

Modeling Robots 4



Lesson Overview

Students practice drawing models of the robots they build.

Modeling your thinking is a scientist's most important job. If they don't take good notes, scientists cannot pass on their thinking to other scientists who can try to run the same experiment again to prove you right or wrong. Modeling happens in all different ways, but the most common is to draw a picture of what you observe. In this lesson, students will practice drawing pictures of robots they build.



Lesson Tags

Grade Level

Preschool & Kindergarten

Difficulty

Artisan

Duration

30 minutes

Prerequisite Knowledge

A robot is a machine that can SENSE, THINK, and ACT

ACT Cubelets

SENSE Cubelets

Battery



Supplies

Cubelets (6 groups of)

1 Distance SENSE

1 Brightness SENSE

Optional: 1 Knob for 4 groups

1 Drive ACT

1 Rotate ACT

1 Flashlight ACT

1 Battery

Other Supplies

Optional: What Is a Scientist? By Barbara Lehn or technology to watch this [Youtube read-aloud 4-Block Modeling Worksheet](#)



Description

Outline

1. Review why scientific modeling is so important.
Optional: re-read [What is a Scientist](#) by Barbara Lehn
2. Students build a variety of robot constructions using the different ACT Cubelets and SENSE Cubelets
3. Students choose at least one to model on the [4-Block Modeling Worksheet](#)
4. Students explain their models to the class.

Objectives

Students will practice drawing and explaining models of the robots they build.

Assessment

Teachers look for students drawing their models with the unique properties of each Cubelet in mind. Teachers listen for clear explanations of the students' models.



Standards

ISTE

- 1.d. With guidance from an educator, students explore a variety of technologies that will help them in their learning and begin to demonstrate an understanding of how knowledge can be transferred between tools.
- 4.d. Students demonstrate perseverance when working to complete a challenging task.
- 5.b. With guidance from an educator, students analyze age-appropriate data and look for similarities in order to identify patterns and find solutions.
- 6.b. Students use digital tools to create original works.

Common Core

NA

NGSS

NA



Vocabulary

Collaborate
Cubelets
Robot
Sense
Think
Act
Scientific Model
Detail

Battery
Distance
Brightness
Drive
Rotate
Flashlight



Resources

Attachments

[4-Block Modeling Worksheet](#)

Tips & Tricks

- Introducing Cubelets without the Battery is a helpful classroom management trick. If students are forgetting to draw their models, you may help by taking away their Battery while they draw their model together.
- Before class, have your groups planned - think also of what collaboration structures make the most sense for your class or your school. Possible team roles:
 - Materials Manager
 - Team Leader (in charge of making sure group stays on task)
 - Recorder

Pacing

5 minutes: Review why scientific models are important
5 minutes: students Open Play with ACT Bots
15 minutes: students draw models of a robot they built today
5 minutes: students share their models with the class

Instructional Steps



Step 1 - Pre-class setup

Time: 10 minutes

Cubelets Needed

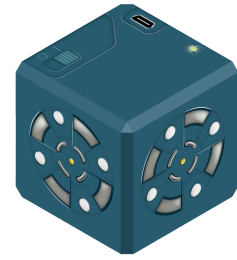
- ❑ Separate Cubelets into 6 groups, each containing:



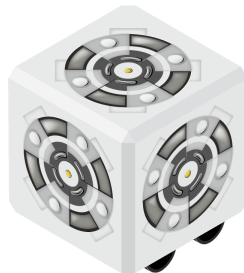
1 Distance SENSE



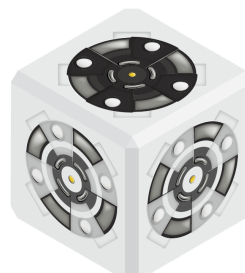
1 Brightness SENSE



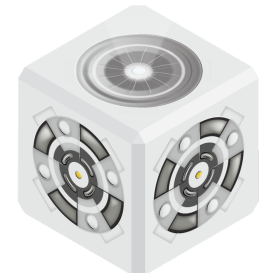
1 Battery



1 Drive ACT



1 Rotate ACT



1 Flashlight ACT



Optional: 1 Knob for 4 groups

Make copies of [4-Block Modeling Worksheet](#) for every student. (Also have blank paper available for students who build robots in orientations not included on the worksheet, or who prefer to draw their squares rather than coloring them in)

cubelets		Student Name _____	
Draw a Robot			
My robot _____			

Classroom Management

- ❑ Plan 6 student groups (groups should be no more than 4 students, and are best with 2-3).



