C.F

H C F

Highest Common Factor.

12 : 1, 2, 3, 4, 6, 12

18 : 1, 2, 3, 6, 18.

H.C.F = 6

1. 24, 36

$2^3 \times 3$ $\quad$ $2^2 \times 3^2$

H.C.F = $2^2 \times 3^1$

= 12.

24)36(1
24
12)24(2
24
x

2. 72, 180, 432.

180)432(2
360
72)180(2
144
36)72(2
72
x

H.C.F of 180, 432

2 | 36

36 | 72
72
x

3. 90, 180, 432.

H.C.F 36.

36)90(2
72
18)36(2
36.
x

So, H.C.F of 90, 180, 432 is 18.

4. 180, 540, 1188

540)1188(2
1080
108)540(8
540.
x

108)180(1
108
72)108(1
72
36)72(2
72
x

H.C.F = 36.

540 | 2
1080
540 | 3
1620
108 | 5
540
108 | 2
216
72 | 3
216
36 | 2
72
144

5. 27, 63, 144, 384

$27\overline{)63}(2$, 54, $9\overline{)27}(3$, 27, $\times$.

$144\overline{)384}(2$, 288, $96\overline{)144}(1$, 96, $48\overline{)96}(2$, 96, $\times$.

$9\overline{)48}(5$, 45, $3\overline{)9}(3$, 9, $\times$.

H.C.F = 3.

6. Find out the greatest number that will divide 105 leaving remainder 9 and 175 leaving remainder 7.

$105 - 9 = 96$

$175 - 7 = 168$.

$96\overline{)168}(1$, 96, $72\overline{)96}(1$, 72, $24\overline{)72}(3$, 72, $\times$.

Ans: 24

7. 81, 99, 180.

Difference 99.

Difference 18, Difference 81

18, 81, 99.

The H.C.F cannot be greater than 18

H.C.F of 18, 81, 99

= 9.

H.C.F cannot be greater than their difference.

Class Test -

4. 37 ——— leaves remainder 2.

58 ——— 4 4 3

37 − 2 = 35

58 − 3 = 55

35) 55 (1
35
20) 35 (1
20
15) 20 (1
15
5) 15 (3
15
∝

Ans: 5.

5. 144, 216, 480, 528

72 | 144
2 | 2
288

144) 216 (1
144
72) 144 (2
144
×

480) 528 (1
480
48) 480 (10
480
×

1
48
2
96

48) 72 (1
48
24) 48 (2
24
×

6.

786 ——— 4
991 ——— 5
1196 ——— 6

786 − 4 = 782

991 − 5 = 986

1196 − 6 = 1190

1
170 | 986 | 1
2 | 2
340 | 972
204
2
204 | 408
4 | 204
816 | 3
612
204
5
1020
34 | 2
5
170
34 | 1
3 | 34
3
68 | 102

986) 1190 (1
986
204) 986 (4
816
170) 204 (1
170
34) 170 (5
170
×

34) 782 (10
340
442

23
34) 782 (
68
102
102
×

Ans : 34

Home Assignment

5. 36, 42, 105, 135

```
36 ) 42 ( 1
     36
     --
      6 ) 36 ( 6
          36
          --
           x
```

```
105 ) 135 ( 1
      105
      ---
       30 ) 105 ( 3
            90
            --
            15 ) 30 ( 2
                 30
                 --
                  x
```

```
6 ) 15 ( 2
    12
    --
     3 ) 6 ( 2
         6
         -
         x
```

Ans : 63

6. 117, 130, 143

```
130 ) 143 ( 1
      130
      ---
       13 ) 130 ( 10
            130
            ---
             x
```

```
13 ) 117 ( 9
     117
     ---
      x
```

H.C.F = 13

13	117,	130,	143
	9,	10,	143

2. 38, 66, 80

42

28 14

⇒ 38 66

28 28

10 R=10

```
14 ) 38 ( 2        14 ) 66 ( 4
     28                 56
     --                 --
     10                 10
```

```
14 ) 80 ( 5
     70
     --
     10
```

Ans : 14.

17. 1709, 1879, 2399.

$$\begin{array}{r} 1879 \\ -1709 \\ \hline 170 \end{array} \qquad \begin{array}{r} 2399 \\ -1879 \\ \hline 520 \end{array}$$

$$\begin{array}{r} 2399 \\ -1709 \\ \hline 690 \end{array}$$

6. 117, 130, 143:

H.C.F = 13.

$\frac{117}{13} = 9.$

$\frac{130}{13} = 10.$

$\frac{143}{13} = 12.$

$= 9+10+13 = 30.$

↳ LCM of Fractions = $\frac{\text{LCM of Numerator}}{\text{HCF of Denominator}}$

↳ HCF of Fractions : $\frac{\text{HCF of Numerator}}{\text{LCM of Denominator}}$.

$\frac{3}{5}, \frac{9}{25}, \frac{81}{125}$

LCM $= \frac{\text{LCM of } 3, 9, 81}{\text{HCF of } 5, 25, 125} = \frac{81}{5}$

HCF $= \frac{\text{HCF of } 3, 9, 81}{\text{LCM of } 5, 25, 125} = \frac{3}{125}$

↳ $x \times y = LCM \times HCF$

LCM of 24, 36, 72.

HCF of 24, 36, 12.

$24 \times 36 = 864$

$72 \times 12 = 864$.

24
×36
144
72×
864

HOME ASSIGNMENT :

4. 3, 5, 7, 11

Suppose, A, B, C, D are 4 runners running at 3 km/hr.

$A = \frac{3}{3}$ hr

$= 1$ hr, 2, 3, 4.

$B = \frac{3}{5}$ hrs

$= \frac{3}{5}, \frac{6}{5}, \frac{9}{5}$

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

$= \frac{6}{7}, \frac{9}{7}, \frac{12}{7}$.

$D = \frac{3}{11}$

$= \frac{6}{11}, \frac{9}{11}$

LCM of $1, \frac{3}{5}, \frac{3}{7}, \frac{3}{11}$

$= \frac{3}{1}$ hr.

= 3 hrs.

They started at 5 am

then they meet at 5+3

2 8 am.

8. H.C.F = a.

LCM = 2900% more than HCF.

= 2900% more than 'a'

= 29 times more than 'a'

∴ LCM = 29a + a

= 30a.

LCM + HCF = 310

30a + HCF = 310

30a + a = 310

31a = 310

a = 10.

HCF = a ⟶ 10.

$x \times y = LCM \times HCF$

$20 \times y = 300 \times 10$ (15)

= 150.

9. $x \times y = LCM \times HCF$

$21 \times 4641 = x \times y$.

(×1)

a) 273, 357 (×21)

b) 231 × 378 (×) = 8.

c) 252 378 (16.)

d) 273 399 (24)

Factorial $n!$

$n! = n \times (n-1) \times (n-2) \times \_\_\_\_ 3 \times 2 \times 1$

$7! = 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1$

$6! = 6 \times 5 \times 4 \times 3 \times 2 \times 1$

$5! = 5 \times 4 \times 3 \times 2 \times 1$

$7! = 7 \times 6!$

$7! = 7 \times 6 \times 5!$

What will be the LCM of 8 & 5 Factorial?

LCM = 8 - can't be greater than the number itself.

HCF = 5 - smallest one

$73!, 225!, 786!$

LCM = $786!$

HCF = $73!$

↳ Find the maximum power of 3 that can perfectly divide $10!$

$3^n \mid 10!$

$$10! = \frac{10 \times 9 \times 8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1}{3 \times 3 \times 3 \times 3}$$

3^4

3 | 10 | 3
9
1

To find out the multiples of 3 in 10 factorials.

$$\frac{10!}{3^n} = \frac{10}{3} + \frac{10}{3^2}$$

$$\Downarrow \quad + \quad \downarrow$$

$$3 + 1$$

↳ Maximum power of 3 that can perfectly divide 100!

$$\frac{100!}{3^n} = \frac{100}{3} + \frac{100}{3^2} + \frac{100}{3^3} + \frac{100}{3^4}$$

$$\Downarrow \quad \Downarrow \quad \Downarrow$$

$$33 \quad 99 \quad 3 + 1$$

$$= 3^{48}.$$

$$\frac{100!}{3^n} = \frac{100}{3} = 33 \quad +$$

$$\Rightarrow \frac{33}{3} = 11 \quad +$$

$$\Rightarrow \frac{11}{3} = 3 \quad +$$

$$\Rightarrow \frac{3}{3} = 1$$

$$48$$

↳ max. power of 11 that can perfectly divide 400!, max. power of 7 → 800!.

$$\frac{400!}{11} = \frac{400}{11} = 36.$$

$$+$$

$$\Rightarrow \frac{36}{11} = 3$$

$$\Rightarrow \frac{3}{11}$$

$$39.$$

$$\Rightarrow \frac{800}{7} = 114$$

$$+$$

$$\Rightarrow \frac{114}{7} = 16$$

$$+$$

$$\Rightarrow \frac{16}{7} = 2.$$

$$132.$$

↳ Find the max. power of 8 that can divide 200!.

$$\frac{200!}{8^n} = \frac{200}{8} = 25.$$

$$+$$

$$= \frac{25}{8} = 3.$$

$$+$$

$$= \frac{3}{8} = \underline{28}.$$

25
8) 200 (
16
40
40.
3
8) 25 (
24

multiples of 8 = 2×2×2

as we have 3 multiples of 2

we will ~~multiples~~ of 8.

$$\frac{200!}{8^n} \quad \text{2} \quad \frac{200!}{2} = 100$$

$$+$$

$$\frac{100}{2} = 50$$

$$+$$

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

$$+$$

$$\frac{25}{2} = 12$$

$$+$$

$$\frac{12}{2} = 6$$

$$+$$

$$\frac{6}{2} = 3$$

$$+$$

$$\frac{3}{2} = 1 = \underline{197}$$

2 200! = 2^{197}

$2^{197} = 8^{65}$

$2^3 = 8$.

8^{65}

$\frac{200!}{8^n} = 8^{65}$

65
3) 197
18
17
15
2

1/
2×2×2

↳ $\frac{100!}{6^n}$

$6 = 2 \times 3$

$= \frac{100!}{3^n} = 48.$

3^{48}

∴ for 6^n

$= 6^{48}$

$\frac{4!}{6^n}$

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

Suppose I am taking

$(2 \times 3) \times (2 \times 3) \times (2 \times 3) \times (2 \times 3) \times (2 \times 3) \times 2 \times 2$

↳ $\frac{500!}{35}$

$35 = 5 \times 7$

$= \frac{500}{7^n} = 71$

$+$

$= \frac{71}{7} = 10$

$+$

$= \frac{10}{7} = 1$

$= \frac{1}{7}$

$82.$

$35^{82}.$

$\frac{300!}{180}$

$180 = 2 \times 3^2$

$= \frac{300}{3} = 100.$

$+$

$= \frac{100}{3} = 33$

$+$

$= \frac{33}{3} = 11$

$+$

$= \frac{11}{3} = 3$

$+$

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

$148.$

$148.$

$= 18 = \frac{9}{74}$

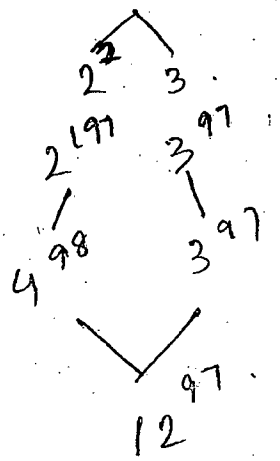
7) 500 (71
49
10
7
3

3) 11 (3
9
2

2) 148 (74
148
0

2) 18 (9
18
0

↳ $\frac{200!}{12^n}$



$2 \frac{200}{2} = 100 +$

$2 \frac{100}{2} = 50 +$

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

$2 \frac{25}{2} = 12 +$

$2 \frac{12}{2} = 6 +$

$2 \frac{6}{2} = 3 +$

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

197

$\frac{200}{3} = 66 +$

$\frac{66}{3} = 22 +$

$2 \frac{22}{3} = 7 +$

$2 \frac{7}{3} = 2$

97

↳ How many zeros are there at the end of 100 factorials?

The maximum power of 10 and the number of zeroes at the end will be same.

10^{24}

↳ Find the max. power 10 of 100!.

$\frac{100}{10}$

$10 / 2 \times 5$

Multiple of 5 will be greater than 2 so, leave 2.

$= \frac{100}{5} \cdot 20$

$+$

$\frac{20}{5} \cdot 4$

$\frac{4}{5}$ ⟶ 0

24.

10^{24}

↳ 12.

H.C.F = a.

LCM = 12 time

LCM = 12a.

$= 13a \cdot 12a$

LCM + HCF = 403.

$12a + a = 403$

$13a = 403$

$a = \frac{403}{13} = 31$

HCF = a — 31

$axy = HCF \times LCM$

$93 \times 4 = 31 \times 372$.

$= 124$.

14 | 403 (28
38
23
14
9

93 | 372 (4
372

20 2:3 30.

↓ ↓

30 ——10—— 40

3 16 x 24.

$x = 30 + 6$

$= 36$

$x = 40 - 4$

$= 36$

49 7:9 63.

↓ ↓

326 ——64—— 390

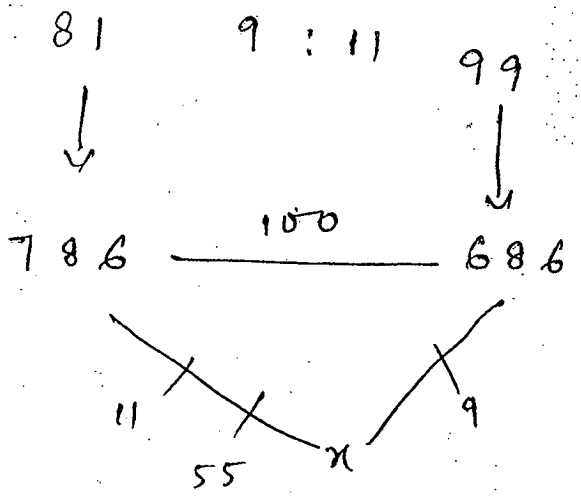
9 36 x 7

$326 + 36$

$= 362.$

$\frac{9}{16} \times 64^{4}$

81 9 : 11 99



786 - 55 = 731

11+9

$\frac{11}{20} \times \frac{100}{5}$.

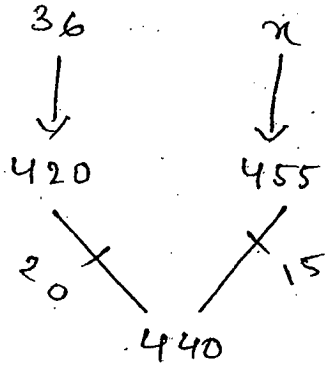
255

$\frac{4 \times 24}{10}$

6:4

2|10
2|420|
4
2
2
0

36 Articles avg. price is Rs 420. x articles avg. price Rs 455 and the over all avg. price is Rs 440.



420 455

440 - 420
= 20

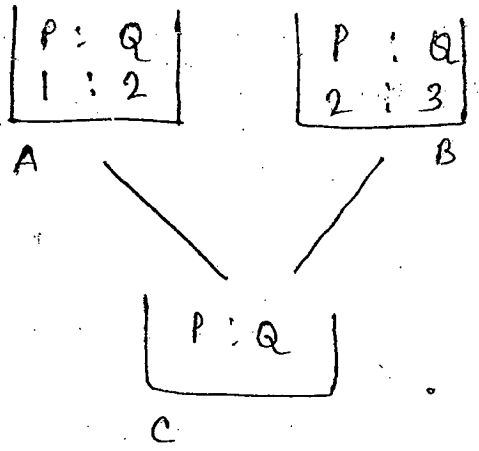
455 - 440
= 15.

The ratio of the diff. = 4:3.

Then inverse it = 3:4.

$x = \frac{4}{3} \times 36^{12}$

= 48.



Vol. of vessel A = x.

Quantity of P = $\frac{1}{3} \times x$.

" " Q = $\frac{2}{3} \times x$.

Vol. of vessel B = x

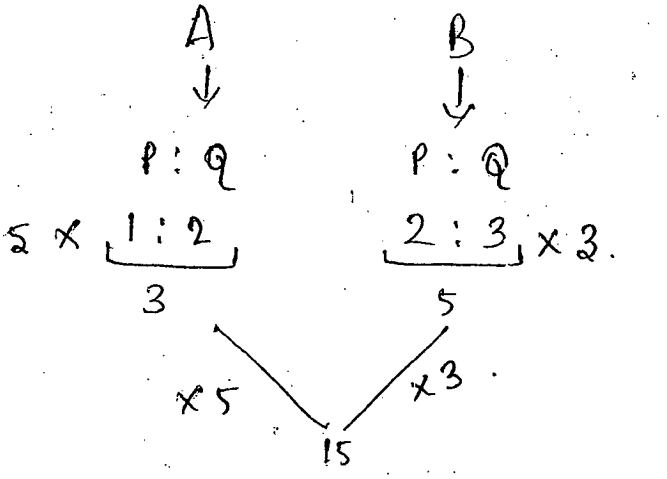
Qty of P = $\frac{2}{5} \times x$.

Qty of Q = $\frac{3}{5} \times x$.

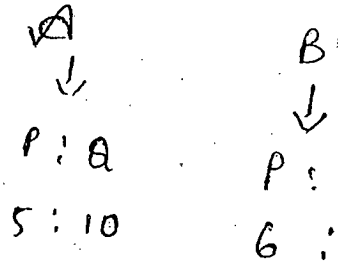
$$\frac{P}{Q} = \frac{\frac{x}{3} + \frac{2x}{5}}{\frac{2x}{3} + \frac{3x}{5}}$$

$$= \frac{\frac{5x + 6x}{15}}{\frac{10x + 9x}{15}} = \frac{11x}{19x}$$

= 11 : 19.



LCM of 3 & 5
= 15

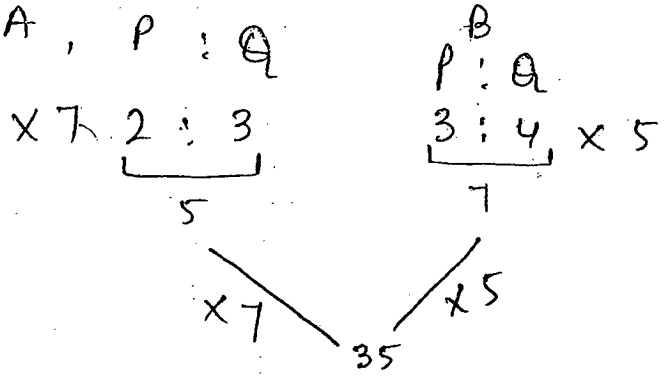


Now adding the value of P = 5+6
= 11

" " " of Q = 10+9
= 19

= 11/19.

2) Vessel A, P : Q



14
+15
29

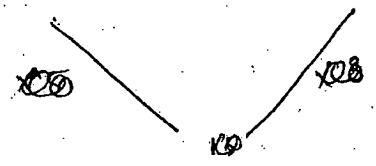
= 14 : 21 15 : 20

= 29/41

⇒ Vessel A P : Q → 1 : 2 (3)

vessel B. P : Q → 2 : 3 (5)

volume of vessel B is twice the volume of vessel of B.



Vol. of vessel A = $x \cdot \frac{1}{3} \times x \cdot \frac{2}{3} \times x$.

Vol of " B = $2x \cdot \frac{2}{5} \times 2x \quad \frac{3}{5} \times 2x$.

$$\frac{P}{Q} = \frac{\frac{x}{3} + \frac{4x}{5}}{\frac{2x}{3} + \frac{6x}{5}}$$

$$= \frac{5x + 12x}{15}$$

$$= \frac{10x + 18x}{15}$$

$$= \frac{17x}{28x}$$

A	B
1	1
P : Q	P : Q
1 : 2 (3)	2 : 3 (5)
×5	×3, ×2

A	B
P : Q	P : Q
5 : 10	12 : 18

$= 5 + 12 = 17$

$10 + 18 = 28$.

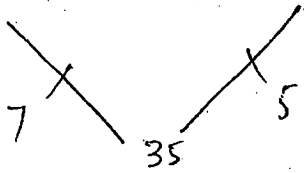
$= \frac{17}{28}$.

21
4
84

volume of vessel is 4 times that of B. So, after mixing them find out the ratio of P & Q.

$\Rightarrow$

	P : Q		P : Q	
×7	2 : 3		3 : 4	×5
×4	5		7	



56 : 84 15 : 20

71 : 104

$P = 56 + 15 = 71$

$Q = 84 + 20 = 104$

14
41
56

64
15
79

84
20
104

56
15
71

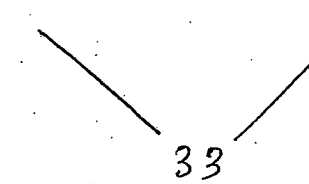
1
17
16
33

A B

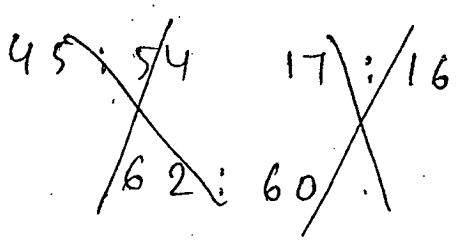
Vessel B is thrice that of A.

$\Rightarrow$

	P : Q		P : Q
~~×3~~	5 : 6		17 : 16
~~×7~~	11		33 ×1



The ratio is already thrice.



$\frac{P}{Q} = \frac{5+17}{6+16}$

$= \frac{22}{22}$

$= 1 : 1$

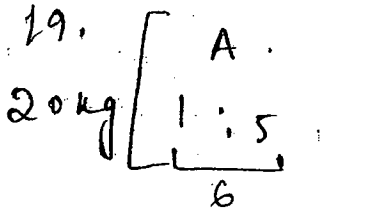
18
3
54

1
45
17
62

1
54
16
60

Handout :

19.



Alu = $\frac{1}{5}$

$= \frac{1}{5} \times 20$

= 4 kg of Aluminium

Ni = $\frac{4}{5} \times 20$

= 16 kg.

$\frac{1}{6} \times 25$

$= \frac{25}{6}$ kg.

$\frac{5}{6} \times 25$

$= \frac{125}{6}$ kg.

$\frac{\text{Alu}}{\text{Ni}} = \frac{4 + \frac{25}{6}}{16 + \frac{125}{6}} = \frac{\frac{24+25}{6}}{\frac{96+125}{6}} = \frac{49}{121}$.

$\frac{1}{6} \times 20^{10}$

$\frac{5}{6} \times 20^{10}$

$\frac{10}{3} + \frac{50}{3} = \frac{60}{21}$

20 : 21.

$\frac{1}{7} \times 25$

$= \frac{25}{7}$.

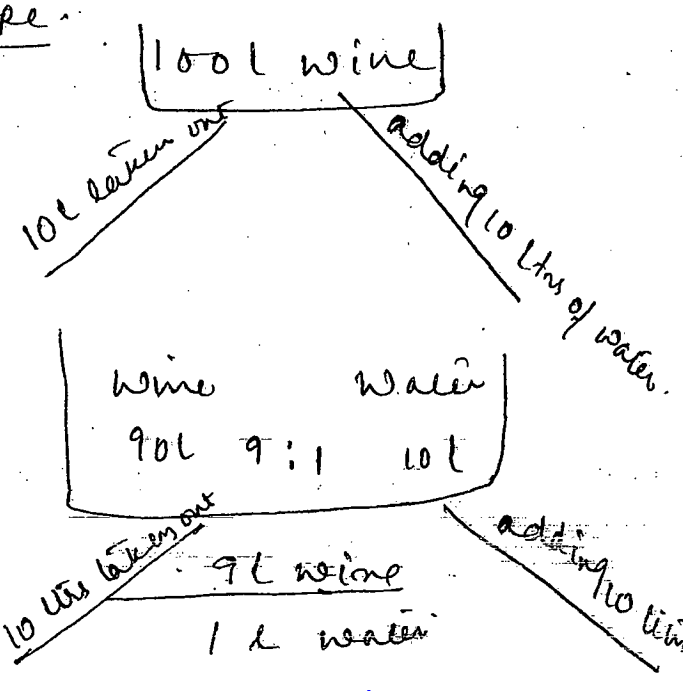
$\frac{6}{7} \times 25$

$= \frac{150}{7}$

$\frac{10}{3} + \frac{25}{7}$.

$= \frac{10+25}{21} =$

Third Type.



wine	water
↓	↓
90 − 9	10 + 9
= 81 l	= 19 l

So, the ratio is 81 : 19.

Ratio of wine in the mixture $= \frac{81}{81+19}$

$= \frac{81}{100}$

Formula:

If the initial qty of pure liquid $= x$

Replaced qty $= y$

No. of replacement done $= n$.

The qty of pure liquid remaining after 'n' operations $= x\left(1 - \frac{y}{x}\right)^n$

Qty of mixture at any point of time will be x.

$x = 100$ l.

$y = 10$ l

Replacement done $= n = 2$.

$$\text{nine} = 100\left(1-\frac{10}{100}\right)^2$$

$$= 100 \times \frac{9}{10} \times \frac{9}{10}$$

$$= 81 \text{ l.}$$

Handout.

7. $$x\left(1-\frac{4}{x}\right)^3$$

$$100\left(1-\frac{10}{100}\right)^3$$

$$= 100 \times \frac{9}{10} \times \frac{9}{10} \times \frac{9}{10}$$

$$= \frac{729}{10} = 72.9$$

8. $$500\left(1-\frac{100}{500}\right)^4$$

$$= 500 \times \frac{4}{5} \times \frac{4}{5} \times \frac{4}{5} \times \frac{4}{5}$$

$$= \frac{4^5}{5} \text{ l}$$

$$= \frac{1024}{5} \text{ l}$$

$$= 204.8 \text{ l.}$$

9. $x = ?$

$y = 50$.

$n = 3$.

Qty of wine remaining

$= x\left(1 - \frac{50}{x}\right)^3$

Mixture $= x$.

Ratio of Wine : Mixture.

$$\frac{\text{Wine}}{\text{Mixture}} = \frac{\cancel{x}\left(1 - \frac{50}{x}\right)^3}{\cancel{x}}$$

$$= \left(1 - \frac{50}{x}\right)^3$$

$$\frac{\text{Wine}}{\text{Water}} = \frac{343}{169}$$

$$\frac{\text{Wine}}{\text{Mixture}} = \frac{343}{343+169}$$

$$= \frac{\frac{343}{512}}{\left(1 - \frac{50}{x}\right)^3 = \frac{343}{512}}.$$

$$\left(1-\frac{50}{x}\right)^3 = \left(\frac{7}{8}\right)^3$$

$$\Rightarrow 1-\frac{50}{x} = \frac{7}{8}$$

$$\Rightarrow 1-\frac{7}{8} = \frac{50}{x}.$$

$$\Rightarrow \frac{1}{8} = \frac{50}{x}.$$

$$\Rightarrow x = 400\ l.$$

28. Profit % $= \frac{\text{Qty of water}}{\text{Qty of milk}} \times 100\%$

$$= \frac{1\phi}{4\phi} \times \frac{25}{\cancel{100}}$$

$$= 25\%.$$

The cost price & Selling Price is same.

29. Ratio of water to milk $= \frac{P\%}{100}$.

$$= \frac{1}{3}\ \frac{\cancel{33.33}\%}{\cancel{100}\%} \quad \frac{1}{3} \quad 1:3.$$

⇒ The Cost Price of an article = Rs 12000. If 1/3 rd of it sold at the loss of 10%. Then, at what profit % remaining article must be sold to make an overall profit of 20%.

12,000 → to make profit of 20%.

1/3 sold @ loss 10%

$\frac{1}{3} \times \frac{4,000}{12000}$

Loss suffered = 400.

2/3 ↓ Profit %: ? 8000.

20%

$= \frac{20}{100} \times 12000$

= 2400

$\frac{2}{3} \times \frac{4,000}{12000}$

$= 8,000 \quad \frac{2}{3} \times 2800$

$\frac{2}{3} \times \frac{800}{2400}$

1600.

Profit = 2400 + 400

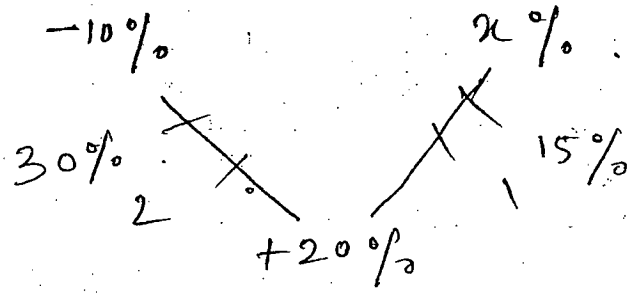
= 2800.

$P\% = \frac{2800}{8000} \times 100$

$= 35\%$.

1/3 — 1 : 2 — 2/3

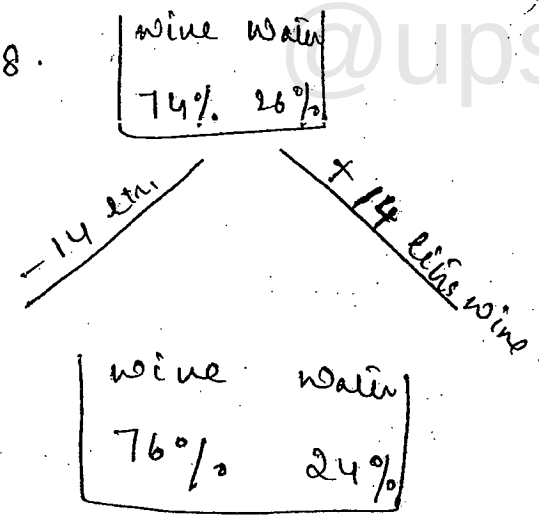
$\frac{2}{3}x$



$-10 + 20 = 30\%$

$x = 20\% + 15\% = 35\%$

8.



Qty = x.

Initial qty of wine = 74 % of x.

" " " water = 26 % of x.

taking out 14 lts.

wine = 74 % of 14.

Qty of water = 26 % of 14.

adding 14 lits

wine = 14 lts.

Qty of wine = 76 % of x.

" " water = 24 % of x.

74% of x − 74% of 14 + 14 = 76% of x

Water

26% of x − 26% of 14 = 24% of x.

$$\frac{26}{100} \times x - \frac{26}{100} \times 14 = \frac{24}{100} \times x.$$

$$\frac{26}{100} \times x - \frac{24}{100} \times x = \frac{26}{100} \times 14.$$

$$\frac{2}{100} \times x = \frac{26}{100} \times 14.$$

$$x = 182 \text{ litres}.$$

Or, 26% − 24% = 26% of 14

2% = $\frac{26}{100} \times 14$.

1% = $\frac{26}{2}$% of 14.

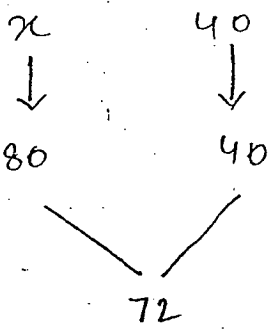
= 13% of 14.

1% = $\frac{13 \times 14}{100}$

= $\frac{13}{100} \times 14 \times 100$

Q. 6, 10, 11, 12, 15, 17, 20, 21, 22, 23, 27

15.



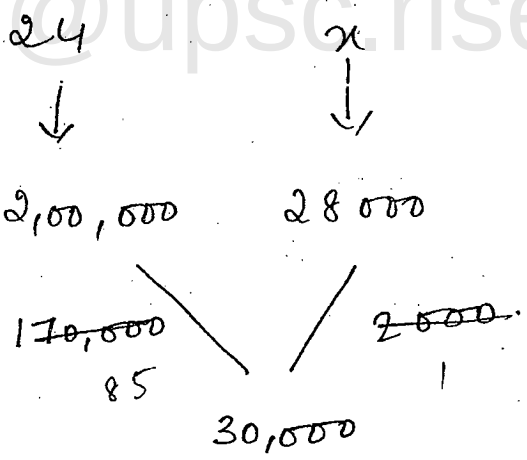
$72 \rightarrow P\% : 20\%$ $\quad 2100+20 = 120$

Cost price $= \frac{72}{120} \times 100$

$= 60$

17.

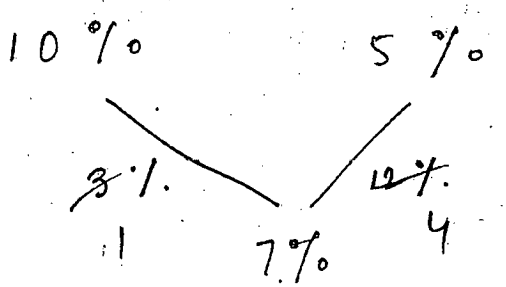
$1 : 85$



$x = 85 \times 24$

$= 2040$

10.



1 : 4

= ~~[illegible]~~ & 40 kg. & 10 kg.

24.

$$\frac{7}{12}x - \frac{7}{12} \times 9 = \frac{7}{16}x$$

7 : 5 → 7+5 → 12

$x = 36$

$$= \frac{7}{\cancel{12}} \times \cancel{36}^{3}$$

$= 21.$

PARTNERSHIP

A — 10 000 — 9 months

B — 15,000 — 8 months.

$$\frac{P_A}{P_B} : \frac{10,000 \times 9}{15,000 \times 8} \quad (2 \text{ and } 3)$$

$$= 3 : 4$$

Profit = 28,000

A : B

3 : 4

$\frac{3}{7} \times 28000$ → 12,000

$\frac{4}{7} \times 28000$ → 16000.

For eg.

A B C

P_A : P_B : P_C

$(I_A \times T_A) : (I_B \times T_B) : (I_C \times T_C)$

1. A started a business by investing Rs 1,00,000, B joins in 3 months later by investing Rs 70,000. If the total profit earned at the end of the year is Rs 1,22,000, find out the profit share of A & B.

$$\frac{1,00,000 \times 12}{70,000 \times 9}$$

$$\frac{120}{63}\ \frac{40}{21} = 40 : 21.$$

1,22,000.

40 : 21

$$\frac{40}{61} \times 1,22,000 : \frac{21}{61} \times 1,22,000.$$

80,000 : 42,000

Handout :

1. A & B invest in the business = 3 : 2.

Profit % goes to charity 5%.

Remaining = 100% - 5%

= 95%.

$171 \times 95 = 855 \times 19 = 16245$

$\frac{171}{5} \times 95 = 855$

A's share = 855.

95% Profit

A : B

3 : 2

$\frac{3}{5} \times 95 = 57\%$

$\frac{2}{5} \times 95 = 38\%$.

57% → Rs 855.

100% = $\frac{855}{57} \times 100$

= Rs 1500.

5.

$P_A : P_B : P_C$

5 : 7 : 8

$(x \times 14) : (y \times 8) : (z \times 7)$

$14x : 8y : 7z = 5 : 7 : 8$

$\frac{14x}{8y} = \frac{5}{7}$

$\frac{x}{y} = \frac{20}{49}$

$\frac{8y}{7z} = \frac{7}{8}$

$\frac{y}{z} = \frac{49}{64}$

$x : y : z$.

$= 20 : 49 : 64$

2.

A B C

7400

↓ 5%

Remaining = 95%.

95% of 7400.

$\Rightarrow \frac{95}{100} \times 7400$

=

A B C

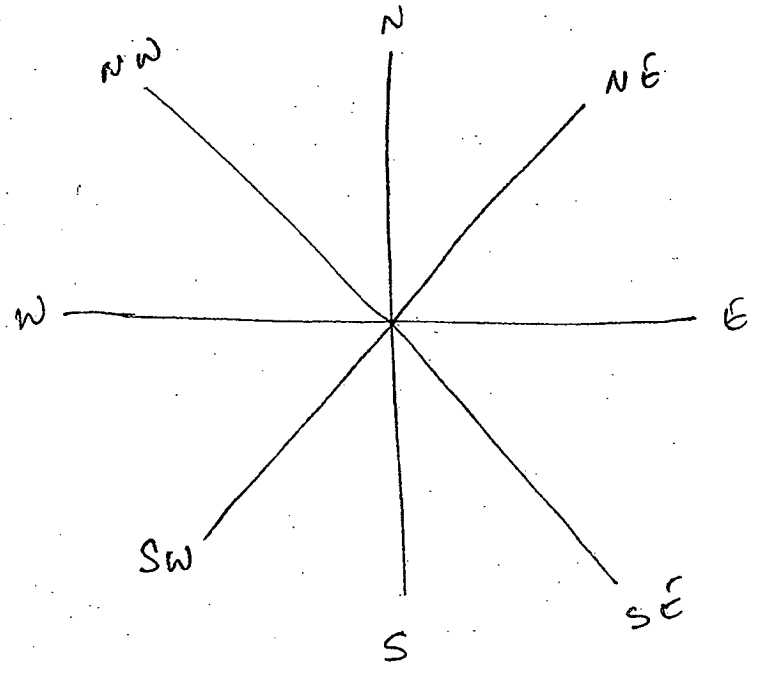
13 : 14 : 10

$B's share = \frac{14}{37} \times 95\% \text{ of } 7400$

$= \frac{14}{37} \times \frac{95}{100} \times 7400$

$= 2660$.

