

# [ai] explore! in Scratch

## Prior knowledge

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

- creates a program using a visual programming interface that uses sequential programming, iterations, branching and evaluates their solution with the help of a teacher

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

## Learning outcomes

Expected learning outcomes:

- creates a program using visual programming interface that uses sequential programming, iterations, branching, and input values;
- solves more complex logical problems with or without the use of a computer

Suggested tasks for testing achievement of learning outcomes (at the end of the document)

## Preparation for the activity

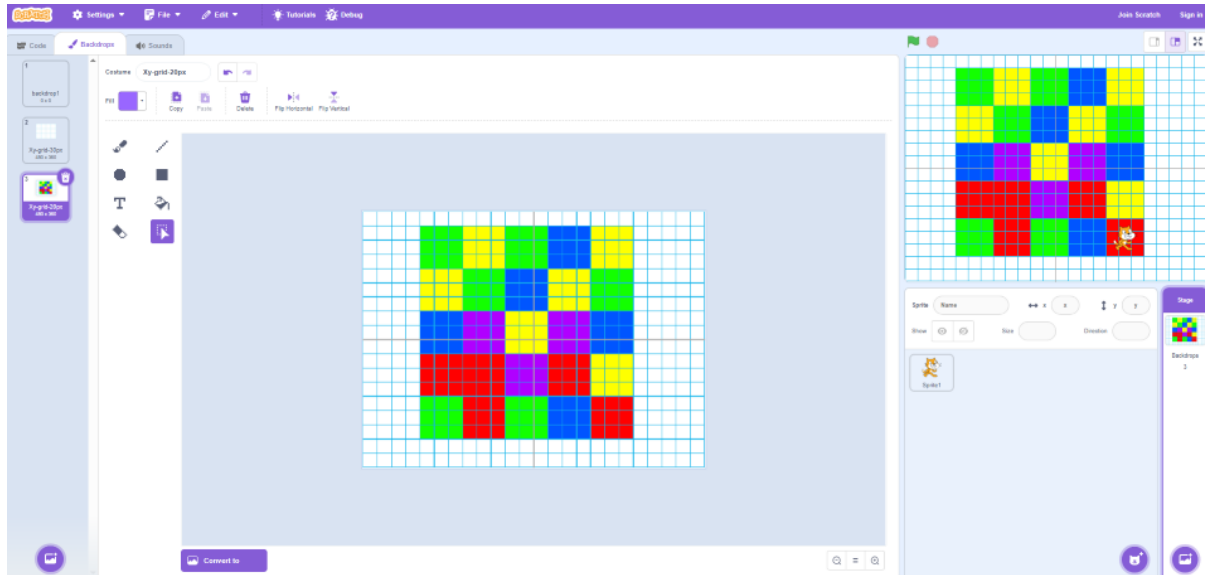
- The game [ai] explore! (Appendix 1)
- 5x5 Geoboards or paper with prepare boards (ideally one per student/computer or one micro:bit per two students). In the following activity, we used the first game in the Appendix 1.
- Rubber band or pencils
- Micro:bits (ideally one per student/computer or one micro:bit per two students)
- Installation of a game on micro:bits (for students to play with) - for example Rock, Paper, Scissors available for download at <https://makecode.microbit.org/projects/rock-paper-scissors>
- Install the program for communication between Scratch and micro:bit

# WEEK 1 (90 minutes activity)

**Task 1.** Draw a board and select a character who will play the [ai] explore! Game.

Instructions for solving the task: Choose a costume for the xy-grid-20px stage. Color each square in the grid with the appropriate color so that the stage looks like the board in front of you.

Solution:



## WEEK 2 (90 minutes activity)

Preactivity:

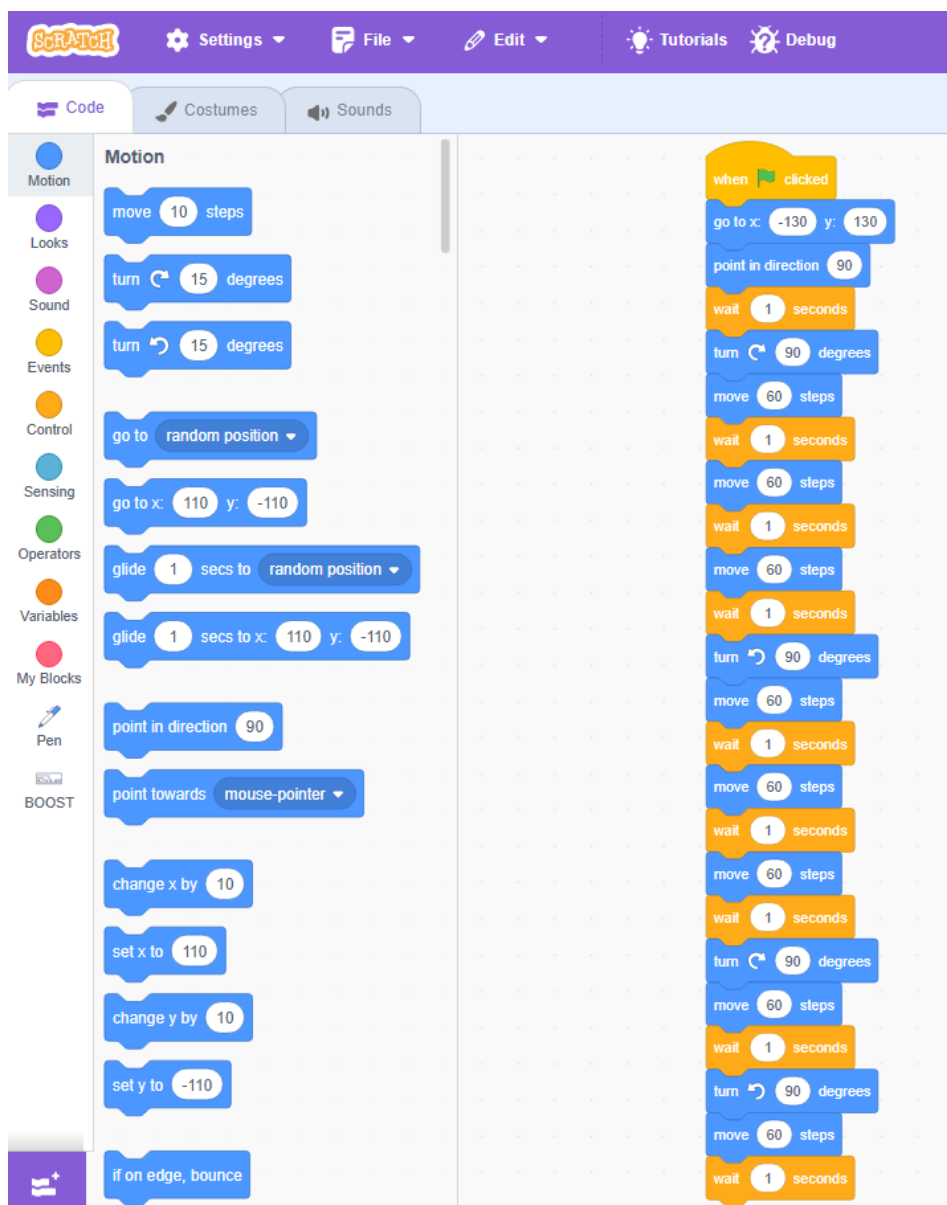
- Playing the game on the GeoBoard.

