



Coding a simple game with Scratch

STEM4inclusive schools
WP2 – Toolbox



Chair of Business and Human Resource Education II
Prof. Dr. Marc Beutner

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Structure of the activity

A Introduction

about the topic

Coding and the use of Scratch

B Training phase

about the training

Create your own simple Scratch game

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A: About the topic

Coding and the use of Scratch

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Definition!



What is coding?

Coding is the process of creating instructions for a computer to follow. These instructions, written in a programming language, tell the computer how to perform specific tasks, such as calculations, data processing, or controlling devices. Coding is the foundation of software development and is used to create everything from simple scripts to complex applications and systems.





Some concepts of coding:

- Coding uses programming languages: These are the languages used to write code, such as Python, Java, C++, JavaScript, etc.
- Each language has its own syntax (rules) and is suited to different types of tasks. Syntax means specific rules and structure of a programming language that dictate how code must be written for the computer to understand and execute it.
- Coding uses algorithms. This is a set of steps or instructions designed to solve a specific problem or perform a task.





Some concepts of coding:

- Coding needs debugging. This is the process of finding and fixing errors or bugs in the code.
- Coding also needs compilation/interpretation. The code must be converted into a form that the computer can execute. This is done through a compiler or an interpreter, depending on the programming language.

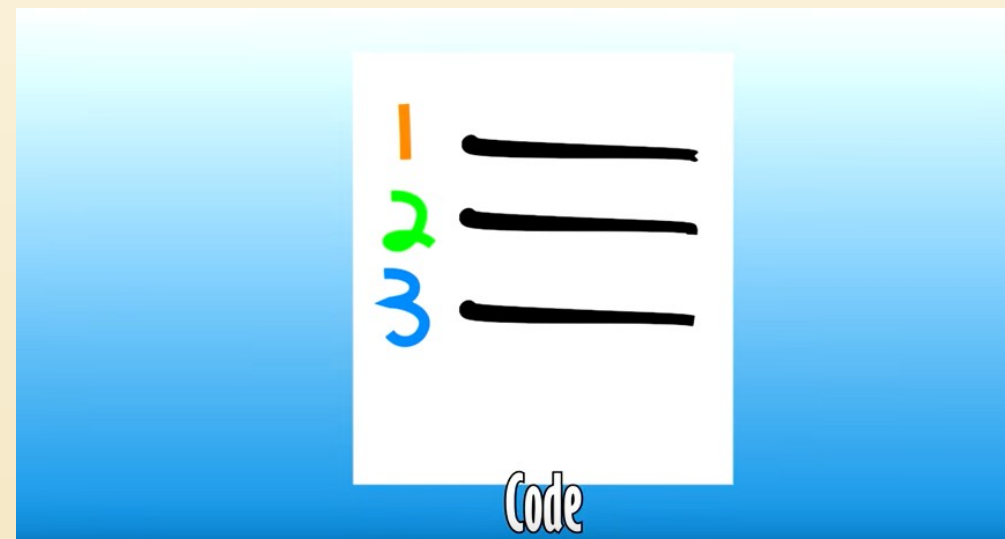


Coding Video

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<https://www.youtube.com/watch?v=N7ZmPYaXoic>



A flow chart:

- A flowchart is a diagram that visually depicts a workflow or process.
- It can also be described as a graphical representation of an algorithm, illustrating a step-by-step method for completing a task.
- A program flowchart, shows the controls in a program within a system.





Flow chart elements - Part 1:



Arrow / Flowline:
Shows the process's order of operation



Terminal
Represents the beginning and ending of a program



Process
Represents a set of operations





Flow chart elements - Part 2:



Input / Output:
Show where to enter data or to display results

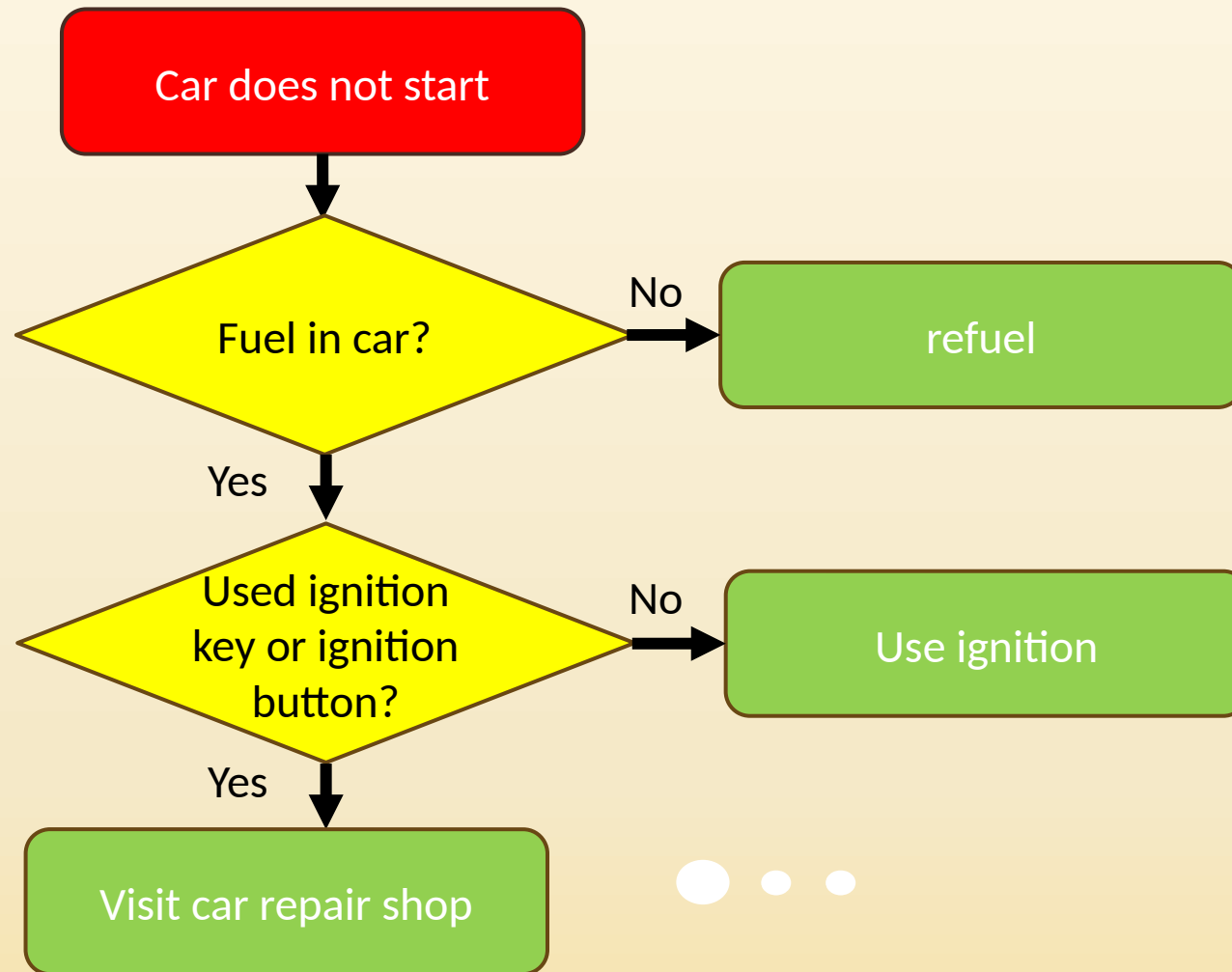


Decision / True-or-False test
Indicates a conditional operation that decides which path the program will follow.





Flow chart elements - Example: The car does not start!



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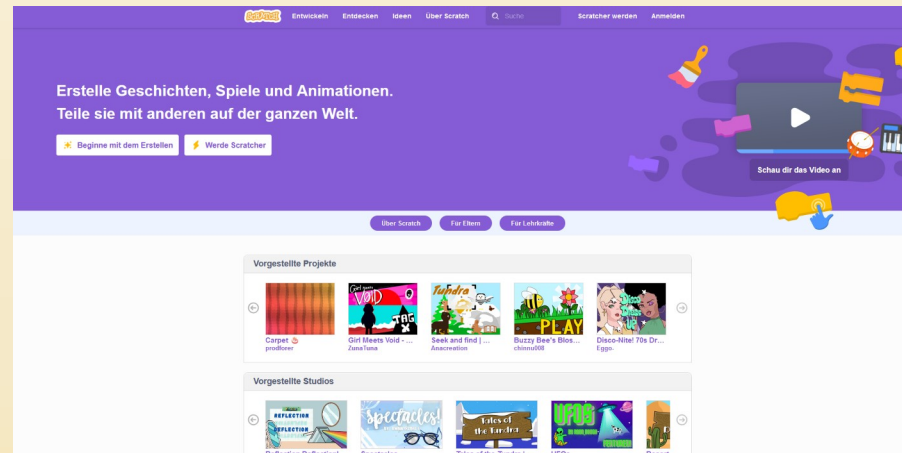
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Definition!