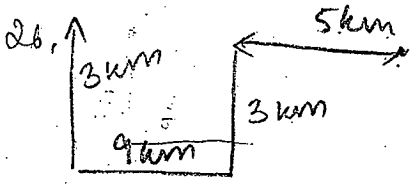
Clock. Directions.



i) Turning towards right is clockwise

ii) Turning towards left is anti-clockwise.

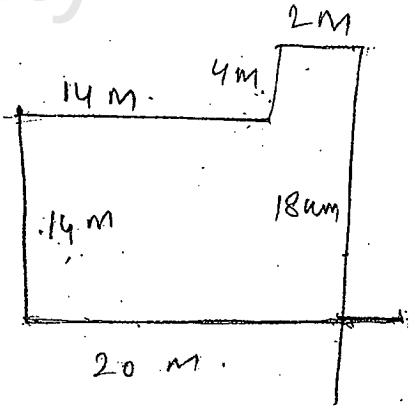
26.



$5 + 9$

$= 14$.

36.



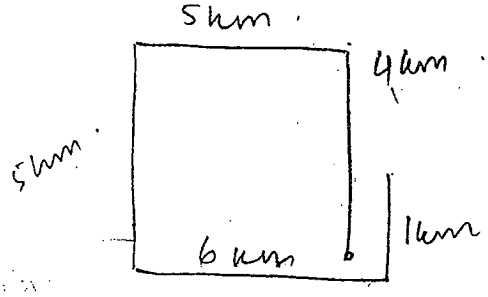
$14 + 2 = 16$.

20

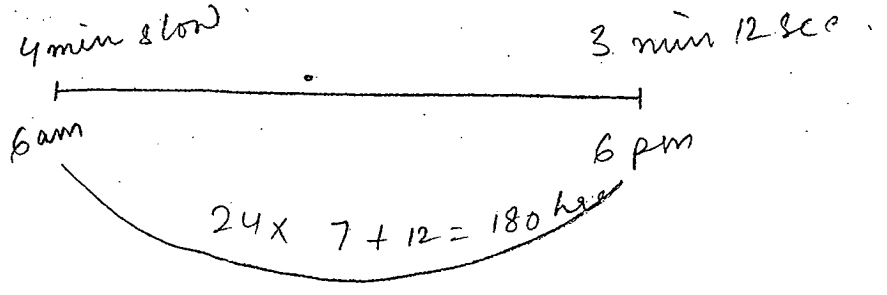
$20 - 16$

$= 4$

3.



A watch which gains uniformly is 4 mins slow at 6 am sunday and is 3 mins 12 sec fast the following sunday 6 pm. when did this watch show the correct time.



4 mins + 3 mins 12 sec

= 7 mins 12 sec gained in 180 hrs.

7 x 60 + 12

= 432 sec

4 min

4 x 60

= 240 sec

432 = 180

240 = ? °

240 = $\frac{180}{432} \times 240$ (10, 10; 18)

100 hrs

6 am Sunday.

↓

100 hrs → 96 hrs + 4

↓

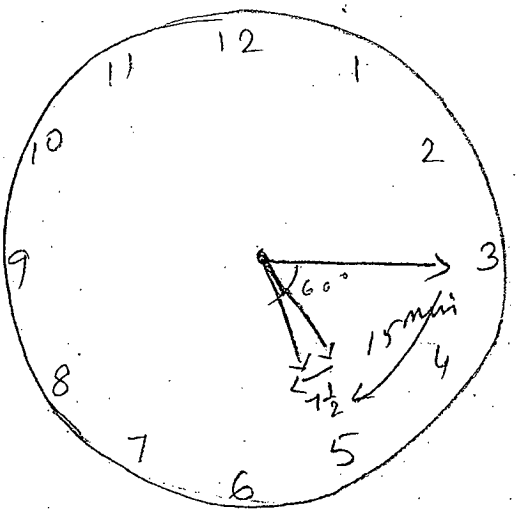
Thursday 10 hours = 4 days & 4 hours.

* The angle between 12 & 1

= 30°

between 12 & 2.

= 60°



Hour hand in 12 hours

= 360°.

1 hour = $\frac{360}{12}$ 30

60 min = 30°

1 min = $\frac{30}{60}$ = $\frac{1}{2}$°.

If 1 min = $\frac{1}{2}$.

Then 15 min = 15 × $\frac{1}{2}$

= $7\frac{1}{2}$.

∴ Angle = $6\frac{1}{2}$

minute hand moves $5\frac{1}{2}$° more than the hour hand.

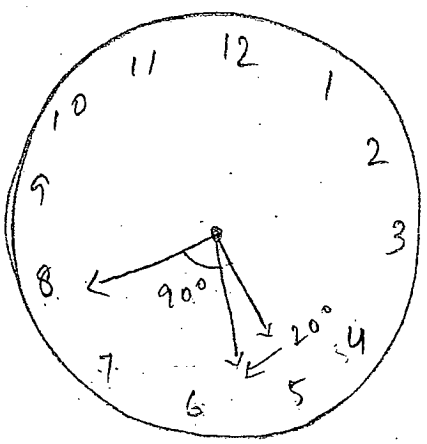
Minute hand in 1 hour.

1 hour = 360°

60 min = 360°

1 min = $\frac{360}{60}$

= 6°.

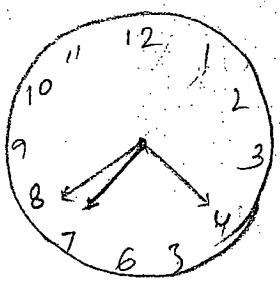


5 hrs 40 min.

90 − 20.

= 70°

7 : 20



20° = 10°.

90° + 10°.

= 100°

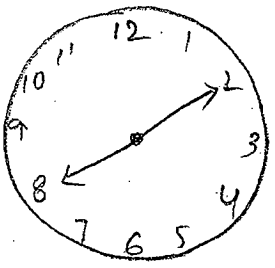
1 : 05

= 2.5°

$\frac{21}{2}$ 0

= 2.5°.

8 : 10 . 180°



10° = 5°

= 185°.

Reflex angle > 180°

11 : 25.

= 167.5° or 192.5°.

1 : 45

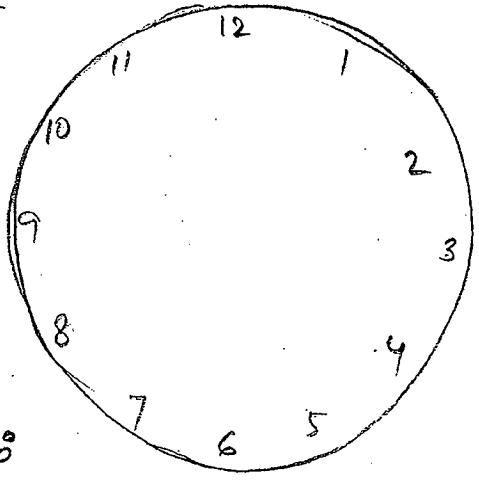
142.5° / 217.5°

Angle = $\frac{11}{2}$ M − 30H.

5 : 15 = $\frac{11}{2} \times 15 - 30 \times 5$

= 82.5 − 150

= 67.5°



60 min = 360°

30 min = 180°

15 min = 90°

Hour hand.

60 min = 5 min.

Minute hand
: 60 min = 60 min.

Minute hand is moving 55 min more in 60 min.

Minute hand gains 55 mins over hour hand in 60 min.

Min. hand gains 55 min in 60 mins.

$$1 \text{ min} = \frac{60}{55}$$

$$= 1\frac{12}{11} \text{ mins.}$$

$$1 \text{ min} = 1\frac{12}{11} \text{ min}$$

12:00 the min. hand and hour hand coinciding then again 1:05 it will coincide.

$$1 \text{ min} = \frac{12}{11} \text{ min.}$$

$$5 \text{ min} = \frac{12 \times 5}{11}$$

$$= \frac{60}{11} = 5\frac{5}{11}.$$

$1\,5\frac{5}{11}$ they will coincide

2 : 10

$$1 \text{ min} = \frac{12}{11}$$

$$10 \text{ min} = \frac{12 \times 10}{11}$$

$$= \frac{120}{11} = 10\frac{10}{11} \text{ min.}$$

Exactly at $2 : 10\frac{10}{11}$ it hour & min. hand coinciding the exact time

$$3 : 15 = \frac{12}{11} \times 15.$$

$$= \frac{180}{11} = 16\frac{4}{11}.$$

$3 : 16\frac{4}{11}$ exact time.

After 11 = 11 : 55

$$\frac{5}{55} \times \frac{12}{11}$$

= 60 min

at 12:00 they coincide.

After 7 → 7:35

it will coincide

$$\frac{12}{11} \times 35$$

$$\frac{420}{11} = 38\frac{2}{11}$$

$7 : 38\frac{2}{11}$ exact time

* The hour hand & the min. hand coincides 11 times in 12 hours and in a day / 24 hours 22 times

At what regular intervals hour hand and minute hand coincide?

12 : 00
1 : $5\frac{5}{11}$ } coinciding.

After every 1 : $5\frac{5}{11}$ hour they will coincide.

1 hour $5\frac{5}{11}$ min.

⇒ 12:00 straight line will be at 12:30. forming an angle of 180° and the time difference will be 30° minutes*. In a straight line but opposite direction.

At 12:00, the min. hand & hr. hand has no difference.

* 1 min 30 × $\frac{12}{11}$ = $\frac{360}{11}$

$32\frac{8}{11}$

min. hand 30 min. ahead and min. hand gets this time at $32\frac{8}{11}$

∴ = 12 : $32\frac{8}{11}$

2 At 1:35 they again meet be, a in. Straight line,

min. hand was 5 min behind
now at 1:35 it is 35 min ahead.

$$= 35 \times \frac{12}{11} = \frac{420}{11}$$

$$= 32\frac{2}{11}.$$

$$1 : 32\frac{2}{11}$$

2 After 5 o' ~~clock~~ exactly at what time.

$$55 \text{ min.} = \frac{5}{\cancel{55}} \times \frac{12}{\cancel{11}}$$

$$= 60 \text{ min.}$$

At 60' clock they will be at straight line.

= After 3 o' clock it will be 3:45 they will be a straight line but opposite direction.

$$45 \times \frac{12}{11}.$$

∴ After 8 o' clock at 8:10 they will

be a straight line.

After 7 o' clock it will be in a straight line at 7:05 i.e, $5 \times \frac{12}{11} = \frac{60}{11}$.

* In 12 hours hr. hand & min. hand are in a straight line 11 times and in 24 hours 22 times

= At what regular interval hour hand & min. hand are in a straight line and opp. direction.

$12:00 \quad \left.\begin{matrix} 12:32\frac{8}{11} \\ 1:38\frac{2}{11} \end{matrix}\right) 1 \text{ hour } 5\frac{5}{11}$

$1 \text{ hr} : 5\frac{5}{11} \text{ min}$.

= After 12 o' clock when are they at right angle to each other i.e 90°.

12 : 15

The time difference of exact 15 min. they will be at right angle $= 15 \times \frac{12}{11}$

Again at 12:45 they will at right angle.

$$45 \times \frac{12}{11}$$

1:20 @ right angle.

$$20 \times \frac{12}{11}$$

1:50 @ right angle.

$$\frac{50 \times 12}{11}$$

After 2 they are @ right angle = 2:25 and again @ 2:55

$$= \frac{25 \times 12}{11}$$

$$= \frac{300}{11}$$

$$= 27\frac{3}{11}$$

$$\frac{\overset{5}{\cancel{55}} \times 12}{\cancel{11}}$$

= 60 mins

@ 30° clock they will be @ right angle.

After 8 o' clock they @ 90° clock they are at right angle.

$$\begin{cases} 12:30 - 1:30 \\ 1:30 - 2:30 \end{cases}$$

Twice.

* In 12 hours they are right angle 22 times. and 24 hrs 44 times.

At what regular intervals they are at right angle to each other ?

22 times —— 12 hrs.

1 time —— $\frac{12}{22} = \frac{1}{2}$ hrs.

$\frac{1}{2} \times 60^{30} = \frac{360}{11} = 32\frac{8}{11}$ min.

Angle $= \frac{11}{2}M - 30H$

Coincidity $= \frac{60n}{11}$

Straight line : $(5n + 30) \times \frac{12}{11}$ If $n < 6$

$(5n - 30) \times \frac{12}{11}$, if $n \geq 6$

Right angle : $(5n + 15) \times \frac{12}{11}$

CYCLICITY:

$273 \times 374 \times 679 \times 287 \times 4$.

2 8 6

$1\underline{2}$ 18 $5\underline{6}$ $2\underline{4}$

Product of unit digit.

$1^n : 1$

$2^n : 2^1 = 2,\ 2^2 = 4\ \ 2^3 = 8\ \ 2^4 = \underline{16}$.

$2^5 = 2^4 \times 2$, $2^6 = 2^5 \times 2$, $2^7 = 8$, $2^8 = 6$.

$= 6 \times 2$ $= 2 \times 2$

$= \underline{12}$ $= \underline{4}$.

$2^9 = 2,\ 2^{10} = 4,\ 2^{11} = 8,\ 2^{12} = 6$.

In case of 2 cyclicity is that of 4.

(3) $2^{83} = 4\overline{)83}$ (quotient 2, remainder 3)

leaves a remainder 3.
So, unit digit will be $\underline{8}$.

(1) $83 \div 4$ = leaves a remainder 3

1. corresponding unit digit is $\underline{2}$.

(2) $2^6 \div 4 =$

$6/4$ = remainder 2 then unit digit is 4.

(4) $2^8 \div 4 = 8/4 = 0$.

when remainder is $\underline{0}$
unit digit will be 6

To find out the unit digit of 2^n, we divide last two digits of n by 4 (cyclicity is 4) & then look for remainder.

If, R = 1 ⇒ Unit Digit = 2.
= 2 = 4
= 3 = 8
= 0 = 6

3^n: $3^1 = 3$ $3^2 = 9$ $3^3 = 7$ $3^4 = 1$

divide the power by 4 leaves a remainder of 1 = 3.

$3^5 = 3$ $3^6/4 = 9$ $3^7/4 = 7$ $3^8 = 1$

$3^9 = 3$ $3^{10}/4 = 9$ $3^{11}/4 = 7$ $3^{12} = 1$

remainder 2 U.D is 9.

Remainder	Unit Digit
1	3
2	9
3	7
0	1

4^n: $4^1 = 4$ $4^2 = 6$ cyclicity is 2 in case of 4.
$4^3 = 4$ $4^4 = 6$
$4^5 = 4$ $4^6 = 6$

power is odd U.D will be 4, power is even it will be 6.

5^n: $5^1 = 5$ $5^2 = 5$ $5^3 = 5$ cyclicity of 5

6^n: $6^1 = 6$ $6^2 = 6$ $6^3 = 6$. and 6 will be 5 and 6.

7^n: $7^1 = 7$ $7^2 = 9$ $7^3 = 3$ $7^4 = 1$

$7^5 = 7$ $7^6 = 9$ $7^7 = 3$ $7^8 = 1$

Rem.	U.D
1	7
2	9
3	3
0	1

8^n: $8^1 = 8$ $8^2 = 4$ $8^3 = 2$ $8^4 = 6$

$8^5 = 8$ $8^6 = 4$ $8^7 = 2$ $8^8 = 6$

Rem.	U.D
1	8
2	4
3	2
0	6.

9^n: $9^1 = 9$ $9^2 = 1$

$9^3 = 9$ $9^4 = 1$ power is odd. U.D = 9, power is even U.D = 1.

567^{322}

$= 7^{322 \cdot 22/4}$.

= Remainder 2, Unit Digit is 9.

$123^{321} \times 729^{486} \times 314^{219}$

$123^{321/4} \times 729^{486} \times 314^{219}$ — 486 power even, 219 power odd.

$3 \times 1 \times 4$ U.D = 2.

1. $222^{333} \times 333^{444} \times 444^{555} \times 666^{777} \times 777^{888} \times 888^{999} \times 999^{111}$ considering 2 and power 33 divided by 4.

$4)33(8$
32
1
-11

$4)44(11$
4
4
-4

$4)99(24$
8
19
16
3

$2 \times 1 \times 4 \times 6 \times 1 \times 2 \times 9$

$2 \times 24 \times 2 \times 9$

$8 = 6 \quad 4$

$16 \quad 54$

$= 4$.

2. $222^{333} + 333^{444} * 444^{555} + 666^{777} + 777^{888} + 888^{999} + 999^{111}$

$2 + 1 + 4 + 6 + 1 + 2 + 9$

$3 + 4 + 7 + 6$

$= 13 + 1$

$= 4 + 2 + 6 + 9$

$= 15$

U.D = 5.

3. $222^{444} \times 333^{555} \times 444^{666} \times 777^{999} \times 888^{222} \times 999^{44}$

$6 \times 7 \times 6 \times 6 \times 3 \times 4 \times 1$

$= 4$

4. $6 + 7 + 6 + 6 + 3 + 4 + 1 = 3$.

111 222 333 444 555 666 777

$111 \times 222 \times 333 \times 444 \times 555 \times 666 \times 777 \times 888 \times 999$

2 0

Miscellaneous.

2. Let the no. of days vacation be x days.

They did activity in the morning.

$x - 24$.

No. of days in the evening they did nothing $= x - 12$.

$$x - 24 + x - 12 = 22.$$

$$2x - 36 = 22$$

$$2x = 58$$

$$x = 29.$$

29 days

35. $4^{61} + 4^{62} + 4^{63} + 4^{64}$

$$4^{61}(1 + 4 + 4^2 + 4^3)$$

$$= 4^{61}(1 + 4 + 16 + 64)$$

$$= 4^{61} \times 85$$

$46! \times 5 \times 17$

= not divisible by 3.

37. $1^2 + 2^2 + 3^2 + \ldots\ldots 10^2 = 385$.

$2^2 + 4^2 + 6^2 + \ldots\ldots 20^2 = ?$

$1 + 4 + 9 + \ldots\ldots 385$.

$\times^4 \quad \times^4 \quad \times^4$

$4 + 16 + 36 + \ldots\ldots ?$

$4 \times 1^2 + 4 \times 2^2 + 4 \times 3^2 + \ldots\ldots + 4 \times 10^2$

$4 (1^2 + 2^2 + \_\_\_\_\_ + 10^2)$

$4 \times 385 = 1540$.

3.

X = aaab or baaa.

Divisible by 9 = 9, 18, 27, 36, ... — —

9: 0009 X not valid number or,

9000.

1116 or 6111
2223 or 3222
3330 or 0333 X

} 6.

18: 3339 or 9333 6660 0666 X

4446 or 6444

5553 or 3553

} 7

27 : 6669 9666
7776 6777
8883 3888
9990 0999 } 7

36 : 9999 } 1

Note: In the question if we remove the word, exactly, then the answer will be 21,

24. $|11a+7|-13$.

If $a = 0$.

$= |11\times0+7|-13$.

$= |0+7|-13 = 7-13 = -6$.

$a = 1$

$= |11\times1+7|-13$

$= |11+7|-13 = 18-13 = 5$.

$a = -1$ $|-11+7|-13 = 4-13 = -9$.

$a = -2$ $|-22+7|-13 = 15-13 = 2$.

25. $\left(\frac{1}{\sqrt{5}-2}\right)+\left(\frac{1}{\sqrt{5}+2}\right)$.

L.C.M.

$= a-b \quad a+b$.

a^2-b^2.

$= \frac{\sqrt{5}+2+\sqrt{5}-2}{5-4}$

$= 2\sqrt{5}$

26. $(1\times2\times3\times\ldots\times9)\times(11\times12\times13\ldots19)\times21\times\ldots\times29$

$(91\times92\times93\times\ldots99)$

$$\frac{99!}{10\times20\times30\times40\times50\times60\times70\times80\times90}$$

$$\frac{99!}{1\times2\times3\times4\times5\times6\times7\times8\times9\times10^{9}}$$

$= 20$. one more zero added that becomes 10^{10}.

$$\frac{99!}{36288\times10^{10}}$$

28. $a+\frac{1}{a}=5$. $a^3+\frac{1}{a^3}$.

$(a+b)^3$

$= a^3+b^3+3ab(a+b)$

$\Rightarrow \left(a+\frac{1}{a}\right)^3 = a^3+\frac{1}{a^3}+3\times\cancel{a}\times\frac{1}{\cancel{a}}\left(a+\frac{1}{a}\right)$

$$5^3 = a^3+\frac{1}{a^3}+3\times5$$

$$a^3+\frac{1}{a^3} = 125-15$$

$$= 110.$$

32. $5^{a-1} + 5^{a} + 5^{a+1} = 775$.

$a = 1 \quad 5^0 + 5^1 + 5^2$

$a = 3 \quad 5^2 + 5^3 + 5^4$

$25 + 125 + 625 = 775$.

9. 100, 101, 102 ..... 198, 199, 200.

100 106 112
101 107 113
102 108 113
103 109
104
105 110
111

Hundredth digit place 1.

100 times.

Ten digit place 1.

10 times.

110, 111, 112, 118, 119.

Unit digit place 1.

101, 121, 121, 181, 191

10 times.

120 times.

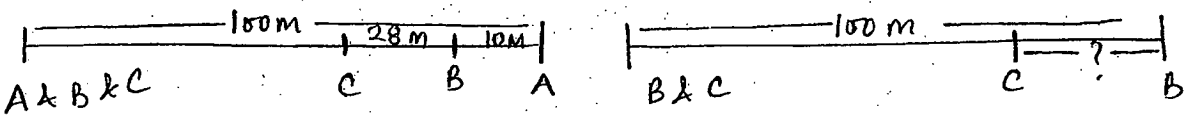
15. $S = \frac{n(n+1)(2n+1)}{6}$

$= \frac{\overset{50}{\cancel{100}} \times 101 \times \overset{67}{\cancel{201}}}{\cancel{6}\ \cancel{3}}$

$= 50 \times 101 \times 67$

$= 20$.

RACES AND GAMES OF SKILL



A — 100 m
B — 90 m
C — 72 m

B — 90 m C — 72 m.

→ 1 m — $\frac{72}{90}$ m.

→ 100 m — $\frac{\cancel{72}^{8}}{\cancel{90}} \times \cancel{100}$ m

= 80 m.

B — 90 m.

Gap b/w B & C = 90 − 72
= 18 m.

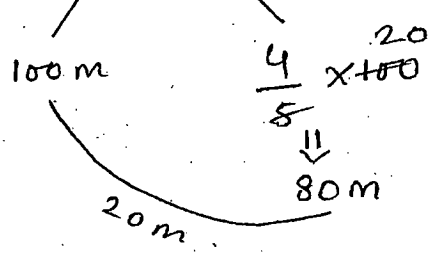
1 m = $\frac{18}{90}$ m.

→ 100 m = $\frac{\cancel{18}^{2}}{\cancel{90}} \times \cancel{100}$

= 20 m.

Ratio of Speed of B & C = $\cancel{90}$: $\cancel{72}$
5 4.

= 5 : 4



Between a 300 m race, A beats B by 80 m and C by 60 m. In a 600 m race b/w B & C, who will win and by what distance.

b/w A, B & C

300 − 80 = 220

300 − 60 = 240

$\frac{\cancel{220}^{11}}{\cancel{240}} \times \cancel{600}^{50}$
$\cancel{24}$
12

= 550

A — 300 m
B — 220 m
C — 240 m

C — 240 m B — 220 m.

600 m — $\frac{\cancel{220}^{11}}{\cancel{240}_{12}} \times \cancel{600}^{50}$

50 m. — 550 m.

(Or) C — 240 C − B — 20 m.

600 m — $\frac{\cancel{20}^{10}}{\cancel{240}_{12}} \times \cancel{600}^{5}$

250 m.

(Or) $S_B : S_C$ (Speed of B : C)

220 m : 240 m.

11 : 12

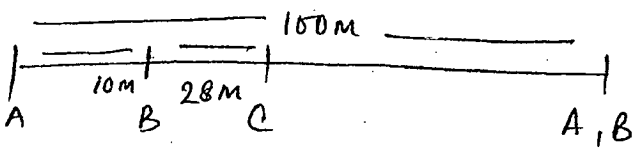
$\frac{11}{12} \times \cancel{600}^{50}$ 600

550

50 m.

Class Assignment.

1.



A = 100 M C = 72 m.

B = 28 m

B —— 90 C —— 72.

1 m —— $\frac{72}{90}$ m

100 m —— $\frac{72^{8}}{90} \times 100$ m

—— 80 m

20 m

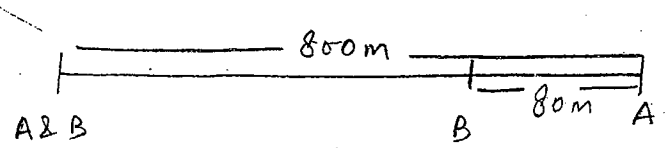
Or, B – 90 m ~~C~~ B-C – 18 m.

1 m —— $\frac{18}{90}$.

—— 100 —— $\frac{18^{2} \times 100}{90}$

= 20 m.

B/w 800 m race A & B, A beats B by 80 m or 8 seconds, Find in what time A completed the race.



800
– 80
720

A —— 800 m.

B —— 720 m.

B covered 80 m in 8 secs.

B —— 800 m = $\frac{8}{80} \times 80$

= 80 seconds

A will finish the race

in = 80 seconds – 8 seconds

= 72 seconds.

B —— 80 m —— 8 seconds

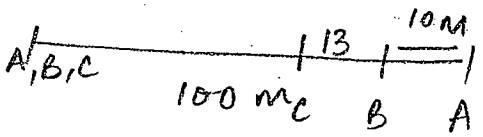
B —— 720 m —— $\frac{8}{8\phi} \times 72^{9}\phi$

= 72 seconds,

3, 5, 6, 2

Class Assignment

3.



$\frac{100}{-13}$
$\frac{}{87}$

A —— 100 m.

B —— 90 m

C —— 87 m.

B —— 180 m. B will beat C by?

B —— 90 C —— 87

1 m —— $\frac{87}{90}$ m.

180 m —— $\frac{87}{90} \times 18^{2}\phi$

— 174 m

6 m.

1
87
2
174
180

5. Race = 200 m

$$\begin{array}{r} 200 \\ -35 \\ \hline 165 \\ 35 \\ \hline 0 \end{array}$$

A —— 200 m.

B —— 165 m.

B would cover 35 m —— 7 seconds.

B —— 165 m —— $\frac{7}{35_{8}} \times \overset{33}{\cancel{165}}$

= 33 seconds.

Or,

B —— 35 —— 7 Seconds.

B —— 200 m —— $\frac{7}{35_{8}} \times \overset{40}{\cancel{200}}$ seconds.

= 40 seconds.

T_A = 40 seconds − 7 seconds

= 33 seconds.

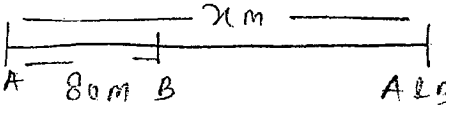
6. Let the lengths of the race course be x m.

$2\frac{1}{3} = \frac{7}{3}$.

B starts 80 m ahead of A.

A — x m.

B — x − 80 m.



Speed of A = $\frac{7}{3}$ times of Speed of B.

Distance A = $\frac{7}{3}$ Distance B.

$x = \frac{7}{3}(x-80)$

$3x = 7x - 560$

$4x = 560$

$x = \frac{560}{4}$

$= 140$ m.

** Distance and time Speed is directly proportional. Distance ~~and~~ ↑ Time will also ↑.

(Or.) If A can give B x mts start and Speed of A is 'n' times Speed of B, Length of the race course, so that both reach the end point at the same time

then, $L = x\left(\frac{n}{n-1}\right)m$.

$x = 80m \quad n = 7/3$

$L = 80\left(\frac{7/3}{7/3-1}\right)$

$= \frac{20}{80} \times \frac{7/3}{4/3}$ m

$= 140$ m.

2.

A and B take part in 100 m race.

Speed of A = 5 kmph.

$$= 5 \times \frac{5}{18} \text{ m/s}.$$

$$= \frac{25}{18} \text{ m/s}.$$

7, 9, 12, 13, 15, 2.

Distance covered by A = 100 m.

Time of A = $100 \div \frac{25}{18}$.

$$= \overset{4}{\cancel{100}} \times \frac{18}{\cancel{25}}$$

= 72 seconds.

Distance covered by B = 100 − 8 m

= 92 m.

Time taken by B = 72 + 8.

= 80 sec

Speed of B = $\frac{92}{80}$ m/s.

$$= \frac{92}{80} \times \frac{18}{5} \text{ km/hr}.$$

$$\simeq 4.14 \text{ km/hr}.$$

7. Total = 224 m.

A — 28 s.

B — 32 s.

$A - \frac{224}{28}$ $B - \frac{224}{32}$.

= 8 m/s. 7 m/s.

$\overline{A-B}$ = 32 − 28

= 4 s.

7 × 4

= 28m.

568 × 4 = 32

112

224

28 4 min

14

7

112 56

224 7 × 4

32 16 = 28

8

8 ×

9. Let it be x.

B starts 80 m ahead of A.

A = x.

B = x − 80

Speed of A = $1\frac{2}{3}$ times of Speed of B.

i.e, $\frac{5}{3}$ times

$\therefore x = \frac{5}{3}(x - 80)$

$3x = 5x - 400$.

$$x = \frac{400}{2}$$

$$= 200 \text{ m}$$

12. Race = 100 m.

A's speed = 2 m/s.

B starts 4 m ahead.

= 96 m.

Distance of A = 100 m.

Time of A = $\frac{100}{2}$

= 50 sec.

Distance of B = 96 m.

Time taken = 50 + 10.

= 60 sec.

Speed of B = $\frac{96}{60}$ ~~48~~ ~~24~~

~~30~~ 15

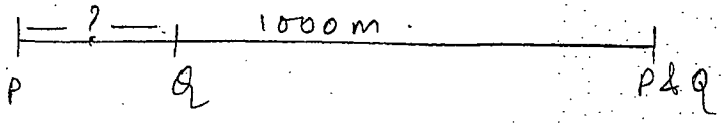
$$15\overline{)24(}\ 1.6$$

15

90

= 1.6 m/sec.

13.



3 min into sec.

P = 180 sec ⟶ 60×3

Q = 250 sec ⟶ 60×4+10.

Q — 250s — 1000m

180s — $\frac{\cancel{1000}^{4}}{\cancel{250}}$ × 180

= 720m

280m

(Or)

Q — 70 sec — $\frac{\cancel{280}\ \cancel{1000}}{\cancel{250}_{1}}$ × $\cancel{70}$ m

=

= $\frac{\cancel{1000}^{4}}{\cancel{250}}$ × 70s.

= 280m.

15. B — 220m — 44s.

— 190m — $\frac{\cancel{44}^{2}}{\cancel{22}}$ × 19

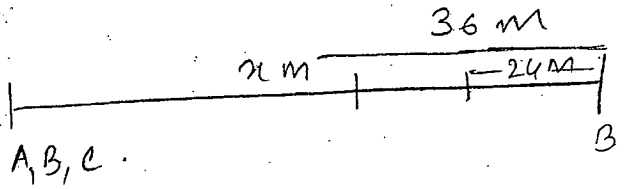
= 38s.

A time = 41s − 38s

= 3sec.

28.

Let the length of the course be x.



Dist. of B = x m.

Dist. of C = $x - 24$ m.

Dist. of A = $x - 36$ m.

Dist of C = x m.

Dist. A = $x - 16$ m.

$$\frac{\text{Speed of C}}{\text{Speed of A}} = \frac{x-24}{x-36}$$

$$\frac{\text{Speed of C}}{\text{Speed of A}} = \frac{x}{x-16}$$

$$\therefore \frac{x-24}{x-36} = \frac{x}{x-16}$$

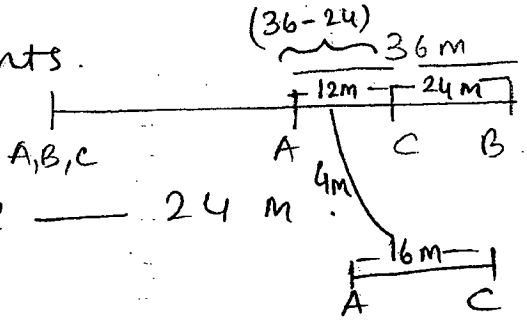
24
16 | 2
4 | 2
6, 4

64
6

$$\frac{x-24}{x-36} = \frac{x}{x-16}$$

$$x = 96 \text{ m}.$$

* A gap of 4 mts is created b/w A and C as soon as C runs 24 mts.



4 m — C–A, C — 24 m.

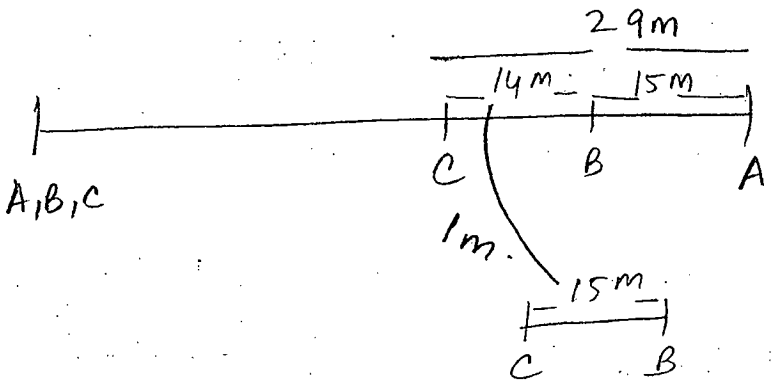
16 m — $\frac{24}{4} \times 16$ (6)

= 96 m.

16 – 12

= 4 m.

17.



1 m $\overline{B-C}$ B —— 15 m.

15 m —— $\frac{15 \times 15}{1}$

= 225 m.

GAME SKILLS.

100 points

$\overline{A-B}$ = 20 points.

$\overline{A-C}$ = 30 points.

A = 100p.

B = 80 p.) 10p.

C = 70 p.)

200 points.

B — 200p.

C — ? 175 p.

B — 80p C — 70p.

→ 200p = $\frac{7\cancel{0}}{\cancel{80}} \times \cancel{200}^{25}$

25 p. = 175 p.

(Or) B — 80 p $\overline{B-C}$ - 10p.

B-200 p — $\frac{1\cancel{0}}{\cancel{80}} \times \cancel{200}^{25}$

= 25 p.

4. A — 60 p.

A-B = 15 p

A-C — 20 p.

A — 60

B — 45

C — 40

60 − 15 = 45

B — 45 C — 40

B → 90 C — 40 × 10/8

45 × 2 = 80

10 p.

B — 90

B — 45/5 × 90/9

= 2 × 180

= 80 points

8 10

40 × 90

45

C = 80 points

90 − 80

= 10.

30. 1. Find out the time taken by each one to complete one round.

5 | 5, 7, 15

1, 7, 3

Time A = 120/5 = 24 s.

Time B = 120/7 s.

Time C = 120/15 = 8 sec.

153 − 7 = 105

2. Find out the L.C.M of $\frac{24}{1}, \frac{120}{7}, \frac{8}{1}$.

L.C.M = 24, 120, 8.

= 120.

H.C.F of denominator.

