**AP CSP CodeX**

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| **MISSION 3 Light Show** | | **Time: 45 minutes** |
| **Project Goal:** Students will turn on and off the four RGB LEDs (NeoPixels) on the CodeX.  **Learning Targets**   * I can assign data to a variable. * I can use variables to make code more efficient. * I can set the pixels using built-in colors. | **Key Concepts**   * The CodeX has four NeoPixels that can turn on any color represented by RGB. * The NeoPixels are numbered 0, 1, 2 and 3. * When setting a pixel, the pixel number, color and optional brightness need to be given. * A variable can be defined and used in code. | |
| **Assessment Opportunities**   * Mission 3 Assignment * Quiz after Objective 4 * Quiz after Objective 8 * [Mission 1, 2 and 3 Kahoot Review](https://create.kahoot.it/share/firia-labs-ap-csp-mission-1-2-3/5be3baab-3370-49ae-8912-adf30394f2bd) * Pixels1 program | **Success Criteria**   * Identify major features of the CodeSpace interface * Successfully connect and disconnect the CodeX using a USB cable * Write a program for the CodeX and run it | |
| **AP CSP Framework**  **CRD-2.I** Identify the error in an algorithm or program and correct the error.  **AAP-1.A** Represent a value with a variable.  **Computational Thinking Practice 3.A** Generalize data sources through variables.  **Computational Thinking Practice 4.C** Identify and correct errors in algorithms and programs, including error discovery through testing. | **Materials**   * Mission 3 Assignment / Answers * CodeX Mission Reminders * Clearing CodeX * [Mission 1, 2, and 3 Kahoot Review](https://create.kahoot.it/share/firia-labs-ap-csp-mission-1-2-3/5be3baab-3370-49ae-8912-adf30394f2bd) * AP CSP CodeX Vocabulary List * AP CSP CodeX Python Code List * Unit 1 Review Links and Test Questions | |
| **Teacher Notes**   * Start the lesson by going over the CodeX Mission Reminders slides. * At the end of the lesson, discuss clearing the CodeX before turning it in. You can use the Clearing CodeX slides. * The assignment is best completed digitally. Prepare the assignment for distributing through your LMS. * 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 3 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.

Talk to students about primary colors. They will probably say “red, yellow and blue.” Mention that those are primary colors for paint, but for light primary colors are red, green and blue. All color on your screen is made by mixing those three lights.

💡 **Teaching tip – Reminders for the beginning of mission:**

*(slide deck: CodeX Mission Reminders)*

* Always start a new program by creating a new file and naming it appropriately. If you don’t, you will lose all your previous work! Using descriptive file names is essential to finding the program later!
* You are making a project – not just working random problems. Focus on the *project-based* objectives and avoid rushing through the material too quickly.
* Test your understanding along the way by “coloring outside the lines”. Try stuff!
* Collect all the Tools you find! (They’re indicated with a wrench icon)
* Read carefully – usually the answer is right there in front of you!

**Activity – Mission #3 (35 minutes)**

💻 Randomly group students into pairs for pair programming.

Students log in to one computer. Two computers can be used if they want to see instructions on one computer and work on the other computer. However, the assignment document requires snippets, so it will need to be open on the same computer as CodeSpace.

Students go to [make.firialabs.com](http://make.firialabs.com) and begin Mission 3. They should have the digital assignment open.

💡 **Teaching tip – Objective 5 & 6:**

These objectives introduce the debugger, and then have the students use the debugger. This can be a little confusing the first time (and even third, fourth, etc.). You may want to demonstrate this with the students. The important thing to remember is that the code that is HIGHLIGHTED happens AFTER the next “step in”.

The students click debug once in Objective 5, but they have to click it AGAIN for Objective 6.

💡 **Teaching tip – Objective 7:**

If you are having students make a chart of their bugs and bug fixes, this is a good time to remind them to record their bugs and debugging strategies.

💡 **Teaching tip – Objective 8:**

Students will create a variable and use it in code. They may have trouble realizing they need to use it in four places – everywhere there is a sleep() command.

💡 **Teaching tip – Objective 9:**

Students will create another variable for the color and use it in code. They may have trouble realizing they need to use it after each group of pixels are set to a color. They can use CodeTrek for ideas, but their code doesn’t have to match it exactly.

✅ Assignment is complete and ready to turn in. Both students should include their names on the document and submit the final program.

**Wrap-Up (10 minutes)**

✅ **IMPORTANT!!**

Show students how to “clear” their CodeX by creating a program file without code. **These instructions are included in the Clear CodeX slides.**

* Students create a new file called “Clear”
* Students type the code to clear the display
* Run the code at the end of the class period to clear the code for the next person.

✅ If this lesson is completed in one class period, the following can be used as a wrap-up. If you are on a block schedule and continuing to the next lesson, a wrap-up isn’t necessary.

Formative Assessment:

* Daily reflection journal
* [Kahoot (in class or individual)](https://create.kahoot.it/share/firia-labs-ap-csp-mission-1-2-3/5be3baab-3370-49ae-8912-adf30394f2bd):
* Exit ticket on vocabulary (RGB, literal, variable)
* Group review on vocabulary (RGB, literal, variable)

**SUCCESS CRITERIA:**

* Define RGB, literal, and variable
* Define and use a variable used in sleep()
* Define and use a variable for color that is changed and used multiple times
* Debug any errors in the code and keep a debugging table
* Write a program, run it, and save it to the CodeX