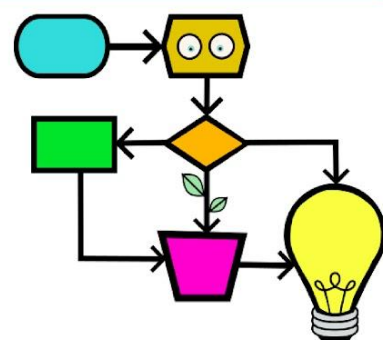
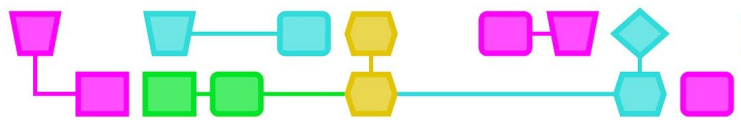


Tinkering with CT  
Roadrunner and Coyote



Co-funded by the  
Erasmus+ Programme  
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**Summary:**

The students play a game in which they walk through a maze by following predetermined instructions describing the path they should take. There are two groups; one group represents the Roadrunner, which has to reach the end of the maze without being caught; while the other Coyote group focuses on catching the Roadrunner by crossing its path. Any movements carried out in the maze must be written in advance prior to starting the game.

**Target group:** Students aged 9 to 12 years old

**Duration:** 60 minutes

**Learning goals:** At the end of this exercise the students will know what programming is.

- The students must study the maze and be incredibly precise with their written instructions.
- The students will come to learn about the conditions when walking through the maze, that is, checking where the walls are and where to turn, etc.

**Online/offline:** offline

**Computational Thinking:**

- General skills: planning, cooperation
- CT foundations: Algorithm, Pattern recognition, Decomposition, Abstraction
- CT concepts: programming, functions, loop, code, condition

**Particulars:** For this activity, the teacher will need to create a maze. Depending on the size of the group, the teacher may have to create multiple mazes.

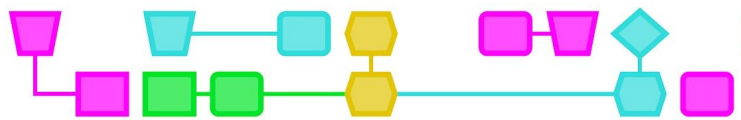
**Materials:**

- Large paper (flip-over or A3 paper) or gridded paper (see appendix)
- Dolls (Coyote and Roadrunner, Lego people or animal figures or something like this)
- Tokens (for example, fake coins, transparent coloured forms (see example))
- Dice

**Tip:** Use a flip-over sheet with a grid as the basis for the maze.

**Preparation**

- Prepare both the example maze and the grid sheet. Once the teacher has made one, then this can be used on several occasions.
- Collect figures to use on the maze as moving objects.



## Roadrunner and Coyote

### Introduction to Roadrunner and Coyote (15 min):

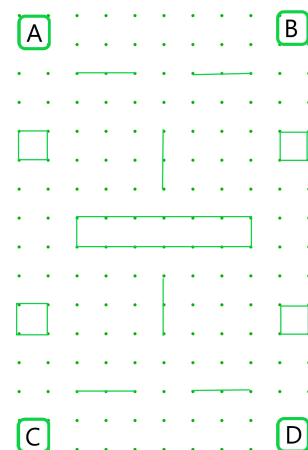
In this introductory activity, students play roadrunner or coyote. Like in the cartoon, coyote's main goal is to catch roadrunner, while roadrunner tries to reach the end of the maze without getting caught. The movements roadrunner and coyote make in the maze are determined in advance.

The students are divided into groups of 8. They form a duo and together plan the moves on the maze. So you have 4 duos playing in 1 maze.

Check example maze (see appendix 2):

### Start and ending point of each group:

- Roadrunner group 1 starts at point A and tries to reach point C.
- Roadrunner group 2 starts at point D and tries to reach point B.
- Coyote group 1 starts at point C and tries to catch Roadrunner group 1.
- Coyote group 2 starts at point B and tries to catch Roadrunner group 2.



