# makeblock

## Lesson 4
## Walk in Place

**Subject:** Computer Science

**Level of Difficulty:** Beginner

**Duration:** 45 minutes

## ⭐ Objectives

By the end of class, students will be able to…

- use costumes to animate a sprite;
- locate and use the Costumes Interface;
- justify the use of a loop in a computer program;
- explain the difference between the "forever" and "repeat ()" blocks;
- determine when to use the "wait () seconds" block.

## ⭐ Overview

Through an exploration in digital 2D animation, students learn to give sprites the appearance of movement. They are introduced to the Costumes Interface in mBlock and learn how to change a sprite's costume using programming blocks. They examine using loops to control the flow of a program's execution and to build programs of increasing complexity.

## 🗒 Key Focus

- Use a loop to control a program in mBlock.

## ⚇ Pre-lesson Checklist

**For Teacher:**

- A computer with mBlock software installed or access to the mBlock software website
- Slides Presentation: *Lesson 4 - Walk in Place - Visual*

**For Student:**

- A computer with mBlock software installed or access to the mBlock software website

## 🗒 Standards

- **CSTA 2-AP-13**: Decompose problems and subproblems into parts to facilitate the design, implementation, and review of programs.

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- **ISTE-1D:** Students understand the fundamental concepts of technology operations, demonstrate the ability to choose, use and troubleshoot current technologies and are able to transfer their knowledge to explore emerging technologies.
- **ISTE-5C:** Students break problems into component parts, extract key information, and develop descriptive models to understand complex systems or facilitate problem-solving.
- **ISTE-6A:** Students choose the appropriate platforms and tools for meeting the desired objectives of their creation or communication.
- **ISTE-6B:** Students create original works or responsibly repurpose or remix digital resources into new creations.
- **ISTE-6D:** Students publish or present content that customizes the message and medium for their intended audiences.
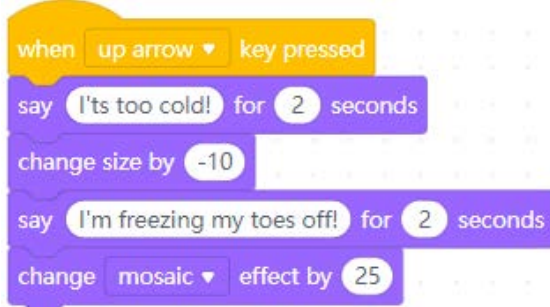
## 🗓 Lesson Plan

| Warm-Up [5 min] |
|---|

In the previous lesson, students learned how to use multiple events to trigger actions for a sprite. Review and discuss the following examples:

(Note, animations are included in the *Lesson 4 - Walk in Place - Visual* slides presentation).

| Example | Effect |
|---|---|
| when space key pressed / say "Too hot, I'm going to bloat!" for 2 seconds / change size by 10 / say "I'm about to melt!" for 2 seconds / change pixelate effect by 25 | When the space key is pressed, the Panda says, "Too hot, I'm going to bloat!" for 2 seconds, and then its size increases by 10; then it says "I'm about to melt!" for 2 seconds, and then the pixelated effect increases by 25. |
| when up arrow key pressed / say "I'ts too cold!" for 2 seconds / change size by -10 / say "I'm freezing my toes off!" for 2 seconds / change mosaic effect by 25 | When the up arrow key is pressed, the sprite says "It's too cold!" for 2 seconds, then the size will change by -10; then it says "I'm freezing my toes off!" for 2 seconds, and then the mosaic effect increases by 25. |

**Motion with 2D Animation**

Let's explore the basics of digital 2D animation.

**Flipbook Animation** – See video included in the slide presentation.



With a flipbook, each page has a drawing that has small changes from the page before and after. When the pages are flipped quickly, they look like a moving cartoon. When digital animators create 2D animations, they use individual drawings to make a character look like it is moving. When the images are played quickly, they look like a moving cartoon. The blowfish animation is created using four different images or costumes to create the animation.

