



The game takes place in a chemistry laboratory, using real test tubes, formulas and chemical elements. Players have to find a vaccine with the correct chemical formula by transferring the elements from one test tube to another!

Printable resources attached: goal cards x 30, test tubes x 4, small elements x 18 (6 of each of the 3 types), big elements x 6 (3 of each of the 2 types)

Additional material needed: scissors

Territory 2 - The Strong Community



Total Duration: 10 min.

Player count: 1 - 3

Learning objectives



Practising scientific approaches



Calculating



Reasoning



Understanding the quantities and measures



Modeling

Linked SDGs



4 QUALITY EDUCATION



9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

Game modalities

8 - 12 years old

indoor

in the classroom

work alone

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Pedagogical interest and topics targeted

Sharpen your thinking: find the building logic behind each formula and compute the step to reproduce. Children enhance their combinatorics in finding the best solutions to remove pieces from one testing tube to another. Dr. Hanoi also prepares for strategic thinking.

Train your dexterity: Be mindful not to drop an element while transferring from one tube to another.

Dexterity is related to the seamless integration of hands into the cognitive system, making manual skills an important part of people's interaction with the environment and their capacities for feeling, exploring, acting, planning, and learning.

Understand the inner working of Hanoi towers: Discover this wonderful but complex mathematical thinking game. This is a puzzle consisting of three rods and a number of disks of various diameters, which can slide onto any rod. The puzzle begins with the disks stacked on one rod in order of decreasing size, the smallest at the top, thus approximating a conical shape. The objective of the puzzle is to move the entire stack to the last rod:



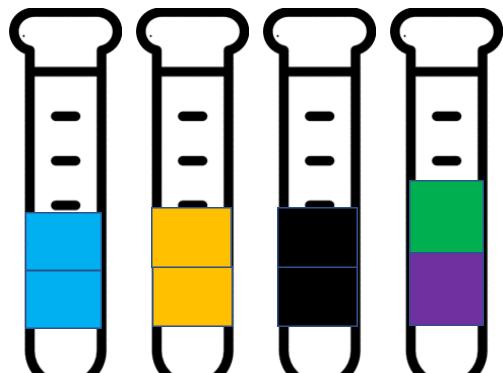
Game rules

Game narrative: Each player is asked to fill test tubes according to the formula (pattern) shown on a card while doing as few transfers as possible!

Role of the teacher and game organisation: We will call the children, **players**, and the adult in charge or the child elected, a **referee**. While the players take a turn, it is the gamemaster who decides the turns.

Installation: Shuffle the goal cards and place them in a pile in the middle of the players. Place the elements, small and big, in the middle of the players. Give each player four test tubes. Match carefully the composition given here:

Start of the game: The referee draws a goal card and shows the card describing the chemical formula made of small elements and of big elements in 3 test tubes. Each player shall complete the formula in the way described by the test tubes on the goal card.

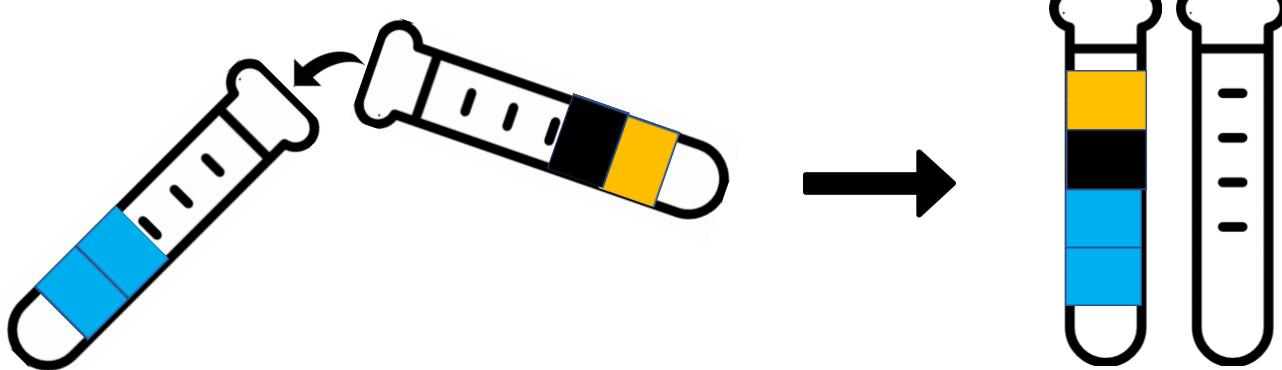




Game rounds

How to play?

In turn, each player makes a **transfer**, complete or partially, from one tube to another.



An element can only be transferred over another element, bigger or of the same size, or at the bottom of an empty tube. Therefore, big elements shall always be at the bottom of test tubes, and cannot be on top of a small element.

Warning: a transfer will invert the order of elements in a tube!

Additional Rules

All players follow the rules below:

- exchanging the position of test tubes **does not count as a transfer**.
- a test tube **can never have more than 4 elements** of any size.
- if a player drops an element outside of a test tube at any time during the game, **they are eliminated**.

Endgame

The player who is the first to complete the formula with the least number of transfers wins the game.

If all players are eliminated, there is no winner.