**Tip:** For extra challenge, you can also have the roadrunner and coyote start diagonally opposite each other. So roadrunner group 1 on A, roadrunner group 2 on C, coyote 1 on D and coyote 2 on B.

### Defining steps and movements (15 min):

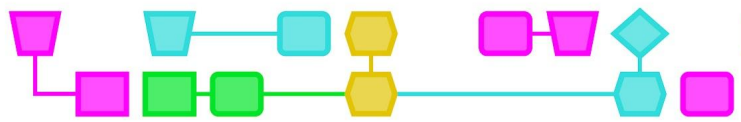
Each group writes out which path they are going to take through the maze using arrows for forward, backward, left, right ( $\uparrow \leftarrow \rightarrow \downarrow$ ). Have students write out a 30-step route, where each arrow equals 1 cube. Once everyone has written out the route, the game can begin.

**Tip:** Print out the maze an extra time for each group, then they can mark out the pre-designed route on the maze.

To determine which group starts first, each group gets a turn to throw a dice. The group with the highest score will go first and the next highest scoring group goes second, and so on and so forth, until the teams are ranked one through four. Groups that score the same number must roll the dice again.

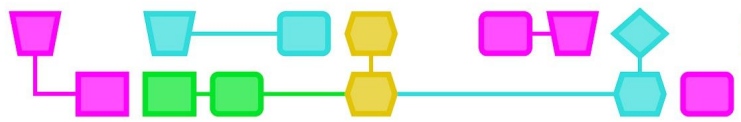
### Playing the game (20 min):

Students walk through the maze, following their own route. Each turn means moving through 2 blocks of the grid, i.e. following 2 arrows. Repeat the task a few times so they can improve their strategy.



### Conclude and Evaluate (10 min):

Discuss with the students how it went. Explain that they wrote a programme (algorithm) to move Coyote and Roadrunner through the maze. Could they also write the programme shorter using a loop or condition



## The Maze

### Create your own game with The Maze (50 min)

The students will now work in groups of 4 to come up with their own game. The basis for the game is the maze or open grid.

Step 1: Goal of the game.

The students think together what the goal of the game will be. Explain that they may use the existing grid or create their own new grid in the blank example. The ideas below can get students started:

- To catch each other
- Who reaches the point first.
- Who can collect more coins or points?
- Cooperate
- Oppose each other
- etc.

Step 2: The maze

The game board is the maze. In this step, students think of what maze fits their game idea. For example:

- An empty grid
- Draw obstacles in the maze
- The same obstacles or different for each side of the maze
- Boxes with a certain function like in Game of go.

Step 3: Rules

Think about how the game should be run. E.g.

- Roll a dice for the starting point or to start first.
- Minimize the number of steps. For example: you may use a maximum of 20 steps and must collect as many coins as possible.
- Try to use loops and conditions. For example: Move left or right when you reach a wall.

