Goals and Standards

Implementing VEX GO STEM Labs

STEM Labs are designed to be the online teacher's manual for VEX GO. Like a printed teacher's manual, the teacher-facing content of the STEM Labs provides all of the resources, materials, and information needed to be able to plan, teach, and assess with VEX GO. The Lab Image Slideshows are the student-facing companion to this material. For more detailed information about how to implement a STEM Lab in your classroom, see the Implementing VEX GO STEM Labs article.

Goals

Students will apply

- How to plan and execute a VEXcode GO project.

Students will make meaning of

- How they can work with VEXcode GO software, the Code Base robot, and with each other to solve problems.
- How robots can do jobs that are dirty, dull or dangerous; such as unsanitary work cleaning sewers, dull work in warehouses, or dangerous work fighting fires.

Students will be skilled at

- Building the Code Base 2.0 robot.
- Creating a plan that correctly orders behaviors in a sequence to solve a challenge.
- Using words and gestures to communicate behaviors that the Code Base robot will need to execute.
- Starting a VEXcode GO project.

Students will know

- How to communicate Code Base robot behaviors through words and gestures when project planning with classmates.
- How to create and start a project using VEXcode GO software and the Code Base robot.

Objective(s)

Objective

1. Students will identify and categorize jobs that robots do in real life.
2. Students will be able to connect VEXcode GO to the Code Base robot and start a project.

Activity

1. During the Engage section students will categorize jobs as being either dirty, dull, or dangerous.
2. Students will follow steps to connect their Code Base robot to a device in Play Part 1. In Play Part 2, students will follow the steps to create and start a project to drive their robot forward.

Assessment

1. During the Engage section, the teacher will discuss and have the students identify some real-life jobs that are dirty, dull, or dangerous that robots perform for us.
2. During Play Part 2, students will start a project.

Connections to Standards

Showcase Standards

Common Core State Standards (CCSS)

CCSS.MATH.CONTENT.K.G.A.1: Describe objects in the environment using names of shapes, and describe the relative positions of these objects using terms such as above, below, beside, in front of, behind, and next to.

How Standard is Achieved: During Engage, students will use spatial reasoning skills to describe the position of VEX GO Kit pieces as they build the Code Base robot. Additionally, in Play Parts 1 and 2, students have to predict how far the Code Base robot will move and how accurate their predictions were. As a result, they will need to describe the position of the Code Base robot relative to their prediction. The students will also be asked by the teacher how changing the orientation of the Code Base robot will affect where it ends up.

Showcase Standards

Computer Science Teachers Association (CSTA)

CSTA 1A-AP-10: Develop programs with sequences and simple loops, to express ideas or address a problem.

How Standard is Achieved: In Play Parts 1 and 2, students will create a project where Drivetrain commands are sequenced together, matching a prompt provided by the teacher.

Additional Standards

Computer Science Teachers Association (CSTA)

CSTA 1B-AP-11: Decompose (break down) problems into smaller, manageable subproblems to facilitate the program development process.

How Standard is Achieved: During Mid-Play Break, students will break down (decompose) what a drivetrain is and break down the steps to use VEXcode GO and the Code Base robot to create a project.

Summary

Materials Needed

The following is a list of all the materials that are needed to complete the VEX GO Lab. These materials include student facing materials as well as teacher facilitation materials. It is recommended that you assign two students to each VEX GO Kit.

In some Labs, links to teaching resources in a slideshow format have been included. These slides can help provide context and inspiration for your students. Teachers will be guided in how to implement the slides with suggestions throughout the lab. All slides are editable, and can be projected for students or used as a teacher resource. To edit the Google Slides, make a copy into your personal Drive and edit as needed.

Other editable documents have been included to assist in implementing the Labs in a small group format. Print the worksheets as is or copy and edit those documents to suit the needs of your classroom. Example Data Collection sheet setups have been included for certain experiments as well as the original blank copy. While they offer suggestions for setup, these documents are all editable to best suit your classroom and the needs of your students.

