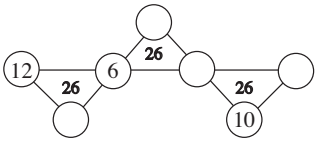
40 thCHAMPIONSHIP, 2025: MATHEMATICAL AND LOGIC GAMES
FBJM Quarter final

START FOR ALL PARTICIPANTS

1. THE CHOCOLATIER'S CHALLENGE (coefficient 1)

A chocolatier is preparing a box of chocolates for his customers. He uses a 7 cm square box, in which he wants to store chocolates, each 2 cm square. The chocolates must be placed flat, in one layer, and fit entirely inside the box.
What is the maximum number of chocolates he can store in this box?

2. THE HAT OF THE YEAR (coef. 2)



By adding the three numbers surrounding each triangle, we always arrive at 26.
Place the numbers 7, 8, 9, and 11 in the empty boxes.

3. PIGGY BANK (coefficient 3)

In his piggy bank, Tom has 26 euro cents, composed of 5, 2, and 1 cent coins.
What is the minimum number of coins he has, given that he has at least one of each value?

4. ODD ONES OUT (coef. 4)

Of these five numbers, three can be obtained from one another by turning (rotation) or by flipping (symmetry). **Which are the two odd ones out?**

5. NOEL HAD SO MANY MORE THAN LEON (coefficient 5)

Noel had 2,026 mathcoins; Leon only had 206. Noel gave Leon some mathcoins, but he still has twice as many as Leon.
How many mathcoins did Noel give Leon?

END FOR CE PARTICIPANTS

6. MY RECIPE (coefficient 6)

My scrambled egg recipe calls for 60g of butter, 12 eggs, and 6 tablespoons of milk. But, I only have 10 eggs.
How much butter and milk should I use to keep the proportions correct?

7. EGG HUNT (coefficient 7)

Claude has four hens and he collects the eggs every evening.
The first hen lays one egg every day. The second lays one every two days. The third lays one every three, and the fourth lays one every four days. Claude was able to collect four eggs laid the same day, on October 1st.
On which day is he next able to collect four eggs laid the same day?.

8. MEXICAN TRAIN (coefficient 8)

The game " Mexican Train," is played with special domino pieces, all different from one another.
Each half-domino end has a number of spots ranging from 0 to 10.
Max uses only the dominoes with at least one end having 0, 2, or 6 spots. He wants to build the longest possible sequence of dominoes, following the rules of dominoes: two half-domino ends that touch must have the same number of spots.
What is the greatest number of dominoes he can place??

END FOR CM PARTICIPANTS

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. ANNIE VERSARY (coefficient 9)
Annie marked twelve dates on her 2026 calendar: January 1, February 2, March 3, April 5, May 7, ... These dates are formed, in order, by the number 1 followed by the prime numbers, in consecutive months.
Which date will be marked in December?
Answer 0 if you think it's impossible. Remember that a prime number is a number with exactly two positive divisors (1 and itself).

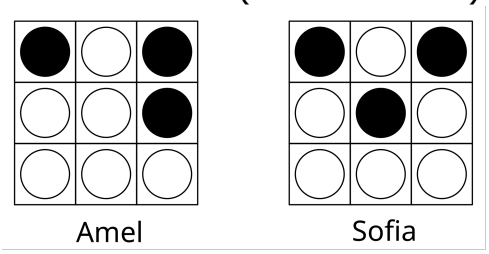
10. MAC'S FACTORS (coefficient 10)
Mac notices that the number 24 and its reverse (42) have at least one common factor other than 1: the number 6.
How many pairs of two-digit numbers AB and BA are there that have at least one common positive factor other than 1?
Note: A and B are two different non-zero digits.

11. AGE RELATIONS (coefficient 11)
A father celebrates his birthday on May 1st, and his daughter celebrates hers on May 31st. On May 2nd, the father's age in whole years will be equal to his daughter's age in whole months. We know that the father was at least 25 and at most 45 at the time of his daughter's birth.
How old (in whole years) was he at the time of this birth?

END FOR C1 PARTICIPANTS

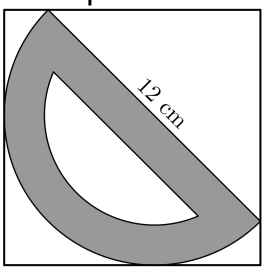
12. DE-ESCALATION (coefficient 12)
When Matthew takes a descending escalator, standing stationary starting on the top step, it takes him 25 seconds to reach the bottom.
When he takes the same escalator walking at a constant speed relative to it, it only takes him 10 seconds to reach the bottom.
If he takes the escalator in the opposite direction, how long will it take him to reach the top, knowing that on a fixed staircase, his upward speed is equal to 4/5 of his downward speed?
Answer 0 if you think his upward speed does not allow him to reach the top.