1, 7, 1

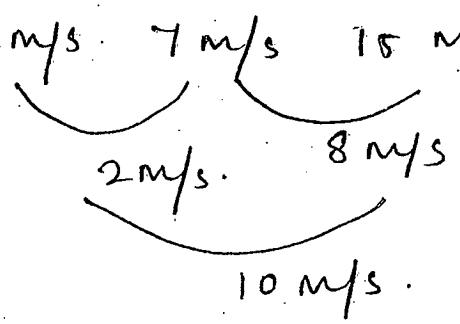
= 1.

L.C.M = $\frac{120}{1}$ s,

= 120s.

For the first time

1) Find out the relative speed among different persons.



2) Find out the H.C.F of Relative Speed

H.C.F of 2 m/s, 8 m/s, 10 m/s.

H.C.F = 2 m/s.

3. Divide the length of the course of the the H.C.F

T = $\frac{120^{60}\,\cancel{m}}{2\,\cancel{m}/s}$ = 60s.

Distance A = 5 × 60

= 300 M.

= 2R + 60m.

Distance B = 7 × 60 m

= 420 m

= 3R + 60 m.

Distance C = 15 × 60

= 900 m

= 7R = 60 m.

R = Round

20.

48 ft

⇓

no. of revolution

= n.

⇓

48 × n

= 48n

40 ft.

⇓

5 revolutions more

⇓

n + 5

= 40(n+5)

48n = 40n + 200.

8n = 200

n = 25.

Distance = 48 × 25

= 1200 ft.

L.C.M of 48 & 40

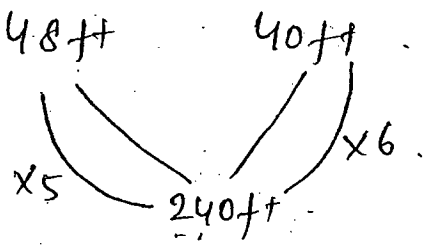
$= 240$.

$48 \times 5 = 240$

$40 \times 6 = 240$

2	48, 40
2	24, 20
2	12, 10
2	6, 5
	3, 5

Q4)



1 revolution — 240 ft.

5 revolution — 240×5

$= 1200$ ft.

25.

I	II	III
x	$2x$	$\frac{2}{3}(x+2x)$

$\frac{2}{3} \times 3x$

$= 2x$.

Distance covered $= x + 2x + 2x$.

$= 5x$. — D.

Dist' travelling at the speed of x for 3 hours $= x \times 3$

$= 3x$ — D'

$D - D' = 120$.

$5x - 3x = 120$

$2x = 120$

$x = 60$.

Avg. Speed = $\frac{\text{Total Distance.}}{\text{Total Time}}$

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

$= \frac{5 \times 60^{20}}{3}$

$= 100$ km/hr.

10. A ——— 100 points.

$\overline{A-B}$ ——— 20 points.

$\overline{A-C}$ ——— 28 points.

$\frac{100}{28}$
$\frac{}{72}$

A — 100.

B — 80 points.

C — 72 points.

B — 80 C — 72.

1 M = $\frac{72}{80}$

100 = $\frac{72^{9}}{80} \times 10$

10 Points = 90 M.

10 points.

11.

A —— 90 points.

$\overline{A-B}$ —— 15 points.

$\overline{A-C}$ —— 30 points.

90
15
75

A —— 90 points.

B —— 75 points.

C —— 60 points.

B —— 75 p C —— 60 p.

1 p —— $\frac{60}{75}$

100 p —— $\frac{\cancel{60}^{20}}{\cancel{75}_{5}} \times \cancel{100}^{4}$.

25
3
75.

20 points. 2 80

2 20 points.

DATA INTERPRETATION

1. India can spend = 3 bn.

$Rs\ 3 \times 10^9$

- 1 barrel of oil costs 110 Riyal.

3.75 Riyal = Rs 48

1 Riyal = Rs $\frac{48}{3.75}$

110 Riyal = Rs $\frac{48}{3.75} \times 110$

$$n = \frac{Rs\ 3 \times 10^{9}}{Rs\ \frac{48}{3.75} \times 110}$$

$$= \frac{3.75 \times 10^8}{16 \times 11}$$

$$= \frac{3.75 \times 100 \times 10^6}{176}$$

$$= \frac{375}{176} \text{ million}$$

$$\simeq 2.1 \text{ million}$$

2.

France imported goods of 6 bn.

Germany 15% of import

$= 15\%$ of 6 bn francs.

$\Rightarrow 6.4$ franc $= 1.9$ DM

1 franc $= \frac{1.9}{6.4}$ DM

$= \frac{19}{64}$ DM

$\Rightarrow 15\%$ of $6 \times 10^9 \times \frac{19}{64}$ DM

$= \frac{15}{100} \times 6 \times 10^{9} \times \frac{19}{64}$ DM

$= 90 \times \frac{19}{64} \times 10^7$ DM

$= 90 \times 10 \times \frac{19}{64} \times 10^6$ DM

$= 900 \times \frac{19}{64} \times 10^6$ DM

$= \frac{900}{3.(\,)}$ million DM

$\simeq$ 270 million DM.

4.

Total Revenue = S.P x Selling Quantity

** Total produce quantity = Total sold quantity

Total Revenue = Rs. 1.8 lakh

Rice = 35% of Revenue.

(i.e) 35% of 1.8 lakh = S.P x $\frac{90^\circ}{360^\circ}$ x 80 quintal

$= \frac{35}{100} \times \frac{0.9}{1.8} \times 10^{8}$ $= S.P \times \frac{90}{360_4} \times 80^{2} \times 100$

S.P = Rs 35 x 0.9/kg.

= Rs 31.5/kg

40 | 0.9 | 36

5

$\frac{40}{100} \times 1.8 \times 10^{5} = S.P \times \frac{3}{150} \times 80 \times 100$.

360 12.

S.P = 1.8 x 12/kg

= Rs 21.6/kg.

Marked price => 90% = Rs 21.6/kg.

90% → 100 − 10 = 90%. 10% discount

100% = Rs $\frac{21.6}{90} \times 100$ /kg (2.4)

= Rs 24.

6. $\frac{\%\text{ of males in U.P, M.P \& Goa}}{\text{Total population}} \times 100\%$

**Anything complete is 100%

$\frac{\%\text{ of males in U.P, M.P \& Goa} \times 100}{100}$

% of males in U.P $= \frac{3}{5} \times \frac{3}{15}\% = 9\%$.

% of males in M.P $= \frac{3}{4} \times \frac{5}{20}\% = 15\%$

% of males in Goa $= \frac{3}{8} \times \frac{3}{12}\% = \frac{9}{2} = 4.5\%$

$\Rightarrow 9\% + 15\% + 4.5\%$

$= \underline{28.5\%}$.

11. Market C → children visiting

= 20% of 45640.

Market F → children visiting

14% of 59650

10 $\frac{\cancel{20\%} \text{ of } 4564}{7\cancel{4}\% \text{ of } 5965} \times 100\%$

$= \frac{10 \times 4564}{7 \times 5965} \times 100$

$= \frac{\cancel{10 \times 4564\,600}}{7 \times \cancel{6}\overset{23}{\cancel{4600}}} \times \cancel{100}$

$= \frac{23}{21} \times 100\%$

$= 109.30\%$.

$3 \overline{)10} \; 3.3$, $\frac{9}{10}$

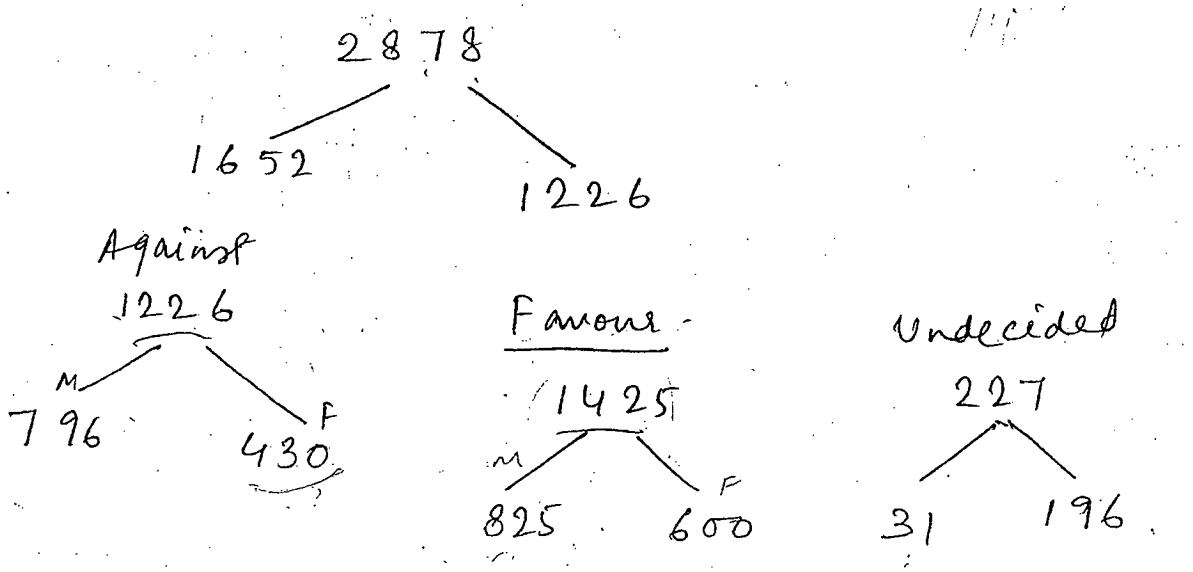
30. Total students = 150.

Students in all three disciplines = 2 boys + 3 girls = 5.

$= \frac{\cancel{5}}{\cancel{150}} \times 100$

$= 3.33\%$.

37.



Total = 1226 + 1425 = 2651

2878 − 2651 = 227

796 + 31 = 827

1652 − 827 = 825

1226 − 796 = 430

1425 − 825 = 600

227 − 196 = 31

15. $\frac{33}{66} \times \frac{3}{150} \times 100 = 99$

$\frac{44}{88} \times \frac{3}{180} \times 100 = 132$

$\frac{99}{100} \times 375 = 463$

$\frac{14}{56} \times \frac{5}{125} \times 100 = 70$

$\frac{14}{56} \times \frac{3}{75} \times 100 = 42$

$\frac{96}{100} \times 50 = 45$

16. Archit = $\frac{76 \times 100}{100}$ = 76.

Garvita = 88

$\frac{88}{100} \times 100$ = 88

$\frac{88}{76} \times \frac{100}{}$ (50) 25 = (38) 19

88
×25
440
176×
2200

19) 2200 (11.
19
30
19
11

20. Vehicle A = $\frac{832}{16}$ – Dist. – Time

= $\frac{864}{16}$ } Not equal X.

Vehicle B = $\frac{516}{12}$ 43.

= $\frac{774}{18}$ 43 } Equal ✓

25. $\frac{\frac{7}{15} \times 17\%}{\frac{9}{16} \times 16\%}$ = $\frac{7 \times 17}{15 \times 9}$

= $\frac{119}{135}$

44. 30% of 40 = 12. 32+8

240.

25% of 12 = 3.

12 − 3

= 9.

1
999
1998 2

① $\left(2-\frac{1}{3}\right)\left(2-\frac{3}{5}\right)\left(2-\frac{5}{7}\right)\cdots\cdots\left(2-\frac{997}{999}\right)$

$= \left(\frac{6-1}{3}\right)\left(\frac{10-3}{5}\right)\left(\frac{14-5}{7}\right)\cdots\cdots($

$= \left(\frac{5}{3}\right)\left(\frac{7}{5}\right)\left(\frac{9}{7}\right)\cdots\cdots\left(\frac{1998-997}{999}\right)$

$= \frac{5}{3}\times\frac{7}{5}\times\frac{9}{7}\cdots\cdots\frac{1001}{999} = \frac{1001}{3}$.

② $\left(1+\frac{1}{3}\right)\left(1+\frac{1}{4}\right)\left(1+\frac{1}{5}\right)\cdots\cdots\left(1+\frac{1}{n}\right)$

$= \frac{4}{3}\times\frac{5}{4}\times\frac{6}{5}\times\cdots\cdots\frac{n+1}{4} =$

$= \frac{n+1}{3}$.

③ $\frac{1}{1\times2} + \frac{1}{2\times3} + \frac{1}{3\times4} + \text{——} + \frac{1}{100\times101}$

$= \frac{1}{1\times2} \quad = \frac{1}{1} - \frac{1}{2} \quad = \frac{2-1}{2\times1} \quad = \frac{1}{1\times2}$

$\frac{1}{2\times3} = \frac{1}{2} - \frac{1}{3} = \frac{3-2}{2\times3} = \frac{1}{2\times3}$

$\frac{1}{3\times4} = \frac{1}{3} - \frac{1}{4}$

$\frac{1}{100\times101} = \frac{1}{100} - \frac{1}{101}$

In this case → denominator → product of two consecutive numbers and in numerator it is there difference

$= 1 - \frac{1}{2} + \frac{1}{2} - \frac{1}{3} + \frac{1}{3} - \frac{1}{4} + \ldots + \frac{1}{100} - \frac{1}{101}$

$= 1 - \frac{1}{101} = \frac{101-100}{101} = \frac{100}{101}$.

④ A number when divided by 663 leaves 53 as remainder, Find the remainder when this number is divided by 39 and 37.

Let the number be x — dividend.

Quotient = y.

$\therefore x = 663 \times y + 53$

$\frac{x}{39} = \frac{663y + 53}{39}$

$= \frac{663y}{39} + \frac{53}{39} = \frac{663y}{39} + \frac{53}{39}$

↓ ↓

Remainder 0. R = 14.

$13\overline{)221}\,(17$

13

91

91

0

$$\Rightarrow \frac{x}{37} = \frac{663y + 53}{37}$$

$$\Rightarrow \frac{663y}{37} + \frac{53}{37}$$

$\Downarrow$

Can't be determined as we do not know the value of y.

Ans. cannot be determined.

5. $\frac{555^{777}}{554} = ① \frac{2^2}{3} \quad ② \frac{4}{3} - 1 \quad \frac{3}{2}$

6. $\frac{333^{777}}{334}$

7. $\frac{333^{786}}{334}$

8. $\frac{70^{80^{90}}}{23} = \frac{70^{720}}{23}$.

$\frac{3}{2} = R = 1 \quad \frac{3^2}{2} = R = 1 \quad \frac{3^3}{2} = R = 1 \quad \text{——} \quad \frac{3^n}{2} = R = 1$

$\frac{4}{3} = R = 1 \quad \frac{4^2}{3} = R = 1 \quad \frac{4^3}{3} = R = 1 \quad \text{——} \quad \frac{4^n}{3} = R = 1$

whenever, $\left(\frac{n+1}{n}\right)^m$ always the remainder is 1

$\frac{2}{3}$ = R = 2. $\frac{2^2}{3}$ = R = 1 $\frac{2^3}{3}$ = R = 2 $\frac{2^4}{3}$ = R = 1

when power is odd Remainder = 1
when power is even Remainder = 2.

$\frac{3^1}{4}$ = R = 3 $\frac{3^2}{4}$ = R 1 $\frac{3^3}{4}$ = R = 3 $\frac{3^4}{4}$ = R 1 ___ $\frac{3^n}{4}$

whenever power is odd Remainder = 3
whenever power is even Remainder = 1.

$\left(\frac{n+1}{n}\right)^m$ = R = 1

$\frac{n^m}{n+1}$

If, m is odd, R = n.
m is even, R = 1

4. If, $\frac{x}{y}$ => R = 1

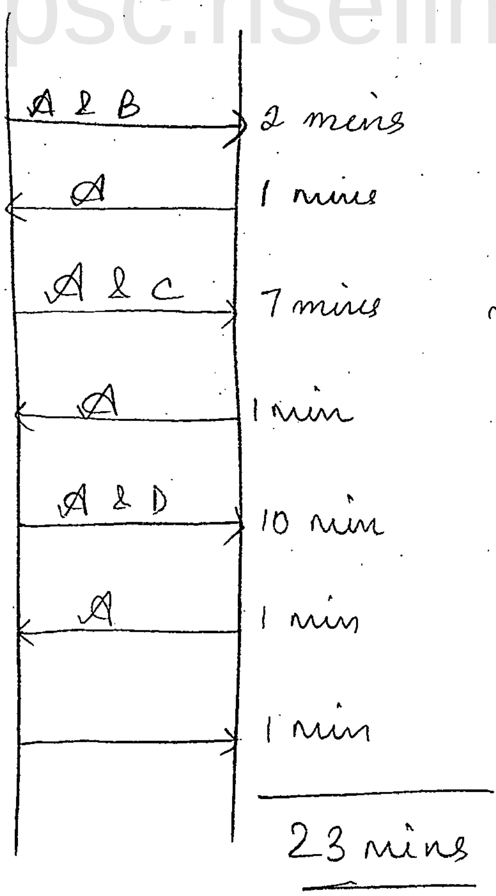
then, $\frac{x^n}{y}$ => R = 1

50^2	= 2500	51^2	= 2601
49^2	= 2401	52^2	= 2704
48^2	= 2304	53^2	= 2809
47^2	= 2209	54^2	= 2916
46^2	= 2116	55^2	= 3025
45^2	= 2025	56^2	= 3136
44^2	= 1936	57^2	= 3249
43^2	= 1849	58^2	= 3364
42^2	= 1764	59^2	= 3481
41^2	= 1681	60^2	= 3600

49
49
441
196×
2401

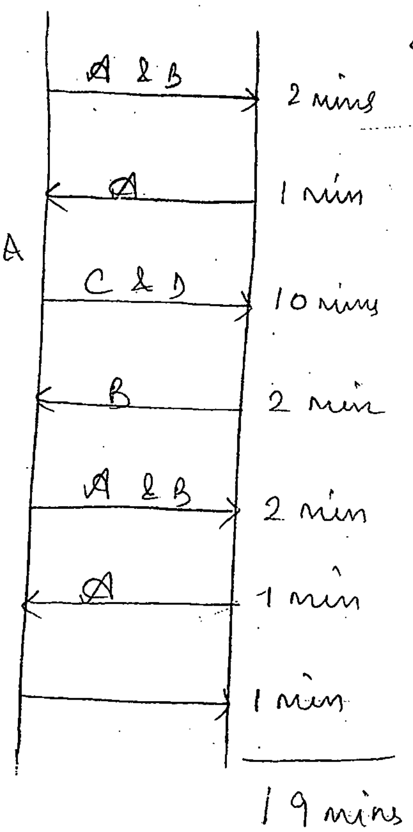
CLASS ASSIGNMENT

1.(a)



Two slow persons are always together

b)



5. 630

x

$x-3$

$x-6$

$x-9$

$x-12$

$x + x-3 + x-6 = 630$

$3x - 9 = 630$

$3x = 639$

$x = \frac{639}{3}$

$x + x-3 + x-6 + x-9 = 630$

$4x - 18 = 630$

$4x = 648$

$x = \frac{648}{4}$

$x + x-3 + x-6 + x-9 + x-12 = 630$

$5x - 30 = 630$

$5x = 660$

$x = \frac{660}{5}$

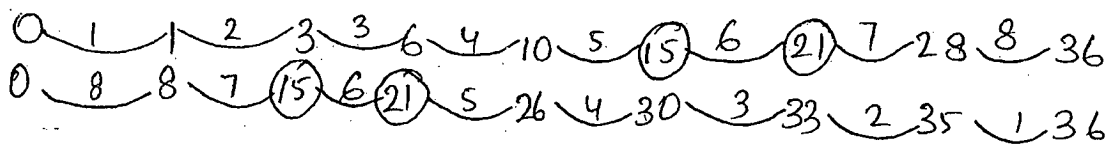
$x + x-3 + x-6 + x-9 + x-12 + x-15 = 630$

$6x - 45 = 630$

$6x = 675$

$x = \frac{675}{6}$ X not possible.

6.



Common points = 2 points

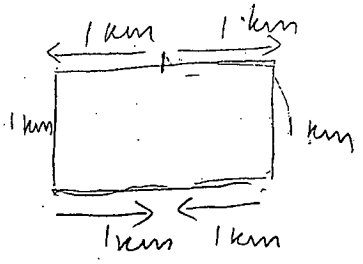
Total points = 14 points

$\therefore 14 - 2$

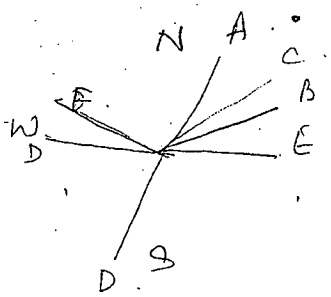
$= 12$ points.

2.

After 3 km



3. $\sqrt{2+\sqrt{2+\sqrt{2+\ldots\ldots}}}$



$$x = \sqrt{2+\sqrt{2+\sqrt{2+\ldots\ldots\infty}}}$$

$$x^2 = 2+\sqrt{2+\sqrt{2+\sqrt{2+\ldots\ldots\infty}}}$$

$$x^2 = 2+x$$

$$x^2 - x - 2 = 0$$

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

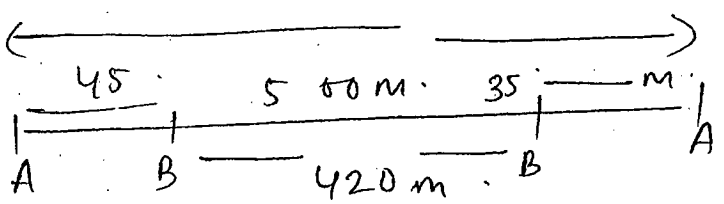
$$x(x-2)+1(x-2) = 0$$

$$(x-2)(x+1) = 0$$

$$x = 2.$$

10.

$$\begin{array}{r} 500 \\ -\ 45 \\ \hline 455 \\ -\ 35 \\ \hline 420 \\ \hline \end{array}$$



500 : 420

25 : 21

1. n is the smallest number that has 5 factors. How many factors does n − 1 has.

2. n is the smallest number that has seven factors. How many factors does n − 3 has.

1.

4	10	12	16
↓	↓	↓	↓
1, 2, 4	1, 2, 5, 10	1, 2, 3, 4, 6, 12	1, 2, 4, 8, 16

N — 16.

N−1 — 15

↓

1, 3, 5, 15.

2 & n − 1 will have 4 factors.

2. 1. N → 'n' factors

If 'n' (total number of factors) is prime

$N \rightarrow a^P \rightarrow$ prime factor

$N \rightarrow a^P \times b^q \times c^r \times \ldots\ldots$

$n = (p+1)(q+1)(r+1) \ldots\ldots$

→ n (total no. of factors) = p + 1

$n \rightarrow 5$

$p+1 \rightarrow 5$

$p = 4$.

$n = a^4$

$\rightarrow 2^4$

2. n — 7

$p+1 = 7$

$p = 6$

$N \rightarrow a^6$

$= 2^6$

$= 64$.

$64 - 3$

$= 61$

1 , 61

* Only applicable in case of prime numbers.

ex. (2^{n-1}) $2^{13} \rightarrow 2^{13-1} = 2^{12}$.

3. Find the smallest possible number by which 5780 must be multiplied or divided to get a perfect square.

4. Find the smallest possible by which 5780 must be multiplied to get a perfect cube.

3.

5780

578 , 10

2×289 , 2×5

$289 = 17^2$

$2^2 \times 17^2 \times 5^1$

power is even , power is odd.

multiplied by 5 it ~~becomes~~ 5^2, power becomes even. $2^2 \times 17^2 \times 5^2$

when divided by 5 again.

$$\frac{2^2 \times 17^2 \times \cancel{5}}{\cancel{5}}$$

4. $2^2 \times 17^2 \times 5^1 \times (2 \times 17 \times 5^2)$

$= 2^3 \times 17^3 \times 5^3$

34 | 2
×25
170
68×
850

5. Find the smallest possible perfect square exactly divisible by 6, 7, 8 and 9.

L.C.M = $2^3 \times 3^2 \times 7$

= 504.

Making power even and to make it perfect square.

$2^3 \times 3^2 \times 7 \times 2 \times 7$

$= 2^4 \times 3^2 \times 7^2$

= 7056.

2 | 6,7,8,9
2 | 3,7,4,9
3 | 3,7,2,9
1,7,2,3

1
24
3
72
7
504

6. Sq. root of 321489 = 567

	56	
2	5 | 32 14 89	567
	+ 5 | 25	1127 | 7889
	106 | 714	7889
	+ 6 | 636	×
	112 | 7889	

7. Sq. root of 166464.

$$
\begin{array}{r|l}
 & 408 \\
\hline
4 & \overline{16}\,\overline{64}\,\overline{64} \\
+4 & 16 \\
\hline
80 & 64\,64 \\
+0 & 64\,64 \\
\hline
808 & \times
\end{array}
$$

8. Sq. root of 15129:

$$
\begin{array}{r|l}
 & 123 \\
\hline
1 & \overline{15}\,\overline{12}\,\overline{9} \\
+1 & 1 \\
\hline
22 & 51 \\
+2 & 44 \\
\hline
243 & 729 \\
 & 729 \\
 & \times
\end{array}
$$

$8018 \times 8 = 64144$

$886 \times 8 = 7088$

$22 \times 2 = 44$

$23 \times 3 = 69$

$243 \times 3 = 729$

9. Find the least numbers of 3 digits which must be subtracted from the greatest number of seven digit that the remaining number is perfectly divisible by 270.

a) 9.

b) 189

c) 279

d) Cannot be determined.

Find the least number of 2 digits which must be subtracted from the greatest number of seven digit that the remaining number is perfectly divisible by 270.

a. 9 b. 79 c. 279 d. cannot be determined

9. $270 \overline{)\ 9999\ 9999}$

9

$9999999 - 9$

$2 \quad 9999990$

-270

9999720

9

9999999

-279

9999720

8

$899 \cdot 8 \quad 999$

$9 \cdot 8 \quad -100$

$8991 \quad 899$

899

10. $m+n \div 12 \Rightarrow R = 8$.

$m-n \div 12 \Rightarrow R = 6$

$mn \div 6 \Rightarrow R = ?$

$12 \quad 9 \quad 108$

116

$m+n = 20 \ (12+8)$

$m-n = 18 \ (12+8)$

$2m = 38$

$m = 19$

$m+n = 20$

$19+n = 20$

$n = 1$

$mn = \frac{19 \times 1}{6}$

$\Rightarrow R = 1$

11. 93×98 Base $= 100$.

$93^{(-7)} \times 98^{(-2)}$

$-2 \quad (-7 \times -2)$

$2 \ 93 \quad 91$

$= 9114$.

$94^{(-4)} \times 99^{(-1)}$

$= 9306$

12. 104×107.

$= 104^{(+4)} \quad 107^{(+7)}$ $\quad +4+7=11$, $+4\times+7=28$.

$= 11128$.

$103^{(+3)} \times 108^{(+8)}$

$= 11124$.

13. $94^{(-6)} \times 106^{(+6)}$

94^{+6}

$= 100^{(-6\times+6)}$

$= 10000^{-36}$

$10000 - 36 = 9964$.

$91^{(-9)} \times 101^{(+1)}$

$= 92^{(-9\times+1)}$

$= 9200^{-9}$

$= 9191$

$92^{(-8)} \times 103^{(+3)}$

$= 9500 - 24$

$= 9476$.

14. 85^2

$= 7225$.

65^2

$= 4225$.

PROBABILITY

1. There are 10 identical coins and each one of them has 'H' engraved on its one face and 'T' engraved on its other face. These 10 coins are lying on a table and each one of them has 'H' face as the upper face. In one attempt exactly four (neither more nor less) coins can be turned upside down. What is the minimum total number of attempts in which the 'T' face of all the 10 coins can be brought to the upper faces?

* Probability is certainty. It will come.
Possibility → it may or may not happen.

H H H H H H H H H H

Step-I T T T T H H H H H H

Step-II T T T H T T T H H H

Step-III T T T T T T T T T T

* First I turn four coins. which is turned upside down and from 'H' ⟶ 'T'.

* Second, I turn three coins of 'H' faced upside down, to 'T' and the one from the previously turned one, from 'T' to 'H'

* Third, the remaining, I am left with will be four coins again. I turn from 'H' to 'T'

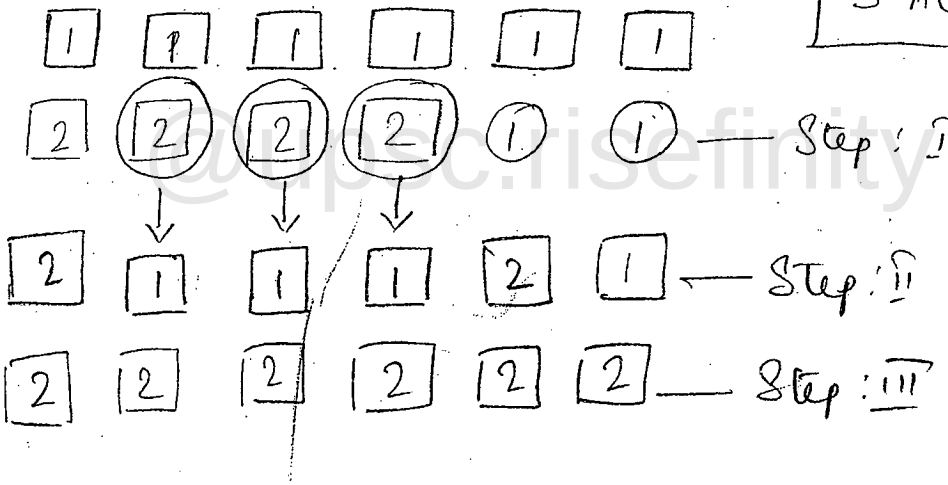
2. Six identical cards are placed on the table. Each card has –

i. Marked on one side

ii. marked on its other side.

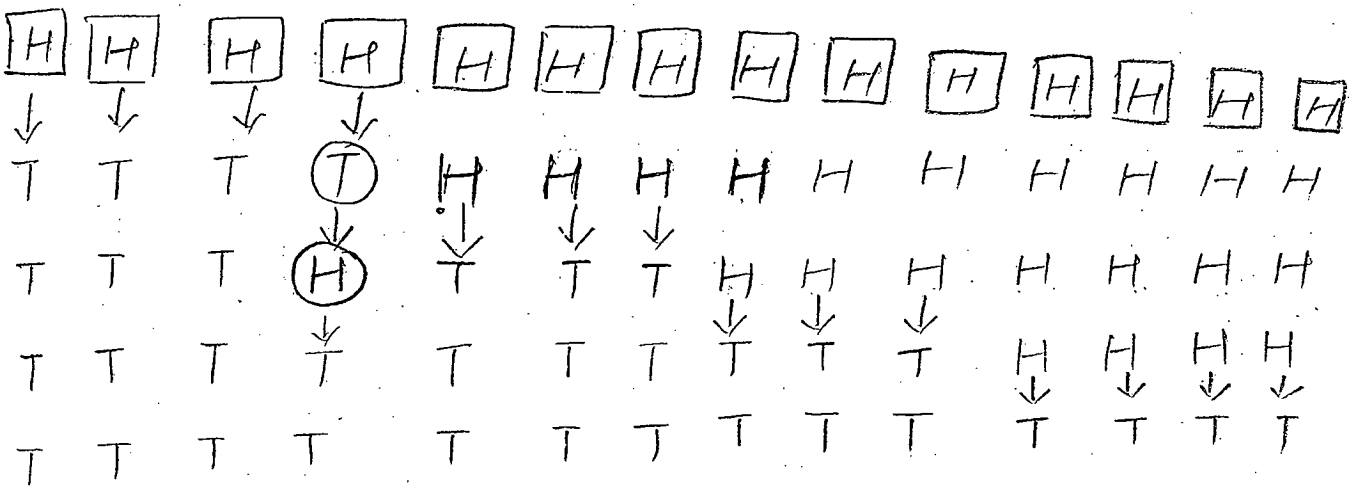
All six cards are placed in such a manner that the number one is on the upper side. In one try exactly four (neither more nor less) cards are turned upside down. In how many number of tries can the cards be turned upside down such that all the six cards shows no. 2 on upper side.

3 Attempts



3. There are 14 identical coins and each one of them has 'H' engraved on its one face and 'T' engraved on its other face. These 14 coins are lying on a table and each one of them has 'H' face as the upper face. In one attempt exactly four (neither more nor less) coins can be turned upside down. What is the minimum

total number of attempts the 'T' face of all the 14 coins can be brought to the upper faces.



4 Attempts

4. A box contains five sets of balls, while there are three balls in each sets. Each of balls has one (same) colour which is different from every other set. What is the least number of balls removed from the box in order to create certainity. A pair of balls of same colour has been removed.

a) 2

b) 3

c) 5

d) None of these ✓

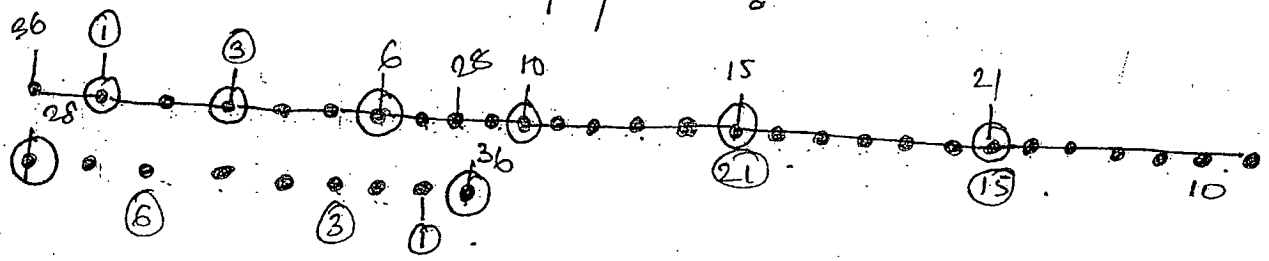
= 5 × 3 = 15.

R/P/Y/G/B — 6th one can be repeatation of the previous colors.

5th.

= 6 balls.

5. A straight line segment is 36 cm long. Points are to be marked on the line from both the end points. From each end the first point is at a distance of 1cm from the end, the second point is at a distance of 2 cm from the first point and the third point is at a distance of 3 cm from the second point. and so on..... If points on the ends are not counted and the common points are counted as one what is the number of points?



1 3 6 10 15 21 28 36
36 28 21 15 10 6 3 1

Omitting the extreme points, here being 36. then calculating the points.

1, 3, 6, 10, 15, 21, 28, ~~36~~.
~~36~~ 28 21 15 10 6, 3, 1

10+2 = 12 points.

AVERAGE

- Average is the range between the maximum and the minimum
- Average is the performance of an individual
- Average comes into picture when the thing is repeated more than once.

Average is $\boxed{\frac{\text{sum of all terms}}{\text{total terms}}}$

Average speed - $\frac{\text{distance}}{\text{time}} = \frac{\text{Total distance}}{\text{Total time}}$

= A man travels from A to B at a speed of 60 km/hr, and from B to A at a speed of 40 km/hr. What is the average speed?

A ——— B
x km/hr y km/hr

Time = Distance / Speed

2 | 60, 40
2 | 30, 20
2 | 15, 10
3 | 15, 5
5 | 5, 5

Average Speed - $\frac{2xy}{x+y} = \frac{120+120}{2+3} = \frac{240}{5}$ = 48 km/hr.

48
24.2
5
120.

= First distance 1/3 rd covered at 10 km/hr, Second 1/3 at a speed of 20 km/hr and the third 1/3 at a speed of 30 km/hr. What is the average speed?

L.C.M of 10, 20 & 30.

Average Speed - $\frac{3xyz}{xy+yz+zx}$

$\frac{60+60+60}{6+3+2} = \frac{180}{11}$ km/hr.

2. A cyclist covered a square field at a speed of 30 km/hr, 20 km/hr, 10 km/hr, 40 km/hr. What is the average speed?

L.C.M of 30, 20, 10, 40 ...

$$\text{Average Speed} = \frac{120 + 120 + 120 + 120}{12 + 6 + 4 + 3}$$

$$= \frac{480}{25} \; 96 = 19.2 \text{ km/hr}.$$

12
10
22
3
4
+2
39

Assignment

15.

