Game Design Document

Introduction to the experience

The escape box experience begins with a brief presentation of the players' mission and who they will be impersonating: they will find themselves as a woman in search of her memory; a memory that can only be found by opening all the boxes in front of them.

Main box

The large wooden box that will contain all the games of this experience will be customised (STEM subjects). On the lid will be an inscription and on the walls will be stuck 8 stickers with different images (this is the "main box" game: see below).

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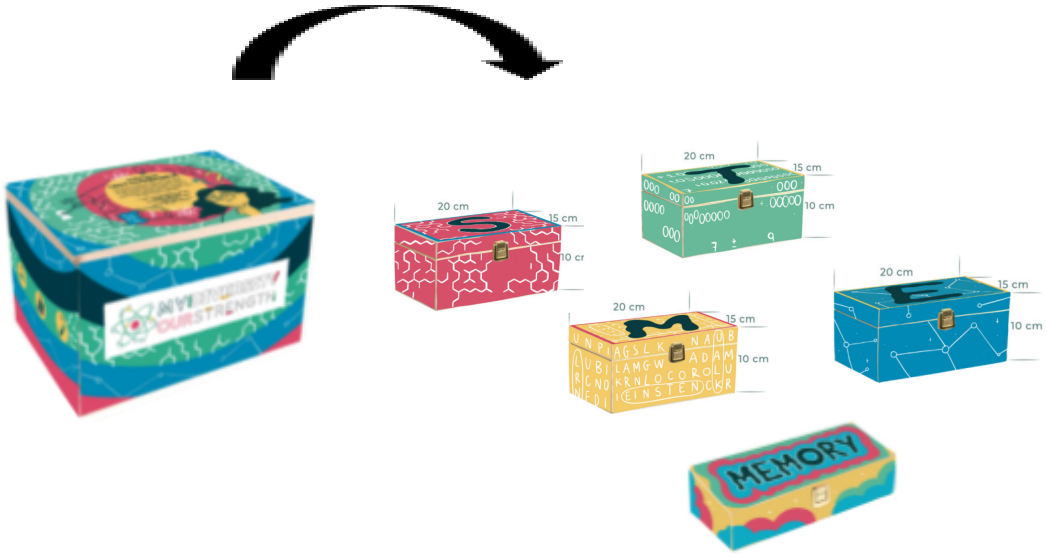
Small boxes

Inside the main box will be five small wooden boxes - named box S, box T, box E, box M and box MEMORY - all padlocked. The name of each box will be written on the lid of the box.



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Main box

Description

By solving the riddle written on the lid of the main (large) box, the player will choose to remove the sticker representing DNA and use the code found underneath to open the padlock that currently closes the box “S”.
Inside the main box, players will discover a small card that reads: “Follow the STEM!” This hint will guide players to realize they need to open the box with the letter S on the top.

Materials

The following materials are needed for this game:

- 1 large wooden box
- 1 post it “Follow the STEM!”
- 8 different stickers: scientist, DNA, RNA, vial, Earth (planet), computer, animal footprint, grass.

Aim of the game

In addition to opening the main box, the aim of this game is to introduce the player to the escape mode and to begin to make them realise that our amnesiac's job is probably in science.

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Game flow

1. read the riddle
2. find the symbol
3. read the hidden code
4. insert the code to open box S

Unfolding of the game

The riddle on the box

The player will read the inscription on the lid of the main box, complete with a riddle.

Text in Word

You have lost your memory. You barely remember what your name is and where you live, but certainly not what job you do or what excites you in life. The only thing you are certain of is that you will find your memory in this chest. It must have been really precious to have locked it away like that. You start reading and find this:

"I am the blueprint of life,
I have the code to create what's seen,
Who am I,
What do you think?"

