Contents

Complete this book to become a coder!

Part 1: Scratch Basics

Part 2: Tutorials

Part 3: Projects

The Interface of Scratch

In Scratch's interface, there are five main components: Block Palette, Code Area, Stage, Sprite Pane, and Backdrop Pane.

Sprites are objects that you control in a project. In order to control a sprite, you have to give it a script – a list of instructions – by putting code blocks together. Each block contains one piece of code. Once the blocks are put together, a script is formed and Scratch is able to run through it from top to bottom to allow the sprite to carry out the actions or functions you want it to perform.

I am controlled by blocks.

Looks Blocks
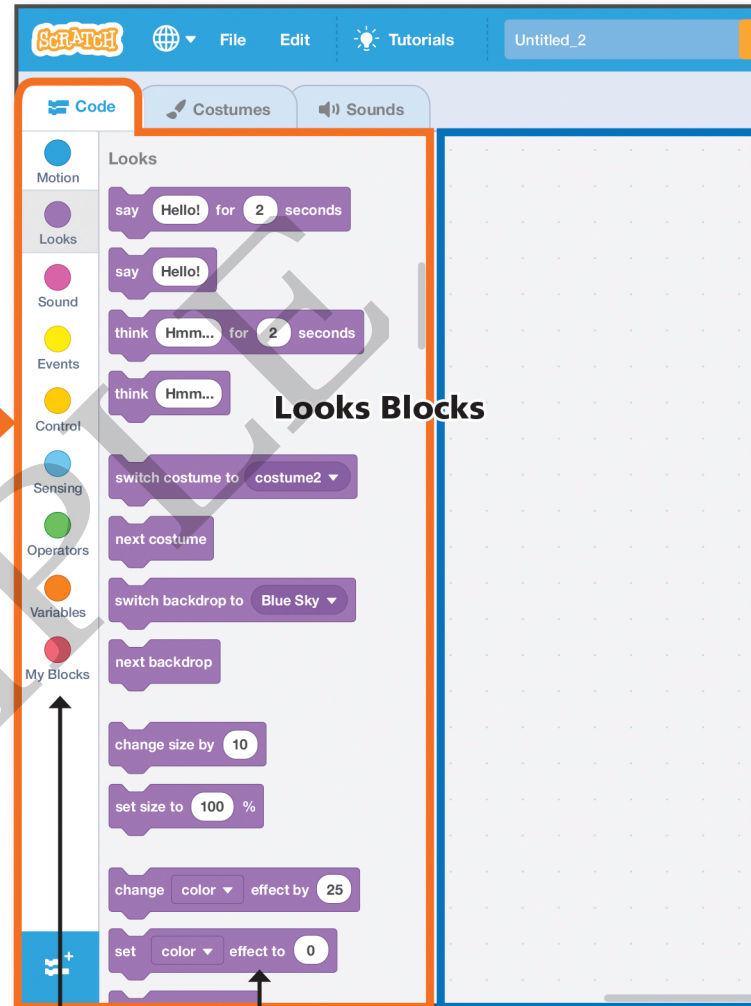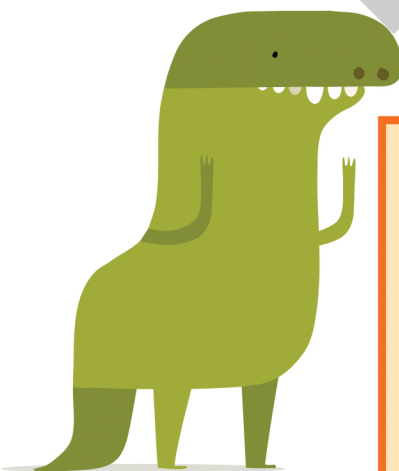
nine main block categories

one piece of code per block

Block Palette

The Block Palette contains blocks that are categorized based on their functionality. The blocks within the same category share the same color and similar functions. There are nine main block categories in Scratch 3.0. This book covers most of them including Motion, Looks, Sound, Events, and Variables.

Code Area

The Code Area is where scripts are housed. Scripts are created by colored blocks to tell sprites what to do and set the Stage.

