**AP CSP CodeX**

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| **MISSION 7 Obj 1-6 Personal Billboard** | | **Time: 45 minutes** |
| **Project Goal:** Students will use images to display a mood or occasion by pressing a CodeX button.  **Learning Targets**   * I can create a list to make my code more efficient. * I can use if statements to scroll through a list. * I can use a nested if/else conditional statement to prevent an index out of range error. | **Key Concepts**   * In python, the == is used to compare an equality. * Codespace lets you inspect variables in the debugger. * Python’s list is a powerful way to hold a collection of objects. | |
| **Assessment Opportunities**   * Mission 7 Obj 1-6 Assignment * Billboard program * [Mission 7 Kahoot Review](https://create.kahoot.it/share/firia-labs-mission-7/06203065-5a87-41df-8449-e6381da62196) | **Success Criteria**   * Create a list of images * Program CodeX buttons to select from a list of images to show * Use nested conditional statements to avoid index out of range errors * Change the code to make it easy to add more images and items to a list | |
| **AP CSP Framework**  **AAP-1.C** Represent a list or string using a variable.  **AAP-1.D** Develop data abstraction using lists to store multiple elements, and explain how the use of data abstraction manages complexity in program code.  **AAP-2.I** Write nested conditional statements, and determine the result of nested conditional statements.  **AAP-2.N** Write expressions that use list indexing and list procedures.  **Computational Thinking Practice 3.A** Generalize data sources through variables.  **Computational Thinking Practice 3.B** Use abstraction to manage complexity in a program. | **Materials**   * Mission 7 Obj 1-6 Assignment / Answers * AP CSP CodeX Vocabulary List * AP CSP CodeX Python Code List * Unit 2 Review Links and Test Questions * [Mission 7 Kahoot Review](https://create.kahoot.it/share/firia-labs-mission-7/06203065-5a87-41df-8449-e6381da62196) * Solution code   + billboard | |
| **Teacher Notes**   * Mission 7 may take a little over a class period, so it is divided up into two lessons. * The assignment is best completed digitally. Prepare the assignment for distributing through your LMS. * Objective 4 introduces the term “nested condition” which isn’t specifically mentioned in the CodeSpace instructions, but it is a topic covered on the AP exam. You may want to emphasize this. * Objective 6 introduces the term “data abstraction” which isn’t specifically mentioned in the CodeSpace instructions, but it is a topic covered on the AP exam. You may want to emphasize this. * After Objective 6 and the quiz, students continue with the code by adding more than five items to their list. * At the end of the lesson, discuss clearing the CodeX before turning it in. * If you have time at the end of the lesson, use the [Mission 7 Kahoot Review](https://create.kahoot.it/share/firia-labs-mission-7/06203065-5a87-41df-8449-e6381da62196). All questions on the review are covered in the first 6 objectives. * Another suggestion for assessment is for students to keep a daily journal, or use a reflection form for students to process information they learned and reflect on questions they may still have. * You may consider having students (or the class collectively) keep a chart of errors and the ways to fix them. * You can also add vocabulary to a word wall and keep a document or chart of the Python code learned during each mission. * Refer to the Python with CodeX Curriculum Guide or Mission 7 Lesson Prep (found in the l[earning portal](https://learn.firialabs.com/curricula/python-with-codex/teachers-resources/codex-teacher-materials)) for more information. * The teaching guide (below) gives the narration for one way to present the lesson. | | |

**Teaching Guide**

**Warm-up (5 minutes)**

🧑‍🤝‍🧑 **Discuss** – Use a discussion strategy, like journaling, working at boards, selecting random students, or a form of think-pair-share.

* Topic: Ask students about lists. What are some lists they use in everyday life (playlist, contact list, grocery list, to-do list, etc.). When might they want to use a list in a program?

**Activity – Mission #7 Objectives 1-6 (40 minutes)**

💻 Randomly group students into pairs for pair programming (or they can work individually).

Students log in to one computer. Two computers can be used if they want to have the activity guide open on one computer and CodeSpace on the other computer.

Students go to [make.firialabs.com](http://make.firialabs.com) and should be at the beginning of Mission 7.

💡 **Teaching tip – Objective 1:**

This objective is mostly review. Challenge students to complete the program code on their own and check it with CodeTrek.

💡 **Teaching tip – Objective 2:**

Students can use CodeTrek if needed. Still, they will need to add new code on their own. They should have 4 if statements with choice and another if statement for a button press to complete the objective..

💡 **Teaching tip – Objective 3:** Students will add another if statement for a button push.

Students will open the CONSOLE. There is an animation in the instructions that show them where to find the console. You should be familiar with this so you can assist as needed. They are also asked to use the debugger. They may need a reminder about what to do with the debugger.

💡 **Teaching tip – Objective 4:**

Students use nested conditional statements in this objective. Call out or mention the term used for this so they are familiar with it for the AP exam.

💡 **Teaching tip – Objective 5:**

This is the first introduction to using a list.

💡 **Teaching tip – Objective 6:**

Students learn a lot more about lists in this objective. A future lesson will have them practice these concepts even more in an unplugged activity.

💡 **Teaching tip – After Objective 6:**

A list is a form of data abstraction, which they need to know for the AP exam. You should emphasize this term and talk a little about data abstraction and how it manages complexity in a program. Exam questions and written response prompts may use the term “data abstraction.”

Students will add more items to the list, just to get experience with using a list and how the list functions work and manage complexity.

✅ Assignment is complete and ready to turn in. You can decide if you want students to turn in the program up to this point, or wait until the end of Mission 7.

**Wrap-Up (5 minutes)**

Use a formative assessment for the wrap-up.

✅ **IMPORTANT!!**

* Remind students to clear their CodeX.

Formative Assessment:

* Daily reflection journal
* Mission 7 Kahoot Review (in class or individual) – all questions can be answered during Objectives 1-6
* Exit ticket on lists or nested if statements.
* Group review on lists or nested if statements.

**SUCCESS CRITERIA:**

* Program the buttons to select from a series of images to show.
* Use conditional statements to scroll through a list.
* Use nested conditional statements to avoid an index out of range error.
* Change the code to make it easy to add lots more images.