VEX Robotics

https://codego.vex.com/

What is VEX Robotics?

VEX provides K-12 robotics programs that focuses on science, engineering, math, literacy, problem solving, creative thinking and collaboration. VEX offers a variety of robotic products, PD/training for teachers, online support, full curriculum that is easy for teachers to use and engaging for students. VEX is designed for students to “create, not consume” technology.

Why VEX for RVC?

VEX provides a comprehensive K-12 framework that challenges students on their level. Kindergarten students will learn the building blocks for coding and robotics while high school students can participate in regional robotics competitions and everything in between. VEX has a variety of products for each grade level and curriculum that extends literacy, math and science. VEX Robots are codable and will allow students to apply what they have learned in coding/engineering/science lessons and create solutions to real life problems. Students start in block code and build to written python code.

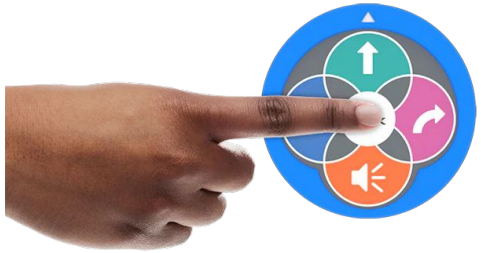
VEX 123 for grades K-2

VEX IQ for Middle School

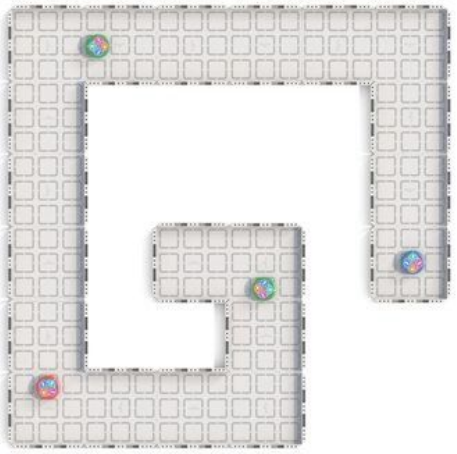
VEX GO for grades 3-5

VEX V5 for HS (in the future?)

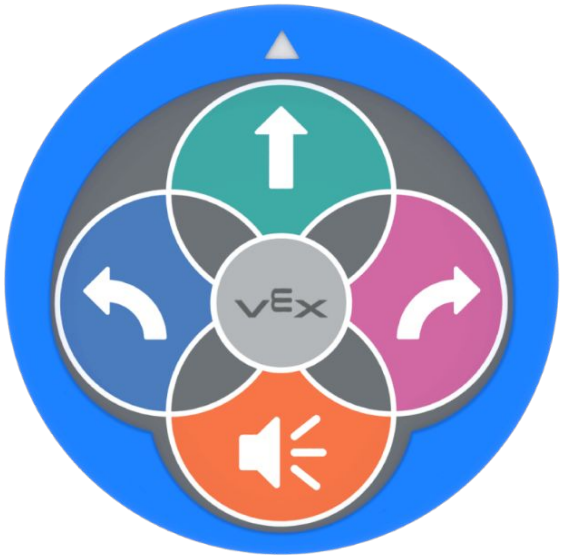
VEX 1-2-3 (Grades K-2)



STEM & CODING

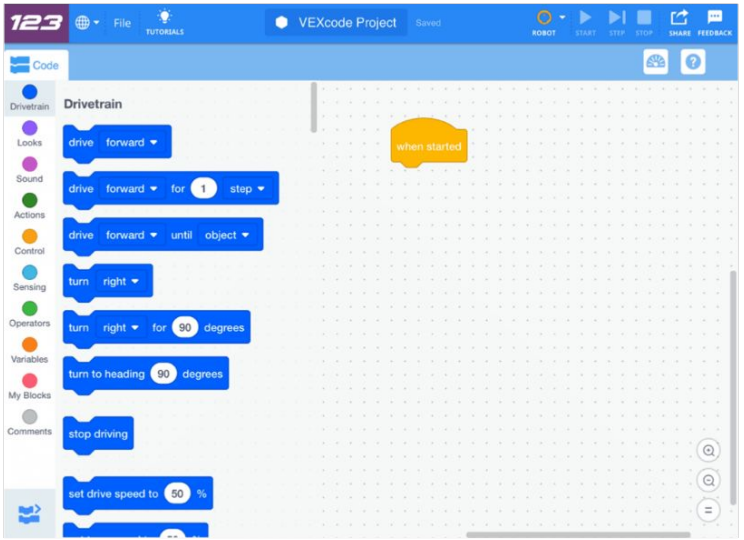


Three Ways to Code



Kindergarten
Touch the robot directly

First Grade
Commands Entered into the Coder

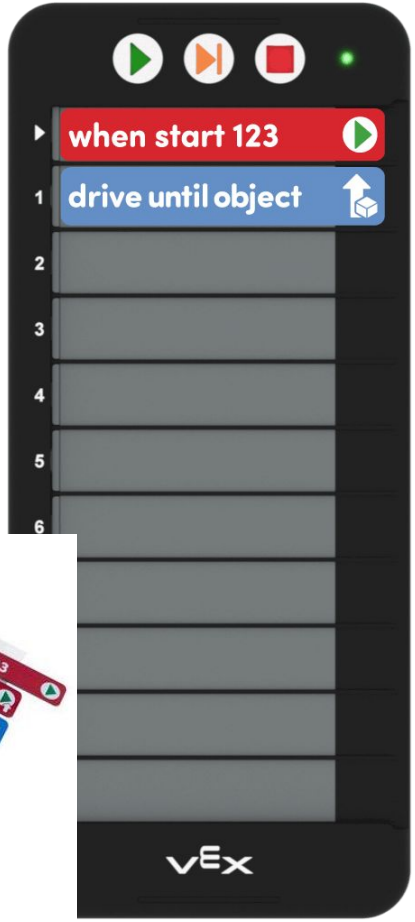


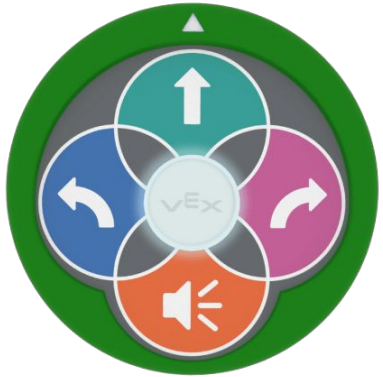
Second Grade
Students code on Chromebooks using block code


VEX
VEX


when start 123
drive until object
if red
turn around
if blue
act happy
and if
go to start
glow purple
if blue
drive 1
drive 2
drive 4
turn right
turn right
VEX


when start 123
go to start
drive 1
drive 1
drive 1
drive 1
drive 2
drive 4
turn right
turn right


when start 123
1
drive until object
2
3
4
5
6
VEX


VEX

VEX 1-2-3 has Literacy, Math, SEL and Science components that can be integrated into existing/new curriculum.

