

Cloud Surfer

Python Game Design

Time: 60 mins

Introduction

In this class, student/s will learn to add gravity to enable a natural fall on every jump so that Zonan can jump on the cloud to collect the magical lights and cross the valley.

New Commands Introduced

- `isTouching(object1, object2)`: User-defined function that checks if object1 and object2 collide with each other.

Vocabulary

- **Gravity** is the force that pulls objects towards a planet.
- **Collision** occurs when the two objects touch each other.
- **A variable** is used to store a value that can be changed based on conditions or information in the program.

Learning Objectives

Student(s) should be able to:

- **Recall** how to handle key events.
- **Demonstrate** how to add gravity to a game character.
- **Describe** how to detect collision between two game objects.
- **Simulate** Zonan's jump over the clouds using gravity and collision detection.

Activities

1. Class Narrative: (2 mins)

- Brief student/s that Zonan landed on a steep ledge after crossing over the cavern. While searching for a route to move ahead, Zonan sees the sky filled with magical lights. Zonan jumps over the clouds using arrow keys to cross the valley in the jungle.
- Inform the student/s that each time they collect the magical light (orange-colored), the count increases by 1. The count decreases by 1 when they collide with the dark lights (purple-colored).

2. Concept Introduction Activity: (2 mins)

- Let the student/s play and explore the activity to observe Zonan's movement to jump over the clouds and collect the magical lights using the up arrow key.
- Use a real-life example of gravity to explain how a ball falls to the ground.

- Brief the student that we will learn to add gravity to Zonan in activity 1. In activity 2, the student will learn to detect collision between Zonan and the cloud to make Zonan jump. In activity 3, the student will learn to debug the code that makes Zonan jump again in mid-air.

3. Activity 1: Add Gravity to Zonan: (10 mins)

Teacher Activity:

- Explain to the student/s how to add gravity to Zonan using variables and operators and update Zonan's vertical movement with gravity in the function draw().
- Teacher will experiment with gravity values starting with 1 being the smallest natural number and then she assigns gravity value as 2. On observation, the student/s will notice that the gravitational pull is faster in case of a value of 2, and hence, the gravity value must be lesser than 1.
- Ask the student/s to observe that Zonan falls rapidly.

Student Activity:

- Guide the student/s to add gravity to Zonan and make Zonan land gradually by decreasing the value of gravity.

4. Activity 2: Use Collision to make Zonan Jump: (15 mins)

Teacher Activity:

- Demonstrate Zonan's fall through the cloud.
- Introduce and explain the helper function isTouching() to detect the collision between two objects.
- Explain the use of the isTouching() function in detecting the collision of Zonan with the cloud to prevent the fall.

Student Activity:

- Guide the student/s to detect the collision between Zonan and the cloud using the helper function named isTouching().
- Ask the student/s to stop Zonan's vertical movement on colliding.
- Let the student/s explore that Zonan cannot jump after landing on the cloud. Probe them to increase the distance between Zonan and the cloud to enable the jump.
- Guide the student/s to make Zonan jump again after landing on the cloud by decreasing its vertical position by its height.

5. Activity 3: Debug the Code: (12 mins)

Teacher Activity:

- Introduce the problem that when the student/s clicks the up arrow key twice, Zonan jumps again in the air.
- Lead the student/s to think that Zonan should jump only after landing on the cloud.
- Explain how to use and update the "jump" variable to enable and disable jump to resolve the problem.

Student Activity:

- Guide the student/s to disable jump so that Zonan stops from jumping in the mid-air.

6. Introduce the Post class project: (2 min)

- Add gravity to the ball and detect the collision among the player, football, and the ground.

7. Test and Summarize the class learnings: (5 mins)

- Check for understanding through quizzes and summarize learning after respective missions.
- Summarize the overall class learning towards the end of the class.

8. Additional activities:

- Encourage the student/s to help Zonan jump higher and land gradually.
- Encourage the student/s to detect the collision of Zonan with the platforms.

9. State the Next Class Objective: (1 min)

- We will help Zonan cross the dungeon.

U.S. Standards:

CSTA: 2-AP-11, 2-AP-12, 2-AP-14

Links Table		
Activity	Activity Name	Link
Class Presentation	Cloud Surfer	https://s3-whjr-curriculum-uploads.whjr.online/8e408d0b-02e1-4614-bb5b-3ced31c9b592.html
Explore Activity	Cloud Surfer: Explore Activity	https://tynker.com/code/view/630734212f9bf443993e3a18/
Teacher Activity 1	Add Gravity to Zonan	https://tynker.com/code/project/6308889611b63a38bc2c5532
Teacher Activity 1 Solution	Add Gravity to Zonan - Solution	https://tynker.com/code/project/6308913302a9fa407b5f8f02
Student Activity 1	Add Gravity to Zonan	https://tynker.com/code/project/63072ce20002531bc66c6f62
Teacher Reference: Student Activity 1 Solution	Add Gravity to Zonan - Solution	https://tynker.com/code/project/63072d0fb4004e02aa0bcc52
Teacher Activity 2	Introduce helper function	https://tynker.com/code/project/630739f14578b961b26d2cc2
Teacher Reference: Teacher Activity 2 Solution	Introduce helper function - Solution	NA
Student Activity 2.1	Make Zonan land on Cloud	https://tynker.com/code/project/6307310268fba479bc7244b7
Teacher Reference: Student Activity 2.1 Solution	Make Zonan land on Cloud - Solution	https://tynker.com/code/project/63072ead60fc805900330852
Student Activity 2.2	Make Zonan jump on Cloud	https://tynker.com/code/project/6307326881442f393f08f952

Teacher Reference: Student Activity 2.2 Solution	Make Zonan jump on Cloud - Solution	https://tynker.com/code/project/63073193419da836c87e9142
Teacher Activity 3	Enable the Jump	https://tynker.com/code/project/6307391edcc70c291853b10a
Teacher Reference: Teacher Activity 3 Solution	Enable the Jump - Solution	https://tynker.com/code/project/6307388b5191545a64604962
Student Activity 3	Stop Zonan from Jumping in the Mid Air	https://tynker.com/code/project/630734ce6d0493050a071022
Teacher Reference: Student Activity 3 Solution	Stop Zonan from Jumping in the Mid Air - Solution	https://tynker.com/code/project/630734212f9bf443993e3a18
Student Additional Activity 1	Debug the code	https://tynker.com/code/project/63073cc9dac26746b457dde2
Teacher Reference: Student Additional Activity 1 Solution	Debug the code - Solution	https://tynker.com/code/project/63073be274ec475e046ecff7
Student Additional Activity 2	Jump over the Platforms	https://tynker.com/code/project/63073e03ec0733482a6672f2
Teacher Reference: Student Additional Activity 2 Solution	Jump over the Platforms - Solution	https://tynker.com/code/project/6306e3132cfdc97db43b5752
Post Class Project	Add Gravity to the Football	https://tynker.com/code/project/6307b32e31cef23581071932
Teacher Reference: Post Class Project Solution	Add Gravity to the Football- Solution	https://tynker.com/code/project/6307b35fca6f041d961dfba2