

SOLUTION
THE ASSOCIATION OF MATHEMATICS TEACHERS OF INDIA
GAUSS CONTEST - FINAL - PRIMARY
CLASS - V & VI

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.

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 '?'

Ans. $9\frac{3}{5}$

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

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

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

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

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

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

$$\Rightarrow x = \frac{10}{96} = 9\frac{6}{10} = 9\frac{3}{5}$$

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.

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Ans. Ram (5, 5, 5), Bilal (6, 3, 1), Cynthia (8, 4, 2)

Sol. Ram Bilal Cynthia

x p a

y q b

z r c

Sum received by Ram, Bilal and Cynthia are 10, 14, 15

Ram received same number three times

So, Sum should be a multiple of 3.

$$x = y = z \Rightarrow 3 \times 5 = 15$$

Ram received '5' all the time

Let, Bilal's sum = 10

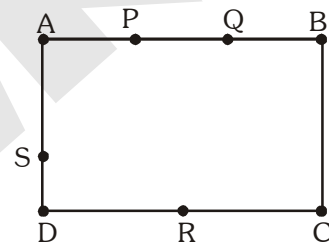
Cynthia's sum = 14

Taking all the possibilities from given numbers

Possible numbers for Bilal are 6, 3, 1

Possible numbers for Cynthia are 8, 4, 2.

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.



Ans. 3 : 7 : 4 : 10

Sol. $AP = PQ = QB = x$

$$DR = RC = \frac{3x}{2}$$

$$AS = 3y, SD = y$$

$$\text{ar. } (\triangle ASP) = \frac{1}{2} \times x \times 3y = \frac{3xy}{2}$$

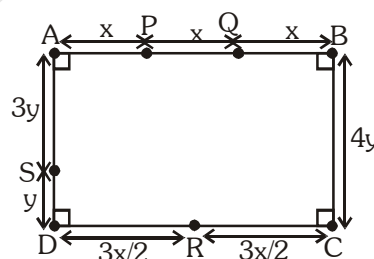
$$\text{ar. } [\square SPRD] = \text{ar. (trapezium APRD)} - \text{ar. } (\triangle ASP)$$

$$= \frac{1}{2} \left(x + \frac{3x}{2} \right) 4y - \frac{1}{2} \times x \times 3y = \frac{7xy}{2}$$

$$\text{ar. } (\triangle PQR) = \frac{1}{2} \times 4y \times x = \frac{4xy}{2}$$

$$\text{ar. (trapezium QBCR)} = \frac{1}{2} \times \left(x + \frac{3x}{2} \right) \times 4y \Rightarrow \frac{10xy}{2}$$

$$\text{Ratio} \Rightarrow \frac{3xy}{2} : \frac{7xy}{2} : \frac{4xy}{2} : \frac{10xy}{2}$$



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Sol. On counting 1st side → 5 on little finger
On counting 2nd side → 9 on thumb.
On counting 1st side → 13 on little finger
On counting 2nd side → 17 on thumb finger
.....and so on
5, 9, 13, 17, 21

The number on the ends are of the form $4n + 1$.
On little finger → odd multiple of 4 plus 1 is there.
On thumb → Even multiple of 4 plus 1 is there.

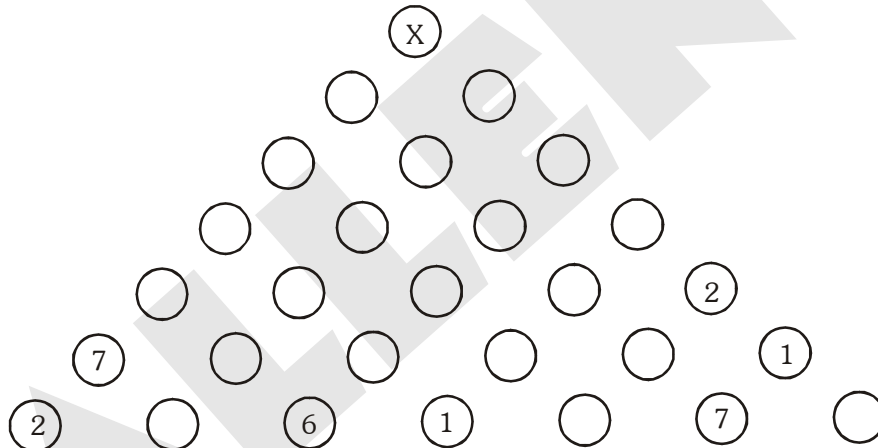
$$2017 = 2016 + 1$$

$$= 504 \times 4 + 1$$

Even multiple of 4

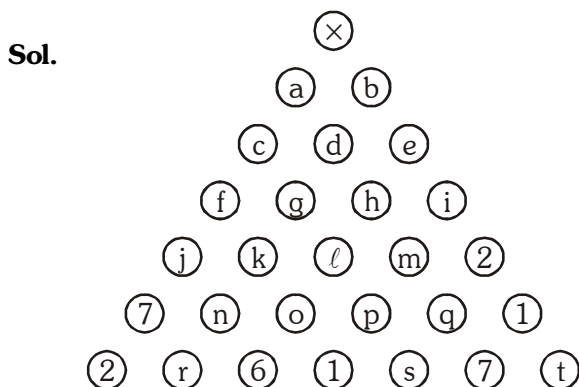
So, 2017 will come on thumb.

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?

Ans. (a) 88, (b) 12, (c) 7



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$$\begin{aligned}2 + r = 7 &\Rightarrow r = 5 \\r + 6 = n &\Rightarrow n = 1 \\6 + 1 = o &\Rightarrow o = 7 \\7 + t = 1 &\Rightarrow t = -6 \\q + 1 = 2 &\Rightarrow q = 1 \\s + 7 = 1 &\Rightarrow s = -6 \\1 + (-6) = p &\Rightarrow p = -5 \\7 + n = j &\Rightarrow 7 + 11 = 18 = j \\n + 0 = k &\Rightarrow 11 + 7 = 18 \Rightarrow k = 18 \\O + p = \ell &\Rightarrow 7 + (-5) \Rightarrow \ell = 2 \\p + q = m &\Rightarrow -5 + 1 = m \Rightarrow m = -4 \\j + k = f &\Rightarrow 18 + 18 = f \Rightarrow f = 36 \\k + \ell = g &\Rightarrow 18 + 2 = g \Rightarrow g = 20 \\\ell + m = h &\Rightarrow 2 + (-4) = h \Rightarrow h = -2 \\m + 2 = i &\Rightarrow -4 + 2 = i \Rightarrow i = -2 \\f + g = c &\Rightarrow 36 + 20 = c \Rightarrow c = 56 \\g + h = d &\Rightarrow 20 + (-2) = d \Rightarrow d = 18 \\h + i = e &\Rightarrow -2 + (-2) = e \Rightarrow e = -4 \\c + d = a &\Rightarrow 56 + 18 = a \Rightarrow a = 74 \\d + e = b &\Rightarrow 18 + (-4) = b \Rightarrow b = 14 \\X = a + b &= 74 + 14 = 88\end{aligned}$$

- (a) $x = 88$
(b) Next perfect square greater than 88 is 100.
So 12 is least positive integer to be added.
(c) Perfect square just less than 88 is 81.
So 7 is least positive integer to be subtracted.