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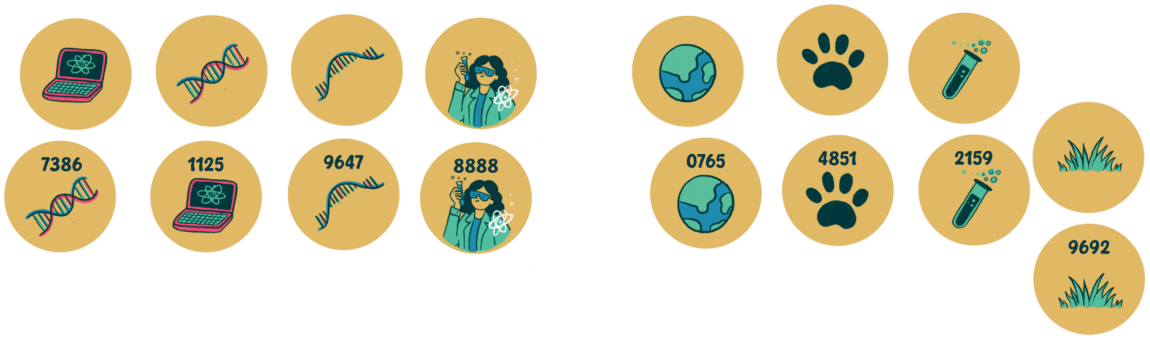
Stickers

Having solved the riddle, the player will turn his attention to the stickers on the sides. There are 8 stickers and they represent: scientist, DNA, RNA, vial, Earth (planet), computer, animal footprint, grass. Under each sticker is a different 3-digit code: scientist 8888, DNA 7386, RNA 9647, vial 2159, Earth (planet) 0765, computer 1125, animal footprint 4851, grass 9692.

The stickers should be placed on the 3 sides of the box, except the front side that contains the project's title.

The sticker with the DNA is attached on the back.



The DNA sticker

The player, having solved the riddle, will realise that the code to be entered is the one hidden under the sticker depicting DNA.

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Conclusion

The player inserts the code 7386 into the padlock that closes the S box, thus managing to open it.

Small boxes

BOX S

Description

The player opens box S. Following the only path in the maze that leads from the first DNA nucleotide to the end of the third (from left to right), the player will collect the letters A, T, G, C, A on the path. The player will use the post it to transcode the found letters, belonging to parts of DNA, into parts of RNA. By inserting the new letters into the lock that closes the T-box, he will open it.

Materials

- 1 small box
- 1 sheet of cardboard
- 1 post it “Vaccines”
- 3 laminated sheets, on each of which a maze is drawn, with the number at the top left and the words 'never go back' at the bottom right

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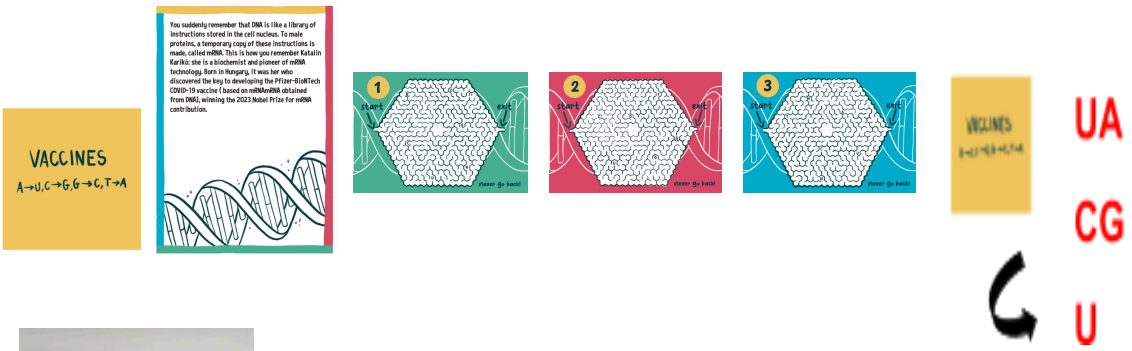
- 1 erasable board marker
- 1 padlock with letters set to 7386

Aim of the game

Open the lock that closes the S-box, learn about DNA and mRNA and get to know the figure of Katalin Karikó.

Game flow



1. read the paper sheet and the post it
2. collect the letters in the mazes
3. use the post it to transform DNA in mRNA
4. Use the letter code found to open BOX T

Unfolding

The sheet

The player finds and reads the following card shee

Text in Word

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You suddenly remember that DNA is like a library of instructions stored in the cell nucleus. To make proteins, a temporary copy of these instructions is made, called mRNA. This is how you remember Katalin Karikó: she is a biochemist and pioneer of mRNA technology. Born in Hungary, it was her who discovered the key to developing the Pfizer-BioNTech COVID-19 vaccine (based on mRNAmRNA obtained from DNA), winning the 2023 Nobel Prize for mRNA contributions.