Materials	Purpose	Recommendation
VEX GO Kit	For students to build the Code Base 2.0.	1 per group
Code Base 2.0 Build Instructions (3D) or Code Base 2.0 Build Instructions (PDF)	For students to follow to build the Code Base 2.0.	1 per group
VEXcode GO	For students to create and start a project to move the Code Base robot.	1 per group
Pre-Built Code Base 2.0	For teachers to use as a demonstration during the Acts and Asks section.	1 for teacher facilitation
Robotics Roles & Routines Google Doc / .docx / .pdf	Editable Google Doc for organizing group work and best practices for using the VEX GO Kit.	1 per group
Tablet or Computer	For the students to launch VEXcode GO.	1 per group
Lab 1 Image Slideshow Google Doc / .pptx / .pdf	Visual aid reference for teacher facilitation.	1 for teacher facilitation
Pin Tool	To help remove pins or pry beams apart.	1 per group
Pencils	For completing the Roles & Routines checklist.	1 per student
Get Ready...Get VEX...GO! PDF Book (optional)	To read with students to introduce them to VEX GO through a story and introductory build.	1 for demonstration purposes
Get Ready...Get VEX...GO! Teacher's Guide (optional) Google Doc / .pptx / .pdf	For additional prompts when introducing students to VEX GO with the PDF Book.	1 for teacher use

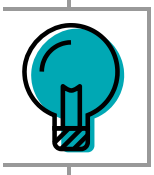
Engage

Begin the lab by engaging with the students.

Hook

Have you ever done a task that was dirty, dull, or dangerous, such as take out the trash, or clean up a mess? Use the Lab 1 Slideshow to show an example of a job that is either dirty, dangerous, or dull. Have the students categorize each.

Note: If students are new to VEX GO, use the Get Ready...Get VEX...GO! PDF book and Teacher's Guide (Google Doc/.pptx/.pdf) to introduce them to learning and building with VEX GO. Add an additional 10-15 minutes to your lesson time to accommodate this additional activity.



Leading Question

Why wouldn't we want to do a job that is either dirty, dangerous, or dull? What if we could have something like a robot, to do those jobs for us? Provide an example of a robot doing such a job.

Build

Code Base 2.0

Play

Allow students to explore the concepts introduced.

Part 1

Students are going to learn how to wirelessly connect their Code Base robot to their device. Students will follow steps to connect their device.

Mid-Play Break

Discuss how the Code Base robot wirelessly communicates with a device.

Part 2

Students will add the [Drive for] block to a project. Students will observe the Code Base robot as the project is started.

Share

Allow students to discuss and display their learning.

Discussion Prompts

- How many pieces did we use to build the Code Base robot? What would be your estimate?
- What are the steps for wirelessly connecting the Code Base robot to a device?
- What are the steps for creating and starting a project?

Engage

Launch the Engage Section

ACTS is what the teacher will do and ASKS is how the teacher will facilitate.

ACTS	ASKS
1. Ask students to reflect on if they have either done a task that was dirty, dull, or dangerous. 2. Tell students that robots complete jobs that are dirty, dull, and dangerous. 3. Show students an image of a robot doing a dirty job. See slide 2 of Lab 1 Image Slideshow from the Materials Needed. 4. Show students an image of the robot doing a dull job. See slide 3 of Lab 1 Image Slideshow from the Materials Needed. 5. Show students an image of the robot doing a dangerous job. See slide 4 of Lab 1 Image Slideshow from the Materials Needed. 6. Have students make comparisons between a human and a robot doing the same task. 7. Show students a pre-built Code Base robot.	1. Have you ever done a task that was dirty, dull, or dangerous, such as take out the trash, or clean up a mess? 2. Robots can complete tasks that are dirty, dull, or dangerous, so that humans do not have to. This can keep humans safe, and allow them to do other jobs. 3. Do you think this shows an example of a job that is either dirty, dangerous or dull? Why? 4. Do you think this shows an example of a job that is either dirty, dangerous or dull? Why? 5. Do you think this shows an example of a job that is either dirty, dangerous or dull? Why? 6. Why wouldn't we want to do a job that is either dirty, dangerous or dull? What if we could have something like a robot, to do those jobs for us? Provide an example of a robot doing such a job. 7. Today, we are going to build our own robot and use VEXcode GO to have the robot perform a job!

