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Lesson 5
Panda's Race

Subject: Computer Science

Level of Difficulty: Beginner

Efforts: 45 minutes

⭐ Objectives

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

- create a program in mBlock that contains multiple sprites.
- use the Motion blocks in mBlock to control a sprites movement and position.
- position sprites on the stage using X and Y coordinates.
- explain the importance of setting the position of a sprite at the start of a program.

⭐ Overview

Students create an mBlock project with multiple sprites running separate programs. Students utilize mBlock's coordinate plane to position and move sprites by setting specific X and Y coordinates. By combining costume changes with motion blocks, students animate a sprite to walk across the stage. Different values are explored to slow down and speed up a sprite's motion.

🗒 Key Focus

- Move and position sprites on the stage in mBlock.

⚙ Pre-lesson Checklist

For Teacher:

- A computer with mBlock software installed or access to the mBlock software website
- Slides Presentation: *Lesson 5 – Panda's Race - Visual*

For Student:

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

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🗓 Standards

- **CSTA 2-AP-13**: Decompose problems and subproblems into parts to facilitate the design, implementation, and review of programs.
- **CSTA 2-AP-15:** Seek and incorporate feedback from team members and users to refine a solution that meets user needs.

- **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.
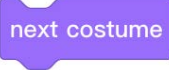
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📅 **Lesson Plan**

Warm-Up [3 min]

In the previous lesson, we created a program for Panda to walk in place using the following blocks:

Block	Function
forever	Continuously repeat the blocks nested inside.
next costume	When a sprite has multiple costumes, switch the sprite costume to the next costume.
wait 1 seconds	Pause the program and wait the specified amount of time.

With our help, Panda has been able to walk in place, but Panda does not know how to run. Panda has entered an upcoming race and needs to learn how to move forward. Let's help Panda compete!
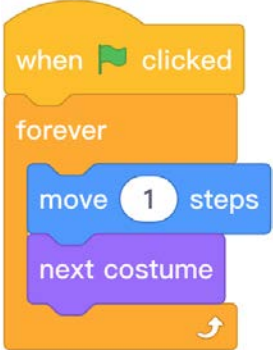
Hands-On [20 min]

In order to help Panda to take part in the upcoming race, we need to learn the following programming knowledge.

Review the following concepts and blocks that will be used to help Panda run.

Moving a Sprite

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In the ⬤ Motion block area, there is a block `move 10 steps`, which can make the sprite move.

Block Area	Block	Function	Example
⬤ Motion	move 10 steps	Move the sprite by 10 steps to the right. The distance can be changed.	when 🏳 clicked forever move 1 steps next costume

Have students predict how a sprite will move when the value is increased or decreased in the

`move 10 steps` block. (Students may say that the smaller the number, the slower or shorter the distance the sprite will move. Or, the larger the number, the faster or further the sprite will move.)

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 🏳 clicked
forever

3. Find and select ⬤ Motion from the Block Area. Click and drag the `move 10 steps` block to the

Script Area and attach it inside the `forever` block. Change the number of steps to "1".

`move 10 steps` ⟶ `move 1 steps`

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4. Find and select 🟣 Looks from the Block Area. Click and drag the `next costume` block to the Script Area and attach it beneath the `move 1 steps` block.

5. Click the 🟢 in the Stage Area to run the program and observe Panda walking.
6. Have students describe where on the stage Panda is located after the program runs for a little while.
7. Click the 🔴 in the Stage Area to stop the program. Click the 🟢 to run the program again.
8. Have students describe the problem with the current program. (Note, students should observe that Panda appears to be stuck on the right edge of the screen.)

Positioning a Sprite

When running this program, we find that when Panda runs to the right edge of the screen, but appears to be stuck there. When you press the green flag again, Panda will remain in the same location. Essentially "stuck".

To resolve this problem, we want Panda to start from the left side of the screen at the start of the

program. We can use the block `go to x: 0 y: 0` to program the starting position of Panda. Then, when we run the program, Panda will start from the starting point we specified.