**Animated Blowfish** – See animation included in the slide presentation.
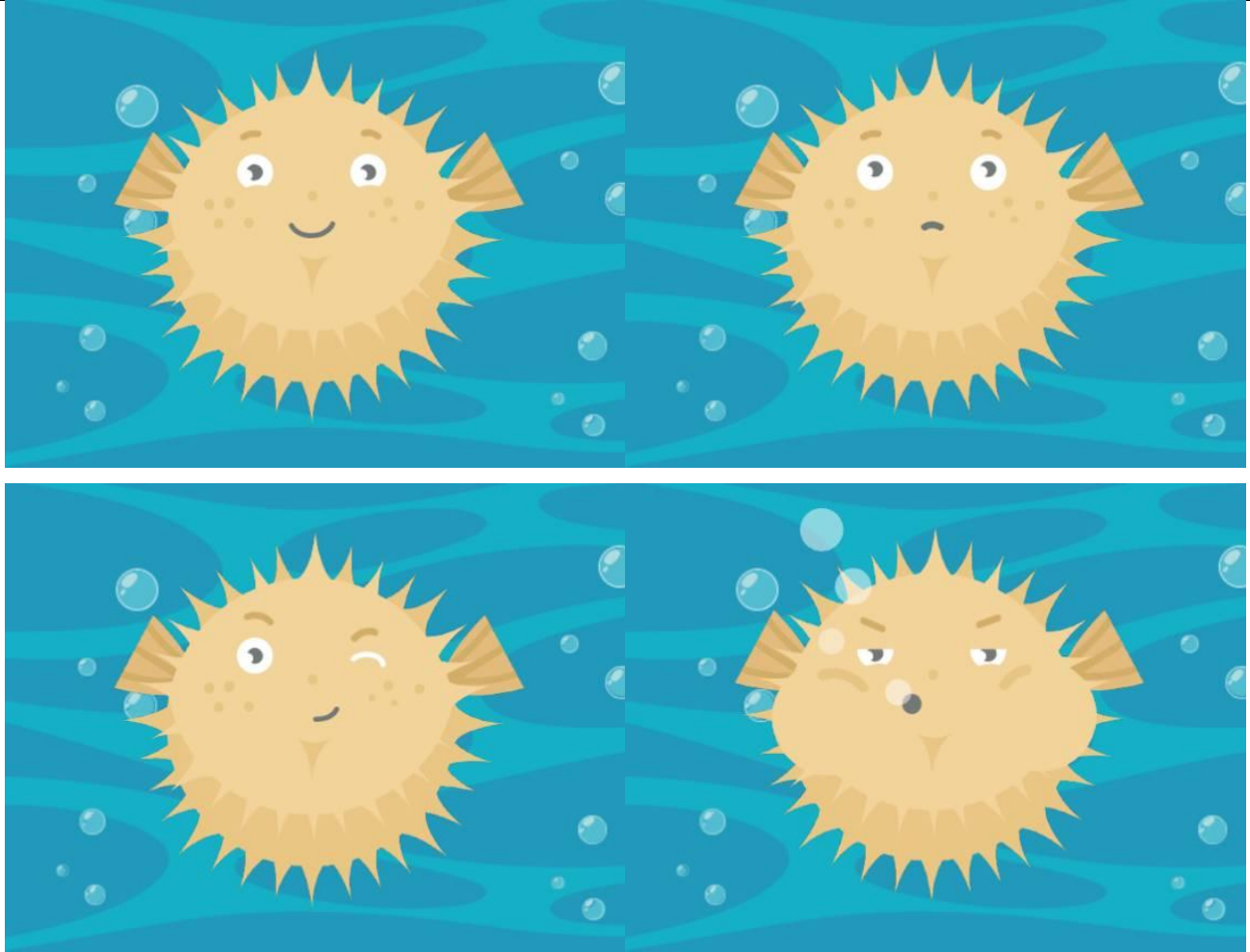
**Costumes in mBlock**

Some sprites in mBlock have multiple costumes available to animate different actions. Let's look at Panda's costumes.

1. Open the mBlock software. Create a new file and click the **Sprites** tab in the Stage Area to ensure that the Panda sprite is selected. Click the ✦ Costumes button in the Stage Area to enter the Costumes interface.

# makeblock
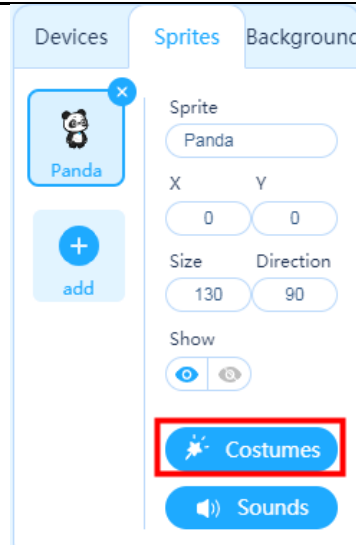


2. Notice, when in the Costumes interface, the Costumes button will become an

   X button. You can exit the Costume interface and return to the Programming

   interface by clicking the X button.