Getting the Students Ready to Build

Before we can get our robot to do a job for us, we have to build the Code Base 2.0!

Facilitate the Build

1

Instruct

Instruct students to join their group and have them complete the Robotics Roles & Routines sheet. Use the Suggested Role Responsibilities slide in the Lab Image Slideshow as a guide for students to complete this sheet.

2

Distribute

Distribute VEX GO Kits and the Code Base 2.0 build instructions to each team. Journalists should gather the materials needed for the build.

Code Base 2.0

3

Facilitate

Facilitate the building process.

- Builders and Journalists should begin building based on their roles and responsibilities, like those shown in the Lab 1 Image Slideshow.
- Circulate around the room to help students with building or reading instructions where needed. Ask questions about how the build is being constructed to keep all students engaged in the buildings process, and remind students to follow their Role Responsibilities if they need help taking turns.

4

Offer

Offer suggestions and note positive team building and problem solving strategies as groups build together.

Teacher Troubleshooting

- Ensure groups are spread out when building their Code Base Robot so pieces are not mixed up or lost.
- Show and help groups to find where the motors are being plugged into since there are four different port options. Looking at the Brain with the VEX logo oriented at the bottom, the students should plug the left motor into Port 1 and the right motor into Port 4. Ensure that the cables do not cross underneath the robot. Use Slide 6 in the Image slideshow to show where the ports are located.

Facilitation Strategies

- Show students how to use the build instructions to problem solve when getting stuck during the building process.
- To ensure that all students have a hand in building the Code Base robot, remind students to follow their Role Responsibilities as shown in the Image Slideshow.
- Use the Get Ready...Get VEX...GO! PDF Book and Teacher's Guide - If students are new to VEX GO, read the PDF book and use the prompts in the Teacher's Guide (Google Doc/.pptx/.pdf) to facilitate an introduction to building and using VEX GO before beginning the Lab activities. Students can join their groups and gather their VEX GO Kits, and follow along with the building activity within the book as you read.
    - Use the Teacher's Guide to facilitate student engagement. To focus on VEX GO connections in a more concrete or tangible way, use the Share, Show, or Find prompts on each page to give students an opportunity to get to know their kits in more depth.
    - To focus on the habits of mind that support building and learning with VEX GO, like persistence, patience, and teamwork, use the Think prompts on each page to engage students in conversations about mindset and strategies to support successful group work and creative thinking.
    - To learn more about using the PDF book and accompanying Teacher's Guide as a teaching tool any time you are using VEX GO in your classroom, see this VEX Library article.

