

Lesson 6 Penalty Kick

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 synchronizes costume changes and motion for multiple sprites.
- distinguish between the “go to x() y()” and “glide to x() y() for () seconds” blocks.
- program a sprite to show and hide.
- duplicate programming blocks in mBlock.
- change a sprite's costume to a specific costume.

★ Overview

In this lesson, students will be programming Panda to learn how to kick a soccer ball into a goal from his friend Jordyn. To do this, students will learn how to control more precise movements by programming sprites to glide to specified X and Y coordinates on the mBlock stage. Students explore how to combine motion and costumes to synchronize actions of multiple sprites and create complex animations. Students learn the benefit of showing and hiding sprites in a program.

📋 Key Focus

- Synchronize animations of multiple sprites including costume changes, motion and show/hide.

🔗 Pre-lesson Checklist

For Teacher:

- A computer with [mBlock software installed](#) or access to the [mBlock software website](#)
- Slides Presentation: *Lesson 6 – Penalty Kick - 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.
- **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, we used programming to create a racing competition and cheering fans. In the example program, we designed a program using 3 sprites. Do you still remember what effects were achieved by the following programs?

Sprite	Block	Effect
	<pre> when green flag clicked go to x: -193 y: -73 forever loop move 1 steps next costume </pre>	When the green flag is clicked, the sprite will move to the starting point, and then continuously move forward with 1 step and change costume.
	<pre> when green flag clicked forever loop say Cheer! for 0.5 seconds wait 0.5 seconds </pre>	When the green flag is clicked, say "Cheer!" for 0.5 seconds every 0.5 seconds.
	<pre> when green flag clicked forever loop next costume say Cheer! for 0.5 seconds </pre>	When the green flag is clicked, continuously switch the costume and say "Cheer!" for 0.5 seconds.

After Panda's first running competition, Panda was interested in learning more about other sports. Panda visits a soccer field and sees Jordyn, a soccer player practicing making goals. Panda is excited to be able to watch Jordyn and learn how to kick a soccer ball into the goal too!

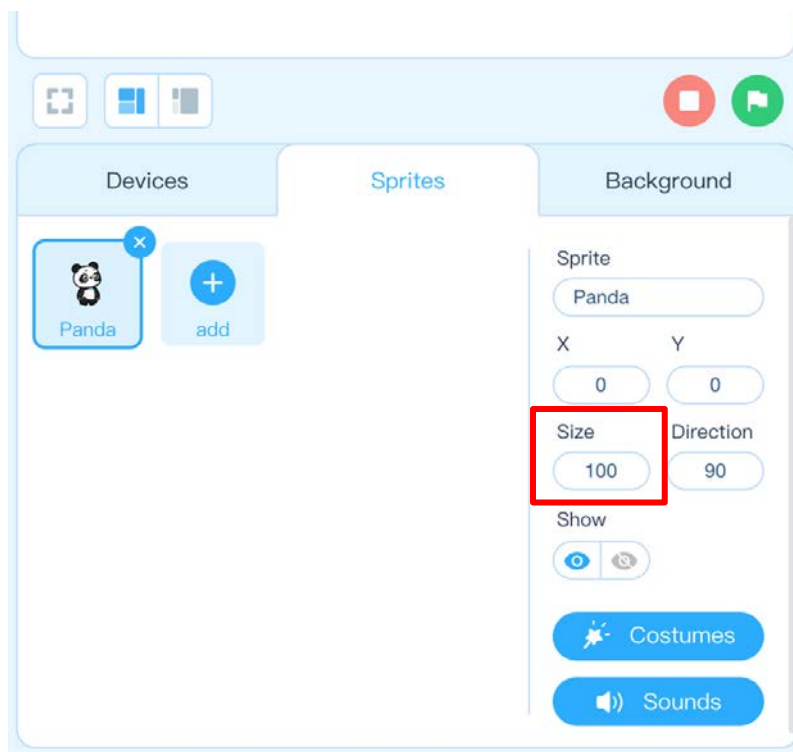


Hands-On [25 min]

Let's make a program that shows Panda watching the soccer player, Jordyn kicking the soccer ball towards the goal.

Change the Size of a Sprite

In mBlock, one way to change the size of the sprite is to enter your desired value in the Size box on the Sprites tab in the Stage Area.



Instruct your student to take a moment away from the computer to sketch and write down on a sheet of paper what things they will need to add to their program in order to create the scene that tells the story of Panda watching Jordyn practice scoring goals. Your students should have the basics, including Panda, a background, a soccer player and the soccer ball. They may add other refinements like changing the size of the ball or the size of Jordyn to make the scale of the objects look right.

