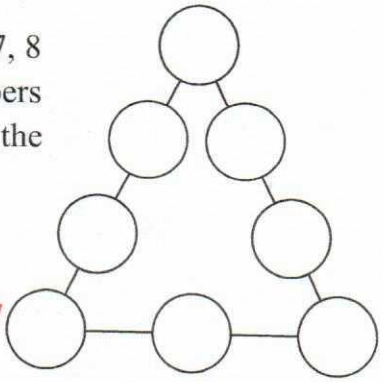
5th Challenge for Future Mathematicians
Bogor, Oktober 27-30, 2018
Middle Primary School Category
Team Contest-**SOLUTION**
Time : 80 minutes

1. In the triangle, each of the numbers 1, 2, 3, 4, 5, 6, 7, 8 is placed into a different circle. The sums of the numbers on each of the three sides of the triangle are equal to the same number, S. List all possible values of S.

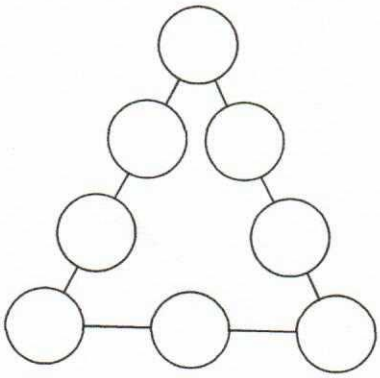


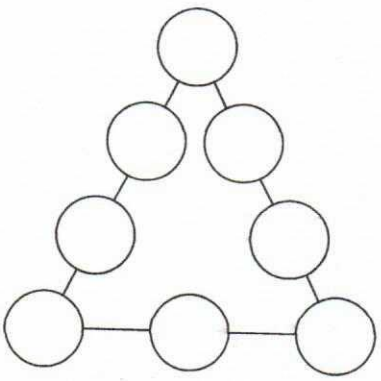
Answer:

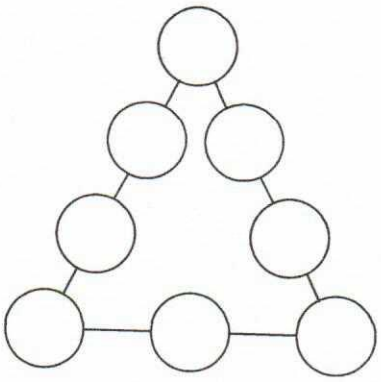
$3S = 36 + (a + b + c)$

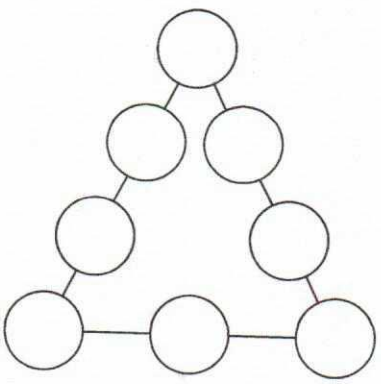
$S = 12 + (a + b + c)/3$

$15+16+17+19 = 67$









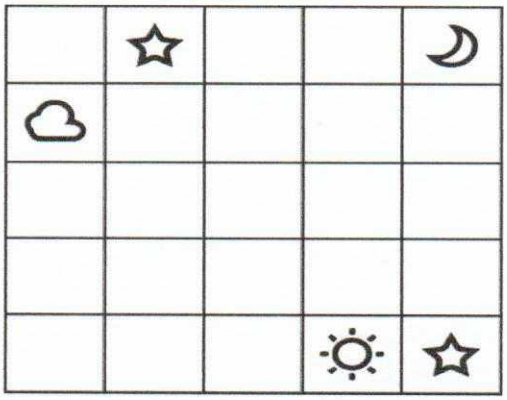
2. In the following equation, $1\frac{3}{7}\times\frac{1}{4}\div1\frac{1}{2}\times2\frac{1}{3}\div\frac{5}{8}=\frac{8}{49}$, one of the operation symbols is wrong. Write the correct equation.

