VEXGO Lab 1 Parade Float Instructions

VEXGO Lab 1 Parade Float

Contents

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 break down a project in order to engage in problem solving.

Students will make meaning of

- Identifying the steps necessary to solve an authentic problem.
- How to persevere through failure using trial and error.

Students will be skilled at

- Using Drivetrain commands in VEXcode GO to navigate their robot through a course.
- Designing an authentic solution to a real world problem.
- Breaking down the steps needed to code a robot through Challenge Courses.

Students will know

- How to program a robot to navigate two different Challenge Courses using the process of trial and error.

Objective(s)

Objective

1. Students will decompose the coding process for navigating the Code Base robot through a particular course.
2. Students will make connections between real-world scenarios of how parade floats navigate through certain constrained routes and their Code Base robot.

Activity

1. Students will decompose the steps needed to navigate their Code Base robot through Challenge Course 1 by manipulating forward, backward, and turning movements in Play Part 1.
2. During the Engage section, students will discuss what parade floats are and how they are used in a real-world setting. Students will then be introduced to the Code Base robot and build it.

Assessment

1. Students will decompose the steps needed to navigate their Code Base robot through Challenge Course 2 by manipulating forward, backward, and turning movements in Play Part 2. Students will navigate the course from start to finish.
2. During Mid-Play Break, students will discuss and make connections between a life-sized parade float and the Code Base robot's movement after they have programmed it during Play Part 1.

Connections to Standards

Showcase 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: In Play Part 1 and 2, students will decompose the steps needed to successfully navigate their Code Base robot through two Challenge Courses.

Showcase Standards

International Society for Technology in Education (ISTE)

ISTE – (3) Knowledge Constructor – 3d: Build knowledge by actively exploring real world issues and problems, developing ideas and theories and pursuing answers and solutions.

How Standard is Achieved: In Play Part 1 and 2, students will build connections between real-world parade floats driving a route and the Code Base driving through a route. They will create that experience in the classroom by coding their Code Base.

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 the Play sections, students will use VEXcode GO to navigate their robot through Challenge Course 1 and Challenge Course 2. Students will have three trials during each course. Students will use spatial reasoning skills to mentally map how the robot should move and navigate through the challenges. Students will need to use directional words such as turn right 90 degrees, or drive forward 200 mm in order to communicate to their group how to navigate their robot.

Additional Standards

International Society for Technology in Education (ISTE)

ISTE – (5) Computational Thinker – 5c: Students break problems into component parts, extract key information, and develop descriptive models to understand complex systems or facilitate problem-solving.

How Standard is Achieved: In Play Part 1 and 2, students will break down the steps needed to navigate their Code Base robot through their Challenge Courses. They will have multiple trials to complete each Challenge Course and will need to work as a group to problem solve.

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 Parade Float.	1 per group
VEX GO Tiles	For students to create their Challenge Courses.	4 Tiles per Challenge Course
VEXcode GO	For students to code the Code Base.	1 per group
Code Base Build Instructions (PDF) or Code Base Build Instructions (3D)	For students to build the Code Base.	1 per group
Robotics Roles & Routines	Editable Google Doc for organizing group work and best practices for using the VEX GO Kit.	1 per group
Pre-Built Code Base	Used by the teacher during the Engage section.	1 for teacher facilitation
Tablet or Computer	For students to run VEXcode GO.	1 per group
Pencils	For students to fill out the Robotics Roles & Routines Worksheet and Student Test Sheet.	1 per group
Masking tape	For students to create their Challenge Courses.	1 roll per group
Lab 1 Image Slideshow	For teachers and students to reference throughout the Lab.	1 for teacher facilitation
Ruler	For students to measure distances in the Play section.	1 per group
Pin Tool	To help remove pins or pry beams apart.	1 per group

Engage

Begin the lab by engaging with the students.

Hook

Ask the students if they have ever watched a parade. For a holiday? On TV? What kinds of parade floats have they seen? Let them know that they will be creating their own parade float. Give students 5 minutes to put together a strategy and theme for their float. Reassure students that there are three phases and this is just the first phase which is the robotics engineering portion.

Leading Question

What will your group enter into the parade?

Build

Introduce Code Base build.

Play

Allow students to explore the concepts introduced.

Part 1

Students will be given Challenge Course 1. Using VEXcode GO, students will run 3 trials to get their robot to move a particular amount forward, backward, left and right in order to complete Challenge Course 1.

Mid-Play Break

Discuss the outcome of the three trials from Challenge Course 1.

Part 2

Students will now have a chance to operate their Code Base on Challenge Course 2. Students who finish Challenge Course 2 will help other groups.

Share

Allow students to discuss and display their learning.