If your students need help, here is a potential solution:

1. Open the mBlock software. Create a new file.
2. Add the “Football field1” background to the program.
3. Change the Panda size to 50 and drag Panda to the lower left corner of the stage.
4. Add the “Soccer Ball” sprite to your program.
5. Change the soccer ball size to 50 and set the starting position for the *Soccer Ball* using these

coordinates: 

6. Add the “Jordyn” sprite to your program.
7. Change Jordyn’s size to 80 and set the starting position using these coordinates:



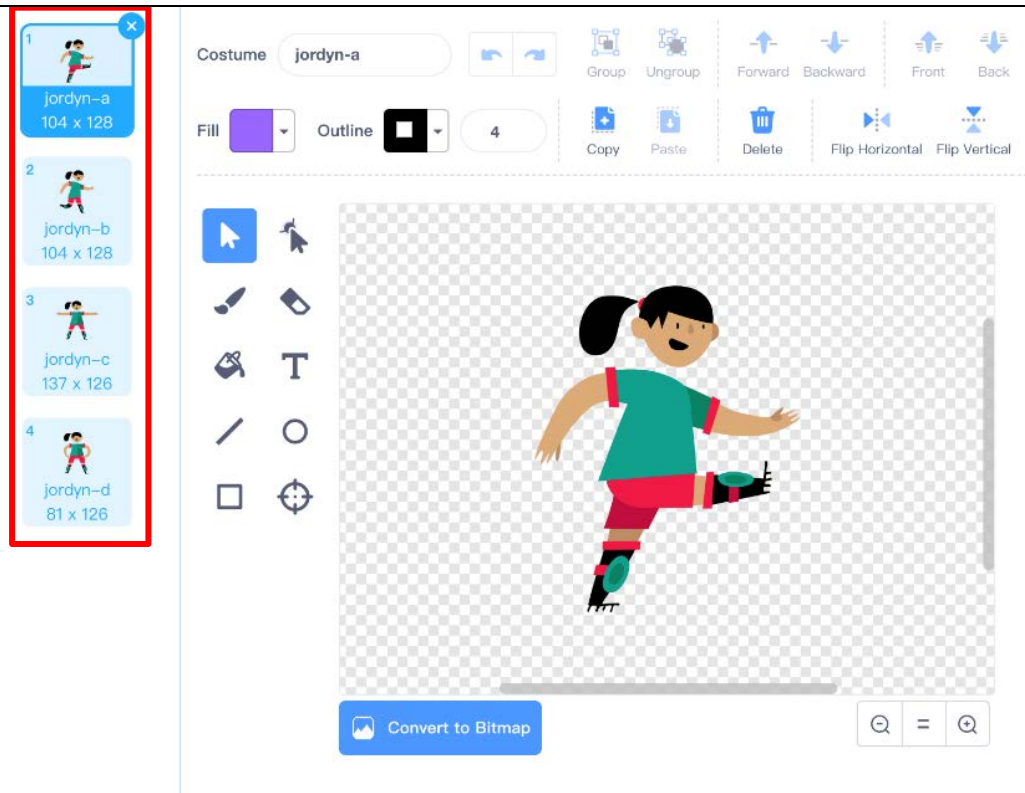
Switch Costumes

Now our mBlock program is set up with a background, a soccer player and the soccer ball. Let’s program Jordyn to kick.

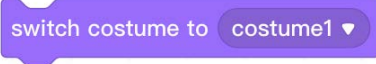
We already know that if a sprite has more than one costume, we can change the costume of the sprite


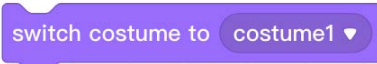
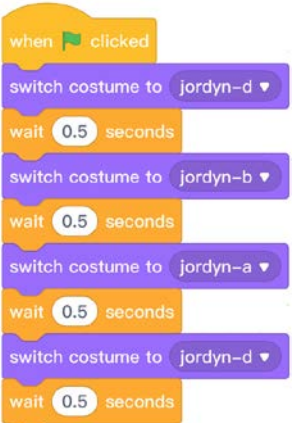
through the  block.

The “Jordyn” sprite has four costumes. To kick, a person completes the following actions: 1) prepare 2) lift leg, 3) kick the ball, 4) end. Looking at the costumes below, the correct order to animate a kick is: 4-2-1-4.



Since we need to specify which costume to change to instead of switching in chronological order, we

need to use the  block.


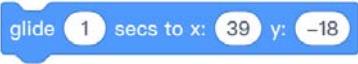
Block Area	Block	Function	Example
 Looks		Control the sprite to change its costume into the specified costume.	


