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THE ASSOCIATION OF MATHEMATICS TEACHERS OF INDIA
GAUSS CONTEST - FINAL - PRIMARY
Classes V & VI
Saturday, 28th October_2017.

Instructions:

1. Answer as many questions as possible.
2. Elegant and novel solutions will get extra credits.
3. Diagrams and explanations should be given wherever necessary.
4. Fill in FACE SLIP and your rough working should be in the answer book.
5. Maximum time allowed is THREE hours.
6. All questions carry equal marks.

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1. If $\frac{1}{5\frac{1}{3}}+\frac{1}{3\frac{3}{7}}+\frac{1}{4\frac{4}{7}}+\frac{1}{?}=\frac{77}{96}$

Find what should be filled in the place marked?

Sol. $\frac{1}{\frac{16}{3}}+\frac{1}{\frac{24}{7}}+\frac{1}{\frac{32}{7}}+\frac{1}{x}=\frac{77}{96}$

$\frac{3}{16}+\frac{7}{24}+\frac{7}{32}+\frac{1}{x}=\frac{77}{96}$

$\frac{18+28+21}{96}+\frac{1}{x}=\frac{77}{96}$

$\frac{67}{96}+\frac{1}{x}=\frac{77}{96}$

$\frac{1}{x}=\frac{77}{96}-\frac{67}{96}$

$\frac{1}{x}=\frac{10}{96}$

$x=\frac{96}{10}=9\frac{6}{10}$

2. There are 10 cards numbered 1 to 10. There are three second standard children Ram, Bilal and Cynthia. The teacher selects 3 cards from the 10 cards without seeing the numbers. She distributes the cards to the children one to each. After the children noting down the numbers in the cards she collects them back. Again she repeats the same process two more times. So, each child now has 3 numbers noted down. The teacher asks them to add the numbers and tell her the sums obtained by them. They told her that the sums were 10, 14,15 But Ram received the same cards three times. Bilal and Cynthia received all cards different. What numbered cards are received by each? Write down the steps you used to get the answer.

Sol. As ram received all 3 cards same.

Let the card be x.

$\therefore$ $3x = 15$

$x = 5$

So ram will received 5 three time.

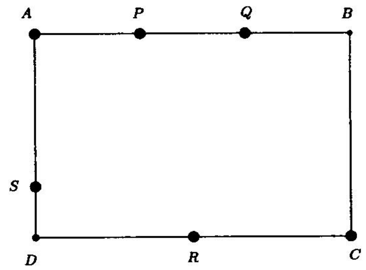
So cynthia & billal received all card different.

So sum of six diff no from 1 to 10 except 5 = 10 + 14 = 24

If we take first six natural no then its sum = $\frac{6\times 7}{2}=21$

So , here if we remove 5 and add
8 so the sum became 24
i.e., 21 – 5 + 8 = 24
So, the remaining numbers = 1,2,3,4,6,8
So, group is (8,2,4)
(1,3,6)
(5,5,5)

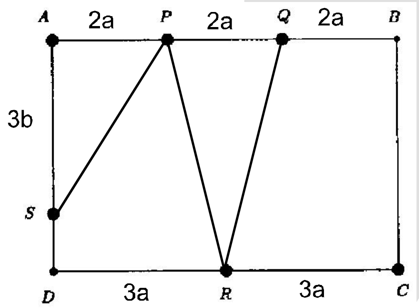
3. In the adjoining figure *ABCD* is a rectangle. Points *P, Q, R, S* are marked as in the diagram such that *AP = PQ = QB . R* is the midpoint of *CD .* If *AS : SD = 3 :* 1, find the ratio of the areas of triangle *ASP* , quadrilateral *SPRD ,* triangle *PQR* and the trapezium QBCR.