3. The costumes appear on the left column of the costume editing area. Each costume has a unique name. Click on each costume to see the sprite change in the Stage Area.

Notice, Panda has two costumes. Have students predict what action Panda will appear to be doing if these costumes are played quickly to make a moving cartoon.
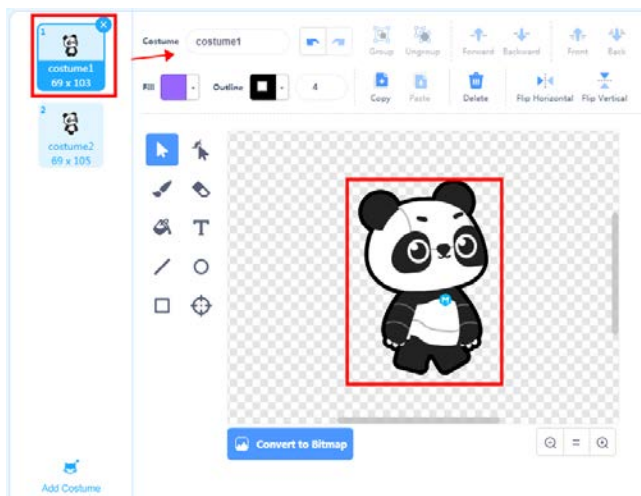
**costume1**                                    **costume2**
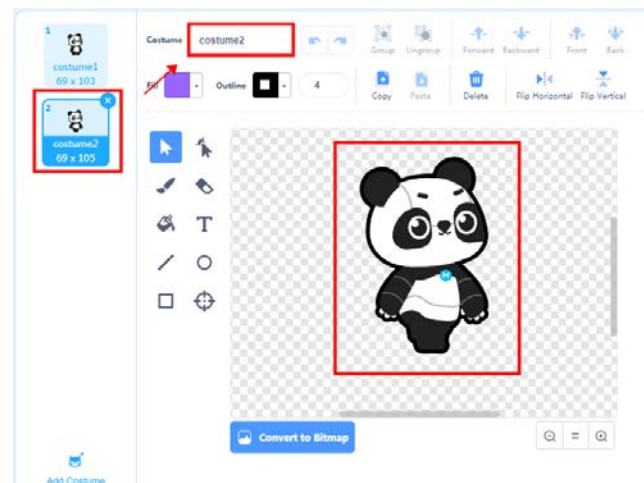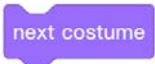
Students can click on costume1 and then costume 2 quickly, alternating between both costumes. They should observe that switching fast between the costumes will create the illusion of Panda walking in place.
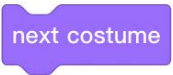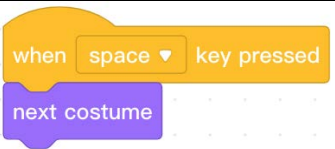
With our help, Panda has been able to speak and showcase transformations to new friends on Earth. Where Panda is from, creatures teleport, so Panda does not know how to walk. Let's begin by programming Panda to walk in place.

## Hands-On [20 min]

Review the following concepts and blocks that will be used to help Panda walk in place.
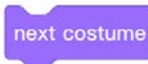
**Switch Costumes**

In the Looks block area, there is a block , which can make the sprite switch costumes.

| Block area | Block | Function | Example |
|---|---|---|---|
| Looks | next costume | When a sprite has multiple costumes, switch the sprite costume to the next costume. | when space ▾ key pressed / next costume |

Instruct the students to write their program according to the steps below:

1   Open the mBlock software. Create a new file and click the **Sprites** tab in the Stage Area to ensure that we are programming the Panda sprite.

2   Find and select Events from the Block Area. Click and drag the `when space ▾ key pressed` block to the Script Area and then release it.

3   Find and select Looks from the Block Area. Click and drag the `next costume` block to the Script Area and attach it beneath the `when space ▾ key pressed` block.