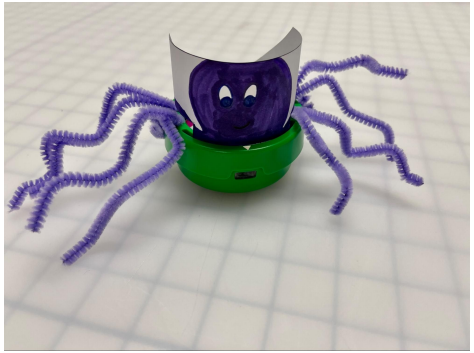
Setting up the Field:
Prior to beginning the Activities, have your 123 Field set up in the following way:

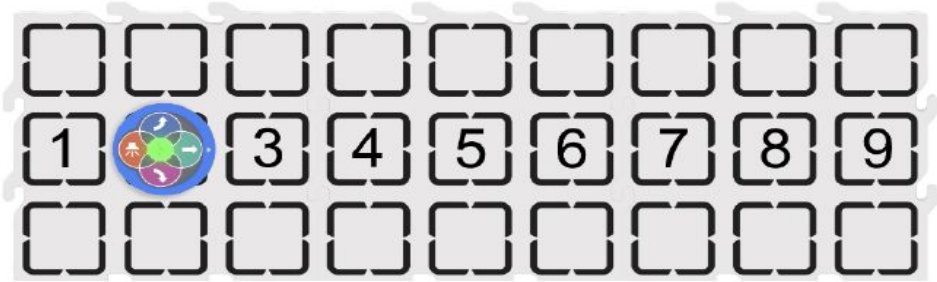
Have these **setting** elements taped to your Field:
- A castle
- Villager's houses

Have the following **characters** ready for the Activities:
- A dragon
- A Royal Family
- Villagers

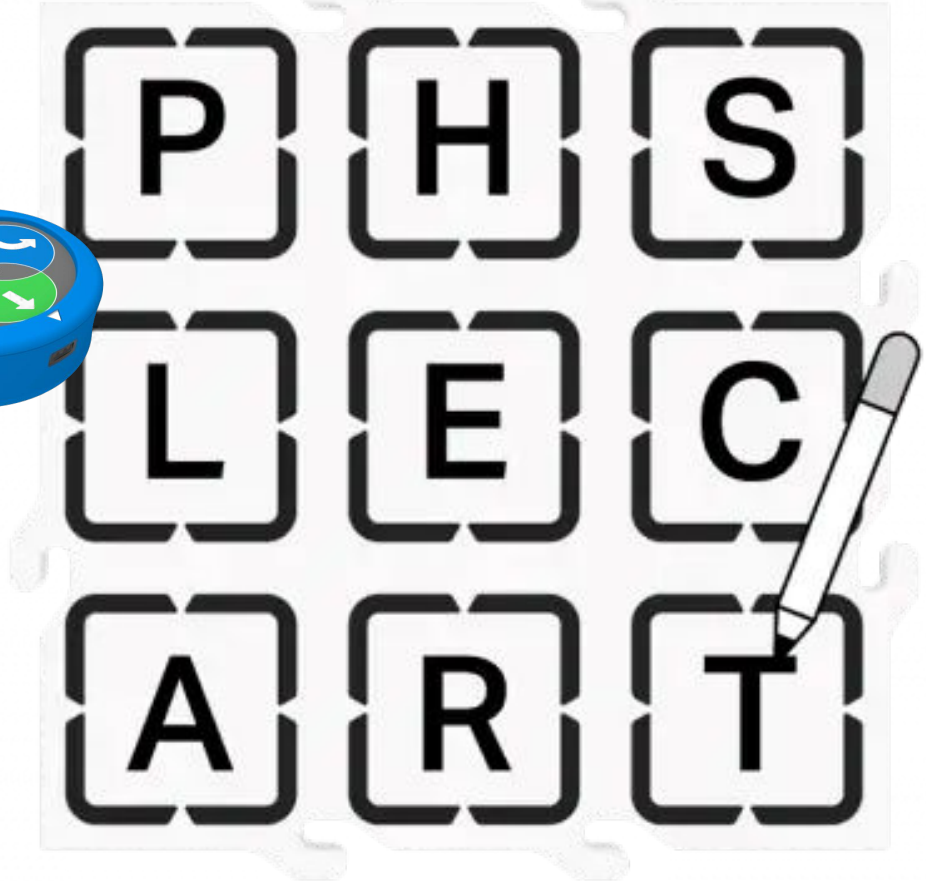
Have the following **plot** materials ready for the Activities:
- Dragon Pushing device - use craft materials to construct a pushing attachment with the Art Ring.

Materials Needed:
- Paper & Markers/coloring materials
- Tape (to attach elements to the Field)
- Craft Materials (like pipe cleaners, straws, etc.)
- 123 Robot
- 123 Field





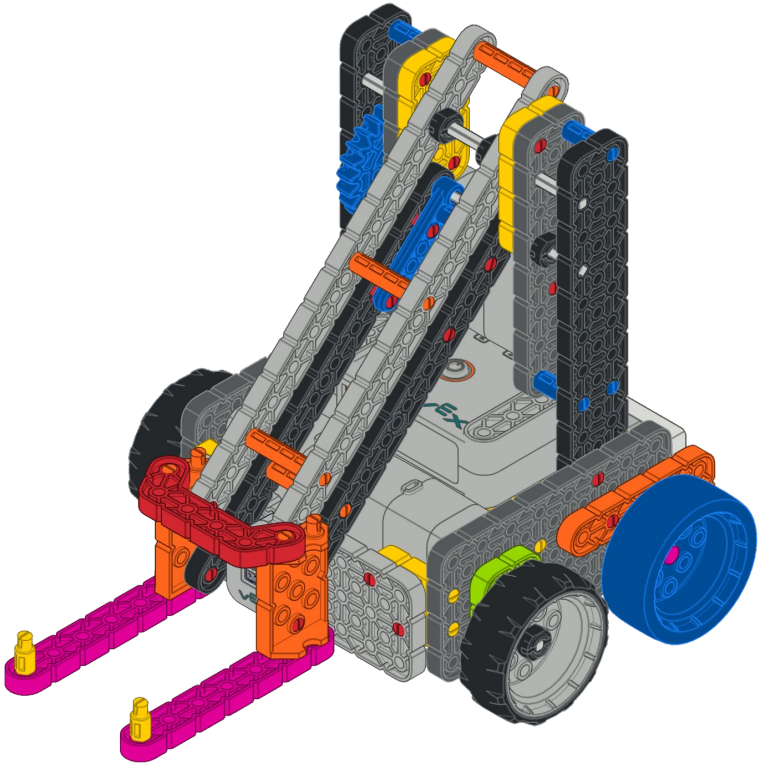
Code your robot to spell a word. Can you write down your partners word?



