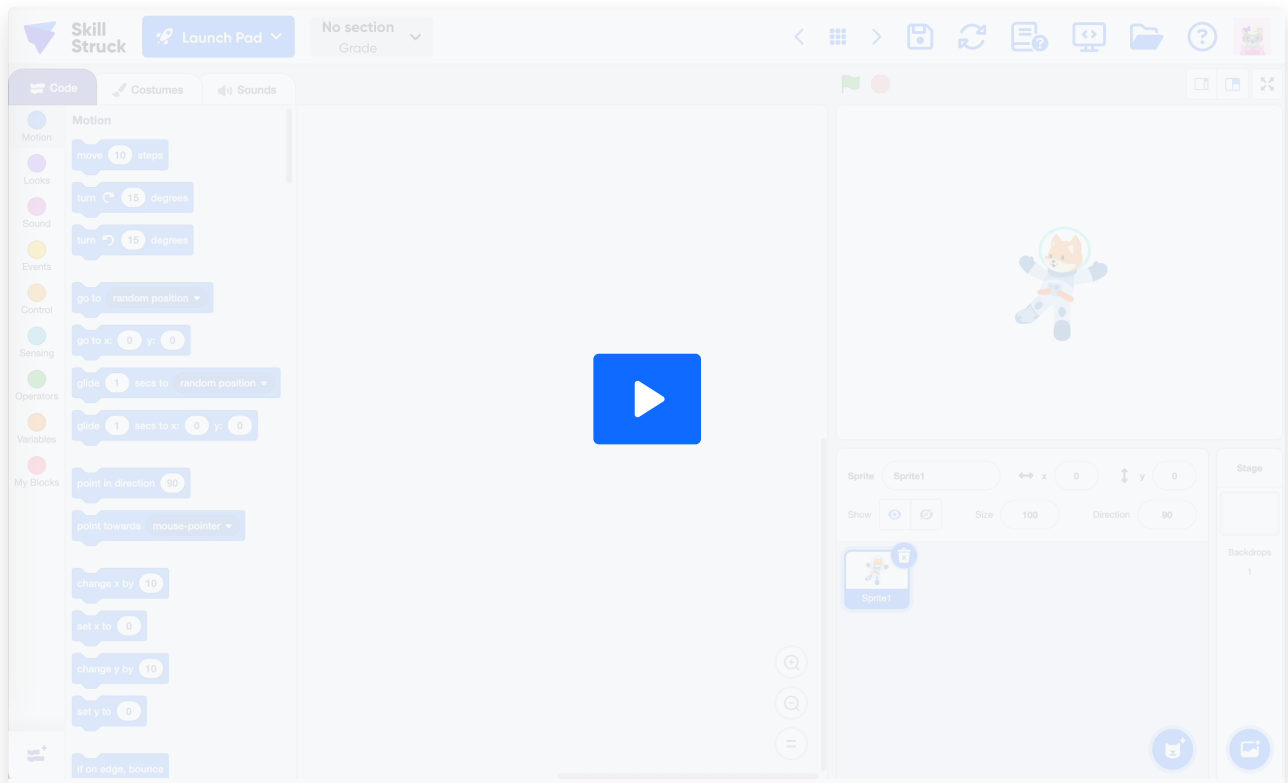


# Variables

## Textbook

## Variables





## Introduction

Imagine you have a special box that can hold anything you put inside it, and you can change what's in the box whenever you want! Think about being able to store numbers, colors, or even game scores in that box, and then use them in your computer program! This is like how **variables** work in coding – you get to create your own "storage boxes" to make your projects stronger and easier to change!

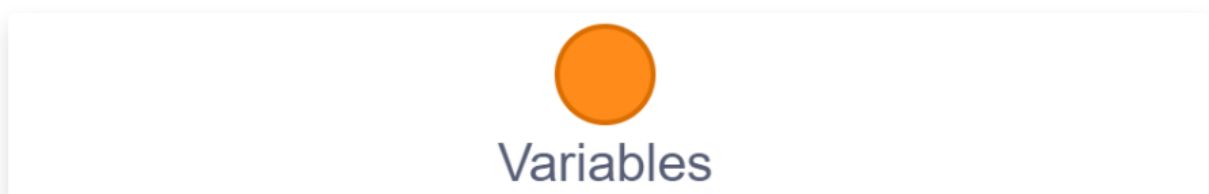
## Variables

A **variable** is like a box that can hold a specific item. Imagine an empty cardboard box. What kinds of things could you put inside it? Maybe paint supplies, roller skates, or clothes? The box itself stays the same, even if you change what's inside it. The box helps you organize and move those items easily. You can also replace what's inside the box when you need to.