The DNA maze

The DNA maze is to be drawn on laminated sheets rolled up in the box. The path will consist of 3 labyrinths, inserted into as many nucleotides; the neighbouring labyrinths will be joined by a horizontal corridor. The route goes from left to right.

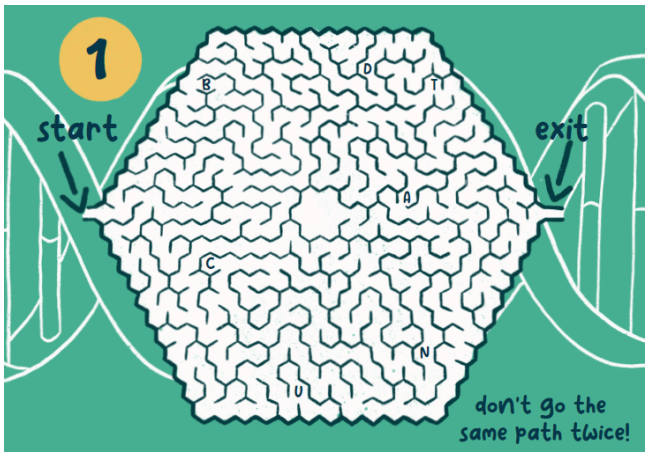
The player must collect the letters A T G C A, in exactly this order; entering the first maze from the left and continuing until the exit from the third, the player will then collect the letters A T G C A.

Additional letters will be inserted in the blind routes: B C U D N in the first maze; C U G T A in the second maze; N M U T in the third.

The words 'Don't go the same path twice!' will appear on the maze sheet.

See the composition of the three labyrinths below:

- Labyrinth 1 - inserted in the first nucleotide



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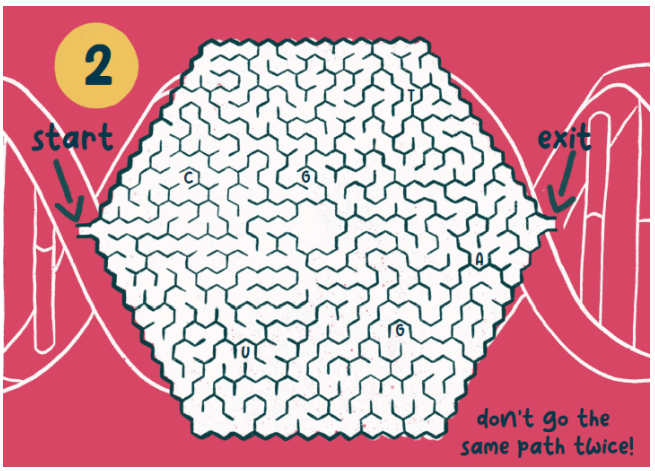
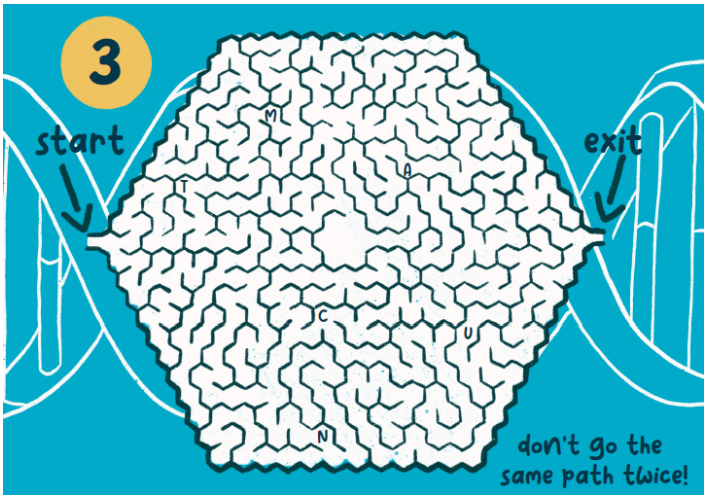
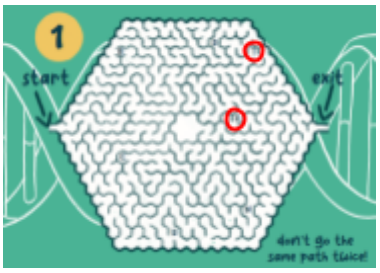
- Labyrinth 2 - inserted in the second nucleotide