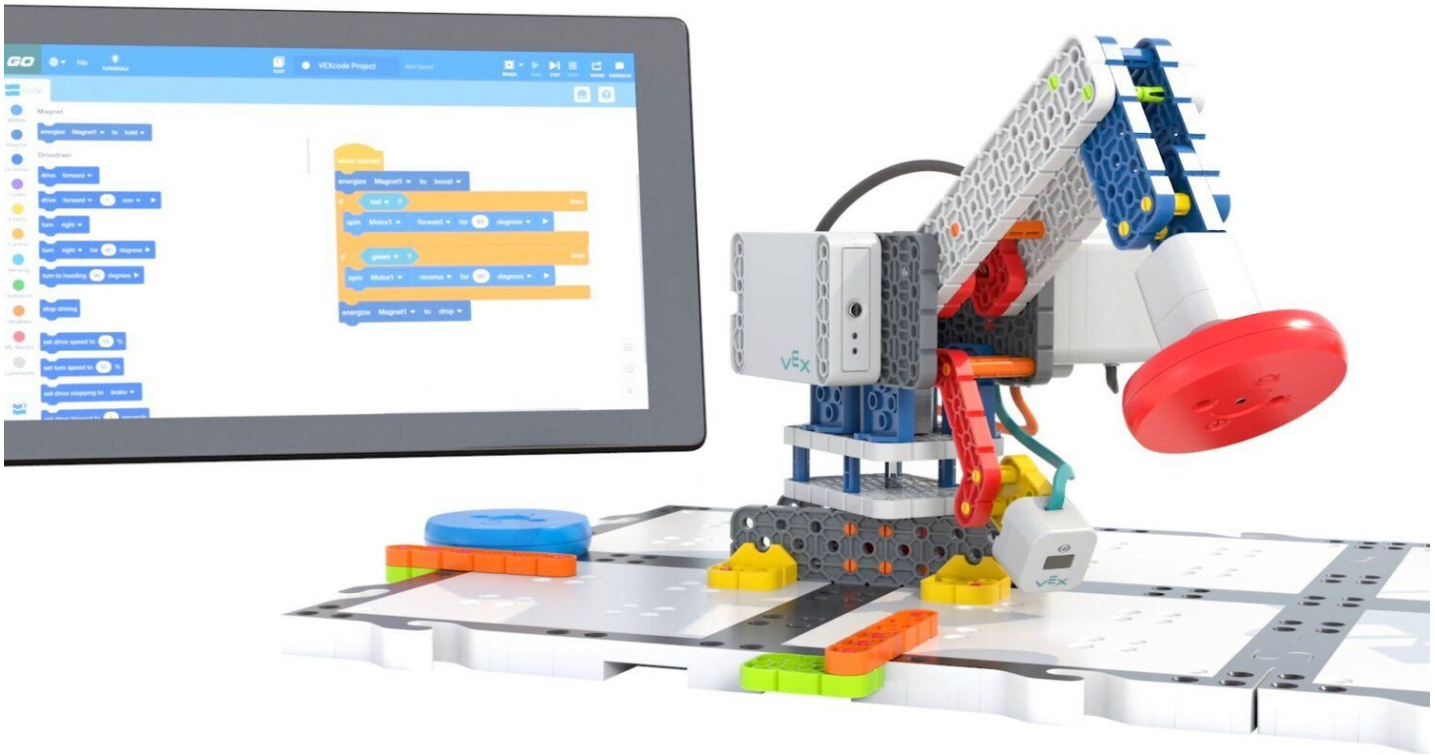
Lessons foster problem solving, planning, application of coding, student collaboration and creative thinking.

There is a full curriculum, scope and sequence, teacher friendly lesson plans and connections to NYS Standards.

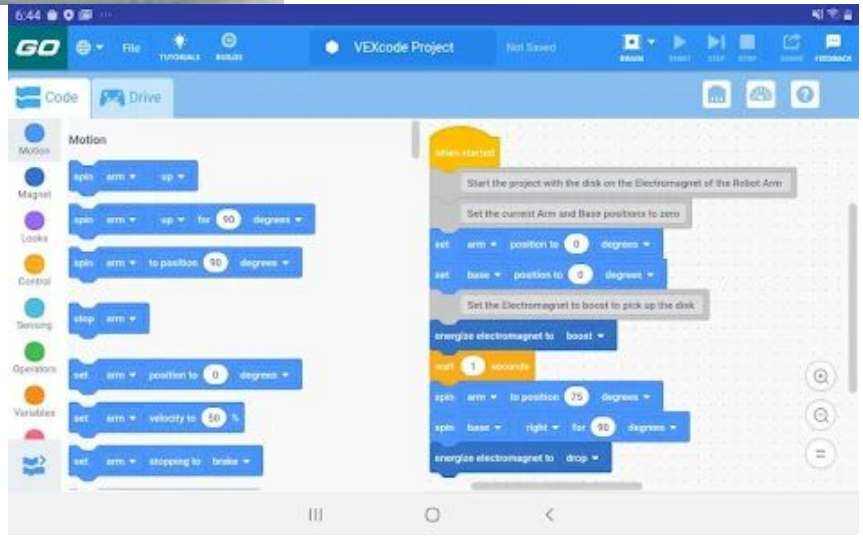
VEX GO! (Grades 3-5)



