

FFJM – SWISS FINALS - MAY 17th, 2014

Information and rankings on <http://fsjm.ch/>

START - ALL PARTICIPANTS

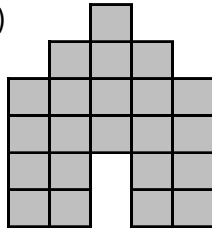
1 – Booking operations (coefficient 1)

Hilde is sitting in front of her opened math book. This book has less than 200 pages. Hilde plays and multiplies the three digits that make up the page number on the left. She obtains 24. She does the same multiplication with the page on the right and obtains 28.

What is the page number on the right ?

2 – Completely squared (coefficient 2)

How many fully drawn squares can you count in this house wall ?



3 – Tea time (coefficient 3)

Matthew opens a 16-centiliter can of ice tea. Mathilda opens a 25-centiliter can of ice tea. They both drink the same quantity of ice tea from their cans. Then, they notice that Mathilda still has a volume of ice tea that is exactly twice as much as what Matthew has left. **How much ice tea has each of them drunk ?**

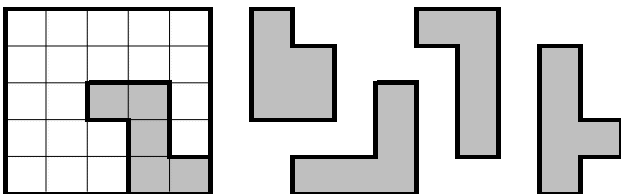
4 – Six little weights in the balance (coefficient 4)

This two-pan balance is at equilibrium when one puts three weights on each pan. Five of these weights weigh 3 g, 8 g, 9 g, 10 g and 18 g. The sixth weight is identical to one of the other five.



Which of the weights is in double ?

5 – Total coverage (coefficient 5)



Place the four pieces in the square so as to completely cover the empty cells of the square. The pieces may be rotated, but not turned upside down.

Draw the contour of the pieces with a thick stroke.

END FOR CE PARTICIPANTS

6 – The round dance (coefficient 6)

Twenty boys and a certain number of girls, hand in hand, build a circle. Everybody is looking towards the centre. Fourteen boys are holding their right hand with a girl.

How many boys are holding their left hand with a girl ?

7 – Saturday 17 (coefficient 7)

Today is Saturday, May 17th, 2014.

Which is the next year where May 17th will be a Saturday again?

Note : Between 2014 and 2099, the years whose number is a multiple of 4 are bissextile and are made of 366 days.

8 – A disk and a square (coefficient 8)

It is known that

$$4\bullet + 6\blacksquare \text{ is worth twice } 2\blacksquare + \bullet\blacksquare$$

In this writing, each symbol always stands for the same digit, and each digit always stands for the same symbol.

How much is $\bullet\blacksquare$ worth ?

END FOR CM PARTICIPANTS

Problems 9 to 18 : beware! For a problem to be completely solved, you must give the number of solutions, AND give the solution if there is only one, or two solutions if there is more than one. For all problems that may admit more than one solution, there is space for two answers on the answer sheet (but there may still be a unique solution).

9 – The dominos (coefficient 9)

With 10 dominos bearing the digits 0, 1, 2 and 3 from 0-0 to 3-3, Matthew wants to build a closed chain satisfying the following constraint.

The difference between the neighbor digits of two adjacent dominos must always be 2; Like 3 and 1, or 1 and 3 for example

2	1	3	0
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	2	2		
0				3
0				3

Dominos to be placed

2	3		
1	1	1	2
1	3	1	3
0	1	0	2
0	3	0	3

Matthew already placed three dominos (0-0, 2-2 et 3-3). **Your turn to place the other seven.**

10 – Hand game (coefficient 10)

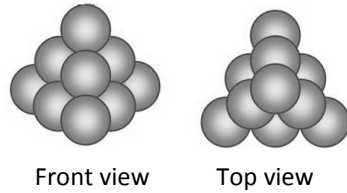
HAND + HAND = BALL

As in any cryptarithm, two different letters stand for two different digits, and two different digits are represented by two different letters. No number starts with a 0.

How much is HAND worth ?

