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Shakuntala Devi Puzzle Book Solution

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"Anything that is difficulty in nature and needs tricks to make it easier falls under the category of puzzle"

Subrato Roy Choudhury.

Dedicated to My Mom & Dad whose blessings are always with me ……

Subrato Roy Choudhury

About the Author

Subrato Roy Choudhury is a B.Tech in Computer Science & Engineering from St. Thomas' College of Engineering & Technology, Kolkata and always has the aim to pursue higher studies. He likes teaching small children and is working as an Asst. Teacher in an English medium school. His research areas include Steganography, Cryptography and Sanitization in images. His research paper had been accepted in international journal. He has many recognitions and awards. He had attended many seminars and conferences organized by IEEE, Microsoft, Mozilla and many others. Apart from these he also enjoys photography, philately.

Subrato Roy Choudhury

Preface

Puzzles forms an important constitute of our day to day life and solving of them increases the sharpness of the brain. This book has been written by the author with an intention to solve the puzzle in a quite simpler approach and using technique with proper explanation. The solution to each and every problem has been explained in details and can be understood easily with the basics of mathematics and physics. This book serves as an important purpose for the students those who are preparing for cracking interviews where puzzles are asked. This is the first edition of the book and feedbacks and suggestions are always welcome from the readers.

You can reach me at **subrato.91@gmail.com**.

Free download of the **PUZZLE BOOK** at the following address:
http://www.sbioak.org/hard%20puzzles/Puzzles%20to%20Puzzle%20You.pdf

1) Brother- 1^{st} = x, 2^{nd} = x+2, 3^{rd} =x+4, 4^{th} = (x+4) + 6=x+10
   => x + x+2 + x+4 + x+10 = 74*4 = 296
   4x = 296-16 = 280
   x= 70
   Heights are **70,72,74,80**.

2) Let time before 6 be x
   Time from 3 be 180-x
   4(x+5) = 180-x-5
   x=**31**.

3) Sons = x, Daughter = y.
   Each boy has brother = x-1 and sister = y i.e. x-1 = y
   Each girl has brother = x and sister = y-1 i.e. x = 2(y-1)
   thus, x=**4**, y=**3**.

4) Naturally, **the train travelling against the spin of the earth will wear its wheels out more quickly**, because the centrifugal force is less on this train.

5) Total Distance, d = x + x =2x
   Total Time, t = t1 + t2 = (x/40) + (x/25)
   Avg. Speed = d/t = $\frac{2x}{(x/40) + (x/25)}$ = **30.769**.

6) Total Amount lose = Cost Price of the bicycle + Rs. 50 i.e. **Rs. 350**.

7) The lowest square number I can think of, containing all the nine digits once and only once, is 139854276, the square of 11826, and the highest square number under the same conditions is 932187456 the square of **30384**.

8) 1, 6, 8, 9, 0 are the numbers that can be turned upside and still remain as a number.
   Perfect square are 1, 9, 16, 169, 196, 961
   Thus, the number can be squared when turned upside down 196⇔961.
   Since, it is less than 500 so, it is **196**.

9) At midnight the clock is pointing upward 12. The minute hand rotates 2π radian per hour.
   Thus, the angular location of minute hand is given by:
   $\mu_m = 2\pi T$ where T is time in hours.
   In 12 hrs. the hour hand completes one complete rotation. So, angular location of minute

hand is given by:

$\mu_h = 2\pi (\frac{T}{12})$

The two hands will be in opposite direction means the angular difference between the two hands will be odd multiple of π.

$\mu_m - \mu_h = \pi(2n - 1)$ where n=1,2,3, ……, 12

$2\pi T - 2\pi (\frac{T}{12}) = \pi(2n - 1)$

$T = \frac{6}{11}(2n - 1)$

$\Rightarrow \mu_m = 2\pi T = 2\pi \frac{6}{11}(2n - 1) = \frac{12}{11}\pi(2n - 1)$

$\Rightarrow \mu_h = 2\pi (\frac{T}{12}) = \frac{1}{11}\pi(2n - 1)$

Now, we know that 2π = 30 minutes.

So, $\mu_h = \frac{30}{11}$ **(2n -1)**.

10) Thief moves 1 unit distance then police moves 2 unit distance.

Time, t	Thief	Police
0	7	0
1	15	10
2	23	20
3	31	30
So, the Police will move a distance of **30 units……**		

11) To strike 7 the clock has to move 6 intervals.

To strike 10 the clock has to move 9 intervals.

For 6 interval time = 7

,, 1 ,, ,, = 7/6

,, 9 ,, ,, = (7/6) * 9 = **10.5**.

12) First sale = x

Total = 2x+1

Let at 3rd sale be 1

Then at 2nd sale will be 2 *1 = 2

Thus, at 1st sale = second sale + half second sale = 2 + 1=3

X = 3

Total= 2 * 3 + 1= **7**

13) All the transactions carried out through the counterfeit note are invalid and therefore everybody stands in relation to his debtor just where he was before I picked up the note.

Thus, **there is no value created or lost**.

14) A pound of cotton is heavier than a pound of gold because cotton is weighed by the avoirdupois pound, which consists of 16 ounces, whereas gold, being a precious metal is weighed by the troy pound which contains **12 ounces (5760 grams)**.

15) Let the ages of Tinku, Rinku and Jojo be t, r, j respectively
Nuts given to the brothers = 1000-230=770
given, t + r + j=17.5
=> t + r + j=7/4 ……(1)
t/r=4/3 ……..(2)
t/j=6/7 ……..(3)
Putting (2) and (3) in (1) we get
t=3/5
=>r=9/20 and j=7/10
t:r:j= (3/5) : (9/20) : (7/10)
= 12 : 9 : 14
To, find how much each brother gets ,
770/(12+9+20)=22
Tinku, t= 22*12 = 264
Rinku, r= 22*9 = 198
Jojo, j=22*14 = 308
Now, see that 12+9+14=35 but their sum of ages is 17.5 i.e. half so, the ratio of their ages should also be divided into half i.e. **6 years, 4.5 years, 7 years**.

16) Let the present age of Mohini and jayant be x and y respectively,
x-12=(3/4)*(y-12)
=>4x-3y=12…….(1)
x=(5/6)y…….(2)
=>y=**36** and x=**30**
At the time of their marriage their ages will be y-12 and x-12 i.e. 24 and 18 years respectively for Jayant and Mohini.

17) The minimum number of weights required would be five and they are 1,3,9,27,81.
till13 pounds we need will be 1,3,9
2 pound can be obtained by placing 3 on one side and 1 on the other side.
4 …… 3 and 1 together.
5 …… 9 on one side and (1 and 3) on the other side.
6 …… 9 on one side and 3 on the other side.