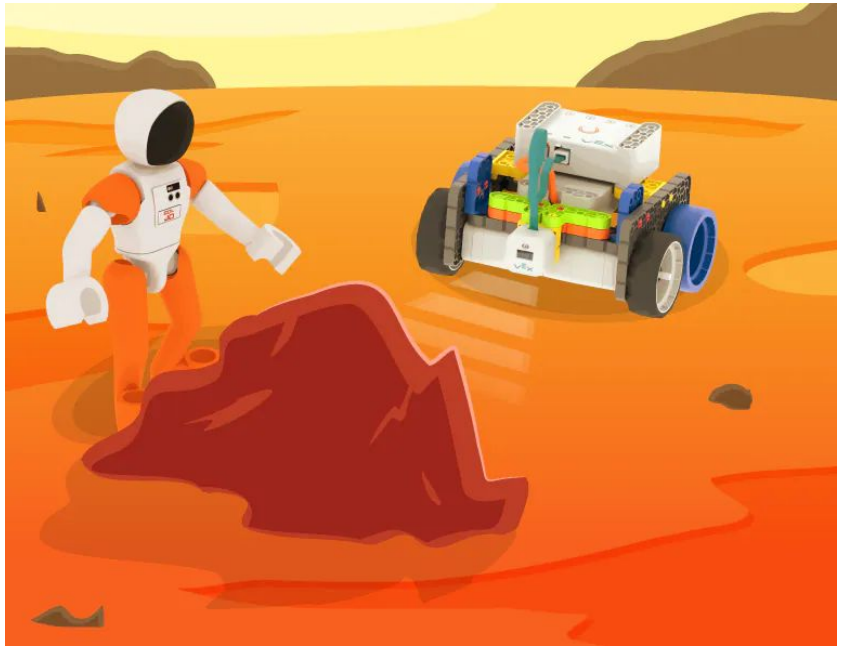
Students design, create and construct their own robots to solve real world problems and code them on Chromebooks using block code. Units are design to connect to state standards and current ELA, Math and Science standards.



Students can design their own robots or follow step by step instructions (similar to legos).



4th graders imagine they are scientists who are visiting Mars. They must design Mars Rovers and complete expeditions. Students work collaboratively to collect and sort Mars rock samples, navigate tricky terrain and make it back to home base.



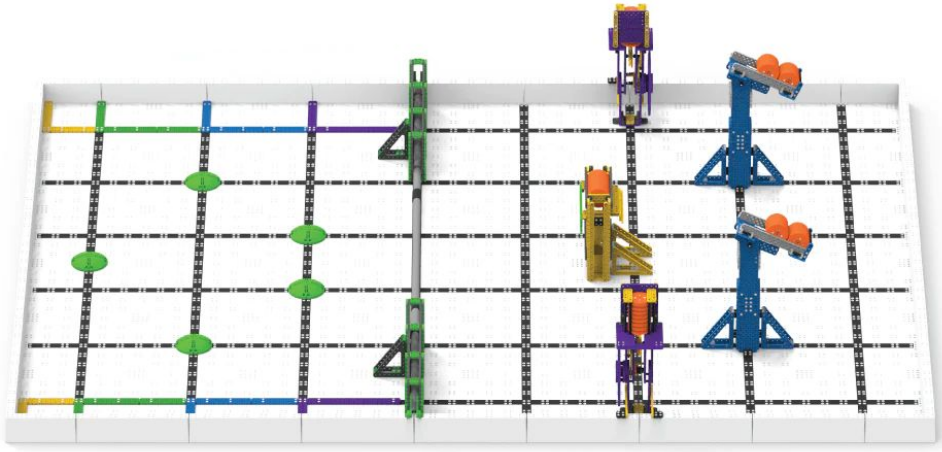
VEX IQ (Middle School)

VEX IQ uses high tech electronics with simple snap together plastic connectables. Students code using block code or python coding. Students meet challenges and work together in robotic competitions.

VEX IQ Competitions

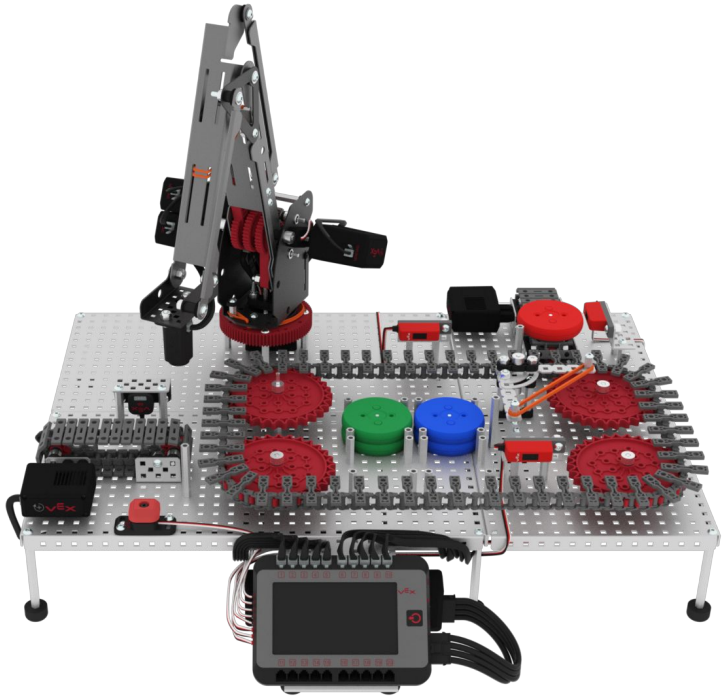
VEX IQ offers competitions for students and teams. Students plan, design, build and compete using VEX Robotics and coding. Classroom STEM concepts are put to the test as students learn lifelong skills in teamwork, leadership and communication.

https://youtu.be/vF3I8FscrKo



VEX V5 (High School)

SSHS has some VEX V5 robots that will be used in the Robotics Club. VEX V5 has metal parts and components that are sturdier and allow for more flexible designs. We are currently looking into adding more robotics into classes or as electives in over the next few years.

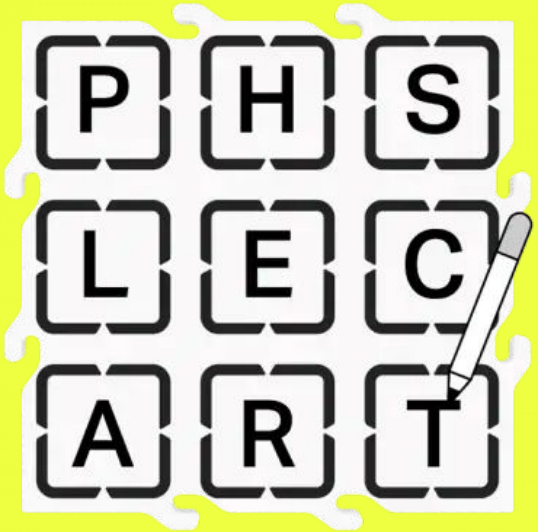


LET'S PLAY!

