

The Perilous Climb

Python Game Design

Time: 60 mins

Introduction

In this class, the student/s will learn to scroll the background infinitely. Student/s will also randomly add and move the stairs. They will also learn to display and update the score as per the frame count.

Python Commands Introduced

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| • <code>random.randint(min, max)</code> | Returns a random number between the specified min and max values inclusive. |
| • <code>environment.frameCount</code> | Returns the number of frames displayed since the start of the program. |
| • <code>fill(r, g, b)</code> | Sets the color by the specified red, green, and blue values. |
| • <code>textSize(number)</code> | Sets the font size by a specified number. |
| • <code>text("message", x, y)</code> | Writes the message text on the screen at the specified x and y position. |

Vocabulary

- **Modulo operator (%)** is used to obtain the remainder after dividing two numbers.
- **Frame count** stores the number of frames displayed since the program started.

Learning Objectives

Student/s(s) should be able to:

- **Explain** how to move the game elements.
- **Describe** how to set the position of a game object randomly.
- **Explain** how to obtain the frame count and use it to calculate the score.
- **Demonstrate** how to use the modulo(%) operator.
- **Program** infinitely moving background along with moving stairs to help Zonan reach the wizard's lair.

Activities

1. **Class Narrative: (2 mins)**
 - Brief the student/s that Zonan has escaped the hidden dungeon and noticed the stairs leading towards the wizard's lair.

2. Concept Introduction Activity: (5 mins)

- Let the student/s play the explore activity and observe how Zonan moves ahead in his quest to reach the wizard's lair. Ask students to move Zonan with the arrow keys.
- Highlight to the student/s that the stairs and the background moved while Zonan was climbing up the stairs.
- Brief the student/s using slides that they will learn to move the background and the stairs. Also, the student/s will learn to update the game score.

3. Activity 1: Move the Background: (12 mins)

Teacher Activity: (6 mins)

- Explain to the student/s to position the background image on the y-axis at -700 and that the value of the y-position of the background image increases as it moves down.
- Explain how to assign an initial y-position of the background image using variable bgY and increase by 0.6 in the function draw() to scroll it downward.

Probing question: What will happen if we decrease the value from 0.6?

Expected Answer: The background will move slower.

Student Activity: (6 mins)

- Explain to the student/s that the canvas size is limited. Let the students know that to achieve an infinitely scrolling background, the background needs to move down and reset the y-position of the background when the top edge of the background image crosses the top edge of the canvas.
- Guide the student/s to reset the background image when its top edge crosses the origin of the canvas.

4. Activity 2: Move the Stairs: (12 mins)

Teacher Activity: (5 mins)

- Probing question: What is the correct command to generate random numbers between a minimum and maximum value?

Expected answer: `random.randint(min_value, max_value)`

Student Activity: (7 mins)

- Narrate to the student/s that Zonan shall climb up the stairs.
- Explain to the student/s that while Zonan moves upward, the stairs move downward and also are placed at random horizontal positions.
- Guide the student/s to write code for moving the stairs by adding the stairs' y-position to its velY. Ask the student/s to click on the play button and observe the output.
- Explain the need to reset the stairs when the top edge of the stair crosses the bottom edge of the canvas using a conditional statement.

Note: The stair moves down thereby the y-position of the stair increases. The canvas height is 800 and hence we check if the stair's y-position exceeds 850 i.e. reset only when it is completely out of the canvas and reset it back to start moving from the top by placing it at y=-20 i.e. a little above the top edge of the canvas so that it smoothly enters the canvas back.

Also, the x and y-position specify the top-left corner of any game element.

The list stairs is a list of dictionaries. The for loop iterates through each dictionary stair from the list stairs

- Guide the student/s to randomly move the stairs.

5. Activity 3: Update the Score: (12 mins)

Teacher Activity: (6 mins)

- Explain to the student/s how to create a score variable and display the score text.
- Highlight the problem that the score does not increase as Zonan climbs the stairs.
- Explain frames and how the function draw() runs infinitely frame by frame.
- Display the frame count on the canvas using environment.frameCount and str().

Student Activity: (6 mins)

- Guide the student/s to change the color, size, and position of the score.
- Guide the student/s to increase the score by 1 after every 10 frames as the frame count increases rapidly using the modulo operator.

