FSJM – SEMI-FINAL- 25 MARCH 2017

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

1. GRANDCHILDREN (coefficient 1)
Louise is three years old and Logan is two years older.
When Louise is five times older than she is now, how old will Logan be?

### 2. A LITTLE CORNER OF PARASOL (coefficient 2)
The square canvas of a parasol is supported by spars (metal rods between the centre of the parasol and the edges of the canvas). There are three for each side of the parasol, including one in each corner.
How many spars in total has the parasol?

3. FROM A SQUARE TO A PYRAMID (coefficient 3)
The square below is made of five different pieces and we want to use these five pieces to form the pyramid.
Draw the five pieces inside the pyramid.
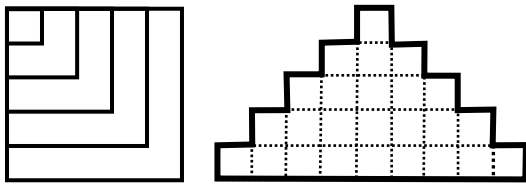

4. SOUVENIRS (coefficient 4)
Heidi is on holiday in Switzerland and wants to buy a souvenir. She hesitates between 11 souvenirs whose prices are all different whole numbers of francs from 5 to 15 francs. Heidi has enough money in her purse to buy any one of these souvenirs by paying the exact amount in coins.
How many coins does Heidi have in her purse as a minimum?

5. SAFE JOURNEY! (coefficient 5)
Along the straight road shown below, two dashed yellow lines have been drawn. Each dashed line is 5m from one edge of the road. The dashed lines are separated by 1m.
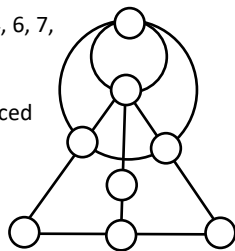**What is the narrowest possible width of the road?**
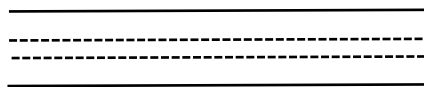
6. 20 OR 17 (coefficient 6)
Place the eight numbers 1, 2, 4, 6, 7, 9, 10 and 14 in the spaces (one number per space) so that:
Every sum of the numbers placed along a circular path is 20;
Every sum of three numbers connected along a straight line is 17.


7. WOW, THE 3 SWISS (coefficient 7)
Werner, Oswald and Walter founded Switzerland in the year 1291. By summing the four digits of this number, we obtain 13.
We perform the same operation for all years since then up to 2017.
What is the biggest difference between any two sums thus obtained?

8. EIGER, MONCH, JUNGFRAU (coefficient 8)
How many complete triangles are there in this figure?
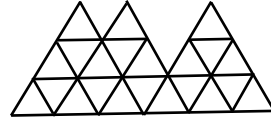
Problems 9 to 18: beware! For a problem to be completely solved, you must give both the number of solutions, AND give the solution if there is only one, or give any two correct solutions if there are more than one. For all problems that may have more than one solution, there is space for two answers on the answer sheet (but there may still be just one solution).

9. HEAD IN THE CLOUDS (coefficient 9)
Christian walks among the clouds he loves so much. There are cumulus, cirrus and stratus clouds. He makes groups, by category, of 2017 clouds. Every group for a given category contains the same number of clouds.
He makes 1 more cirrus group than cumulus group and 1 more stratus group than cirrus group.
In each cirrus group, he puts 2 more clouds than in each cumulus group and 1 cloud fewer than in each stratus group.
He places 18 cirrus clouds in each cirrus group.
How many groups has he made?

10. CRYPTARITHM or DIGITS FOR LETTERS
(coefficient 10)
In a cryptarithm, every letter is to be replaced by a digit. Two different letters always represent two different digits and two different digits are always represented by two different letters. Moreover, no number starts with a zero.
In the cryptarithm :

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  S I X
+ U N
+ U N
+ U N
+ U N
  D I X
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What is the biggest possible value of DIX?