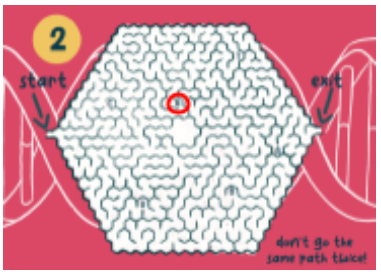


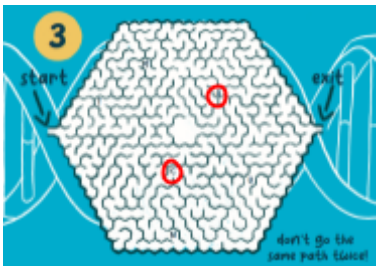
- Labyrinth 3 - inserted in the third nucleotide



- Maze solutions







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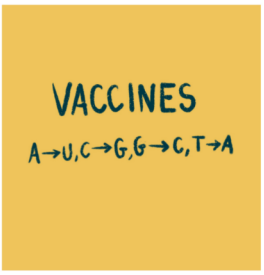
The post It

The player finds the post-it note and, reading it, realises that he has to transform the letters collected in the maze from 'DNA letters' to 'mRNA letters'. The post it is as follows:

Text in Word
VACCINES
A → U, C → G, G → C, T → A



Conclusion

The player will transform the DNA 'letters' found in the maze into mRNA 'letters'; he will then insert the mRNA code UACGU into the lock that closes the T-box, managing to open it.

BOX T

Description

The player reads the notes on the piece of paper and realises that they need to convert the fractions into decimal numbers. The player writes the name 'ADA' on the whiteboard following Bernoulli's sequence. Then, by entering the letters 'A', 'D', 'A' followed by 'L' and 'O' - the syllable described in the notes - into the lock on box E, they will be able to open it.

Materials

- 1 small box

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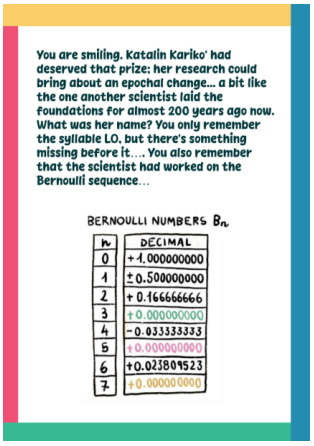
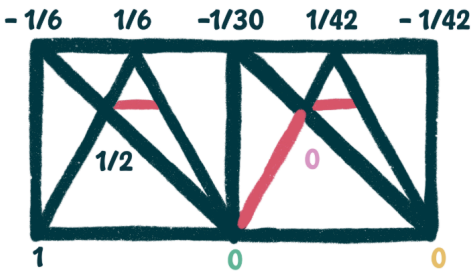
- 1 erasable board
- 1 red erasable board marker
- 1 sheet of cardboard
- 1 padlock with letters set to UACGU

Aim of the game

Opening the lock that closes the E-box, learning about the historical figure of Ada Lovelace, discovering a curiosity about the first computer and the Bernoulli sequence.

Game flow





ADA
+
LO

1. read the notes sheet
2. transform the fractions written on the board into decimals numbers
3. use the red pen to connect the numbers on the board in the correct sequence
4. Use the letter code you have found “ADA” and add the letters “LO” to open the following padlock of box E

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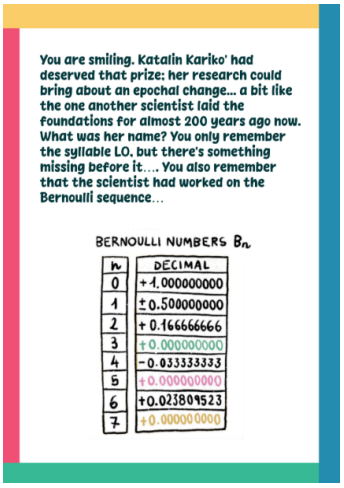
Unfolding

The leaflet

There will be a piece of cardboard with the following text and table. The zeros will be coloured of three different colours, so that they correspond to the zeros on the board:



