Good practices
INTER_501CD_EN

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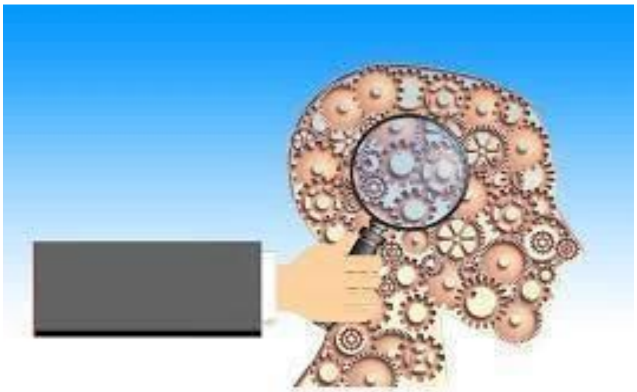
Description of the problem / exercise: **Poly-dimensional point and the human brain**

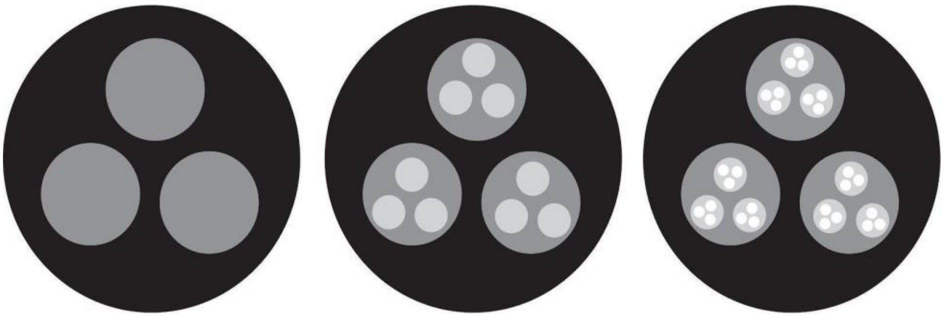
You can read about the concept of the 'Poly-dimension point' in the PUNTE Study, chapter 2.5.1.
The relationship between the 'Poly-dimensional point' and the human brain:

a. Humanity currently has a population of 8 billion, or 8×10^9
b. The number of human brain cells is about 100 billion, or 10^{11}

We attempt to relate the orders of magnitude between the didactic figure created during the creation of the 'Poly-dimensional point' and the Poly-Universe game, and the above numbers:



'The way to perception the 'Poly-dimensional point' can be a simple logic experiment: If there is a set of planes made up by at least three other sets of planes that in turn include three further sets of planes each, and so forth ad infinitum, then we may witness the termination of the plane as a form, as it becomes a set of points. If, on the other hand, we take space, then the same process leads to the depletion of space or an object, and the substance, after reaching a density of infinite fineness, is immaterialized, is transformed in our mind definitively.'



Questions:

1. How many depth layers within a 'Poly-dimensional point' must be reached before the number of points in the set equals the number of human inhabitants?
2. How many layers of depth within the 'Poly-dimensional point' must be the number of points in the set to reach the number of average human brain cells?
3. How many brain cells in total do humans alive today have?
4. Could we give all the brain cells of all the people alive today a Poly-Universe game box, packed in different layouts?
5. How many people have lived on earth so far, if we include the number of people alive today?
6. Could we give every brain cell of every human being who has ever lived on earth a Poly-Universe game box, packed in different layouts?

- *Why this exercise is good:* This exercise is a true dimensional shift in thinking, helping us to find our real place in the Poly-Universe, the vertical web of microcosm and macrocosm...
- *Level of teacher training:* Subject teacher, secondary school
- *School subject(s):* Mathematics, biology, anthropology, informatics
- *Comments:*
    a) The number of people living so far: https://www.youtube.com/watch?v=PUwmA3Q0_OE&ab_channel=AmericanMuseumofNaturalHistory
    b) Combinatorial Packaging: (PUSE Tasks 236C)

Based on the idea of the inventor, packaging happens as follows: each element of the 24-piece package is placed randomly above each other, and then covered with transparent foil. With this method, how many different ways are there to place the elements on each other? Calculate the solution with triangle, square and circle base forms.

Solution(s) of the task:

Triangle: $6^{24} \times 24! \approx 2.9 \times 10^{42}$

Explanation: a triangle can be put down in 6 ways, so 24 triangles above each other give 6^{24} possibilities. We also need to calculate the different orders of putting the 24 elements on each other, the permutation of the 24 elements without repetition, which is 24!

Square: $8^{24} \times 24! \approx 2.9 \times 10^{45}$

Explanation: the only difference between the arrangement of squares and triangles is that the square can be put down in 8 ways. Other considerations are the same, see above.

Circle: $24! \approx 6.2 \times 10^{23}$

Explanation: When packaging the circle set, semicircles of the same size need to be joined (so we do not calculate their rotated or reflected layouts). Thus, the formula of the cardinality of different stacks becomes a simple permutation without repetition.