Quick Tip: In the Block Area, the X and Y coordinates of the `go to x: 0 y: 0` are automatically populated based on the current position of the sprite. Therefore, you may see alternative values in this block while viewing the programming block library.

| Block Area	Block	Function	Example
Motion	go to x: 0 y: 0	Set a specific position for a sprite. The X and Y coordinates are used to specify the position of the sprite in the horizontal and vertical plane and can be adjusted freely.	when 🏴 clicked go to x: −193 y: −73 forever move 1 steps next costume

X & Y Coordinates

In mBlock, X and Y coordinates are used to position a sprite. The coordinate plane in mBlock has an X-axis range of -240 to 240, from left to right. The Y-axis range is -180 to 180, from bottom to top.
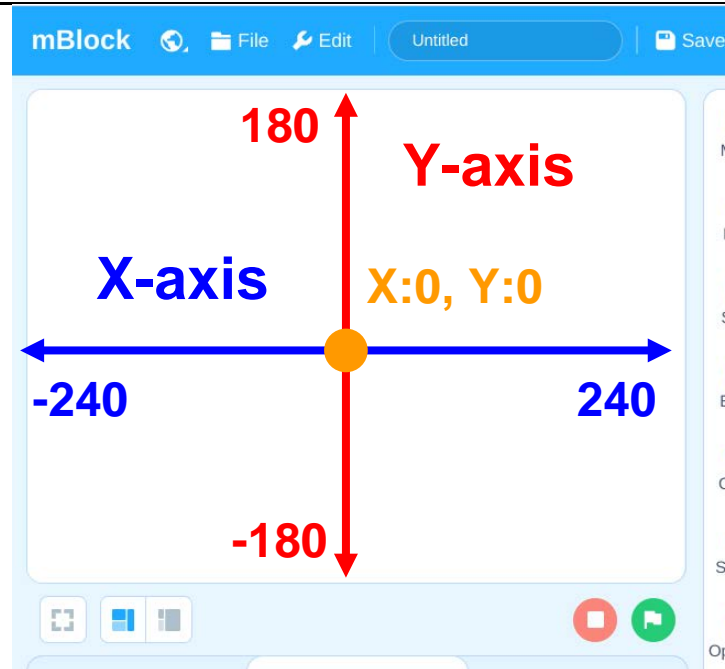
Using the chart above, have students estimate the X and Y coordinates for placing Panda on the left side of the stage.

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

1. In the Stage Area, click and drag the Panda sprite to the left side of the stage.
2. On the Sprites tab, we can see the specific position of the sprite.
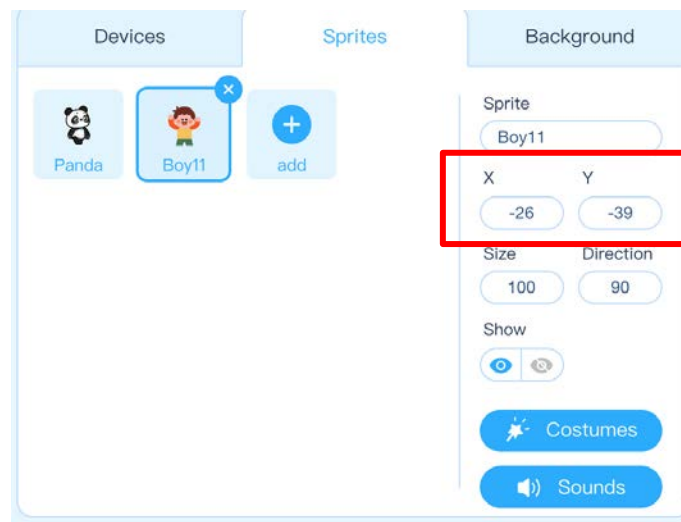
1   Find and select **Motion** from the Block Area. Click and drag the `go to x: 0 y: 0` block to the

Script Area and attach it between the `when 🏳 clicked` block and the `forever` block. Change the

X and Y coordinates to `go to x: -193 y: -73` to position Panda on the left side of the stage.

```
when 🏳 clicked
go to x: -193 y: -73
forever
    move 1 steps
    next costume
```

2   Click the 🏳 in the Stage Area to run the program and observe Panda starting on the left side of the stage.

3   Have students observe and explain *when* the `go to x: -193 y: -73` runs. How many times does it run in the program?

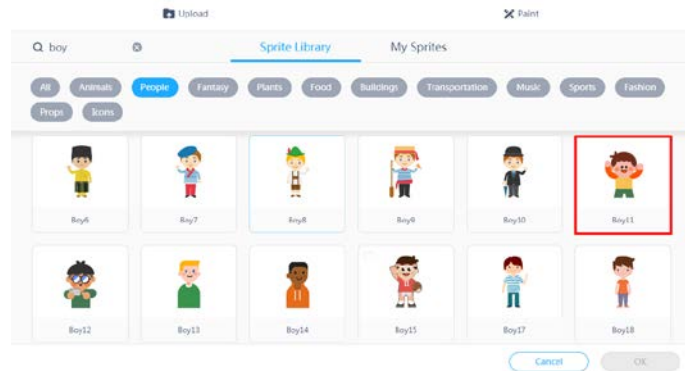**Add a Background and Multiple Sprites**

Now that Panda knows how to walk forward, Panda is entering a race. Panda's friends have come to cheer for Panda along the race track.

