

# The KIBO Snowplow - 1 hour

## Important Jobs in the Community (Social Studies connection)

**Overview:** The city is covered in snow, and we need to design a KIBO snowplow to help clean up! Students will engage in the engineering design process as they design, test, and improve snowplow robots that can help clean up the cotton-ball snow. Students will also learn more about the many important jobs that make a community function.



**Learning Goals:** After this lesson, students will:

- Have greater familiarity with the engineering design process.
- Develop hands-on familiarity with how the shape of an object affects its function.
- Design an algorithm to solve a problem.
- Have a deeper understanding of community life.

**Materials/Resources:**

- One KIBO 10 kit or higher per group of 2 – 4 students.
- Craft / recycled materials to build the plow extension onto KIBO
- Cotton balls for the snow
- Optionally, LEGO™-compatible building bricks and KIBO Building Brick Extension Sets, to provide more options for building the plow



**New to KIBO? Watch the Videos!**

If this is your first time using KIBO, we encourage you to check out our short tutorial videos at [kinderlabrobotics.com/getting-started](http://kinderlabrobotics.com/getting-started).

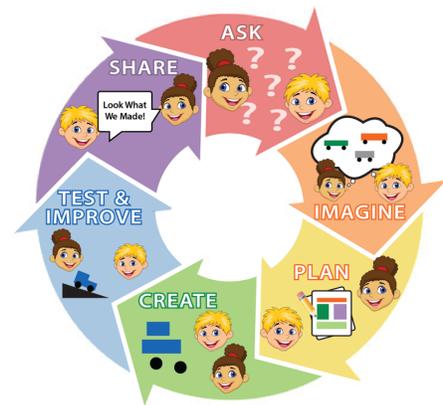
### Lesson Plan



**Inspire: Let's Test and Improve:** Ask students to think about what it's like when the town is covered in snow. Have they helped clean up when snow covers the sidewalks and driveways? Do they know any adults who work to clear snow for the town with plows and trucks? If your school community is not located in a snowy part of the world, you can share videos of snowstorms with the students.

“Today KIBO will become a snowplow, helping to clear snow from our classroom! We will build, test, and improve using the Engineering Design Process.”

The “Test & Improve” step of the Engineering Design Process allows us to keep changing something to make it work better and better. Today students will design “snowplows” for KIBO to clean up their town. Their designs may work well or not on a first try; but either way, they can reflect and improve on the design. This activity is all about making improvements along the way.



**Small-Group Work:** Prepare a KIBO construction area, with craft supplies to build and attach a plow extension to KIBO. Provide recycle-craft materials like cardboard boxes and foam shapes, along with tape, pipe cleaners, and string; students will use these to build their plows. Students will program their KIBOs to operate in an open, flat “snowplow area.” Scatter cotton balls here and mark out a “target square” (e.g. with masking tape) in the snowplow area. You may also choose to engage the students in building a representation of a neighborhood, with roads and buildings, using craft materials, boxes, blocks or other supplies. This can enhance the community connection.

Groups will build and program KIBO snowplows. Their plows need to clean up the town by pushing the cotton balls into the target area. They should have opportunities to build and program, then test their constructions, then revise both to improve KIBO’s plowing ability.

**Expansion tip:** If you have the KIBO Building Brick Extension Set, students can also build their plows with LEGO-compatible building bricks.

The following exploration prompts can keep students on track or increase the challenge:

- If KIBO is having trouble pushing the cotton balls, why is that happening? Are cotton balls escaping around the sides of the plow? Or getting trapped underneath? How can you change the shape of the plow to improve this?
- If KIBO is successfully pushing the snow straight ahead, can it also turn while keeping control of the snow? Can you change your design to allow KIBO to turn but keep pushing the snow?



**Reflect: What Design Changes Did You Make?** Close with a discussion circle. What design changes did you make along the way, as you following the engineering design process to revise your design? How did you decide what to try to improve?

## Standards Addressed

**CSTA K-12 Computer Science Standards:** 1A-AP-10, 1A-AP-12, 1B-AP-15  
**Next Generation Science Standards:** K-2-ETS1-1, K-2-ETS1-2, K-2-ETS1-3