About us.

We are Modular Robotics, the makers of Cubelets® robot blocks, the building blocks of better thinkers.

Modular Robotics is headquartered in Boulder, Colorado, USA. We believe toys shape the way children think about the world, so we design little robots to help build better thinkers.

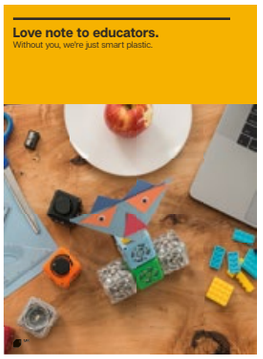
Our goal is to make captivating robot toys that inspire an intuitive understanding of complexity, computational thinking, emergence, design, and a bunch of other vital thinking skills.

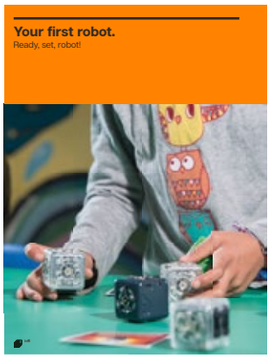
Enjoy making, exploring, and creating with Cubelets robot blocks!

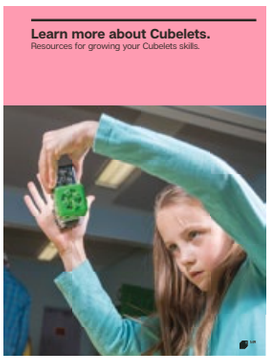
Modular Robotics

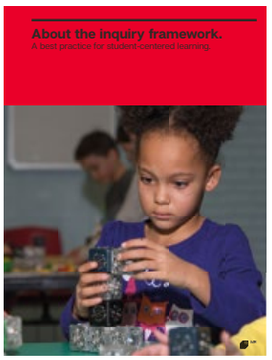
What’s inside.

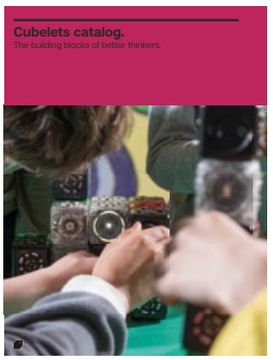
- Educator resource hub & social.
- Love note to educators.
- Your first robot.
- Learn more about Cubelets.
- About the inquiry framework.
- Cubelets catalog.
- Letter to parents.
- Maintenance & support.
- Routines to establish.
- Classroom management.
- Standards.
- Scope & sequence.
- Lesson plans.
- Blackline masters.

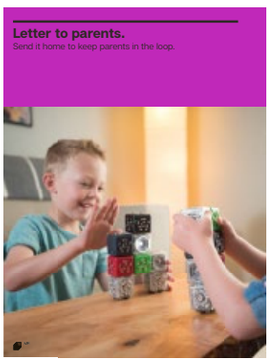


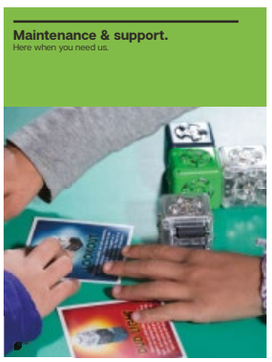


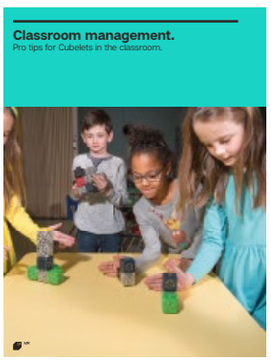


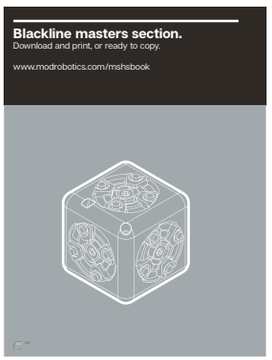












Hello.

Dear Educator,

You are one of the most important people in the lives of your students, and your work is hard. Thank you for everything you do for your students every single day!