Discussion Prompts

1. What challenges did you face during your Challenge Courses?
2. How did this failure help you not to make the same mistakes?
3. What successes did you have? Can you share one for the rest of class to learn from these challenges?

Engage

Launch the Engage Section

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

ACTS	ASKS
1. Stand in the front of the room to facilitate a discussion about parade floats. 2. Write down ideas for what to use to make a parade float in the classroom on a whiteboard or a piece of poster paper. 3. Show students the Pre-Built Code Base. 4. Give students 5 minutes to put together a strategy and theme for their float. Reassure students that there are three phases and this is just the first phase which is the robotics engineering portion. Remind students that they will be working in groups to build and program their parade float.	1. Have you seen a parade before? Where have you seen one? Was it a special place? Was it a holiday? 2. What types of materials do you think we need to make a parade float in our classroom? 3. We are going to use the VEX GO Kit to create a moveable base for our parade floats. Today we will build our Code Base and practice programming its movement. 4. What will your group enter into the parade?

Getting the Students Ready to Build

Before we can code our Code Base to move like a parade float, we need to build the Code Base!

Facilitate the Build

1. **Instruct**
   Instruct students to join their team, 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 build instructions to each team. Journalists should gather the materials on the checklist.
3. **Facilitate**
   Facilitate building process.
   VEX GO Code Base
   1. Builders can begin building. If there are multiple builders, they should alternate steps to complete the build.
   2. Journalists should assist with build instructions as needed.

VEX GO Code Base

4. **Offer**
   Offer suggestions and note positive team building and problem solving strategies as teams build together.

Teacher Troubleshooting

- If students are having trouble with the pins, offer the Pin Tool as a support.
- Connect all GO Brains to the VEX Classroom App before beginning the Lab to help facilitate the use of VEX GO in your classroom.
- Use the VEX Classroom App or the indicator lights to check the status of the GO Batteries, and charge if necessary before the Lab.

Facilitation Strategies

- **Not enough GO Tiles?** Use classroom materials to make the challenge courses! Create a 600 millimeter (mm) by 600 millimeter (mm) (~24 inches by 24 inches) square with tape on the floor. Use the diagrams in the Lab 1 Slideshow to help create a course with similar dimensions.
- **Ask three before me** – Encourage students to ask three other students questions relating to the project before asking the teacher. This is just one way to facilitate discussions around problem solving in order to foster student agency and a collaborative mindset.
- Offer in the moment observation as teams work well, and invite them to share teamwork strategies with the class.

Play

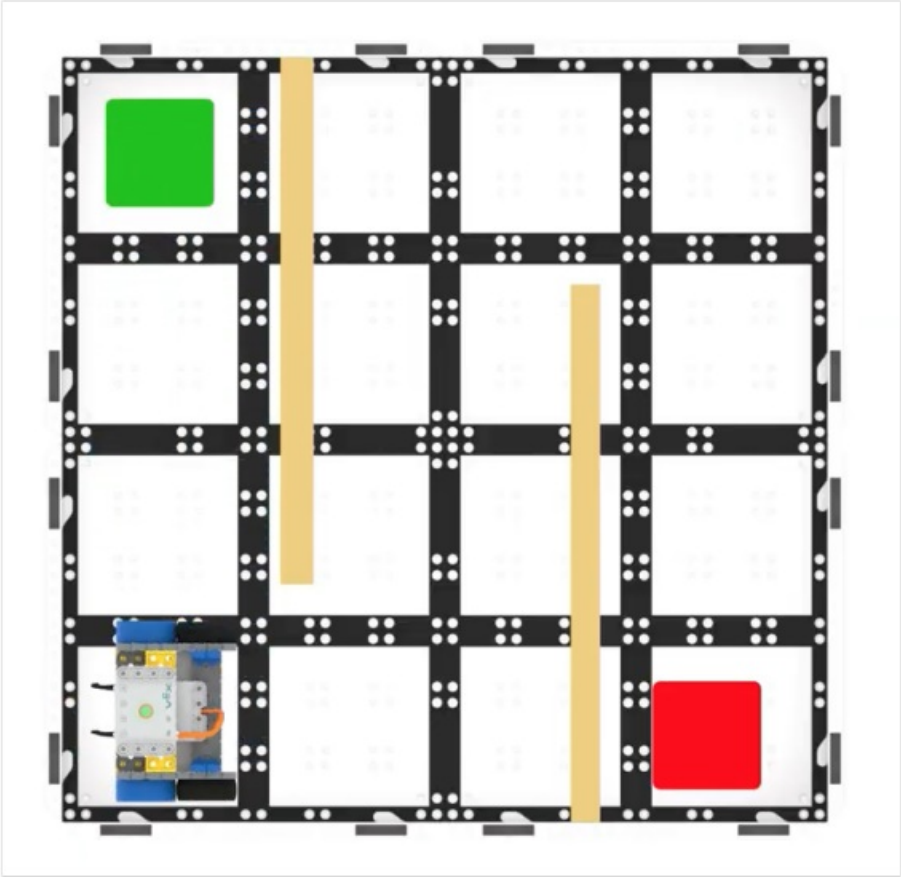
Part 1 – Step by Step

1. **Instruct**

   Instruct students to use VEXcode GO to navigate their robot through Challenge Course 1. They will iterate on their project in order to successfully complete the Challenge Course.

