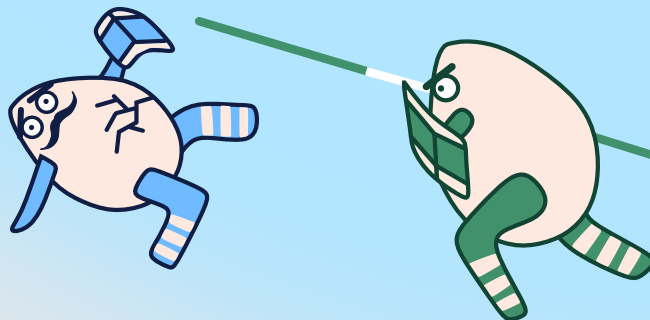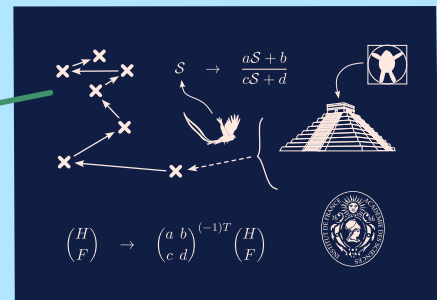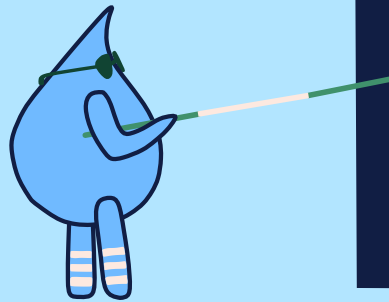# 11ᵗʰ French Physicists' Tournament

Problem 7: smart water

If you let water flow in a maze you end up with a physical maze-solving algorithm. Many other algorithms and computations can be done with physical systems. Create a water-based computer (without electronics) that solves an NP-hard problem.

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$$\mathcal{S} \rightarrow \frac{a\mathcal{S}+b}{c\mathcal{S}+d}$$

$$\begin{pmatrix} H \\ F \end{pmatrix} \rightarrow \begin{pmatrix} a & b \\ c & d \end{pmatrix}^{(-1)T} \begin{pmatrix} H \\ F \end{pmatrix}$$

Problem 13: egg fight

Egg taping is a traditional game where two players hold a boiled egg. Each player hits the other player's egg with their own. The player whose egg has cracked loses the game. Devise a non-invasive method to predict the winning egg among the given two. Improve the prediction with invasive examination methods.

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Problem 8: peculiar echo

The combination of a clap and the massive pyramid (Chichen Itza, Mexico) gives rise to a mysterious sound called "Quetzal tail". Investigate the phenomenon, find the necessary conditions to create it, and reproduce it.

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