Answer:

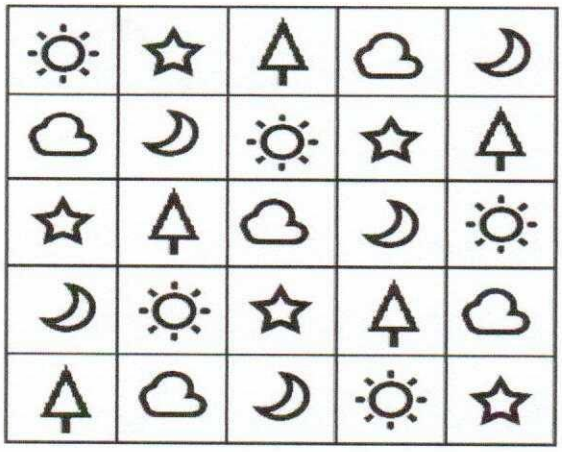
$1\frac{3}{7}\times\frac{1}{4}\div1\frac{1}{2}\div2\frac{1}{3}\div\frac{5}{8}=\frac{8}{49}$

$1\frac{3}{7}\square\frac{1}{4}\square1\frac{1}{2}\square2\frac{1}{3}\square\frac{5}{8}=\frac{8}{49}$

3. The figures  are put on a 5 x 5 table below so that each figure is used only once on each row, each column and each diagonal line. Finish filling the table.



\Ans:



Hint: Begin to fill with the cell at the bottom on the left, then at the top on the left, then can fill all the table.

4. The Cross Math boxes must contain all the numbers 1 to 9, so that all the equations are true. Some of the numbers are already filled in.

5	×		–		17
+		×		×	
	×	6	–		5
×		+		+	
	+		+	1	18
21		33		22	

Answer:

5	×	4	–	3	17
+		×		×	
2	×	6	–	7	5
×		+		+	
8	+	9	+	1	18
21		33		22	

5. Study the following sequence: 1, 2, 4, 5, 9, 8, 16, *A*, *B*, 14, 36, …. Find the product of *A* and *B*.

Answer:

Look at the odd positions, we have: 1, 4, 9, 16, ***B***, 36, … → a square sequence, which *B* equals to 25.

Look at the even positions, we have: 2, 5, 8, ***A***, 14, … → a sequence which has difference 3, So, *A* equals to 11.

So, The product of A and B 25 x 11 = **275.**

Proposed Marking Scheme:

- Correct value of A **(10 points)**
- Correct value of B **(10 points)**
- Correct final answer **(20 points)**

6. Find 4 last digits of the sum below:

$$8+88+888+\ldots+\underbrace{888\ldots888}_{\text{2018 digit 8}}$$

Ans: 0304

Hint: The last 4 digits of the sum above is the same of the last 4 digits of:

*8 + 88 + 888 + 2015*8888*

Proposed Marking Scheme:

- Get the idea of how to get the last 4 digits **(Up to 20 points)**
- Correct final answer **(20 points)**

7. 2018 numbers from 1 to 2018 are arranged following a pattern as follows:

1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24
25	26	27	28	29	30	31	32
...	...	...	...	...	...	...	...

The sum of 12 numbers inside the rectangle size 3 x 4 is: 13 + 14 + 15 + 16 +21 + 22 + 23 + 24 + 29 + 30 + 31 + 32 = 270.

Find the numbers inside a rectangle size 3 x 4 whose sum is 714.

Ans: 50, 51, 52, 53, 58, 59, 60, 61, 66, 67, 68, 69.

Hint: If the first number is n, then the sum of the rectangle (if exists) is: 3(4(n+8)+6). From that we can calculate that n=50. Note that 50,51,52,53 is all in the same row, so the result is ok.

Proposed Marking Scheme:

- Get the idea of how to get the last 4 digits **(Up to 20 points)**
- Correct final answer **(20 points)**

8. Mrs. Reny has a chocolate pack which contains some chocolate grains. She will share it with every student in her class. If Mrs. Reny gives 3 chocolate grains to each student, there will be 7 chocolate left. If Mrs. Reny gives 4 chocolate grains to each student, then she needs 12 more chocolate grains. How many students are in the class?