A variable in computer programming is similar! You can put a value inside a variable, like a number or a word. Then you can use that variable in different parts of your program. You can also change the value inside the variable whenever your program needs to.

## Coding Variables

1. Navigate to the Variable tab.



1. Click "Make a Variable."
2. Create a variable that says 'Apple.'
3. Drag the **When space bar pressed** event block into your code editor. Change 'space bar' to 'up

arrow.'

4. Drag the `change apple by 1` variable block and connect it to the up arrow event block.
5. Drag the `When space bar pressed` event block into your code editor. Change 'space bar' to 'down arrow.'
6. Drag another `change apple by 1` variable block and connect it to the down arrow event block. Change 1 to -1.
7. Click the event triggers to watch your variable change.

## Critical Thinking Questions

1. How is a variable like a box at home, and how does it help organize information in your program, similar to how a box helps organize your toys or books?
2. If you were making a variable for a game, what kind of information would you put inside it and why? How might that information change during the game?

## Questions (5)

### 1. What is a variable in programming?

MULTIPLE CHOICE

Choose the correct answer:

- A. A box that holds whatever code you want
- B. A programming language
- C. A gift
- D. The order that things happen

### 2. True or False: You can replace what's inside a variable.

MULTIPLE CHOICE

Choose the correct answer:

- A. True
- B. False

### 3. What is a variable similar to?

MULTIPLE CHOICE

Choose the correct answer:

- A. A box
- B. A tv
- C. A pillow
- D. A dice

#### 4. What can you store inside a variable?

MULTIPLE CHOICE

Choose the correct answer:

- A. Instructions for moving a sprite
- B. A sequence of sounds to play
- C. A specific value, such as a number or text
- D. Different backdrops for a scene

#### 5. Why are variables useful in programming?

MULTIPLE CHOICE

Choose the correct answer:

- A. To select a backdrop from the library
- B. To change the sprite's size
- C. To repeat code indefinitely
- D. To store and change data

## Games (2)

### 1. Variables Typing

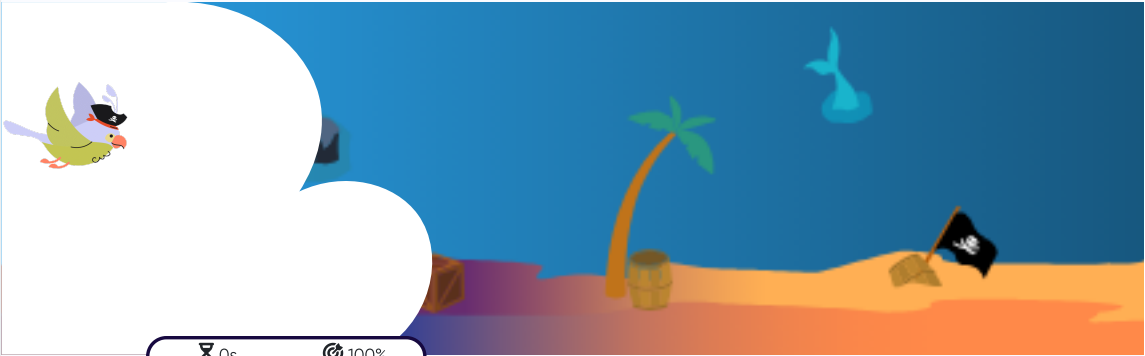
Full Screen

Audio

Instructions

Restart

Pause



You can put whatever va

2. Variables Memory Game

Full Screen

Audio

Instructions

Answer Key

Pause

Flips: 0

1Control

2Sound

3Motion

4Looks

5Sound


6Variables

7Control

8Variables

9Looks

10Motion



W

e

# Blocks Pro Challenges (3)

## 1. Apples and Bananas

Challenge

Textbook

### Apples and Bananas

Ask the peers around you what they like better – apples or bananas. You will keep track of student responses with this challenge.

Select the apple and banana sprites and place them on your screen.

Then, create two variables:

- Apples
- Bananas

Keep track of student responses by clicking on the corresponding fruit. Code each fruit sprite so when that sprite is clicked, it will change [apples] or [bananas] by 1.

Requirements

0/2

2 Event

4 Variable

Blocks must be connected to

Code

Costumes

Sounds

Motion

move 10 steps

turn 15 degrees

turn 15 degrees

go to random position

go to x: 0 y: 0

glide 1 secs to random position

glide 1 secs to x: 0 y: 0

point in direction 90

point towards mouse-pointer

change x by 10

set x to 0

change y by 10

set y to 0

if on edge, bounce

set rotation style left-right

x position

Sprite

Sprite1

x 0 y 0

Size 100 Direction 90

Sprite1

Stage

Backdrops 1

## 2. Star Collector

Challenge

Textbook

### Star Collector

Program a rocket that adds 1 to the score for each star it touches. To code your rocket:

- Create a variable named, "Score"
- Program the rocket to respond to all arrow controls.
- When the space key is pressed, the variable "Score" will reset to 0.