11 – Have you seen Monte-Carlo ? (coefficient 11)

After the finals of the Monte-Carlo tennis tournament, Stan and Roger built a tennis ball heap.



Except for the last floor, each floor of the heap has a triangular shape with no hole. The topmost layer only has a single ball, the second-to-last has 3 balls, the third-to-last 6 balls, etc.

The heap is made of 11 layers.

How many tennis balls were used in total ?

END FOR C1 PARTICIPANTS

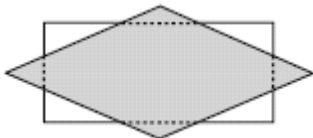
12 – The hidden side (coefficient 12)

Logan and Lilou are sitting at a wooden table, face to face. On the table, there is a traditional cubic gaming die. Logan sees the upper face of the die as well as two lateral faces. Lilou sees the upper face as well as the other two lateral faces. The sum of all dots on the sides visible by Logan is 11. The sum of all dots on the sides visible by Lilou is 9.

Give, in increasing order, the numbers of dots on the two lateral faces visible by Lilou.

Note : the sum of the number of dots on two opposed faces is always worth 7.

13 – A diamond hides a rectangle (coefficient 13)



A diamond is pasted flat onto a rectangle in such a way that their centres and their symmetry axes match. The points where the diamond sides intersect with the rectangle's length split the latter in three segments of identical width. The visible part of the rectangle represents 2/9 of the total rectangle's area.

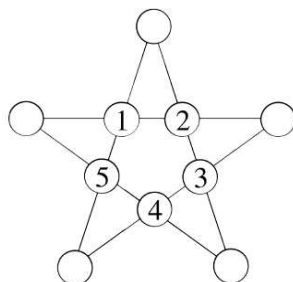
The bonding is turned over.

Which fraction of the diamond is now visible? The answer must be given as an irreducible fraction.

14 – The Shooting Star (coefficient 14)

This star contains 10 positive integers that are all different. The product of four aligned numbers is always the same.

What is, at a minimum, the value of the greatest number used ?



END FOR C2 PARTICIPANTS

15 – Il piatto del giorno (coefficient 15)

Il piatto del giorno is a rectangular pie that is made of two parts. The first part, covered with raspberries, is square-shaped; the second part, covered with blueberries, is rectangular-shaped. The area of one of the two parts is 17.5 cm². One side of the pie is 14 cm long.

How long is the other side of the pie ?

Note: the answer must be rounded up or down to the next mm (rounding half up). If needed, one can use

$\sqrt{2} = 1,414$; $\sqrt{3} = 1,732$; $\sqrt{5} = 2,236$; $\sqrt{7} = 2,646$; $\sqrt{11} = 3,317$.

16 – Minus two (coefficient 16)

The integer 2014 can be written as a sum of positive consecutive integers among which at least one is divisible by 14.

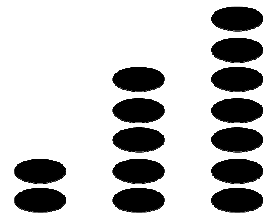
Which is this number divisible by 14 ?

END FOR L1 AND GP PARTICIPANTS

17 – Take or divide (coefficient 17)

Christian and Philippe are playing the following game.

They are facing three stacks of 2 stones, 5 stones and 7 stones.



One move is either

- removing one or more stones from a stack (possibly even the entire stack) ;
- split a stack that contains at least two stones in two stacks (not necessary with the same numbers of stones), without removing any stone.

The players alternate to play. The player who removes the last stone wins.

It's Philippe's turn. **What must he do in order to win whatever Christian's moves are ?**

The starting configuration is described as (2;5;7). The answer must describe the configuration that follows as (a ; b) or (a ; b ; c) or (a ; b ; c ; d) depending on the played move, with the stack counts sorted in increasing order.

18 – Four aces (coefficient 18)

♥♦♠♣♥♦♥ is a 7-digit number that was encoded with the symbols ♥, ♦, ♠ and ♣.

Each symbol always stands for the same digit, and two symbols always stand for two different digits.

Find the value of each of the four symbols, knowing that the 7-digit number is the square of an integer.

END FOR L2 AND HC PARTICIPANTS