Preparation for the task:

- Recall the Motion commands in Scratch

**Task 2.** Move your character around the GeoBoard that you drew in Scratch so that the character follows the path indicated on the GeoBoard.

Solution: in the presented code one possible path is implemented.



The image shows the Scratch code editor interface. The left sidebar displays the 'Motion' category with various blocks. The main workspace shows a script starting with a 'when green flag clicked' event block, followed by a sequence of motion blocks: 'go to x: -130 y: 130', 'point in direction 90', 'wait 1 seconds', 'turn 90 degrees', 'move 60 steps', 'wait 1 seconds', 'move 60 steps', 'wait 1 seconds', 'move 60 steps', 'wait 1 seconds', 'turn 90 degrees', 'move 60 steps', 'wait 1 seconds', 'move 60 steps', 'wait 1 seconds', 'turn 90 degrees', 'move 60 steps', 'wait 1 seconds', 'turn 90 degrees', 'move 60 steps', and 'wait 1 seconds'. The 'Motion' category in the sidebar includes blocks for moving, turning, gliding, and changing coordinates.

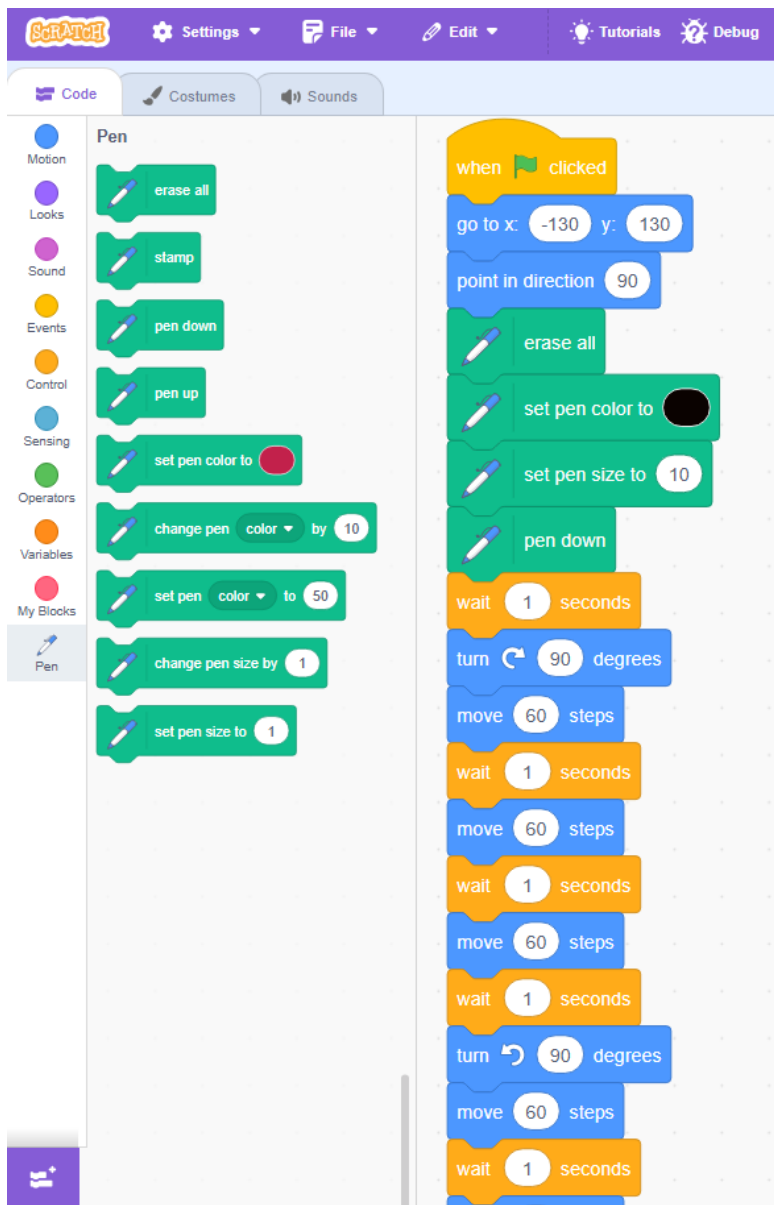
Preparation for the task:

- Select the pen from the Scratch extensions list.
- Get to know the commands you can use to control the pen.