You need at least 4 stars. To code your stars, program the following for *each* star:

- Program each star to respond when the green flag is clicked.
- If the star is touching the rocket ship, it will change "Score" by 1 and hide.
- Note: This conditional must be in a forever loop.
- Program each star so when the space key is pressed, it will show again.

Requirements

0/4

Code

Costumes

Sounds

Motion

move 10 steps

turn 15 degrees

turn 15 degrees

go to random position

go to x: 0 y: 0

glide 1 secs to random position

glide 1 secs to x: 0 y: 0

point in direction 90

point towards mouse-pointer

change x by 10

set x to 0

change y by 10

set y to 0

if on edge, bounce

set rotation style left-right

x position

Sprite

Sprite1

x 0 y 0

Size 100 Direction 90

Sprite1

Stage

Backdrops 1

### 3. Catch the Fruit

#### Catch the Fruit

Your goal is to catch the falling fruit in the fruit bowl. The game will keep track of your score.

First, choose a bowl sprite. Program the bowl to respond to the left and right arrow controls.

Then, select at least 3 fruits to fall from the top of the screen. Program each fruit so it falls down at different speeds. Use a forever block so the fruit falls to the bottom of the page. When each fruit touches the fruit bowl, the fruit should hide.

Finally, make a variable named "Score" so the game tracks your score. To do this, the "Score" should set to 0 when the green flag is clicked. Then, if the fruit touches the bowl then it should change "Score" by 1. This conditional must be in a forever loop.

#### Requirements

0/6

5 Motion

3 Looks

The image shows the Scratch code editor interface. The 'Code' tab is selected, and the 'Motion' category is chosen from the left sidebar. The script for the bowl sprite (Sprite1) is as follows:

```
when green flag clicked
  go to random position
  go to x: 0 y: 0
  glide 1 secs to random position
  glide 1 secs to x: 0 y: 0
  point in direction 90
  point towards mouse-pointer
  change x by 10
  set x to 0
  change y by 10
  set y to 0
  if on edge, bounce
  set rotation style left-right
```

The right sidebar shows the 'Sprite' panel with 'Sprite1' selected, and the 'Stage' panel with 'Backdrops' set to 1.

## Answer Keys & Solutions

### Questions

#### 1. What is a variable in programming?

MULTIPLE CHOICE

Correct Answer:

- A. A box that holds whatever code you want ✓ Correct
- B. A programming language ✗ Incorrect
- C. A gift ✗ Incorrect
- D. The order that things happen ✗ Incorrect

#### Explanation:

A variable holds information.

#### 2. True or False: You can replace what's inside a variable.

MULTIPLE CHOICE

Correct Answer:

- A. True ✓ Correct
- B. False ✗ Incorrect

#### Explanation:

The information in a variable can change

#### 3. What is a variable similar to?

MULTIPLE CHOICE

Correct Answer:

- A. A box ✓ Correct
- B. A tv ✗ Incorrect
- C. A pillow ✗ Incorrect



D. A dice

✗ Incorrect

**Explanation:**

What is something that can hold content?

#### 4. What can you store inside a variable?

MULTIPLE CHOICE

**Correct Answer:**

A. Instructions for moving a sprite

✗ Incorrect

B. A sequence of sounds to play

✗ Incorrect

C. A specific value, such as a number or text

✓ Correct

D. Different backdrops for a scene

✗ Incorrect

**Explanation:**

Variables can hold various types of data.

#### 5. Why are variables useful in programming?

MULTIPLE CHOICE

**Correct Answer:**

A. To select a backdrop from the library

✗ Incorrect

B. To change the sprite's size

✗ Incorrect

C. To repeat code indefinitely

✗ Incorrect

D. To store and change data

✓ Correct

**Explanation:**






They allow for storage and retrieval of information.

## Games

### 1. Variables Typing

## 2. Variables Memory Game

### Memory Game Pairs:

1.  Blue circle with the word "motion" ↔  Blue circle with the word "motion"
2.  Purple circle with the word "looks" ↔  Purple circle with the word "looks"
3.  Pink circle with the word "sound" ↔  Pink circle with the word "sound"
4.  Light orange circle with the word "control" ↔  Light orange circle with the word "control"
5.  Dark orange circle with the word "variables" ↔  Dark orange circle with the word "variables"

*Students must find all matching pairs by flipping cards and remembering their positions.*