Text in Word

You are smiling. Katalin Karikó had deserved that prize; her research could bring about an epochal change… a bit like the one another scientist laid the foundations for almost 200 years ago now. What was her name? You only remember the syllable LO, but there's something missing before it…. You also remember that the scientist had worked on the Bernoulli sequence…

BERNOULLI NUMBERS B_n

n	DECIMAL
0	+1.000000000
1	±0.500000000
2	+0.166666666
3	+0.000000000
4	-0.033333333
5	+0.000000000
6	+0.023809523
7	+0.000000000

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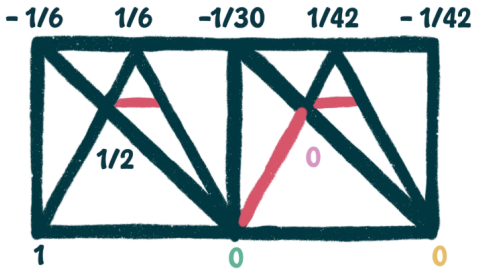
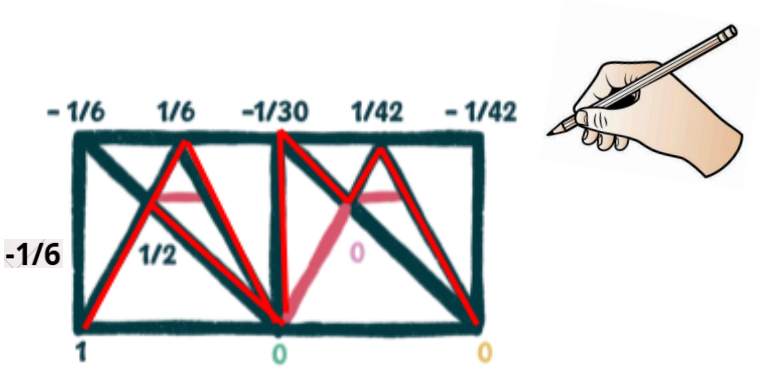
The board

The following diagram will be printed on the board in black colour with red inserts. The zeros will have three different colours, corresponding to the same zeros written in the Bernoulli sequence



The design of the name

The fractions shown in the diagram on the board represent the same decimal numbers found in the Bernoulli sequence. By connecting the fractions with a marker in the order of the Bernoulli sequence, the player will derive the letters ADA.



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Conclusion

By adding the letters LO to the name ADA, as suggested by the leaflet, the player will obtain the game-solving code. The player will insert the code ADALO into the padlock that closes the box E, thus succeeding in opening it.

BOX E

Description

The player will use the cipher to draw the 'routes' of the last communications (following the order of the cipher) on the plexiglass anchored to the bottom of the box - the plexiglass, in fact, covers the bottom of the box, where dots are drawn in seemingly random order and surrounded by city names. The routes will turn out to be symbols which, mirrored in the mirror, will return the digits 9, 2, 1, 4. By inserting the digits into the padlock attached to the M-box, the M-box will open.

Materials

- 1 small box
- 1 mirror slightly smaller than the inner sides of the box
- 1 transparent plexiglass to cover the bottom of the box
- 1 felt-tip pen for writing on plexiglass
- 1 sheet of cardboard
- 1 cipher on cardboard
- 1 padlock set to ADALO

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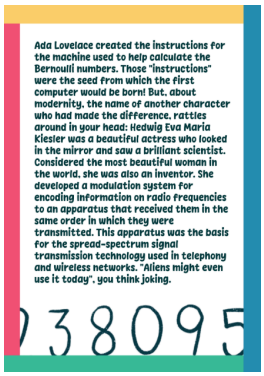
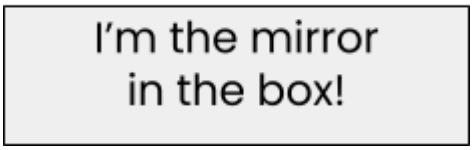
Aim of the game

Open the lock that closes the M-box, discover some interesting facts about wireless and learn about the historical figure of Hedwig Eva Maria Kiesler.