Incorporating Numeracy and Literacy

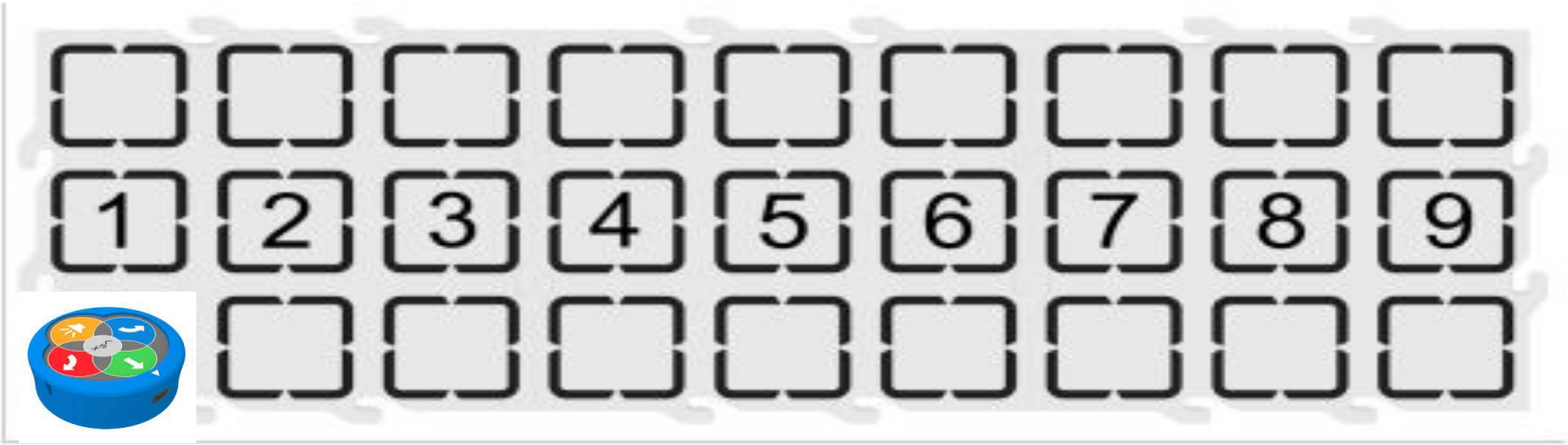
https://docs.google.com/presentation/d/1arspJfZovlQI_R4aAYMVvrxx-31dXkUfeHhA9okx-ec/edit#slide=id.g7920958cb6_0_200

https://education.vex.com/stemlabs/123/number-line



Numeracy and Counting

Today we are going to practice counting and adding. Can you program your robot to show 2 + 4 using our number line?



Let’s Play a game with your partner.

- With a partner, roll two dice.
- On your sheet, show an addition problem that finds the sum of those two numbers.

  ____ + _____ = _____

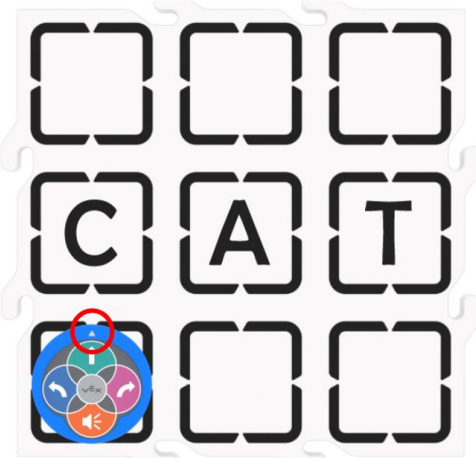
  3 + 4 = 7

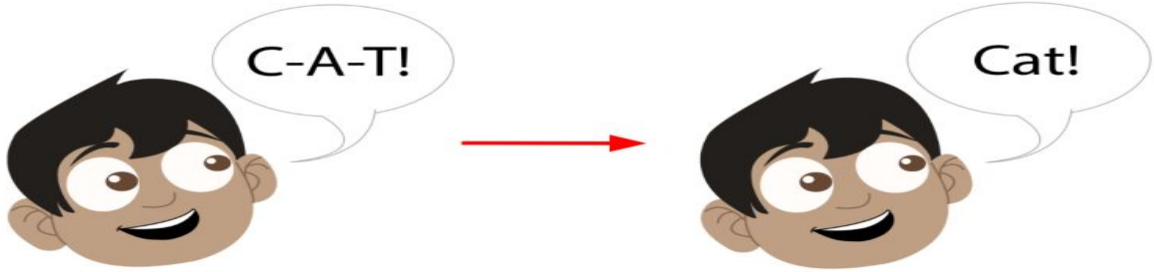
- Code your robot to show your equation.

  Instead of the + sign, have your robot pause or make a noise.

- Did your robot land on the sum of your 2 numbers?

This week in class we focused on the word family -at. Can you code your robot to spell the word cat? As your robot moves to the letters, say the letters out loud, then say the whole word.





Challenge: What other letters can we use instead of ‘c’ to make a word?

Let’s see if we can make more words.

Using the letters below, work with your partner to write 3 words. Code your robot to spell out those words. Challenge your partner to use your code to discover your secret word.

Mr. Duffy’s Secret word:

- Start
- Drive x 2 (first letter)
- Turn right, drive 1 (second letter)
- Drive 1, turn right, drive one (third letter)

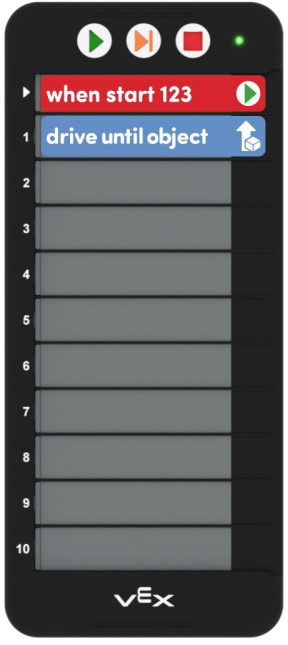
What is my mystery word?

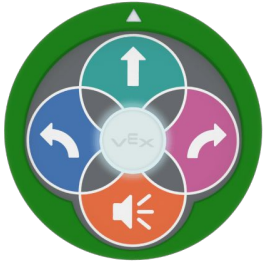
VEX 1-2-3 Visiting the Zoo (Grades 1-2)

https://education.vex.com/stemlabs/123/moving-from-touch-to-coder/go-see-the-lions/goals-and-standards

https://docs.google.com/presentation/d/1UjLU0bR1UgUjVINxLadfVM6yDGPOP3Xty1R1-PXsUuk/edit#slide=id.g7920958cb6_0_200

