**AP CSP CodeX**

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| **MISSION 10 Reaction Time** | | **Time: 45 minutes** |
| **Project Goal:** Students will use CodeX's internal clock to create a device to measure reaction time.  **Learning Targets**   * I can write a function to make code more efficient and readable. * I can utilize multiple variables to a new program and describe their purposes. * I can use functions from the time library to calculate reaction time. | **Key Concepts**   * Computers are driven by internal clocks. * Use the time.ticks\_ms() function to record the current computer time. * Debounce the button press to detect only the most recent button press. * The DRY concept. Never write the same code twice! | |
| **Assessment Opportunities**   * Mission 10 Assignment * Reaction\_Time program | **Success Criteria**   * Display a countdown * Clear the screen * Clear the pixels * Create a function for the wait\_button * Use the start time and end time to calculate the elapsed time * Display the reaction time | |
| **AP CSP Framework**  **DAT-2.A** Describe what information can be extracted from data.  **AAP-3.D** Select appropriate libraries or existing code segments to use in creating new programs.  **AAP-3.E** Write expressions to generate possible values, and evaluate expressions to determine the possible results.  **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 10 Assignment / Answers * Mission 10 Lesson Plan * [Mission 10 Kahoot Review](https://create.kahoot.it/share/firia-labs-mission-10/e0201887-f391-492b-a743-8df3f937f76d) * Solution code for two objectives and the final program | |
| **Teacher Notes**   * The assignment is best completed digitally. Prepare the assignment for distributing through your LMS. * Encourage the students to do as much code on their own as they can, and use the CodeTrek to check their work, or as a hint when needed. * The assignment adds an extra step to complete after Objective 7, before turning in the program. * If you have time at the end of the lesson, use the [Mission 10 Kahoot Review](https://create.kahoot.it/share/firia-labs-mission-10/e0201887-f391-492b-a743-8df3f937f76d). * 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. * Refer to the Python with CodeX Curriculum Guide or Mission 10 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**

The actual coding part of this Mission is about one normal class period.

**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:** There isn’t a specific warm-up for this lesson. As a teacher, decide on a topic that may need review with your students before starting the mission. You may want to review functions. Or you can go over common programming errors. Spend five minutes or less doing a quick review and then get right to the mission.

**Activity – Mission #10 (35 minutes)**

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

For pair programming, students log in to one computer. Two computers can be used if they want to have the assignment 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 10.

💡 **Teaching tip – Objective 1:**

The objective reviews random numbers and the argument for randrange. There are some questions to answer on the document students need to answer. They should read the instructions carefully.

💡 **Teaching tip – Objective 2:**

This objective also is a review – displaying a countdown. Students create a function for this instead of typing directly in the main program.

💡 **Teaching tip – Objective 3:**

This objective has students use **import time** instead of **from time import sleep**. This means whenever they use sleep in their code, they need to use time.sleep(). If they are getting errors, be aware of this.

💡 **Teaching tip – Objective 6:**

Students create a function for the wait button. This is similar to the kill switch but does the opposite – wait for the button press before beginning. It is used twice in the code, so the instructions talk about reducing repetition by creating a function. This is a good concept to reinforce – a reason for functions, and also an example of abstraction.

💡 **Teaching tip – After Objective 7:**

The students are asked to create at least one more function from the main program to increase the readability of the program.

✅ Assignment is complete and ready to turn in.

**Wrap-Up (5 minutes – optional)**

Use a formative assessment for the wrap-up.

✅ **IMPORTANT!!**

* Remind students to clear their CodeX.

Formative Assessment:

* Daily reflection journal
* Mission 10 Kahoot Review (in class or individual)
* Exit ticket or group review on functions or local variables, or loop conditions