Lesson 8
A Running Moth

Subject: Computer Science

Level of Difficulty: Intermediate

Duration: 45 minutes

Objectives

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

- create a program that combines multiple conditional statements to create an interactive program in mBlock;
- change the direction of a sprite;
- describe the two ways to detect keyboard input from a user;
- program a game to end based on a specified condition.

Overview

By combining previously learned skills, students create an interactive game where the moth tries to avoid being eaten by the bat. Students program the moth to move using multiple conditional statements that detect when the arrow keys are pressed. Students program the game to end and stop all scripts using a conditional statement that detects if the bat and moth are touching.

Key Focus

- Use simultaneous conditional statements to create an interactive game.

Pre-lesson Checklist

For Teacher:

- A computer with mBlock software installed or access to the mBlock software website
- Slides Presentation: *Lesson 8 – A Running Moth - Visual*

For Student:

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

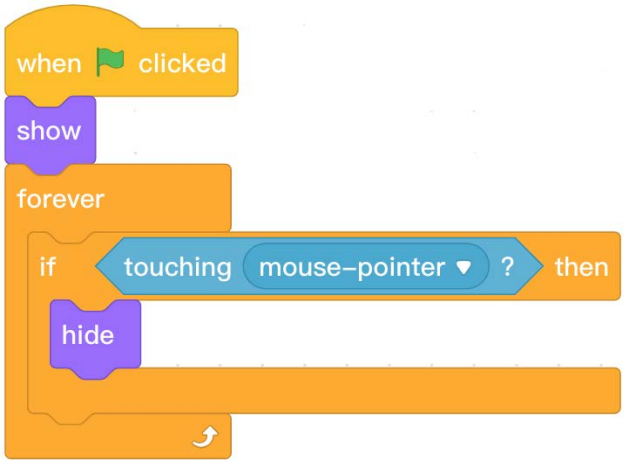
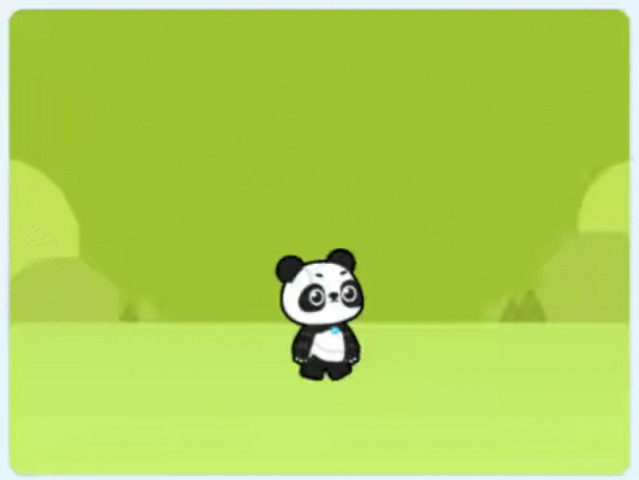
Standards

- **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 travelled around the world with Panda. Look at the following program, do you remember how this program works?

Program	Description
	Click the green flag, the sprite appears on the stage area; When the mouse pointer touches the character, it disappears. 

While traveling, Panda learned about many of the animals that live on Earth. While sleeping under the stairs on a camping trip, Panda observed a bat chasing a moth. The moth was trying very hard to avoid the bat, but eventually the bat would catch the moth. Let's help Panda create a program that can reenact this scene.

Game Time [5 min]

Instruct the students to open the example program, **A Running Moth**. Allow students time to play the game and explore the program. The player controls the moth and runs away from the bat so that it is not eaten. Use the arrow keys on the keyboard to control the movement of the moth. If the moth touches the bat, it will fall down from the air and the game will be over.

How long can you stay alive?

Explore a mBlock Project – A Running Moth

Instruct the students to open the example, **A Running Moth**. Allow students time to play the game and explore the program. The player controls the moth and runs away from the bat so that it is not eaten. Use the arrow keys on the keyboard to control the movement of the moth. If the moth touches the bat, it will fall down from the air and the game will be over.

How long can you stay alive?

