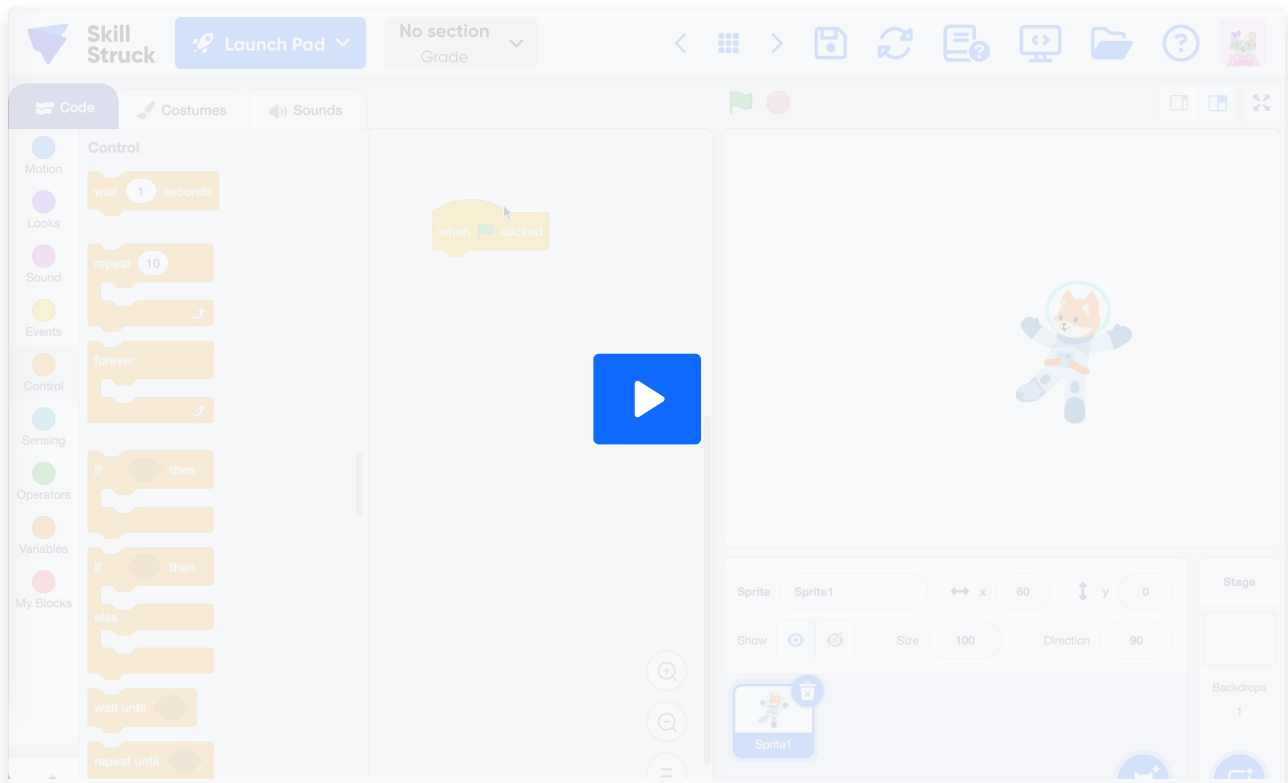
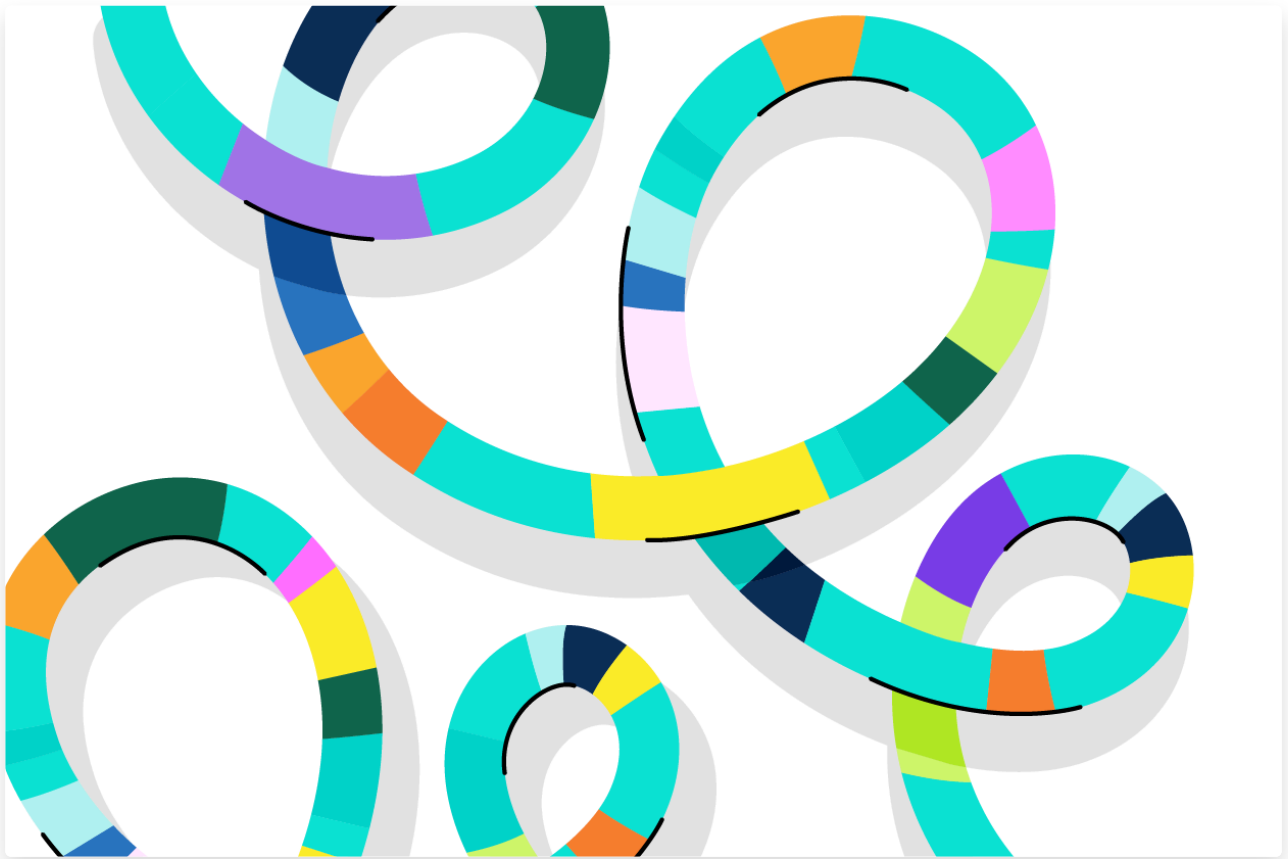