7 …… (9 and 1) on one side and 3 on the other side.
8 …… 9 on one side and 1 on the other side.
10…….. 9 and 1 together.
11…….. (9 and 3) on one side and 1 on the other side.
12…… 9 and 3 together.
13…….. 9, 3 and 1 together.
So, the sequence is a GP series so the weights will be **1, 3, 9, 27 and 81**.

18) Let x and y be the glasses delivered safely and broken respectively.
Then, x + y = 100……..(1)
Also, amount received for safe delivery is 3p/glass
So, for x glasses it will be 3x
Amount deducted will be 9p/glass for each broken glass
So, for y glasses it will be 9y
thus, net amount received will be 3x - 9y = 240 …….. (2)
Solving (1) and (2) we will get y = **5** and x = **95**.

19) Let the number be in the form of xy like 15
Then sum of it's digits will be x + y
Number will be 10*x + y
10x+y=3(x + y)
7x=2y
=>(x/y)=(2/7)
The number will be **27**

20) $\mathbf{3\frac{69258}{714}}$

21) Let 2p stamps be x
then, 1p …… 6x (6 times of 2p stamps).
Let, the number of 5p stamps be y.
A/Q,
2*x + 1*6x + 5*y = 75
=> 8x+5y = 75

X	1	2	3	4	**5**
Y	13.4	11.8	10.2	8.6	**7**
2p stamps = **5** 1p stamps = 6*5 = **30** 5p stamps = **7**					

22) A sold at 3 marbles/p
B…….2 marbles/p
If they are selling by mixing they should have contributed in the proportion.
A/B=3/2 So, A 36 and B 24 marbles.
Since, they Have contributed equal marbles difference of 6 marbles
B-A= (6/2)-(6/3) = **1p**.

23) They reached the home 10 minutes earlier. So, each 5 minutes for up and down was saved.
Thus the man had to walk for (6-5) hr. - 5 min. = **55 minutes**.

24) There are 25 stations.
At each station there are 24 tickets.
So, the total tickets will be 25 x 24 = **600**.

25) Let the amount received by mother be x.
Then daughter will get 2x and son will get 6x.
Assume that the number of son be m and daughter be n.
x+2nx+6mx=1920000
=> x(1+2n+6m)=1920000
Consider, (m,n) as (1,4) or (4,1) in both the cases x= 128000.
So, the aunt's share is **128000**.

26)
We can build concentric hexagon containing 1, 6, 12, 18, 24, 36, 42 circles. When R/r becomes sufficiently large then there will be place for extra circles.

$R/r \geq \frac{1+\sqrt{3/2}}{1-\sqrt{3/2}}$ i.e. $R/r \geq 13.9$.

$[(R + r)^2(\sqrt{3/2})^2 + (2r)^2] + r \leq R$

i.e. $0 \leq (\frac{R}{r})^2 - 14\frac{R}{r} - 15$

$=> \frac{R}{r} \geq 15$

Thus, the number of saucers that can be placed on the table is:
1 + 6 + 12 + 18 + 24 + 30 + 36 + 42 + (3*6) =**187**

27) Let the speed of the escalator be x stairs/seconds.
26 + 30x = 34 + 18x
x = 2/3

stairs = 26 + 30 * (2/3) = **46 stairs**

28) No, it cannot be done because both the squares we remove are of the same white color. So, we are left out with two black squares and **hence it cannot be done**.

29) Let the number of cats be x and each killed n mice.
So, nx=999919.
But, it is given that n>x.
The factors of 999919 are 991 and 1009.
So, **991 cats** killed **1009 mice**.

30) Distance to cover is given 96 feet.
Now, let us consider that C_f and C_h be the circumference of the fore wheel and hind wheel.
Number of revolutions will be $\frac{\text{Distance}}{\text{Circumference}}$
A/Q, $96/C_f - 96/C_h = 4$
=> $1/C_f - 1/C_h = 1/24$ .....(1)
Also, $96/(C_f+(3/2)) - 96/(C_h+(4/3)) = 2$
=>$1/(C_f + (3/2)) - 1/(C_h + (4/3)) = 1/48$.....(2)
Solving (1) and (2) we get,
C_f = **8** and C_r = **12**

31) The conversion scale from Celsius to Fahrenheit is

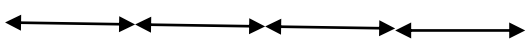
$$\frac{C}{5} = \frac{F-32}{9}$$

Let the temperature at which both the scale are equal will be x

$$\frac{x}{5} = \frac{x-32}{9}$$

=> $x = -40^0$

32)



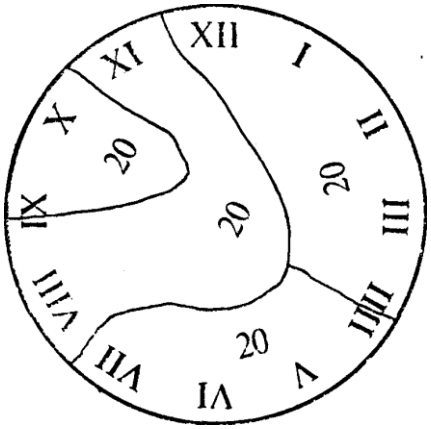
Total distance is 4x divided into 4 quarters each of length x miles.
Let the speed of the llama be s miles/minutes.
Time taken to cover the total distance = 4x/s.
Given, $s = \frac{3x}{6\frac{3}{4}}$

=>4x/s = **9 minutes**.

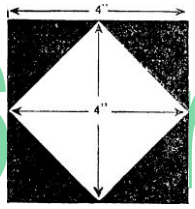
33) The clock is broken as:

The two parts which sums 20 is OK but the rest two parts sums up 21+17=38.

We need to work on this part and have to increase the value by 2. So, we will split up IX (nine) in such a way that it acts as I and X i.e. increasing the value by 2.



34) The half area is painted in this way:



35) Let the number of cows, sheeps and pigs be x, y and z respectively.

Then (x +y + z) mod 5 = 0 as all 5 droves has equal number of animals.

Also, (x +y + z) mod 8 = 0 as all 8 dealers brought equal numbers.

Now 8x5=40. Highest multiple is 120 which can be **3cows, 8 sheeps and 109 pigs.**

36) Frock 1:

SP= (8/7)*35=40

%=(40-35)/35 = 5/35 = 1/7 i.e. (1/7)*100=14.285%

Frock 2:

SP= (7/6)*30=35

%=(35-30)/30 = 5/30 = 1/6 i.e. (1/6)*100=16.67%

Thus, **Frock 2** is a better option.

