

6. Treehouse Camp

LEGO Spike Essential - Great Adventures

Subject: STEAM, Computer Science	Topic or Unit of Study: Computational Thinking, Coding
Grade/Level: Grades 1-2	Time Allotment: 1.5 hours
Objectives: <ul style="list-style-type: none"> ● We will understand that an action can be repeated. ● We will develop programs that use simple loops (repetitions) to address a problem. 	Standards: MD 1.AP.PD.03: Identify and correct errors (debug) in programs which include sequencing and repetition to accomplish a task, through a variety of techniques and strategies that could include an unplugged activity (e.g., changing order or sequence, following steps, trial and error). NGSS K-2-ETS 1-2: Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. ISTE 1.5c: Students break problems into component parts, extract key information and develop descriptive models to understand complex systems or facilitate problem-solving.
Synopsis: This unit introduces your students to computational thinking. They'll begin to understand what a sequence is, be able to follow instructions to create a sequence, and describe the sequence to their peers. They'll learn how to break problems down into smaller parts, identify cause and effect, and understand simple loops. Finally, they'll explore the process of testing and debugging programs to ensure that their programs work as intended.	Materials: <ul style="list-style-type: none"> ● Teacher/instructor lesson plan ● Teacher/instructor Google Slides presentation ● Teacher computer with access to internet and teacher presentation ● Student computers ● LEGO Spike Essential kit (one per two students) ● Paper copies of Building Instructions (optional)

SLIDE 2:

Display the RoboMasters info. Allow students/guardians time to scan the QR code for website access.

SLIDE 3:

Share basic definitions for the following words: *camping*, *debug*, *moon*, *roof*, and *treehouse*.

- *Camping*: an outdoor area where tents are set up to live in or sleep in
- *Debug*: to find and remove mistakes or flaws from
- *Moon*: the body that circles around the Earth
- *Roof*: the covering on the top of a building
- *Treehouse*: a structure built within the branches of a tree

SLIDE 4:

Review the Engineering Design Process with students.

SLIDE 5:

Facilitate a quick discussion about having to make a change in order to do something.

Some facilitation suggestions are listed below:

- Talk with your students about wanting to see the sunset while standing in the classroom but not being able to.
- Ask questions, like:
 - What could you change to be able to see the sunset while standing in the classroom?
 - What could you move or remove to help you see it?

SLIDE 6-7:

Introduce your students to Sofie (using the minifigure bios) and the challenge: opening the treehouse roof.

SLIDE 8:

Share the SOARing expectations for the LEGO kits.

SLIDE 9:

Distribute a LEGO Essentials set to each pair of students.

Teacher/Instructor Note: It would be best to have pairs pre-selected.

SLIDE 10:

Have students open the LEGO Education SPIKE Essential App.

- Open the app
- Click SPIKE Essential
- Click Unit Plans
- Click Great Adventures
- Click Treehouse Camp

SLIDE 11:

Students will read/listen to slides 1 through 3:

1. Sofie is sleeping outside for the first time.
2. She wants to see the moon from her treehouse.
3. Build the treehouse so Sofie can see the moon.

SLIDE 12:

Tell students that they are now going to build their treehouse camp. Explain to students that if they do not follow each direction exactly as shown, their build will not work properly.

SLIDES 13-33:

On Step 4, students will go through all twenty-one building steps in pairs using their Spike Essentials kits.

Circulate the instructional space to ensure students are building correctly.

Teacher/Instructor Note: There is a picture of each building step on a separate slide in the presentation.

SLIDE 34:

Step 5 provides students with today's challenge: make the program that opens the treehouse roof.

SLIDE 35:

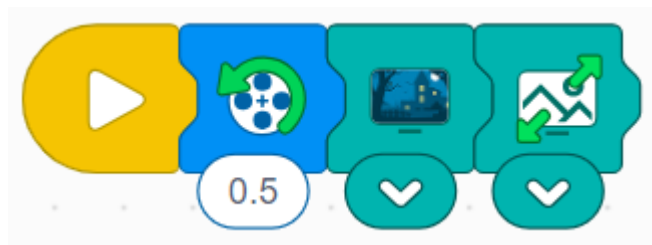
Step 6 has students connect their Hubs to the Spike Essentials App using the white USB cable.