X kms V_1 km/hr. x/v_1

y km V_2 km/hr x/v_2

$$\frac{x+y}{\frac{x}{v_1} + \frac{y}{v_1}} = \frac{v_1 v_2 (x+y)}{v_2 x + v_1 y}$$

2 | 8, 10, 9, 11
2 | 4, 5, 9, 11
2, 5, 9, 11
3 co
11
36
36 X
3960

= Four cars are hired at the rate of Rs 6/km plus the cost of diesel at Rs 40/litre. In this context consider the details given in the following table.

	Mileage (km/hr)	Hours	Total Payment
Car A	8	20	2120
Car B	10	25	1950
Car C	9	24	2064
Car D	11	22	1812

which car maintained the maximum average speed?

Average Speed = $\frac{\text{Total Distance}}{\text{Total Time}}$

Suppose take distance as a.

8 km/hr — 40

1 km/hr — $\frac{40}{8}$ 5.

Car A. $6a + 5a = 2120$

$11a = 2120$

$a = \frac{2120}{11} = \frac{106}{11} = 9\frac{7}{11}$ km/hr.

Car B.

10 km/hr — 40

1 km — $\frac{40}{10}$ 4.

$6a + 4a = 1950$

$10a = \frac{1950}{10}$

$a = \frac{1950}{10} = 7.8$.

Car B. $= \frac{1950}{11} = \frac{78}{11} = 7\frac{1}{11}$.

390 78.

7.09

11) 78 (

77

100

99

1

Average of 2, 4, 6 $= \frac{12}{3} = 4$.

Add +1 $= 3+5+7 = \frac{15}{3} = 5$

Substract −1 $= 4$

$\overline{2+4+6}$.

Multipy ×2 $4+8+12 = \frac{24}{3} = 8$.

Divide ÷2 $2+4+6 = 4$.

7. Avg. marks of 100 students = 60.

Total marks of 100 Students $= 60 \times 100$
$= 6000$

Correct total $= 6000 - 75 + 65$
$= 5990$.

Average $= \frac{5990}{100}$
$= 59.5$

12. Average marks of 75 students = 35.

Total marks $= 75 \times 35$
$= \frac{2625}{75}$

$$\begin{array}{r} 75 \\ 35 \\ \hline 375 \\ 225\times \\ \hline 2625 \end{array}$$

The average weight of a class of 30 students is 40 kgs. If however weight of teacher is included, the average becomes 41 kg. What is the weight of the class-teacher?

Avg. weight of 30 students = 40kgs.

Total weight of 30 students = 40×30
= 1200 kgs.

Avg. weight of 31 persons = 41 kgs.

Total weight of 31 persons = 41×31
= 1271 kgs.

Weight of class teacher = 1271 − 1200
= 71 kgs.

Method 2: Avg. is 40 kgs. of 30 students

Then = now after the class teacher arrives avg increases to 41 kg.

Now the 31 persons = 40 + 31
= 71 kgs.

25.

A B C D → 120 kg.

E brought

120 +

replaced by E.

E = 120.

if not weight replaced.

30 — 14

420.

465
−420
45

14 1
3
420

31
×15
155
31×
465

2

Class Assignment 08 | Previous class –

9. Let per head expenditure = Rs x

No. of students = 35

Total expenditure = 35x.

No. of new students = 35 + 7
= 42.

∴ The new expenditure = $\frac{35x+42}{42}$

Expenditure diminishes Re 1 per head = $\frac{35x+42}{42} = x-1$

$35x + 42 = 42x - 42$

$7x = 84$

$x = 12$.

Original expenditure = $35x = 35 \times 12$.

= Rs 420.

10. Let average expenditure of 9 persons = x.

Total expenditure of 9 persons = 9x.

8 of them pays 12/- each = $9x = 8 \times 12$.

$9x = 8 \times 12 + 8 + x$.

$\downarrow 96+8$

$9x - x = 104$

$8x = 104$

$x = 13$

$\Rightarrow 9x = 9 \times 13$

11. Avg. of a batsman = $\frac{\text{Total runs scored}}{\text{Total innings out}}$

Avg. of a bowler = $\frac{\text{Total runs given upon}}{\text{Total wickets taken}}$

Let the avg. till 16 innings = x. $11x$

Total = $16x$.

Total runs scored = $16x + 87$

17th innings $\Rightarrow \frac{16x+87}{17} = x + 3$.

$\Rightarrow 16x + 87 = 17x + 51$

$x = 36$.

New avg. = $36 + 3$

= 39.

13. Let the number of wickets taken before last match = x.

Avg. = 12.4.

$\Rightarrow 12.4 = \frac{\text{Total runs}}{x}$.

Total runs = $12.4x$.

Last match given = 26 runs

= $12.4x + 26$.

Total wickets taken $= x+5$.

The avg. decreases by 0.4
so the new avg. $= 12$.

$$\Rightarrow \frac{12.4x+26}{x+5} = 12$$

$$\Rightarrow 12.4x+26 = 12x+60.$$

$$\Rightarrow 0.4x = 340.$$

$$4x = 34\times 10.$$

$$x = \frac{340}{4}.$$

$$= 85.$$

(*) 21

	No. of students	Avg. marks	Total marks.
Cl-I	x	$m = 35$	$m\times x$.
Cl-II	y	$n = 55$	$n\times y$.

Combined Avg. Or Weighted Avg. $= \frac{mx+ny}{x+y}$.

$$\Rightarrow 40 = \frac{35x+55y}{x+y}.$$

$$\Rightarrow 40x+40y = 35x+55y.$$

$$5x = 15y.$$

$$\frac{x}{y} = \frac{15}{5} = \frac{3}{1} = 3:1$$

14. Avg. annual income of certain agricultural worker = S.

Other workers = T.

No. of worker	Avg.	Total.
11	S	11 S
1	T	T

Avg. $\frac{11S+T}{12}$

* There is a certain number of cigrattes in a box. They are divided in such a way that the person who gets 1/4 of the whole gets thrice of what the others get on an average. Find the no. of people, amongst whom the cigrattes are distributed.

Find the no. of cigrettes.

A. 12 $\frac{1}{4} \times 12^{3}$ = rest gets 1 each which is thrice what he has taken

B. 36

C. 48

D. Not possible.

Let the no. of cigrattes be x.
and the no. of persons be y
one person take $\frac{1}{4} = \frac{1}{4}x = \frac{4-1}{4}x$
No. of cigrattes left $= \frac{3}{4}x$.
Each share $= \frac{\frac{3}{4}x}{y-1}$

$\Rightarrow \frac{1}{4}x = \left(\frac{\frac{3}{4}x}{y-1}\right) \times 3$

$y-1 = 9$.

$y = 9+1$.

$= 10$.

2. $\frac{45}{100} \times 500$

$= 225$

$\frac{55}{100} \times 500$

$225 + 275$

$= 500$.

$\frac{452}{5}$

225

$\frac{552}{\times 5}$

275

$+ \frac{275}{225}$

500

2 | 40, 60

2 | 20, 30

5 | 10, 15

2, 3

$\frac{5}{100} \times 40$

$= 20$.

$\frac{3}{120} : \frac{2}{40}$

$\frac{2}{120} : \frac{1}{60}$

$40 + 20$

$= 60$.

$\frac{120 + 120}{3 + 2} = \frac{240}{5}$

$= 48$.

Annual avg. 60 %.

45 % + 15 = 60.

55 % + 5 = 60.

60 % + 15 + 5

= 80 %.

80 % of 500

$= \frac{80}{100} \times 500$

= 400.

3. 5 consecutive odd integers.

1, 3, (5), 7, 9

c — middle

$= a + a+2 + (a+4) + a+6 + a+8$

$\frac{}{5}$

$= \frac{5a + 20}{5} = \frac{5(a+4)}{5}$

$= a+4$ c is the avg.

4. $\frac{45 + 55 + x}{3} = 60$

$100 + x = 60 \times 3$

$100 + x = 180$.

$x = 180 - 100$

$= 80$.

80 % of 500.

$= \frac{80}{100} \times 500$

$= 400$.

5. Let average till 11 innings be x.

Total $= 11x$.

12th innings $= 90$.

Total $= 11x + 90$.

Avg. $\Rightarrow \frac{11x+90}{12} = x - 5$

$\Rightarrow 11x + 90 = 12x - 60$.

$12x - 11x = 90 + 60$.

$x = 150$.

Decreases by 5 $= 150 - 5$

$= 145$.

T - Manya
Thurs - Anni
Sat - Chand

* What can be possible no. of cigarettes

RATIO AND PROPORTION

→ Ratio shows relation b/w two numbers.

→ Ratio represents fraction.

$$2:4 = \frac{2}{4} = \frac{1}{2}$$

$$8:16 = \frac{8}{16} = \frac{1}{2}$$

→ Proportion is equal

$$2:4 :: 8:16$$

$$\frac{2}{4} = \frac{8}{16}$$

→ Simplest form of Ratio:

2:13

14:15

Any ratio which cannot be further reduced is called simplest form of Ratio.

→ a:b is the simplest form of Ratio

Duplicate ratio will be $a^2 : b^2$

Triplicate ratio will be $a^3 : b^3$

Sub-duplicate ratio will be $\sqrt{a} : \sqrt{b}$

Sub-triplicate ratio will be $\sqrt[3]{a} : \sqrt[3]{b}$

A : B :: 1 : 2

B : C 3 : 4

A : B : C :: 3 : 6 : 8

Suppose, if I double it.

A : B = 2 : 4 , 3 : 6.

Suppose if I double B : C

6 : 8.

a : b :: 1 : 2

multiply b : c 3 : 4

1 × 3 = 3

2 × 3 = 6

2 × 4 = 8.

---

a : b : c :: 3 : 6 : 8.

---

a : b :: 1 : 5

b : c 3 : 4

---

a : b : c :: 3 : 15 : 20

---

a : b : c :: 1 : 2 : 3

c : d 4 : 5

---

a : b : c : d :: 4 : 8 : 12 : 15

→ If a : b :: 1 : 2

b : c :: 3 : 4

~~c : d :: 5 : 6~~

---

a : b : ~~c~~ ~~d~~ :: 3 : 6 : 8.

c : d :: 5 : 6

---

15 : 30 : 40 : 48

---

a : b : c : d ::

1. A bag contains 50 paisa, rupee 1 and rupee 2 coins in the ratio 2:3:4. If the total amount is Rs240. What is the total number of coins?

50 paise, ₹1, ₹2.

2 : 3 : 4

₹240 × 20.

₹1 : ₹3 : ₹8 = 1+3+8 = 12

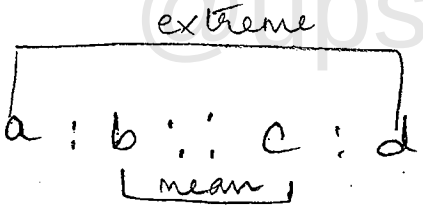
20×1 : 3×20 : 20×8

₹20 : ₹60 : ₹160

$\frac{240}{12}$ 20.

How many coins required to make 20 rupees → 40 + How many coins reqd. to make Rs 160 → 60 + How many coins reqd. to make Rs 160 → 80 = 180 total coins.

⇒



$\frac{a}{b} = \frac{c}{d}$

$ad = bc$

Product of extreme = Product of mean

Assignment

24. Gold : Non-Gold

1 : 3

x : 3x

(x+10) : (3x) :: 1 : 2

$2(x+10) = 3x$

$2x + 20 = 3x$

$x = 20.$

$\therefore \quad x + 10 + 3x$

$4x + 10$

$4 \times 20 + 10 = \underline{90}.$

2. A bag contains rupees 114 in the form of ₹ 1, 50 paisa, 10 paisa in the ratio of 3 : 4 : 10. What is the number of 50 paisa coins.

₹ 1 | 50 p | 10 p.

3 : 4 : 10.

$3+2+1$

$= 6.$

$\frac{114}{6} = 19.$

23 : 22 : 21

257 : 238 : 219.

$57 + 76 + 190$

$\underline{76}.$

3. A bag contains Rs 112 in the form of ₹1, 50 paisa, and 10 paisa coins in the ratio of 3:8:10. What is the number of 10 paisa coins?

₹1 : 50 ₱ : 10 ₱.

3 : 8 : 10.

3+4+1 : 28 : 23 : 24 : 210.

112 : 14 : 242 : 256 : 214.

8) 112 (14
8
32

1
56
× 2
112

× 10

42 + 112 + 140.

140.

17 8 4
136 17 8 5
17 8 136
102

4. Kundan has collection of coins of denomination of ₹ 1, 50 paisa and 25 paisa in the ratio of 12:10:7. The total worth of coins he has is 75 rupees. Find the number of 25 paisa coins.

12
5.75
1.75
18.75

75

19 × 4 = 76.

18.75 × 4 = 75.

3.752
4
1.00

l.c.m of 1, 1, 4 multiplying by 4.

18.75 ÷ 4 (15)

.25 × 4 (1)

₹ 1 50 p 25 p.

12 : 10 : 7

₹ 12 : ₹ 5 : ₹ 7/4.

× 4 × 4

₹ 48 : ₹ 20 : ₹ 7. × 4.

48 : 40 : 28

for ₹ 1 = 4 25p required

Then = 7 × 4 = 28

5. A man willed his 1/3 of his estate and the remaining 2/3 to his son. Should one be born but in case of a daughter being born, 2/3 of the estate will go to the wife and 1/3 to the daughter. After the man's death, twins were born, a boy and girl were born. Estate was to be divided as per the wish of the man by maintaining the proportion as desired by the man. What is the ratio in which the property is to be divided among the son, wife and daughter.

Son = 2/3 wife = 2/3

wife = 1/3 Daughter 1/3

Son : wife :: 2 : 1

Wife : Daughter :: 2 : 1

S : W : D :: 4 : 2 : 1

Assignment:

22.

50 paisa, ₹1, ₹2, ₹5. Total ₹50.

₹26. ₹24

14 + 10

It is said 5 ~~rupees~~ more than 5 rupees.

2 + 5 = 7

∴ 7 × 2 = 14.

10 + 5 − 5 = 10.

$2x + (x-5)5 = 24$.

$2x + 5x - 25 = 24$.

$7x = 49$.

$x = 7$.

25. Total Application = 120

Male = 70.

Female = 120 - 70

= 50 — 80 - 50

= 30.

No. of those who have driver's license = 80.

Minimum no. of males having driver's licence : Maximum nos of male having driver's licence

3Ø : 7Ø.

3 : 7

(*) 30 which is by default male.
50 is female.
Among 80 having driver's licence 50 are females then male will be 80 - 50
= 30.

20. A : B : C

6 : 19 : 7

6x 19x 7x = 32x.

↓ ↓

6x : 19x+200 : 7x-200 :: (3) : 10 : (3)

A & C equal.

$$6x = 7x - 200.$$

$$x = 200.$$

$$32x = 32 \times 200$$

$$= \underline{26400}.$$

$\Rightarrow$ Original value $= x$.

Increase by I %

New value $= x \times \frac{(100 + I\%)}{100}$.

23. Maths : Physics : biology

5 : 7 : 8

$\frac{5x \times 140}{100} : \frac{7x \times 150}{100} : \frac{8x \times 175}{100}$

+40 : +50 : +75

$100 + 40 = 140$

$100 + 50 = 150$

$100 + 75 = 175$.

$$\boxed{2 : 3 : 4}$$

8. Total mixture = 28 litres

Milk : water :: 5 : 2.

$5 + 2 = 7$.

Qty of milk $= \frac{5}{7} \times 28$.

$= 20$ litres.

Qty of water $= \frac{2}{7} \times 28$

$= 8$ litres.

Milk : Water

20 : $8+x$ :: 2 : 5

$20 \times 5 = 16 + 2x$

$100 = 16 + 2x$

$2x = 100 - 16$

$2x = 84$

$x = 42$.

Q1. Milk Water

5 → ×4 → 20

2 → ×4 → 8 + 42 → 50

7 → ×4 → 28

20 : 50

2 : 5

50 − 8

= 42.

9. Milk Water

2 → ×20 → 40

1 → ×20 → 20 + 40 → 80

3 → ×20 → 60

2 : 1

80 − 20

= 60 litres.

RATIO & PROPORTION

1. ~~He~~ Two glasses of equal volume are respectively half and 3/4 th filled with milk. They are then filled to the brim by adding water. There contents are then pour into another vessel. What is the ratio of milk to water in this vessel.

	Milk	Water	
VI	$\frac{1}{2}x$	$\frac{1}{2}x$	x
VII	$\frac{3}{4}x$	$\frac{1}{4}x$	x
	$\frac{1}{2}x+\frac{3}{4}x$	$\frac{1}{2}x+\frac{1}{4}x$	
	$\frac{2x+3x}{4}$	$\frac{2x+1x}{4}$	

$5x : 3x$

$5 : 3$

	Milk	Water
	$\frac{1}{2}$	$\frac{1}{2}$
	$\frac{1}{x}$	$\frac{1}{x}$
	2	2
	$\times 2$	$\times 2$
	$\frac{3}{4}$	$\frac{1}{4}$
	$\frac{1}{4}$	$\frac{1}{4}$
	$= 4 \times 1$	$= 4 \times 1$

Or,

	Milk	Water	
VI	1×2	1×2	$2 = 4$ ($\times 2$)
VII	3	1	$= 4$
	5	3	

2. Two vessels are full of milk and water in the ratio of 1:3 and 3:5 respectively, if both are mixed in the ratio of 3:2. What is the ratio of milk and water in the new mixture.

24 | 3 | 72

4

Milk	water
$1 \times 24 = 24$	$3 \times 24 = 72$ | $4 \times 8 = 32$ 3
$3 \times 8 = 24$	$5 \times 8 = 40$ | $8 \times 4 = 32$ 2
48	112

48 : 112.

Milk water

$1 \times 6 = 6$ + $3 \times 2 = 6$

$6 + 6 = 12$

$3 \times 6 = 18$ $4 \times 2 = 8$ $2 \times 3 = 6$

$5 \times 2 + 8 \times 1 = 10 + 8$ $1 \times 2 = 2$.

$18 + 10 = 28$.

$12 : 28$

$3 : 7$

$1 \times 6 = 6$ $3 \times 6 = 18$ $4 \times 2 = 8$ $3 \times 2 = 6$ $5 \times 2 = 10$ $8 \times 1 = 8$

$12 : 28$

$3 : 7$

Or, milk water.

VI $\frac{1}{4} \times 3x$ $\frac{3}{4} \times 3x$ $3x$

285 : 115

VII $\frac{3}{8} \times 2x$ $\frac{5}{8} \times 2x$ $2x$

$\frac{3x}{4} + \frac{3x}{4}$ $\frac{9x}{4} + \frac{5x}{4}$

$\frac{6x}{4} : \frac{14x}{4}$

$3 : 7$

$3 : 7$

Class Assignment No. 10.

19.

90×2 180	10×2 20	100×2
80×5 400	20×5 100	100×5
70×9 630	30×9 39	100×9
1210	390	

121 : 39.

No. of employees = 9 : 4

Increase their wages = 2 : 5

Wage Bill = No. of employees × No. of employee

$\overline{9\times2}$: $\overline{4\times5}$

= 18 : 20

9 : 10

= 9 : 10

1. ? Original : Present

22 : 25

3 : 2

$\overline{22\times3}$: $\overline{25\times2}$

~~66~~ : ~~50~~

33 : 25

~~×200~~ ~~×200~~

~~6600~~ ~~5000~~

∴ 33 : 25 : $33\times\frac{\cancel{5000}^{200}}{\cancel{25}}$

= 6600.

Or, Original Present

3 : 2

22 : 25

$\overline{66}$: $\overline{50}$

66x : 50x

$\cancel{50}x = \cancel{5000}^{100}$

$x = 100$

66×100

= 66 00.

300 200

350 350

200 600

850 1150

40×5 = 200 ; 60×5 = 300 = 100 ×5

50×7 = 350 ; 50×7 = 350 = 100 ×7

75×8 = 600 ; 25×8 = 200 = 100 ×8

23

HSΦ : 85Φ

Two candles of the same height are lighted at the same time. The first is consumed in 8 hours and second in 6 hours. Assuming that each candles burn at a constant rate. In how many hours after being lighted, the ratio b/w the first and the second candles becomes 2:1

Let, both the height of the candles be h.

1st candle = 8 hours.

then in 1 hour = $\frac{h}{8}$ m/hr.

2nd candle = 6 hours

then in 1 hour = $\frac{h}{6}$ m/hr.

Then in x hours it will be:

$$\frac{hx}{8} \quad \frac{hx}{6}$$

$$= \left(h - \frac{hx}{8}\right) : \left(h - \frac{hx}{6}\right) :: 2 : 1$$

$$= h - \frac{hx}{8} = 2\left(h - \frac{hx}{6}\right)$$

$$= h\left(1 - \frac{x}{8}\right) = 2h\left(1 - \frac{x}{6}\right)$$

$$= 1 - \frac{x}{8} = 2 - \frac{x}{3}$$

$$= \frac{x}{3} - \frac{x}{8} = 1$$

$$\frac{8x-3x}{24} = 1$$

$$\frac{5x}{24} = 1$$

$$x = \frac{24}{5} = 4\frac{4}{5}.$$

12. Assignment

3	1
×	×
1	3
3	3

$$3 - x = 2(3-3x)$$

$$3 - x = 6 - 6x$$

$$5x = 3$$

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

Or, Two candles = 1 hour = 60 min

5 = 60

= 12

8 hours 6 hours. 12×3

= 36

LCM of 8 & 6 = 24.

8	6
×	×
3	4
24	24

$$24 - 3x = 2(24-4x)$$

$$\Rightarrow 24x - 3x = 48 - 8x$$

$$5x = 24$$

$$x = \frac{24}{5} = 4\frac{4}{5} \text{ hrs.}$$

12.

3 hrs = 180 mins (×1) 1 hr = 60 min (×3) → 180. LCM of 1 & 3 = 3

$180 - x = 2(180 - 3x)$

$180 - x = 360 - 6x$

$5x = 180.$

$x = 36.$

Class Test.

1. A = 6 ltrs.

B = 10 ltrs

C = 16 ltrs

A & B = 6 ltrs.

C = 10 ltrs.

B & C = 8 ltrs.

2. Boys Girls

3	2	5
60	40	100

(×20)

$60\% \times 80\% = 48 + 30 = 78.$

Scholarship = 20% + 80%

25% + 75%.

$40 \times \frac{15}{75}$

New Price : Original Price

$= 125 : 100$

$5 : 4$

$P \propto \frac{1}{Q}$

New Quantity : Original Qty

$= 4 : 5$

$3 : 4 = 3x \& 4x$

Increased by 3 : $\frac{3x+3}{4x+3} = \frac{4}{5}$

$15x + 15 = 16x + 12$

$16x - 15x = 15 - 12$

$x = 3$

History	Economics	Mathematics
$4 \times \frac{130}{100}$	$7 \times \frac{120}{100}$	$9 \times \frac{140}{100}$

$52 : 84 : 126$

$= 26 : 42 : 63$

6. water Spirit

1 3

+1

1 : 4

$\frac{4 \times 251}{4}$

8. $\frac{4x}{5x-100} = \frac{6}{7}$

$28x = 30x - 600$

$2x = 600$

$x = 300$.

$B = 4x = 4 \times 300$

$= 1200$.

$G = 5x = 5 \times 300$

$= 1500$.

9. Let the first no. be x.

$= \frac{50}{100} x + y = \frac{4}{3} y$.

$\frac{x}{2} = \frac{y}{3}$.

$= x/y = 2/3 = x : y :: 2 : 3$.

10. Let the no. be

$5x \qquad 4x$

$\frac{\cancel{4}\cancel{0}}{\cancel{100}} \times \cancel{5}x = 12 \cdot 6$

$4x = 4 \times 6$

$= 24$

$\frac{\cancel{5}\cancel{0}}{\cancel{100}} \times 24 \; 12$

$= 12$

7. $2A = 3B = 4C$

$A : B : C$

$12 : 8 : 6$

$\frac{12}{\cancel{25}} \times \cancel{2600}^{100}$

$= 1200$

$A = B \times C$

$B = C \times A$

$C = A \times B$

AGES & NUMBERS

1. The age of Ramesh is four times the age of Suresh. After 10 years age the age of Ramesh will be twice the age of Suresh. Find the present age of Suresh.

Ramesh	Suresh
$4x$	x
$4x+10$	$x+10$

$$4x+10 = 2(x+10)$$

$$4x+10 = 2x+20$$

$$4x-2x = 20-10$$

$$2x = 10$$

$$x = 5$$

Suresh = 5 years.
Ramesh = 4x5
= 20 yrs.

2. The sum of ages of father and son is 50 years. Also 5 years ago, the father's age was 7 times the age of the son. The present age of father and son respectively are.

Father	Son
$50-x$	x
$(45-x)$	$(x-5)$

five years ago = 50 - 5
= 45.

$$(45-x) = 7(x-5)$$

$$45-x = 7x-35$$

$$8x = 80$$

$$x = 10$$

Son = 10 - 5.
= 5 years

Father = 50 - 10
= 40 yrs.

A father's age is three times sum of ages of his two children. 20 years hence his age will be equal to sum of their ages. Then, the father's age is ?

Father $= 3(C_1 + C_2)$

Let $C_1 + C_2 = x$.

Father $= 3x$.

After 20 yrs $= 3x + 20$

And, the children $= x + 20$

$x + 20$

$= x + 40$.

$3x + 20 = x + 40$

$2x = 20$.

$x = 10$.

Father $= 3x$.

$= 3 \times 10$

$= 30$ years.

A father said to his son "I was as old s you are at present at the time of your birth. f the father's age is 38 years now, the son's ge five years back was ?

Father	Son	
38	x	$38-x = x-0$
		$2x = 38$
x	0	$x = 19$ yrs

At the time of birth he was 0 years father was x years.
Now father is

Present age of Son 19 yrs
Five years ago his age was $19-5$
$= 14$ yrs.

5. The sum of the ages of 5 members comprising a family three years ago was 80 years. The average age of the family today is the same as it was three years ago because of an addition of a baby in the intervening period. How old is the baby today?

3 years ago average age of 5 members.

The age of family members increases by three years

$= 80 \Rightarrow \frac{80}{5} = 16$ years.

At present total age of 5 members.

(i.e) $5 \times 3 = 15$ yrs. $= 80 + 15 \Rightarrow 95$.

At present total age of 6 family members
$= 16 \times 6 = 96$.

$\therefore$ the age of the baby $= 96 - 95$

No. 12: 1, 2, 5, 6, 14, 20, 15, 19.

No. 13: 1 to 4.

No. 12: 4, 3.

The age of a mother before two years was 8 times the age of her daughter. After 1 year mother's age will be 5 times the daughter's age. After how many years from now, mother's age will become 3 times the daughter's age?

Ten years ago average age of family of 4 members was 24 years. 3 children having been born the average age of the family today is 22 years. What are the present ages of children, if 2 children are identical twins and differ by 3 years from the younger one?

Assignment · 12.

1.

Present age	Age when she got married.
x	$x-6$

Today her age is $= x$ $\quad = 1\frac{1}{4}(x-6)$

$\Rightarrow x = \frac{5}{4}(x-6)$

$4x = 5x - 30$

$x = 30$ years.

Son's age $= \frac{1}{10} \times 30$

$= 3$ yrs.

5. Average age of 5 members = 21 yrs.
Total age of 5 members = 21 × 5
= 105.

5 yrs back total age of 5 members = 105 − 25
= 80.

∴ Avg. age of 4 members = $\frac{80}{4}$
= 20 yrs.

6. 3 yrs ago the avg. age of 5 members = 17 × 5
= 85 yrs.

At present the total age = 5 × 3 + 85
= 15 + 85
= 100 yrs.

At present, avg. age of 6 members
= 17 × 6
= 102 yrs.

∴ Age of the baby = 102 − 100
= 2 yrs.

Notebook Question.

6.

	Mother	Daughter
	$8x$	x
At present	$8x+2$	$x+2$.
After 1 yrs	$8x+3$	$x+3$.
After	$8x+3$	$5(x+3)$

$8x + 3 = 5x + 15$

$3x = 12$

$x = 14$.

Mother $8x = 8 \times 4 = 32$.

$8x + 2 = 34$

Daughter $= x + 2$.

$6 + 2$.

$= 8$.

$34 + y = 3(6 + y)$

$34 + y = 18 + 3y$.

$16 = 2y$.

$y = 8$.

10 years ago average age of 4 family members $= 24$ years.

Total age $= 24 \times 4$

$= 96$ yrs.

Present total age $= 10 \times 4 = 40$.

$154 - 136 = 18$

$\Rightarrow 96 + 40$

$= 136$ yrs.

Total age of 7 members whose avg. age is 22 yrs $= 22 \times 7 = 154$ yrs.

The gap is $154 - 136 = 18$ yrs.

$x + x + x - 3 = 18$.

$3x = 21$

$x = 7$.

$7, 7, 7 - 3 = 4$

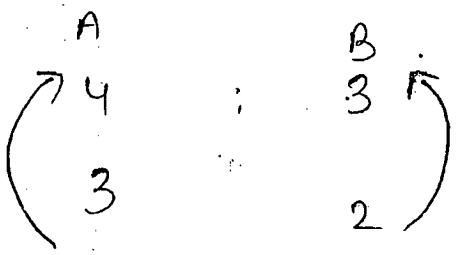
7, 7, 4 yrs respectively.

Assignment : 12

Avg. of 2 & 4.

2 3 :

3.



If difference is $\frac{1}{8}$ years.

on adding is 7 years.

The difference = $\frac{1}{7} \times 63^{9}$

= 9 years.

20.9.18.

NUMBERS.

1. A number consists of two digits whose sum is 10. If 18 is subtracted from the number, digits of the number are reversed. What is the product.

Let unit digit be x

Ten's digit be y.

Original numbers is $10y+x$.

After ~~reversing~~ the digits are reversed $10x+y$.

Sum of the 2 digits $= x+y = 10$ —— ①

$$10y + x - 18 = 10x + y$$

$$9xy - 9x = 18$$

$$y - x = 2 \quad \text{—— (11)}$$

$$x + y = 10 \quad \text{—— ①}$$

$$y - x = 2 \quad \text{—— (11)}$$

$$2y = 12$$

$$y = 6.$$

$$x = 10 - 6 = 4$$

$$x \times y = 6 \times 4$$

$$= 24.$$

2. How many numbers of two digits can be formed if the digits of the numbers are interchanged and added to form a perfect square?

Let unit digit = x.

Ten's digit = y

Original numbers = $10y + x$.

After the digits are reversed, New numbers

$$= 10x + y.$$

$$(10y + x) + (10x + y)$$

$$= 11y + 11x$$

$$= 11(y + x)$$ should be a perfect square.

→ 11 (y + x)

9	2	9 2	29
2	9	8 3	38
8	3	7 4	47
3	8	6 5	56
7	4		
4	7		
6	5		
5	6		

} 8 numbers

121 is a perfect square.
8 two digits number can be formed.

3. How many numbers of 2 digits can be formed, if the digits of numbers are substracted from the original number a perfect square is formed?

4. How many number of 2 digits can be formed, if the digits of numbers are reversed and their differences are Cayen a perfect cube?

3. Let unit digit be x.

Ten's digit y.

Original number $= 10y + x$.

After the digits are reversed $= 10x + y$.

$$(10y + x) - (10x + y)$$

$$9y - 9x$$

$y - x$

$9 \times 1 = 9$ $\quad y - x$

$9 \times 4 = 36$ $\quad y - x$

$9 \times 9 = 81$ $\quad y - x$

$\Rightarrow 9(y - x)$ is a perfect square.

If difference is 1, if difference is 4, if difference is 9,

9	8	9	5	(9 0)
8	7	8	4	
7	6	7	3	
6	5	6	2	
5	4	5	1	
4	3	(4 0)		
3	2			
2	1			
(1 0)				

Ans – 16 numbers formed. when in case of difference – 10, 40, 90 will not be counted because it when reversed can 1 & 0 but not 0 & 1, 4 & 0, 0 & 9, 9 & 0, in case of difference we will leave the 0 digit, in substraction we will take the numbers.

4.

Let unit digit be x

Ten's digit y

Original numbers $= 10y + x$.

After the digits are reversed,

New numbers $= 10x + y$

Difference ↓ Substraction ↓ (−)

* → we ignore the sign, gap b/w two numbers

gap b/w the 2 numbers. $(10y + x) - (10x + y)$ or $(10x + y) - (10y + x)$

$(9y - 9x)$ is a perfect cube.

$9(y - x)$ is a perfect cube.

9	6	~~6~~ 9
8	5	5 8
7	4	4 7
6	3	3 6
5	2	2 5
4	1	1 4

$= 12$ numbers.

5. There are five hobby clubs in a college, Photography, yatching, chess, electronics a gardening. The gardening group meets ev second day, the electronic group meets every third day, ~~the~~ chess group meets every ~~fourth day~~, yatching meets every fifth day, photography meets every sixt

ay. How many times all the 5 groups meet on the same day within 180 days.

Electronics, Yatching

2, 3, 4, 5, 6 ← the class ~~they~~ meet on the respective days.

Gardening, chess, Photography.

2 | 2, 3, 4, 5, 6	3
3 | 1, 3, ~~2~~, 5, 3	180
1, 1, ~~2~~, 5, 1	60

LCM = 60.

Three times ~~Third day~~ they will meet within 180 days.

A girl purchased a certain no. of ~~eggs~~ eggs from a shop, while returning to her home, she fell down and some eggs were broken, now she was left with 10 eggs only. She was asked how many eggs she purchased. She could not ~~remember~~ remember, but she said when it was made 3 ~~eggs~~ eggs in a group, 1 egg was left, then she made 4 ~~eggs~~ eggs in a group one egg was left, when she made 5 eggs in a group, none was left, how many eggs were broken.

L.C.M = of 3 & 4

= 12.

and remainder = 12+1

= 13 . (K = 1, 2, 3, 4 ---

12K + 1.

= 12 × 2 + 1

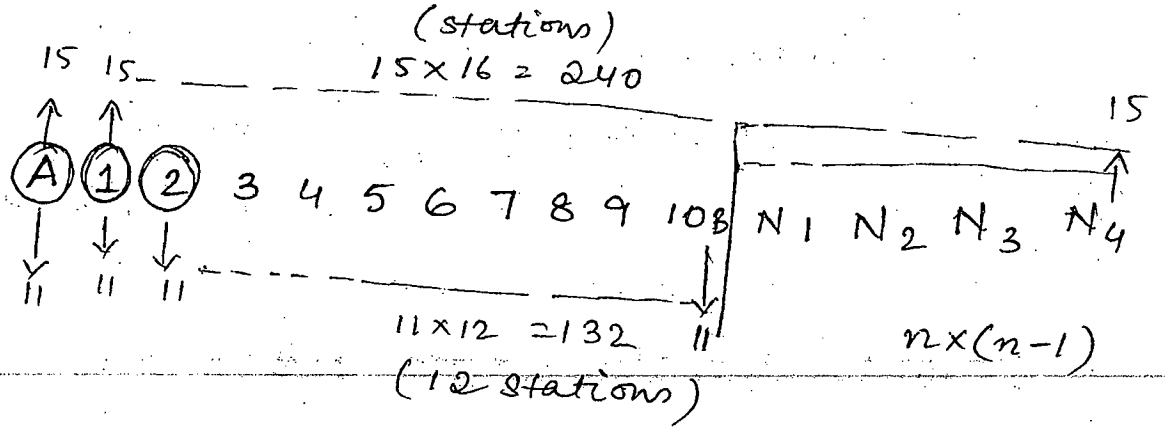
= 25 when divided by 3 & 4 leaves a remainder 1, but when divided by 5 perfectly divisible.

25 − 10

= 15 eggs broken.

Assignment No. 12.

12.



240 − 132 = 108.

If "n" number of stations are connected to each other and one token is to be issued for one way journey then no. of tokens to be issued will be $n \times (n-1)$

16 × 15 = 240

12 × 11 = 132

OR,

A 1 2 3 4 5 6 7 8 9 10 B | 12_s 13_s 14_s 15_s.

N_1 N_2 N_3 N_4

↓ ↓ ↓ ↓

24 26 28 30

(12×2) (13×2) (14×2) (15×2)

$24+26+28+30$

$= 108$.