Play

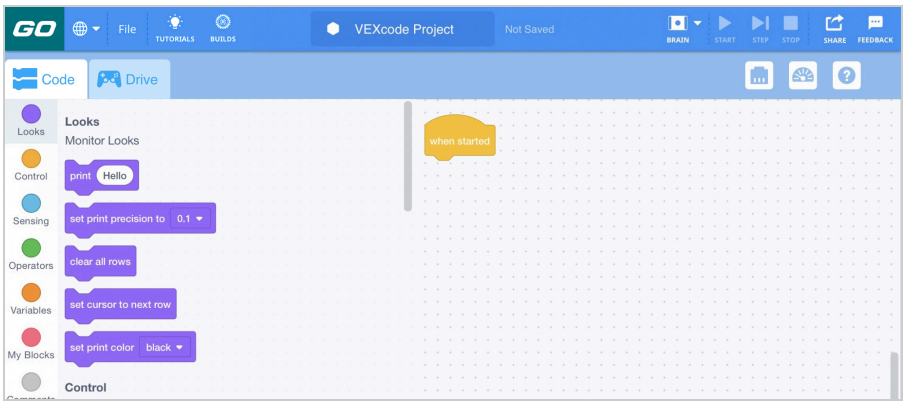
Part 1 - Step by Step

1

Instruct

Instruct students that they will explore how to wirelessly connect their Code Base robot to their device. To begin, each group should have a device, VEXcode GO software, and a built Code Base

robot.



VEXcode GO

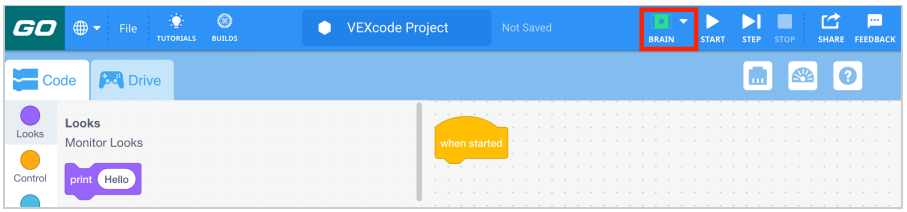
2

Model

Model how to launch VEXcode GO on a device and the steps to connect a device to the Code Base robot.

Follow the steps in the Connect a VEX GO Brain VEX Library article for your device to connect to your Code Base robot. Model for students how to check to ensure that their Code Base robot has been successfully connected, by viewing the colored Brain icon in the toolbar.

Note: When you first connect your Code Base to your device, the Gyro built into the Brain may calibrate, causing the Code Base to move on its own for a moment. **This is an expected behavior, do not touch the Code Base while it's calibrating.**



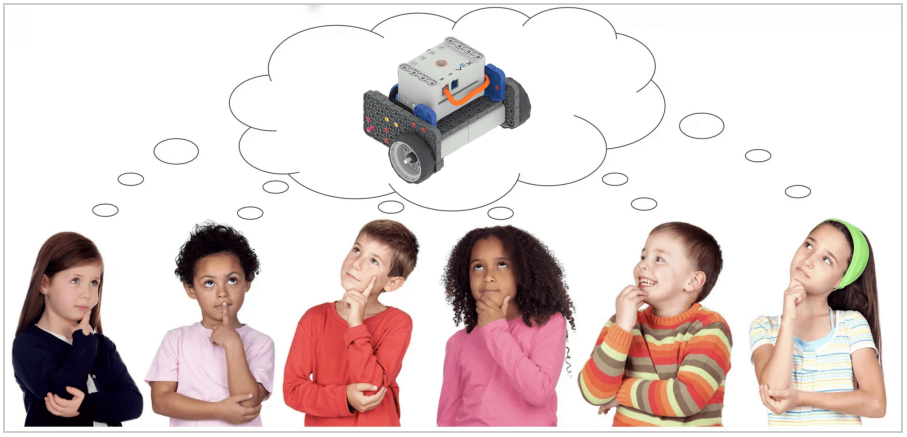
Connect the GO Brain

3

Facilitate

Facilitate a discussion as students are connecting their device to VEXcode GO by asking the following:

- How do you know if your device is connected successfully?
- Where is the Brain icon in the Toolbar?
- What is the first step in wirelessly connecting your device?



Connect to the Code Base

4

Remind

Remind students that learning new concepts may take multiple tries and encourage them to try again if they are unsuccessful connecting their device on the first try.

5

Ask

Ask students to think about how robots can be used to complete jobs in real life that are dirty, dull, or dangerous. Why would it be better to have a robot do these jobs than a human? Can you think of jobs where the robot does all of the work? What about jobs where a human and a robot work together?