37) The key to the solution is that with a little bit of pencil work, it will be found, while I can walk 5 miles, my friend who started from Tumkur can walk 7 miles. Let's assume the distance between Bangalore and Tumkur is 24 miles, then the point of meeting would be

14 miles from Bangalore, and therefore I walked $\mathbf{3\frac{3}{7}}$**miles** per hour while my friend walked $\mathbf{4\frac{4}{5}}$**miles** per hour and both of us will arrive at **7 p.m.**

38) Speed of the cyclists is 12m.p.h. So, 6 miles he covered in 30 minutes.
He was late by 25 minutes and hence met the train 6 miles before the crossing that means the train requires (30-25) minutes to cover the 6 miles.
Speed of the train will be **72m.p.h**.

39) The woman altogether made a profit of Rs.20/-.
She brought for 60 and sold at 70 so made a profit of Rs. 10/-.
Again, brought at 80 but sold at 90 so profit of Rs. 10/-.
So, total profit made will be **Rs. 20/-**.

40) Let us consider that the number is in the form of yx.
So, the value of the number will be 10y+x.
Also it is given that y=x+4
Sum of the digits = y + x.

$$\frac{10y+x}{y+x} = 7$$

$$\frac{10(x+4)+x}{(x+4)+x} = 7$$

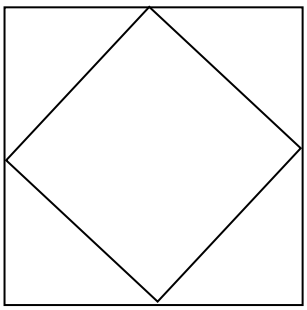
=> x=4. Hence the number is **84**

41)

192	384	576
219	438	657
273	546	819
327	654	981

42) Let us group them in the three groups A (3 parts), B (3 parts), C (3 parts), D (1 part).
Each part is the 1 flywheel of each machine. Let us weigh the group:
If A==B and B==C then D is the faulty.
If A==B and B! =C then let the faulty group be B so divide the 3 parts into 2parts and 1 parts and weigh them if the two parts weighs equal then faulty is the faulty is the single part otherwise among the two which one differs is the faulty.

43)



44)

Coffee1	Coffee 2	Coffee 3
weight=x	weight= (100-x)	weight=100
price = 32/kg	price = 40/kg	price = 43/kg

Total CP = 32x+40(100-x) = 32x + 4000 - 40x = 4000-8x

SP = 4300

profit % = 25 %

SP = CP + profit% of CP

4300 = 4000-x + 25 % * (4000-x)

=> x = 70 kg.

Thus, **70 kg**. Of coffee1 and **30 kg**. of coffee 2 will be mixed.

45) Let the total money in my purse be Rs. x

Poor's boy's fund = $(\frac{x}{2} + 1)$

Women orphanage = $\frac{1}{2}[x- (\frac{x}{2} + 1)] + 2 = (\frac{x}{4} + \frac{3}{2})$

Religious group = $\frac{1}{2}[x- (\frac{x}{2} + 1)- (\frac{x}{4} + \frac{3}{2})] + 3 = (\frac{x}{8} + \frac{7}{4})$

Original Money – Total Expenditure = Left out money

$x – [(\frac{x}{2} + 1) + (\frac{x}{4} + \frac{3}{2}) + (\frac{x}{8} + \frac{7}{4})] = 1$

$=> x – [(\frac{7x}{8} + \frac{17}{4})] = 1$

=> x = **42**

46) Let the three consecutive numbers be n, n+1, n+2

Product of the three numbers will be n(n+1)(n+2)

Product divided by one number in the $(\frac{n(n+1)(n+2)}{n})$, $(\frac{n(n+1)(n+2)}{n+1})$, $(\frac{n(n+1)(n+2)}{n+2})$

$(\frac{n(n+1)(n+2)}{n}) + (\frac{n(n+1)(n+2)}{n+1}) + (\frac{n(n+1)(n+2)}{n+2}) = 74$

=>(n + 6)(n – 4) = 0

=>n = 4,-6

n=4. So, the three numbers are **4, 5 and 6**.

47) Let the cost of sari be x and blouse be y.

Then, x + y=110……..(1)

Also given that x – y =100 …….(2)

Solving both the equations we get x = **105** and y = **5**.

48) I met the boy on 1st Jan. and the boy's birthday was 31st Dec. of the previous year. Today, he is **11 years** old.

49) Let the weight of the block be x lb.

A/Q, $\frac{x}{4} = \frac{3}{4} + \frac{3x}{4}$

=> x = **3lb**.

50) If suppose the investment is re. 1 then next after 3 years it will be 1.5 and next after 3 years it will be 2.25……

So, the sequence will be 1, 1.5, 2.25…

After 18 years that means 7th term of the GP series i.e. $1*(1.5)^6$

n^{th} term of the GP series will be given by $a*r^{(n-1)}$

where a->1st term of the series, r->common ratio.

So, for 2000 Rs. investment the return will be $2000*(1.5)^6$ = **Rs. 22781.25/-**.

51)

Let us consider the age of ship at present be X and that of boiler be Y years.

The ship X is twice as old as its boiler (Y-X) was when the ship was (x-X) as old as boiler is now.

X = 2(Y-X) and x – X = 2

=> 4Y = 3x

Also, x + Y = 30

=> Y = $\frac{\mathbf{90}}{\mathbf{7}}$ years and X= $\frac{\mathbf{120}}{\mathbf{7}}$ years.

52)

19 ounces 13 ounces 7 ounces

0	13	7
19	0	1
19	1	0
12	1	7
12	8	0
5	8	7
5	13	2
18	0	2
18	2	0
11	2	7
11	9	0
4	9	7
4	13	3
17	0	3
17	3	0
10	3	7
10	**10**	**0**

53) Only **I** was going to the market because rests all are returning from the market.

54) Let the fraction be $\frac{x}{y}$.

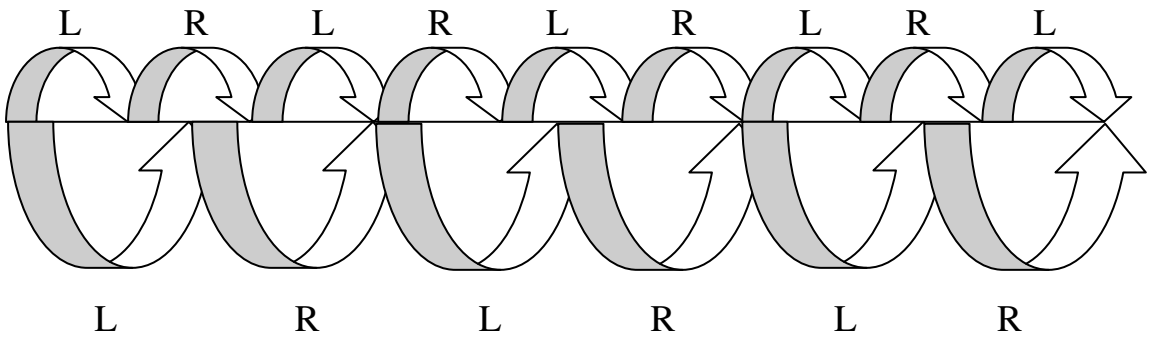
Given $y = x+6$

Also, $\frac{x}{y+8} = \frac{1}{3}$

Solving we will get $x = 7$

So, the fraction will be $\frac{\mathbf{7}}{\mathbf{13}}$

55)



They will **never** step out their right feet together.