1.   Add the "Playground" background to the program.

2.   Select the **Sprites** tab, click the ⊕ add button. Search "Boy" in the sprite library, select "Boy11"
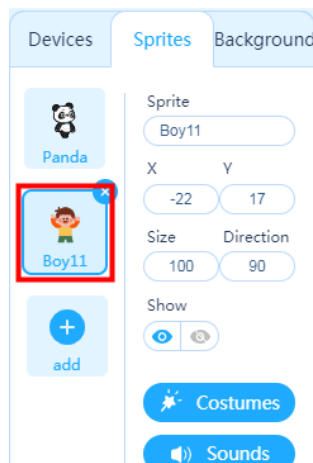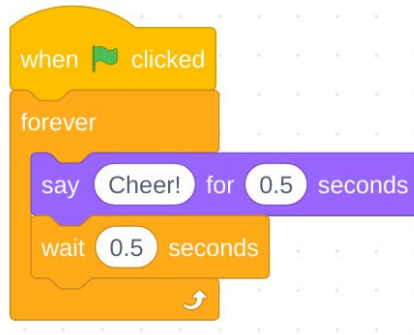
and click "OK".

3. In the Stage Area, click and drag the "Boy11" sprite to the position shown in this example:

4. Select "Boy11" in the **Sprite** tab to enter the programming interface for "Boy11".

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

6. Click the ⚑ in the Stage Area to run the program and observe Panda's friend cheering for the race.

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

1. *When adding a sprite, how do you know if a sprite has multiple costumes?*

   When browsing the **Sprite Library,** place the cursor on a sprite and watch the sprite. If a sprite has multiple costumes, the preview will animate. Also, sprites with multiple costumes have a small icon in the top left corner as indicated below:
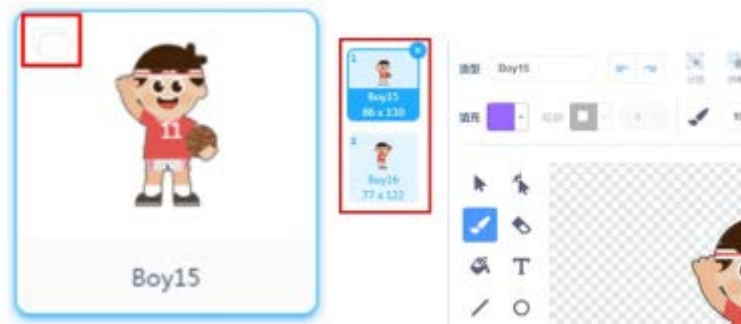
   After adding the sprite, the costumes can be viewed by clicking the **Costumes** button for the sprite.

2. *How do I change the order of sprites on the stage?*

   When running a program, you may find that Panda appears to be behind another sprite. The sprites are automatically arranged in the order in which they are added. The sprites which were added first are in the bottom layer. The sprites which were added last are in the top layer. Click to move the sprites in the stage area and change their stacking order. The last sprite to be moved will become the top layer.

| Panda Behind Other Sprites	Panda in Front of Other Sprites

Try It [15 min]

Independent Practice

Instruct the students to complete the program, Panda's Race. Their final project should include the following elements:

- Include "Boy15" who cheers on Panda when the is clicked.

- Have "Boy15" change costumes while cheering on Panda.

- Panda moves across the stage when the is clicked.

- Panda is programmed to start at the left side of the stage when the is clicked.

