Spillover in the City

Python Game Design

Time: 60 mins

Introduction

In this class, the student/s will learn to create and display game objects like Dr. Cleo and the platform using the concept of Classes from Object Oriented Programming. Student/s will also learn to add images to the game objects created.

Python Commands Introduced

● class className()	This command declares a class with the specified className.
● objectName = className()	This creates an object as an instance of class.
● objectName.methodName()	This will call the method using the object name.
● self	self represents the instance of the class. By using self, we can access the properties and methods of the current object.
● __init__(self)	This function is called every time an object is created.

Vocabulary

- **Object-oriented programming** is a way of structuring programs such that properties and behaviors are bundled into individual objects.
- **Class** is a user-defined blueprint or prototype from which objects are created/instantiated.
- **Object** is an instance of a class.
- **Abstraction** refers to providing only essential information about the data to the outside world, hiding the background details or implementation. E.g. a user using a mobile phone need not know about the internal workings of the phone.
- **Encapsulation** is binding data and methods in one unit. E.g. a class binds its data members and methods together.

Learning Objectives

Student/s(s) should be able to:

- ***Explain*** how to define classes using OOP.
- ***Describe*** how to create objects.
- ***Demonstrate*** how to add images to the objects.
- ***Create*** game objects like Dr. Cleo and the platform using classes.

Activities

1. **Class Narrative:** *(2 mins)*
    - Brief the student/s that Dr. Cleo lives in a sci-fi city and loves performing experiments. One day, while she is away, mysterious gas leaks from her laboratory and throws the city into chaos.

2. **Concept Introduction Activity:** *(5 mins)*
    - Let the student/s observe the activity gif and name the different objects in the sci-fi city.
    - Explain to the student/s that to add objects like Dr. Cleo, platforms, and buildings in a game, we used dictionaries in processing.py.
    - Highlight to the student/s the problem in storing the function definitions in dictionaries.
    - Explain to the student/s about the classes concept of Object-oriented programming using the slides.
    - Using the slides, explain they will learn:
        - to create and display the game objects
        - to change the appearance of the game object

3. **Activity 1: Create a Game Object:** *(12 mins)*

    Teacher Activity: *(6 mins)*
    - Explain to the student/s how to create a class and an object.
    - Explain how to create a class Shape() by defining its properties and creating a rectangle to display the shape object.
    - Summarize the concepts of
        - Class as a blueprint from which objects can be created and is also known as Sprite in the game world.
        - Object as an instance of the class and we can create multiple objects of a single class.

    Student Activity: *(6 mins)*
    - Guide the student/s to create the class Sprite() and create and display Dr. Cleo as an object.

4. **Activity 2: Display the Game Object:** *(12 mins)*

    Teacher Activity: *(7 mins)*
    - Explain to the student/s how to define the display() method and use the shape1.display() command to display the object.
    - Explain to the student/s that functions can be reused and are known as methods when associated with a class.
    - Explain to the student/s about the use of self using the slides.
    - Probing question: What is the format to call a method of the class?
      Expected answer: objectName.methodName(parameters)

    Student Activity: *(5 mins)*
    - Guide the student/s to create the display() method for the class Sprite() and display Dr. Cleo as an object on the screen.

5. **Activity 3: Change the Appearance of the Game Object:** *(12 mins)*

    Teacher Activity: *(6 mins)*
    - Explain to the student/s that multiple objects having similar properties can be created using the same class.

- Explain to the student/s how to initialize the properties of an object within a class and also assign an image to the game object by defining the __init__() method.
  Note: self which is passed as the first parameter of the method represents the current object.

  Student Activity: *(6 mins)*
- Guide the student/s to debug the code to display Dr. Cleo and the platforms with their images using the class Sprite().

6. **Introduce the Post class project:** *(2 min)*
   - In the game, create platforms over a canyon to help an astronaut reach his spaceship.

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 add platform tiles to complete the bridge to make it easier for her to move from one platform to another.
   - Encourage the student/s to add an air purifier on top of the platform to clear the air in the city as the gas has spread throughout the city.

9. **State the Next Class Objective:** *(1 min)*
   - We will learn to move Dr. Cleo to help her go around the city and explore the damages caused by the gas leakage in the sci-fi city.

U.S. Standards:

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

Links Table		
Activity	**Activity Name**	**Link**
Class Presentation	Spillover in the City	https://s3-whjr-curriculum-uploads.whjr.online/32af8264-e602-4ff8-8897-2e3b456eb22d.html
Teacher Activity 1	Create an Object for Player	https://tynker.com/code/project/632a2b879cd2e30adf33ff92
Teacher Activity 1 Solution	Create an Object for Player : Solution	https://tynker.com/code/project/632a2c3973a4480bac4b15d2
Student Activity 1	Create an object for Dr. Cleo	https://tynker.com/code/project/632a2de0f8549a1de9058e22
Teacher Reference: Student Activity 1 Solution	Create an object for Dr. Cleo : Solution	https://tynker.com/code/project/632a2def45d6930c2e3c1f72
Teacher Activity 2	Display an Object for Player	https://tynker.com/code/project/63

		2a2c8180c94966352e8c72
Teacher Activity 2 Solution	Display an Object for Player : Solution	https://tynker.com/code/project/632a2c8e9166a657f848f892
Student Activity 2	Display the Object for Dr. Cleo	https://tynker.com/code/project/632a2ed57fec066d14541f02
Teacher Reference: Student Activity 2 Solution	Display the Object for Dr. Cleo : Solution	https://tynker.com/code/project/632a2ee1e06d5f4f65270a82
Teacher Activity 3	Define the __init__() method	https://tynker.com/code/project/632a2d3b962cb304b56a58d2
Teacher Activity 3 Solution	Define the __init__() method : Solution	https://tynker.com/code/project/632a2d48a8fa276d44253832
Student Activity 3	Debug the Code	https://tynker.com/code/project/632a30f2a4a6fc02966f5012
Teacher Reference: Student Activity 3 Solution	Debug the Code : Solution	https://tynker.com/code/project/632a30fc5e5f0948f17e1d22
Student's Additional Activity 1	Complete the Bridge	https://tynker.com/code/project/633442690c71a6517c7ca84c
Teacher Reference: Student's Additional Activity 1 Solution	Complete the Bridge : Solution	https://tynker.com/code/project/6334855ef19c8f76123b2e32
Student's Additional Activity 2	Add an Air-Purifier	https://tynker.com/code/project/6334861c1f7ac6424f5e2e72
Teacher Reference: Student's Additional Activity 2 Solution	Add an Air-Purifier : Solution	https://tynker.com/code/project/63341264642617238c4c8572
Post Class Project	Cross the Valley	https://tynker.com/code/project/633517cd66a5fc3c6d74a172
Teacher Reference: Post Class Project Solution	Cross the Valley : Solution	https://tynker.com/code/project/6316f9bb83d6a61779244462