Step 2 - Cultivate Wonder

Time: 10 minutes

Reviewing Scientific Modeling

"Remember the book we read called What is a Scientist? By Barbara Lehn? Based on that book, what scientific job have we been really focusing on lately?"

- Optional: Read Aloud What is a Scientist by Barbara Lehn or watch this [Youtube read-aloud](#)
- [Noticing details and drawing models (and having fun, too!)]

"Do you remember when we sorted our Cubelets? We sorted them into three groups. Do you remember what groups we sorted them into?"

- [SENSE, THINK, and ACT]

"Excellent! Yes, SENSE, THINK, and ACT Cubelets all look very different from one another. And even though SENSE Cubelets look very different from THINK Cubelets, you remember that each SENSE Cubelet is unique and special even compared to the other SENSE Cubelets, right?"

"Well now that we finally investigated robots that use two ACT Cubelets, let's practice observing and modeling the details of the Cubelets we know so far."

- Optional: share a couple examples of student models from the last Modeling Robots lesson



Step 3 - Experience Before Expertise

Time: 5 minutes

Exploring Robots

"Remember that our Learning Goal today is focused on noticing important details and making sure our models show those details. First, I'll give you five minutes with your group to practice building different robot constructions that you built last class or that you didn't have time to build, but wanted to, last class!"

- Students go back to tables and build a variety of robot constructions together.

Notes

- ★ Be extra alert for students who are collaborating well and those who need your support. With only five minutes to open explore, students may encounter some tension in their groups.
- ★ Some teachers choose to use visual cues (like a necklace or a hat) to represent each group role.
- ★ It is recommended that one of your group norms be: Be respectful of materials. Cubelets are made for children and can sustain the hazards of normal play (falling off low tables, for instance), but are also machines that can break. Students may need help remembering to be gentle with Cubelets.



Step 4 - Co-Construct Meaning

Time: 15 minutes

Modeling

"Now that you have had time to remember so many of the different robot constructions you can make, it is time to practice modeling like a scientist. Remember, our goal is to pay attention to the important details that make each Cubelet unique and to draw those details on our models. I encourage you to think carefully about which colors you might need to share with your group mates since everyone will be basing their models off the same five blocks..

You can draw a model of any robot construction you built today - it does not have to be the same as anyone else in your group, and it's ok if you all choose to model the same one. If you need to, take turns building your robot construction so you can look at it from different angles. Which angle will be the best to draw your model so other people can make the exact same Drive Bot as you?"

- Students draw their models.

cubelets Student Name _____

Draw a Robot

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My robot _____.

Notes

- ❑ Look for students who are not paying attention to details - young learners especially need extra reminders to focus on the learning goal during this type of lesson.
- ❑ Based on how groups were collaborating during the Explore time, be extra present for students sharing the Cubelets while they draw their models. If needed, have students from a group start by drawing a model of the same robot so everyone has an opportunity to look at it.



Step 5 - Check for Understanding

Time: 5 minutes

Students Share Models

Have a few students share their models with the class.



Differentiation - Intervention & Extension

Time: NA

Intervention

For students who are struggling to draw the details in a 3-block model, consider asking them to model only one Cubelet at first. After they've given that one their best effort, then give them another block. Be careful to set the Cubelets down with the unique side face-up or facing the student to immediately catch their attention.

Extension

For students who are already drawing with adequate detail, ask them how they might show which direction the wheels are facing on a Drive Bot? This is called "labelling" and is a very important part of scientific modeling. Also consider giving them a blank white piece of paper and asking them to draw models of the same robot from different perspectives.