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Stage

backdrop

This is the Stage. It is similar to the stage in a play where the characters (also sprites) perform.

when clicked
move 10 steps
say Hello!

↑
a script for the sprite shown in the top right corner

sprite

Sprite   Sprite1   x -2   y -116

Show   Size 100   Direction 90

Sprite1

Stage

Backdrops
2

Sprite Pane

Sprites are the "actors" of your project. They can be animals, letters, or objects and they are controlled by scripts. The Sprite Pane shows all the sprites that are included in your project. You can also add, remove, and reorder sprites in the Sprite Pane.

Backdrop Pane

The Backdrop Pane is where you can add backdrops to your project. Backdrops are basically the backgrounds of the Stage and there can be multiple backdrops for the Stage.

Basic Operations

Picking a Random Number

Ready, set, go!

Ballerina

In this tutorial, you will use the sprite Ballerina and the following blocks:

`pick random 1 to 10`   `say Hello! for 2 seconds`   `switch costume to ballerina-d ▼`

Try These!

1. Drag `say Hello! for 2 seconds` to the Code Area.

    • Drag `pick random 1 to 10` to the first slot of `say Hello! for 2 seconds` .

    • Click `say pick random 1 to 10 for 2 seconds` a few times.

    • Check what Ballerina says.

    Ⓐ "pick random 1 to 10"   Ⓑ any number from 1 to 10

⯆ *Let's help Ballerina pick a costume randomly.*

I have four costumes numbered from 1 to 4.

2. Drag `switch costume to ballerina-d ▼` to the Code Area.

    • Drag `pick random 1 to 10` to the slot of `switch costume to ballerina-d ▼` .

    • In `pick random 1 to 10` , change 10 to 4.

    • Click `switch costume to pick random 1 to 4` a few times. Check what you see on the Stage.

    Ⓐ Ballerina's costume changes randomly.

    Ⓑ Ballerina's costume changes according to the order of the costumes in the Costumes tab.
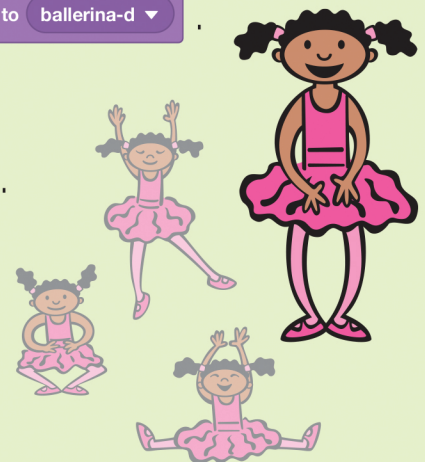
3. Check the blocks that `pick random 1 to 10` can fit into.

    Ⓐ `move 10 steps`   Ⓑ `change volume by -10`

    Ⓒ `when space ▼ key pressed`   Ⓓ `wait 1 seconds`

Picking a Random Number

1? 3?

I can do it!

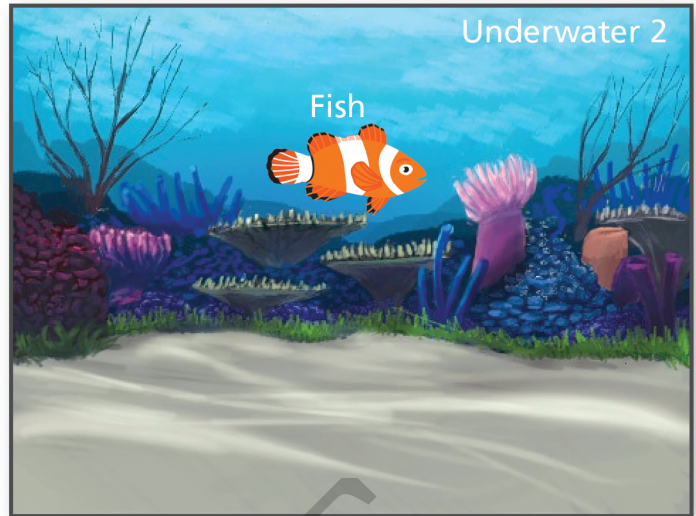**Setup**   Add Underwater 2 as the backdrop and Fish as the sprite.