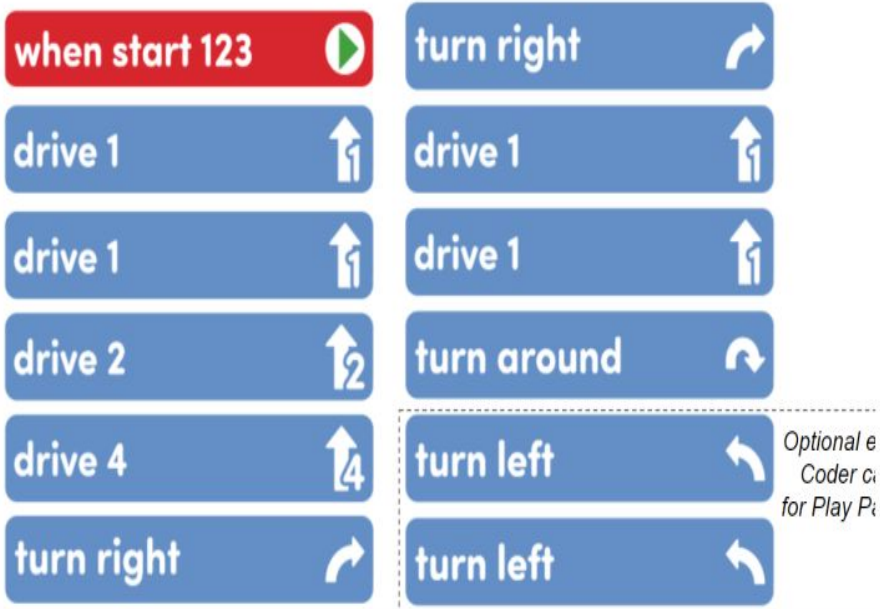
Today we will be taking a class trip to the RVC Zoo with our VEX Robot. We will visit a lion, bear and tiger. Can you code your robot to visit these animals?
We can code the VEX 1-2-3 in 3 ways. Today we will use the coding cards.



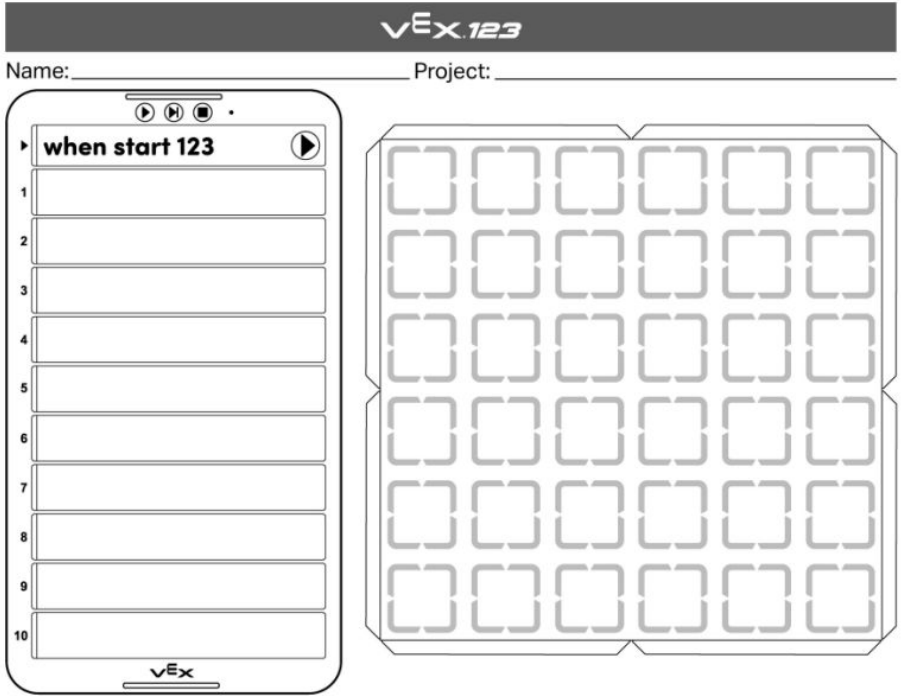


Start by arranging the play board to make a zoo as shown below.
You will need the coding cards on the right.

Coder cards needed

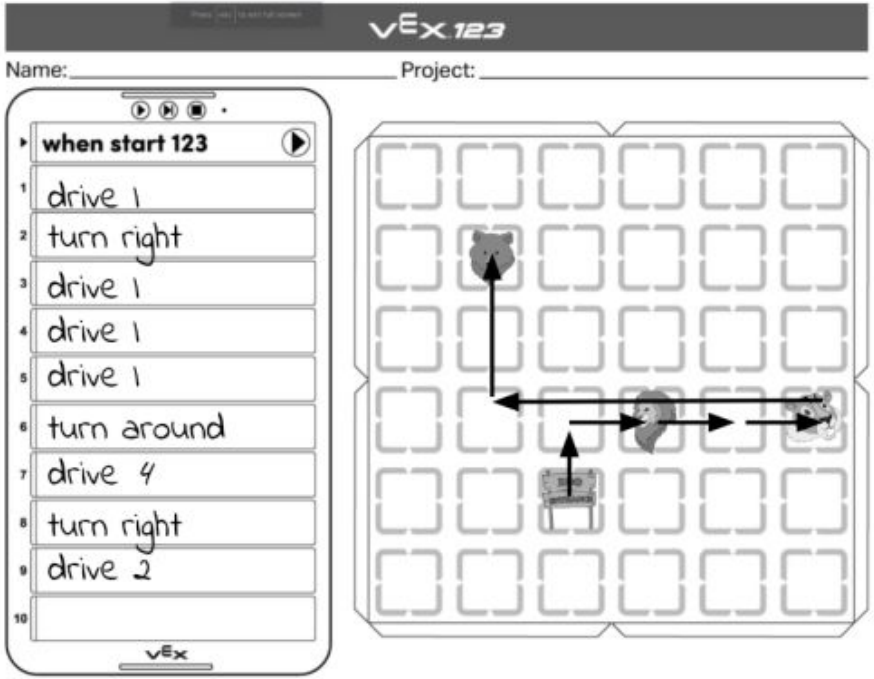


Work with your partner to plan a code that will allow your VEX robot to visit all 3 animals. USe your planning sheet to help you.



Use your planning sheet and input your code into the coder.

Example project and completed printable



Additional Challenges

- Draw additional animals that you would like to visit at the zoo. Add them to your map. Can you code your robot to visit them?
- Rearrange the animals in the zoo. Can your partner code the robot to visit the animals?
- Write a creative story about going to the zoo with your family. What animals would you be the most excited to see?
- Pick an animal from the zoo. Can you find a book in our library about that animal?

Exit Ticket Questions

- If someone visited our classroom who didn't know what the Coder and Coder cards were, how would you explain how they work?
- What is one thing that you did that helped your group successfully code your robot today, that you want to remember and do the next time we code our robots with the Coder?
- What are three things you see or hear when you are coding with the Coder and Coder cards that help you learn?