Hands-On [20 min]

In Lesson 3 – Talented Transformations, we used Event blocks to use the arrow keys to control a sprite. In this lesson, we will learn another way to control a sprite using the arrow keys. This lesson will the following conditional statements instead of Event blocks:

1. **IF** the ↑ up arrow key is pressed, **THEN** the sprite moves up.
2. **IF** the ↓ down arrow key is pressed, **THEN** the sprite moves down.
3. **IF** the ← left arrow key is pressed, **THEN** the sprite moves left.
4. **IF** the→ right arrow key is pressed, **THEN** the sprite moves right.
5. **IF** the Panda touches the opponent, **THEN** the game is over / stop all scripts.

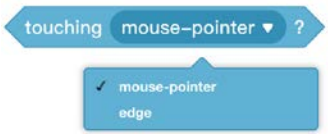
Changing the Direction of a Sprite

The 

block moves a sprite in the direction the sprite is facing. In order to change the direction a sprite moves, you must program the sprite to point in your desired direction.

Block Area	Block	Function	Example
Motion	point in direction 90	Specify the direction the sprite faces. Adjust the direction using the diagram or by inputting a value. 0 Up 90 Right 180 Down -90 Left	

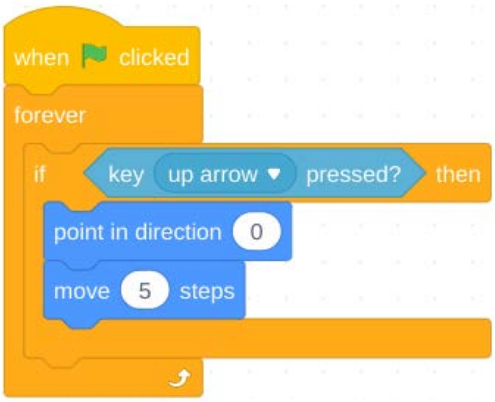
Sensing Blocks

In Lesson 7, we used the  block from the Sensing Block Area to determine whether the sprite was touching the mouse pointer or the edge of the stage. We will use the following Sensing block to detect when a key is pressed.

Blocks Area	Block	Function
Sensing	1 key space pressed?	Sensing block used in a conditional statement to determine if a condition is met.

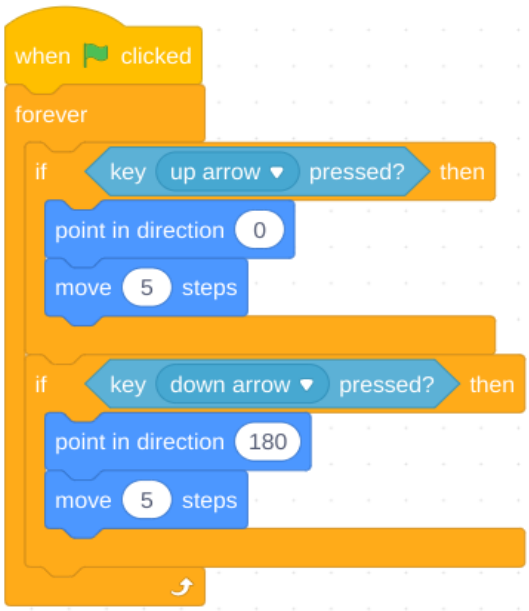
Instruct the students to write their program according to the steps below:

1 Create a new mBlock project. Find and select the appropriate blocks from the Block Area to create the following program.



2 Click the in the Stage Area to run the program. Press the up arrow to observe Panda moving up.

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



4 Add conditional statements for the left arrow and the right arrow keys.

5 Click the in the Stage Area to run the program. Press the up arrow to observe Panda moving in four directions: up, down, left and right.

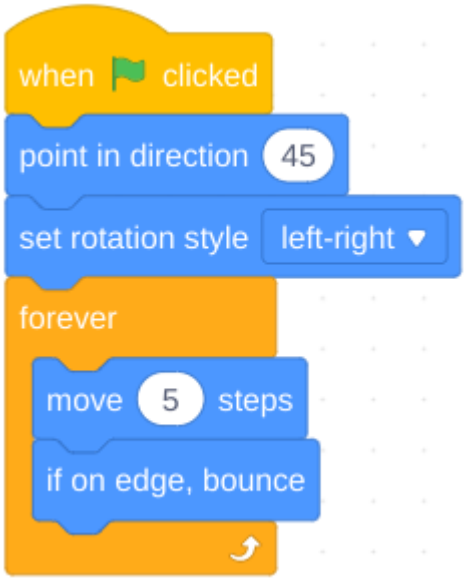
Stop All Scripts

Now that Panda is able to move around the stage using keyboard input, we need to create an opponent for Panda to avoid. We will add another sprite, program it to move around the screen and program it to stop the entire program if it touches Panda.