4    Press the space key several times to run the program and observe Panda switching costumes.

**Loop**

In the previous exercise, the user had to press the space key multiple times for Panda to switch costumes. In mBlock, actions can be programmed to occur multiple times using a loop. Blocks nested inside of a loop will be repeated in the program. The following blocks are used to program Panda's walking animation.

| Block area | Block | Function | Example |
|---|---|---|---|
| Control | forever | Continuously repeat the blocks nested inside. | when space key pressed / forever / next costume |
|  | repeat 10 | Repeat the nested blocks 10 times and then stop. |  |

Instruct the students to write their program according to the steps below:

1    Open the mBlock software. Create a new file and click the **Sprites** tab in the Stage Area to ensure that we are programming the Panda sprite.

2    Find and select the appropriate blocks from the Block Area to create the following program.

when space key pressed / forever / next costume
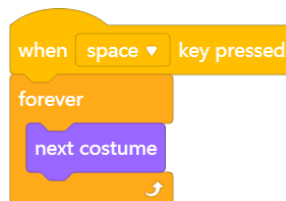
(Note, the forever block is located in Control in the Block Area.)

3    Press the space key to run the program and observe Panda switching costumes.
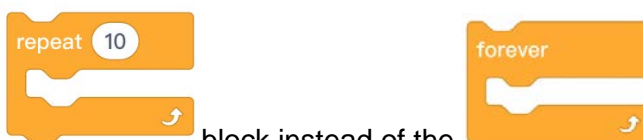
4    Repeat steps 2 and 3 using the repeat 10 block instead of the forever block.

5    Press the space key to run the program and observe Panda switching costumes.

6   Have students describe the difference between these two programs.

**Difference between Forever and Repeat**

When the ![forever block] block is used, Panda continuously changes costumes, and the program will not stop running.

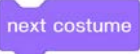When the ![repeat 10 block] block is used, the program stops running after Panda changed costumes 10 times.

**Wait**

In the previous exercise, you will see that Panda changes costumes very fast. The computer processes the program so fast that each costume switch happens in a split second. To see the animation more clearly and slow Panda's walking down, we will use the following blocks:

| Block area | Block | Function | Example |
|---|---|---|---|
| ● Control | wait 1 seconds | Pause the program and wait the specified amount of time. | when space key pressed / repeat 10 / next costume / wait 0.5 seconds |

Instruct the students to write their program according to the steps below:

1.   Add the ![wait 0.5 seconds] block beneath the ![next costume] block nested inside the loop.

2.   Press the space key to run the program and observe Panda switching costumes slowly.

**Time Out:**  Take a moment to review the following fundamentals for working in mBlock and saving programs in mBlock.

1.   *How do I duplicate or copy a block or set of blocks in mBlock?*
     Right-click on a block, select **Duplicate** to copy this block and all the subsequent blocks. Click in the Script Area to drop the blocks. You can change and adjust the copied blocks as needed.

📋 **Assessment**

Have students answer the following questions:

1.   Explain the difference between the two loops explored in this lesson.

2. Which of the following would cause an animation in mBlock to be slower?



3. Which block should be used to make an animation appear slower in mBlock?

## Try It [10 min]

**Independent Practice**

Instruct the students to program Panda walking in place. Their final project should do the following:

- Panda says, "I can walk in place!" and then starts moving.
- While moving, Panda shouts the costume number of "1" or "2".
- Add an appropriate background.

The students who have spare time, can customize their sprites freely.

**Example Program**



## Extension Activity

Challenge students with remaining time to do one or more of the following:

- After the Panda walks in place a number of times, say "I can stand still.", and then take two steps before stopping completely.
- Add transformation effects while Panda is walking.
- Change the event that triggers Panda to walk.

## Wrap-Up [10 min]

## ≔ Quiz

1. Which of the following blocks is not in the control block area?

A. forever

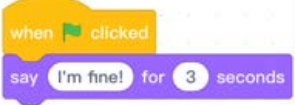B. wait 1 seconds

C. repeat 10

D. when space ▾ key pressed

Answer: D

2. Which Block Area does "Next costume" belong to?

A. Control

B. Events

C. Motion

D. Looks

Answer: D

3. Which of the following programs can make the sprite say "I'm fine!" for 3 times?

A.
when ⚑ clicked
say I'm fine! for 2 seconds
say I'm fine!

B.
when ⚑ clicked
say I'm fine! for 3 seconds

C.
when ⚑ clicked
repeat 10
say I'm fine! for 1 seconds
say I'm fine! for 1 seconds
say I'm fine! for 1 seconds

D.
when ⚑ clicked
repeat 3
say I'm fine! for 1 seconds

Answer: D