What is Scratch?

Scratch is a visual programming language and online community designed to make coding accessible, particularly for beginners and younger learners. It was developed by the Lifelong Kindergarten Group at the MIT Media Lab. MIT recommends Scratch for children and young people between the ages of 8 and 16.



<https://scratch.mit.edu/>

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Benefits of coding with scratch

Creative and fun:
users create games,
animations, and
interactive stories.

**Creative
Expression**

Accessibility

Low barrier to entry

Platform for sharing,
learning, and collaborating
with others

**Community
Learning**

**Logical
Thinking**

Simplified and using fundamental
programming concepts like sequencing, loops,
conditionals, and event handling

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Key Features of Scratch – Part I:

- Visual Blocks: Instead of typing code, Scratch uses colorful blocks that represent different coding commands. Users can drag and drop these blocks to create sequences of instructions.
- Sprites: In Scratch, characters or objects are called sprites. These sprites can be animated and programmed to move, interact with each other, and respond to user inputs.
- Stages: The stage is the background or environment where the sprites perform. Users can design and customize stages to fit the theme of their project.





Key Features of Scratch – Part II:

- **Scripts:** A script is a series of connected blocks that control the behavior of a sprite. For example, a script might make a sprite move across the screen when the user clicks a button.
- **Events:** Scratch programs are often triggered by events, such as pressing a key, clicking a sprite, or starting the program. Event blocks in Scratch help manage these interactions.
- **Loops and Conditionals:** Like traditional coding, Scratch includes loops (for repeating actions) and conditionals (for making decisions based on certain conditions).
- **Broadcasting:** Scratch allows sprites to communicate with each other through broadcast messages, enabling complex interactions and synchronized actions.

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Coding in Scratch – How does it work?

Create a
project

Drag and
Drop
Blocks

Build
Scripts

Test and
Debug

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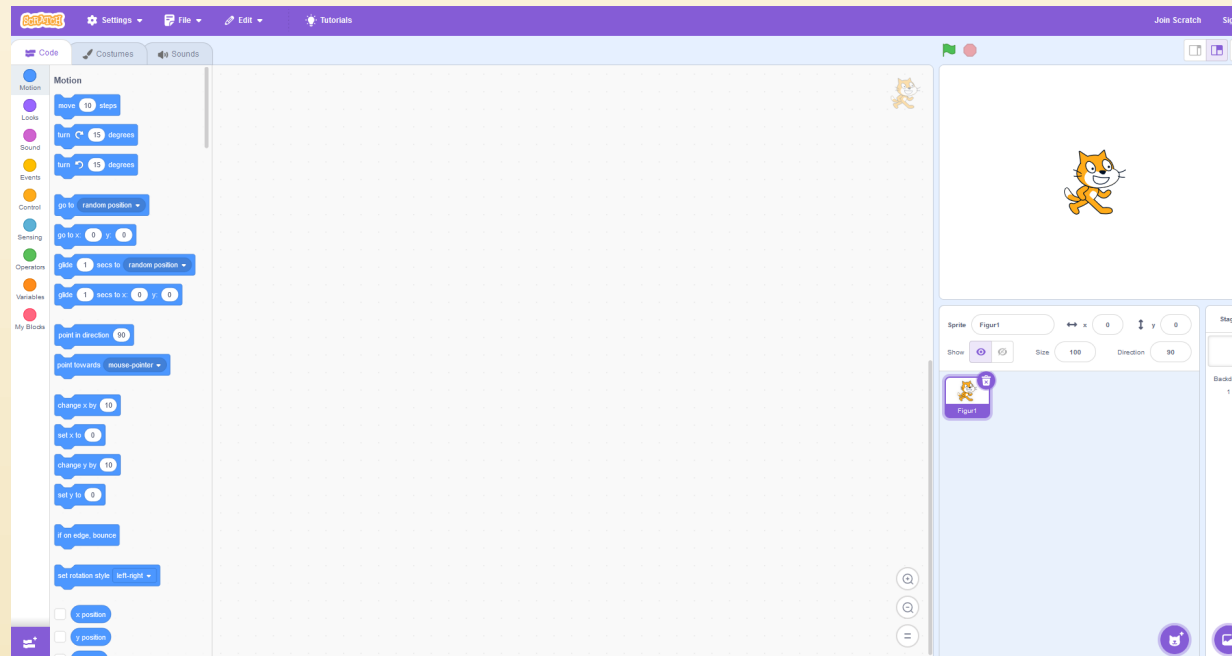
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What does Scratch look like?