Letter Home to Parents

Moving From Touch to Coder Letter Home

Introduction

In the Moving from Touch to Coder Unit, students will transition from Touch coding to using the Coder to program the 123 Robot. Students will learn to use the Coder and explore the concept of path planning by coding their 123 Robots to drive to visit animals in an imaginary zoo. Through the activities in this Unit, students will learn about using the Coder cards as a programming language, in which each card is a command that corresponds to a behavior, or action, performed by the 123 Robot.

Students will start by using Touch to code their robot to visit an animal in an imaginary zoo. Then, they will be introduced to the Coder and use it, along with a planning printable, to code the exact same project. This helps students to make the connection between coding each behavior with Touch and coding each behavior using an individual Coder card. Next, they are introduced to new Coder cards, and then plan a path and use the new cards to code their robot to visit two more zoo animals, again using the Coder. Throughout the Unit, students will need to sequence the Coder cards correctly in order to successfully code their 123 robot to reach each zoo animal.

Please keep this letter for your reference as your student works through the Moving from Touch to Code Unit. It contains information that you can use to keep up to date on what students are learning and to spark discussions about Computer Science at home.

Look Inside the VEX 123 STEM Lab Unit

In **Lab 1: Go See the Lions,** students are introduced to the premise of the lab: the 123 Robot is going on a field trip to the zoo, and students will need to code the robot to move in order for it to visit the animals. They will plan a Touch project for the Robot to visit the lions using a planning printable, and run the project to test it. They are then introduced to the Coder, and how to use it correctly. They then recreate the project for the robot to visit the lions using Coder cards.

In **Lab 2: Visit the Tigers and Bears,** students will build on the Coder project they created in Lab 1, by using the Coder and Field Planning Printable to plan and then code the 123 Robot to get to the second zoo animal, the tiger. They will be introduced to the Drive 2, Drive 4 and Turn Around Coder Cards, and then use the Coder to plan and code their robot to get to the final zoo animal, the bear.

Moving From Touch to Coder Letter Home

Vocabulary

General notes on encouraging vocabulary usage with young children:

- The vocabulary words offered are not meant for students to memorize terminology, but to give them language to use to talk about the activities and learning they are doing throughout the Unit. Work these terms into conversations naturally, and positively reinforce this for students as well.
- Remind students that as they try new vocabulary words that they may not be able to explain everything in detail the first time. Encourage failure and remind students that it is an important part in the learning process.

Vocabulary

- **Behavior -** Actions performed by a robot, defined by the programming language.
- **Coder -** Device that enables students to code the 123 Robot to execute behaviors by sequencing Coder cards in the slots on the Coder
- **Coder cards -** Physical cards that represent commands to be used in the Coder.
- **Sequence -** The order in which commands are executed one after the other. The order of the touch button presses is the order in which the 123 Robot will perform the actions.
- **Path planning -** Planning out each action a robot will need to take in order to complete a project.
- **When start 123 -** The Coder card used to begin all Coder projects.
- **Drive 1 -** Coder card that makes the robot drive forward 1 robot length, or 1 square on the 123 Field.
- **Drive 2 -** Coder card that makes the robot drive forward 2 robot lengths, or 1 square on the 123 Field.
- **Drive 4 -** Coder card that makes the robot drive forward 4 robot lengths, or 1 square on the 123 Field.
- **Turn around -** Coder card that makes the robot turn 180 degrees to face the opposite direction.

Connection to Daily Life

The exploration that students do during this Unit will help them to learn about the concepts of path planning which is central to Computer Science. Path planning is also a part of our daily

VEX provides letters home to parents with descriptions of what students are learning, vocabulary and questions that parents can ask their children about their experiences. Students also earn certificates.

Follow-up questions to ask at home

Use these questions to discuss the coding activities that your student is participating in with their group. Included here are questions that address the trial and error process that is an essential part of coding. It will likely take several tries for your student to create a successful coding project. Asking process-oriented questions and celebrating mistakes can encourage young learners to embrace making mistakes and help them build resilience and confidence to persist when confronted with challenges.

1. How did you use the Coder to help your robot visit the lions, tigers and bears at the Zoo?
2. How is coding the Coder like coding with Touch? How is it different?
3. How did planning a path for your robot help you to choose Coder cards for your projects?
4. Can you tell me how to code the same robot behavior by Touch and with using the Coder?
5. What do you like about coding with the Coder?

VEX GO (Grades 3-5)

Simple Machines (Grade 3)

https://content.vexrobotics.com/vexgo/pdf/builds/simple_machines/Inclined_Plane_Rev8.pdf

https://docs.google.com/presentation/d/1Ixj9TITIVkGg7u90bRt6mXTTyvTfgDHUpG7XVwHaIEk/edit#slide=id.g9a29ca0c4c_0_5

Incline Plane:

- Students build an incline plane using VEX snap and click parts
- Students predict and test their incline plane and record data

Main Focus Question: How does an inclined plane affect work?

Students will use the VEX GO Kit to build an Inclined Plane with 3 height levels. They will use the build to investigate how height and gravitational force affect the distance an object travels after rolling down an inclined plane. Students will test how far the VEX GO Blue Wheel travels after rolling down the Inclined Plane at 3 different heights.

- How can we conduct an investigation to observe cause and effect relationships?
- How do simple machines make work easier?
- What happens to an object when a force is applied to it?
- A simple machine is a device that changes the direction or strength of force, and is used to make work easier.

Vocabulary

Force
A push or pull that causes change in speed, direction or shape of an object.

Gravity
A force that pulls objects toward the Earth.

Simple Machine
A device that can change the direction or strength of force, and is used to make work easier.

Work
A task that requires effort to complete.

Inclined Plane
A sloped ramp.

Lever
A plank that moves at one fixed point.

Pivot Point
A single point that the lever rests on.

Gear
A wheel with teeth used to transfer or receive force.

Meshed
When two or more gears are connected with their teeth.

Data
Gathered facts.

Investigation
To observe or study by close examination and systematic inquiry.

Group Name: _____ Date: _____

Build: _____ The Goal of our build is: _____

Builder Responsibilities	Journalist Responsibilities
Builder Name(s)	Journalist Name(s)

We are ALL responsible for:

- Keeping track of our VEX GO Kits and pieces so nothing gets lost
- Following directions and working together
- Making decisions by: _____

What works well in our group that we will do today?	What is a new strategy that we will try today?
What did not work well in our group today?	What is a possible plan for next time?

Lab 1: Inclined Plane Date: _____

Group Name: _____

Height	Prediction	Why?	Distance
Low			

Height	Prediction	Why?	Distance
Middle			
High			

Testing our incline plane.