13. TOKEN FLIPS (coefficient 13)



A 3×3 playing board has nine tokens, each white on one side and black on the other. Starting from a randomly chosen position, the goal of the game is for all tokens to have their black sides up. A legal move is to flip three tokens in a row, either in the same row, the same column, or the same diagonal, at once. Amel and Sofia are playing separate games.
What is the minimum number of moves required for Amel and for Sofia?
Answer 0 if this is impossible from the given starting position.

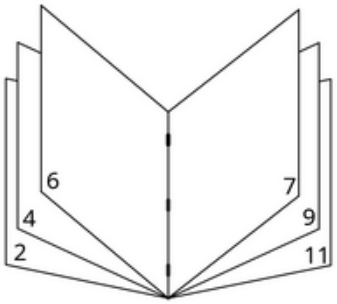
14. PROTRACTOR (coefficient 14)
Matilda's protractor is shaped like a half-disc with a diameter of 12 cm. It can be stored flat in a square box.



What is the minimum side length of this box?
If necessary, take √2 as 1.4142, and give the answer in cm rounded to the nearest hundredth.

END FOR C2 PARTICIPANTS

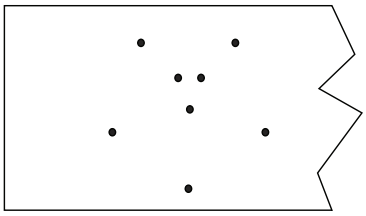
15. FAVOURITE MAGAZINE (coef 15)



Matthew has unfastened the staples of his favourite magazine, which has fewer than 100 pages assembled into a single section, and the quadruple pages (printed on both sides) have scattered. He has one of the sheets in front of him and sees a double page whose product of the numbers is equal to 900. **What is the product of the page numbers appearing on the back of this double page?**

All the pages of the magazine are numbered in order, starting with 1.

16. MICHAEL POLISHES HIS CAR (coefficient 16)

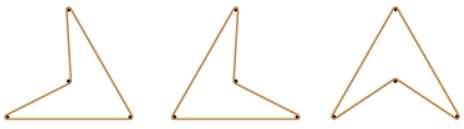


While polishing his car in the garage, Michael discovered a board with eight nails placed as shown in the drawing and a rubber band stretched between these nails such that:

- the rubber band touches each nail only once,
- the rubber band does not cross itself.

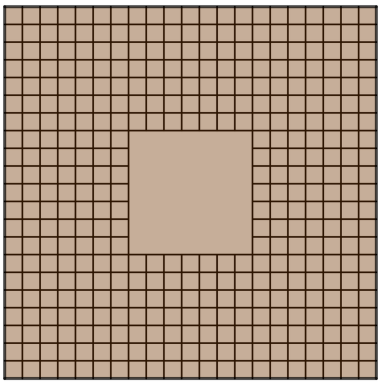
How many different ways can the rubber band be stretched like this?

For example, with four nails placed as shown below, there are only three possibilities:



END FOR L1, GP PARTICIPANTS

17. STRANGE BAR (coefficient 17)

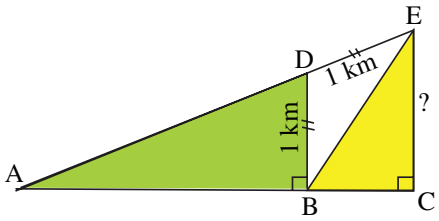


This strange chocolate bar is composed of a central square measuring 7 cm on each side, surrounded by 392 smaller squares measuring 1 cm on each side. The bar is broken into two along a straight line that does not follow the grid. The break is made in such a way that the maximum number of squares are cut into two. With this cut, the central square has been cut into two pieces, one smaller and one larger. **What is the maximum area of the smaller of these two pieces of the central square?**

Give the answer in cm² as an irreducible fraction.

Answer 0 if the break is impossible while respecting the conditions.

18. SETH ROOE'S WOOD (coef. 18)



Seth Rooe owns a triangular wood ACE divided into three plots ABD, BDE, and BCE, such that:

- angles ABD and ACE are right angles;
- BD = DE = 1 km;
- the area of triangle ABD is twice that of triangle BCE.

What is the length of CE?

Give the answer rounded to the nearest metre, and if necessary, take √3 as 1.732.

END FOR L2, HC PARTICIPANTS