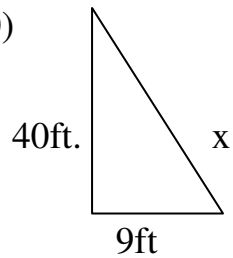
56) She has to take all total of **3 shocks** because if the first one is black and the next one is white then the third result whatever black or white will always result in a pair.
However, if there is a left right combination matching then she has to take **11 shocks** because let us consider the worst case
20 shocks means 10 left and 10 right…….
First she picks up 10 left white left shocks and then next 10 left black shocks next whatever she picks up will always result in a pair because at that instant she is left with 10 white right and 10 black right shocks.

57) Total property 100 acres.
Mala : 1/3
Reshmi : 1/4
Rekha : 1/5
But, Rekha died so, the property will be divided between Mala and Reshmi
$\frac{1}{3} : \frac{1}{4}$ = 4:3
So, Mala will get **4/7** and Reshmi will get **3/7** of 100 acres of land.

58) The man must have lost the game because for example initially he had 1Re.
Next after one loss he is left with 1-1/2=1/2
Again after next loss he is left with $\frac{1}{2} - \frac{1}{4} = \frac{1}{4}$
Again after one loss he is left with $\frac{1}{4} - \frac{1}{8} = \frac{1}{8}$
Repeating in this process he will always **loose**……

59) L->Persons with training in literature
M-> Persons with training in mathematics
LUM->Persons with training in literature or mathematics
L∩M-> Persons with training in literature and mathematics
LUM=L+M-L∩M
L∩M = (L+M)-LUM
= 70 + 82 – 90 = **62**.

60)



By, Pythagoras' Theorem:
$x = \sqrt{(40)2 + (9)2}$
$= \sqrt{1681}$
= **41ft**.

61) This is a confusing problem and we have to go from backward i.e.
2 -> 2*10 = 20 -> 20 + 8 = **28**.

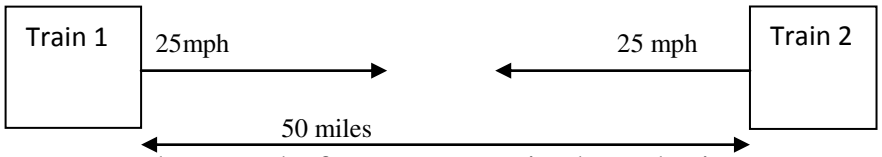
62) Let the number of pigs be x and that of ducks be y.
Both have 2 eyes. So, total eyes of pigs and ducks will be 2x+2y.
Pigs have 4 legs and ducks 2. So, total legs of pigs and ducks will be 4x+2y.
A/Q, $2x + 2y = 60$……. (1)
$4x + 2y = 86$……. (2)
Solving (1) and (2) we get **x = 13** and **y = 17**.

63) The number of eggs n will be such that $50 \leq n \leq 100$
The number of eggs should be divided by both 2 and 3
54,60,66,72,78,84,90,96
Among these n should be such that when divided by 5 gives remainder 3 hence, n will be 78.
Each egg costs 50p.
So, the gentleman has to pay 78*50p = **Rs. 39**.

64) Since, we want to divide the ratio equally. So, I need to pay her for 5 sheeps and I paid her Rs. 150/-. So, cost of each sheep will be **Rs. 30/-**.

65) The two hands of the clock coincide at every $65\frac{5}{11}$ hr. Thus, it gains $\frac{5}{11}$ of a minute in 65 minutes or $\mathbf{\frac{60}{143}}$ of a minute per hour.

66)



(One can use the pseudo force concept in the velocity vector to make one train static and the other one moving at 50 mph).
The trains are separated by 50 miles.
The speed of the two trains is 25 mph.
So, the trains will meet after 1 hr.
Since the speed of the bird is 100 mph, so, the bird must have travelled a distance of **100 miles**.

67)

Year	Person1	Person2
1	2000	1000+1100=2100
2	2000+300=2300	1200+1300=2500
3	2300+300=2600	1400+1500=2900
4	2600+300=2900	1600+1700=3300
Person2 **who wants the increment of Rs.100 per half yearly is in advantage.**		

68) Let Mammu and Nawal have respectively x and y marbles.

A/Q,

$x + 1 = y - 1$……..(1)

$y + 1 = 2(x - 1)$……..(2)

Solving (1) and (2) we have **x=5** and **y=7**.

69) Let the age of Mrs. Sareen be x

and that of Sudha , Seema, Reema, Sonny, Kishu be a, b, c, d, e years.

A/Q,

$(a-15) + (b-15) + (c-15) = \frac{1}{2}(x-15)$

$\Rightarrow 2a + 2b + 2c = x + 75$……(1)

$(a-10) + (b-10) + (c-10) + (d-10) = (x-10)$

$\Rightarrow a + b + c + d = x + 30$……(2)

Let kishu was born t years before. Then, age of kishu i.e. e = t

$(a-t) = (c-t) + (d-t)$

$\Rightarrow a + e - c - d = 0$……(3)

$a + b + c + d + e = 2x$……(4)

$x = a + b$……(5)

$a = d + e$……(6)

Solving all these equations we have, **x = 39, a = 21, b = 18, c = 18, d = 12, e = 9**.

70) Since 437 contain the percentage of all apartments including the number of 4's and the total of these percentages is 244, the number of 4's must be represented by 100% as the base. In order to find the base of 100% representing the number of 4's. We have to divide 437 by 244%, which gives us 179.0984. Thus we can work out a table showing the number of each type apartment, which should look as follows:

Type of Apartment	*Number of Apartments*	*Rounded out to the nearest figures*
2	8.9549	9

$2\frac{1}{2}$	12.5369	13
3	26.8647	27
$3\frac{1}{2}$	35.8197	36
4	179.0984	179
$4\frac{1}{2}$	87.7582	88
5	59.1024	59
$5\frac{1}{2}$	21.4918	21
6	5 3729	5
Total	436.9799	437

71) The numbers that can be reversed but still read are 0, 1, 6, 8, and 9.
So, the number was **10968** changed to 89601.