Mid-Play Break & Group Discussion

As soon as every group has successfully connected their Code Base robot to their device, come together for a brief conversation.

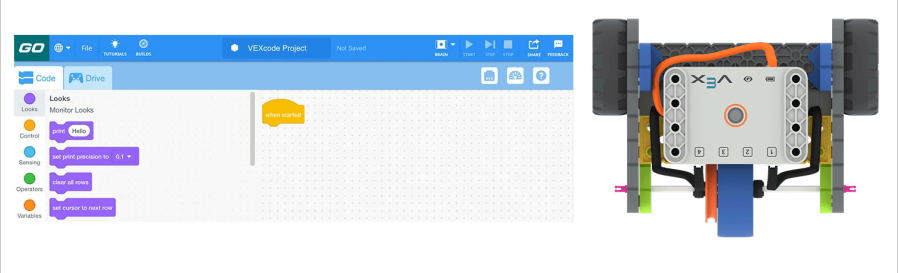
- What is the first step in wirelessly connecting your Code Base robot to your device?
- How do I know if my wireless connection was successful?
- If you had to explain to a friend using words and gestures how to connect a Code Base robot to a device, what would you say?
- Did you have any difficulty when connecting? If so, how did you overcome it?

Part 2 - Step by Step

1

Instruct

Instruct students that they will now explore how to get the Code Base robot moving! To begin, each group should have a device, VEXcode GO software, and a built Code Base robot.



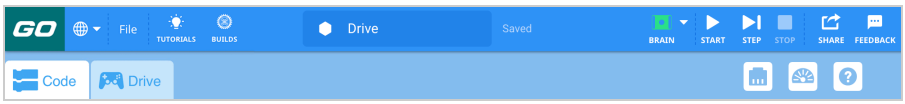
Using VEXcode GO with the Code Base

2

Model

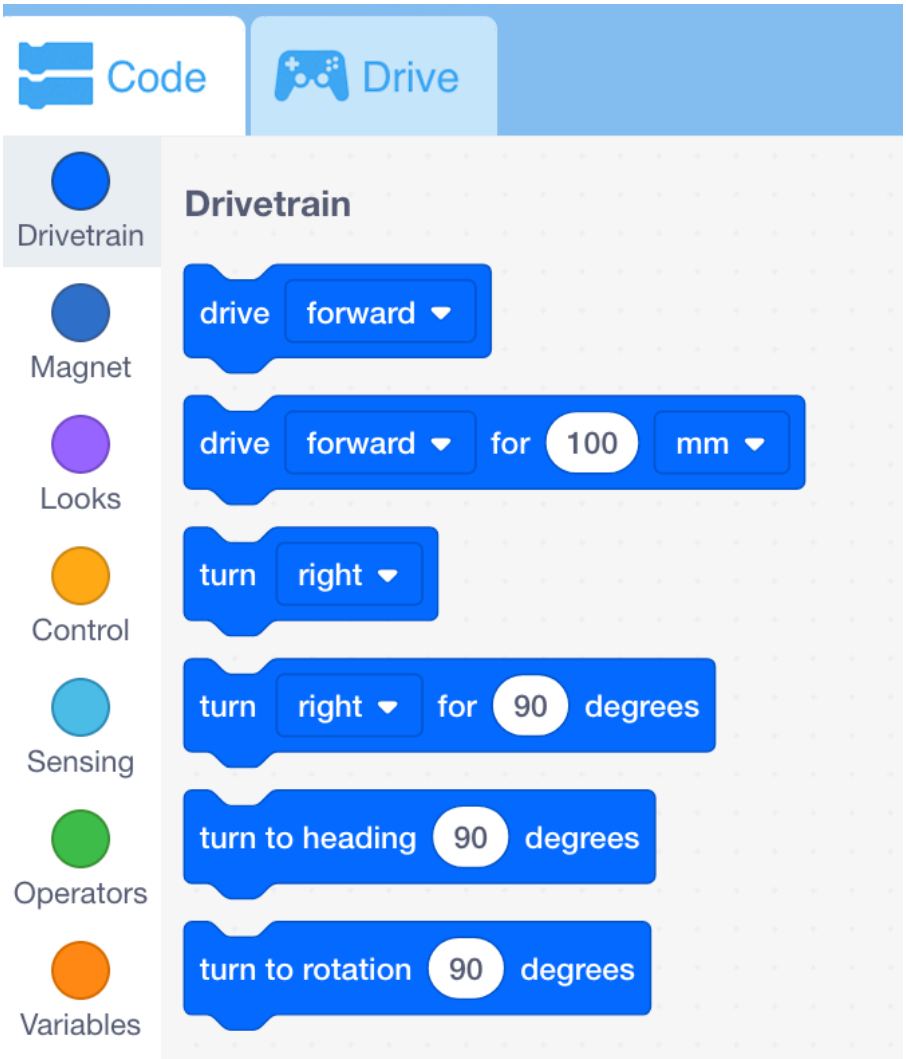
Model for students how to open and save their project, and configure a Code Base in VEXcode GO.