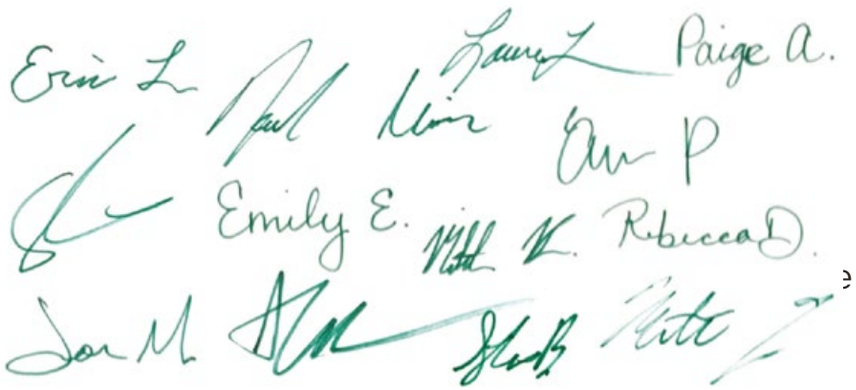
In this bundle, and on our free educator resource hub (found at modrobotics.com/thehub), we have tried to make it easy to introduce Cubelets to your students. However, the best advice we have, echoed by educators around the globe, is just go for it!

Cubelets were designed specifically for kids. Try learning alongside your students so they can see how you learn. Cubelets are the perfect tool for think-alouds because students may be able to help you!

As you look through these getting started lessons and resources, keep in mind that we are always here for you. If you have any questions – even specific to your students, classroom, or school – feel free to email our support team at support@modrobotics.com. They'll be able to connect you to the resources you need and can also refer you to our Education Design Team.

We hope you enjoy these little robot blocks as much as we do!

Sincerely,
The Team at Modular Robotics



Your first robot.

Start with the Distance, Battery, and Drive Cubelets. They represent the three types of Cubelets you need to build a robot construction.

SENSE

THINK

ACT

To build a robot construction, you need:

(1) SENSE Cubelet (Any SENSE Cubelet)	**(1) THINK Cubelet** (Battery always required)	**(1) ACT Cubelet** (Any ACT Cubelet)

Connect the magnetic faces so you have a robot construction that looks like this:

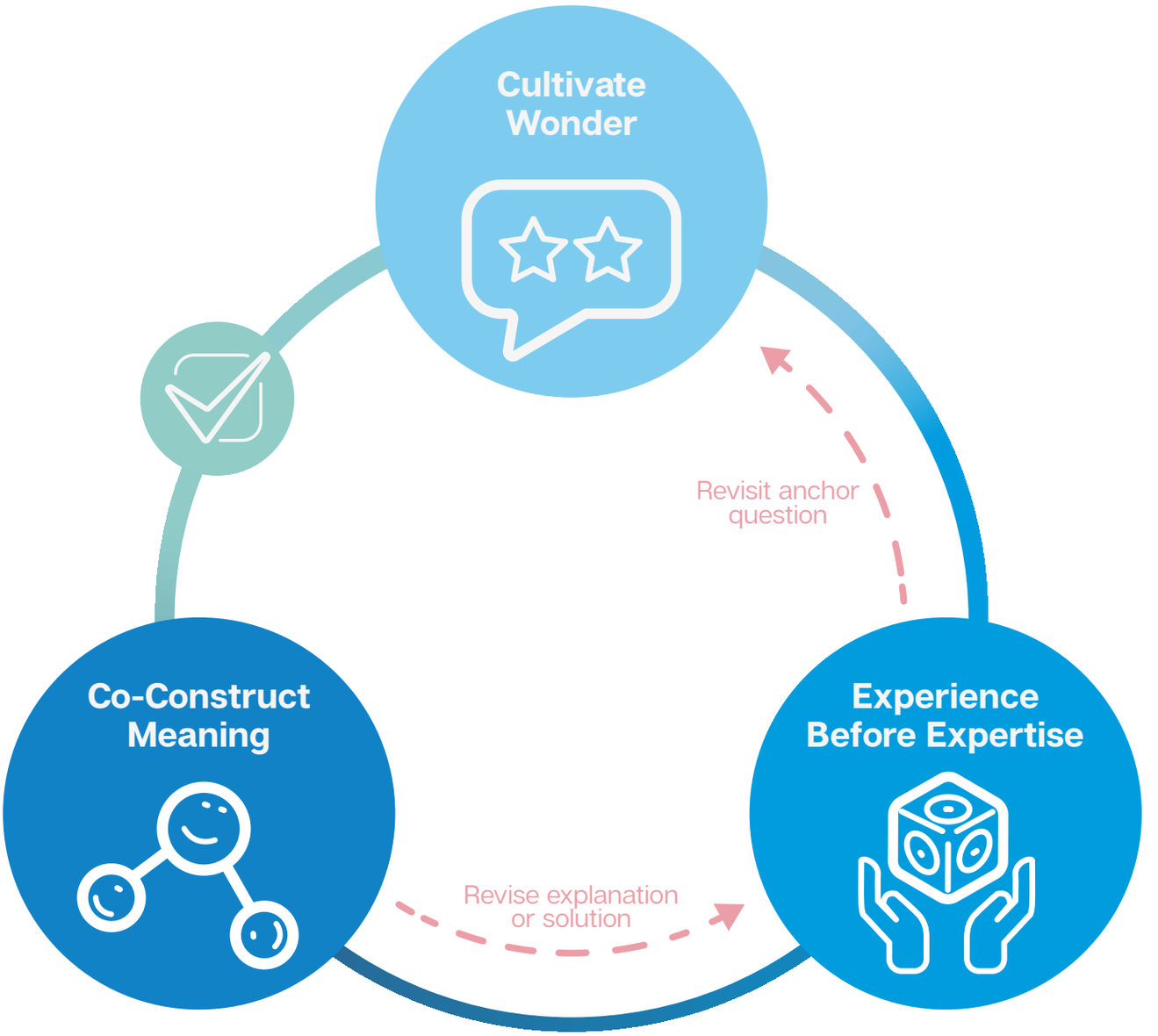
Find the switch on the side of the Battery Cubelet and turn it to the ON position.

