Unit 2: Putting it all Together

Mission 6: Heart Beat

Intro and Discussion Points:
The end goal of this project is simple – a continuously flashing heartbeat. Along the way it reinforces understanding of coding concepts learned so far, and ushers in the crucial concept of **loops**.

Ask students if they've seen flashing road signs. Can they think of other continuously blinking or repeating indicators? How would you make something repeat forever with code?

At this point, we suggest introducing the students to features of the Editor they may not be aware of, such as **cut**, **copy**, **paste**, and **undo**. There is a Toolbox tool covering these "Editor Shortcuts", and they're also explained in a video at https://youtu.be/WItk_kpkGiU.

CodeX Lesson Plans		
UNIT 1 : Getting Started	**MISSION 6: Heartbeat**	**# DAYS:** 2
UNIT GOALS: Students will learn the basics of Python.	**ADDITIONAL MATERIALS:** ● none	**VOCABULARY:** ● while loop ● Variable ● branching

FOCUS CSTA STANDARDS:1B-CS-03, 1B-AP-09, 1B-AP-10, 1B-AP-15, 1B-AP-17, 2-AP-11, 2-AP-16, 2-AP-19

LEARNING TARGETS:
- I can create a *while loop* to make my code more efficient.
- I can apply variables to a new program.
- I can program using *float values.*

SUCCESS CRITERIA:
- ❏ Code an animated heartbeat, pulsing on the LCD display.
- ❏ Learn how to make your code LOOP forever, and how to break out of it.
- ❏ Make the heartbeat speed *adjustable* using the CodeX buttons.

KEY CONCEPTS:
- Infinite loops – when a *condition* is always **True**.
- Readability is very important in coding. Whitespace can help, and comments are essential.
- Use the STOP control to halt your program and break out of an infinite loop.
- Using a **variable** to hold the *current state* of your program. In this case it's the speed of the heartbeat, or to be specific the *delay* between beats.

DISCUSS REAL WORLD APPLICATIONS:
You've programmed an embedded computer to monitor pushbuttons to control speed UP and DOWN. That's real-world code used in many applications you see around you.

- TV Remote Controls (volume + / -)
- Game controllers
- Push button light dimmers

ASSESSMENT STRATEGIES:
4.10 Checkpoint - Spend time focusing on the *Step* feature in the Editor.
Remix suggestions (set aside 0.5-1 period to complete):
- A car company has hired you to code the **turn signals** for their new line of cars!
    - o Instead of a HEART, blink ARROW_E or ARROW_W (left or right).
    - o Button A and B toggle the LEFT and RIGHT blinking signals.
    - o So rather than 'delay' you need a variable that indicates which arrow is flashing, if any. (button presses will change this variable)
- Add beeping to the heartbeat. Now it's a **metronome**!
    - o music.pitch(440, 100) # plays a 440Hz tone for 100ms (BEEP!)

TEACHER NOTES:
Always refer to **Answer Keys by Mission** if you get stuck. All coding solutions are available, in alphabetical order.