Game flow





1. Read the sheet
2. use the cipher to draw the 'routes' of the last communications
3. mirror the symbols of the 'routes' of the last communications
4. use the number code you have found to open the following padlock of box M

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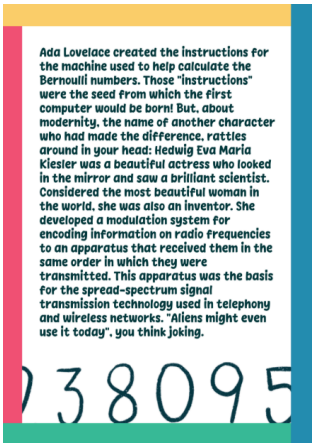
Unfolding

The sheet

The player finds and reads the following sheet:

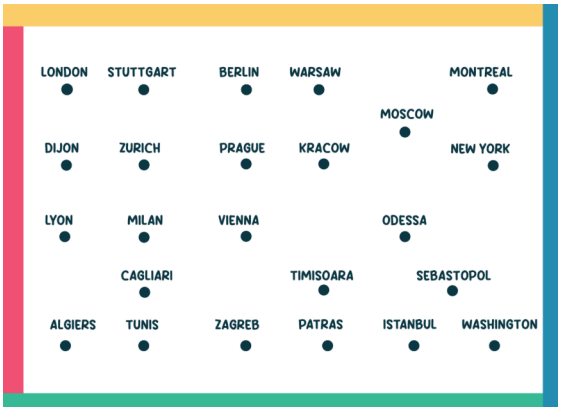


Text in Word

Ada Lovelace created the instructions for the machine used to help calculate the Bernoulli numbers. Those 'instructions' were the seed from which the first computer would be born! But, about modernity, the name of another character who had made the difference rattles around in your head: Hedwig Eva Maria Kiesler was a beautiful actress who looked in the mirror and saw a brilliant scientist. Considered the most beautiful woman in the world, she was also an inventor. She developed a modulation system for encoding information on radio frequencies to an apparatus that received them in the same order in which they were transmitted. This apparatus was the basis for the spread-spectrum signal transmission technology used in telephony and wireless networks. "Aliens might even use it today,' you think joking.

The design on the bottom and the plexiglass

The player reads the bottom of the box, which will be drawn and show dots flanked by city names positioned exactly like this:



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A transparent plexiglass sheet will be fixed above the drawn bottom, on which the player can write with erasable marker:

The cipher

The player will draw 4 symbols on the bottom of the box, following the instructions of the following cipher, made of thick cardboard/paper:

Text in Word

Latest communication cipher

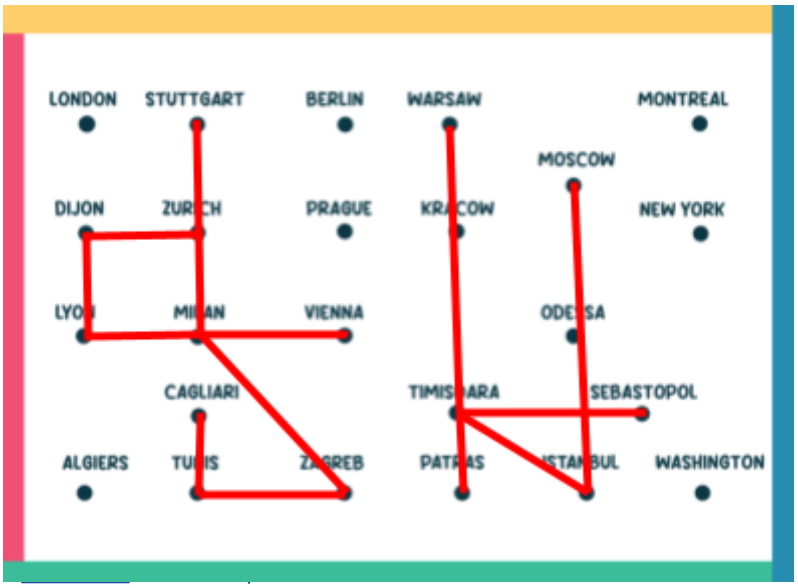
Stuttgart - Milan - Lyon - Dijon -Zurich

Vienna - Milan - Zagreb - Tunis - Cagliari

Warsaw - Timisoara - Patras

Moscow - Istanbul - Timisoara - Sebastopol

Solution of the cipher application



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The Mirror

A mirror with a side a little less than the perimeter of the box will be attached to the inside of the lid. By mirroring the symbols in it, the player will obtain the 4 numbers to insert into the lock.

Conclusion

The player inserts the code 9214 into the padlock that closes the M-box, thus succeeding in opening it.