Going further



Topic 1 - Logical and strategic thinking

To further develop logical reasoning you may wish to refer to other Unplugged games, among which: **Memory, Good ways, Farm in the City, Peace Magic Grid, PotLuck March, Reroute a better world, Plastic continent, etc.**

To read more about logical reasoning you may see <https://criticalthinkingsecrets.com/what-is-logical-thinking/> and to read more about combinatorics and its relation to computing you may read <https://www.carthrottle.com/post/2zm2ele/>



Topic 2 - Dexterity

To further develop dexterity you may wish to refer to other Unplugged games, among which: **Good ways, Farm in the City, Pop-up city of the Future, Reroute a better world, Plastic continent, Brain Twister, etc.**

To read more about the importance of development dexterity and hand control you may wish to read here: <https://childdevelopment.com.au/areas-of-concern/fine-motor-skills/hand-control/>

To get inspired by more ideas to train dexterity, you may refer to: https://www.teachearlyyears.com/images/uploads/article/Developing_fine_motor_skills.pdf



Topic 3 - Hanoi Tower

You may wish to discover the well-known mathematical game Hanoi Tower: https://en.wikipedia.org/wiki/Tower_of_Hanoi or play it here: <https://www.mathsisfun.com/games/towerofhanoi.html>



Printables



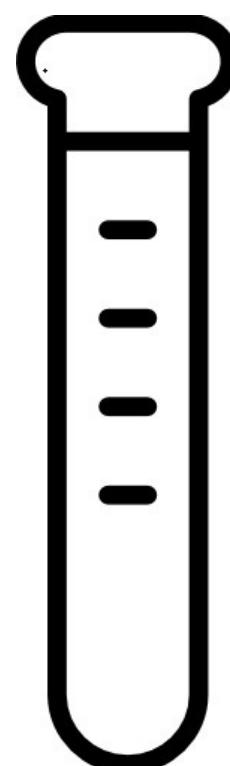
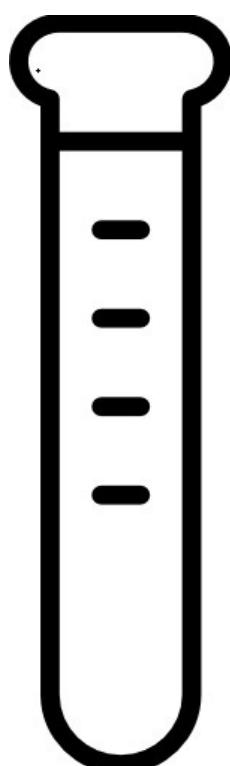
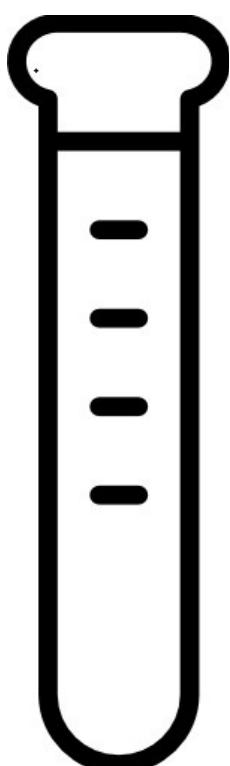
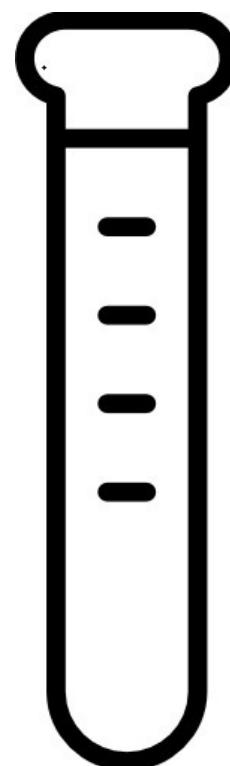
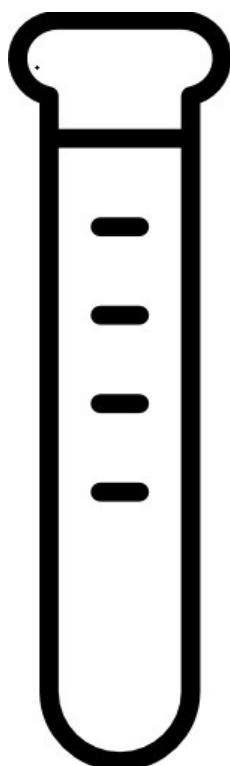
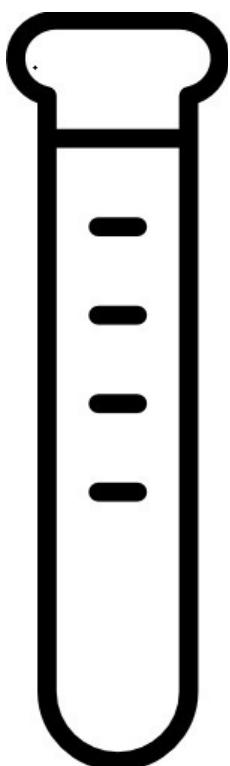
Goal cards

Printables



Goal cards

Printables - Test tubes



Printables - Small and big parts