72) SP = CP + (Profit/Loss) % of CP
Let the cost price be x and y for the first and second good respectively.
For the first one 20% profit.

$600 = x + \frac{1}{5}x$
x = 500.
For the second one 20% loss.
$600 = y - \frac{1}{5}y$
y = 750
Total cost price of both the goods are 500 + 750 = 1250.
Total Selling price of both the goods are 600 + 600 = 1200.
So, he made a loss of **Rs. 50/-**.

73) Let the weight of the brick be x.
$x = \frac{3x}{5} + \frac{3}{4}$
x = 3 lb.
For 16 bricks weight will be 48 lb.
For 11 bricks weight will be 33 lb.
So, her weight will be $\sqrt{(48 * 33)}$ = **39.79 lb**

74) To solve this puzzle we will consider the worst case as for the first three draw let us assume that we have got marbles of different colours, then in the next pick surely there will be a match and hence a pair. So, one must draw **4 marbles**.

75) Let the number be x

$2x - \frac{1}{2}x = 45$

=> x = **30**

76) 1 sawing makes it into 2 pieces, 2 into 3……..

Thus, (n-1) sawing divides into n pieces.

So, 11 sawing are required for 12 pieces.

Since, 1 sawing requires 1 minute therefore, 11 sawing requires **11 minutes**.

77) The train schedule must have been in the following manner:

Churchgate train into the station at 1.00 P.M. and Bandra train at 1.01 P.M.

Churchgate train into the station at 1.10 P.M. and Bandra train at 1.11 P.M.

Churchgate train into the station at 1.20 P.M. and Bandra train at 1.21 P.M. and so forth.

This way each train would be arriving every ten minutes but his chances of getting the Churchgate train would be 9 times as great as of getting on the Bandra train, because if he arrives in the station between 1.20 P.M. and 1.21 P.M. he goes on the Bandra train but if he arrives between 1.21 P.M. and 1.30 P.M. he goes to Churchgate.

78) Let the two parts be x and 34-x.

A/Q, $\frac{4}{7}x = \frac{2}{5}(34-x)$

=> x = 14.

So, the two parts are **14** and **20**.

79) Let the amount spent by writer be a, doctor be b, dentists be c and that of bank employees be d.

25a + 20b + 18c + 12d = 1330……(1)

5a = 4b……..(2)

12b = 9c……....(3)

6c = 8d……..(4)

Solving the equations we get a=14, b=17.5, c=$\frac{70}{3}$, d=17.5

Each group expenses:

Writer = 25*14 = **Rs. 350/-**

Doctor = 20*17.5 = **Rs. 350/-**
Dentists = 18* (70/3)= **Rs. 420/-**
Bank Employees = 12*17.5 = **Rs. 210/-**

80) Let the person has money x.y i.e. Rs. x and y paise.
Net amount is 100x+y paise.
On spending the half person has (100x+y)/2 = 50x+0.5y.
(50x+0.5y)/100 =0.5x+0.005y.
Before entering the person has equal rupees and paise x=y.
The amount should be like **99.98**

81) Let us consider the following sequence of weighing (6 required):

Weight	Inference
1	Three groups each of weight 40 Kg. Weigh the first two if equal then the third one is faulty else the difference in weight is the faulty one.
2	Next divide the 40 into group of 20 each and weigh them to isolate the faulty one.
3	Next divide the 20 into group of 10 each and weigh them to isolate the faulty one.
4	Next divide the 10 into group of 5 each and weigh them to isolate the faulty one.
5	Make group of 2, 2 &1and weight the both 2.
6	If equal then single is the faulty otherwise separate the group(of 2) and weigh them.

82) The container is full in 10 days so it will be half in the **9th day**.

83) Let the total number of sheeps be x.
Let the two parts be a and b.
A/Q, a + b = x……(1)
Also, $a - b = a^2 - b^2$
=> $a - b = (a + b)(a - b)$
=> $(a + b) = 1$
=> $x = 1$
Thus, Gopal Shepherd had **1** sheep.

84) Let the number be x.

A/Q, $x - [\frac{x}{3} + \frac{x}{10} + \frac{x}{12}] = 58$

=> x = **120**

85) Let the name be replaced with the first alphabet.

Before player's amount = $2^n - 1$ where n is the next player's amount.

G started with 8 quarter of a rupee.

F……15…….

E……29…….

D……57…….

C……113…….

B……225…….

A……449…….

86) Let Ram Rakhan worked for x days and idled for y days.

Salary per day= $\frac{240}{3}$ = Rs. 8/-

Salary forfeited = Rs. 10/- per idled day.

Since he did not get any salary so,

8 x = 10 y……(1)

x + y = 30……(2) since, total number of days in the month worked and idled is 30

Solving, we get

x = $\frac{50}{3}$, y = $\frac{40}{3}$.

87) Consider that there are 5 match sticks so, the opponent will always loose.

Because Opponent can take 1≤ Opponent≤ 4.

So, whatever the opponent take I can take the left out and win.

Similarly, the opponent person will loose when there are 10 to 15 sticks.

So, the best way is to start the game and take to match sticks and make it 15. Then one can easily win the game.

88) Let the present age of father be x and that of son be y years.

A/Q, x = 4y……..(1)

$\frac{1}{2}$ (x + 30) = (y + 30)……..(2)

x = **60 years** and y = **15 years**.

89) Let us consider that x guavas were given initially.(Rs 1.20 has been taken as 120 p)

Cost per dozen

Without bargain = $\frac{120}{x} * 12$

Now, when he bargained = $\frac{120}{x+2} * 12$

Difference is 10 p

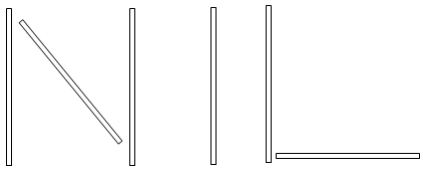
$\frac{120}{x} * 12 - \frac{120}{x+2} * 12 = 10$

$=>x^2 + 2x - 288 = 0$

$=>(x-16)(x+18) = 0$

=>x=**16**

90)



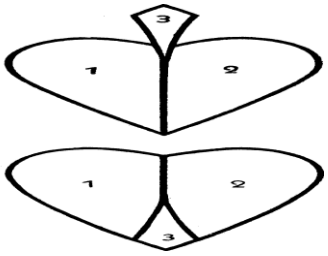
91) **One coins each of 50p, 20p and four 10p coins**.

92) The year is **1948** as 24 has highest number of factors 1,2,3,4,6,8,12,16,24.(factors less than 32) 7 occasions.
24/1/24, 2/12/24, 12/2/24, 3/8/24, 8/3/24, 4/6/24, 6/4/24

93) The bucket which is full of half sovereign gold pieces is more worth than the one which is half filled with 1 sovereign gold pieces because what more important is that the gold and not the denomination.