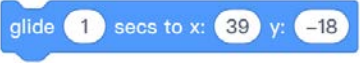
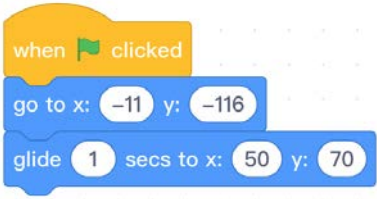
Instruct the students to write their program according to the steps below:

1. In the **Sprites** tab in the Stage Area, select the Jordyn sprite to ensure that we are programming on this sprite.
2. Find and select the appropriate blocks from the Block Area to create the following program.



Moving a Sprite with Glide

In the previous lesson, we used the  block to move a sprite. This movement happened instantaneously. To create the effect of soccer ball rolling towards the goal, we need to use the  block.

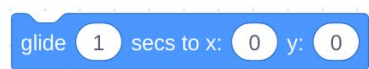
Block Area	Block	Function	Examl
 Motion		Moves smoothly to a specified position at the stage in a specified time.	


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

1. In the **Sprites** tab in the Stage Area, select the Soccer Ball sprite to ensure that we are programming on this sprite.

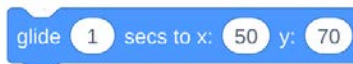


2. Find and select **Motion** from the Block Area. Click and drag the

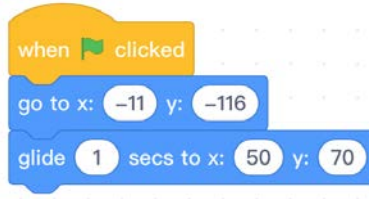


block to the Script Area and attach it beneath a  block Change the block to the


following coordinates and duration:

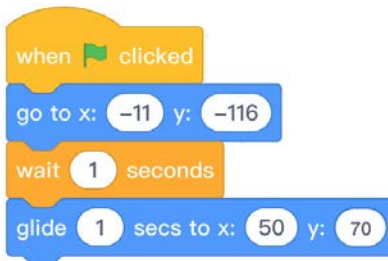


3. Ensure the Soccer Ball contains the following program:






4. When running the program you will find that the kicking action of the player and the movement of the soccer ball are not synchronized. Correct synchronization occurs when the player makes

the “kicking” animation and the ball begins to roll. We can use the block  to solve this problem.



Show and Hide

We have created the kicking action and programmed Jordyn to kick the ball towards the top of the goal. While showing Panda how to kick, Jordyn misses the goal and kicks the ball far away. In our program, the ball goes beyond the edge of the stage. To animate this, we just need to hide the sprite. We will use the following blocks:


Block Area	Block	Function	Example
 Looks		Display the hidden sprite.	
		Hide the sprite.	

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

1. In the **Sprites** tab in the Stage Area, select the Soccer Ball sprite to ensure that we are programming on this sprite.


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



- Click the  in the Stage Area to run the program where Jordyn kicks the ball into the goal.
- Have students observe the program run and identify two problems with their program.


Problem 1 – Soccer Ball is still hidden.



Since the Soccer Ball was programmed to  at the end of the Kick Away program, the Soccer Ball sprite is still hidden when the next program is executed. To avoid the sprite “disappearing

permanently,” we need to include the  block immediately after the Event block for each program on the Soccer Ball sprite.

- In the **Sprites** tab in the Stage Area, select the Soccer Ball sprite to ensure that we are programming on this sprite.


- Modify the first program to include the  block as indicated below:

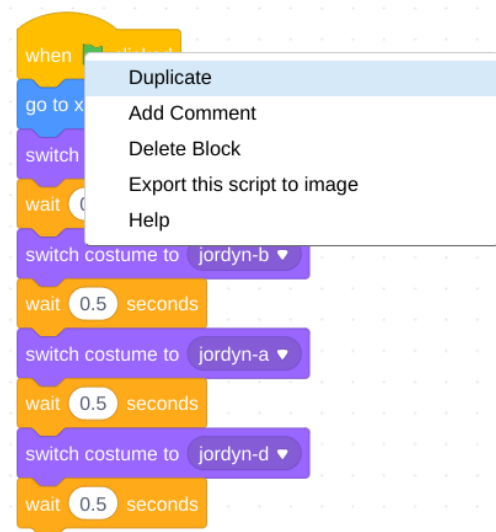


Problem 2 – Jordyn does not change costumes when the left arrow key is pressed.

Jordyn is programmed to perform the kick animation when the green flag is clicked. In order to have Jordyn kick when the left arrow key is pressed, we need to Duplicate the existing code.

1. In the **Sprites** tab in the Stage Area, select the Jordyn sprite to ensure that we are programming on this sprite.

2. Right-click on the  block in the Script Area and select Duplicate. Release the copy of the program in the Script Area.