**Task 3.** Change the program from Task 2 so that the character draws the path it passes (let the pencil draw a black line with a thickness of 10).

Solution:

We provide the image of the code inserted into the previous code (green blocks).



## WEEK 3 and 4 (180 minutes activity)

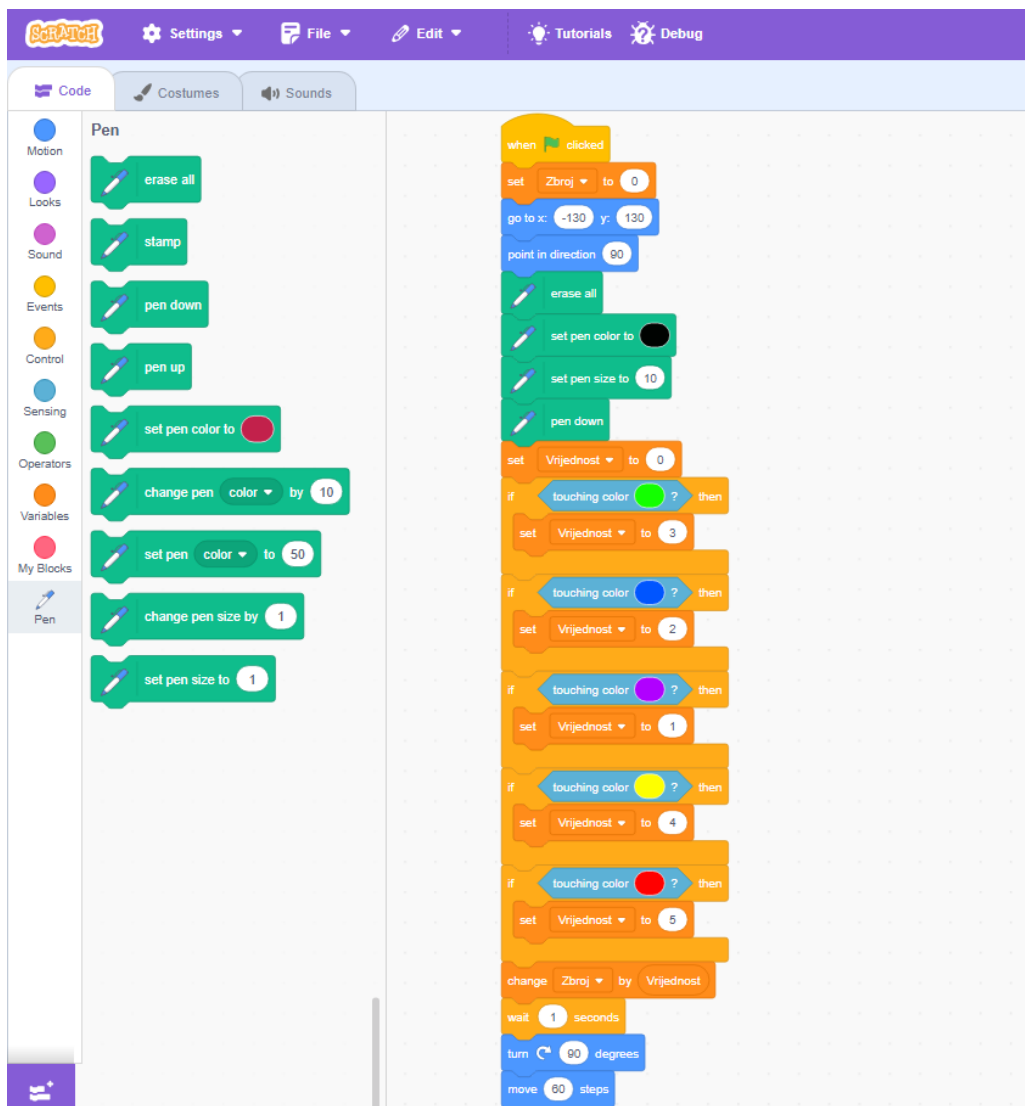
Preparation for the task:

- Do you remember what a variable is?
- How do we introduce variables in Scratch?
- Review the Read commands.

**Task 4.** Change the program from Task 3 so that the character adds up the points according to the rules of the game.

Solution:

We provide the image of a repetition part of the full solution. The full code consists of repeating the orange blocks (adding points according to the background colour) after every movement step.