2. **Model**

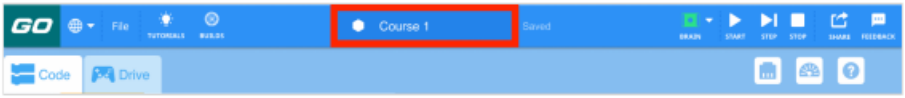
   Model for students how to create the challenge course following the layout in the Lab 1 Image Slideshow.



Challenge Course 1 Example Setup

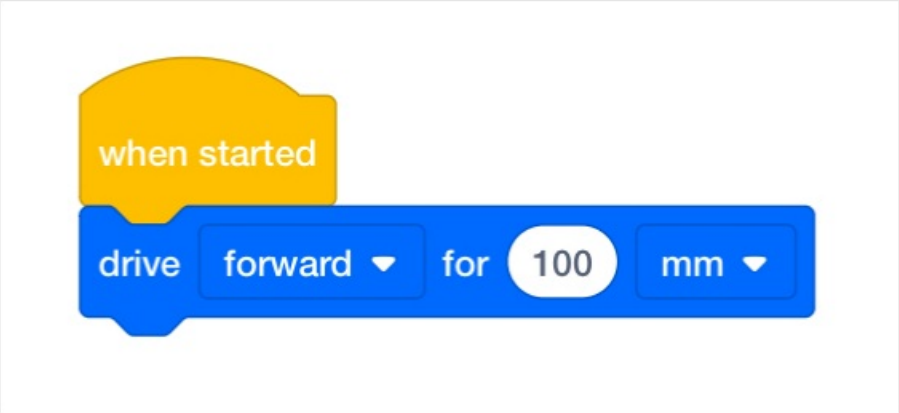
- Once students have created their challenge course, model for students how to launch VEXcode GO, **connect their Brain**, and **name and save their project**. Instruct students to name their project Course 1.

  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.



  Name the Project

- After naming their projects, students will need to configure the Code Base. Model the steps in the **Configuring a VEX GO Code Base** article if students need any assistance.
- Add a [Drive for] block to the Workspace and connect it to the {When started} block. Ask students how far forward the Code Base needs to drive. Students will give answers that may or may not be correct, but let them know that the only way to know for sure is to measure.



[Drive for] Connected to {When started}

- Model using a ruler to measure the distance the Code Base needs to drive forward, then input that number into the [Drive for] block. Remind students that the [Drive for] block can be set to millimeters (mm) or inches.

Changing Parameters

- Instruct students to continue measuring and using [Drive for] and [Turn for] blocks to create their projects. As they build their projects, have them **start** and test their projects so they can identify where edits need to be made.

3. **Facilitate**

Facilitate a discussion with the students by asking the following questions:

- What direction does your robot have to move first?
- How far does your robot have to move?
- Does your robot need to make any turns? If so, what direction?
- Can you use your hands to explain how the robot needs to move through the course?
- Can you explain what each command in your project is doing?
- Is your Code Base robot moving in a way that you didn't expect?

Students helping one another around a tablet (to program the Code Base)

4. **Bemind**
   Remind students to keep trying even when they fail at first. The students will need to go through multiple trials of their projects.
5. **Ask**
   Ask students if they have ever had to try something multiple times to get it right? Ask students if they feel trying something multiple times is a valuable skill for a future job? Discuss the importance of being able to be iterative in future jobs.

