

## 2. Arctic Ride

LEGO Spike Essential - Great Adventures

<b>Subject:</b> STEAM, Computer Science	<b>Topic or Unit of Study:</b> Computational Thinking, Coding
<b>Grade/Level:</b> Grades 1-2	<b>Time Allotment:</b> 1.5 hours
<b>Objectives:</b> <ul style="list-style-type: none"><li>● We will use directional vocabulary to describe a sequence.</li><li>● We will break a problem down into smaller parts.</li></ul>	<b>Standards:</b> <p><b>MD 2.AP.C.01:</b> Create programs using a programming language that utilize sequencing and repetition to solve a problem or express creative ideas.</p> <p><b>NGSS K-2 ETS 1-2:</b> 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.</p> <p><b>ISTE 1.5d:</b> Students understand how automation works and use algorithmic algorithmic thinking to develop a sequence of steps to create and test automated solutions.</p>
<b>Synopsis:</b> <p>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.</p>	<b>Materials:</b> <ul style="list-style-type: none"><li>● Teacher/instructor lesson plan</li><li>● Teacher/instructor Google Slides presentation</li><li>● Teacher computer with access to internet and teacher presentation</li><li>● Student computers</li><li>● LEGO Spike Essential kit (one per two students)</li><li>● Arctic map copies (one per two students)</li><li>● Paper copies of Building Instructions (optional)</li></ul>

**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: *challenge, change, program, push, and robot.*

- *The Arctic:* The area around the North Pole
- *Backward:* Move toward the back
- *Forward:* Move toward the front
- *Left vs Right:* \*Show picture of left vs right\*
- *Snowmobile:* A small vehicle with two skis on the front for traveling on snow

**SLIDE 4:**

Review the Engineering Design Process with students.

**SLIDE 5:**

Facilitate a quick discussion about following directions to get somewhere, like a playground.

Some facilitation suggestions are listed below:

- Talk with your students about using directional vocabulary (i.e. left, right, forward, backward).
- Ask questions, like:
  - How could you explain to a friend how to get to a playground?
  - What words would you use?

**SLIDE 6-7:**

Introduce your students to Leo (using the minifigure bios) and the challenge: making the snowmobile go.

**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 Arctic Ride

**SLIDE 11:**

Students will read/listen to slides 1 through 3:

1. Leo likes polar bears.
2. Leo wants to see where the polar bears live.
3. Build the snowmobile. It'll help Leo visit the polar bears.

**SLIDE 12:**

Explain Newton's First Law of Motion to students using the statements and the video clip.

Ask students, "How do you think this relates to today's LEGO arctic ride activity?"

**SLIDE 13:**

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

**SLIDES 14-39:**

On Step 4, students will go through all twenty-six 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 40:**

Step 5 provides students with today's challenge: make the program that makes the snowmobile go.

**SLIDE 41:**

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 42:**

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 43**

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 will hopefully identify they need their snowmobile to navigate around the ice, so they will need to change the number under the pink arrow block, and add more blocks to the end of their code.

**SLIDE 44:**

Review the Engineering Design Process with students.

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

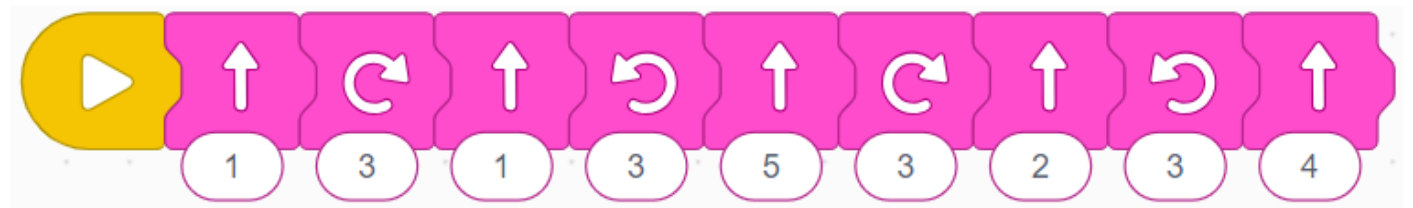
**SLIDES 45 and 46:**

Give students a copy of the arctic map.

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

- Change the program for Leo's next trip. Don't forget to make sure he can get home!

**Sample Program:**



**SLIDE 47:**

Provide students with time to modify and re-test.

**SLIDE 48:**

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

- ❖ Where did Leo go on his next adventure?
- ❖ How did your snowmobile get him there?

**SLIDE 49:**

Prompt your students to discuss and reflect on how to describe a sequence.

Ask questions like:

- ❖ Why is it important to use words like “left, right, forward, and backward” when giving directions?
- ❖ Why is it important to be able to give directions to a friend?

**SLIDE 50:**

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

**SLIDE 51:**

Ask students, “How does today’s activity connect to robotics?”

**SLIDE 52:**

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