



Lesson 3.2

Loops & Sequences

 **Lesson Time : 45-65 min**

Established Goals

The goal of this lesson is to challenge students to extend their understanding of computational thinking from lesson 3.1 and solve problems using the block-based coding language in PiperCode. Students will make three LEDs blink in succession. They will mimic a real-life situation by building a circuit and programming it to reflect the nature of a stoplight at a public intersection.

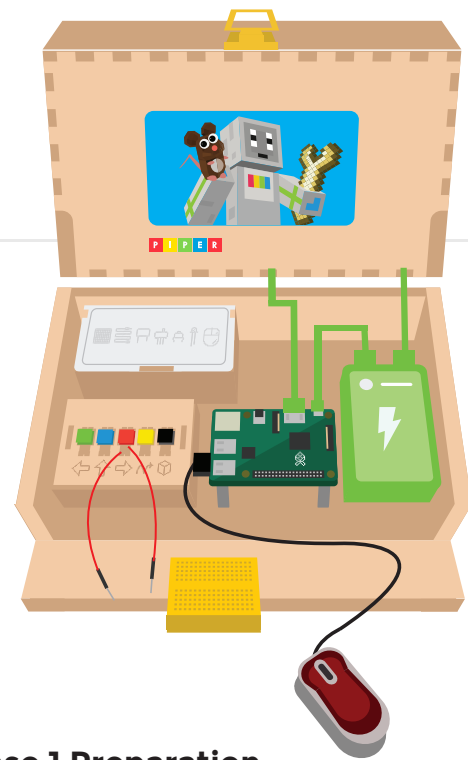
Learning Objectives

Students will:

- Review and apply computational concepts of:
- *Loops*: running the same sequence multiple times
 - *Sequence*: identifying a series of steps for a task

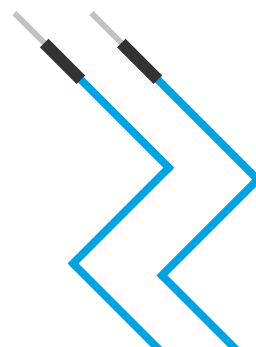
Demonstrate computational thinking core concepts, including:

- *Algorithm Design* by creating an ordered series of instructions for solving similar problems or for doing a task, such as turning a light off and on in the right order.
- *Simulation* by developing a program to imitate real-world process of a stoplight.



Phase 1 Preparation

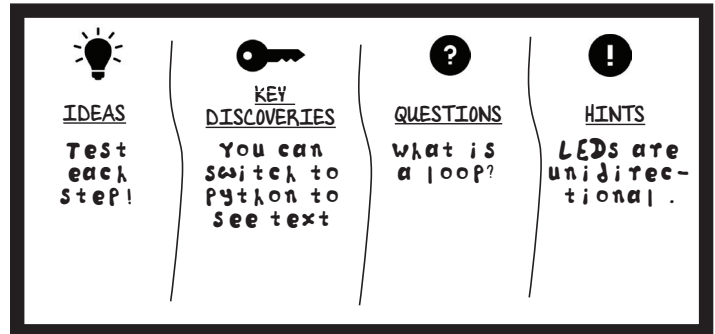
Make sure your Piper kits are built, cords are connected correctly, your class set of batteries are charged, and the Piper computers are functioning. Set up the Idea Wall discussed below on a whiteboard, smart-board, or shared google document.



Introduction (5-10 minutes):

· Create a Class Idea Wall on a whiteboard, Smart board or a shared document, with sections for students to share their ideas, key discoveries, questions, and hints with their classmates.

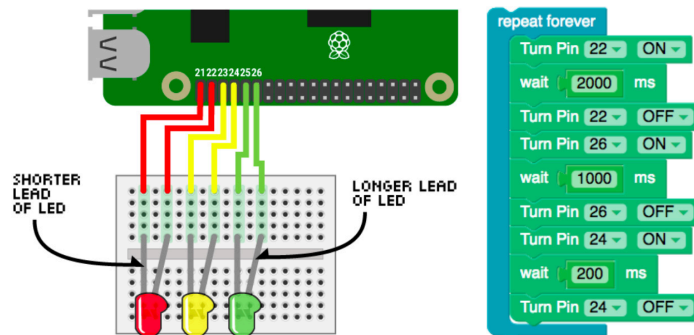
· TEACHER TIP: Provide examples for the class on your Idea Wall. Collect reflections from last session's Closing Activity as a group before students begin to contribute individually. All students to write in each section and discuss as a full class at the end.



Main Activity (30-40 Minutes):

· Allow students to complete the project: Stoplight in PiperCode with their partners/groups.

· During this time, the educators are circling the room and can ask probing questions based on the essential questions* of this lesson:



In Stoplight project:

· How is the sequence more complicated in this project than Blink?

· How can you simulate a real-life stoplight (start with green, go to yellow, rest on red)? (answer = wait variable time!)

· How might we adjust the wait times to make your stoplight safer for pedestrians or cyclists?

· EXTENSION: How might we create a two-way stoplight? (answer = add a breadboard and run parallel block code sequences.)

* These checks for understanding help reinforce learning of computer science skills such as creating programs that use include loops, sequences; decompose problems into smaller tasks; or incorporate smaller portions of existing programs, to develop something new or add more advanced features. (CA CS 3-5.AP.12 through 14)

Closing Activity (15-20% of class time):

Preparation: If your students have trouble paying attention with their Piper Computer in front of them, have students first put their Piper Computers away to avoid distractions during this teacher led discussion.

· Conduct a teacher-led discussion using these: [3.2 SLIDES - Loops and Sequences](#)

· While moving through the slide show, be sure to review the major concepts of Loops and Sequences and relate them to their experience with the Stoplight project in PiperCode

· Example questions: How were your use of Loops and Sequences different than when you made one line blink? What does a loop make your the electronics do in the physical world? What does a sequence make your the electronics do in the physical world?

[OPTIONAL]: Formatively assess students by asking them to show the basic logic of the code from Blink and Stoplight by drawing a map, graphic, or writing in [Pseudocode](#).

· Teacher Tip: personal maker journals work really well for these types of tasks!

Do a quick reflection with an exit ticket. Use the questions below to check for student understanding:

- Write down one problem you've encountered, if and how you were able to resolve it.
- Write down two things you learned today.
- Write down one question you have about today's lesson.