* 12 stations $\times 2 = 24$.

SIMPLE INTEREST

→ Any sum on which interest is charged is Principal

Simple Interest – Bookish Chapter (Theoritical)

Compound Interest – Practical Chapter

$$(R\% \text{ on } P) \times A = S.I$$

$$(10\% \text{ on } 100) \times 5 = S.I$$

$$S.I = \frac{P \times T \times R}{100}$$

$$\text{Amount} = P + I$$

$$= P + \frac{PTR}{100} = P\left(1 + \frac{TR}{100}\right)$$

$$= P\left(\frac{100 + TR}{100}\right)$$

$$P = \frac{100A}{100+tR}$$

1. Principal = Rs 100
   Rate = 10%
   Time = 1 yr
   S.I = $\frac{P \times T \times R}{100}$
   $= \frac{100 \times 10 \times 1}{100}$
   Rs 10

   Principal = Rs 100
   Rate = 10%
   Time = 2 yrs
   S.I = $\frac{P \times T \times R}{100}$
   $= \frac{100 \times 10 \times 2}{100}$
   = Rs 20.

Principal = Rs 100
Rate = 10%
Time = 3 yrs.
S.I = $\frac{P \times T \times R}{100}$
$= \frac{100 \times 10 \times 3}{100}$ = Rs 30.

→ S.I is directly proportional to time if principal and Rate are constant.

→ S.I is equal for every year.

→ In case of S.I amount grows in the pattern

of arithmetic progression.

P = Rs 100.
R = 10 %
T = 1 yr.

$S.I = \frac{100 \times 10 \times 1}{100} = Rs\,10$

P = Rs 100
R = 20 %
T = 1 yrs.

$S.I = \frac{100 \times 20 \times 1}{100} = Rs\,20.$

S.I is directly proportional to Rate if Principal and time are constant.

S.I is directly proportional to Principal if Time and Rate are constant.

Assignment -

Principal = Rs 1200.
Amount = Rs 1632.
Interest = A − P
= 1632 − 1200
= 432.
Time = 4 yrs.

$S.I = \frac{P \times T \times R}{100}$.

$\Rightarrow 432 = \frac{1200 \times 4 \times r}{100}$.

$r = 9\%$.

If rate increased by 1% = it becomes 10%.

New Rate = 10%.

P = Rs 1200.

T = 4 yrs.

$A = P\left(\frac{100 + rt}{100}\right)$

$\Rightarrow \frac{1200 \times (100 + 10 \times 4)}{100}$

$= 12 \times 140$

$= 1680.$

Or, 1% of 1200 = Rs 12.

Then in 4 yrs it will be.

= Rs 12 × 4

= Rs 48.

S.I proportionate to Rate %.

= Rs 1632 + 48

= Rs 1680.

1. 11400.

$= \frac{P \times 6 \times 2}{100} + \frac{P \times 9 \times 3}{100} + \frac{P \times 14 \times 4}{100}$.

58
× 6.

$11,400 = \frac{P \times 12 + P \times 27 + P \times 56}{100}$

$11,400 = \frac{95P}{100}$.

$\frac{600 \quad 20}{11,400 \times 100} \times 2$ P.

$\frac{}{95 \quad 19}$

= Rs 12,000.

First yr - 2 yrs.
Rate = 6%
S.I = 11,400.

Second yr = 3 yrs.
Rate = 9%.
S.I = 11,400.

For the rest of at the end = 4 yrs.
Rate = 14%.
S.I = 11,400.

Time = 9 - 2+3
= 4 yrs

Let Ashok borrowed = Rs x.

$$\frac{x \times 2 \times 6}{100} + \frac{x \times 3 \times 9}{100} + \frac{x \times 4 \times 14}{100} = 11,400$$

$$\Rightarrow \frac{12x}{100} + \frac{27x}{100} + \frac{56x}{100} = 11,400.$$

$$19 \quad \frac{95x}{100} = 11,400.$$

$$20 \quad 600$$

$$x = 600 \times 20$$

$$= 12,000.$$

or, Let Principal be Rs 100.

Time Interest = 6×2 + 3×9 + 14×4

= 12 + 27 + 56 = 95.

95 — 100.

11,400 — $\frac{100}{95} \times 11,400$ = 120.

= 12,000

3. Rs 40 on 4 yrs.

1 = Rs 10.

$\frac{10}{2000} \times 100$.

$= \frac{1}{2}\%$.

5. $\frac{1}{4} P = \frac{P \times r \times r}{100}$ 25.

$r^2 = 25$.

$r = 5$.

r & t are equal. So it is taken r and r.

6. Rs 100 — Rs 300 — Rs 400.
Rs 1 — Rs 1

$r = 10\%$.

$= 30$ yrs.

Or,

$P = x$.

$A = 4x$.

$I = A - P$.

$= 4x - x$

$= 3x$.

Rate $= 10\%$.

$S.I = \frac{P \times t \times r}{100}$

$3x = \frac{x \times t \times 10}{100\ 10}$

$t = 30$ yrs.

7.

Rs 40 (Rs 460 — 3 yrs. / Rs 500 — 5 yrs.) 2 yrs.

2 yrs — 40 ₹

1 yr $= \frac{40}{2}$ = Rs 20

3 = Rs 60.

$P + 60 = 460$.

$P = 400$.

↑ 460 − 60.

$$R = \frac{20}{400} \times \frac{5}{100}$$

$$= 5\%.$$

11. S.I in 4 yrs = Rs 150. S.I $\propto$ P

(×5)

S.I in next 4 yrs = Rs 150 × 5

Increases 5 times = Rs 750.

S.I in 8 yrs = 750 + 150

= 900.

15. ₹ 1 —— 28% —— ₹ 2.

+ ₹ 1

₹ 1 —— ₹ 4 —— ₹ 5.

$r = 8\%$.

(×4)

S.I $\propto$ R%

17. ₹ 1 —— +4 —— ₹ 5 —— +4 —— ₹ 9

4 + 4 = 8 yrs.

Deposited = Rs P.

2 yrs ——— Rs 720.

7 yrs ——— Rs 1020.

5 yrs ——— Rs 300.

1 yrs ——— $\frac{300}{5}$

$= Rs\ 60.$

2 yrs ——— 60×2

$= Rs\ 120.$

$P + 120 = 720.$

$P = 600$

$R\% = \frac{60}{600} \times 100$

$= 10\%.$

4. Let another amount be ₹ x.

$$\text{On } \frac{12,000 \times 10 \times 1}{100} + \frac{x \times 20 \times 1}{100} = \frac{(12000+x) \times 14}{100}.$$

$$120000 + 20x = 168000 + 14x.$$

$$6x = 48000$$

$$x = 8000.$$

∴ Total amount = Rs 12000 + Rs 8000

= Rs 20,000.

23. Let the sum lent at 6% p.a be x.

So, $\frac{P \times R \times t}{100}$

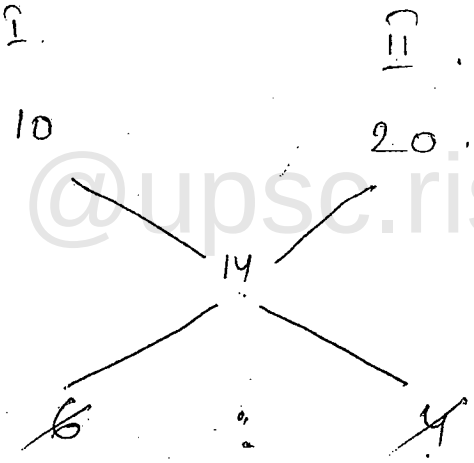
$\Rightarrow \frac{x \times 6 \times 5}{100} + \frac{(7000-x) \times 4 \times 5}{100} = 1600$.

$30x + 140000 - 20x = 160000$

$10x = 20,000$.

$x = 2,000$.

4.



$20 - 14 = 6$.

$10 - 14 = 4$.

3 : 2

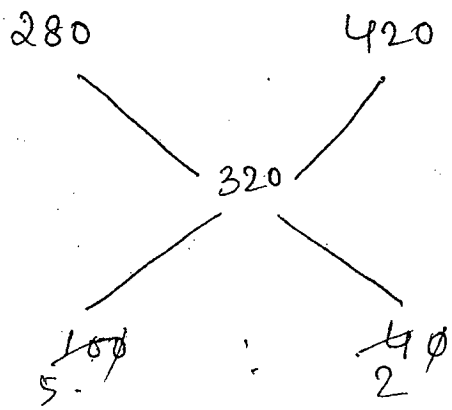
$3x = 12000$.

$x = 4000$.

$5x = 5 \times 4000$

$= 20,000$.

23. 4% (I) 6% (II)



5 : 2.

5 yrs = 1600.

1 yr = 1600/5

= 320.

420 − 320 = 100

6% of 7000.

= Rs 420.

320 − 280 = 40

4% of 7000.

= Rs 280.

5 : 2

= 5 + 2

= 7.

$\frac{2}{7} \times 7000^{1000}$.

= 2000.

Let capital be ₹ x.

$\frac{1}{3}x \times \frac{7}{100} \times \frac{1}{4}x \times \frac{8+5x}{100} \times 10 = 561$

$\frac{7x}{300} + \frac{8x}{400} + \frac{50x}{1200} = 561$

$\frac{28x + 24x + 50x}{1200} = 561$

$\frac{102x}{1200} = 561$

$x = 6600$.

Remainder =

$x - \frac{1}{3}x - \frac{1}{4}x$

$\frac{12x - 3x - 4x}{12}$

$= \frac{5x}{12}$.

Or, $\frac{1}{3}$ $\frac{1}{4}$ $\frac{5}{12}$

7% 8% 10%

4.00 3.00 5.00

28 + 24 + 50 = 102.

C = 12000.

102 — 1200

561 — $\frac{1200}{102} \times 561$ (600, 11)

= 6600

Simple Interest

COMPOUND INTEREST

Assignment No. 16.

14

1440

x y z

$\frac{x \times 1 \times 3}{100} = \frac{y \times 3 \times 2}{100} = \frac{z \times 1 \times 5}{100}$

3 | 3, 6, 10.

2 | 1, 2, 10

1, 1, 5

$3x = 6y = 10z$

$x : y : z$

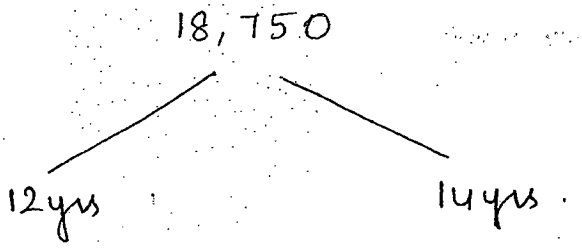
60 : 30 : 18

10 : 5 : 3

$\therefore \frac{7}{18} \times 1440^{80}$

= 560.

1.



120 : 130.

maturity @ 18 yrs. i.e,

12 + 6 = 18.

@ 5% interest = 6 × 5.

= 30.

Taken as = 100

= 100 + 30.

14 + 4 = 18.

@ 5% = 4 × 5.

= 20.

100 + 20

= 120.

12ϕ : 13ϕ.

= 12 : 13 = $\frac{12}{25} \times \overset{750}{\cancel{18750}}$

$\frac{13}{25} \times \overset{750}{\cancel{18750}}$ = 9000.

= 9750.

2. Suppose,

2018	2019	2020	2021	2022	
₹100	₹10	₹10	₹10	₹10	₹140
	₹100	₹10	₹10	₹10	₹130
		₹100	₹10	₹10	₹120
			₹100	₹10	₹110
				₹100	₹100

clearing a debt of ₹600

If for ₹2600 ——— 100.

₹4200 ——— 100 × ~~4200~~ 7
~~600~~

= ₹ 700.

Class Test Assignment No. 17.

8. Total = 25,000.

first part = x @ 15%.

Second part = 25,000 − x @ 18%

$$\frac{x \times 15 \times 1}{100} + \frac{(25000 - x) \times 18 \times 1}{100} = 4,050.$$

$$= \frac{15x}{100} + \frac{25000 - x \times 18}{100} = 4050$$

$$= \frac{15x}{100} + \frac{4,50,000}{100} = 4050.$$

$$= 15x + 4,50,000 - 18x = 4,05,000$$

$$= 3x = 450,000 - 405,000$$

$$= 3x = 45000$$

$x = 15,000$.

∴ Second part $= 25,000 - x$.

$= 25,000 - 15000$

$= 10,000$.

S.I in 10 yrs $= 600$.

S.I in 5 yrs $= 300$.

S.I in next 5 yrs $= 300 \times 3$

$= 900$.

In next 5 yrs $= 300 + 900$

$= 1200$

$$\frac{x}{y} = \frac{\frac{y \times t \times r}{100}}{\frac{z \times t \times r}{100}} = \frac{x}{y} = \frac{y}{z}$$

$$y^2 = xz$$

$\frac{1}{3}$ @ 3 %. $\frac{1}{2}$ @ 8 %.

$\frac{1}{6}$ @ 6 %.

Annual income $=$ Rs 300.

∴ Original Sum $=$?

Let, the sum be 600

L.C.M of 3, 6, 2 and since in % it is assumed as 100.

$\frac{1}{3}$ of 600 = $\frac{1}{3}$ of 600 = 200 — 3%

$\frac{1}{6} = \frac{1}{6}$ of 600 = 100 — 6%

$\frac{1}{2} = \frac{1}{2}$ of 600 = 300 — 8%

6 x 100 = 600.

3% of 200 + 6% of 100 + 8% of 300.

6 + 6 + 24 = 36.

36 ——— 600.

300 ——— $\frac{600}{100} \times \frac{300}{50}$

$= 5000.$

7.

$$\frac{x \times 9 \times 3}{100} - \frac{1150 \times 6 \times 3}{100} = 274.95$$

$= 1785.$

Compound Interest

* Compound interest more closer to % age.

When paying interest simple interest is what we go for.

When taking/charging interest

* Principal changes with every unit of time.

In case of compound interest, principal will change with the change in the next month. Jan will be common for simple and compound after that ~~compo~~. in the month of Feb it will change the

mpound interest principal amount as well.
what we go
w.

Suppose, Rs, 10,000 × $\left(\frac{100+10}{100}\right)$ + $\frac{(100+10)}{100}$ ..... tnos of 4 ears.

10,000 $\left(\frac{100+10}{100}\right)\left(\frac{100+10}{100}\right)$ ---

↓ tnos. of 4 ears

10,000 $\left(\frac{100+10}{100}\right)^t$

10,000 $\left(1+\frac{10}{100}\right)^t$

$F.V = 0.V\left(1+\frac{I}{100}\right)^t$

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

Suppose = P = 100.

R = 10% A_1 A_2 A_3 A_4

$100\left(1+\frac{10}{100}\right)^1$ $100\left(1+\frac{10}{100}\right)^2$ $100\left(1+\frac{10}{100}\right)^3$ $100\left(1+\frac{10}{100}\right)^4$

In case of compound interest, amount grows in the pattern of Geometric Progression.

COMPOUND INTEREST

Class Assignment -

4. $P = x$ $\quad$ $P = x$.

$A = 3x$ $\quad$ $A = 9x$

$T = 3$ yrs. $\quad$ $T = ?$ yrs.

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

$$3x = x\left(1 + \frac{R}{100}\right)^3 \qquad 9x = x\left(1 + \frac{R}{100}\right)^t$$

$$3 = \left(1 + \frac{R}{100}\right)^3$$ Squaring both sides.

$$(3)^2 = \left[\left(1 + \frac{R}{100}\right)^3\right]^2 \quad \therefore 9 = \left(1 + \frac{R}{100}\right)^t = 6.$$

Or,

Let, ₹1 ——— ₹3 ——— ₹9.

in 3 yrs $\quad$ in 3 yrs.

So, $3 + 3$

$= 6$ yrs.

Compound interest goes in the pattern of geometric progression..

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

$$7520 = P\left(1+\frac{r}{100}\right)^{15}$$

* Base is same, difference of power will be the answer.

So,

$$\frac{7896}{7520} = \frac{P\left(1+\frac{r}{100}\right)^{16}}{P\left(1+\frac{r}{100}\right)^{15}}$$

$$1+\frac{r}{100} = \frac{7896}{7520}$$

$$\frac{r}{100} = \frac{7896}{7520} - 1$$

$$\frac{r}{100} = \frac{376}{7520}$$

$$r = 5\ \%.$$

Or,

15^{th} yr.	———	7520/-
16^{th} yr	———	7896/-
		376

interest paid on Rs 7520/.

In 1 yrs it grew.

So, $\frac{376}{7520}$, then on 100 it will be,

$\frac{376}{7520} \times 100 = 5$.

Rate = 5 %.

13.

1st _____ 650.

2nd _____ 676.

26.

$$R = \frac{26}{650} \times 100 = 4\%$$

4% is out of 100.

After 1 yrs a 9 will get

= 100 + 4

= 104.

104 ____ 100.

650 ____ $\frac{100}{104} \times 650 = 625$

= Rs 625

P = Rs 100

R = 10%

No. of yrs	Bank simple Interest	Bank compound Interest	Difference
I	₹ 10.	₹ 10	0
II	₹ 10.	₹ 11	₹ 1
III	₹ 10	₹ 12.1	₹ 2.1

Difference b/w S.I and C.I in the first year is 0

100 old P, 10 last year interest

= 100 + 10

6, 7, 8, 9, 10 - Assignment

4, 9, 10 - Class Test

$\frac{5}{\cancel{100}} \times \overset{8}{\cancel{160}}\ \phi$

1st yrs = 5% @ 160.

$= \frac{5}{\cancel{100}} \times \overset{8}{\cancel{160}}$

160 + 8 = 168. C.I.

S.I = 160.

Difference = 168 − 160

= 8.

8. S.I = Rs 80 for

2 yrs = i.e,

40 + 40.

C.I

= 240 + 4% of 40

= 40 + 1.6

= 81.60.

S.I = 240

in 2 yrs = i.e,

20 + 20.

C.I = 40.80.

in 2 yrs = i.e.

(20) + 20 + 0.80.

↓

1st yrs same

$$R = \frac{8}{20} \times 100$$

$$= 4\%$$

$$\frac{4P}{100} = 20$$

$$P = 500$$

8. S.I 160 = 80 + 80

C.I 160 = 80 + 5% of 80 = 4.

i.e, 80 + 4

= 84.

= 164.

164 − 160

= Rs 4.

9.

Let sum = ₹ 100.

R = 5 % p.a.

S.I = 5 + 5 = 10.

C.I = 5 + 5% + 5 = 10.25.

5 + 5.25

0.25 —— 100.

3 —— $\frac{100}{25} \times 300$.

= 1200.

1. Let sum = Rs 100.

R = 5%.

S.I = 5 + 5 = 10.

C.I = 5 + 5.25 = 10.25.

$$\frac{C.I}{S.I} = \frac{1025}{1000} = \frac{41}{40} = 41:40.$$

0.

Let sum = Rs 100.

R = 8%.

S.I = 8 + 8 = 16

C.I = 8 + 8.64 = 1664

100 —— 64

625 —— $\frac{64}{100} \times \frac{625}{100} = 4$

Rs 4

Class-Test.

P = 100.

R = 8% p.a payable half yearly

Annual rate = 4% per 6 months

4 + 4.16

= 8.16%

10. If $P = 100$.

$4\% = S.I = 4 + 4 = 8$.

$C.I = 4 + 4.16 = 8.16$.

8.16 —— 8.

2448 —— $\frac{800}{8} \times 2448$

$= 2400$.

COMPOUND INTEREST.

ASSIGNMENT.

1. Difference b/w C.I and S.I for 3 yrs $= \frac{Pr^2}{(100)^2}\left(\frac{r}{100} + 3\right)$

$$122 = \frac{P \times (5)^2}{(100)^2}\left[\frac{5}{100} + 3\right]$$

$$122 = \frac{2}{\cancel{122}} = \frac{2\cancel{5}P}{\cancel{100} \times 100}\left[\frac{61}{20}\right]$$

$$P = 16000.$$

16. $\cancel{64} \times \frac{9}{\cancel{8}} \times \frac{9}{\cancel{8}} = 81$.

17. Difference b/w C.I & S.I

6 : 5

$\frac{1}{5} \times \frac{20}{100}$

$= 20\%$.

23. Principal $= P$

Rate $= R\%$ Pa payable half-yearly/ k times

Actual rate $= r/2\%$ here it is r/k.

Time $= 1$ yrs $= n$ yrs.

Actual time $= k \times n$

$= nk$.

$$\text{Amount} = P\left(1 + \frac{r}{k \times 100}\right)^{nk}$$

24. Population = x.

Increase 20% = 120.

Decrease 20% = 80

Beginning of third year population = 5184.

$$x \times \frac{120}{100} \times \frac{80}{100} = 5184$$

$$x \times \frac{120}{100} \times \frac{80}{100} = 5184.$$

SPEED, TIME AND DISTANCE.

Speed	Time
10 km/hr	1 hr.
20 km/hr	1/2 hr
5 km/hr	2 hr.

Distance = S x T.

Speed = $\frac{D}{T}$.

Time = D/S.

Speed = $\frac{\text{Constant}}{\text{Time}}$.

D = km or m

T = hrs or secs

S = km/hr or M/sec

1 km ~ 1000 m

1 hr ~ 3600 Secs.

1 km/hr ~ $\frac{1000}{3600}$

~ $\frac{5}{18}$ m/s.

$S \propto \frac{1}{T}$.

man walks at 3/4 of his normal speed and reaches
s destination 13 minutes late. What is the normal
ne taken by man, if he walks at his normal
eed.

Let normal time taken
be t times.

$$\frac{3}{4} S \sim \frac{4}{3} t$$

$$\frac{4}{3} t - t = 13$$

$$t = 39 \text{ minutes}$$

man drives his car at 125% of his normal
peed and reaches the destination 15 minutes early
What is the normal time taken by the man
o cover the same destination if he drives at a
ormal speed.

$$125\% \text{ of } S = \frac{125}{100} S = \frac{5}{4} S \sim \frac{4}{5} t$$

$$t - \frac{4}{5} t = 15$$

$$t = 75 \text{ minutes}$$

Example:

H ——————— V.R.

Student starting at x km/hr. ↓ increased the speed by y km/hr.

t1 minutes, the class already started, that is t1 minutes late. ↓ now the student is t2 minutes earlier.

Let distance be D kms and normal time taken be t hours.

$D/x = t + \frac{t_1}{60}$ — ①

$D/y = t - \frac{t_2}{60}$ — ②

$\frac{D}{x} - \frac{D}{y} = \frac{t_1}{60} + \frac{t_2}{60}$

$D\left(\frac{1}{x} - \frac{1}{y}\right) = \frac{t_1 + t_2}{60}$

$D\left(\frac{y-x}{xy}\right) = \frac{t_1 + t_2}{60}$

$D\left(\frac{xy}{y-x}\right)\left(\frac{t_1 + t_2}{60}\right)$

5 km

7 am ——— 8 am.

he took to reach 1 hr 15 mins.

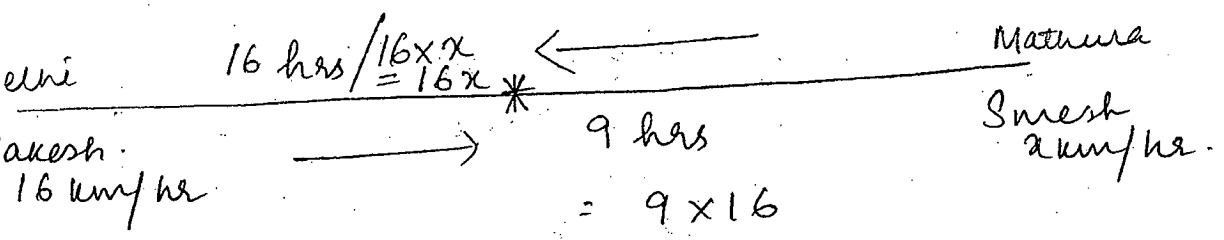
$\frac{5}{4} = 1 + \frac{1}{4}$.

$\frac{5}{6} = 1 - \frac{1}{6}$ — next day he leaves home early

** The change in signs, if he is late both the days.

Required distance is = $\frac{\text{Product of Speeds}}{\text{Difference of Speeds}} \times$ Time Gap

Rakesh sets out to cycle from Delhi to Mathura and at the same time Suresh starts from Mathura to Delhi. After passing each other, they complete the journey in 9 and 16 hrs respectively. At what speed does Suresh cycles if Rakesh cycles at 16 km/hr.



$= 9 \times 16$

$= 144$.

$D = S \times T$.

$\frac{\text{Suresh Dist.}}{\text{Rakesh Dist.}} \Rightarrow \frac{16x}{16} = \frac{144}{x}$

$x^2 = 144$.

$x = 12$ km/hr.

Class Assignment

18.

1500 km

x $\quad$ $1/2$

$4/3\,x$ $\quad$ on time

$$\frac{1500}{750} = \frac{x \times \frac{4}{3}x}{\frac{4x}{3}} \times \frac{1}{2}$$

$$x = 750 \text{ km/hr}.$$

$$\therefore \quad \frac{4}{3}x = \frac{4}{3} \times 750^{250}$$

$$= 1000 \text{ km/hr}.$$

(Or) $\quad S \propto \frac{1}{T}$

$$t - \frac{3}{4}t = \frac{1}{2}.$$

$$t = 2 \text{ hrs}$$

$$S = \frac{1500}{1.5} = 1000 \text{ km/hr}.$$

Relative Speed = Speed of one objects w.r.t. others'.

Case I → when objects are moving in same direction

Relative Speed = difference of their speeds

Case II → when objects are moving in opposite direction

Relative Speed = Sum of their Speeds.

Class Assignment.

11. Policeman goes after a thief who has 100 mts start.

$$Sp = \frac{1\text{ km}}{8\text{ mins}} = \frac{1000}{8} = 125\text{ m/mins}$$

$$S_T = \frac{1\text{ km}}{10\text{ mins}} = \frac{1000}{10} = 100\text{ m/mins}$$

Relative Speed = 125 − 100

= 25 m/mins.

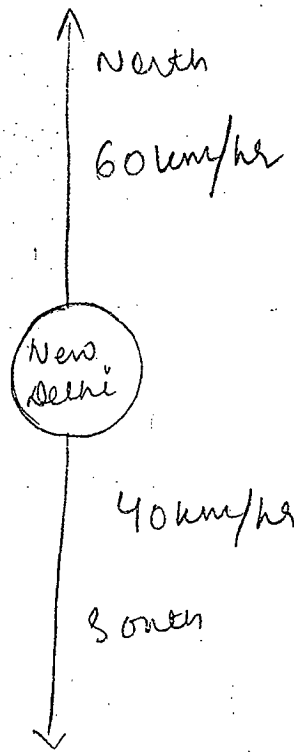
$$\text{Time} = \frac{D}{\text{R. Speed}} = \frac{100}{25}$$

= 4 mins.

Distance covered by thief = 4 × 100

= 400 mts.

12.



$$\text{Time} = \frac{\text{Distance}}{\text{Relative Speed}}$$

$$= \frac{150}{60+40} = \frac{150}{100}$$

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

10.

100 mts Start.

$$\frac{100}{1000} = 0.1 \text{ km}.$$

$S_P = 10$ km/hr $\quad S_T = 8$ km/hr.

$$T = \frac{0.1}{20} \text{ hr} \quad 3 \text{ minutes}.$$

15.

Aryan Speed = 40 km/hr.

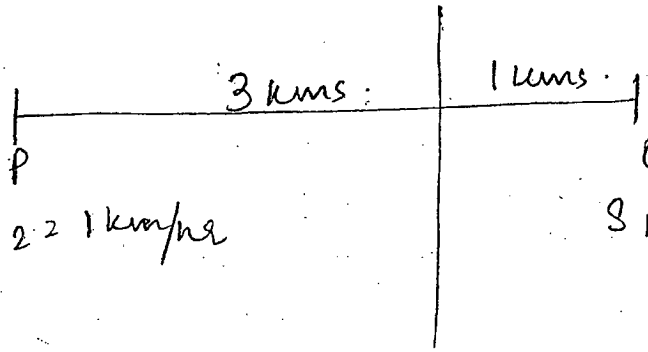
Starts ahead of Rahul = 5 mins.

$$40 \times 5 = 200 \text{ m}.$$

$$T = \frac{200}{50-40} = 20 \text{ mins}.$$

Distance covered by dog = 20 × 60

= 1200 mts.



1st person started 1 hr earlier.

* we have taken 3 kms because they cover a distance in 3 hrs.

$$T = \frac{2}{1+1} = \frac{2}{2} = 1 \text{ hrs.} \quad (3-1=2)$$

Time taken = 2 hrs.

Every minutes goat jumps = 3 ft.

Slips back = 2 ft.

= 1 ft.

Cliff = 60 ft.

that is = 60 − 3

= 57 ft.

57 ft in 57 mins + 1 min

= 58 mins.

TRAINS, BOATS AND STREAMS

Time taken to cross insignificant object $= \frac{\text{Length of Train}}{\text{Speed of Train}}$

When train has to cover length of the significant object, the time taken will be $= \frac{\text{Length of train + length of objects}}{\text{Speed of Train}}$

150 / 200 / 350 — 14 : 350/25

Moving in same direction - Relative Speed is the difference of their Speed

Moving in different direction - Relative Speed is sum of their Speed

Time taken by a train to cross a man sitting on another train $= \frac{\text{Length of the train on which the man is not sitting}}{\text{Relative Speed}}$

* You cannot find out the length on which the person is sitting.

Eg. km/hr — m/sec

km/hr	m/sec
9	2.5
18	5
27	7.5
36	10
45	12.5
54	15
63	17.5
72	20
90	25
108	30
126	35
144	40
162	45

22.5

Length of Shatabdi =

$$\frac{LS}{\text{Difference of R.S}}$$

$$= \frac{LS}{142-106} = 45$$

$$= \frac{LS}{36} = 45$$

converting it into m/s

$$= \frac{L.S}{10} = 45$$

$$= L.S = 450 \text{ Mtrs}.$$

Length of the train =

$$\frac{L.T}{\text{Sum of R.S}}$$

$$= \frac{L.T}{24+12} = 10$$

$$= \frac{L.T}{36} = 10$$

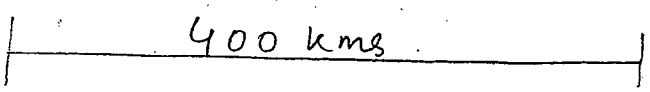
$$= \frac{L.T}{10} = 10$$

= Length of train = 100 mts.

A train completes a journey with a few stoppages in between at an average speed of 80km/hr. If the train had not stopped anywhere it would have completed the journey at an average speed of 100 km/hr. On an average how many minutes per

hour the train stops during the journey.

* Assuming a distance that is divisible by 80 and 100 km/hr.



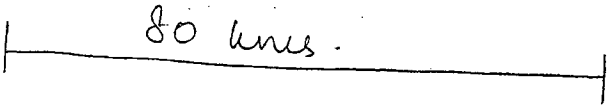
$\frac{400}{80} \times 5$

5 —— 1

1 —— $\frac{1}{5}$ hr

$= \frac{1}{5} \times 60$

= 12 mins.



time $= \frac{80}{100}$

$= \frac{4}{5}$ hrs. $= \frac{4}{5} \times 60$

= 48 mins.

$\frac{6}{5} \times 60^{12} = 72$.

60 − 48 = 12

= 60 mins 48 mins

= 12 mins.

2.

55 − 35 = 20

$\frac{120+80}{55+35}$ $= \frac{200}{90}$ m/s

200 ÷ 25 = 8

= 8 seconds.

1, 2, (3), 5, 6, 7, (8),
10, 11, (12), (13), (14), (15),
16, 17, (18)

Speed = $\frac{300}{15}$ 20

= 20 m/sec

converting it to km/hr = 72 km/hr.

$\frac{192}{32}$. 6

= 6 hrs.

$2\frac{1}{2}$ hrs late started after the first train and reaches 1/2 hr early = $2\frac{1}{2} + \frac{1}{2}$

= 3 hrs.

6 hrs – 3 hrs.

= 3 hrs

Train B = $\frac{192}{3}$ = 64 km/hr.

Ratio = 32 : 64

= 1 : 2.

60+72

192 kms

Mumbai — Pune

$T_A = \frac{192}{32} = 6$ hrs.

2 | 72, 60
2 | 36, 30
3 | 18, 15
3 | 6, 5
2, 5

$\frac{360}{60}$ 6.

5. $\frac{360}{60}$

$\frac{360}{72}$

$72\frac{1}{5}$

360

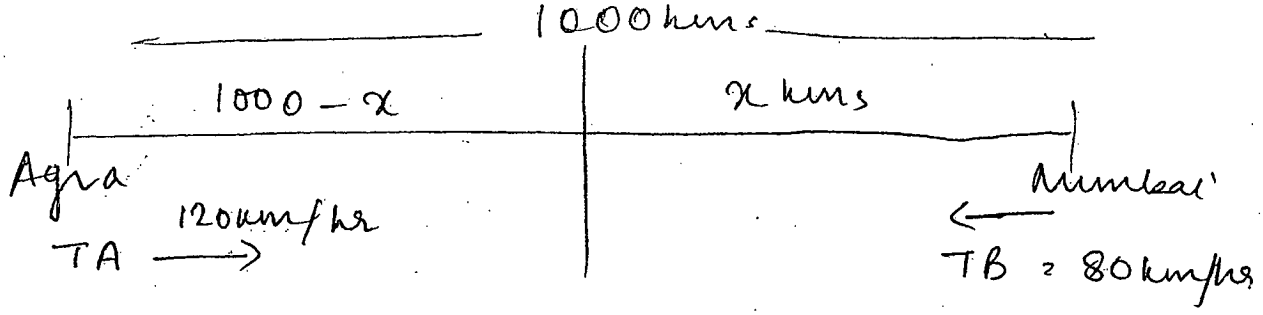
3

11

2+2+2+2+2+1

4 6 8 10 12 1

3.



$$\text{Train A} = \frac{1000+x}{120} = \frac{1000+1000-x}{80}$$

$$\frac{1000+x}{3} = \frac{2000-x}{2}$$

$$2000+2x = 3000+3000-3x$$

$$2000+2x = 6000-3x$$

$$5x = 4000$$

$$x = 800 \text{ kms}$$

6.

Mumbai central — Lucknow.

Train A = 11 am

Speed = 60 kmph

Train B = 2 PM

Speed = 72 kmph

Alone train A covered = 60×3 — 11 − 2 pm.

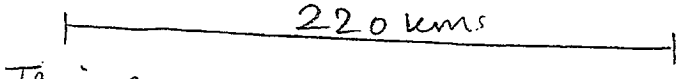
= 180 kms.

$$T = \frac{\text{Distance}}{\text{R.S}} = \frac{180}{72-60}$$

$$= \frac{180}{12} = 15 \text{ hrs}$$

= 5 AM next day.

7.



$$\frac{220}{a-b} = 11 \Rightarrow a-b = 20 \quad \text{—(1)}$$

220 kms

Ta = a kms/hr Tb = b kms/hr $\frac{220}{a+b} = 1$ $a+b = 220$ — ①

$a - b = 20$ — ①

$a + b = 220$ — ②

$2b = 200$

$b = 100$ kms/hr

Goods Train →

Passenger's Train →

$\frac{\text{length of goods train + length of passenger's train}}{\text{Relative Speed}} = 30$

$\frac{\text{length of Good Train}}{\text{R.S}} = 20$

$\frac{LG + LP}{R.S} = 30$

$\frac{LG}{R.S} = 20$

$3LG - 2LG$

$1LG = LG/LP = 2/1$

$LG : LP = 2:1$

$\frac{LG + LP}{LG} = \frac{3}{2}$

$2LG + 2LP = 3LG$

$LG = 2LP$

10.

$$\frac{Lt + Lp}{St} = 10 \text{ sec}.$$

$$\frac{Lt}{St} = 6 \text{ sec}.$$

$$S = \frac{200}{4} = 50 \text{ m/sec}.$$

$$= 180 \text{ km/hr}.$$

Length of Train

$$= \frac{l}{50} \times 6$$

$$= 50 \times 6$$

$$= 300 \text{ mts}.$$

14.