94) The products of twice of the distances are 144 whose square root is 12.
The sum of the distances is 17.
12+17=29 or 17-12=5
Diameter = **58**

95)



96) Let the two numbers be x and y.

A/Q, $x - y = 3$……(1)

$x^2 - y^2 = 51$……...(2)

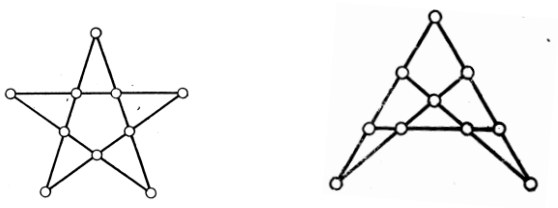
$(x + y)(x - y) = 51$

=> $(x + y)*3 = 51$

=>$x + y = 17$……(3)

Solving (1) and (3) we get x = **10** and y = **7**

97)



98) By, Pythagoras' Th.

Height climbed = square root of 3^2 and 4^2 i.e. 5 ft.

So, in ascending 16 ft. it will climb **20 ft**.

99)

$x + y = 63$……(1)

Let both of them meets at time t

So, Distance = Speed * Time.

Putting in (1)

$4t + 3t = 63$

$t = 9$

x = **36 miles** and y = **27 miles**.

100) Total bottles of beer ordered = 8

Each drink equally, so each ones' share = $\frac{8}{3} = 2\frac{2}{3}$

First man ordered 5 bottles, so he contributed =His ordered – His Drink = $5 - 2\frac{2}{3} = \frac{7}{3}$

Second man contribution = His ordered – His Drink = $3 - 2\frac{2}{3} = \frac{1}{3}$

Ratio of both of their contribution = 7 : 1

So, the money will also be divided in the order of **Rs.7/-** and **Re.1/-**.

101) Let the woman's age be in the form of xy and the husband is yx.

Age of woman = 10x + y

Age of husband = 10y + x

Given,

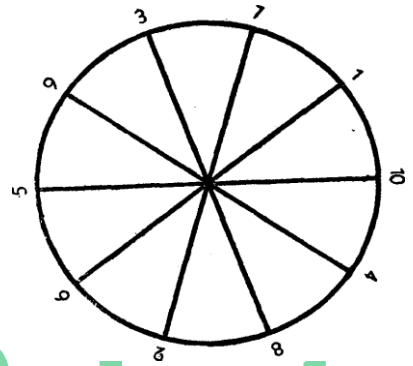
$$(10y + x) - (10x + y) = \frac{1}{11}(10y + x + 10x + y)$$

=> 8y = 10x

=> x = 4 and y = 5 (x and y should be between 1 to 9)

Woman's age = **45** and Man's age = **54**.

102)



103) Let the speed of the passenger train be x and that of goods train be y.

Let the distance be d

When they are travelling in opposite direction speed = (x + y)

When they are travelling in same direction speed = (x - y)

A/Q,

$$3\frac{d}{(x+y)} = \frac{d}{(x-y)}$$

=> x:y = 2:1

Thus, speed of the passenger train is **twice** that of the good's train.

104) Let the number of aged person be x, young be y and that of children be z.

3x + 2y + 0.5z = 100

x = **5**, y = **25** and z = **70**.

105) To, get the result 31 using five three

$$\mathbf{3^3 + 3 + \frac{3}{3}}$$

106) Let the total number of bees be x.

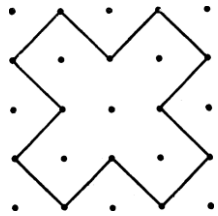
A/Q,

$\sqrt{\frac{x}{2} + \frac{8x}{9}} + 1 + 1 = x$

Solving, we get x = **72**.

107) The candles must have burnt for three hours and three quarters as one candle had **one-sixteenth** of its total length left and the other **four-sixteenths**.

108)



109) First person = 9 mules = 27/2 cows = 27/2

Second Person = 12 cows* 2 = 24.

Both of them have to pay = Total – Third person's amount

= 1000-500 = 500

Ratio = 27/2: 24 = 27: 48 = 9: 16

So, First person = 180

Second person = 320

Total number of goats = **25**.

110) The crew can row 1/5 of the distance per minute on still water and the stream does half that distance per minute.

The difference and sum of these two fractions are 7/60 and 17/60. Hence, against the stream would take 60/17 minutes and with stream 60/17 minutes. The correct answer is $\mathbf{3\frac{9}{17}}$ **minutes**.

111) Let the height be x.

$\frac{5}{2} = \frac{x}{120}$ => x = **300 ft**.

112) Bottle 1: 10 ounce spirit.

Bottle 2: 10 ounce water.

.25 ounce poured from bottle 1 to bottle 2

Bottle 2: Water = 10 ounces and wine = .25 ounces.

So, ratio of wine : water = .25:10 = 1:40

From this mixture again .25 is poured back to bottle 1

After transfer mixture will b e again nearly **40:1** for spirit : water.

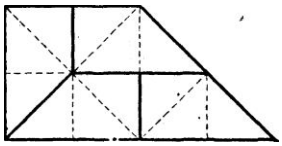
113) For the train to pass the entire tunnel it has to cover both its length along with the length of the tunnel.
Distance = 2 miles, speed= 1 miles/min.
time=**2 minutes**.

114) 1 horse and 1 cow 1 day pasture = 1/40.
1 horse and 1 sheep 1 day pasture = 1/60.
1 cow and 1 sheep 1 day pasture = 1/90.
Equivalent 1 day pasture = $\frac{1}{40} + \frac{1}{60} + \frac{1}{90} = \frac{19}{360}$ (2 horses, 2 sheeps, 2 cows).
$\frac{19}{360} / 2 = \frac{19}{720}$.
The whole pastures will take $\frac{\mathbf{720}}{\mathbf{19}}$ **days**.

115) Let the two ages be x and y years.
A/Q, x – y = 30…….. (1)
xy = 1624…….. (2)
Putting (2) in (1) we get
$x - \frac{1624}{x} = 30$
$x^2 - 30x - 1624 = 0$
So, x=**58** and y =**28**.

116) When a car has travelled 20000 miles, each tire has sustained this distance. Thus, the total distance travelled = 80000miles using 5 liters of fuel.
1 liter of fuel sustains **16000 miles.**

117)



118) **4+4+4+4+4+4+44+44+444+444**

119) Let the two numbers be x and y
$x^2 - y^2 = z^3$
$x^3 - y^3 = t^2$

x = **10** and y = **6**

120) Total amount with me is 20 paise (two 10 paise coins).