Model the steps of the Open and Save a Project VEX Library article for your device, and have them follow the steps to open and save their project. Instruct students to name their project *Drive*.

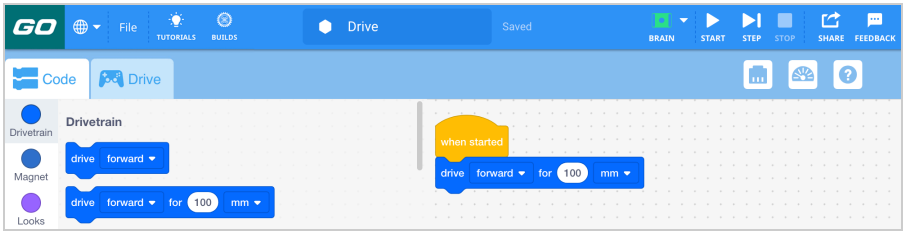


Name the project Drive

Once students have named their project, they need to follow the steps to configure for the Code Base. Model the steps from the Configure a Code Base VEX Library article and ensure students can see the Drivetrain blocks in the Toolbox.



Show how to drag in the [Drive for] block into the Workspace and place it under the {When started} block.



Add the [Drive for] block

Model for students how to start the project in order to test it.

3

Facilitate

Facilitate a discussion as students are creating and starting their projects by asking the following:

- Where can I find the [Drive for] block in VEXcode GO?
- How do I add a block to my project?
- Before starting your project, what do you expect the Code Base to do?
- Did you face any challenges when creating and starting your project? If so, how did you overcome them?

Discuss using VEXcode GO

4

Remind

Remind students that learning new concepts may take multiple tries and encourage them to try again if they are unsuccessful driving their Code Base robot forward on the first try.

5

Ask

Ask students to think about what job or task the Code Base robot could accomplish by driving forward. Could it deliver medicine to a patient in a hospital? Could it deliver packages? Possibly drive somewhere that is too dangerous or small for a human? Ask students to come up with at least two scenarios or jobs where they could use the Code Base robot to complete a task.

Optional: If possible, keep the Code Base assembled for other Labs in this Unit.

Share

Show Your Learning

Discussion Prompts

Observing

- How many pieces did we use to build the Code Base robot? What would be your estimate?
- What are the steps for wirelessly connecting the Code Base robot to a device?

- What are the steps for creating and starting a project?

Predicting

- If you wanted to have your robot drive in reverse instead of forward, what do you think you would change in your project?
- What if I added a second [Drive for] block to my project? Predict how the Code Base robot would behave when I start the project.

Collaborating

- Describe two strategies that your group used to effectively work together to build the Code Base robot. Some examples could include taking turns, or sharing ideas.
- How did your group work together to create and start your project?