Loops

Textbook

Loops





Think of a time where you heard a new song that you loved. You played it over and over again until you had it memorized by heart! You probably have a few songs that you've loved like this.

Loops in [programming](#) are similar. A programming loop is a set of instructions that repeats. A loop can save you a lot of time if you want the computer to do something over and over again.

When we make a loop, we are creating a repeatable pattern to solve a problem!

Imagine you want your sprite to jump up and down 5 times. You could write the "jump" code 5 separate times. But that would take a long time! A loop lets you create the "jump" pattern *once* and then tell the computer to repeat it. This is how we use patterns to make our code smarter and solve problems more easily.

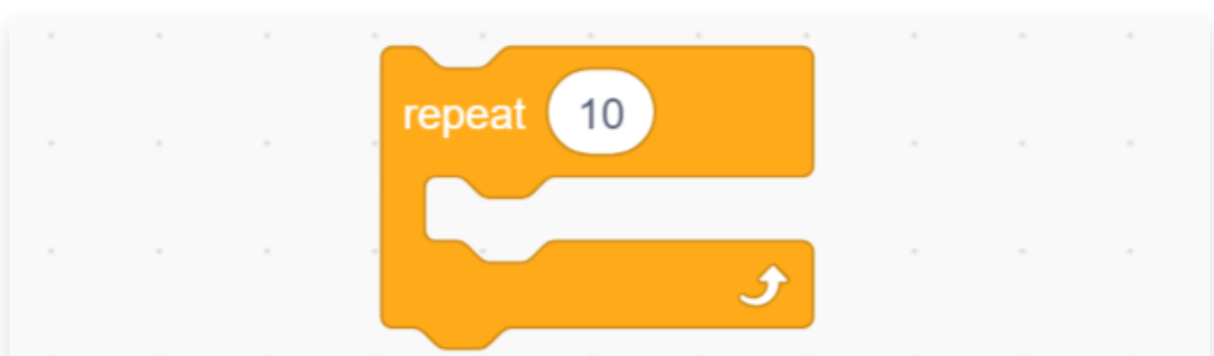
There are two types of loops you can code - repeat loops and forever loops.