Block Area	Block	Function	Example
Control	stop all	Stop all scripts of the program.	

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

1. Add another sprite of your choosing to your program.
2. Find and select the appropriate blocks from the Block Area to create the following program.



3. Click the in the Stage Area to run the program and observe the opponent sprite moving around the stage.
4. Find and select the appropriate blocks from the Block Area to create the following program to stop all of the scripts in the program and end the game.

5. Click the  in the Stage Area to run the program. Move the Panda to touch the opponent sprite and observe the program stop.

Try It [10 min]

Independent Practice

Instruct the students to create the Running Moth game. Their final project should do the following:

1. Contain two sprites, “Bug2” and “Bat1”, and an appropriate background.
2. Set starting positions for both sprites using programming blocks when the green flag is clicked.
3. Program the moth to move using the arrow keys.
4. Program the bat to fly around the stage after waiting one second to allow the playter time to get ready.
5. Create an animation of the wings flapping on the bat.
6. End the game and stop all the scripts when the sprites are touching.

Extension Activity

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

- Program the moth to fall and hide when it touches the bat.

- Change the transformation effect of the moth when it touches bat. Be sure to reset the appearance effect of the moth at the start of the program.
- Add Panda to the program to watch the moth and bat.

Wrap-Up [5 min]

Quiz

1. From the following options, which block can stop the action of all sprites?

A. 

B. 

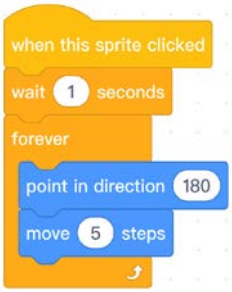
C. 

D. 

Answer: A

2. Which block combination is used to animate the effect that the character is falling down from the air?

A. 

B. 

C. 

D. 

Answer: B

3. When pressing key “C”, what will the character say?

A. a

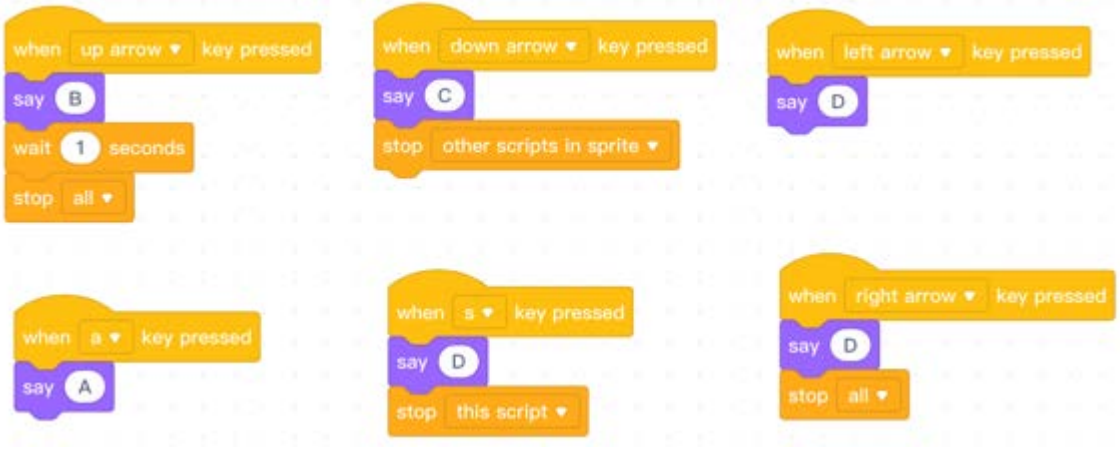
B. b

C. c

D. d

Answer: A

4. Pressing ____ key can realize the effect of “Stop all” running programs immediately.



Answer: Right arrow (→)