FSJM 31 - SWISS FINAL – May 20 2017

Information and results at http://www.fsjm.ch

START FOR ALL PARTICIPANTS

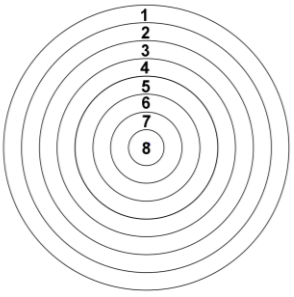
1. CLASSIFICATION *(coefficient 1)*
Matt loves mathematical games.
51 competitors took part in the final of the last championship in his category. Only 13 competitors were placed in front of him in the standings.
How many competitors were ranked behind Matt?

2. THE NEW WITH THE OLD *(coefficient 2)*
By adding the digits of the number forming last year, we obtain 2 + 0 + 1 + 6 = 9
This year, the sum of the digits is 10: how many years from now will it take until the next year for which, by adding the digits, we also get 9?

3. INITIAL (FIRST LETTER) *(coefficient 3)*
A competitor wrote on his answer sheet:
Family name: Federer First name: Stan
The family name of his neighbour begins with the letter 4 places after the initial of his own family name in the alphabet. The first name of his neighbour begins with the letter 6 places before the initial of his own first name in the alphabet.
What are the initials of his neighbour?

4. SEVENTEEN ... OR NOT *(coefficient 4)*
For the large number of 17 digits 58439538127816749, in how many ways, by adding up three digits placed next to each other, does one get a total that is not 17?

5. GRANDFATHER LOSES *(coefficient 5)*
Sacha, Baptiste and their grandfather play darts on the target pictured below, where the points for a hit in each zone are marked. Everyone throws three darts. The grandfather threw his first dart exactly in the centre, he is the only player to hit the centre of the target; but with his second dart he missed the target completely. Otherwise all the other zones of the target have been hit by a dart. Despite his dart in the centre, the grandfather loses the game, his two grandsons finishing as winners each with the same total points.
How many points did Sacha and Baptiste each score in total?



END FOR CE PARTICIPANTS

6. BONUS *(coefficient 6)*
A furniture store distributes bonus gifts thus:
1 bonus gift for the first 500 francs purchased, then 1 bonus gift for every complete 200 frs of additional purchase.
Knowing that Mickey A. bought furniture for exactly 2017 frs, how many bonus gifts did he receive?

7. DIALOGUE *(coefficient 7)*
Mathias: "Today I am 8 years old"
Matthieu: "And I'm 41 years old"
Mathias: "In what year were you as old as I am today? "
Answer Matthias' question.

8. I HAVE YOU GIVEN SWEETS *(coefficient 8)*
Vic and Tim share a certain amount of sweets thus:
First Vic takes half of them and another 50 sweets.
Then Tim takes half of what's left over and another 50 sweets.
Knowing that none are now left, how many sweets were there at the start?

END FOR CM PARTICIPANTS

Problems 9 to 18: Caution! For a problem to be completely solved, you must give the number of solutions, and give the solution if it has only one, or two solutions if it has more than one. For all problems that may have several solutions, the answer sheet has been designed to accommodate two solutions (but there may be only one!).

9. TELEPHONE *(coefficient 9)*
The old six-digit telephone number of Mathilde's great-grandmother is 11.31.12. By chance, these three two-digit numbers correspond, in a different order, to the day, month and year of her birth.
What is her date of birth?

10. START OF SCHOOL YEAR *(coefficient 10)*

23 schoolchildren go to a stationery shop to buy things for school:
- 8 buy a pen and a pencil
- 7 buy a pencil and an eraser
- 6 buy pen and eraser
- No child bought all three items, but all bought at least one item

The saleswoman finds that she has sold the same number of pencils as pens.

How many erasers did she sell?

11. BLACK SQUARE *(coefficient 11)*

On a black square are stuck diagonally two rectangular white bands three times longer than they are wide, whose edges are parallel to the diagonals of the square, and whose corners are on the edges of the square. A cross is thus formed and the total area of the black zones still visible is 18 cm^2.

What is the area of the initial black square?

END FOR C1 PARTICIPANTS

12. WHITE SQUARE *(coefficient 12)*

A very large rectangle is divided into small squares. In the 1998 small squares on the edge of the rectangle, one writes the alphabet, one letter per square, without leaving an empty square between the individual letters. There are so many small squares that one can write the alphabet more than 10 times, always leaving the same number of blank squares (without letters) between each complete listing of the alphabet.

How many blank squares are there between each complete listing of the alphabet?

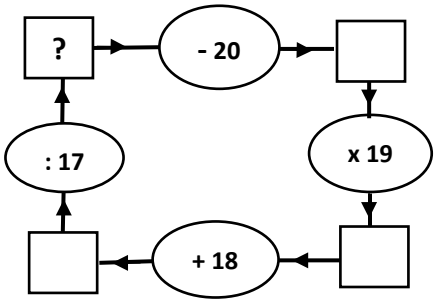
13. 3P *(coefficient 13)*

Four fruit trees form the four corners of a flat rectangular orchard: a peach tree is 24 metres away from a pear tree and is 25 metres from a plum tree.

What is the area of this orchard?

14. FROM 17 TO 20 *(coefficient 14)*

Which whole number should be placed in the box "?" for the system to work?



END FOR C2 PARTICIPANTS

15. MOWER *(coefficient 15)*

Mathias would take an hour to mow the lawn, while Matthew would take 90 minutes. They get together to mow this lawn and they start at the same time, using one mower each.

How many minutes will it take them to mow the lawn together?

16. SUMS OF THE PARTS *(coefficient 16)*

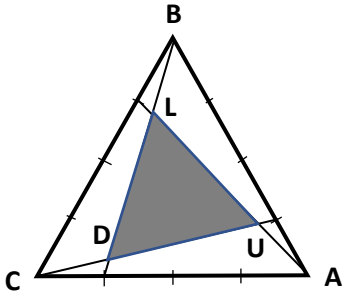
Which four-digit numbers greater than 2017 are such that the sum of the number formed by the first two digits and the number formed by the final two digits equals the number formed by the two middle digits?

END FOR L1, GP PARTICIPANTS

17. BIG AIR *(coefficient 17)*

A field BAC forms an equilateral triangle with area 1001 m2. After dividing each side of this triangle into four equal parts, a new triangular meadow LUD was marked out inside.

What is the area of LUD within BAC?



18. FATHER A. WAY'S FIELD *(coefficient 18)*

Father Anda Way owns a triangular field whose sides are whole numbers of hectometres in arithmetic progression, the longest side measuring less than 30 hm. Moreover, this field has an angle whose cosine multiplied by 10 is an integer.

How long is the perimeter of Father A. Way's field, knowing that the common difference of the arithmetic progression is the largest possible?

END FOR L2, HC PARTICIPANTS

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