Note: The score keeps on increasing along with the moving background even when Zonan falls off the stairs. This will be addressed using game states in the next class.

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

- Complete the game 'The Onerous Drive' by moving the game elements and updating the distance covered.

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 flowers to the stairs.
- Encourage the student/s to increase the speed of the stairs as the score increases.

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

- We will learn to help Zonan fend off the attacks by the Pyroclaw and reach the dark wizard's lair.

U.S. Standards:

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

| Links Table | | |
|-----------------------------|--------------------------------------|---|
| Activity | Activity Name | Link |
| Class Presentation | The Perilous Climb | https://s3-whjr-curriculum-uploads.whjr.online/6e109f1e-765d-42ff-9506-949a58db2f5d.html |
| Explore Activity | Explore Activity: The Perilous Climb | https://tynker.com/code/view/6308f84f3dc51f6ef35f1de6/ |
| Teacher Activity 1 | Move the Background | https://tynker.com/code/project/6308ce25b5a8af3151394aa2 |
| Teacher Activity 1 Solution | Move the Background - Solution | https://tynker.com/code/project/6308ce25b5a8af3151394aa2 |

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| Student Activity 1 | Reset the Background | https://tynker.com/code/project/6308d6829e399c4aba423682 |
| Teacher Reference: Student Activity 1 Solution | Reset the Background - Solution | https://tynker.com/code/project/6308d4195995f65e83110361 |
| Student Activity 2.1 | Move and Reset the Stairs | https://tynker.com/code/project/6308da66cb807d59a5424402 |
| Teacher Reference: Student Activity 2.1 Solution | Move and Reset the Stairs - Solution | https://tynker.com/code/project/6308dd4e13c08a608f605072 |
| Student Activity 2.2 | Make the Stairs appear Randomly | https://tynker.com/code/project/6308df4396c1442dee30fb62 |
| Teacher Reference: Student Activity 2.2 Solution | Make the Stairs appear Randomly - Solution | https://tynker.com/code/project/6308df44051c374066053462 |
| Teacher Activity 3.1 | Display the Score | https://tynker.com/code/project/6308e312952ec6485664f2b3 |
| Teacher Activity 3.1 Solution | Display the Score - Solution | https://tynker.com/code/project/6308e3113b9cc11e50549713 |
| Student Activity 3.1 | Change the Color, Size, and Position of the Text | https://tynker.com/code/project/6308e4bd63683969d64403f8 |
| Teacher Reference: Student Activity 3.1 Solution | Change the Color, Size, and Position of the Text - Solution | https://tynker.com/code/project/6308e4cb38433f4c0b708dd2 |
| Teacher Activity 3.2 | Print the Frame Count | https://tynker.com/code/project/6308e95d26f21925d44ef894 |
| Teacher Activity 3.2 Solution | Print the Frame Count - Solution | https://tynker.com/code/project/6308e95726f21925d44ef892 |
| Student Activity 3.2 | Update the Score | https://tynker.com/code/project/6308f848a7acde3b376d6548 |
| Teacher Reference: Student Activity 3.2 Solution | Update the Score - Solution | https://tynker.com/code/project/6308f84f3dc51f6ef35f1de6 |
| Student's Additional Activity 1 | Add Flowers on the Stairs | https://tynker.com/code/project/6308ff1760012b2b3a735db2 |
| Teacher Reference: Student's Additional Activity 1 Solution | Add Flowers on the Stairs - Solution | https://tynker.com/code/project/6308fef14e05bf4688059882 |
| Student's Additional Activity 2 | Increase the Speed of the Game | https://tynker.com/code/project/63090266a5eb5470733c9392 |
| Teacher Reference: Student's Additional Activity 2 Solution | Increase the Speed of the Game - Solution | https://tynker.com/code/project/63090260ab67e26b82132652 |
| Post Class Project | The Onerous Drive - I | https://tynker.com/code/project/63 |

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|---|----------------------------------|---|
| | | 0dec605acac721cc5408da |
| Teacher Reference: Post Class Project Solution | The Onerous Drive - I - Solution | https://tynker.com/code/project/630e16cd28ad0600ae01f092 |