BOX M

Description

After reading the diary pages, the player will realise that they must solve the letter puzzle by erasing the names underlined on the diary sheet. Still reading the diary, but also helping themselves with the post-it note, the player will replace the letter puzzle with the number puzzle; by solving the quick equation formed by the numbers that will remain legible, they will obtain the code 2100, with which they will open the lock of the MEMORY box.

Materials

- 1 small box
- 1 post it “Delete the names and... swap!”
- 2 diary pages on thick paper/cardboard
- 1 frame 15x15 with transparent film
- 2 sheets of 12x12 cm paper (one with letters, one with numbers)

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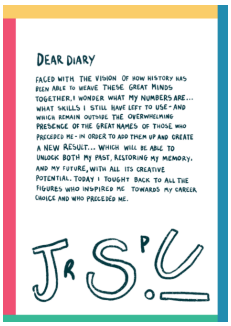
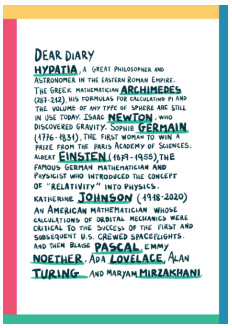
- 1 erasable pen for whiteboard
- 1 calculator
- 1 lock set to 9214

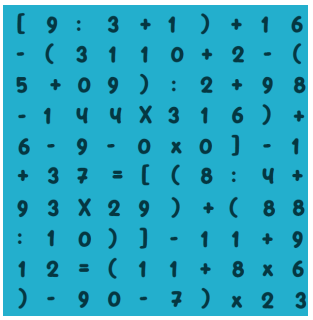
Aim of the game

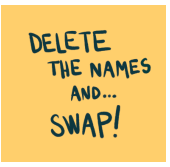
Open the lock that closes the MEMORY box and gain some knowledge about some of the great mathematicians of the past.

Game flow









1. Read the diary sheets
2. find the names of the scientists, erasing the correct letters with the pen
3. change the puzzle in the frame (as suggested by the post it), putting in the one with the numbers. Solve the equation that appears using

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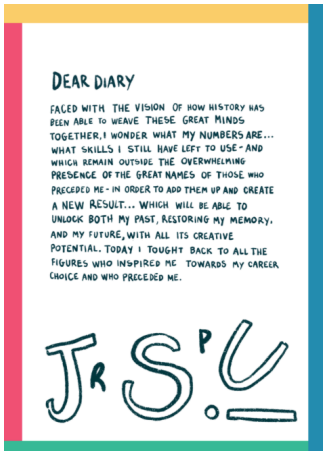
the numbers and symbols highlighted (you can use the calculator provided).

4. use the number code you have found to open the following padlock of box MEMORY

Unfolding

The diary

The player finds and reads two diary pages on thick/thick paper, as follows:



Text in Word

Faced with the vision of how history has been able to weave these great minds together, I wonder what my numbers are... what skills I still have left to use - and which remain outside the overwhelming presence of the great names of those who preceded me - in order to add them up and create a new result... which will be able to unlock both my past, restoring my memory, and my future, with all its creative potential. Today I thought back to all the figures who inspired me towards my career choice and who preceded me.

HYPATIA, a great philosopher and astronomer in the Eastern Roman Empire. The Greek mathematician ARCHIMEDES (287-212), his formulas for calculating pi and the volume of any type of sphere are still in use today. Isaac NEWTON (1642-1727), who discovered gravity. Sophie GERMAIN (1776-1831), the first woman to win a prize from the Paris Academy of Sciences. Albert EINSTEIN