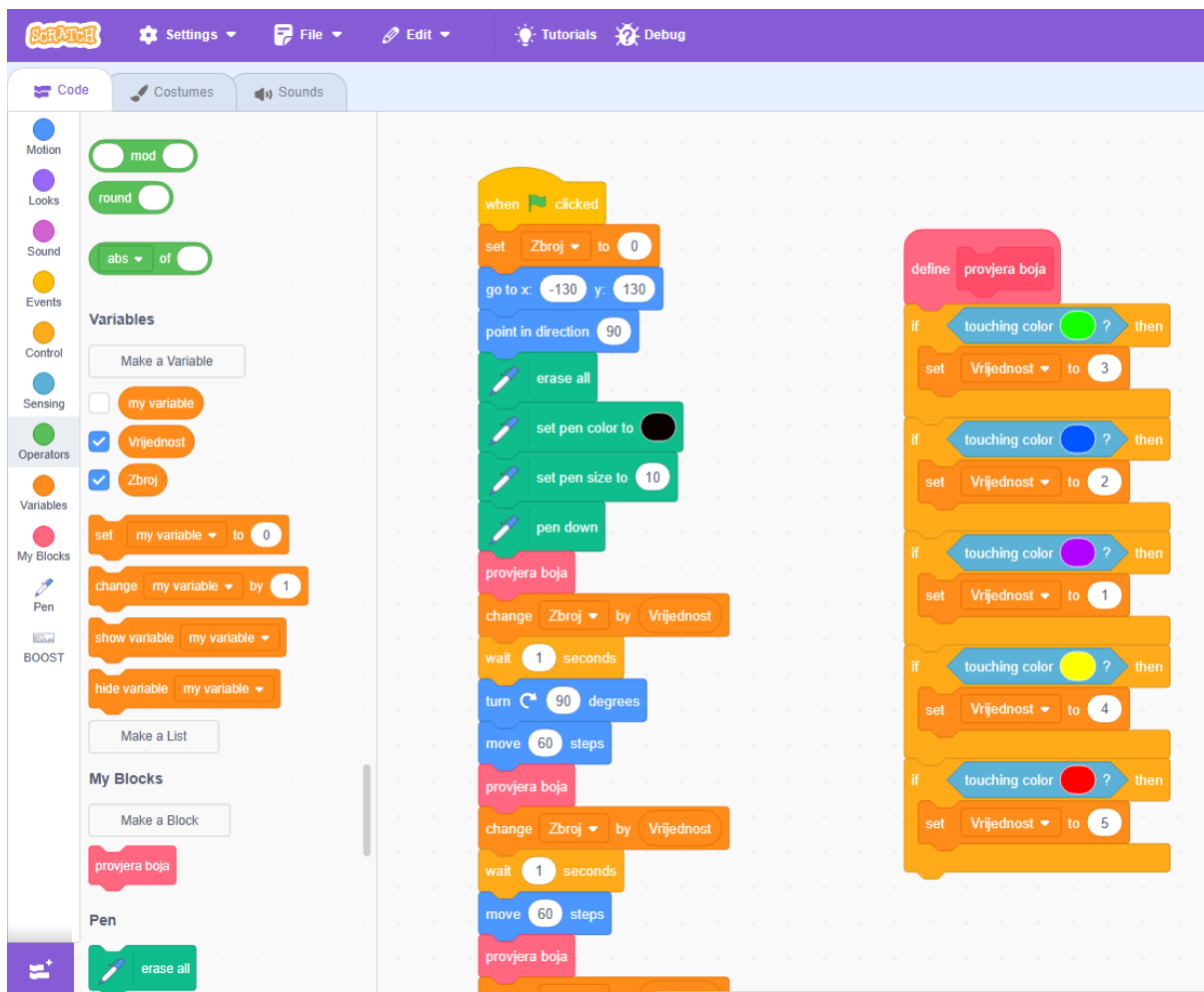
## WEEK 5 (90 minutes activity)

Preparation for the task:

- What are blocks? Can you make a block that will reduce the number of lines of code in the previous task?

**Task 5.** Change the program from Task 4 so that it creates a block of commands.

Solution:

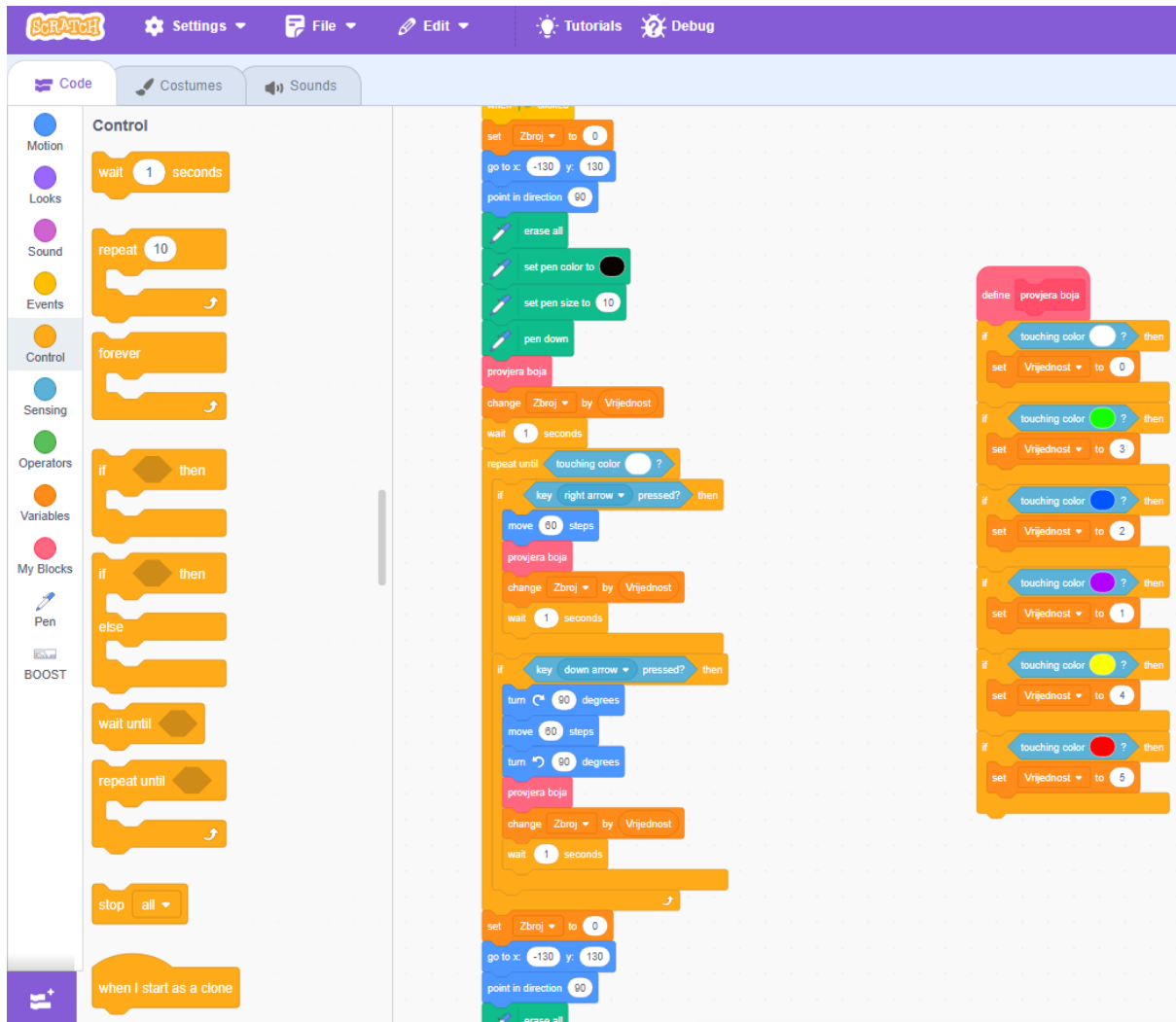


Preparation for the task:

- Recall the commands for Events in Scratch.

**Task 6.** Change the program from Task 5 so that you control the character's movement, using the arrow keys on the keyboard. If your character goes outside the game board, the game ends and the character returns to the beginning.

Solution:



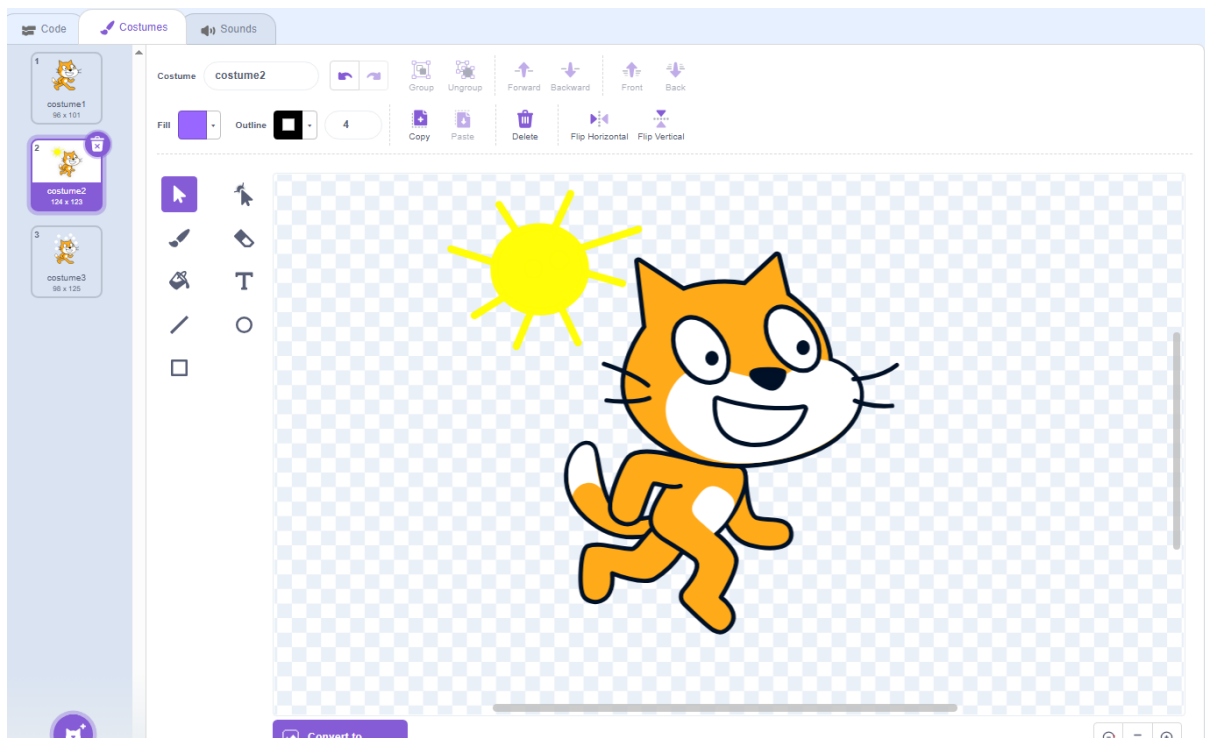
## WEEK 6 (90 minutes activity)

Preparation for the task:

- Recall the commands for Looks and Sound.

**Task 7.** Change the program from Task 6 so that after the character reads the color, he changes his costume depending on the color, gives a sound signal, and says what the color temperature of the field he is standing on is.

Solution:



Scratch Settings File Edit Tutorials Debug

Code Costumes Sounds

**Sound**

- play sound Meow until done
- start sound Meow
- stop all sounds
- change pitch effect by 10
- set pitch effect to 100
- clear sound effects
- change volume by -10
- set volume to 100 %
- volume

**Events**

- when clicked
- when space key pressed
- when this sprite clicked
- when backdrop switches to backdrop1

```

when clicked
  set Zbroj to 0
  go to x: -130 y: 130
  point in direction 90
  erase all
  set pen color to black
  set pen size to 10
  pen down
  provjera boja
  change Zbroj by Vrijednost
  wait 1 seconds
  repeat until touching color white?
    if key right arrow pressed? then
      move 80 steps
      provjera boja
      change Zbroj by Vrijednost
      wait 1 seconds
    if key down arrow pressed? then
      turn 90 degrees
      move 80 steps
      turn 90 degrees
      provjera boja
      change Zbroj by Vrijednost
      wait 1 seconds
  set Zbroj to 0
  go to x: -130 y: 130
  point in direction 90
  
```

```

define provjera boja
  switch costume to costume1
  if touching color white? then
    set Vrijednost to 0
  if touching color green? then
    set Vrijednost to 3
    start sound Meow
  if touching color blue? then
    set Vrijednost to 2
    say Hladnooooo! for 2 seconds
  if touching color purple? then
    set Vrijednost to 1
    switch costume to costume3
  if touching color yellow? then
    set Vrijednost to 4
    say Toplooooo! for 2 seconds
  if touching color red? then
    set Vrijednost to 5
    switch costume to costume2
  
```

## WEEK 7 (90 minutes activity)

Preactivity:

- Play a game on micro:bit.