11. "PERFECT PAIR" (coefficient 11)
A number is a "perfect pair" if it is a perfect square formed of two perfect squares placed side by side. 49 and 361 are "perfect pairs".
What "perfect pair" smaller than 2017 starts with the number 1?
Note : a perfect square is the result of the multiplication of a positive whole number and itself.

12.MAYA THE BEE (coefficient 12)
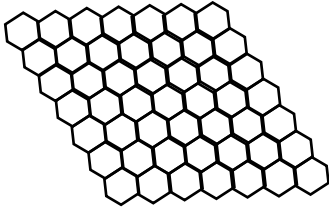
In the honeycomb below, Maya fills certain of the cells with honey so that each cell filled exactly touches two other filled boxes.

How many cells as a maximum can be filled?

13. CASINO ROYAL (coefficient 13)

My name is Mond, Ray Mond. At the casino, I play on a slot machine. It is made up of three wheels and on each of them is shown, in order, the 26 letters of the alphabet. Observing the operation of the machine carefully; I note that at each turn:

The first wheel advances a letter in the alphabet
The second wheel advances by 2 letters in the alphabet
The third wheel advances by 3 letters in the alphabet
To win the machine must display the same letter on all 3 wheels.

Knowing that the machine displays the letters A, B, C (respectively), at the beginning, which letter will appear when Ray Mond wins for the first time?

14. FOOL'S MATE (coefficient 14)

My mate Matt buys a chess set and resells it a few months later for 24 francs. He loses as many percent on the sale as the game had cost him in francs to buy.

How many francs does he lose?

END for C2 PARTICIPANTS

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15. « WHAT ELSE ! » POEM BY M. POE (coefficient 15)

Matt Poe decides to write a poem in heptasyllables (lines each of 7 syllables) in accordance with the following rules:
- The poem begins with the line "Maths is so cool, what else!" (7 words of one syllable)
- He can use any word of one to seven syllables
- Two different lines can be composed of words of the same composition of syllable lengths, but not in the same syllable length sequence. For example:
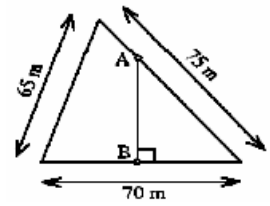"Euclid was far from stupid"
"Turing's test is alluring"

How many lines can the poem have, as a maximum?

16. FARMER FIELD (coefficient 16)

Farmer Field owns a triangular field whose sides measure 65m, 70m and 75m.
He decides to share the field between his two sons by drawing a perpendicular (AB) to the 70 m side such that the two new fields are of equal area.

What is the length of AB? (answer in centimetres)
Note : If needed, take √2 as 1,414; √3 as 1,732; √5 as 2,236 et √7 as 2,646.

END for L1, GP PARTICIPANTS

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17. DISCOUNT COUPONS (coefficient 17)

A	B	C
D	E	F

In a shopping centre, six shops A, B, C, D, E and F offer discount coupons.
The sheet of discount coupons above is composed of six coupons, being one each for 1 franc, 2 francs, 3 francs, 5 francs, 8 francs and 17 francs.
By cutting out (or not) one or more coupons we can obtain every integer discount from 1 to 36 francs with the remaining coupons, and leave them as one single piece of paper connected by coupon edges.
If any of the remaining coupons are connected only by a corner, the remainder is not considered as a single piece.
Recreate the sheet of coupons above with the discount that each shop offers.

18. AN EQUIDISTANT CIRCLE (coefficient 18)

The diamond ABCD has diagonals measuring 18 m and 6 m. It is not circumscribable; however, it is possible to draw a circle which passes at equal distance from the four vertices.

What is the radius (finite) of such a circle?

Note : The distance from a point M to a circle is the smallest distance between M and any point on the circle.

END for L2, HC PARTICIPANTS