Graphical Programming and Loops

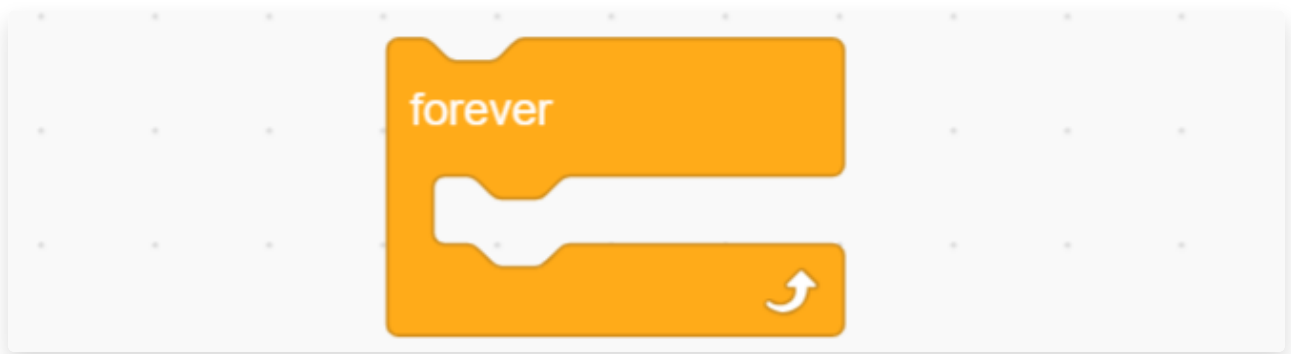
When we code, we don't always write long lines of words. Sometimes, we use **graphical programming**, which means we use colorful blocks that snap together like LEGOs! These blocks are **visual cues** that help us see our instructions, or algorithms, very clearly.

For example the two loop blocks:

- The `repeat 10` block has a number that tells us *exactly* how many times something will happen. You can **see** that it will repeat!



- The **forever** block has an arrow that curls around, like a circle, showing that the instructions inside will repeat *endlessly*. This is another **visual cue** for repetition!



Using these visual blocks helps us build our algorithm step-by-step. It's like drawing a picture of our instructions, especially when those instructions need to happen over and over again! Let's learn more about the two loops!

Repeat Loops

Repeat loops are loops where you can set the algorithm to repeat a certain number of times. For example, move 10 steps 6 times. To code a repeat loop:

1. Select a sprite.
2. Start with an event block to trigger your algorithm.
3. Open the Control category.
4. Drag a **repeat 10** block and connect it to your event.
5. Drag the code you want to repeat. For example, move 10 steps then say "Hello!" for 2 seconds.
6. Trigger your event to watch your code play.

Forever Loops

Forever loops are loops where the algorithm repeats forever. To code a forever loop:

1. Select a sprite.
2. Start with an event block to trigger your algorithm.
3. Open the Control category.
4. Drag a **forever** block and connect it to your event.
5. Drag the code you want to repeat nonstop. For example, say "Hello!" for 2 seconds and play a sound.
6. Trigger your event to watch your code play.

Critical Thinking Questions

1. How do you think loops in programming can help save time when creating games or apps? Can you think of a task that would be hard to do without using loops?
2. Why do you think some loops, like the "forever" loop, are useful in certain situations while others, like the "repeat" loop, are better for tasks with a set number of repetitions?