With your partner:

- Predict how far the wheels will roll at each level (low, medium and high)
- Explain your reasoning in the why box.
- Test the wheels at each level and record your data.

https://docs.google.com/presentation/d/1Ixj9TITIVkGg7u90bRt6mXTTyvTfgDHUpG7XVwHaIEk/edit#slide=id.g806bb9be79_0_0

Enrichment/Extensions

Choice Board		
Photographer Take pictures of real-life simple machines from your house and/or neighborhood. Label what type of simple machine it is and identify what it does.	**Venn Diagram** Create a Venn Diagram of two or three simple machines. Identify their similarities and their differences.	**Create a cartoon strip** Use four vocabulary words in your own cartoon strip.
Engineer Research two different fields of engineering. Write a paragraph about what they do. Identify how simple machines are involved in their job.	**Poem** Use any of the following words to make an Acrostic Poem: Force, Gravity, Machine, Lever, Engineer, Work.	**Collage** Create a collage of different examples of simple machines in real-world environments.
Sticky Note Game A student stands in the front of the class (or small group) with a vocab word written on a sticky note stuck to their forehead. This student chooses classmates, one at a time, to give them hints until they guess the correct word.	**Simple Machine Scavenger Hunt** How many of these simple machines can students find in the room? In the school? At home? Inclined Plane, Lever, Wheel and Axle, Gear.	**Work of the Day** Students track when they observe work being done throughout the day in a chart or list.

Mars Rover (Grade 4-5)

Students launch into a unit that has them pretend they are scientists on Mars. They must construct a Mars Rover and complete a series of missions. Students build and code their Rover and add extensions to help them complete tasks.

https://content.vexrobotics.com/vexgo/pdf/builds/code_base/CodeBase_Rev6.pdf

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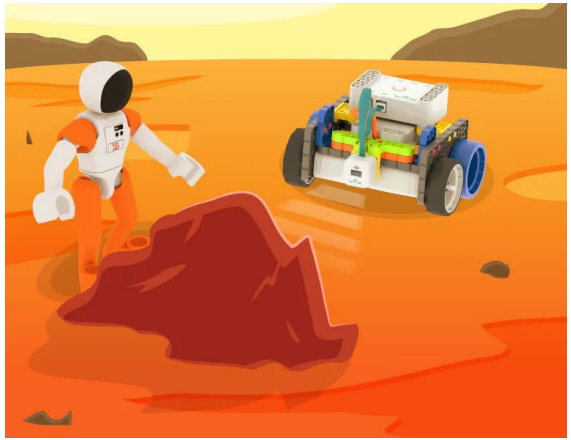
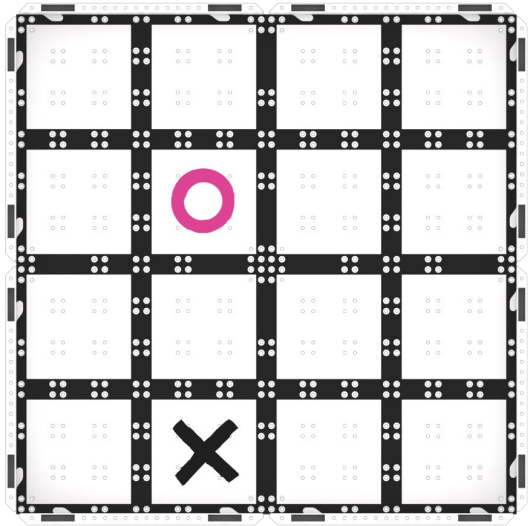


Our Mission

Once you have completed the construction of your Mars Rover, code the Rover to travel to the Field Set Up, collect a sample and bring it back to base camp.

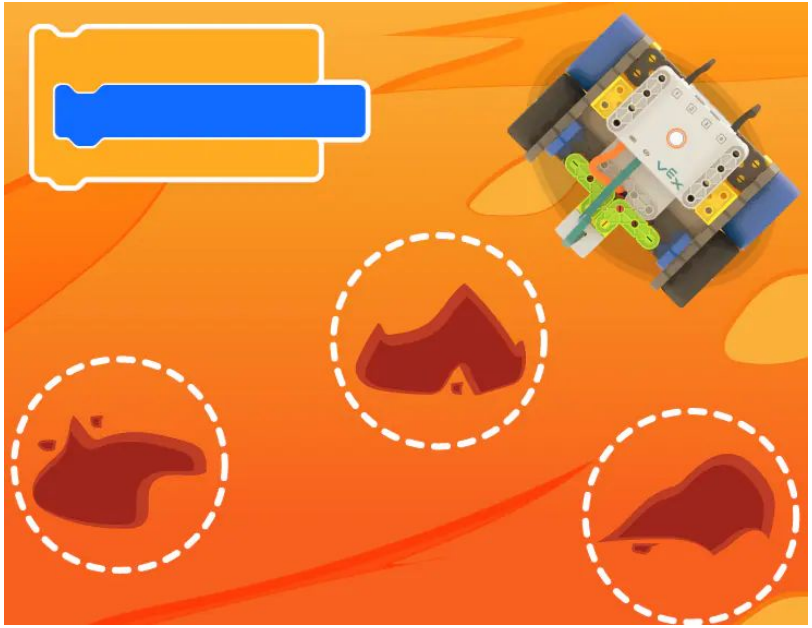
https://docs.google.com/presentation/d/1ClsvfwNnoMSwXxkXyFbPLJA4VG4lOoAyOliXYUsfDIU/edit#slide=id.gc005b6e7b8_0_36

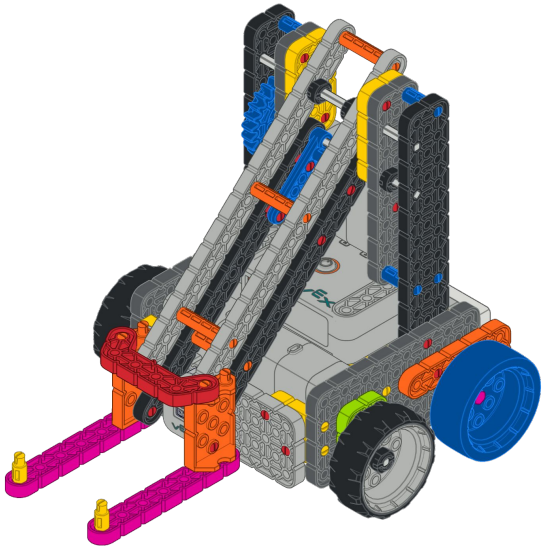


codego.vex.com

Use the VEX “Codego” app to create block code to complete your mission.


when started
drive forward for 325 mm
set bumper to red
wait 3 seconds
set bumper to off
turn right for 180 degrees
drive forward for 325 mm
set bumper to red
wait 3 seconds
set bumper to off





Students can eventually build extensions on their rover to do jobs such as pick up martian rocks or build extensions to their home base.

VEXcode GO