cubelets
ROBOT BLOCKS

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Investigating SENSE and ACT Cubelets

Lesson Overview

Students investigate SENSE and ACT Cubelets

Students investigate the unique properties of each SENSE and ACT Cubelet. They create robots and name them, practice counting how many Cubelets are in their robot, and try to use SENSE, ACT, and Battery accurately when they are talking to peers and adults in the room.

Lesson Tags

Grade Level
Grades 1-3

Difficulty
Apprentice

Duration
45 minutes

Prerequisite Knowledge
A robot is a machine that can SENSE, THINK, and ACT.
Battery Cubelet

Supplies

Cubelets (6 groups of)
1 Distance SENSE
1 Drive ACT
1 Battery
1 Rotate ACT*
1 Flashlight ACT*
1 Brightness SENSE*
1 Knob SENSE*
Brick adapters*
Legos*
*Keep these blocks at the supply table

Other Supplies
Anchor Chart Paper
Anchor Chart Markers
Robot Rumpus by Sean Taylor or technology to watch this Youtube read-aloud

Description

Outline
1. Read Robot Rumpus by Sean Taylor
2. Review Cubelets vocabulary and group norms
3. Investigate ACT Cubelets one by one
4. Investigate SENSE Cubelets one by one

Objectives
Students will investigate each ACT and SENSE Cubelet.

Assessment
Teachers look for group collaboration, thoroughly testing each ACT Cubelet, persevering in investigating SENSE Cubelets, clear explanations of what each Cubelet does, and accurate Cubelets vocabulary.

How did this lesson work for you? Let us know! goo.gl/EaqJmb
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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.a. With guidance from an educator, students ask questions, suggest solutions, test ideas to solve problems, and share their learning.
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.

K12CS

Hardware and Software: A computing system is composed of hardware and software. Hardware consists of physical components, while software provides instructions for the system. These instructions are represented in a form that a computer can understand.

Inference and Models: Data can be used to make inferences or predictions about the world. Inferences, statements about something that cannot be readily observed, are often based on observed data. Predictions, statements about future events, are based on patterns in data and can be made by looking at data visualizations, such as charts and graphs.

Modularity: Complex tasks can be broken down into simpler instructions, some of which can be broken down even further. Likewise, instructions can be combined to accomplish complex tasks.

NGSS

Planning and Carrying Out Investigations - Scientists and engineers plan and carry out investigations in the field or laboratory, working collaboratively as well as individually. Their investigations are systematic and require clarifying what counts as data and identifying variables or parameters.

Using Mathematics and Computational Thinking - In both science and engineering, mathematics and computation are fundamental tools for representing physical variables and their relationships. They are used for a range of tasks such as constructing simulations; statistically analyzing data; and recognizing, expressing, and applying quantitative relationships.

Vocabulary

Collaborate	Sense	Battery	Drive
Cubelets	Think	Distance	Flashlight
Robot	Act	Brightness	Rotate

Resources

Tips & Tricks

- Before class, have your groups planned - think also of what collaboration structures make the most sense for your class or your school.

Pacing

10 minutes: Read and discuss Robot Rumpus by Sean Taylor or watch this Youtube read-aloud
5 minutes: Review Cubelets vocabulary and group-work norms
20 minutes: Students investigate SENSE and ACT Cubelets
10 minutes: Class reviews what they know about each SENSE and ACT Cubelets

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Instructional Steps

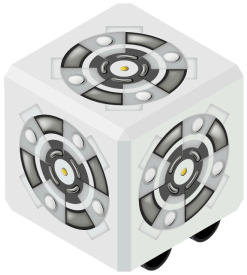
Step 1 - Pre-class setup

Time: 10 minutes

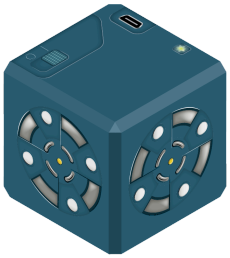
Cubelets Needed

Separate Cubelets into 6 groups, each containing:

1 Distance SENSE

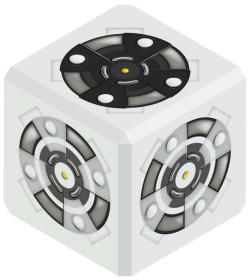


1 Drive ACT



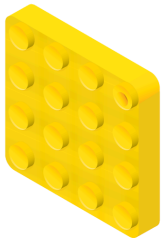
1 Battery

At a central materials table, have 6 groups containing:



1 Rotate ACT*

1 Flashlight ACT*



brick adapters*

1 Brightness SENSE*

1 Knob SENSE*

Legos*

- ❑ Prepare Anchor Chart to collect the names of the SENSE and ACT Cubelets next to the Cubelet you already know - (Battery). Leave room to eventually add all of the Cubelets in your pack by the end of the unit.

Classroom Management

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

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Step 2 - Cultivate Wonder

Time: 10 minutes

Robot Rumpus By Sean Taylor

"It's time to really get to know our Cubelets robots. When we think about robots, though, we should probably think about all the things the robots can do! Here's a funny book about pretend robots that make a huge mess in someone's house!"

- Read and discuss Robot Rumpus by Sean Taylor or watch this Youtube read-aloud

"Woah! That was a funny book! What did you notice in the book while we were reading?"

"Do you remember when we sorted our Cubelets several classes ago? 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 ACT Cubelets look very different from THINK Cubelets, do ACT Cubelets look very different from each other?"

- [Yes, wheels, big dented circle, black spinny circle on one side]

And even though SENSE Cubelets look very different from THINK Cubelets and ACT Cubelets, do SENSE Cubelets look very different from each other?"

- [Yes, two eyes vs one eye]

"Yes! Every Cubelet looks at least a little different than every other Cubelet in the set. Today, we're going to be investigating exactly what all these ACT and SENSE Cubelets do."

Step 3 - Experience Before Expertise

Time: 5 minutes

Review Group Norms

"First, let's remember the Group Norms we made on the first day of this Cubelets unit.

- Review ideas on Group Norm anchor chart.

"Today, you will be in groups of [2, 3, or 4] students. Each person will have a very specific job. [Review the jobs you decided on during your preparation for class]."

- Wrap up conversation by reviewing the group norms, separating students into their groups, and assigning group roles.
- Once students are in their groups, have them share with the other group members what their role in the group is.

Investigate

"Today is all about understanding the different SENSE and ACT Cubelets. Make sure you spend time with each Cubelet, turning it around, putting it in different parts of the robot. See how you might add Legos to your robots to bring them to life. At the beginning, you'll start with a Drive Bot - see how many different Drive Bots you can make, then have your Materials Manager trade in your Drive Cubelet for a different ACT Cubelet. For today, make sure you're only using one SENSE Cubelet at a time - those will be the trickiest to figure out.

- Groups get to work investigating ACT Cubelets & SENSE Cubelets one at a time.

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: 10 minutes

Class Discussion

Students share out what they learned about each of the ACT & SENSE Cubelets while the teacher records a model of each Cubelet next to its name on the Anchor Chart.

Step 5 - Check for Understanding

Time: 5 minutes

Exit Ticket

Draw one robot you made today and label each Cubelet with its name.

Differentiation - Intervention & Extension

Time: NA

Intervention

Some students may still struggle with holding their hand around the SENSE Cubelet instead of the ACT Cubelet. Be a support for them, but also give them time to practice on their own and with their peers.The Brightness Cubelet can be hard to understand, however, so consider turning the lights on and off when the majority of the class is trying to investigate the Brightness Cubelet.

Extension

For students who very quickly figure out what each ACT Cubelet does, ask them to use Legos and brick adapters to make their robots "come to life" with what they think it could do or be. If you'd like to really push their understanding, ask them to experiment with both SENSE blocks on one robot. There are many different lessons in robots with multiple SENSE blocks:

- ❑ The robot averages out the SENSE blocks
- ❑ The SENSE values are strongest for the blocks closest to it, and weaker for the blocks furthest from it.