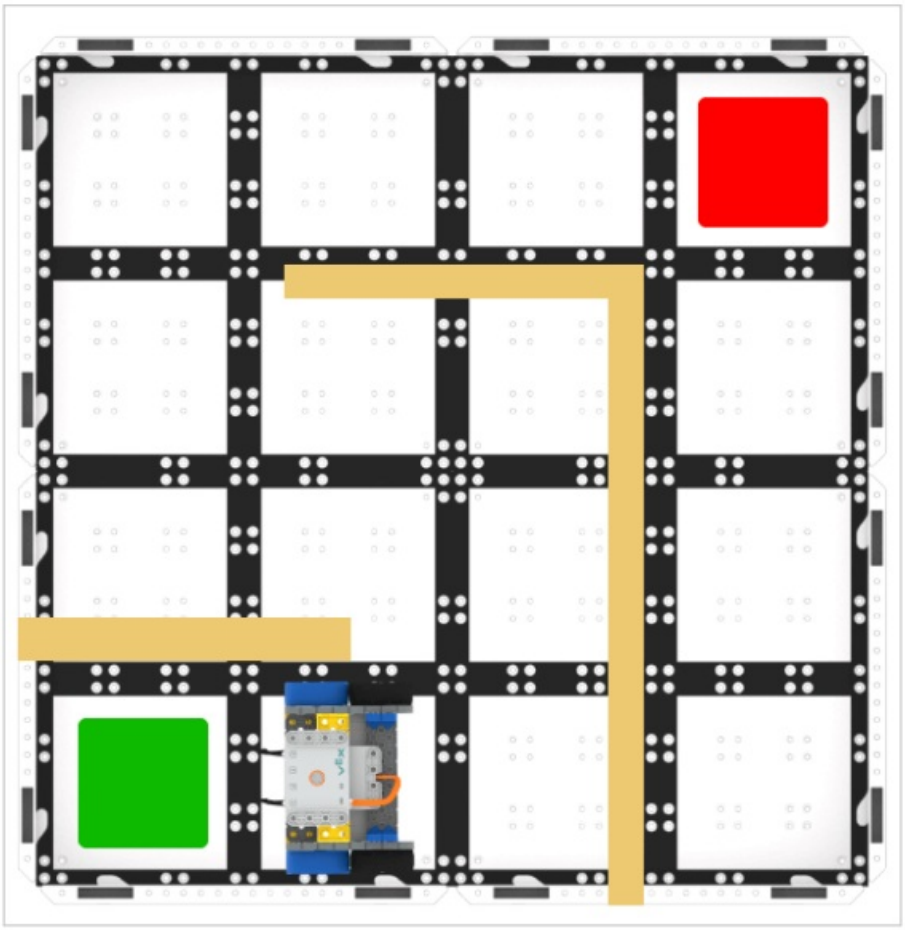
Mid-Play Break & Group Discussion

As soon as every group has finished their testing, come together for a brief conversation.

- What happened during your testing? Did your robot move as expected?
- How did you edit/change your project?
- How did you work together as a group to make changes?

Part 2 – Step by Step

1. **Instruct**
   Instruct students that they will be setting up Challenge Course 2 and creating a VEXcode GO project where their Code Base will move from beginning to end of the course.
2. **Model**
   Model for students how to create the second challenge course using tape by following the layout in the Lab 1 Image Slideshow.



Challenge Course 2 Example Setup

- Once students have created their second challenge course, ensure students still have VEXcode GO open, the **Brain connected**, and the **Code Base configured**. Have students **save their project** and name the new project Course 2.

Name the Project

- Students will be following the same steps as Play Part 1 to create a project that moves the Code Base through the challenge course. If needed, again model how to use a ruler to measure the distance the Code Base needs to drive forward, then input that number into the [Drive for] block.
- Instruct students to continue measuring and using [Drive for] and [Turn for] blocks to create their projects. As they build their projects, have them start and test their projects so they can identify where edits need to be made.

3. **Facilitate**

Facilitate a discussion with the students by asking the following questions:

- What direction will the Code Base robot be facing after it completes Challenge Course 2?
- If the Code Base robot could only make left turns, could it still complete the challenge? If so, how?
- Can you use your hands to explain how the robot needs to move through the course?
- Can you explain what each command in your project is doing?
- Is your Code Base robot moving in a way that you didn't expect?

Students helping one another around a tablet (to program the Code Base)

4. **Remind**
   Remind students to keep trying even if they fail at first. The students will need to go through multiple trials of their projects.
5. **Ask**
   Ask students who have finished both Challenge Courses to work on the choice board.

Share

Show Your Learning

Discussion Prompts

Observing

- What challenges did you face during your Challenge Courses?
- How did this failure help you not to make the same mistakes?
- What is one piece of advice you would give another team?

Predicting

- How were you able to complete the courses?
- If you didn't complete both courses, what would you do if you had to try again?
- What are you most excited about in the next phase, designing?

Collaborating

- Moving forward, do you think your jobs worked in your group? How would you reassign the group roles?
- How well did you work in your group?
- What worked well in your group?
- What successes did you have? Can you share one for the rest of class to learn from these challenges?

Documents / Resources

	VEXGO Lab 1 Parade Float [pdf] Instructions Lab 1, Lab 1 Parade Float, Parade Float, Float

References

- User Manual