Congratulations! You've completed your first robot construction!

What happens when you place your hand in front of the Distance SENSE? Can you figure out what makes the robot construction move faster and slower?

Cubelets Inquiry Framework.

As you dig into the Cubelets Lesson Plans, you will notice they all use a common format. This format represents our version of an Inquiry Framework. In each lesson, after you find the Overview and Classroom Prep sections, you'll notice the following sections:



06

Steering robots.

Lesson overview.

Students design steering robots using their understanding of SENSE Cubelets and THINK Cubelets.

Steering robots take Cubelets to the next level and prepare students for challenges that ask for robots to navigate their environment (e.g., solving a maze or exploring “Mars”). There are many different ways to design steering robots using what students already know, and today is all about that learning process. It is important to be prepared for each group to have access to at least two Drive Cubelets for this task.

Objectives	Students design robots that can turn both left and right without needing to be rebuilt in between.
Assessment	Students drive their steering robots through a maze that has both left and right turns.

Supplies needed.

Cubelets (6 groups of)

- 2 Distance SENSE
- 1 Brightness SENSE
- 1 Rotate ACT
- 2 Drive ACT
- 1 Flashlight ACT
- 1 Battery
- 1 Blocker
- 1 Inverse
- 1 Passive

Assorted

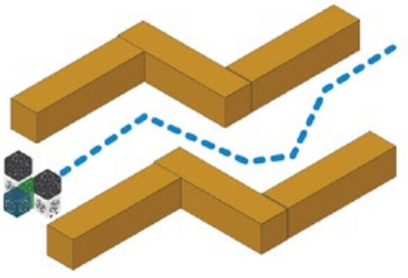
- A maze for students to test their steering robots
- A flashlight (for Brightness Cubelets)
- Youtube videos about tracked vehicles

Setup Tip
Have all other Cubelets available in a central location for students who need them.

Videos available at [redacted]

Vocabulary.

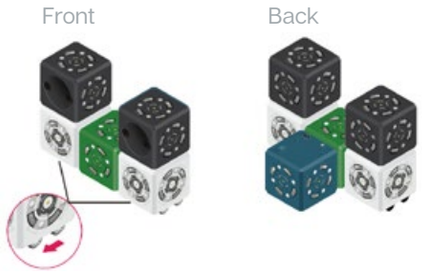
- Tracked vehicle
- Weighted average
- Left
- Right
- Faster
- Slower



06 Steering robots.

Pacing.

- 10 minutes: How do tracked vehicles turn?
- 20 minutes: Students design steering robot constructions.
- 10 minutes: Students share and compare designs.



Sample steering robot

Cultivate wonder.

"We've spent a few days exploring Cubelets, and it's time to take our engineering to the next level. Today's challenge is to design several steering robots. To be a steering robot, a robot must be able to turn left and turn right without needing to be taken apart in between. Before we start, though, it may be helpful to compare Cubelet steering to other vehicles we may know about. Does anyone know how a snowcat or a tank turns?"

- Students share ideas.

The criteria for your robot to be a steering robot will be:

01. Can turn left.
02. Can turn right.
03. No need to reassemble.

Experience before expertise.

How do tracked vehicles turn?