Let you have x paise

A/Q, $\frac{4}{5} * 20 = \frac{8}{9} x$

=> x = **18 paise**

121) 1,2,3,4 are male and A, B, C,D are female

1 A	**2 B**	}
1 A	**3 C**	
1 A	**4 D**	}
2 B	**3 C**	
2 B	**4 D**	}
3 C	**4 D**	

122) 1024,640, 400, 250...

The prices are reducing and becoming 0.625 of the previous amount.

The next price will be 0.625* 250 = **156.25**

123) Let the cost of pineapple be x and that of jackfruit be y.

6x + 2y = 15……..(1)

Let the four more pineapple be a.

ax = 14……..(2)

(a – 4)y = 9……....(3)

=> a = 14/x

Thus, $(\frac{14}{x} - 4)y = 9$

$\frac{14y}{x} - 4y = 9$

$\frac{14(7.5-3x)}{x} - 4(7.5 - 3x) = 9$ [y = (15 - 6x) / 2]

$\frac{105-42x}{x} - 30 + 12x = 9$

$105 – 42x – 30x + 12x^2 = 9x$

$12x^2 – 81x + 105 = 0$

$4x^2 – 27x + 35 = 0$

$4x^2 – 20x – 7x + 35 = 0$

(4x - 7)(x - 5) = 0

x = 7/4, 5
=> x = 1.75, 5
=>y = 2.25, -7.5
So, pineapple = Rs. **1.75** and jackfruit = Rs. **2.25** (Negative values not to be taken)

124) The cheapest method of joining is to cut 4 links of 1 section and to join them back which costs **Rs. 8/-**.

125) Let the sides be a, b, c.
A/Q, $a^2 - b^2 = 5*12^2$…… (1) (Sq. feet to be converted to sq. inches)
$b^2 - c^2 = 5*12^2$……(2)
$a^2 - c^2 = 10$ (Adding 1 & 2).
The sides are **31, 41** and **49**.

126) Let the total age be x years.
$x - (\frac{x}{4} + \frac{x}{5} + \frac{x}{3}) = 13$
60x - (15x + 12x + 20x) = 13 * 60
x = **60 years**.

127) Let the present age of Reena and Seena be r and s respectively.
r + s = 44……(1)
r : s = 5 : 3……..(2)
Reena is **27years and 6 months** of age.

128) All **26 boxes** are having at least one surface painted except the center box which won't have any surface painted.

129) **7** because after 6 cigarette have been smoked then again from the 6 butt 1 further can be made.

130) The number when divided by 2, 3, 4, 5, and 6 leaves remainder 1.
LCM of 2, 3, 4, 5and 6 is 60
Now, this (60x+1) (divisible by 11)
for, x = 2, the number is **121**.

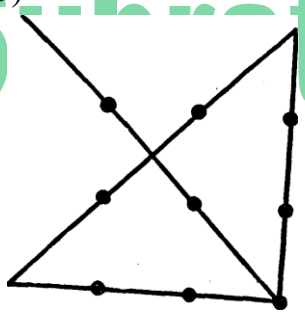
131) The first and the second labourers each take a crate with the former carrying his load one mile and turning it over to the third, who will carry it two miles. Then, second labourer should carry his crate two miles and turn it over to the first, who will then carry

it one mile. Thus each carries a crate **2 miles**.

132)

10 Quart	10 Quart	5 Quart	4 Quart
10	10	0	0
5	10	5	0
5	10	1	4
9	10	1	0
9	6	1	4
9	7	0	4
9	7	4	0
9	3	4	4
9	3	5	3
9	8	0	3
4	8	5	3
4	10	**3**	**3**

133)



134) Let the total number of bees be x.

A/Q,

$x - (\frac{x}{5} + \frac{x}{3} + 3\,(\frac{x}{3} - \frac{x}{5})) = 1$

$x - \frac{x}{5} - \frac{x}{3} - x + \frac{3x}{5} = 1$

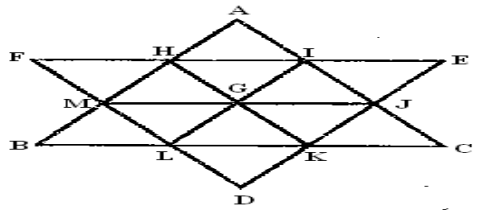
$\frac{x}{15} = 1$

$x = 15$

Thus, there are **15 bees**.

135) We need to eliminate 29 persons out of 30 so, **29 matches** are needed.

136)

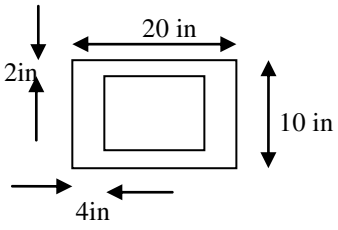


The triangles are
ABC, DEF, BHK, LIC, FLI, HKE, AMJ, DMJ, and remaining 12 small triangles, so, total number of triangles is **20**.

137) The distance covered are 7, 11, 15,……., 51.
AP series $t_n = a + (n - 1) d$
where,
t_n = Last term of the series.
a = First term.
d = common difference.
n = number of terms.
$51 = 7 + (n - 1) * 4$
$\Rightarrow n = 12$
Number of days = **12**.
Total distance travelled = $S_n = 7 + 11 + 15 + \ldots\ldots\ldots + 51$
$S_n = \frac{n}{2}(a + l)$ where l-> last term of the series.
$= \frac{12}{2}(7 + 51) = 6 * 58 =$ **348 miles**.

138) The Christian and the Turk sets out for world tour. Christian due east and the Turk due west. So, when they meet again the Christian gains a day and the Turk looses a day. So, when they meet at the Jews house all three will agree and celebrate their Sabbath on the same day.

139)
Picture 12x6.
Length of the canvas = 12 + (4 + 4) = **20 inches**.
Breadth of the canvas = 6 + (2 + 2) = **10 inches**.

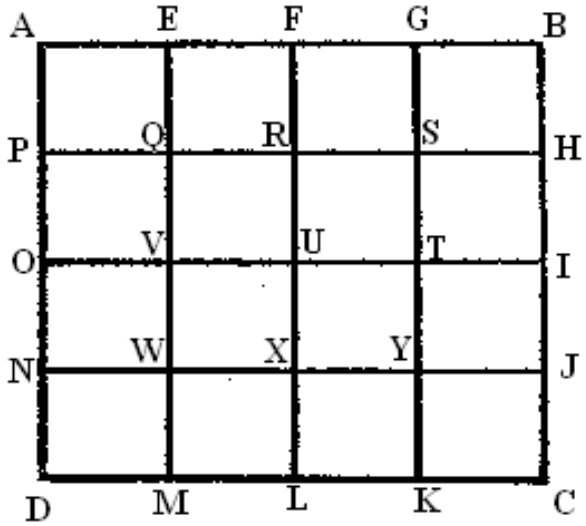


140) The largest number containing all 10 digits from 0 to 9 will be 9876543210.
Now, the number should leave the remainder 0 when divided by 11.