Example Program – Panda's Race
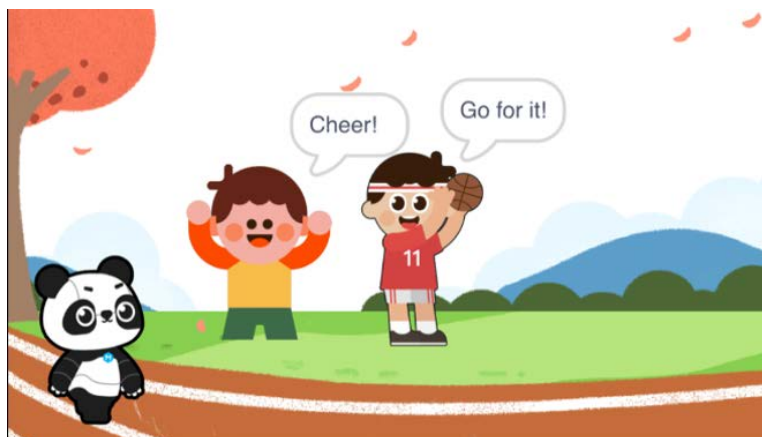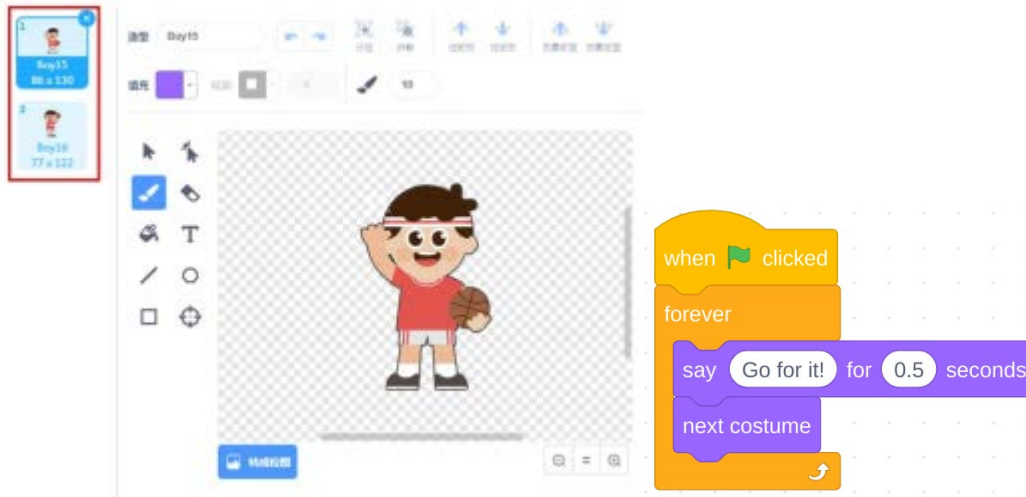
Extension Activity

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

- Add another friend to cheer for Panda at the race.

- Have Panda say something before the start of the race.

- Trigger the start of the race using the space key.

- Change the appearance of the "Boy11" sprite using transformations from the Looks block area.

Wrap-Up [5 min]

📋 Assessment

1. Record a screencast of the project and ask students to submit reflection videos in Seesaw/Flipgrid or similar platforms where students can post projects for classmates to view and comment.

2. Facilitate a "Panda Showcase" activity where students view other student's projects. While viewing each project, have students comment on the following:

   a) Share one thing that you found **interesting** about the project.

   b) Share one recommendation for **improving** the project.

3. Facilitate a class discussion on what students observed from viewing the other students' projects.

4. Have students reflect on improvements and changes they would make based on the feedback received.

Alternative Assessment Ideas

- Share your project with a classmate, parent or sibling and ask for feedback.
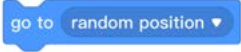
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1. Which block category does `move 1 steps` belong to?

    A. Events   **B.** Control

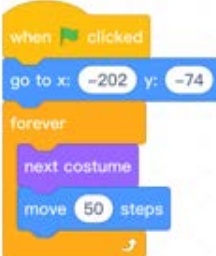   **C.** Looks   **D.** Motion

Answer: D

2. Which of the following blocks can position the sprite on specific coordinates in the stage area?

    A. `move 10 steps`   B. `go to x: -73 y: -136`

    C. `glide 1 secs to random position ▾`   D. `go to random position ▾`

Answer: B

3. Which sprite runs the fastest in the following programs?

    A.
```
when 🏴 clicked
go to x: -202 y: -74
forever
    next costume
    move 10 steps
```

    B.
```
when 🏴 clicked
go to x: -202 y: -74
forever
    next costume
    move 50 steps
```

    C.
```
when 🏴 clicked
go to x: -202 y: -74
forever
    next costume
    move 50 steps
    wait 0.5 seconds
```

    D.
```
when 🏴 clicked
go to x: -202 y: -74
forever
    next costume
    move 10 steps
    wait 0.5 seconds
```

Answer: B