Train A ____ 5 sec.

Train B ____ 6 secs.

L.C.M of 5 & 6 = 30 m.

$$\frac{30 \text{ m}}{5} = 6 \text{ M/S}.$$

$$\frac{30}{6} = 5 \text{ m/s}.$$

$$\frac{30+30}{6-5} = \frac{60}{1}$$

$$= 60 \text{ sec}.$$

Speed of a man in still water = x km/hr

Speed of water = y km/hr

Speed in downstream (V) = $(x+y)$ km/hr.

Speed in upstream (U) = $(x-y)$ km/hr.

$$x + y = V$$
$$x - y = U$$
(-) (+) (-)

$$2y = V - U$$
$$y = \frac{V-U}{2}$$

$$x + y = V$$
$$x - y = U$$

$$2x = V + U$$
$$x = \frac{V+U}{2}$$

Speed of man = $\frac{\text{Speed downstream} + \text{Speed upstream}}{2}$.

20.

$25 = 20 + x$.

$20 + x = 25$.

$x = 25 - 20$

$= 5$.

20, 21, 22, 23

21. $\frac{14+5}{2}$.

$= \frac{19}{2} =$

9.5

23. $\frac{26+11}{2} = \frac{37}{2}$

22. $\frac{11-7}{2} = \frac{4}{2}$

$= 2$ km/hr

If a man takes twice as much time to row upto a certain than to row down. Then speed of man is 3 times that speed of water.

$$\frac{D}{V} = t.$$

$$\frac{D}{u} = 2t \Rightarrow t = \frac{D}{2u}.$$

$$\frac{D}{V} = \frac{D}{2u}$$

$$\Rightarrow 2u = v$$

$$\Rightarrow 2(x-y) = x+y$$

$$\Rightarrow 2x - 2y = x+y$$

$$\Rightarrow x = 3y.$$

$\rightarrow$ Speed m = 3 X Speed water.

If a man takes thrice as much time to row upto a certain than to row down. Then speed of man is twice that speed of water.

Quantitative Aptitude

- Number System
- Percentage
- Profit & Loss
- Time & Work
- Work & Wages
- Pipe & Cistern

Reasoning

- Series
- Coding-Decoding
- Character Puzzle
- Number Ranking
- Blood Relations
- Cube & Dice
- Calendar

Data Interpretation

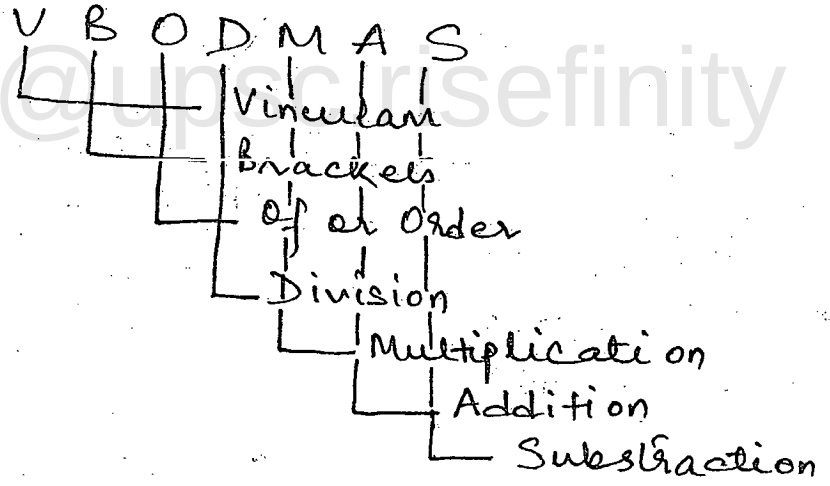
- Non-verbal reasoning
- General Mental Ability.

6th - 8th Std NCERT

- Number System
- Percentage
- Ratio & Proportion
- Average
- CSAT - 2011 - 2018

- GS Question Bank Prior to 2011 - GMA.
- Assistant Commandant Paper Accpf.
- Asst. Provident Fund Commission - Question Bank.

1] Rule for V B O D M A S



$2 + 7 \times 5 - 3 \div 6 = (2 + 7 \times 5 - 3 \div 6)$

$5 + 2 \times 7 + 10 \div 2 + 12 \div \overline{6+6}$

$= 5 + 2 \times 7 + 10 \div 2 + 12 \div 12$

$= 5 + 2 \times 7 + 5 + 1$

$= 5 + 14 + 5 + 1 = 25.$

$21 + 22 + 23 + 24 \ldots\ldots\ldots\ldots\ldots 80$.

$= \frac{40}{2} \times (80+1)$ ..... (1).

$= 40 \times 81 = 3240$.

$= \frac{10}{2} \times (20+1)$ ..... (11).

$= 10 \times 21 = 210$.

$\therefore$ 3240 - 210

$= \underline{\underline{3030}}$.

3240
210
3030

19.7.18.

Vertical Movement

(1) 11 Pen = Rs 15.

×3 ↓ 1 Pen = ↓

33 Pen = 15×3

= 45.

(2) 9 Pencils = 20

×4 ↓ ↓

36 Pencils = 20×4

= 80.

(3) 35 Marker = 60.

÷5 ↓ ↓ ÷5

1 Marker = 60÷5

= 12.

(4) 4 Dusters = Rs 25

×3 ↓ ↓ ×3

12 Dusters = 25×3

= 75.

Horizontal Movement

(5) 11 Pens = Rs 33.

×3 →

15 Pens = 15×3

= 45.

(6) 1 Pencils = Rs 35.

×5 →

20 Pencils = 20×8

= 100.

(7) $\xrightarrow{\times 4}$
12 markers = Rs 48.

$\xrightarrow{\times 4}$
19 markers = 19 × 4
= 76.

(8) 1.150 kg.
@ 15/kg.

1 kg.
100 gm.
50 gm.
} Breaking down 1.150 kg.

15.00
1.50
.75
17.25

(9) 1.850 kg.
@ 15/kg.

2 kg = Rs 30.00
− 100 gm = − 1.50
.75
50 gm = −
Rs 32.25

(10) 49 × 19.
= (50 − 1) × 19.
= 950 − 19
= 931

(11) 11% 880

10% = 88.
1% = 8.8.
96.8

(12) 19% of 760.

20% = 152
− 1% = 7.6.

13. 12.5% of 816 14. 11.11% of 909 15. 09.09% of 1100.

$= \frac{1}{8} \times \overset{102}{\cancel{816}}$ $= \frac{1}{9} \times \overset{101}{\cancel{909}}$ $= \frac{1}{11} \times 1100$.

$= 102$ $= 101$ $= 100$.

$\frac{1}{1} = 100\% = 1.00$. $\frac{1}{2} = 50\% = 0.50$.

$\frac{2}{1} = 200\% = 2.00$ $\frac{2}{2} = 100\% = 1.00$

$\frac{3}{1} = 300\% = 3.00$. $\frac{3}{2} = 150\% = 1.50$

$\frac{1}{3} = 33.33\% = 0.33$ $\frac{1}{4} = 25\% = 0.25$

$\frac{2}{3} = 66.66\% = 0.66$ $\frac{2}{4} = 50\% = 0.50$

$\frac{3}{3} = 100\% = 1.00$ $\frac{3}{4} = 75\% = 0.75$

$\frac{4}{4} = 100\% = 1.00$.

$\frac{1}{5} = 20\% = 0.20$ $\frac{1}{6} = 16.66\% = 0.166$

$\frac{2}{5} = 40\% = 0.40$ $\frac{2}{6} = 33.33\% = 33.33\%$.

$\frac{3}{5} = 60\% = 0.60$ $\frac{3}{6} = 50\% = 0.50\%$.

$\frac{4}{5} = 80\% = 0.80$ $\frac{4}{6} = 66.66\%$

$\frac{5}{5} = 100\% = 1.00$ $\frac{5}{6} = 83.33\%$

$\frac{6}{6} = 100\%$

$\frac{1}{7} = 14.28\%$

$\frac{2}{7} = 28.56\%$

$\frac{3}{7} = 42.85\%$

$\frac{4}{7} = 57.14\%$

$\frac{1}{9} = 11.11\%$

$\frac{2}{9} = 22.22\%$

$\frac{3}{9} = 33.33\%$

$\frac{4}{9} = 44.44\%$

$\frac{7}{9} = 77.77\%$

multiples of 11

$\frac{1}{11} = 09.09\%$

$\frac{2}{11} = 18.18\%$

$\frac{3}{11} = 27.27\%$

$\frac{4}{11} = 36.36\%$

$\frac{7}{11} = 63.63\%$

multiples of 9.

$\frac{1}{8} = 12.5\%$

$\frac{2}{8} = 25\%$

$\frac{3}{8} = 37.5\%$

$\frac{4}{8} = 50\%$

$\frac{5}{8} = 62.5\%$

$\frac{6}{8} = 75\%$

$\frac{7}{8} = 87.5\%$

$\frac{8}{8} = 100\%$

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

$\frac{2}{10} = 20\%$

$\frac{3}{10} = 30\%$

$\frac{4}{10} = 40\%$

$\frac{1}{12} = 8.33\%$

$\frac{1}{13} = 7.7\%$

$\frac{1}{14} = 7.14\%$

$\frac{1}{15} = 6.66\%$

$\frac{1}{16} = 6.25\%$

$\frac{1}{19} = 5.25\%$

$\frac{1}{20} = 5\%$

$\frac{1}{21} = 4.75\%$

$\frac{1}{25} = 25\%$

16. 112.5 %.

$= 100\% + 12.5\%$

$\frac{1}{1} + \frac{1}{8}$.

$= \frac{8+1}{8} = \frac{9}{8}$.

17. 111.11 %.

$= 100 + 11.11\%$

$= \frac{1}{1} + \frac{1}{9}$.

$= \frac{9+1}{9} = \frac{10}{9}$.

18. 93.75 %.

$= 100\% - 6.25\%$

$= \frac{1}{1} - \frac{1}{16}$.

$= \frac{16-1}{16} = \frac{15}{16}$.

19. 125 %.

$= 100\% + 25\%$.

$= \frac{1}{1} + \frac{2}{8}$.

$= \frac{8+2}{8} = \frac{10}{8} = \frac{5}{4}$.

Or,

$\frac{125}{100} = \frac{5}{4}$.

20. $x \times 120\% \times 120\% \times 120\% = 4$

$= x \times \frac{6}{5} \times \frac{6}{5} \times \frac{6}{5} = 4$

$x = \frac{216}{125} = 4$.

(1). Type 1. Practice Questions.

2D Rectangle = $L \times B$ = (A).

Square = $D_1 \times D_2$ = (A).

Product $P \times C$ = (B).

Speed × Time = Distance.

M x D = W.

Percentage change Graph (P.C.G)

100 % increase $\xrightarrow{+100\%}$ 200 ↑

decrease $\underset{-100}{\overset{-100}{\overset{\cancel{200}}{\cancel{200}}}} = \frac{1}{2}$

$= \frac{1}{2} \times 100$

$= 50\%$ ↓

$100 \underset{+50}{\overset{+50\%}{=}} 150$ ↑

decrease $= \frac{\overset{50}{\cancel{150}}}{-100} = 33.33\%$.

$100 + \underset{+33.33}{33.33\%} = 133.33$ ↑

$133.33 \dfrac{\dfrac{33.33}{133.33}}{33.33} 100 = \frac{1}{4}$ ↓

$100 \underset{+25}{+25\%} = 125$

100% ↑ = $\frac{1}{1}$ 50% ↓ $\frac{1}{2}$.

50% ↑ = $\frac{1}{2}$ 33.33% ↓ $\frac{1}{3}$.

33.33% ↑ = $\frac{1}{3}$ 25% ↓ $\frac{1}{4}$.

25% ↑ = $\frac{1}{4}$ 20% ↓ $\frac{1}{5}$.

= If the length of the rectangle is increased by 40% Then by what percentage breadth should be decreased so that overall area remains the same.

Method 1:

40% of 100 = 40%.

$$100 \begin{matrix} 40\% \\ +40\% \end{matrix} = 140 \xrightarrow[-40]{-140} 100.$$

$= \frac{2}{7} = 28.56\%$ ↓ decrease

Method 2:

$\frac{n}{D}$ ↑ $\frac{n}{D+n}$ ↓

$\frac{n}{D} = \frac{1}{2}$ ↑ $\frac{1}{3}$ ↓ $\frac{1}{2+1}$ ↓ $\frac{n}{D+n}$ ↓

$\frac{n}{D}$ $\frac{1}{3}$ ↑ $\frac{1}{4}$ ↓ $\frac{1}{3+1}$ ↓ $\frac{n}{D+n}$ ↓

$40\% : \frac{2}{5} \uparrow = \frac{2}{5+2} \downarrow$

$= \frac{2}{7} \cdot \times 28.56 \downarrow$

If the petrol price is increased by 75%, when by what percentage consumption will be reduced so, that overall budget remains the same.

$100 \xrightarrow[+75\%]{75\%} \times 175 \xrightarrow[-75]{-\frac{75}{175} \cdot 3 \cdot 1} 100.$

$\frac{3}{7} \downarrow$

$\times 42.85\%$

If length of the rectangle is decreased by 40%, then by what percentage breadth should be increased so that over all area remains the same.

$100 \xrightarrow[-40\%]{-40\%} 60 \xrightarrow[+40]{\frac{2}{3} \cdot 40} 100.$

$\frac{2}{3} \times 66.66\% \uparrow$ increase.

$\frac{n}{D} \downarrow \quad \frac{n}{D-n} \uparrow$

$\frac{n}{D} = \frac{1}{3} \downarrow$

$\frac{1}{2} \uparrow \quad \frac{1}{3-1} \uparrow \quad \frac{n}{D-n} \uparrow$

40%

$= \frac{2}{5} \downarrow \quad \frac{2}{5-2} \uparrow$

$= \frac{2}{3} \uparrow = 66.66\%$

Type 2.

Type 1 — Product same.

Type 2 — Product different.

Change in 1st dimension $= \pm x$.

" " 2nd " $= \pm y$.

$$\pm x \pm y + \frac{(\pm x)(\pm y)}{100} \%$$

5.

$$+10 - 10 + \frac{(+10)(-10)}{100} \%$$

$$= \frac{100}{100} \% = -1\%$$

1% decrease.

Method 1

$$100 \xrightarrow[+10]{+10} 110 \xrightarrow[-11]{-10} = 99$$

$\therefore$ 100 − 99

$\therefore$ 1% decrease in the area.

7)

$$\pm x \pm y \pm \frac{(\pm x)(\pm y)}{100}$$

$$+10 + 10 + \frac{(+10)(+10)}{100}$$

$$20 + \frac{100}{100} = 21\%$$

Method 2.

$$100 \xrightarrow[+10]{+10} 110 \xrightarrow[+11]{+10} = 121\%$$

$= 100 - 121$

$= 21\%$

8) $$-10 - 10 + \frac{(-10)(-10)}{100} \%$$

$$-20 + \frac{100}{100} \%$$

$= -19\%$

$$100 \xrightarrow{-10\%} 90 \xrightarrow{-10\%} 81$$

$$-10 \qquad -9$$

$$= 19\%.$$

$$\begin{array}{r} 100 \\ -81 \\ \hline 19 \end{array} \qquad \begin{array}{r} 90 \\ -9 \\ \hline 81 \end{array}$$

(9) $-12 - 12 + \dfrac{(+12)(-12)}{100}\%$

$$= \frac{-144}{100}\% = -1.44\%.$$

(10) $100 \xrightarrow[10]{+10\%} 110 \xrightarrow[-11]{-10\%} 99$

$$= 1\%.$$

$$\pm x \pm y \pm x + \frac{(\pm x)(\pm y)}{100} + \frac{(\pm y)(\pm z)}{100} + \frac{(\pm z)(\pm x)}{100} + \frac{(\pm x)(\pm y)(\pm z)}{100 \times 100}.$$

Length increased by 10%
Breadth reduced by 20%
Height increased by 10%.

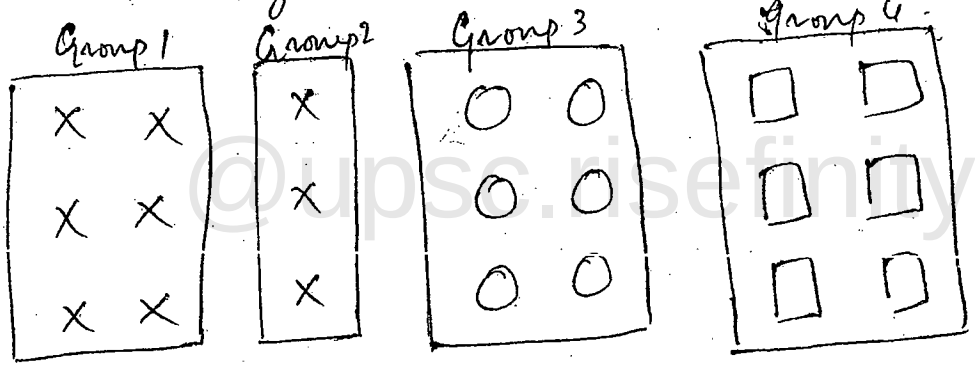
Find the % change in the volume of cuboid.

$$160 \xrightarrow{+10\%} 176 \xrightarrow{-20\%} 140.8 \xrightarrow{+10\%} 154.88$$

$+10$, -22, $+8.8$

Type 3. Venn Diagram

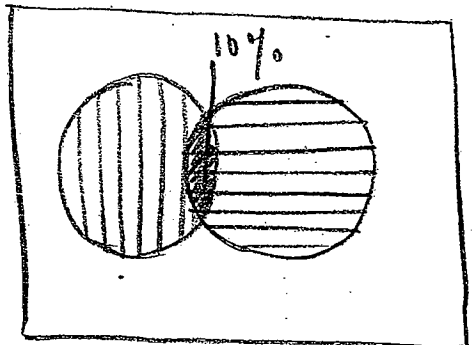
11.



Failed in one subject = $G_1 + G_3$.

Failed in 2 subject = G_2.

Passed exactly in one subject = $G_1 + G_3$.



= 40%.

= 40% − 10%.

= 30%.

= failed only Math.

30% = 30 − 10%.

= 20%.

└ failed in only Engg.

10% - failed in both.

So, students failed = 30% + 10% + 20%.

= 60%.

Students passed = 100 − 60.

= 40%.

---

x % of y = y % of ____

$\frac{x}{100} \times y = \frac{y}{100} \times$ ____

$\frac{xy}{100} = \frac{yx}{100}$

12% of 75 = 75% of 12.

$= \frac{3}{4} \times 12^{3}$

$= 9.$

96 % of 820 = $\frac{20}{100} \times 96$

x % of y % z = z % of y % of ——

$\frac{x}{100} \times \frac{y}{100} \times z = \frac{z}{100} \times \frac{y}{100} \times$ ——

$\frac{xyz}{100 \times 100} = \frac{zyx}{100 \times 100}$

~~12.5 % of 20 % of 40 % of x~~

Method 1:

100,000 students

40% – Prelims 40,000

12.5% – Mains 12.5 of 40,000 $\frac{1}{8} \times \cancel{40,000}^{5000}$

20% – Interview 20 % of 5000

$\frac{1}{5} \times \cancel{5000}^{1000}$

= 1000 qualify.

Method 2:

20 % of 12.5 % of 40 % of 1,00,000

$\frac{1}{5} \times \frac{1}{\cancel{8}_{1}} \times \frac{\cancel{2}^{1}}{\cancel{5}_{1}} \times \cancel{20,000}^{5000}\ \cancel{1,00,000}^{1000}$

= 1000.

= Mr X Salary = 1,60,000.

Party = 20% . 20,000 party exp.

Snacks = 25 % = 25% of 20,000

$\frac{1}{4}$, ~~20,000~~ 5000

Method 2:

25% of 20% of 1,60,000

$\frac{1}{4} \times \frac{1}{5} \times$ ~~1,60,000~~ ~~20,000~~ 5000.

= 5000.

= 100 Rupees increase 100 %. now if it is 300.

$\frac{\text{Difference}}{\text{Reference}} \times 100$ $\frac{200 - 100}{100} \times 100$.

= $\frac{100}{100}$ 100%.

$\frac{300 - 100}{100} \times 100$ = $\frac{200}{100} \times 100$.

= 200%

2018
1,50,000

2019
4,50,000

$\frac{3,00,000}{1,50,000} \times 100 = 200\%$

Triple

Double – 100% ↑
Triple – 200% ↑
4 + times – 300% ↑
N times – (N-1) × 100 ↑

Type 4:

2.2

Salary ↑ – 2.5 times.

$(N-1) \times 100$

$(2.5-1) \times 100$

1.5×100

$= 150\%$ ↑

Salary ↑ 2.25 times

$(2.25-1) \times 100$

1.25×100

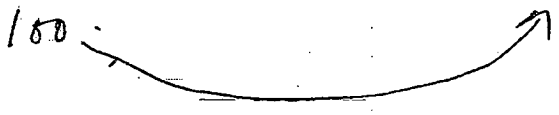
$= 125\%$ ↑

Handout:

1. Two number = 20% and 50%.

1st 2nd 3rd.

Let's take it as 100. 150.



1st	2nd	3rd.
100+20	100+50	100
: 120	: 150	100

What % is the first of the second.

$\frac{120}{150} \times 100 = 80\%$.

$\frac{120}{150} = \frac{4}{5}$

$= 80\%$.

What % is the third of second.

$\frac{100}{150} \times 100$

$\frac{200}{3}$

$= 66.66\%$

$\frac{100}{150} = \frac{2}{3}$

66.66%.

2.

1st	2nd	3rd.
20	80	100
100+20	100+80	
: 120	: 180	100.

What % of first of the second.

$\frac{120}{180} = \frac{2}{3} = 66.66\%$.

3. 1st 2nd Third

100 − 20 100 + 60 100

80 160 100.

$\frac{160}{80} \times 100$ | $\frac{160}{80} = \frac{2}{1}$

$= 200\%$. | $= 200\%$.

Type 5

Let the number be 100.

Now, dividing it by 5 = $100 \div 5$

$= 20$.

instead of multiplying $= 100 \times 5$

$= 500$.

Required correct value.

% of the result of the required correct value − 20% of 500.

$\frac{20}{500} \times 100$ | $\frac{120}{2500} = \frac{1}{25}$

4% | $= 4\%$.

If Error is to be calculated.

upon 100

80% — 20%.

90% — 10%.

20% — 80%

95% — 5%.

So, in this case the error is

100% - 4%.

= 96%

5. Let the number be 100.

Now, dividing it = $\frac{100}{2}$.

= 50.

Multiplying = 100 × 2

= 200

50% of 200.

$\frac{1}{4}\frac{\cancel{8}\cancel{0}}{\cancel{2}0} = \frac{1}{4} = 25\%$.

Error = 100 − 25

= 75%.

Type 6. Successive Percentage.

Method 1

6. Let assume 100 boxes of books in the library.

20% in Hindi = 20.

∴ 100 − 20 = 80%.

50% in English. = % in successive value is 50% of 80%

= 40%.

30% in French.

$= \frac{30}{100} \times 40$

= 12.

= 40 − 12

= 28 boxes.

∴ left over books = 6300.

If, 28 boxes contain = 6300

1 box = $\frac{6300}{28}$

100 boxes contain = $\frac{6300}{28} \times 100$

= 22,500.

Method 2.

100 $\xrightarrow{-20\%}$ 80 $\xrightarrow{-50\%}$ 40 $\xrightarrow{-30\%}$ & 28%.

$\xrightarrow{-20}$ $\xrightarrow{-40\%}$ $\xrightarrow{-12}$

∴ 28% Regional Languages.

28% = 6300

1% = $\frac{6300}{28}$

100% = $\frac{6300}{28} \times 100$ (900 225)

= 22500.

7.

100 $\xrightarrow{-10}$ 90 $\xrightarrow{-20\%}$ ~~80~~ 72 $\xrightarrow{-20\%}$

$\xrightarrow{-10}$ $\xrightarrow{-18\%}$ $\xrightarrow{-14.4}$

57.6 $\xrightarrow{10\%}$ 51.84%

$\xrightarrow{-5.76}$

72.0
14.4
57.6

51.84% = 15,552

↓ 1% = $\frac{15552}{51.84}$ now taken then.

50% ↘ 15,000.

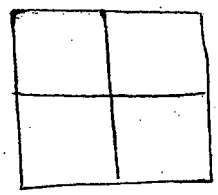
= ~~15,552~~

100% = 30,000.

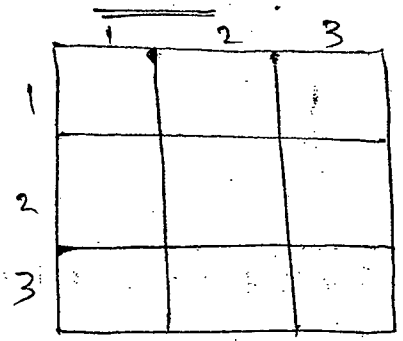
cannot be determined — only if we cannot get answer. None of these option when answer is different from the other values option.

GMA.

Square —

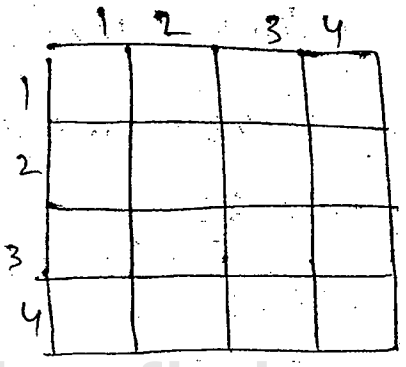


2x2.



3 x 3

N x N.



4x4.

$N \times N = N \times N + (N-1) \times (N-1) + (N-2) \times (N-2) + \ldots$

$\rightarrow 3 \times 3 \Rightarrow 3 \times 3 + 2 \times 2 + 1 \times 1 + 0 \times 0$

$9 + 4 + 1 + 0$

$= 14.$

$2 \times 2 + 1 \times 1 + 0 \times 0$

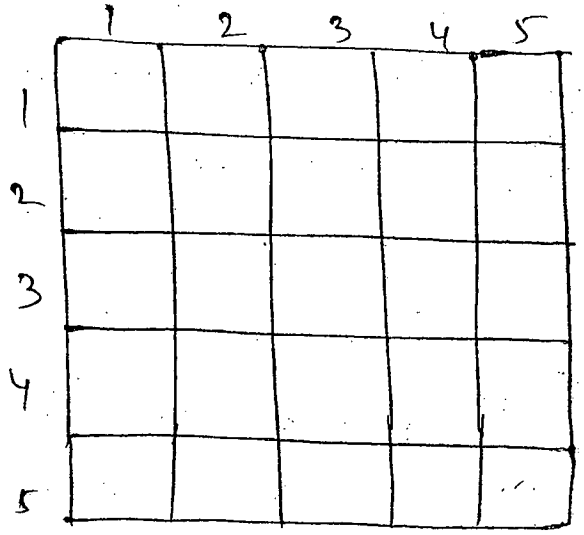
$4 + 1 + 0$

$= 5.$

$4 \times 4 + 3 \times 3 + 2 \times 2 + 1 + 1 + 0 \times 0$

$= 16 + 9 + 4 + 1 + 0$

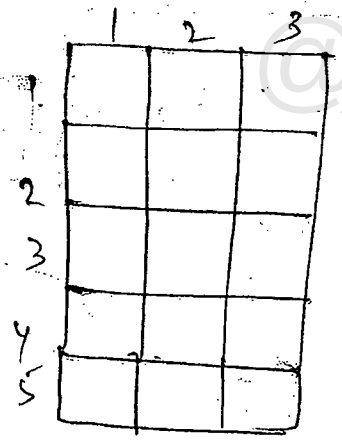
$= \underline{30}.$



$5\times5 + 4\times4 + 3\times3 + 2\times2 + 1\times1 + 0\times0$

$= 25 + 16 + 9 + 4 + 1 + 0$

$= \underline{55}$.



No. of column = n

No. of row = m.

5×3.

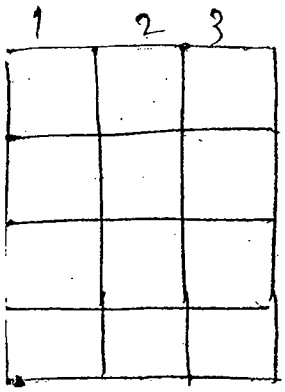
$n \times m =$

$n\times m + (n-1)\times(m-1) + (n-2)(m-2)\ldots$

$= 5\times3 + 4\times2 + 3\times1 + 2\times0$

$= 15 + 8 + 3 + 0$

$= \underline{26}$.

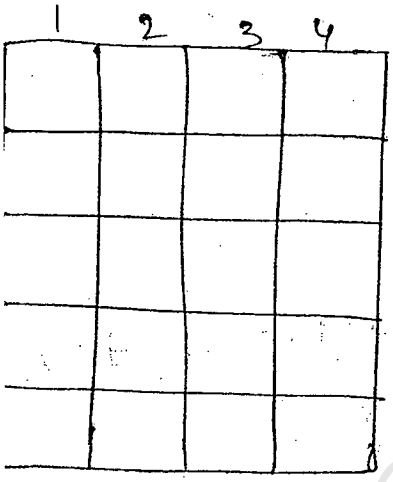


4×3 —

$4 \times 3 + 3 \times 2 + 2 \times 1$

$12 + 6 + 2$

$= 20.$



5×4

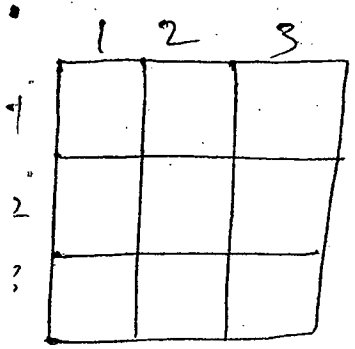
$= 5 \times 4 + 4 \times 3 + 3 \times 2 + 2 \times 1 + 1 \times 0$

$= 20 + 12 + 6 + 2 + 0$

$= \boxed{40}$

Rectangle

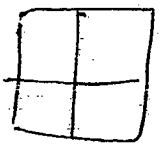
$N \times N$ — $(1+2+3 \ldots\ldots n) \times (1+2+3 \ldots n)$



3×3 — $(1+2+3) \times (1+2+3)$

$= 6 \times 6$

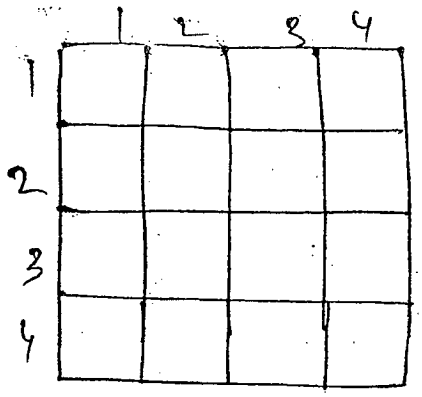
$= 36.$



$2 \times 2 = (1+2) \times (1+2)$

3×3

$= 9.$

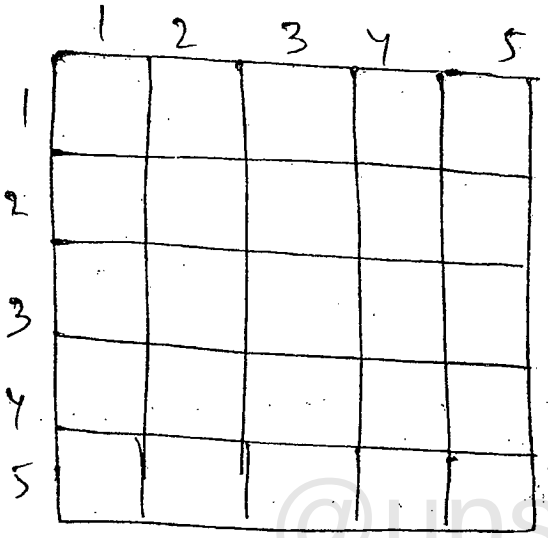


$4 \times 4 \longrightarrow$

$(1+2+3+4) \times (1+2+3+4)$

10×10

$= 100.$

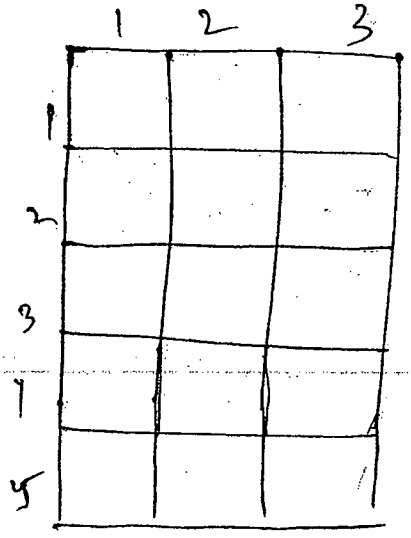


5×5

$(1+2+3+4+5) \times (1+2+3+4+5)$

15×15

$= 225.$



$h \times m$

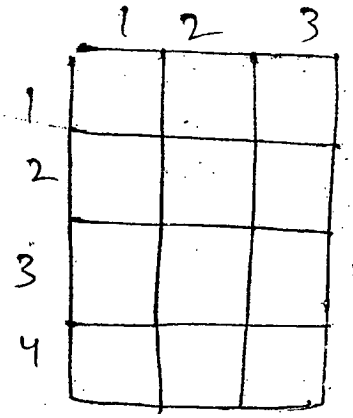
$\rightarrow (1+2+3 \ldots\ldots n) \times (1+2+3 \ldots m)$

$5 \times 3.$

$(1+2+3+4+5) \times (1+2+3)$

15×6

$= 90.$

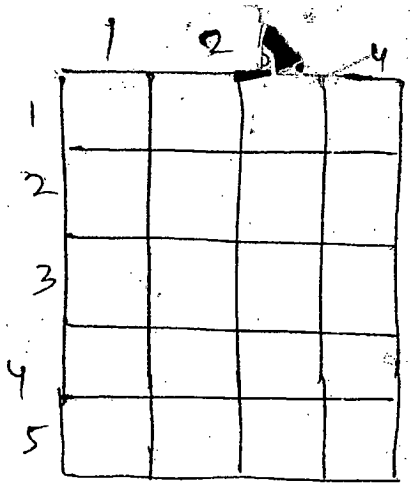


4×3.

$(1+2+3+4) \times (1+2+3)$

10×6

$= 60$.

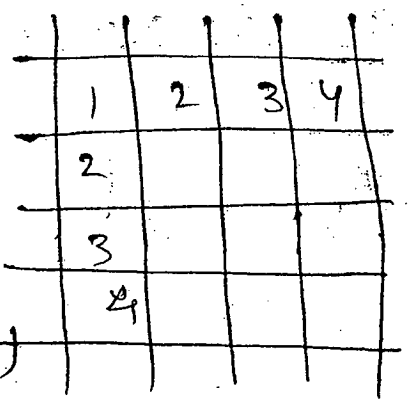


$(1+2+3+4+5) \times (1+2+3+4)$

15×10

$= 150$.

There are five vertical and five horizontal lines. Find what are the maximum no. of square possible.



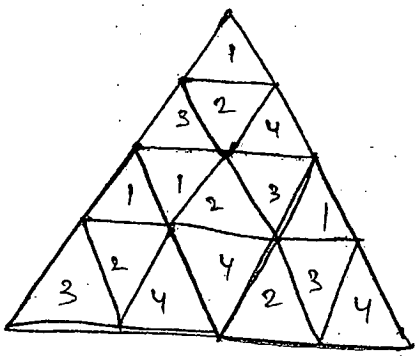
~~(5 × 5) 4~~

$4 \times 4 \rightarrow$

$(4 \times 4) + (3 \times 3) + (2 \times 2) + (1 \times 1) \times (0 \times 0)$

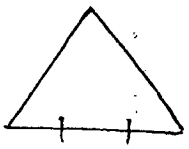
$16 + 9 + 4 + 1 + 0$

$= 30$

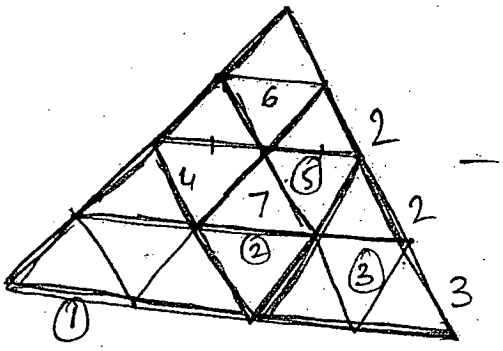


Total — 21.