<https://scratch.mit.edu/>



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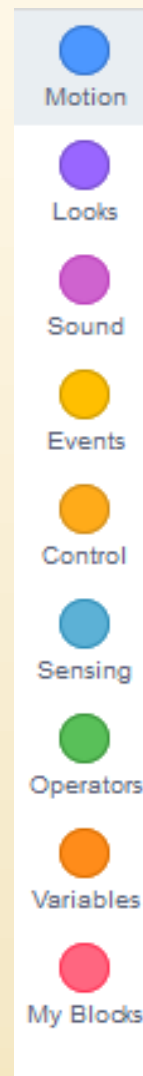


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Types of coding blocks



<https://scratch.mit.edu/>



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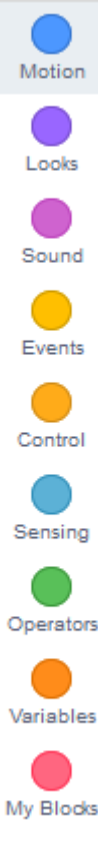
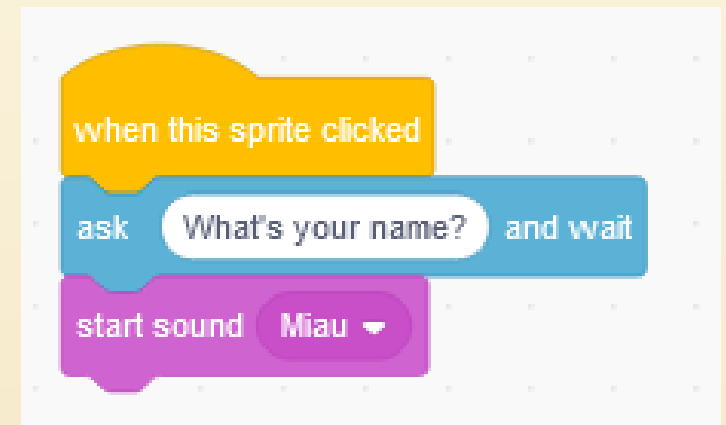
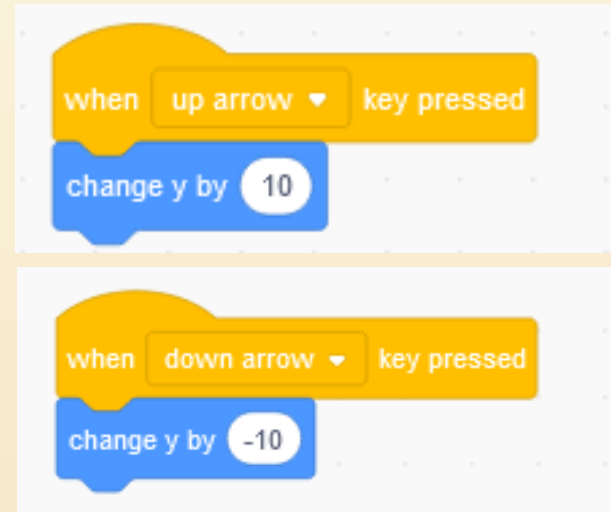
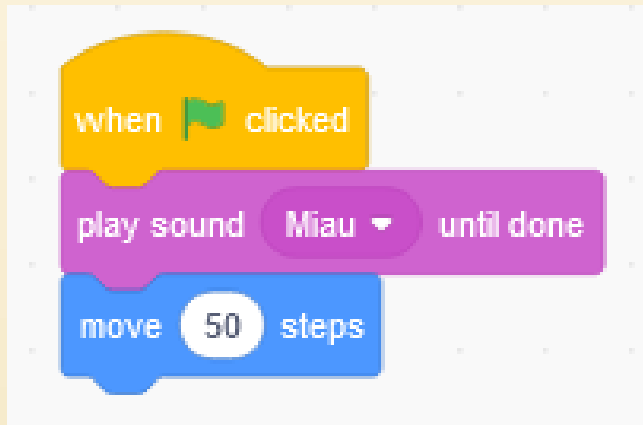
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Small visual coding parts - scripts. Just drag and Drop. Part I