3. Modify the program to be triggered by the  block. There should be two programs on the Jordyn sprite.



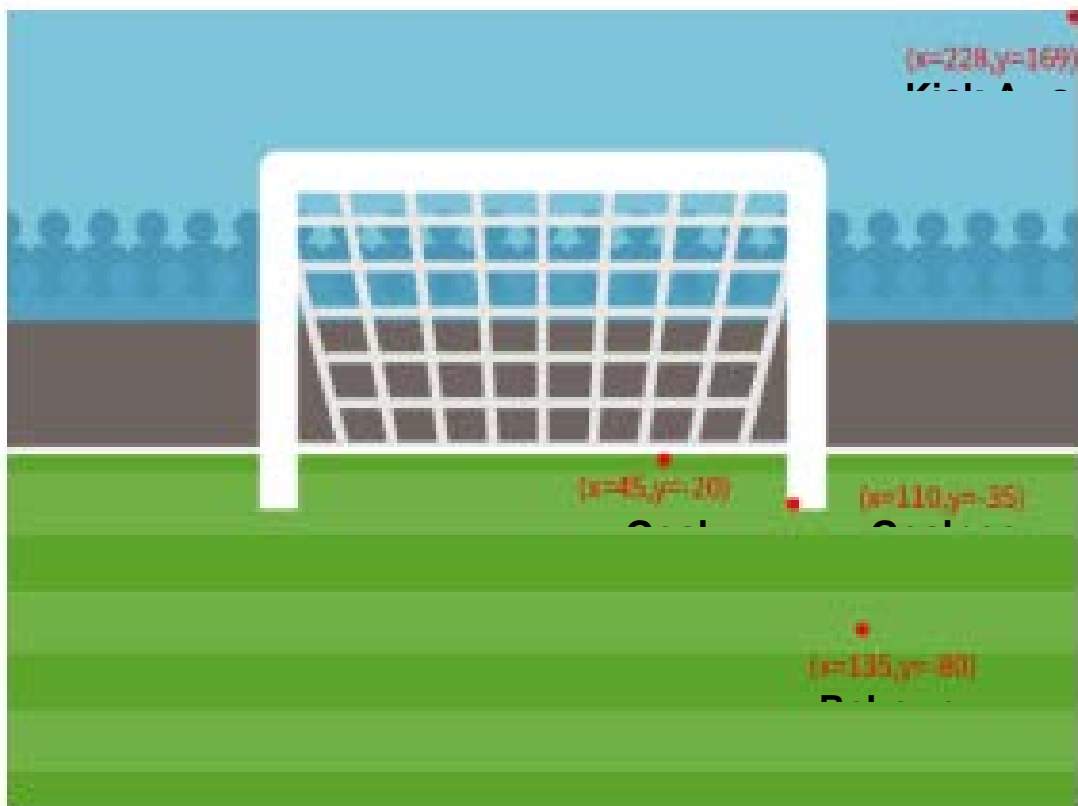
Try It [15 min]

Independent Practice

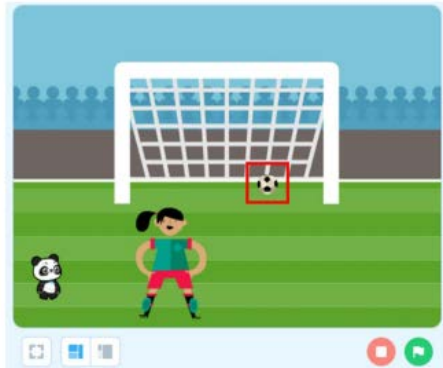
Instruct the students to complete the program, Penalty Kick. Their final project should do the following:

- The ball is kicked into the goal by pressing the space key.
- The ball hits the post by pressing the right arrow key.

Quick Tip: The following figure provides several key coordinate points for reference.



Ball is Kicked into the Goal



Ball Hits the Goalpost



Extension Activity

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

- Program the ball to rebound once it hits the goalpost.
- Program Panda to ask Jordyn to show how to kick the ball.
- Program Jordyn to kick the soccer ball to Panda.

Wrap-Up [5 min]

Quiz

1. Which of the following blocks can display the hidden sprite?

A. change size by 10

B. set size to 100 %

C. show

D. go to front layer

Answer: C

2. When running the code, what will the sprite's path of movement be?



- A. A square
B. A rectangle
C. Move to the right in a straight line
D. Move back and forth in a straight line

Answer: D

3. When running the code, the sprite will glide for 4 times. What is the slowest instruction?

A. glide 1 secs to x: 200 y: 0

B. glide 0.5 secs to x: 50 y: 0

C. glide 10 secs to x: 200 y: 0

D. glide 1 secs to x: 50 y: 0

Answer: C