Questions (5)

1. True or False: Loops can save you a lot of time if you want the computer to do the same thing over and over again.

MULTIPLE CHOICE

Choose the correct answer:

- A. True
- B. False

2. What are loops in programming?

MULTIPLE CHOICE

Choose the correct answer:

- A. Instructions that repeat
- B. A roller coaster
- C. Knitting
- D. The order that things happen in

3. How do repeat loops differ from forever loops?

MULTIPLE CHOICE

Choose the correct answer:

- A. Repeat loops play a sound
- B. Forever loops change the sprite's size
- C. Repeat loops run for a specific number of times
- D. Forever loops select a backdrop

4. What does a forever loop do in programming?

MULTIPLE CHOICE

Choose the correct answer:

- A. It changes the backdrop image
- B. It repeats the code endlessly
- C. It moves the sprite
- D. It plays a sound once

5. When coding a forever loop, what happens when you trigger the event?

Choose the correct answer:

- A. The code inside the forever loop repeats continuously
- B. The code runs once and stops
- C. The sprite changes color
- D. The backdrop switches to a different scene

Games (3)

1. Loops Typing Game

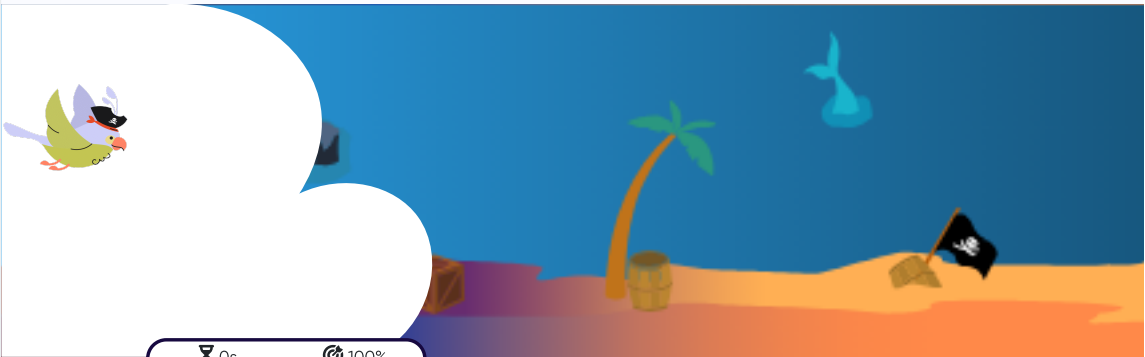
Full Screen

Audio

Instructions

Restart

Pause



0s 100%

A programming loop is a

2. Loops Matching Game

Full Screen

Audio

Instructions

Answer Key

Pause

Clear All

Check Matches


Attempts: 0

repeat 10

forever

A repeat loop

A forever loop



3. Loops Memory Game

Full Screen

Audio

Instructions

Answer Key

Pause

Flips: 0

1

repeat 10

2


forever

3

forever

4

repeat 10



Blocks Pro Challenges (4)

1. Dribble the Ball

Dribble the Ball

Create a bouncing ball.

Start by drawing a ball sprite. Use a forever loop to continuously move the ball up and down. To make it bounce, change y by a number (i.e. 90), program the ball to wait for .2 seconds, and then change y again by the opposite of that number (i.e. -90).

Requirements 0/3

2 Motion

1 Event

2 Control

Blocks must be connected to an Event block in order to pass the requirements

Submit ↗

The image shows the Scratch code editor interface for the 'Dribble the Ball' challenge. The 'Code' tab is selected, showing a script with the following blocks: a 'go to random position' block, a 'go to x: 0 y: 0' block, a 'glide 1 secs to random position' block, a 'glide 1 secs to x: 0 y: 0' block, a 'point in direction 90' block, a 'point towards mouse-pointer' block, a 'change x by 10' block, a 'set x to 0' block, a 'change y by 10' block, a 'set y to 0' block, an 'if on edge, bounce' block, and a 'set rotation style left-right' block. The 'Sprite' panel on the right shows a cat sprite named 'Sprite1' with a size of 100 and a direction of 90. The 'Stage' panel shows a single backdrop named '1'.

2. Circles

Circles

Draw 4 different colored circles on your screen. Code a sprite to forever move to a random position and see how long it takes to land in each circle.

Hint: You will need to code your sprite to wait 1 second after it moves to a random position.