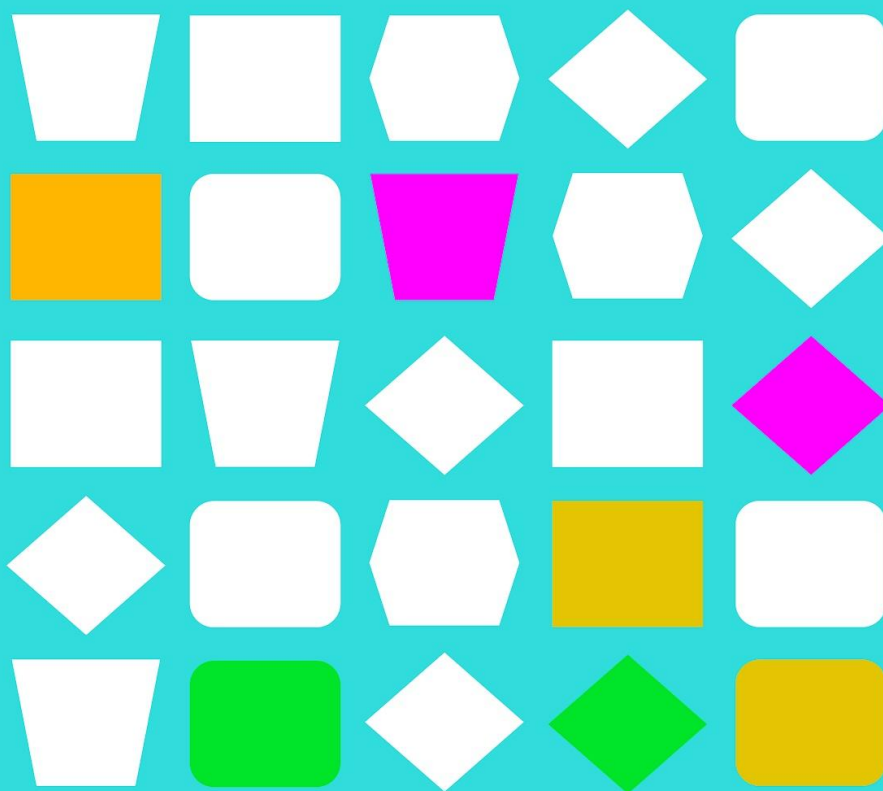
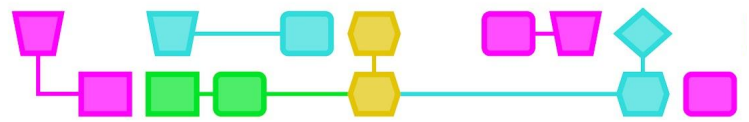
Step 4: Try out and adapt

Students write down the rules and try out the game. As they try it out, they encounter things that may or may not work well. Encourage students to adjust the rules until the game works well.

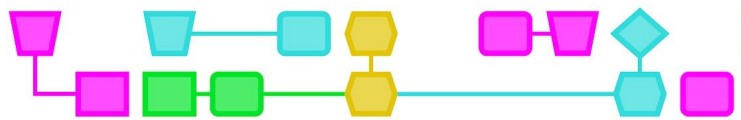
### Conclusion (15 min)

Exchange the games among the students and write down points of improvement for the games.

Discuss with students their experience. Explain the connection to programming: you must be very precise in your commands, or the computer will not execute your command as you meant to.

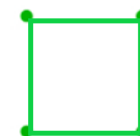
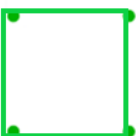
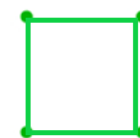
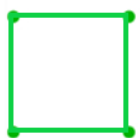