Solution:

Let the number of the students = A

If she gave 3 and remained 7, so we can write it as $3A + 7$

And, if she gave 4 but needed more 12, so we can write it as $4A - 12$,

so we can make

$3A + 7 = 4A - 12$

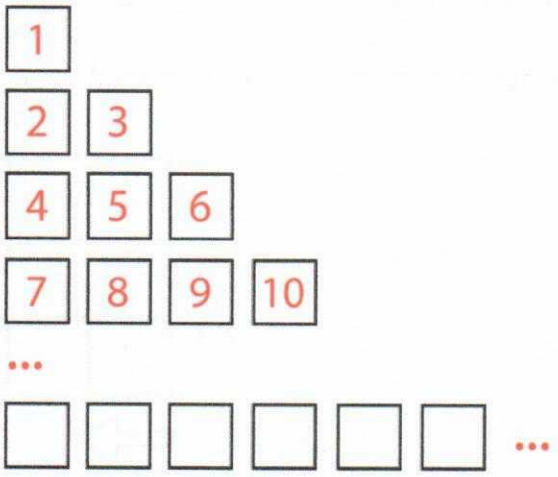
$A = 19$

So, the number of students is 19.

Proposed Marking Scheme:

- Get the idea of how to the answer using logic or algebra **(Up to 20 points)**
- Correct final answer **(20 points)**

9. The numbers below are arranged following a pattern:



The number 295 is found in row A and column B, what is the value of

$A + B$?

(Example: 8 is in row 4, and column 2, so A = 4, and B = 2, so the value of A + B = 4 + 2 = 6)

Ans:

A = 24, B = 19

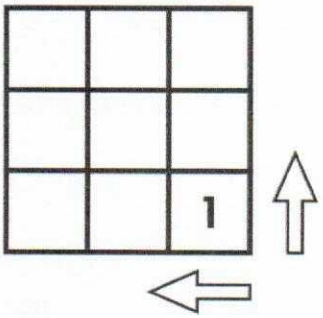
A + B = 43

Proposed Marking Scheme:

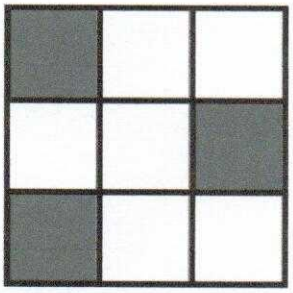
- Correct value of A **(10 points)**
- Correct value of B **(10 points)**
- Correct final answer **(20 points)**

10. Each square to encode is filled as follows:

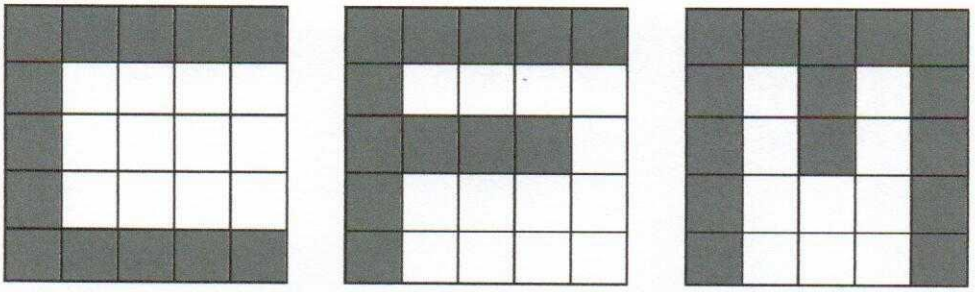
- Each big square contains many small squares.
- Each small square is filled with a number.
- First, the small square at the bottom on the right is filled with number 1.
- Then, from right to left, the next number is 2 times of the previous number.
- Then, from bottom to top, the next number is 2 times of the previous number.



A CFM code of a square is the sum of the numbers of the grey cells. For example, the CFM code of the square below is: 2 + 16 + 4 = **22.**



What is the sum of the code below?



Proposed Marking Scheme:

- Correct value of C **(10 points)**
- Correct value of F **(10 points)**
- Correct value of M **(10 points)**
- Correct final answer **(10 points)**