"Some of us do have background knowledge about how tracked vehicles turn, which may help you a lot today. Let's take a couple minutes to build a little more of our common understanding as a class. First, here's a model of a tracked vehicle turning. Notice how this video marks one spot on each track with a red dot – keep an eye on those red marks throughout the turn. We'll watch the video a couple times."

- **Youtube Video – Tracked Vehicle Turning (0:35)**
  - Discuss and re-watch video as necessary for everyone to observe the two tracks moving at different speeds.

06 Steering robots.

"Here's a real-world example of someone turning a tracked snow vehicle they made. It shows the tracks moving at different speeds."

- **Youtube Video – Personal Tracked Vehicle in Snow (1:58)**
  - Discuss and re-watch video as necessary for everyone to observe the two tracks moving at different speeds.

"Based on what we know so far about Cubelets and now tracked vehicles, what predictions might you make about how to design Cubelets robots that can steer?"

- Students share predictions.

Notes:

- Tracked vehicles turn by moving each track at its own unique speed. This will be important when designing steering robot constructions because Cubelets move like tracked vehicles. So, we can control the speed and direction of a Drive Cubelet, but we can't rotate it like the wheels on a car.

Co-construct meaning.

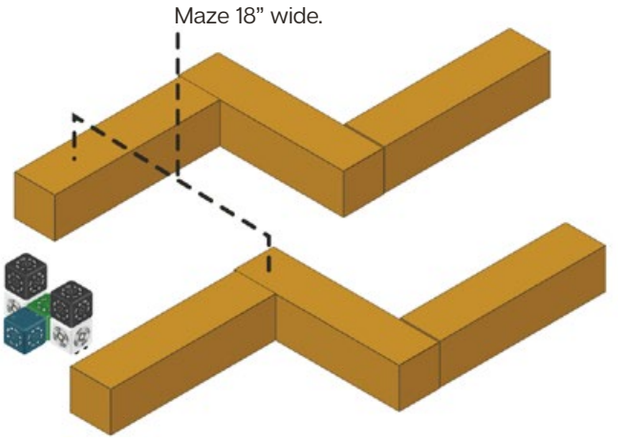
Design steering robots.

"Now it's time to design steering robots. There are many different ways to do this, but keep in mind what we learned about tracked vehicles. They are an important hint for you as engineers!"

- Students design steering robot constructions and test them by driving them through a maze.

"When you think you've designed a robot that can turn both left and right without taking it apart in between, come over here and test it in this maze! You can steer it through the maze using your hands or a flashlight; it doesn't need to be automatic."

Hey teachers! Start with a maze that is 18" wide. Your students may need to widen or narrow the path.



06 Steering robots.

Check for understanding.

Share designs.

"Let's look at all the steering robots we designed today! What do our designs have in common? What makes them different from each other?"

- Students share designs and discuss the designs of other groups.

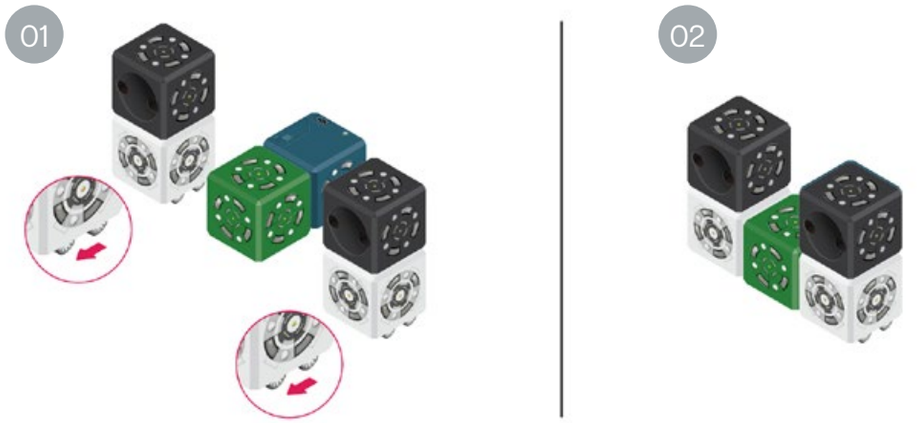
"What was the hardest part of today's design challenge? How did you push through that with your group?"

- Students share their design processes.

Differentiation – Intervention & extension.

Intervention

Ask students who are struggling to build a steering robot to build two simple Drive-bot towers and then attach them together using a Blocker Cubelet.



Extension

Challenge students to design a robot that can solve the maze automatically. Don't give this group too many hints; this will be the next design challenge for the whole class!

END OF LESSON #6

How did this lesson work for you? Let us know!
Check out our newest resources at [redacted]