Sol. ar (ASP) : ar (SPRD) : ar (PQR) : ar (QBCR)

$$\frac{1}{2}\times 2a\times 3b : \frac{1}{2}(2a+3a)4b-\frac{1}{2}2a\times 3b : \frac{1}{2}2a\times 4b : \frac{1}{2}(2a+3a)4b$$

3ab : 10 ab – 3ab : 4ab : 10 ab
3 : 7 : 4 : 10



4. Take the numbers 1,2,3,4,5,6,7 and 8. We have to make two groups, *A, B* each containing four numbers such that

(a) The sum of the numbers in group A is equal to the sum of the numbers in group B
(b) Group A has a number such that when it is moved from group A to group B, the sum of the five numbers in group B is equal to twice the sum of the 3 numbers in group A.
(c) Group B has a number such that when it moved to group A, the sum of the three numbers in Group B is $\frac{5}{7}$ of the sum of the 5 numbers in Group A.

Find the number in the groups A and B.

Sol. Sum of 1,2,3,4,5,6,7,8 = $\frac{8\times 9}{2}=36$

ATQ Sum of no in group A = Sum of no in group B

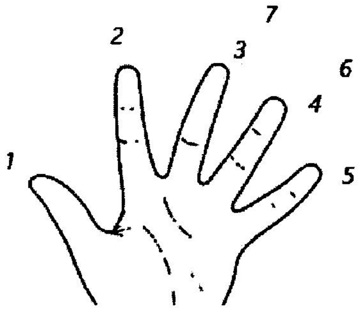
$$=\frac{36}{2}=18$$

No according to condition (b) Let x is moved from A to B, then
2(18 – x) = 18 + x = x = 6
$\therefore$ Group A contains x = 6
Now according to condition (C) Let y is moved from B to A, then

$$18-y=\frac{5}{7}(18+y)\ ,y=3$$

$\therefore$ Group B contains y = 3
So sum of remaining 3 no in group A
8 Group B in (18 – 6) = 12, 18 – 3 = 15 respectively.
$\therefore$ Group A = 6,7,4,1,
Group B = 3,8,2,5

5. Mahadevan was puzzled by the strange way in which his grand daughter was counting. She began to count on the fingers of her left hand. She started by calling the thumb 1, the first finger 2, middle finger 3, ring finger 4, little finger 5, then she reversed direction, calling the ring finger 6, middle finger 7, first finger 8, thumb 9, then back to the first finger for 10, middle finger for 11, and so on. She continued to count back and forth in this peculiar manner until she reached a count of 20 on her ring finger.

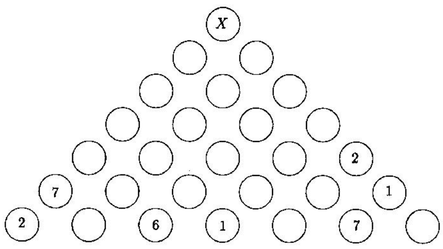


Seeing this, Mahadevan told her "If you can find on which finger you will count 2017, I will buy you an ice cream". Can you find on which finger she will count 2017? Explain the steps you used to arrive at the answer.

Sol. So have we observe that on thumb the number are 1,9,17 …..
On thumb we get 8m + 1
As 2017 = 8 × 252 + 1
So on thumb she will get 2017

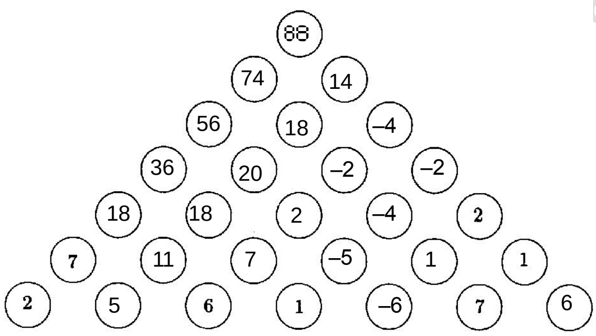
Thumb	**F.F.**	**M.F.**	**R.F.**	**L.F.**
1	2	3	4	5
9	8	7	6	
	10	11	12	13
17	16	15	14	
	18	19	20	21

6. In the adjoining figure the number in each circle is the sum of the numbers in the two adjacent circles below it.



(a) Find X, writing the steps systematically.
(b) What is the least positive number to be added to X so that the result is a perfect square?
(c) What is the least positive number to be subtracted from X so that the result is a perfect square?

Sol. (a) x = 88
(b) 88 + 12 = 100 = 10^2 12   **Ans**
(c) 88 – 7 = 81 = 9^2 7   **Ans.**



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