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<https://scratch.mit.edu/>



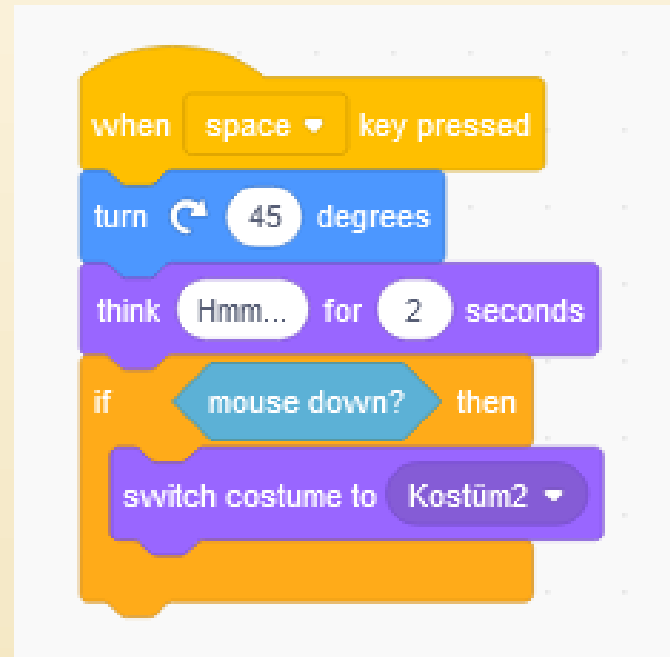
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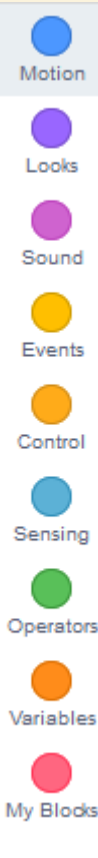
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Small visual coding parts - scripts. Just drag and Drop. Part II



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A fist game in Scratch Video

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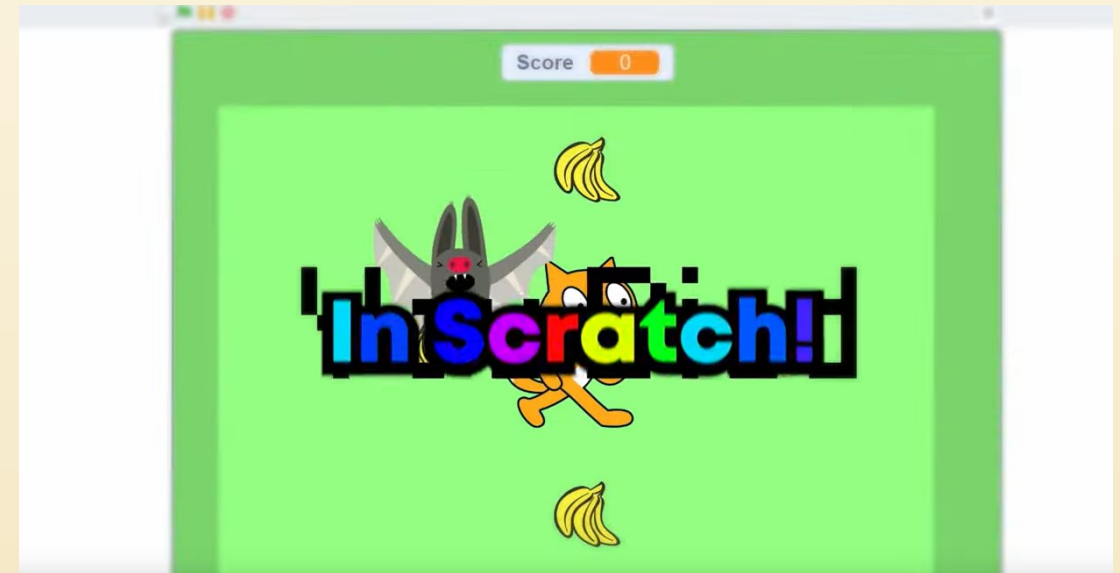


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Let's have a look at this
youtube video on
Scratch!



<https://www.youtube.com/watch?v=D-nW4jvzRr8>

A jumping game in Scratch Video

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Let's have a look at this
youtube video on
another Scratch game!