Δ = 16.



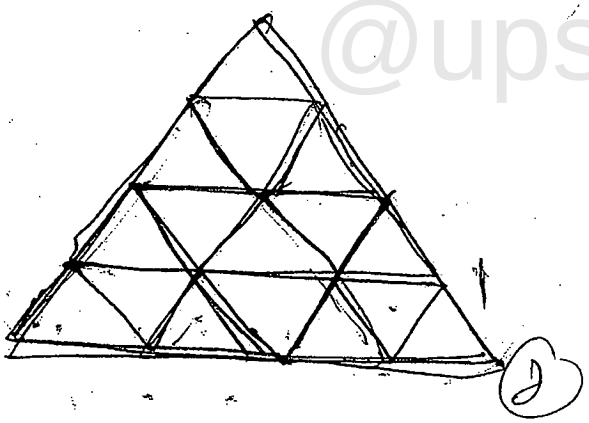
3 Triple base.



~~2 2 2~~

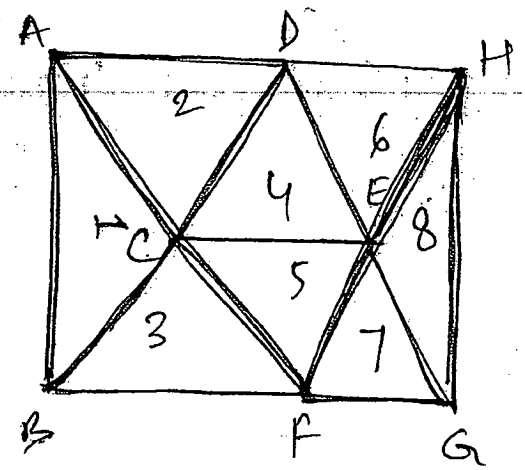
2+2+3.

= 7 Double base.



2+1

= 3.



Individual 8 triangle.

Combined = (1+2) (1+3)

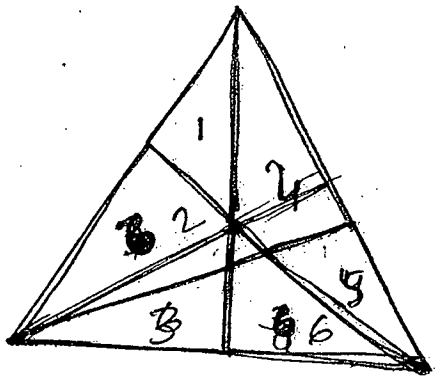
(6+8) (7+8) = 4 possibility

4 at a time

= (2+4+5+6) (3+4+5+7)

(2)

= 8+4+2 = 14



Individual - 6.

Combined (1+7+6) (2+3+4)

= 2.

(2+4)(1+7)

(1+3)(3

(1+2)(3+6)(4+5) = (3).

A (1+2+3)(4+5+6).

B (2+1+3)(3+6+5)

C (2+3+6)(1+4+5) = 6.

Big Triangle = 1.

1. A has Rs 20.

40 % of Total bus fare.

$\frac{2}{5}$ = 20.

$20^{10} \times \frac{5}{2}$ = 50.

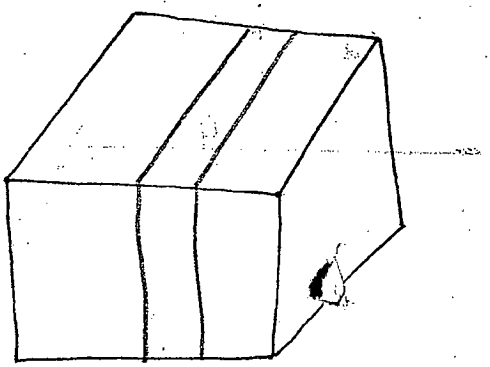
B handed over Rs 30 to A.

20 + 30.

= 50.

Cube And Dice

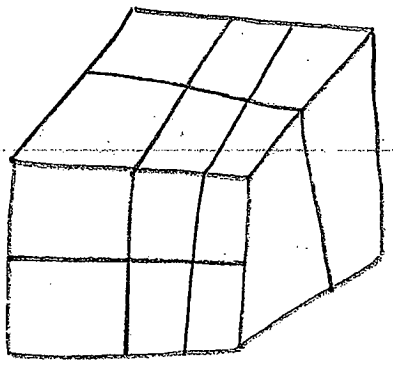
1. Cutting of cube
2. Colouring of cube
3. Problem based on dice.



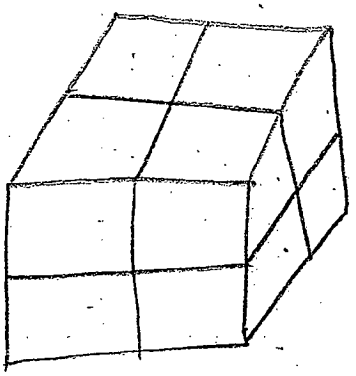
Properties :-

- Every cube has 8 vertices
- Every cube has 12 edges
- Every cube has 6 faces
- Every vertex in a cube is having 3 faces adjacent to it.
- Every edge in a cube is having two faces adjacent to it.
- Every cube is having 3 pairs of opposite faces.

Cut	Pieces
1	2
2	3
3	4
4	5
n	(n+1)
1+1	4
1+2	6



1 + 3	8
1 + 4	10
1 + 1 + 1	8



Cut	Pieces
x y z	x y z
n + m + p	(n+1) × (m+1) × (p+1)

Total number of cut we add

Total number of pieces we multiply

(1+1) ⟶ (1+1) × (1+1)
= 4.

(1+2) ⟶ (1+1) × (2+1)
= 2 × 3
= 6.

1 + 3 ⟶ (1+1) (3+1)
= 2 × 4
= 8.

1+1+1 = (1+1) × (1+1) × (1+1)
= 2 × 2 × 2
= 8.

6

5 + 1 = (5+1) × (1+1)
= 6 × 2
= 12

7

4 + 2 = (4+1) × (2+1)
= 5 × 3
= 15.

3 + 3

$(3+1) \times (3+1)$

4×4

$= 16$ — max. pieces possible

4 + 1 + 1

$= (4+1) \times (1+1) \times (1+1)$

$= 5 \times 2 \times 2$

$= 20$

3 + 2 + 1

$= (3+1) \times (2+1) \times (1+1)$

$= 4 \times 3 \times 2$

$= 24$

4 × 4 × 2

3 + 3 + 1

2 + 2 + 2

$= (2+1) \times (2+1) \times (2+1)$

$= 3 \times 3 \times 3$

$= 27$ — max. pieces possible

2 × 2 × 2

3 × 3 × 3

= 27

25 3

5

30 0

15

4 + 4 + 5

= 5 × 5 × 6

=

Cut of	Min. no. of pieces	Max. Pieces
3 (1+1+1)	4	2 × 2 × 2 = 8
6 (2+2+2)	7	3 × 3 × 3 = 27
9 (3+3+3)	10	4 × 4 × 4 = 64
12 (4+4+4)	13	5 × 5 × 5 = 125
15 (5+5+5)	16	6 × 6 × 6 = 216
18 (6+6+6)	19	7 × 7 × 7 = 343

36 3

6

216

Cut Min Max.

10 4+4+2
↘ 3+3+4

5×5×9
= 75

4×4×5 nearest
= 80 multiple of 3

N, N, (N+1)
N, N, (N-1)
14 → 5+5+4

6×6×5
= 180

11 → 4+4+3

= 5×5×4
= 100

no. of pieces we multiply.
no. of cuts we add.

7 → ~~3×3×1~~
2+2+3

~~4×4×2~~
~~16~~
= 3×3×4
= 36

3×3

8 → 3+3+2

4×4×3
= 48

~~Cut~~	Pieces	Cuts
	10	
	5×2	4+1 = 5

Pieces	Cuts
X 4 7	X 4 7
N M P	(N-1)+(M-1)+(P-1)
N × M × P	(n-1)*(m-1)*(p-1)

20 19 — max.

= 10×2 = 9+1 = 10

5×4 = 4+3 = 7

5×2×2 = 4+1+1 = 6 — min.

24 = 12 × 2

8 × 3

$11 \overset{+}{*} 1 = 12$

$7 \overset{+}{*} 2 = 9$

clubbing we look for lesser multiple

$= 2 \times 2 \times 2 \times 3$

$= 4 \times 2 \times 3$.

$= 3 \times 1 \times 2$

$= 3 + 1 + 2 = 6$.

$100 = 4 \times 25$

$= 2 \times 2 \times 5 \times 5$

$= 2 \times 2 \times 5 \times 5$

$= 4 \times 5 \times 5$

$= 3 + 4 + 4$

$= 11$.

2 | 36
2 | 18
3 | 9
  | 3

$36 = 2 \times 2 \times 3 \times 3$

$= 4 \times 3 \times 3$

$= 3 + 2 + 2$

$= 7$

2 | 48
2 | 24
2 | 12
2 | 6
3 | 3
  | 1

$48 = 2 \times 2 \times 2 \times 2 \times 3$

$= 4 \times 4 \times 3$

$= 3 + 3 + 2$

$= 8$.

2 | 60
2 | 30
3 | 15
  | 5

$60 = 2 \times 2 \times 3 \times 5$

$= 2 \times 6 \times 5 = 4 \times 3 \times 5$

$= 2 + 5 + 4 = 3 + 2 + 4$

$= 11 = 9$

72

$= 2 \times 2 \times 2 \times 3 \times 3$

$= 4 \times 2 \times 3 \times 3$

$= 4 \times 6 \times 3$

$= 3 + 5 + 2$

$= 10$

1000 2

$= 10 \times 10 \times 10$

$= 9 + 9 + 9$

$= 27$

2 | 72
2 | 36
2 | 18
3 | 9
3

216

$= 6 \times 6 \times 6$

$5 + 5 + 5$

$= 15$

512.

$= 8 \times 8 \times 8$

$= 7 + 7 + 7$

$= 21$

Pieces	Max. Cut	Min. cut.
5	4	4

For prime number of pieces max. and min. number of pieces are always same.

Colouring of cube

3 faces ~~colour~~ red − 1 × 8 (V)

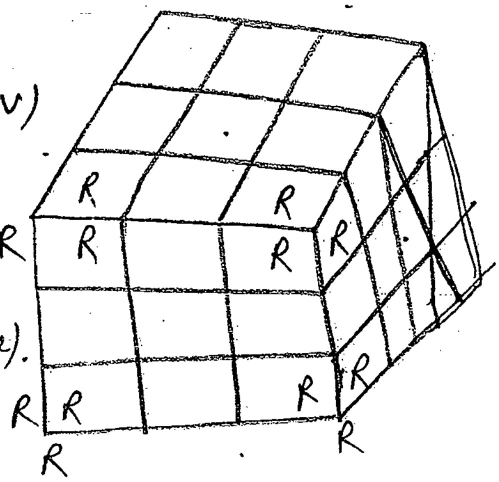
2 faces colour red − (1 × 12) (e)

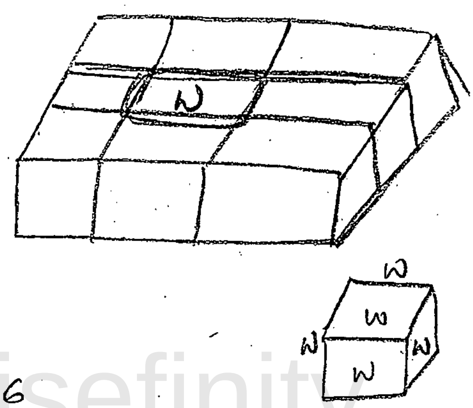
1 face colour red − (1 × 6) (face).

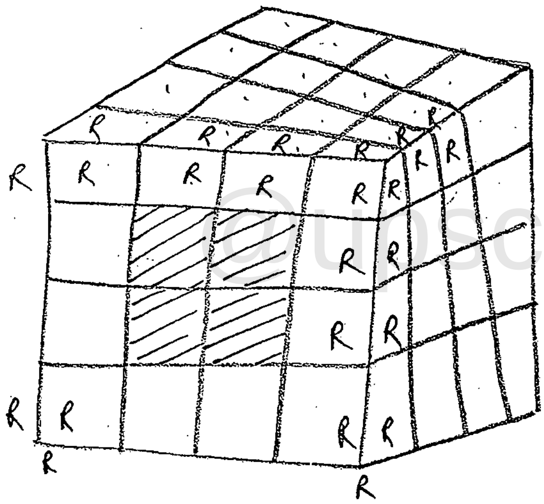
0 face colour red 1

———

27







16

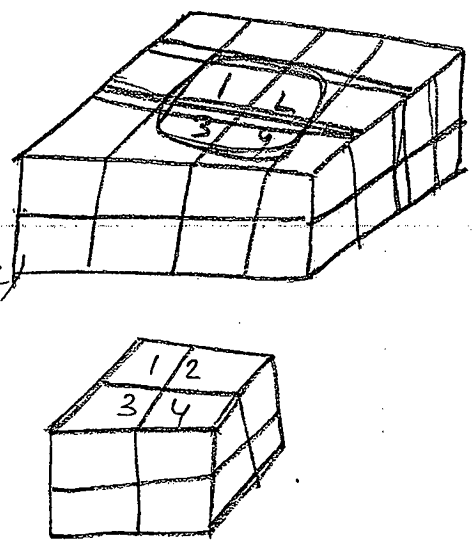
= 64.

3 faces colour red − 1 × 8 (V)

2 faces colour red − 2 × 12 (e)

1 face colour red − 4 × 6 (face)

0 face colour red = 8.



$125 \quad (5^3)$ $\quad 216 \quad (6)^3$ $\quad 343 \quad (7)^3$ $\quad N^3$

faces colour red

8 8 8 8

faces colour red

(3×12) (4×12) (5×12) $(N-2) \times 12$

face colour

~~2~~ ~~cube~~

$3^2 \times 6$ $\quad 4^2 \times 6$ $\quad 5^2 \times 6$ $\quad (N-2)^2 \times 6$

0 face colour red

3^3 $\quad 4^3$ $\quad 5^3$ $\quad (N-2)^3$

All the six faces of a cube painted in green colour. After that the cube is cut into 1000 small equal cubes. How many are

$10002 \; 10^3$

3 faces colour ~~red~~ green 8

2 faces colour green $(10-2) \times 12 = 96$

1 face " " $(10-2)^2 \times 6 = 8^2 \times 6$

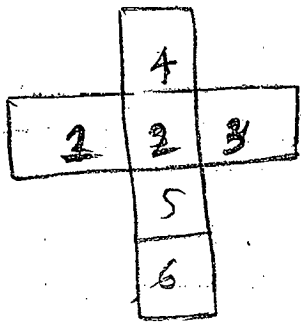
$= 384$

0 face " " $(10-2)^3 = 8^3$

$= 512$

Construction of Boxes

Type 1: When in a column or row alternate faces are always opposite.

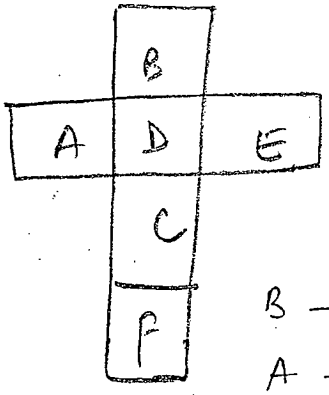


∴ Mon — Wed

1 — 3

4 — 5

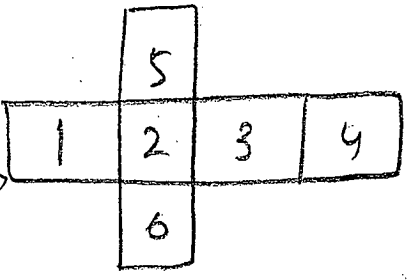
2 — 6



1 — 3

2 — 4

5 — 6

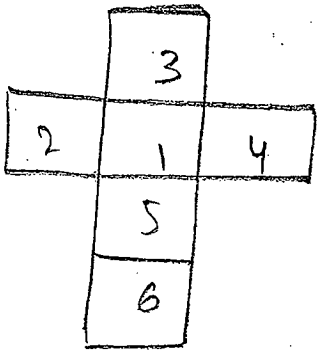


B — C

A — E

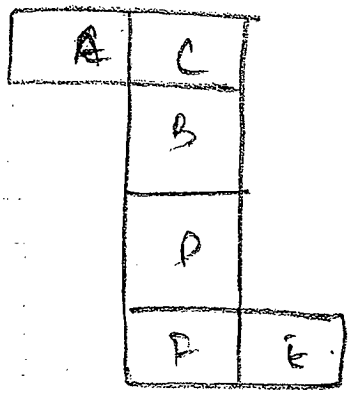
D — F

Type 2:



Left hand face opposite to right hand face, no matter where placed

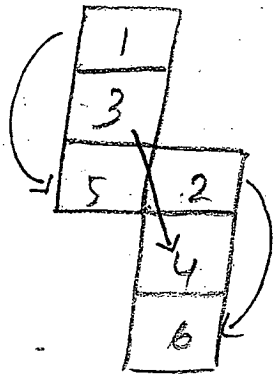
2 — 4



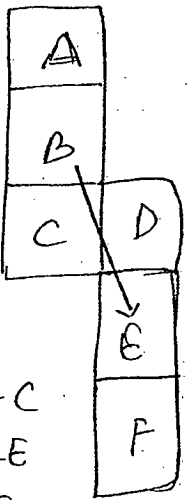
The upper face will be opposite to lower face.

A — D

ype 3.



1 — 5
2 — 6
3 — 4

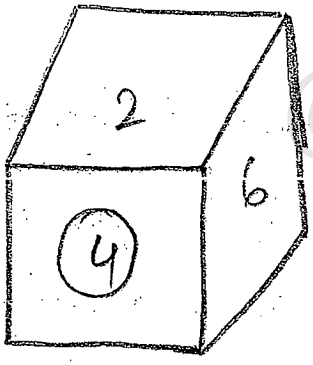


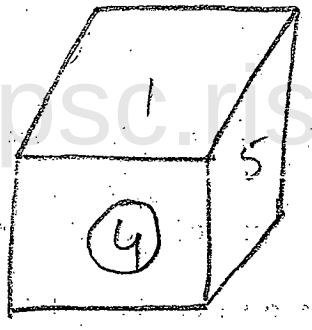
A – C
A – E
D – F.

8.18.

Type : 1

When only one face is common.





(*) 4 is common.

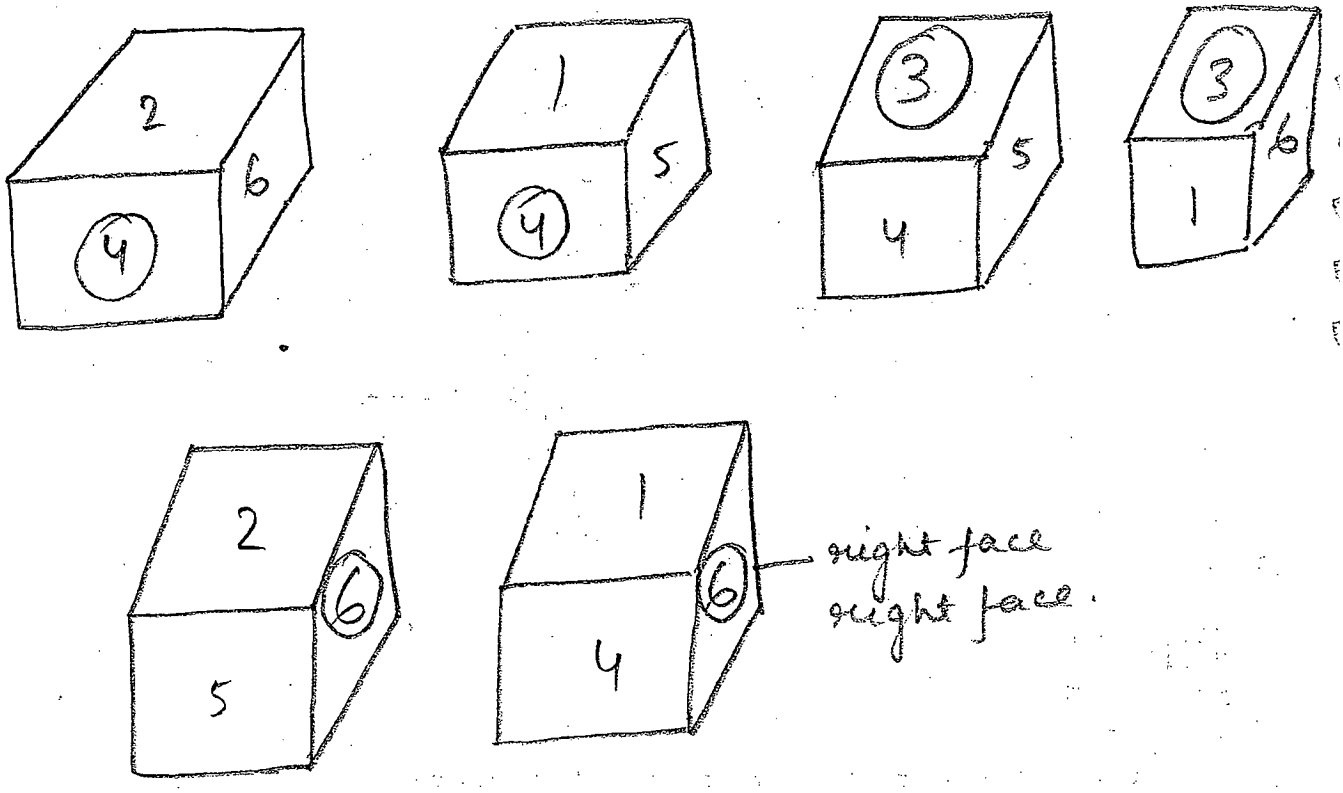
Adjacent :-
taking numbers
1 to 6.

4 – 6
2
1
5

opposite will be
3 then.

operties

Every face in a cube is having four faces adjacent to it and remaining one will always be opposite of it.

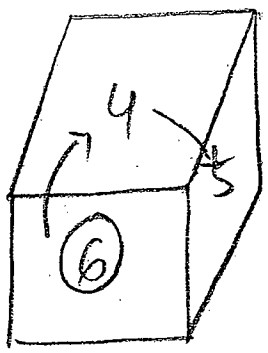


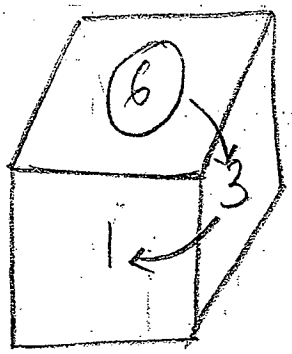
Property : 8.

- If the common face is having same position in two different ~~cases~~ views of same dice, then in the respective remaining positions will always be opposite to each other. (Top face opposite top, right face opp. to right face, side face opp. to side face depending on question)

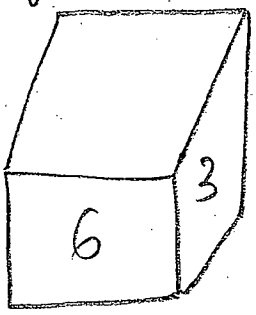
Property : 9.

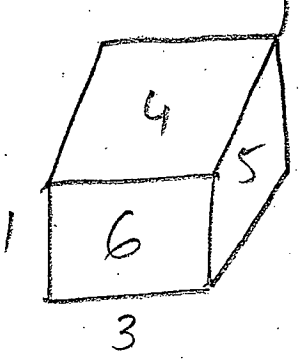
- If only one face is common in two different views of same dice then we can find all the three pairs of opposite faces.



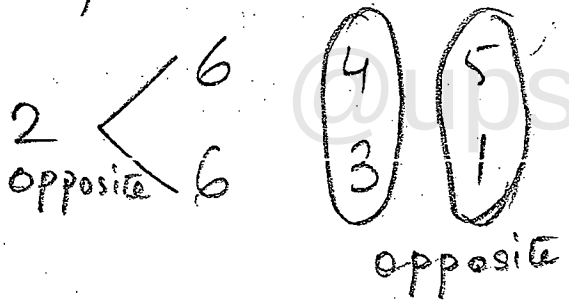


→ If 9 rotate once → rotating twice

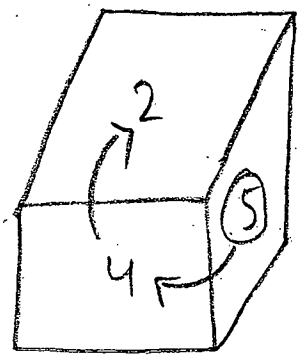


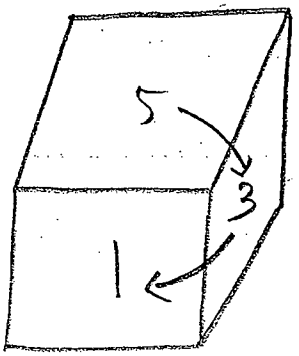


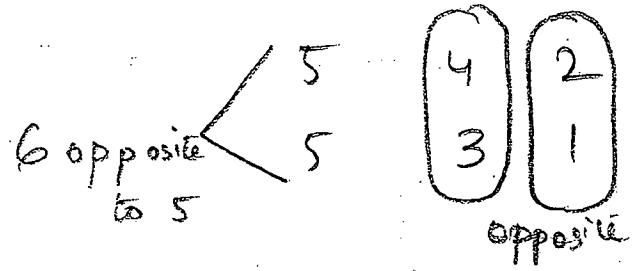
reading from clockwise :-



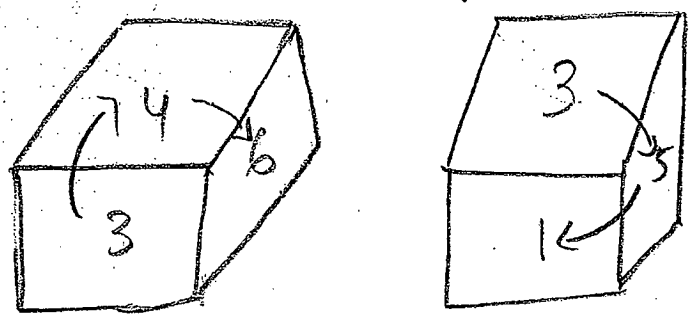
#







Master Property Method #1.

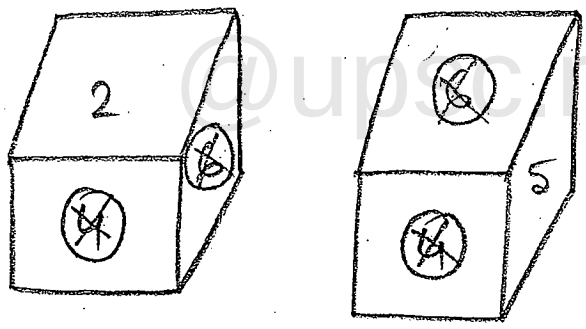


2 opp. $\begin{matrix} 3 \\ 3 \end{matrix}$ $\begin{matrix} 4 \\ 5 \end{matrix}$ $\begin{matrix} 6 \\ 1 \end{matrix}$

Type: 2.

When two faces are common.

⊛ Never use property 7, 8, 9 or Master method #1



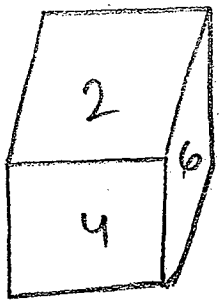
Master Method #2.

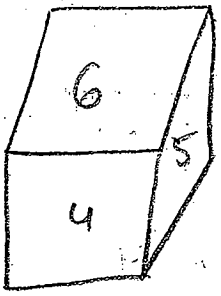
↳ cancel the common faces.

↳ in this case 2 is opposite to 5.

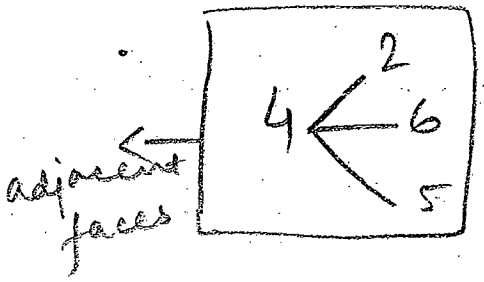
Property: 10

If two faces are common in two different views of same dice, then we cannot find all the three pairs of opposite faces but we can conclude only one pair of opposite faces.



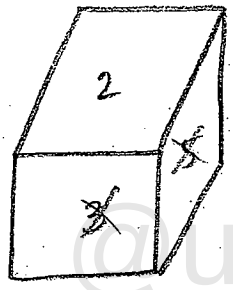


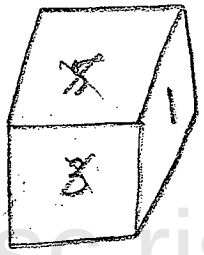
⇒ opposite of 4?



* either 1 or 3 is opposite of 4 in this case.

#



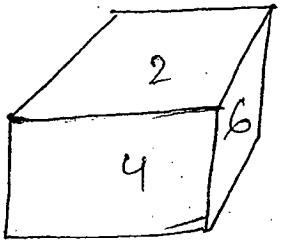


2 opposite → 1

Statement : 1

2, 4, 6 are adjacent to each other.,

↳ in statement we cannot tell about the exact positions



4, 5, 6 are adjacent to each other.

② · 1, ~~3~~, ~~5~~ are adjacent to each other.

~~3~~, 4, ~~5~~ are adjacent to each other

1 opposite to 4.

③ · 2, 4, 6 are adjacent to each other.

3, 4, 5 are adjacent to each other.

Today's Handout:

Q20. ① Y, O, B

② 1, ~~G~~, ~~V~~
③ B, ~~G~~, ~~Y~~ } 1 opp. → B — Pair 1

④ O, V, B.

Y, ~~O~~, ~~B~~
~~O~~, V, ~~B~~ } Y opp. → V P2

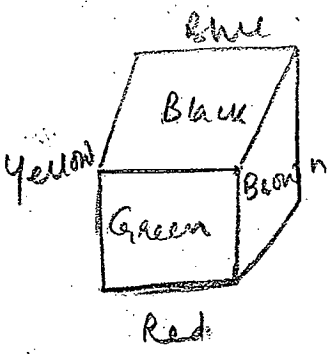
So, Orange → Green.

↳ Consider only 1st & third statement

~~Y~~, O, ~~B~~.
~~B~~, G, ~~Y~~

O → G.

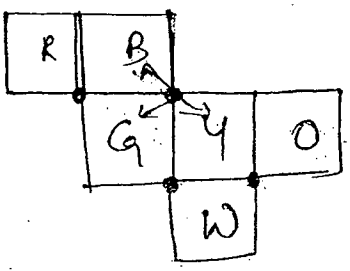
26. Blue adjacent Yellow
Brown adjacent blue.
Green inbetween
Red and Black.



Property : 11

⇒ opposite faces never have common vertex
⇒ common vertex adjacent faces.

- If any vertex is common for two or three faces then this two or three faces will always be adjacent to each other.



White sharing common vertex
W, G, Y are adjacent.

Green, Y, B are adjacent.

Since, W G Y, Green & yellow common.
G Y, B.
Blue is opposite to white.

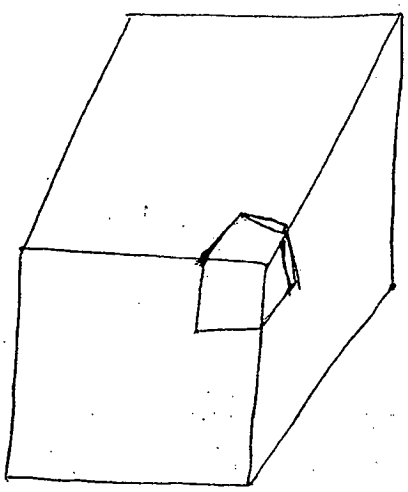
If I change the position.

R, B, G adjacent.

If I take B vertex

B, G, Y Red opposite to yellow

40.



$6 \times 6 \times 6 = 216$.

$1 \times 1 \times 1 = 1$ kg.

$= 215$ kg.

215/216

41.

512 − 1

511

$8^3 = 512$

⇒ A cube of length 3 cm is taken out from a cube of length 5 cm. What is the weight of removed portion from the original / find the weight of the ratio of the removed is to remaining.

27

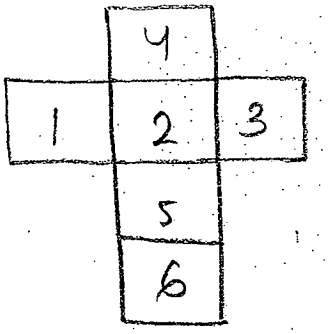
$5^3 = 125$

$125 - 27$

27/125

$125 - 27 = 98$.

Ratio = 27 : 98



Adjacent to 2 ?

1, 4, 5, 3.

SERIES.

CODING- DECODING

CHARACTER PUZZLE.

Hit & Trial

Brain Storming

1. 3, 5, 7, ? 9

2. 2, 3, 5, 7, 11.

3. 53, 59, 61, 67, 71, 73, 79, 83

4. 4, 9, 25, 49, 121

$2^2, 3^2, 5^2, 7^2, 11^2$

5. 2, 4, 7, 12, 19, 30, 43

+2 +3 +5 +7 +11 +13

6. Multiplication — 2, 4, 8, 16, 32, 64, 128

×2 ×2 ×2 ×2 ×2 ×2.

7. 1, 2, 6, 24, 120, 720, 5040

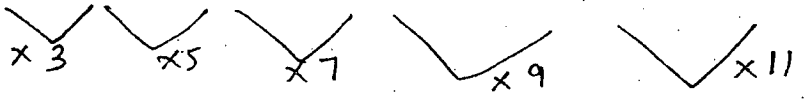
Factorial N! + 1

N! − 1

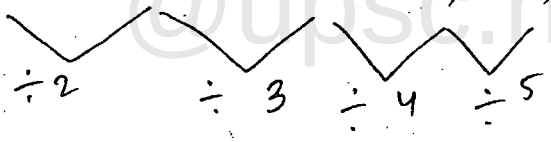
2, 3, 7, 25, 121, 721, 5041

1+1 2+1 6+1 24+1 120+1 720+1, 5040+1

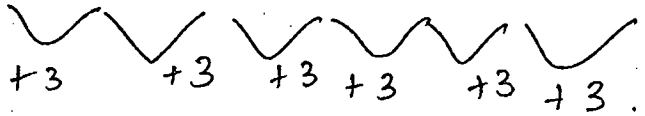
8. 4, 12, 60, 420, 3780, 41580



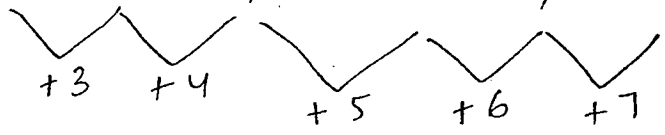
9. 720, 360, 120, 30, 6, 1



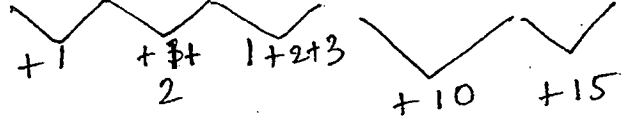
10. 4, 7, 10, 13, 16, 19, 22



11. 2, 5, 9, 14, 20, 27.



12. 5, 6, 9, 15, 25, 40



50, 49, 46, 40, 30, 15

-1 -3 -6 -10 -15

-1 -1-2 -1-2-3 -1-2-3-4 -1-2-3-4-5

7, 15, 31, 63, 127, 255, 511 — Method-1

×2+1 ×2+1 ×2+1 ×2+1 ×2+1 ×2+1

7, 15, 31, 63, 127, 255, 511 — Method 2.