# Appendices



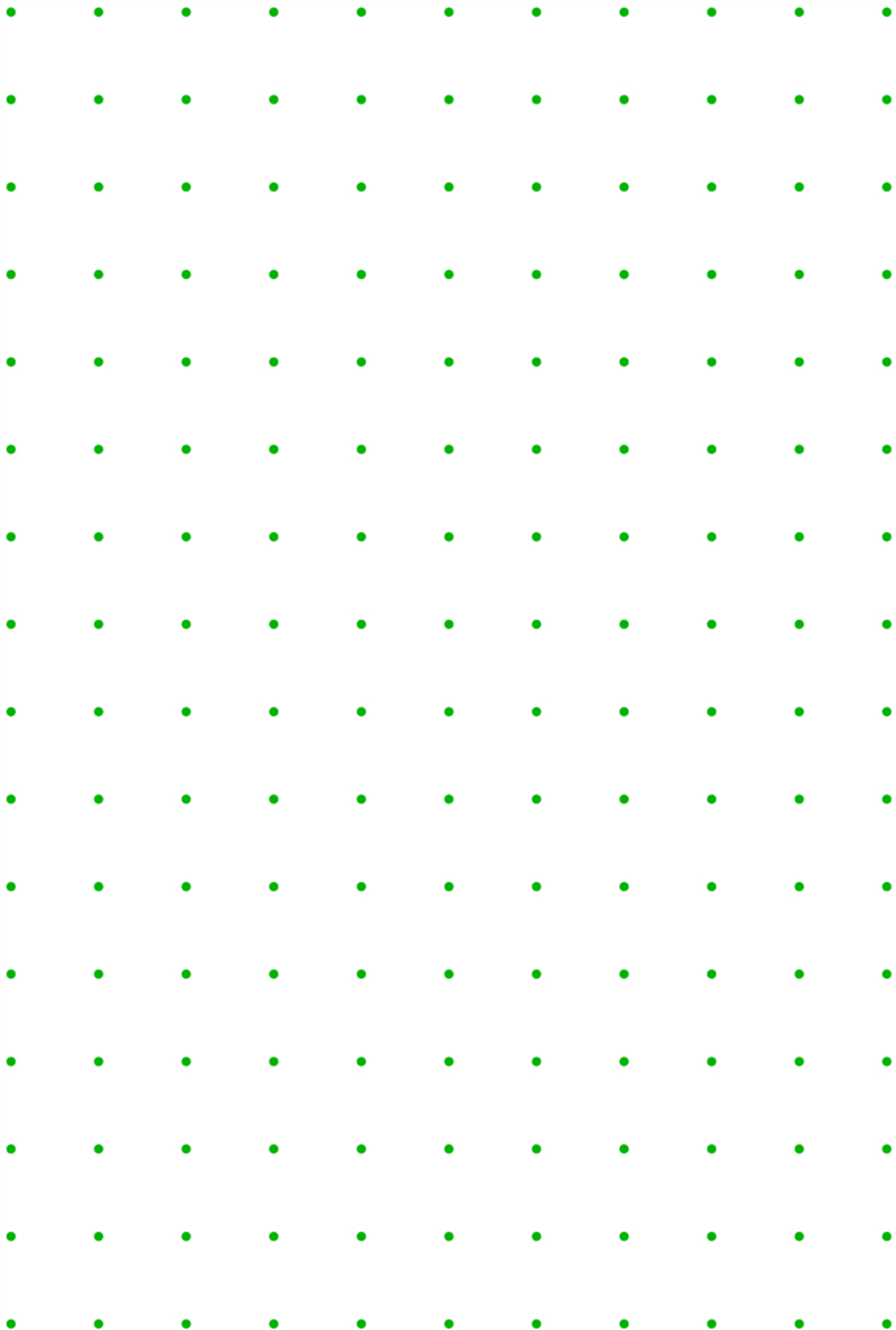
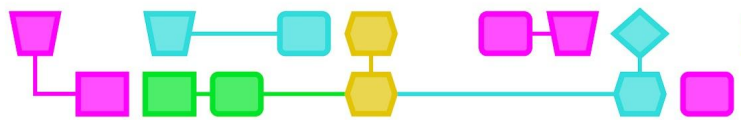
A