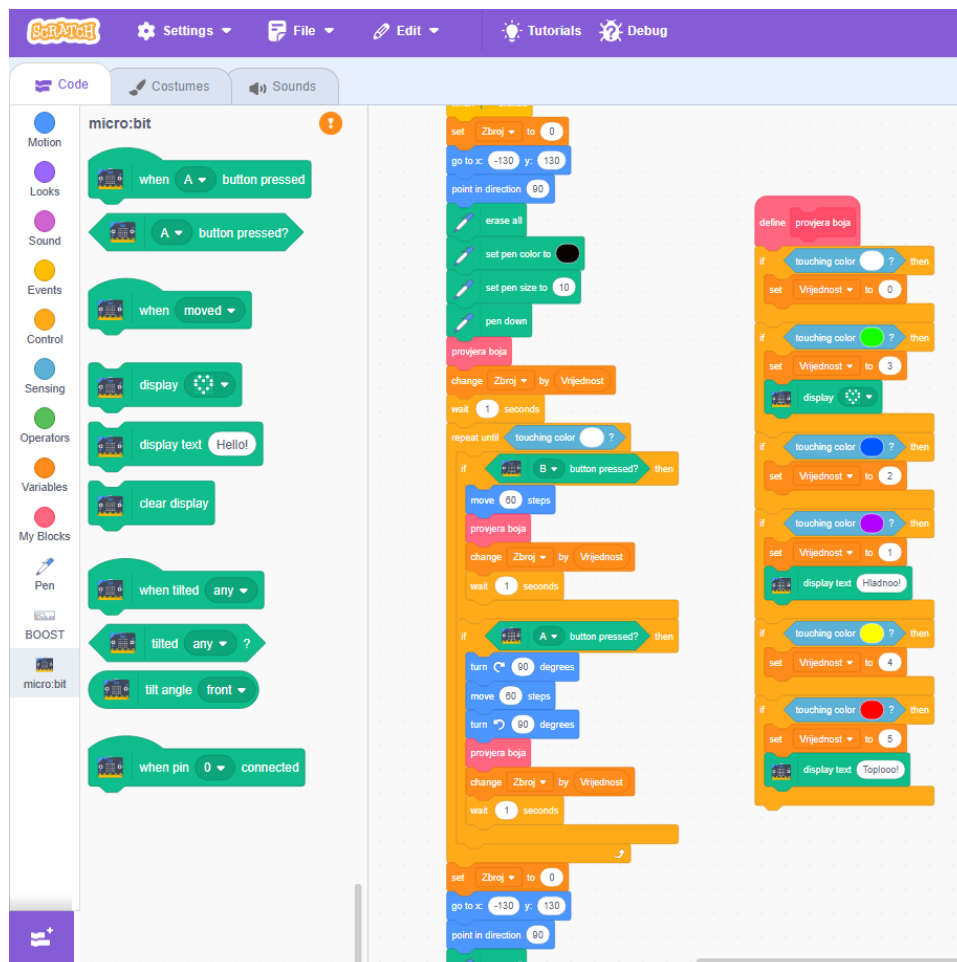
Preparation for the task:

- Have you ever used a micro:bit? Get to know the micro:bit!
- Select micro:bit from the Scratch extensions list. Get to know the commands you can use to control the micro:bit
- You need to install Scratch Link (Scratch - Scratch Link Download)

Task 8:

Change the program from Task 5 so that you control the movement of the character using the micro:bit (A button - down; B button - straight). If your character goes outside the game board, have him return to the beginning. Have the micro:bit say cold (if the colour is purple), warm (if the colour is red), and have it show a heart if the colour is green.

Solution:





## OPITIONAL ACTIVITY – PROJECT IN SCRATCH

Preparation for the task:

- Whichever shortest path your character takes on the GeoBoard, he always takes the same number of steps. What is that number?

PROJECT TASK (in pairs):


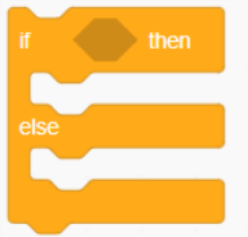
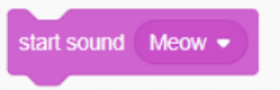
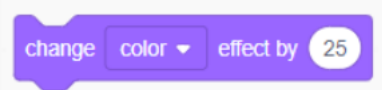
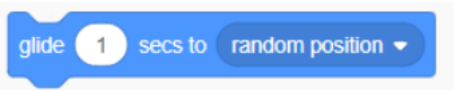
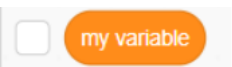
- Create a program in which your character randomly decides at each step whether to go right, without leaving the board, or down, and adds up the points it collects along the way.