Pictures are included on the slide of where to connect the cable into the Lego hub.

SLIDE 36:

Students will begin their coding sequence. The App is interactive and shows students exactly which coding blocks to drag into the work area.

They will end up with this sequence:

**SLIDE 37:**

Students will click the yellow PLAY button when directed to, to test their program.

Ask students, "What happened? How can we modify our builds to be more successful?"

Teacher/Instructor Note: Students should notice they need to fix (debug) the program. The current program rotates the motor so the roof closes further, not opens. Therefore, students need to fix (debug) the program using a Motor Block running in the opposite direction.

SLIDE 38:

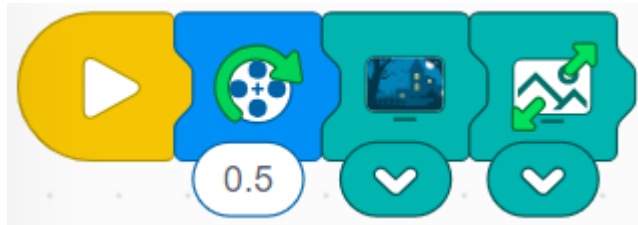
Review the Engineering Design Process with students.

Ask them what steps they have completed thus far, and what steps they still need to complete.

SLIDE 39:

Allow students time to fix (debug) their program.

Teacher/Instructor Note: They should end up with the following program:

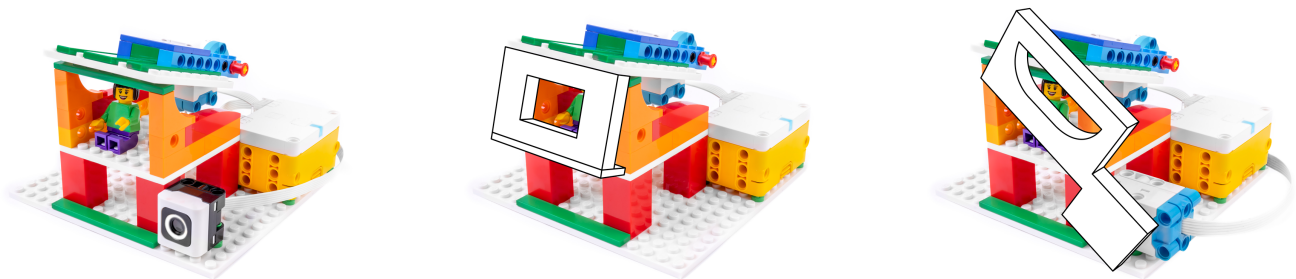


Teacher/Instructor Note: ENSURE STUDENTS ARE RESETTING THEIR ROOF TO THE CLOSED POSITION BEFORE TESTING A NEW PROGRAM!!!

SLIDES 40 and 41:

Have the students iterate and test their models to complete the next challenge in the app:

- Change the program submarine for Sofie's next camping adventure.
- Show students the pictures below to spark their imaginations as they experiment and change their models



SLIDE 41:

Provide students with time to modify and re-test.

SLIDE 42:

Host a debrief discussion to reflect on the completed challenges. Ask questions like:

- ❖ How did you help Sofie see the moon?
- ❖ How did you make the treehouse roof move?

SLIDE 43:

Prompt your students to discuss and reflect on the importance of fixing (debugging) errors in a program..

Ask questions like:

- ❖ Why is it important to make sure that your program works correctly?
- ❖ What can you do if your program isn't working the way you want it to?

SLIDE 44:

Display the RoboMasterminds info. Allow students/guardians time to scan the QR code for website access.

SLIDE 45:

Ask students, "How does today's activity connect to robotics?"

SLIDE 46:

Provide students with ample clean-up time, helping to ensure they are separating all pieces and placing them back appropriately.