B

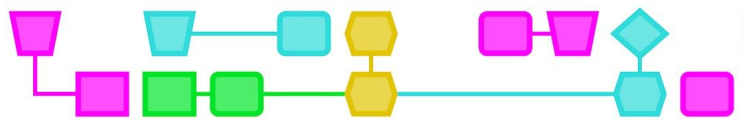


C

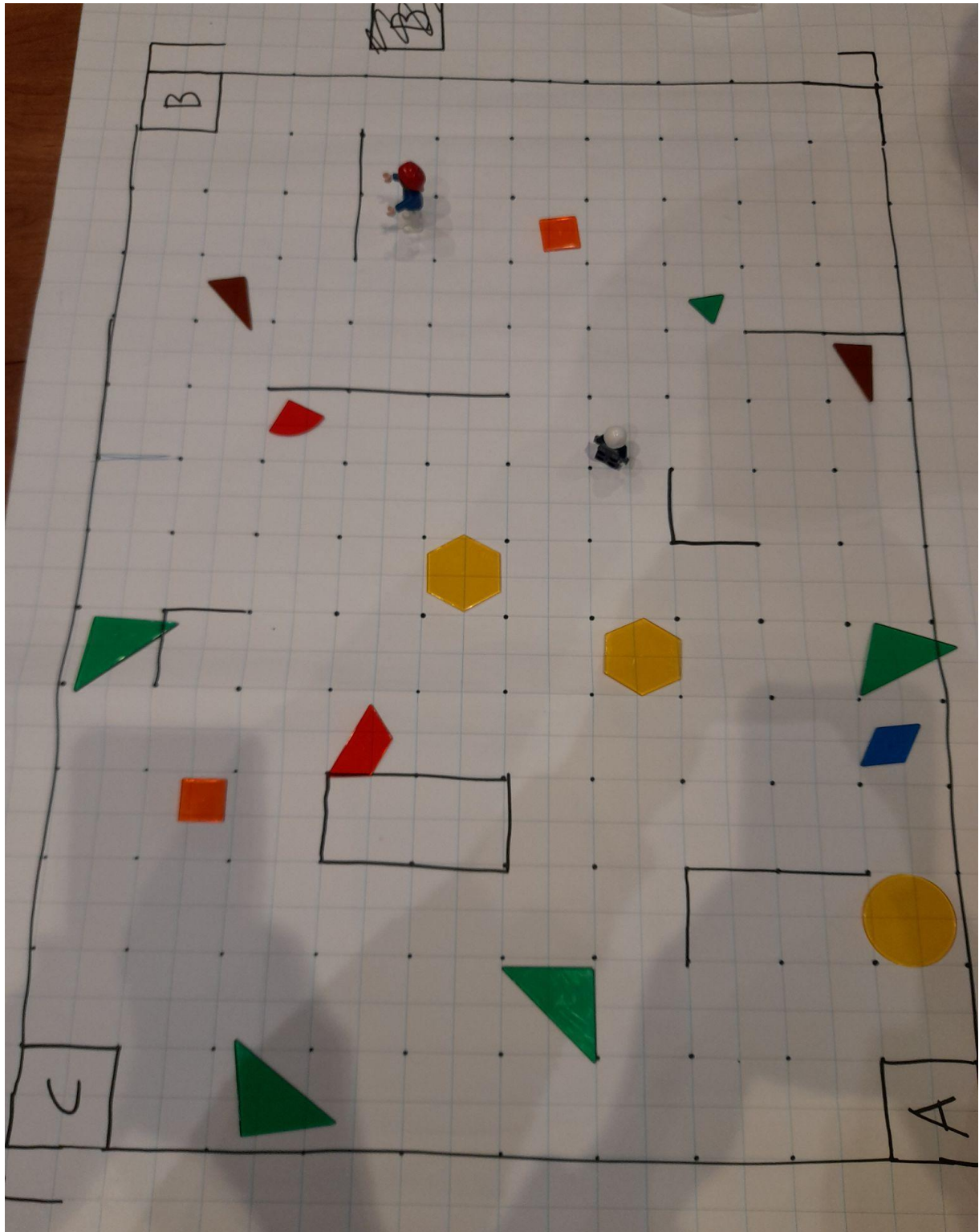
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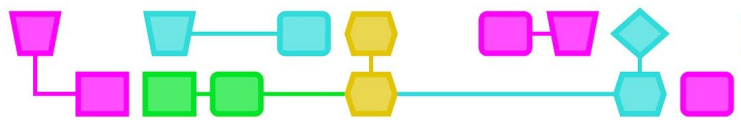






## Appendix 2: Example maze





# Colophon

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# Deusto