## INITIAL KNOWLEDGE TEST

1. What can we add to the Scratch program (two correct answers)?

- a) background
- b) sprites
- c) video
- d) documents

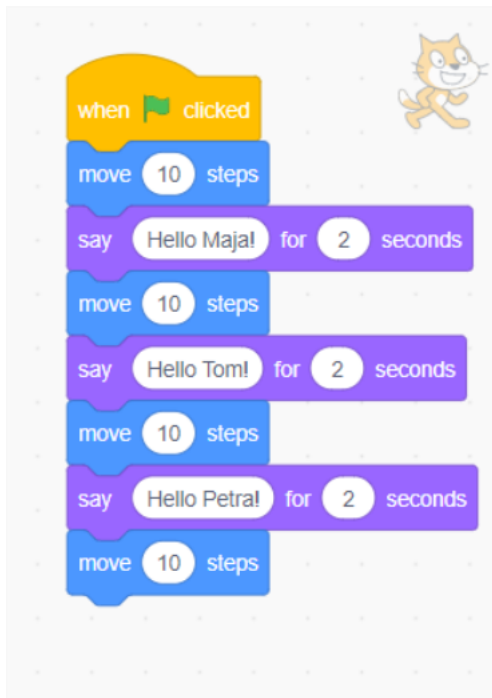
2. Write the numbers next to the actions that explain what the corresponding command does.

1		___ Sprite moving
2		___ change color
3		___ repeat
4		___ creates new variable
5		___ decision making
6		___ adds sound

3. Look at the following program and then answer.

a) How many steps will Sprite take? \_\_\_\_\_

b) Who will Sprite say hello to first? \_\_\_\_\_



4. Make two decisions from your life (for example: if it is cold, I will put on warm clothes).

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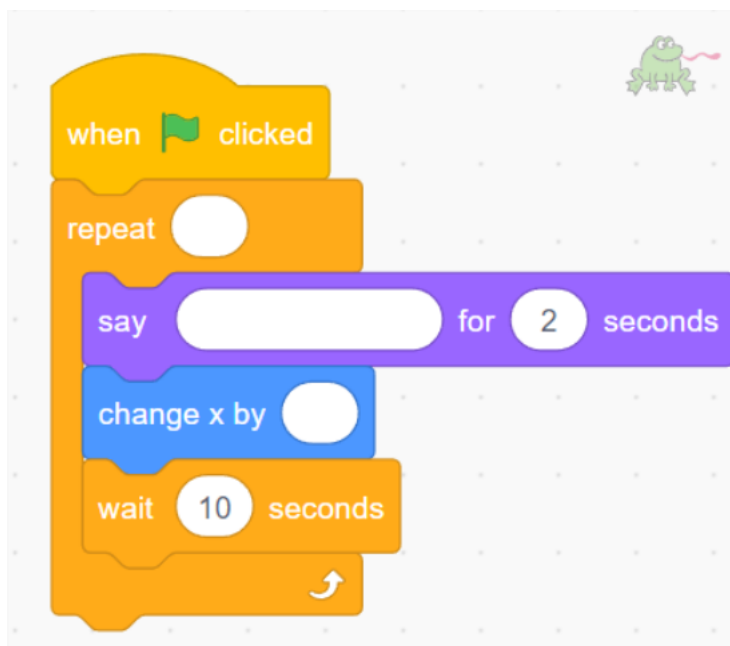
5. Look at the following program and then answer.

a) What will the Sprite buy if he has 15€? \_\_\_\_\_

b) What is the name of the variable in which the answer to the question 'Do I have 15€?' is stored? \_\_\_\_\_



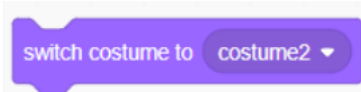
6. Complete the program shown in the picture so that the frog, after being clicked, jumps 5 times. The length of each jump is 75. Before each jump, it should say 'Ribbit!', and after each jump, wait 2 seconds.



## POST-INTERVENTION ASSESMENT

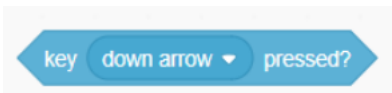
1. How can you control a Sprite movement in Scratch? (3 correct answers)
  - a) Using mouse
  - b) Using keyboard
  - c) Using TV remote
  - d) Using wireless controller for the PS5 console
  - e) Using micro:bit
  
2. Write the number next to the commands on the blank lines next to the actions that explain what the command does.

1



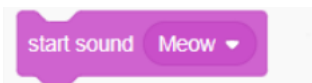
\_\_\_ shows written text in a cloud

2



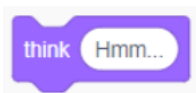
\_\_\_ checks whether the given color is touching

3



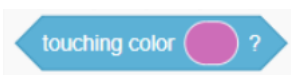
\_\_\_ checks whether the selected key is pressed

