Sparks in Space

Python Foundation

Time: 60 mins

Introduction

In this class, students will create the game title screen with stars and craters on the moon by drawing shapes of varying sizes and colors using the Turtle tool. Students will define custom functions to create more structured programs and explore the power of functions to generate distinct results for different values.

Commands Introduced

- turtle.dot(diameter, "color") — Draws a circle with a given diameter and a specified color.
- screen = turtle.Screen() — Creates a screen.
- screen.setup(width,height) — Sets the screen size to a given width and height.
- screen.bgcolor("color") — Set the screen background color.

Vocabulary

- **Function:** Function is a block of organized, reusable code that fulfills a specific purpose. A function is a named sequence of instructions that performs a specific action.
- **Function Definition:** A function must be defined before it can be called and function names must be unique. In Python, the function definition is started by using the keyword "def," the name of the function, parentheses, and a colon.
  Syntax: def *function_name*(*value 1*, *value 2*):
  Commands
- **Function Call:** After a function is defined, you can use the name of the function to execute the instructions in the function. A function can be called any number of times.
  Syntax: *function_name*(value1, value2)

Learning Objectives

Student(s) should be able to:

- ***Memorize*** giving instructions and using turtle commands in Python.
- ***Describe*** how to write functions to create more structured programs.
- ***Implement*** how to write custom functions and call them, to draw stars and circles using commands in Python.
- ***Create*** *a* game title screen showing a few stars and craters on the moon.

Activities

1. **Class Narrative:** (*2 mins)*
   - Encourage students to think about different objects in space.
   - Showcase space images received from the satellite.

2. **Concept Introduction Activity:** *(2 mins)*
    - Ask them what different objects can be added to the game title screen.
    - Lead them to think how turtle tool can help us draw a star.

3. **Activity 1: Setup the screen:** *(5 mins)*

    Teacher Activity:
    - Encourage students to read the tutorial and follow the steps to set up the screen size and color and seek assistance as and when required.
    - Help the students navigate the tutorial and guide them when they face any difficulty.
    - Explain to students **the importance of comments.**
    - Note: **#** is used to comment the code in python. The editor ignores comments as text and Comments add more readability to the code.

4. **Activity 2: Create a Star:** *(7 mins)*

    Student Activity:
    - Guide the students to create a star using turtle commands.
    - Allow them to play with the value passed to **forward()** command to change the size of the star.
      Note:The inner angle of a star is 36 degrees and since the turtle rotates from the outer side, we rotate the turtle by 180-36=144 degrees.

5. **Activity 3: Create multiple Stars:** *(8 mins)*

    Teacher Activity:
    - Explain how to define a function without parameters to draw a star.
    - Describe the **syntax of functions and a function call.**
    - Discuss the need to pass the location values to create stars at different locations.
      Note: Avoid using vocab like parameters, arguments and instead use "passing value to functions".

    Student Activity:
    - Guide the students to pass values of size and color to create stars of different colors and size.
      Note: Make sure students replace *steps, color* for commands **forward()** and **fillcolor()**.
      If you're trying to debug a program with your students, have them double-check their indentation and colon(**:**) at the end of the definition of function.

6. **Activity 4: Create a Moon with Craters:** *(7 mins)*

    Student Activity:
    - Guide students to use **turtle.dot(diameter, color)** command to draw a circle to create a moon.
    - Guide them to fix the function to create multiple craters on the moon surface.

7. **Introduce the Post class project:** *(2 min)*
    - Create any space object using functions to draw different basic shapes.

8. **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.
      Note: If time permits, ask the students to justify their answers.

9. **Additional activities:**
    - Guide the student to create a day view in space by adding Sun.
    - Lead the student to add depth to the craters using concentric circles.

10. **State the Next Class Objective:** *(1 min)*
    - You will learn to create a complete game title screen along with title text.

U.S. Standards:

CSTA: 2-AP-13,2-AP-14, 3B-AP-22, 3A-AP-17, 3A-AP-18, 3B-AP-14, 3B-AP-16

Links Table		
Activity	**Activity Name**	
Class Presentation	Sparks in Space	https://s3-whjr-curriculum-uploads.whjr.online/27bfa618-1d8d-4c11-8d4b-480214655aec.html
Student Activity 1	Set Up the Screen	https://tynker.com/code/project/6299d64a5cd1d145d17713b2
Teacher Reference:Student Activity 1 Solution	Solution of SA1	https://tynker.com/code/project/6299d68030a764035a5826b2
Student Activity 2	Create a Star	https://tynker.com/code/project/62a70be9714713589a723822
Teacher Reference:Student Activity 2 Solution	Solution of SA2	https://tynker.com/code/project/62a6e6d31e823a5593557db2
Teacher Activity 3	Create a Star using function	https://tynker.com/code/project/6299d98f08a09e245a163cc2
Teacher Activity 3 Solution	Solution of TA3	https://tynker.com/code/project/6299d9ddaeb9fb505613fae2
Student Activity 3	Create Multiple Stars	https://tynker.com/code/project/62a713211d71d959341339e2
Teacher Reference: Student Activity 3 Solution	Solution of SA3	https://tynker.com/code/project/62be93862737873aa1531652
Student Activity 4.1	Create a Moon	https://tynker.com/code/project/6299d60f21ffec34aa3c2632
Teacher Reference: Student Activity 4.1 Solution	Solution of SA 4.1	https://tynker.com/code/project/62a725301c089036705caef2
Student Activity 4.2	Create Multiple Craters	https://tynker.com/code/project/62a725ea70495c1b6c5780f2

Teacher Reference: Student Activity 4.2 Solution	Solution of SA 4.2	https://tynker.com/code/project/62a726cedd49521d2204ea82
Student Additional Activity 1	Create a Day View	https://tynker.com/code/project/62ac2698221725287b23be22
Teacher Reference: Student Additional Activity 1 Solution	Solution of SAA 1	https://tynker.com/code/project/62ac2b989b8a9f28a42b3882
Student Additional Activity 2	Add Shadow to Craters	https://tynker.com/code/project/62a73049b6867712447f04b2
Teacher Reference: Student Additional Activity 2 Solution	Solution of SAA 2	https://tynker.com/code/project/6299e3d198604f06676bb732
Post Class Project	Create a Space Object	https://tynker.com/code/project/62b15a6204b4654b86629062
Teacher Reference: Post Class Project Solution	Solution of Post Class Project	https://tynker.com/code/project/62a088b1c92dd04e00236512