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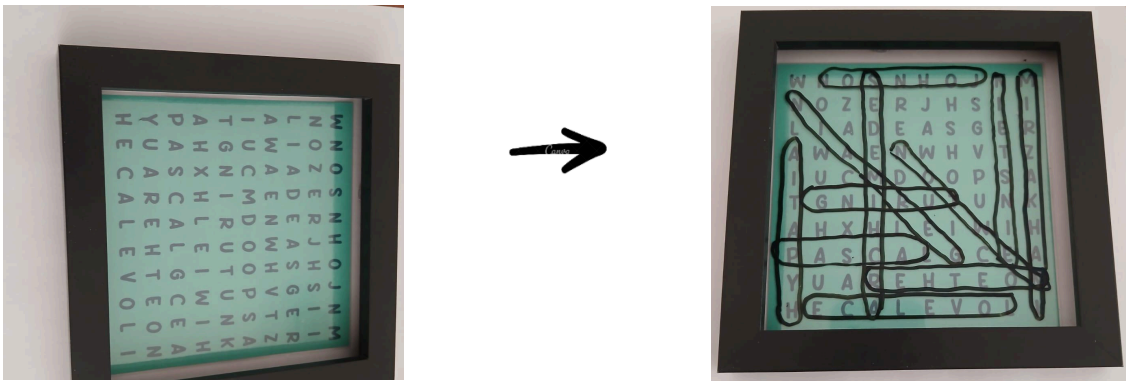
(1879-1955), the famous German mathematician and physicist who introduced the concept of 'relativity' into physics. Katherine JOHNSON (1918-2020) an American mathematician whose calculations of orbital mechanics were critical to the success of the first and subsequent U.S. crewed spaceflights. And then Blaise PASCAL, Emmy NOETHER, Ada LOVELACE, Alan TURING and Maryam MIRZAKHANI.

The frame and the letter puzzle

In the 12x12 frame with transparent plastic, the 10x10 cm sheet of paper showing a letter puzzle scheme will be placed. Players must find all the names of the scientists, erasing the correct ones with the erasable pen.



The number puzzle

The number puzzle is printed on the second 10x10 cm sheet. The text is exactly as follows:

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The post It

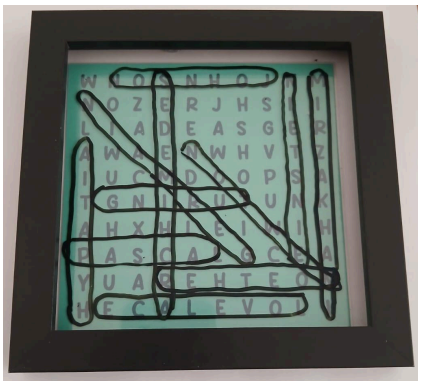
The following post it will be an additional clue for the player to be able to swap the two puzzles:

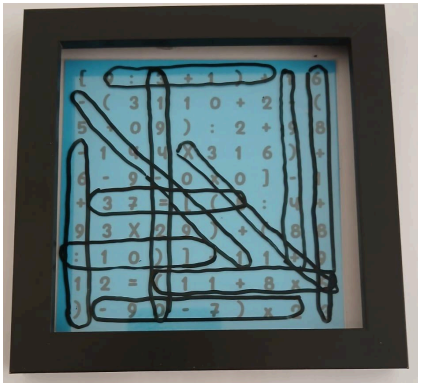
Text in Word

Delete the names and... swap!

The exchange

Once all the names of scientists have been canceled over the transparent plastic of the frame, the player replaces the letter puzzle sheet with the number puzzle sheet.





Conclusion

The player will solve the operation: [(310+250):2+1316-900]3X9+12 = (280+416):3x9+12 = 232x9+12 = 2100. The player will insert the code 2100 into the padlock that closes the MEMORY box, thus succeeding in opening it.

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MEMORY BOX

Description

The player has recovered their memory: they now know that they are a scientist in love with science, mathematics and all STEM subjects.

Materials

- 1 small box
- 2 sheets of thick paper
- 1 lock set to 2100

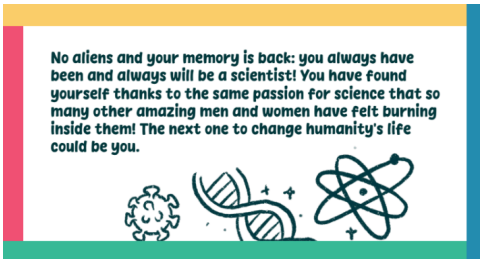
Aim of the game

Finally recovering the protagonist's memory by reading a last note, discovering that she is a scientist and sharing her love and passion for STEM subjects.Unfolding and Conclusion

Memory lines

The player reads the following paper and thus ends the adventure: the memory has been found!

Text in Word : *No aliens and your memory is back: you always have been and always will be a scientist! You have found yourself thanks to the same passion for science that so many other amazing men and women have felt burning inside them! The next one to change humanity's life could be you.*



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