4



\_\_\_ changes the value of a variable

5



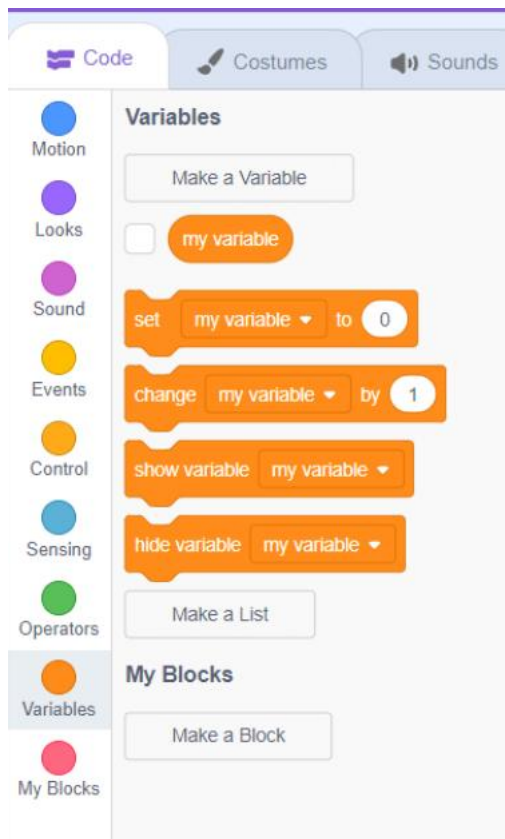
\_\_\_ changes the costume

6



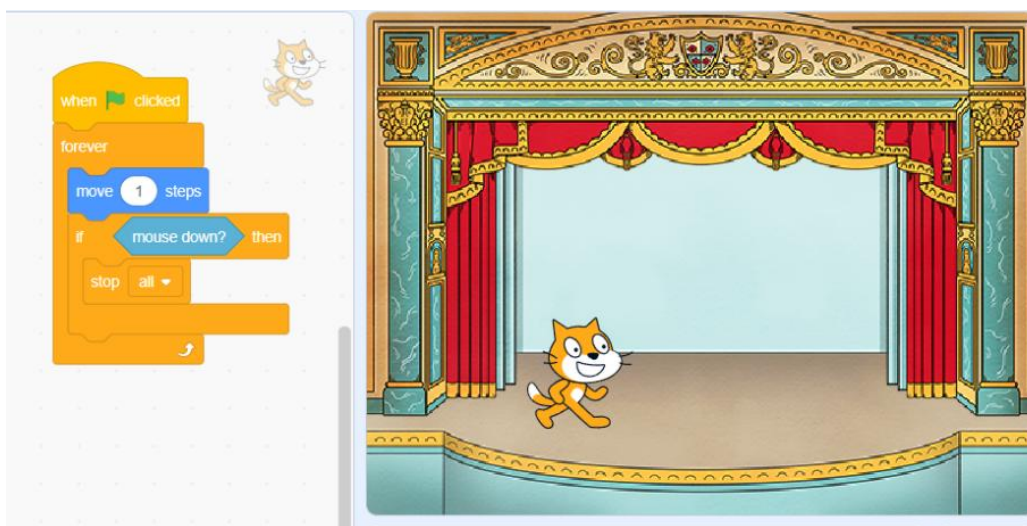
\_\_\_ adds selected sound

3. Circle the part of the image which needs to be clicked to create the new variable.



4. When will the program indicated in the following image stop?

- a) When the cat touches red drape
- b) When you press the up key on your keyboard
- c) When you click the mouse button
- d) when the cat takes enough steps to no longer be on stage

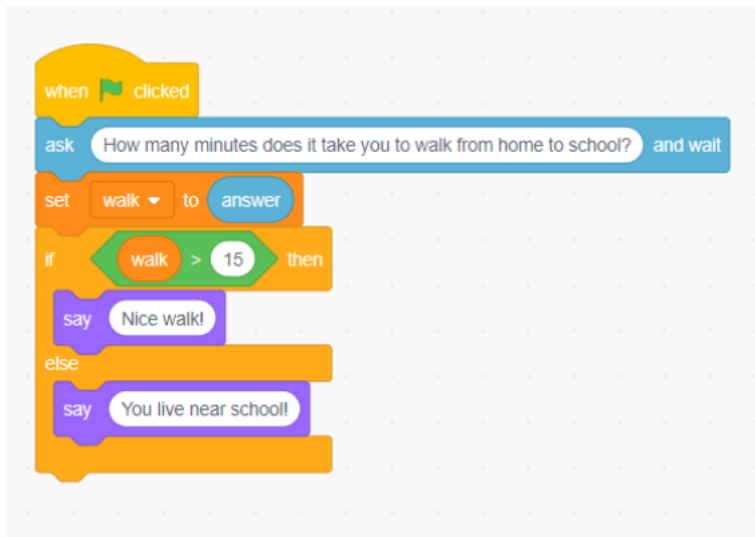


5. Look at the following program.

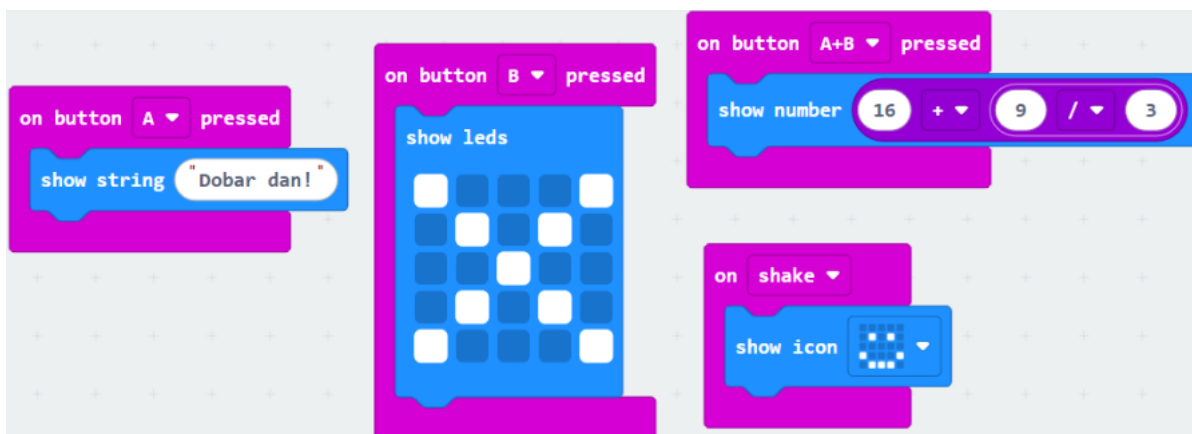
a) What will be the output if you answer 15?

\_\_\_\_\_

b) What is the name of the variable that stores the answer to the question "How many minutes does it take you to walk from home to school?" \_\_\_\_\_



6. Write down what will appear on the micro:bit.



When A is pressed: \_\_\_\_\_

When B is pressed: \_\_\_\_\_

When A and B are pressed simultaneously: \_\_\_\_\_

When shaken: \_\_\_\_\_