Requirements 0/3

1 Motion

1 Event

2 Control

Blocks must be connected to an Event block in order to pass the requirements

Submit ↗

The image shows the Scratch code editor interface for the 'Circles' challenge. The 'Code' tab is selected, showing a script with the following blocks: a 'go to random position' block, a 'go to x: 0 y: 0' block, a 'glide 1 secs to random position' block, a 'glide 1 secs to x: 0 y: 0' block, a 'point in direction 90' block, a 'point towards mouse-pointer' block, a 'change x by 10' block, a 'set x to 0' block, a 'change y by 10' block, a 'set y to 0' block, an 'if on edge, bounce' block, and a 'set rotation style left-right' block. The 'Sprite' panel on the right shows a cat sprite named 'Sprite1' with a size of 100 and a direction of 90. The 'Stage' panel shows a single backdrop named '1'.

3. Dance Dance

Dance Dance

Create a sprite dancing on the screen using a loop. Program a dance by using the "turn" and "move" blocks to make it look like it's dancing. Use a "forever" loop to repeat the dance animation continuously.

Add sound effects to make the dance more fun.

Note: You can use the **wait [seconds]** block inside the loop to create a pause between dance moves.

1. When green flag pressed
2. Repeat 70 times
3. Turn 5 degrees
4. When green flag pressed
5. Play guitar sound until done

Requirements 0/4

2 Motion

1 Sound

The code editor shows a 'forever' loop containing the following blocks: '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', and 'set rotation style left-right'. The 'x position' checkbox is checked. The stage shows a cat sprite at (0,0) with a size of 100 and direction of 90.

4. Bouncing Fruit

Bouncing Fruit

Program 3 pieces of fruit to fall from the top of your screen. If they hit the edge, they should bounce.

Requirements 0/3

6 Motion

3 Event

3 Control

Blocks must be connected to an Event block in order to pass the requirements

Submit ↗

The code editor shows a 'forever' loop containing the following blocks: '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', and 'set rotation style left-right'. The 'x position' checkbox is checked. The stage shows a cat sprite at (0,0) with a size of 100 and direction of 90.

Answer Keys & Solutions

Questions

1. True or False: Loops can save you a lot of time if you want the computer to do the same thing over and over again.

MULTIPLE CHOICE

Correct Answer:

A. True ✓ Correct

B. False ✗ Incorrect

Explanation:

Loops are instructions that repeat.

2. What are loops in programming?

MULTIPLE CHOICE

Correct Answer:

A. Instructions that repeat ✓ Correct

B. A roller coaster ✗ Incorrect

C. Knitting ✗ Incorrect

D. The order that things happen in ✗ Incorrect

Explanation:

Loops save lots of time in coding when things happen again and again.

3. How do repeat loops differ from forever loops?

MULTIPLE CHOICE

Correct Answer:

A. Repeat loops play a sound ✗ Incorrect

B. Forever loops change the sprite's size ✗ Incorrect

C. Repeat loops run for a specific number of times

✓ Correct

D. Forever loops select a backdrop

✗ Incorrect

Explanation:

Consider the duration or number of repetitions in each type.

4. What does a forever loop do in programming?

MULTIPLE CHOICE

Correct Answer:

A. It changes the backdrop image

✗ Incorrect

B. It repeats the code endlessly

✓ Correct

C. It moves the sprite

✗ Incorrect

D. It plays a sound once

✗ Incorrect

Explanation:

This loop type continues indefinitely.

5. When coding a forever loop, what happens when you trigger the event?

MULTIPLE CHOICE

Correct Answer:

A. The code inside the forever loop repeats continuously

✓ Correct

B. The code runs once and stops

✗ Incorrect

C. The sprite changes color

✗ Incorrect

D. The backdrop switches to a different scene

✗ Incorrect

Explanation:

The nature of a forever loop is continuous repetition.

1. Loops Typing Game

Typing game - no answer key needed. Students practice typing the provided content.

2. Loops Matching Game

Matching Game Solutions:

1.  A yellow code block that says "repeat" →
2.  A yellow code block that says "forever" →

Students must drag items from the left to match with corresponding items on the right.

3. Loops Memory Game

Memory Game Pairs:

1.  A yellow code block that says "repeat" ↔  A yellow code block that says "repeat"
2.  A yellow code block that says "forever" ↔  A yellow code block that says "forever"

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