This leaves the remainder 6 so, the number is 9876543204.
Now, rotate the last 4 numbers to obtain the following numbers and check their divisibility by 11.
987654321, 987654312, 987651234…
The number will be **987652413**.

141) Half the sum of the sides is 29 and from this we deduct the sides in turn, which gives us 9, 13, 17, 19, which when multiplied together make 37791. The square root of this number is 194.4. Thus, **194.4 square rods** will be the answer.

142)



The squares are respectively : ABCD, UICL, ULDO, AOUF, BIUF, RHJX, RXNP, EGVT, QMSK, QWSY, PSKD, QMCH, ANYG, BJWE and remaining 16 small squares.
Thus, total number of squares = **30**.

143) Let the number of mules, sheeps, goats and pigs be m, s, g, and p respectively.
Total cost will be 50m + 40s + 25g + 10p
Avg. price of the animal = 30
=>(50m + 40s + 25g + 10p)/(m + s + g + p) = 30
=>50m + 40s + 25g + 10p = 30m + 30s + 30g + 30p
=>20m + 10s = 5g + 20p
=>4m + 2s = g + 4p
Also, m, s, g, p >0 and are integers.
m=**1**, s=**1**, g=**2**, p=**1**. This is the minimum number animals brought.
m=**1**, s=**3**, g=**2**, p=**2**.
Other answers are also possible.

144) Let the number of mangoes the boys steal be x.

Given, x < 100.

A/Q, (x%3) = 1…….(1) [% -> modulus operator]

The first thief ate up 1, so, left out mangoes = (x-1).

He took one third, thus remaining = (x-1)- $\frac{(x-1)}{3} = \frac{3x-3-x+1}{3} = \frac{2x-2}{3} = \frac{2(x-1)}{3}$

$\frac{2(x-1)}{3}$ % 3 = 1

The second thief again ate up 1

So, left out mangoes = $\frac{2(x-1)}{3} - 1 = \frac{2x-5}{3}$

He took one third, so, left mangoes = $\frac{2x-5}{3} - \frac{2x-5}{9} = \frac{6x-15-2x+5}{9} = \frac{4x-10}{9}$

The third thief again ate up 1

So, left out mangoes = $\frac{4x-10}{9} - 1 = \frac{4x-19}{9}$

He took one third, so, left mangoes = $\frac{4x-19}{9} - \frac{4x-19}{27} = \frac{12x-57-4x+19}{27} = \frac{8x-38}{27}$

Now, $\frac{8x-38}{27}$ % 3 = 1

To satisfy the above condition x = **79**.

145) The numbers of the houses on each side will add up alike if the number of the house be 1 and there are no other houses, and if the number be 6 with 8 houses in all, if 35 with 49 houses, if 204 with 288 houses, if 1189 with 1681 houses and so on. But we know that there were more than 50 and lesser than 500 houses, and so we are limited to a single case. The number of the house must be **204**.

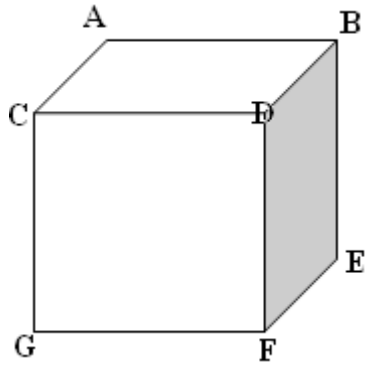
146) Let the total number of coins be x.

A/Q, 0.25x + 0.5x + x =700

x = 700/1.75 = 400

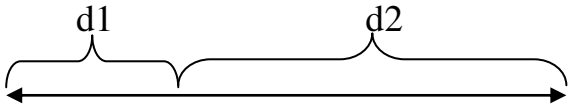
Total number of coins of each denomination will be **400**.

147) No, the number of cuts cannot be reduced. **6** cuts are needed to get 27 cubes from a bigger cube. Two cuts are needed each on face ABDC, BDFE, CDFG.



148) Let the speed of the two trains be x and y

They meet at distance d1 from the first train at time t.



$x = \frac{d1}{t}$……...(1)

$y = \frac{d2}{t}$……..(2)

d1 = xt…….(3) (from 1)

d2 = yt…….(4) (from 2)

Also, $x = \frac{d2}{1}$…….(5)

$y = \frac{d1}{4}$ ……..(6)

Dividing 5 by 6

$\frac{x}{y} = \frac{4d2}{d1}$

$\frac{x}{y} = \frac{4yt}{xt}$ (from 3 & 4)

$x^2 = 4y^2$

x = 2y

Thus one is **twice** faster than the other.

149) Let the four numbers be a, b, c, d.

(a + b), (a + c), (a + d), (b + c), (b + d), (c + d), (a + b + c + d) all are perfect squares.

The numbers are a = **10430**, b = **3970**, c= **2114**, d = **386**.

Other answers may be there.

150) Let x be the time elapsed and y be the time left.

A/Q, $\frac{2x}{3} = \frac{4y}{5}$

=> $x = \frac{6y}{5}$

Also, x + y = 99
=> y = 45
Thus, **45 years** are still remaining.

********** THE END **********

Some Common Formulae Used

Speed = Distance/Time
Selling Price = Cost Price + Profit
Selling Price = Cost Price + Profit % Cost Price
Selling Price = Cost Price – Loss
Selling Price = Cost Price – Loss % Cost Price
Number of Revolutions $= \frac{\text{Distance}}{\text{Circumference}}$

$$\frac{\text{Celsius}}{5} = \frac{\text{Fahrenheit}-32}{9}$$

AUB = A + B - A∩B
Pythagoras' Theorem,
$h^2 = p^2 + b^2$
$\pi^c = 180°$
Area,
Rectangle = Length x Breadth
Square = Side^2
Circle = $\pi * (\text{radius})^2$
Volume,
Cuboid = Length x Breadth x Height
Cube = Side^3
Sphere = $(\frac{4}{3})\ \pi * (\text{radius})^3$

Series:
Arithmetic Progression,
AP = a, (a + d), (a + 2d),……..
t_n = a + (n - 1)d
$S_n = \frac{n}{2}(2a + (n-1)d)$

Geometric Progression,
GP = a, ar, ar^2,……..
$t_n = ar^{(n-1)}$
$S_n = a(r^n - 1)/(r-1)$

NOTES

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