<https://www.youtube.com/watch?v=1jHvXakt1qw>



Coding in other programme languages? – example of a coding programme which asks for you name and write the name in coloured letters.

In Python

```
# Import the necessary module to use colored text
from termcolor import colored

# Ask the user for their name
name = input("What's your name? ")

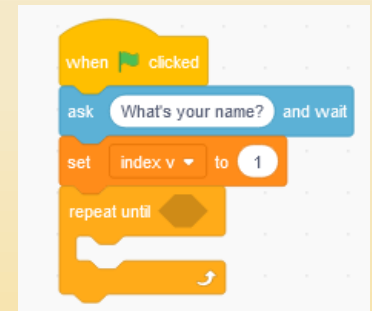
# Define colors for the text
colors = ['red', 'green', 'yellow', 'blue', 'magenta', 'cyan', 'white']

# Print each letter in the name with a different color
for i, letter in enumerate(name):
    color = colors[i % len(colors)] # Cycle through the colors
    print(colored(letter, color), end='')

print() # Just to move to the next line
```

In Scratch (with Blocks)

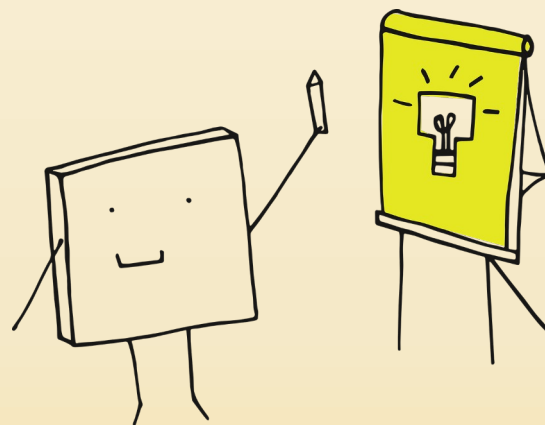
- When [green flag] clicked
- Ask [What's your name?] and wait
- Set [index v] to [1]
- Repeat (length of [answer])
- Create a clone of [myself]
- Set [text v] to [letter (index) of [answer]]
- Set color effect to (pick random 1 to 200)
- Go to x: (index * 20 - 100) y: 0
- Increase [index v] by [1]
- End repeat



B: About the training



Training phase



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Task 1:

- Open Scratch and let the cat move when you are hitting the keys “arrow up”, “arrow down”, “arrow left” and “arrow right”
- Work in a group. You have 20 minutes for the creation. If you have people with special needs in your group you will get additional 10 minutes for the creation while the other groups have to check and improve their solutions
- Show you results to the other learners



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Task 2:

Open Scratch and let the cat (or another sprite) move between to lines by using the arrow keys (like in task 1). On contact of the cat with the lines play the sound “miau”



- Work in a group. You have 30 minutes for the creation. If you have people with special needs in your group you will get additional 10 minutes for the creation while the other groups have to check and improve their solutions



- Show you results to the other learners



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Task 3:

- Think about an own small game which you would like to design and write down or record your idea with your mobile phone.
- Meet each other in the class. Share your idea and collect feedback.
- Open Scratch design you game. Help each other in your group but also help other groups if they ask you.



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H5P- Tasks 1 about Scratch and Coding – Coding definition



Coding is the process of creating instructions for a computer to follow.

☐ True

☐ False

✓ Check

Reuse <> Embed

H5P

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H5P- Tasks 2 about Scratch and Coding – Key features



Enter the key features of Scratch in the crossword.

Across

2 This represents different coding commands in Scratch (6)

3 This is the background or environment where the sprites perform. (5)

6 A character in Scratch (6)

7 In Scratch making decisions is based on ... (10)

Down

1 Repeating actions in Scratch are called: (5)

2 In Scratch sprites can communicate with each e.g. through messages this is called ... (12)

4 This is triggering: like pressing a key, clicking a sprite, or starting the program (5)

5 A series of connected blocks that control the behavior of a sprite. (6)

[Check](#) [Show solution](#) [Retry](#)

[Reuse](#) [Embed](#)

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H5P- Tasks 3 about Scratch and Coding – Coding blocks



Motion, Looks, Sound, Events, Control, Sensing Operators, and Variables are types of coding blocks.

☐ True

☐ False

☒ Check

[Reuse](#) [Embed](#)

H5P

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Congratulation!

You mastered the activity on coding and game development in Scratch!

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