

[ai] explore in Logo 2 (for advanced programming)

Prior knowledge

The expected prior knowledge in the field of programming and computational thinking was:

- creates an algorithm to solve a simple problem, checks the correctness of the algorithm, detects and corrects errors,
- uses a programming tool to create a program that uses input and output values and repetition.

Suggested tasks for testing prior knowledge (at the end of the document)

Learning outcomes:

- creates, monitors, and refactors programs that contain branching and conditional repetition structures and predicts the behaviour of simple algorithms that can be represented by diagrams, spoken words, or programming language,
- considers and solves a more complex problem by breaking it down into a series of subproblems.

Preparation for the activity

- The game [ai] explore! (Appendix 1)
- 5x5 Geoboards or paper with prepare boards (ideally one per student/computer). In the following activity, we used the first game in the Appendix 1
- Rubber bands or pencils

WEEK 1 (2 x 45min)

1. Playing the [ai] explore! game
2. Construction of polygons in FMSLogo (excercise) using repeat for drawing the square

Task 1. Make a procedure “square” which draws a square with side of length 50 and colour the square with a colour of your choice.

Task 2. Modify the procedure "square" from Task 1 so that it draws a square whose side is of length d (the user enters the side length outside the procedure).

Task 3. Modify the procedure “square” from Task 2 so that it draws a square whose side is of length d and colours it with colour b which user enters (inside of the procedure).

After the square is drawn, set Turtle to lower left corner of the square, looking upwards (starting position).

COMMANDS: make, readword, repeat, setfc :colour fill, invoking a procedure with a variable; color code

Task 4. Using the procedure created in Task 3, make 5x5 square grid such that each square is coloured (as in the geoboard in front of you). Hint: make a plan how to draw a 5x5 grid (for example, row by row or column by column).

COMMANDS : for

WEEK 2 (2x 45min)

At the beginning of the exercise, all students have access to the file with solution of Task 4 (from week 1).

Task 5. Place the turtle in the middle of the top left square (from Task 4) and orient it so that it faces right. Walk the turtle across the grid of squares so that it follows the same path as indicated on the Geoboard in front of you.

Task 6. Modify the Task 5 such that turtle writes the color code of that square on each square on its path.

COMMANDS: label pixel

WEEK 3 (2x 45min)

Task 7. Walk the turtle around the grid so that it starts from the upper left corner and moves only to the right or down using the buttons along the path indicated on the Geoboard.

COMMANDS: buttons

Creating the plan to make a game on 8x8 grid. (45 min)

1. Show the student a game in Logo, i.e. the final goal for students to create

Task 8. Enter the grid size n ($n=8$) and make an $n \times n$ grid such that the squares are coloured with random colour (some of the five colours: black, blue, green, yellow, red).

COMMANDS: pick [0 1 2 4 6]

1. Show a game in FMSLogo, as a presentation of final goal.

WEEK 4 (2x45min)

Task 9. Make a procedure “points” which reads the color of the field where the turtle is and returns the number of points that color carries, respecting the following scale: black - 1 point, blue - 2 points, green - 3 points, yellow - 4 points, red - 5 points).

Modify task 8 so that the turtle writes the number of points in each field (instead of the field color label).

WEEK 5 (2x45min)

Task 10. Modify task 9 so that the turtle walks on the board from the upper left corner and moves only to the right or down using the buttons and, using the "points" procedure, calculates the points it has collected during its walk.

COMMAND: if

WEEK 6 (2x45min)

Task 11. Modify the task 10 in a way that turtle cannot walk outside of the grid and when the turtle comes to the lower right corner write down the total amount of points.

COMMANDS: if – else (if number of steps to the right equals n then ALERT, else step++)

Task 12. Testing the created program.

WEEK 7 (2x45min)

PROJECT TASK:

Enter the size of the grid n ($n=8$) and draw a square grid $n \times n$ so that the squares are colored randomly (some color from the 5 colors: black, blue, green, yellow, red), but in such a way that the first column is colored as follows: blue, green, red, yellow, red (so that the blue square is in the upper left corner). If there are more than 5 rows, a random color is chosen for the rest of the first column. Finally, place the turtle in the lower right square and orient it to face right.

Walk the turtle around the grid so that it starts from the lower right corner (and ends in the upper left corner) and moves only left or up using the buttons (after each step the turtle looks to the right again).

Create a procedure "points" that reads the color of the square the turtle is on and returns the number of points that that color carries, respecting the following scale:

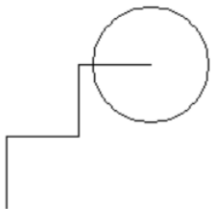


black - 0 points, blue - 1 point, green - 2 points, yellow - 3 points, red - 4 points. The turtle writes the number of points it has collected so far in each space it lands on.

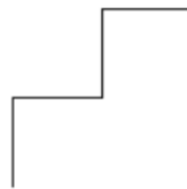
Suggested tasks for testing prior knowledge

1. ___ is the command that starts the program; while the command ___ is the command that ends it.
2. Which command do we use to fill a shape?
 - a. fillshape
 - b. fill
 - c. repeat
 - d. pu
3. Which commands will draw a rectangle (2 correct answers)?
 - a. *repeat 4 [fd 60 rt 90]*
 - b. *repeat 2 [fd 60 rt 90 fd 40 rt 90]*
 - c. *repeat 2 [fd 60 rt 90 fd 60 rt 90]*
 - d. *fd 60 rt 90 fd 40 rt 90 fd 60 rt 90 fd 40 rt 90*
4. What shape will we get with command: *repeat 3 [fd 75 lt 360/3]*?
 - a. rectangle
 - b. square
 - c. triangle
 - d. circle
5. Which drawing will we get with the following commands:

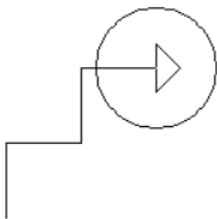

```
repeat 2 [fd 50 rt 90]
lt 180 fd 50
rt 90 fd 50
circle 40
ht
```



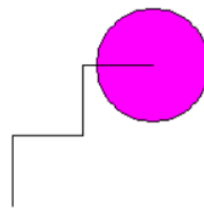
a)



b)



c)



d)