Blocks   Looks, Events, Control, Sensing, and Operators

Mission   Fish changes its appearance randomly and asks the user to guess how many looks it can turn into.

Underwater 2

Fish

Use each description to help find the correct block. Click 🏁 to run the script to test whether I'm moving on the Stage the way I'm supposed to.

Draw lines to bring the correct blocks to the script.

stop all ▼

pick random 1 to 4

answer = 4

say No, it is 4. for 1 seconds

when 🏁 clicked

ask How many types of fish can I turn myself into? and wait   ← Ask a question and wait for an input.

if ⬡ then   Run the block in the first space if the input is 4.

say Bingo! for 1 seconds

else   Run the block in the second space if the input is not 4.

Fish reveals the answer with a speech bubble.

← Stop all scripts.

when 🏁 clicked

forever   ← Repeat the blocks inside forever.

switch costume to

wait 1 seconds   Change the costume to a random one.

A Maze Game

Snake

Each cloned Snake will appear on the Stage and glide up and down.

Steps:

1 Drag `when I start as a clone` and `show` to the Code Area and put them together.

2 For the first cloned Snake, add the Motion, Control, Operators, and Variables blocks as shown in the red box. Change the numbers accordingly.

3 For the other two clones, repeat Step 2 and change the numbers as shown in the blue and green boxes.

4 Put the blocks together as shown. Click 🏁.

when I start as a clone ← Run the script for each cloned Snake.

show ← Make each clone shown.

if cloned snake = 1 then
  forever
    glide 2 secs to x: -210 y: -160
    glide 2 secs to x: -210 y: 0

if cloned snake = 2 then
  forever
    glide 2 secs to x: 5 y: 175
    glide 2 secs to x: 5 y: 35

if cloned snake = 3 then
  forever
    glide 2 secs to x: 110 y: -160
    glide 2 secs to x: 110 y: 70
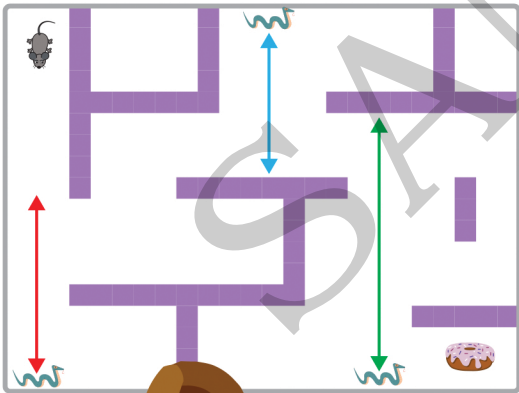
The "glide" blocks of each clone are to make it move up and down in the maze.

Question Time

Circle how many locations each clone moves between.

2   4   5

In programming, a bug is a coding error in a computer program. The coders find that there are bugs in their programs. Help them spot the bugs in their scripts and answer the questions.

Case
1

At the beginning of the game, Noor should show up on the Stage and explain the game when "game initialized" is received, but something must be wrong with the code.

Morgan

```
when I receive start game ▼
show
set size to 200 %
switch costume to Noor-b ▼
say Welcome to the maze! for 2 seconds
next costume
broadcast show mouse and donut ▼
say Help the mouse complete the mission by brin
say It loses one life if it touches the snakes or the
next costume
say The mouse has three lives to complete the m
next costume
say Good luck! for 2 seconds
repeat 10
    change size by -20
hide
broadcast start game ▼
```

Check the correct answers.

1. With Morgan's script, what happens on the Stage when 🚩 is clicked?

   A Mouse1 explains the game.

   B Nothing happens.

2. Which message activates the current script?

   A game initialized

   B start game

3. Which sprite broadcasts "start game"?

   A Noor   B Mouse1

   C Donut   D Snake

4. Morgan has fixed the code by making one change. What is the change?

   A removing `broadcast start game ▼`

   B changing `when I receive start game ▼` to

   `when I receive game initialized ▼`

152