8 16 32 64 128 256

8-1, 16-1, 32-1, 64-1, 128-1, 256-1, 512-1 — Method 3

2^3-1, 2^4-1, 2^5-1, 2^6-1, 2^7-1, 2^8-1, 2^9-1

2, 8, 26, 80, 242, 728

3-1 9-1 27-1 81-1 243-1 729-1

3^1-1 3^2-1 3^3-1 3^4-1 3^5-1 3^6-1

2, 3, 8, 27, 112, 565

2×1+1 3×2+2 8×3+3 27×4+4 112×5+5

2 × 1+1
3 × 2+2
8 × 3+3
27 × 4+4
112 × 5+5

17. 4, 13, 41, 126, 382, 1151

$3\times1+1$
$3\times4+1$

$4\times3+1=13$
$13\times3+2=43$
$41\times3+3=126$
$126\times3+4=382$
$382\times3+5=1151$

18. 1, 4, 9, 16, 25, 36, 49, 81

3 5 7 9 11 13 15

19. 2, 5, 10, 17, 26, 37, 50, 65

1+1 4+1 9+1, 16+1 25+1, 36+1 49+1, 64+1

8 16 24 32 40

19. 2, 10, 26, 50, 82, 122

1+1 9+1 25+1 7^2+1 9^2+1, 11^2+1

3^2+1 5^2+1

$1^2=1$
$2^2=4$
$3^2=9$
$4^2=16$
$5^2=25$
$6^2=36$
$7^2=49$
$8^2=64$
$9^2=81$
$10^2=100$
$11^2=121$
$12^2=144$
$13^2=$

20. 3, 10, 29, 66, 127, 218

1+2, 8+2, 27+2, 64+2, 125+2 + 216+2

1^3+2, 2^3+2, 3^3+2, 4^3+2, 5^3+2 + 6^3+2.

Triangular Pattern

1. 3, 10, 29, 66, 127,

Level 1: 7, 19, 37, 61, 91

Level 2: +12, +18, +24, +30

Level 3: +6, +6, +6

2. 6, 25, 62, 123, 214, 341

$8-2, 27-2, 64-2, 125-2, 216-2, 343-2$

$2^3-2, 3^3-2, 4^3-2, 5^3-2, 6^3-2, 7^3-2$

12 13 14
21 19 17
16 17 18
49 49 49

12 16 17
25 13 18
16 20 49
49
15
15
19
49

Alphabetical

1. T, R, P, N, L, J, H, F

1	2	3	4	5	6	7	8	9	10
A	B	C	D	E	F	G	H	I	J
11	12	13	14	15	16	17	18	19	20
K	L	M	N	O	P	Q	R	S	T
24	25	26							
U	V	W	X	Y	Z				

E	J	O	T	Y
5	10	15	20	25

C	M	W
3	13	23

2. R, U, X, A, D, G, J, M

18, 21, 24, 27, 4

+3 +3 +3 +3 +3 +3 +3

3. H, I, K, N, R, W, C

8, 9, 11, 14, 18, 23, 29

+1 +2 +3 +4 +5 +6

4. AZ, GT, MN, SH, Y, B

A G M S Y Z, T, N, H, B

1 7 13 19 25 26, 20, 14, 8, 2

+6 +6 +6 +6 −6 −6 −6 −6

* After Z which is 26
A is 27
B is 28
C is 29.

G H, J L, N Q, S W, Y D

1
19
6
25.

G J N S Y

7 10 14 19

+3 +4 +5 +6

H L Q, W D

8 12 17, 23 30

+4 +5 +6 +7

CODING - DECODING

1. E = 5

16+5+14

PEN = 35

PAGE - 29.

P - 16

N

E - 5

16+1+5+7.

17

12.

29 :

2. RED - 6720

18 5 4

+2 +2 +2 = 2076 = 6720.

REVERSE

GREEN -

7 - 18 5 5 14

+2+2+2+2+2

= 9 20 7 7 16

16 7 7 20 9.

18
×5 4
90
×4
360

G - 7

R - 18

E - 5

E - 5

N - 14

3. D E E R 34417 H I G H 7867 H E L L
4 5 5 18 8 9 7 8 8 5 12 12
-1 -1 -1 -1 = 34417 -1 -1 -1 -1 = 7867 -1 -1 -1 -1
= 7 4 11 11

4. G O = 32 S H E - 49
7 15 1985 = 8 + 19 + 22
20 + 12

S O M E = 56 S = 27 - 19 = 8
19 15 13 5 O = 27 - 15 = 12
M = 27 - 13 = 14
E = 27 - 5 = 22
56.

G = starting = 7
from Last = 27 - 7 = 20
O = 27 - 15 = 12.
S = 27 - 19 = 8.
H = 27 - 8 = 19
E = 27 - 5 = 22

Ranking from starting + Ranking from last = TN + 1
$R_S + R_L = 26 + 1$

5. A T = 20
1 x 20 = 20

B A T = 40
2 x 1 x 20 = 40

Z A T = 520
26 x 1 x 20

C S A T = 1140
3 x 19 x 1 x 20

27 - 1 = 26.
27 - 20 = 2

19 | 2
38 | 2
3

1140.

6. Z I P = 153
   | | |
   26 9 16 = 51
   × 3
   153

ZAT = 141

26×1×20 = 47×3
= 141

ZAP — 129

26×1×16 = 43×3
= 129.

$$\begin{array}{r} 26 \\ \times\ 16.3 \\ \hline 156 \\ 26\times \\ \hline 416 \end{array} \qquad \begin{array}{r} 2 \\ 26 \\ 9 \\ \hline 16. \\ \hline 51. \end{array}$$

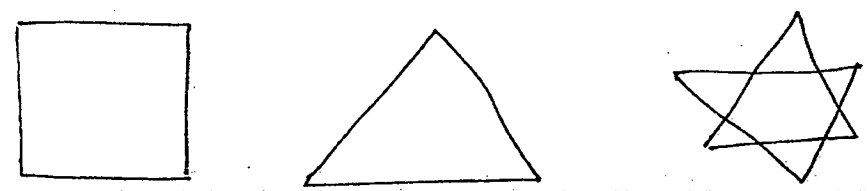
7. Chu cha chi — 123
   2.

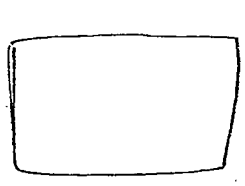
chu chu chul — 422.
2 2 ↓ 4

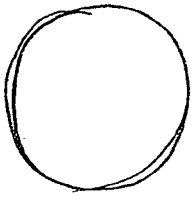
Cha → can either 1 or 3

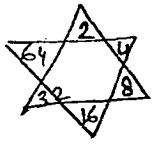
Chi → can either 1 or 3.

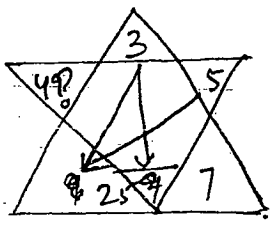
8. **Character Puzzle**:











3	+10	13
1	+14	15
7	+12	19

2	3	2
1	4	7
5	25	53

-2^2

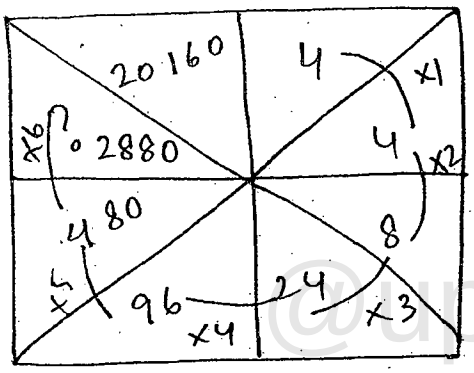
-7^2

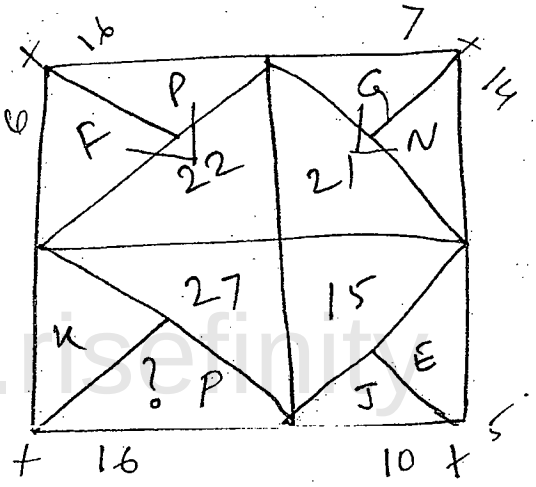
2^2 3^2

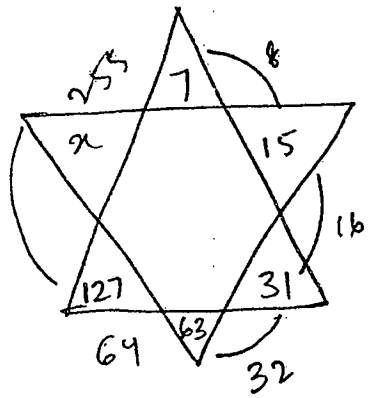
$+1^2$ $+4^2$

5 $9+16$.

2.







—, 3, 7, 15, 31, 63, 127

$x \times 2 + 1 = 7$

$2x + 1 = 7$

$2x = 6$

$x = 3$.

~~$7 \times 2 + 1$~~

~~$7 \times 4 - 2$.~~

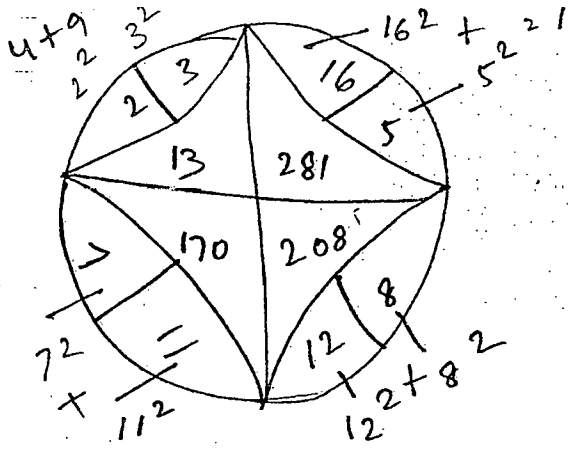
~~7×6~~

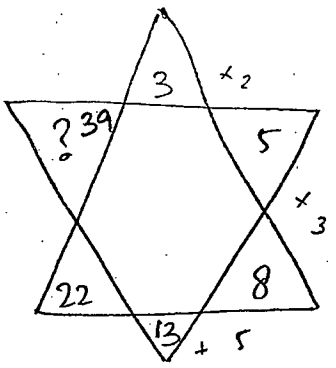
$15 \times 2 + 1$

$= 31$

$31 \times 2 + 1 = 63$.

255 & 3 both can be correct.





22
11
33.

121
39
170

a) 35
b) 39
c) 43
d) 47

3, 5, 8, 13, 21.

2, 3, 6, 18, 108, ——

if diagonally :-

3 x 4 + 1 = 13

5 x 4 + 2 = 22

8 x 4 + 3 = 35.

Or,

3 x 2 - 1 = 5

5 x 2 - 2 = 8.

8 x 2 - 3 = 13

13 x 2 - 4 = 22

22 x 2 - 5 = 39.

12+2 : 12
10-2 : 8.

12-2
10-2

16
16

25
21
25
50x
525

CALENDAR

Leap year - for century year we divide by 400.

Non-century year we divide by 4, check divisibility of 4.

Odd days.

365 ÷ 7

= 52 weeks + 1 odd day.

366 ÷ 7

= 52 weeks + 2 odd days

Jan = 31.

31 ÷ 7 =

4 weeks + 3 days.

Odd days with respect to Month.

A J S N - 30 days. J M M J A O D - 31 days Months.

Feb - either 28 or 29

July Aug } 2 consecutive
Dec Jan } month with 31 days.

			Leap year.
Jan	- 31 days	- 3 odd.	3
Feb	- 28 "	= 0 "	1
Mar	- 31 "	= 3 odd	3
Apr	- 30 "	= 2 odd	2

			Leap year
May -	31 days	- 3 odd	3
June -	30 "	- 2 "	2
July -	31 "	- 3 4	3
Aug -	31 "	- 3 4	3
Sep -	30 "	- 2 4	2
Oct -	31 "	- 3 4	3
Nov -	30 "	- 2 4	2
Dec -	31 "	- 3 4	3

Monday - 1
Tuesday - 2
Wednesday - 3
Thurs - 4
Friday - 5
Sat - 6
Sun - 7 or 0.

Navigation

1. Yearly Navigation → If 1st Jan 2017 - Mon, 1st Jan 2086
2. Monthly Navigation
3. Date Navigation.

4th April - 2017 - Mon.

14th Nov, 2047 - ?

If 1st Jan 2017 - Mon

1st Jan 2027 - ?

Step 1 :- 2027 - 2017 = 10 yrs.

Step 2 :- 2 leap year $2 \times 2 = 4$

8 normal year $\cdot 8 \times 1 = 8$

12.

Step 3 :- $\frac{12}{7}$ = 1 week + 5 days.

Step 4 = Mon

+ 5

= 6 - Saturday.

1st Jan 2017 Monday

1st Jan 2018 - Tuesday.

1st Jan 2019 - Wednesday

1st Jan 2020 - Thursday

1st Jan 2021 - Saturday.

1st Jan 2011 - Mon

1st Jan 2031 - ?

Step 1 = 2031 - 11

= 20 yrs.

Step 2 : 12, 16, 20, 24, 28.

5 LP = $5 \times 2 = 10$

15 NY = $15 \times 1 = +15$

25.

Step 3 : $\frac{25}{7}$

= 3 weeks 4 days.

Step 4 : Mon = 1

+ 4

5.

= Friday

1st Jan 2011 - Mon

1st Jan 20641 -

Step 1 : 41 - 11 = 30

Step 2 : 8 LY = 8 × 2 = 16

22 × 1 = 22

38

Step 3 : $\frac{38}{7}$ = 3 odd days.

1st Jan 2011 - Mon

1st Jan 2026 -

4 LP 4 × 2 = 8

11 × 1 = 11

19

$\frac{19}{7}$ = 2 weeks + 5

Mon = 1

+ 5

2 . Saturday

26
11
15

15
- 4
01

2012
2016
2020
2024

1st Jan 2011 - Mon +0

1st Jan 2061 - ? Mon

4, 8, 12 - 1st Jan 2001

15 | 3×2 = 6
7 | 18 | 12
18

Step 1 : 61 - 11
= 50 yrs

Step 2 : Leap year - 13 L Y
Normal = 50 - 13
= 37

Step 3 : 13 × 2 = 26
37 × 1 = 37
63
63/7 = 0

Step 4 : No change

2012
2016
2020
2024
2028
2032
2036
2040

$$\text{Leap} = \frac{\text{last leap year} - \text{first leap year}}{\text{Common difference}} + 1$$

$$= \frac{2060 - 12}{4} + 1$$

$$= \frac{48}{4} + 1$$

12 + 1 = 13.

1st Jan 2011 - Mon +1
+ 4
1st Jan 2081 = Friday

18 × 2 = 36.
52 × 1 = 52
88

88/7 = 4 odd days

$$\frac{2080 - 12}{4} + 1$$

$$= \frac{80 - 12}{4} + 1$$

$$= \frac{68}{4} + 1$$

17 + 1 = 18.

1st Jan, 2015 Mon +1

+2.

1st Jan, 2061 Wed

60 61
12 15
48 46

46
26.
20.

$13 \times 2 = 26$

$20 \times 1 = 20$

46.

$46/4 =$

$12 \times 2 = 24$

$34 \times 1 = 34$

58.

$58/7$ = 2 days Remainder.

$\frac{60-12}{4} + 1$

12
48 + 1
4

12
= 13.

1st Jan, 2015 - Mon +1

1st Jan, 2055 - Tuesday

Step 1: 55 - 15 = 40 yrs.

When the gap is exactly divisible by 4 = $\frac{40}{4} = 10$.

$10 \times 2 = 20$.

$30 \times 1 = 30$

50.

$50/7$ = 1 day

1st Jan, 2015 - Mon + 1

+ 85

1st Jan, 2075 - Saturday.

60 − 15 = 45

75 − 15 = 60

60 / 4 = 15 : 2

15 × 2 = 30

45 × 1 = 45

75

75/7 = 5 day -

Total odd days = Total year + Leap year.

1st Jan, 2041 - Mon.

1st Jan, 2051 = 40 yrs. +1

Tuesday.

1st Jan, 2015 = Mon 1

+2.

1st Jan, 2095 = Wed.

95 − 15 = 80.

80/4 = 20.

80 + 20

= 100.

100/7 = 2 days.

1st Jan 2017, Mon! + 5

1st Jan 2077, Saturday.

77
17
60
-15
45

$\frac{60}{4} = 15$.

15 × 2 = 30 45 × 1 = 45.

60 + 15.

= 75/7.

= +5.

Step 1 : Total year

Step 2 : Leap year.

- Gap divisible by 4 multiple of 4
- Gap is not multiple of 4 manual/AP.

Step 3 : Total year + Leap year = Total odd day

Step 4 : Total days / 7.

Monthly Navigation

Jan - 21.
Feb - 28.
Mar - 31
Apr - 30
June - 10.
120/7

10 Jan 2017 → Mon.

10 Jun 2017 →

For a monthly navigation question, for whatever month we cross the last date we take odd days for that month only.

1st Jan 2018 Mon

+3

1st Feb 2018 Thursday

+0

1st Mar 2018 Thursday — 4th day.

+3

1st April 2018 Sunday.

-3
--0
1-3
+-2
1-3
F-2

1st Jan 2018] Mon = 1
1st July 2018] +6
Sunday.

13/7 = 6.

10th Jan 2017 Mon — 1

+4

10th Jun 2017 Friday.

11/7 = 4 days.

26th Jan 2018 — Mon — 1

+4

26th June 2018 — Friday.

11/4

*Jan 1 ← 31st Jan 2018 — Mon — 1

n crossing

* not 31st July.

+5

31st July 2018 — Sunday.

13/7.
= 6.

7th April 2018 — Mon — 1

7th Nov 2018 — Friday +4

2 A
3 M
2 J
3 J
3 A
2 S
3 O
18.

7th Jan, 2016 — Mon — 1

+ 5

18/7
24 days

7th Jan 2016 — ____

12/7.
2 + 5

Feb - 1 odd day.

2016 — leap year

Monthly & Yearly Navigation

57
-17.
40

4th Jan 2017 — Mon

4th April 2057 — Mon.

40/4 = 10.

4th Jan 2017 - Mon +1

4th April 2057 =

40+10
= 50.

50/7 = 1 odd day.

4th Jan 2017 = + 6.

7

1 week after

Mon

=

7th Nov 2018 - Mon — 1

+ 6.

27th Nov 2018 — Sunday

27 - 7

= 20/7 = 6.

4th April 2018 Mon — 1

+4

22nd April 2018 Friday.

22 - 4 = 18/7

4 th Jan 2011 — Mon — 1

+3

14 th April 2051 - Thursday.

51
11
40

40/4.

210

1+6+3

= 10/7

= 3

14 - 4

= 10/7

= 3 odd days.

Jan 40
+10
Jan 3 50.
Feb. 0
Mar - 3.50/7 2 odd
April - 2 day.
May - 3

11/7 = 4 odd day.

1st Jan 2001 — Mon 18.

3rd Jun 2019 — Monday.

Monthly Navigation

3.
3.
2
3
11/7.

~~25/7~~ 2

1+4+2

= 7

1/2
+1/1
2/3
+2/
2/5

~~4x2=8~~ 18
~~4x2=8~~ 18
12

~~8~~

4x2=8.

18-8=14.

22

22/7 = 1 day.

11/7 = 4 day.

3-1 = 2 day = 2.

Backward Movement.

-1 [29th Aug — Wednesday] -1

+1 [30th Aug — Thurs 4] +1

[31st Aug — Friday.

1st Jan, 2018 — Sunday] 7
1 odd day.
1st Jan 2017 — Saturday] -1
6.

1st Jan, 2017 – Sun = 7
1st Jan, 2007 = Monday — 6
— 1

17 – 7

210 + 3 = 13.

16, 12, 8, 4, 13/7 = 6 odd days

1st Jan, 2021 – Friday = 5
1st Jan, 2001 – Monday — 4
1

2021 – 2001
= 20

20, 16, 12, 8, 4
20+5
= 25/7.
= 4.

1st Jan 1905 – Mon
31st Dec. 1909.
4.
+1
5/7

26 Jan 2018 – Sun: 7.
15 Aug 2018 – Tuesday.

3. J
0. F
3. M
2. A
3. M
2. J
3. J
16/7.
2 odd.

206

Mon Jan 1 2007
Jan 2010
3
+2.1
5.

Repeatation of Calendar.

1st Jan 2017 Mon
4th April 2017 Thurs.
7th Nov " Sun.

① Normal year calendar repeat in Normal year

Leap year calendar repeat in leap year only.

② 1st Jan of both year should have same day.

② 1st Jan, 2021 - Mon

	2022 + 1 (odd day)
	2023 + 1
LP	2024 + 1
	2025 + 2
	2026 + 1
	2027 + 1
	7

2027 - Mon.

④ 1st Jan, 2019 - Mon

1st Jan, 2030. will be Mon.

	2020 + 1
	2021 + 2
	2022 + 1
	2023 + 1
	2024 + 1
	2025 + 2
	2026 + 1
	2027 + 1
	2028 + 1
	2029 + 2

1st Jan 2023 - Mon

of 1st Jan, 2017 - Mon

① 1st Jan, 2018 - Thes (+1)
1st Jan, 2019 - Wed (+1)
1st Jan, 2020 - Thurs (+1, LP +2)
1st Jan, 2021 - Sat (+1)
1st Jan, 2022 - Sun (+1)
1st Jan, 2023 - Mon

	2017.
	18 +1
	19 +1
LP	20 +1
	21 +2
	22 +1
	23 +1
	7

③ 1st Jan, 2018 - Mon.

2024	+2	2019	+1
2025		2020	+1
2026	+1	2021	+2
2027	+1	2022	+1
2028	+1	2023	+1
2029	+1	2024	+1
	7		7

Mon

Second, condition satisfied but not the first, So, it ~~cannot~~ happen so in this case 2029 will

1st Jan, 2013 Mon

2014 +1
2015 +1
2016 +1
2017 +2
2018 +1
2019 +1

7

1st Jan 2019, Mon.

ithin a century, Calendar a leap year repeats in every 28 year.

Calender of 2016

+28

2044

044
- 28
072

2020
+28
2048

2012
+28
2040
+28
2068.

5) 1st Jan 2092 Monday.

8 +1
9 +1
0 +1
1 +1
2 +1
3 +1
+1

7

2093 +2
2094 +1
2095 +1
2096 +1
2097 +2

7

14.

1st Jan, 2104 — Mon.

⑥ 1st Jan, 2016 - Sun:

2017 +2
2018 +1
2019 +1
2020 +1
2021 +2

2044 7

1st Jan, ~~2044~~ Sun.

2021
2022 +1
2023 +1
2024 +1
2025 +2
2026 +1
2027 +1

7

2028 +1
2029 +2
2030 +1
2031 +1
2032 +1
2033 +2
2034 +1
2035 +1
2036 +1
2037 +2
2038 +1
2039 +1
2040 +1
2041 +2
2042 +1
2043 +1
2044 +1

alternate method

2016 } +5
2020 }
2024 } +5
2028 } +5
2032 } +5
2036 } +5
2040 } +5
2044 }

35

Divisible by 7.

5 odd days = 4 yrs

1 odd day = $\frac{4}{5}$

35 odd day = $\frac{4}{5} \times 35$

= 28 yrs.

Alternate,

2092 } +5
2096 }
2100 } +5
2104 } +4

14. 1st Jan, 2104 will be Mon,
not necessary to be added 28.

6.9.18.

BLOOD RELATIONS

Father / Mother
Uncle / Aunt
Cousin — I → Brother / Sister — Husband / Wife.

brother in law /
Sister in law

Father in law /
Mother in law

Grand father /
Grand Mother
Father / Mother
Uncle / Aunt
Nephew / Niece

connected horizontally Husband & wife.

Brother & Sister chain

Male
Female

Son / Daughter

① Grand Son / Grand Daughter

Son1 Son2 D1 D2

4

X

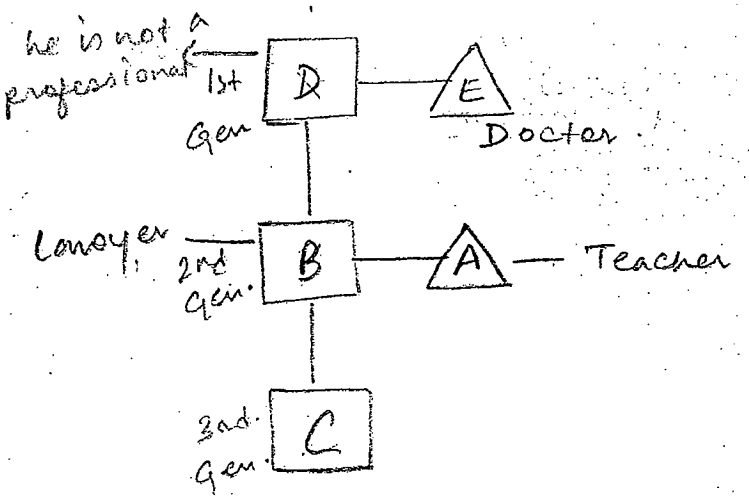
How is X related to 4?

i) Sister
ii) Niece
iii) Uncle
iv) Aunt.

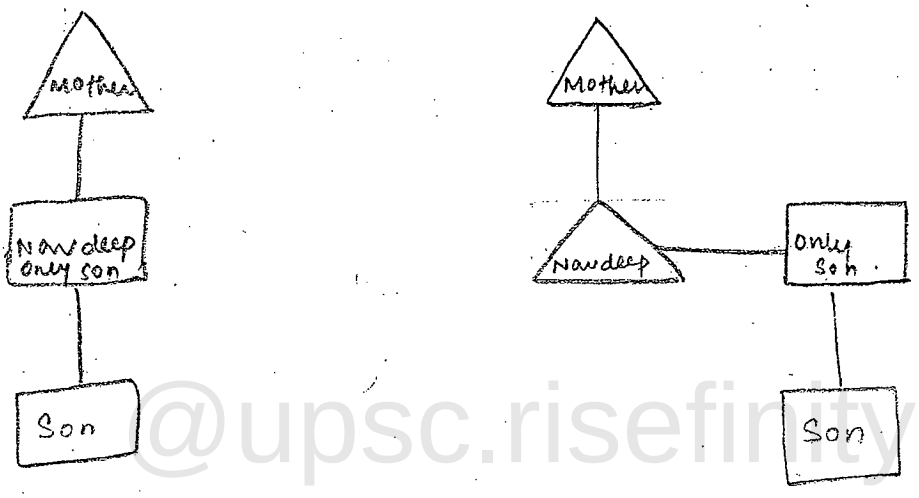
Based on level we can eliminate options:

Handout.

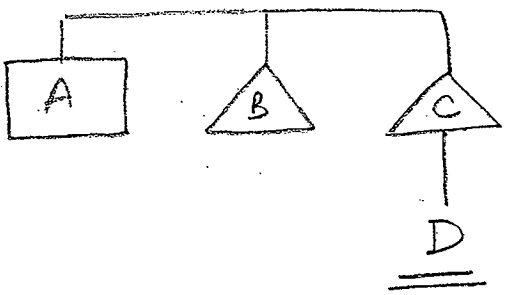
Type: 1



Type: 2

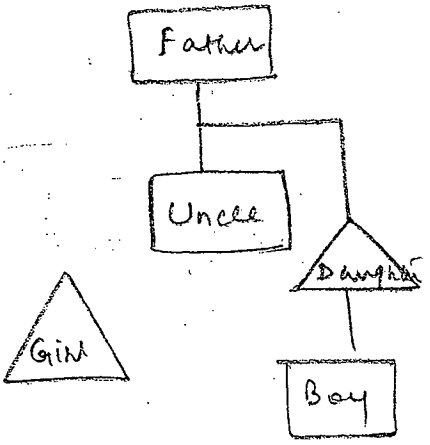


3.



Gender cannot be determined whether male or female.

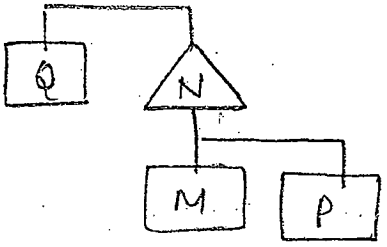
5.



Uncle is not confirmed whether paternal or maternal, So it can either me brother/cousin

2.

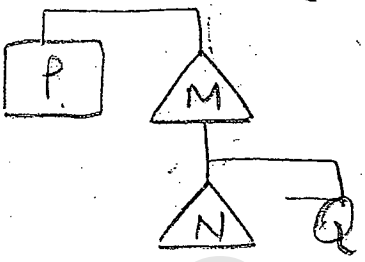
A. Q − N + M × P.



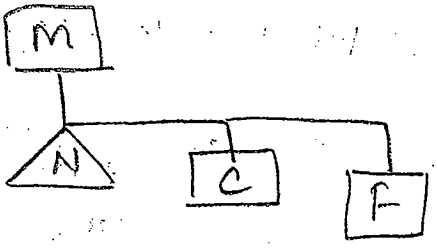
Female.

B. P + S × N − Q

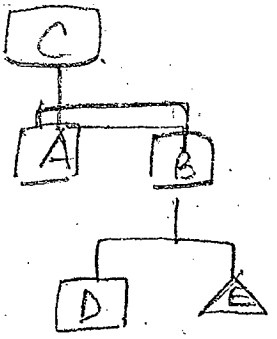
C. P − M + N × Q



4. A.



Q4.



9.18.

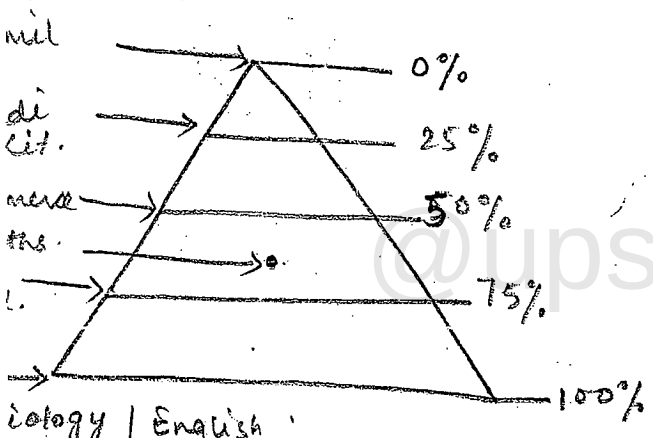
DATA INTERPRETATION

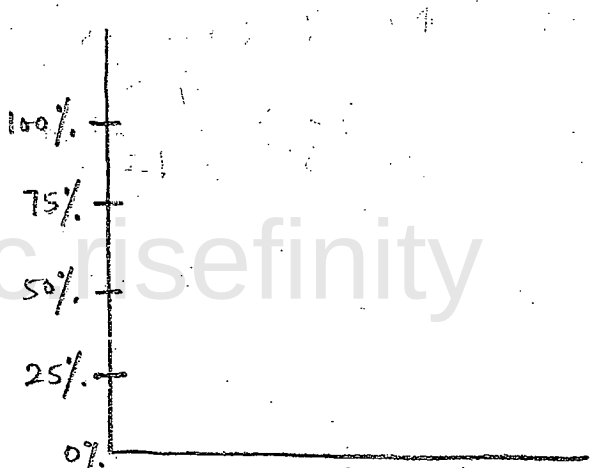
based on.

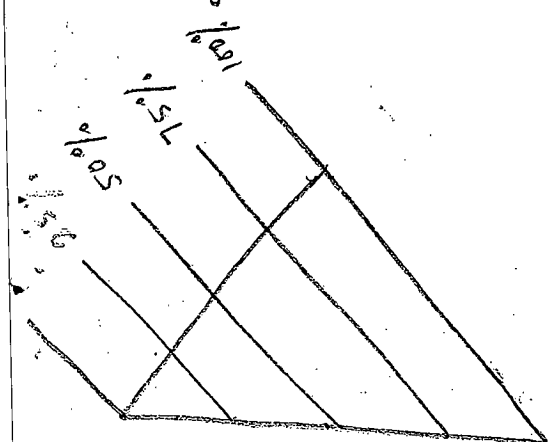
1. Line Graph.
2. Bar Graph
3. Mixed Graph
4. Pie Chart
5. Table
6. Misc.

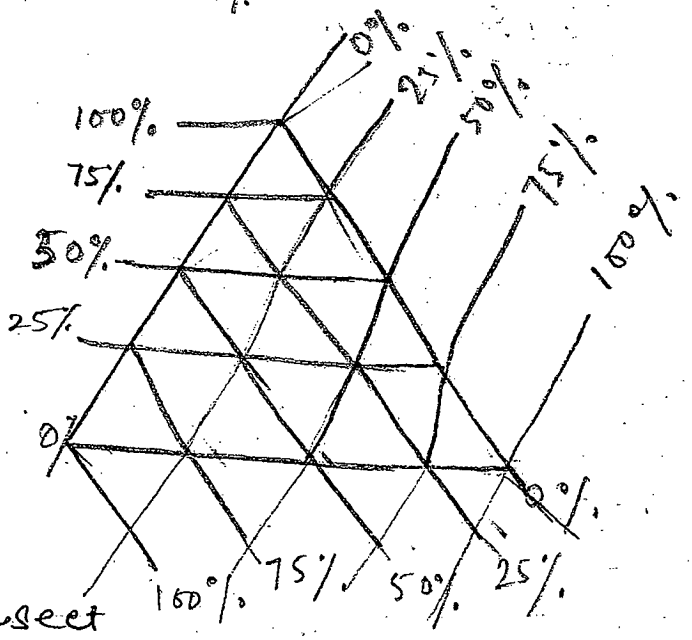
1. Number System
2. Ratio & Proportion.
3. Average
4. Percentage.

Misc. → Triangle based Data Interpretation.
→ Venn Diagram based D.I
→ Misc.









1. You cannot intersect the scale
2. You have to go parallel to the scale.

Assignment

		I	II
Emerald School	500	50% of 500 = 250	30% of 500 = 150
DPS	750	20% of 750 = 150	50% of 750 = 375
Sanwan Public	470	40% of 470 = 188	20% of 470 = 94
	1720.	588.	619.

3. DPS : Emerald Public

375 : 150

5 : 2

4. $\frac{619}{1720} \times 100$

$= \frac{6190}{172}$

(Total) read with total you will be comfortable.

Q14. What % of L size shirts belong to Brand A?

Total of Large size = 185

Brand A large size = 91

% $= \frac{91}{185} \times 100$

Short cut.

check = $\frac{185}{2}$.

= 92.5.

= 91.

50% of 91.

2; is half.

Total = 252.

Brand B = 94.

% = $\frac{94}{185} \times 100$.

$\frac{94}{252} \times 100$.

L and XL = 60%.

M = 40%.

40% of 560 = $\frac{40}{100} \times 560$

= 224

	Harish	Sanjay	Total.
1991	1800	2200	1000 kg/acre Total = 4000.
1992	2500	2700	5000.
1993.			6000
1994.	3200.	4800.	8000.
1995	9000 ↓ 75%	25% of 9000. 3000. ↓ 25%	12000

18. Ratio of production.

4000.
−1800
2200

Production twice
2 4000 × 2
= 8000.

@upsc.risefinity

If 9,000 is 75%.

$\frac{75}{100} \times 9000$

25%

$= \frac{25}{100} \times 9000$

$\frac{60}{100} \times 8000$.

4800

Q8.

$\frac{25}{100} \times 12000$

21 : 105
18 : 90

65	35	50	77	80	80
150	130	120	100	100	100
↓	↓	↓	↓	↓	↓
90+7.5	35% = 45.5	60	77	80	80
97.5					

$$\frac{97.5+45.5+60+77+80+80}{700} \times 100$$

$$\frac{460}{700} \times 100$$

63%.

7) 460 (

2006 ⟶ 51%.

Total — 384 in lakh.
= 72%.

51% of 72% of 384.

51 = 49% of 72% of 384

$$\frac{49}{100} \times \frac{72}{100} \times 384 \times 0$$

2.0