VEX 123 and VEX GO
Jason McKenna
Director of Global Educational Strategy, VEX Robotics

What STEM Can Do for Your Classroom:
Improving Student Problem Solving, Collaboration, and Engagement
Who Is VEX?
World’s Largest Robotics Competition
The VEX Continuum

**VEX 123**
Coding Starts Early
Ages 4+

**VEX GO**
STEM Starts Early
Ages 8+

**VEX IQ**
Applied STEM Learning
Ages 11+

**VEX EXP**
Real World STEM for Classrooms
Ages 14+

**VEX V5**
Real World STEM for Competition
Ages 14+

**VEX V5 WORKCELL**
Workforce Readiness
Ages 14+

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**VEX CODE VR**
Virtual Robot Coding
Ages 8+
What is VEX 123?

- Takes Computer Science off the screen and brings it to life
- Can code in multiple ways
- Easy to learn & easy to teach
- Designed by teachers, for teachers
- [Free curricular materials and teacher support resources](#)
Three Ways to Code

1. Touch Coding
2. Coder and Coder Cards
3. VEXcode 123
Why Should Coding Start Early?
Meet Your Robot!

Hi! I'm Vector P. Robot, you can call me VEX. I'm smaller than some other robots you might know, but that's okay. I can still do a lot of fun things with my friends. I have robot friends and human friends.
Touch to Code
Decorate Your Robot!
Why teach CS with VEX 123?
Using the Coder

- when start 123
- drive 1
- turn right
- drive 1
Using the Coder as a Teaching Tool
Using the Classroom app

![Screen capture of Classroom app](image)

### Device Info

<table>
<thead>
<tr>
<th>Port</th>
<th>Type</th>
<th>Reading</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eye</td>
<td>Brightness</td>
<td>100%</td>
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<tr>
<td>Eye</td>
<td>Color</td>
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<td>Eye</td>
<td>Hue</td>
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<td>Eye</td>
<td>Proximity</td>
<td>Far</td>
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<td>Light</td>
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<td>Dark(2317)</td>
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<td>Acc X</td>
<td>-0.009277 Gs</td>
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<tr>
<td>Inertial</td>
<td>Acc Y</td>
<td>-0.02612 Gs</td>
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<td>Acc Z</td>
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<td>Roll</td>
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<td>Inertial</td>
<td>Yaw</td>
<td>67 degrees</td>
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</tbody>
</table>
Using the Classroom app
when started

drive forward until object

glow green

wait 2 seconds

glow off
VEXcode VR - 123 Playgrounds
What is VEX GO?

- Grades 3+
- Adapted VEX plastic construction system for elementary students
- Allows young students to investigate, tinker, explore, make mistakes and try again
- Fosters critical learning at an age when young minds are still open to their full potential
Get Ready...Get VEX...GO!

Congratulations! You just made your first VEX GO build! Now you can use your imagination to make J.O.S.H. the robot come to life! Move the arms to wave, or move the legs to dance, or give J.O.S.H. a voice and talk to your partner!
Car that uses the physics of a slingshot to propel movement. In this build, the "slingshot" feature is built into the car, and can be launched from any solid surface.

**VEX GO Builds**

<table>
<thead>
<tr>
<th>Spring Car</th>
<th>Unpowered Super Car</th>
<th>Super Car</th>
<th>Unpowered Super Car to Super Car</th>
<th>Motorized Super Car</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Spring Car" /></td>
<td><img src="image" alt="Unpowered Super Car" /></td>
<td><img src="image" alt="Super Car" /></td>
<td><img src="image" alt="Unpowered Super Car to Super Car" /></td>
<td><img src="image" alt="Motorized Super Car" /></td>
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<tr>
<th>Adaptation Claw</th>
<th>Inclined Plane</th>
<th>Scale Lever</th>
<th>Drawbridge</th>
<th>Frog Life Cycle</th>
<th>Magnet Car</th>
<th>Pendulum</th>
<th>Bunny Traits</th>
</tr>
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<td><img src="image" alt="Adaptation Claw" /></td>
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<td><img src="image" alt="Scale Lever" /></td>
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<td><img src="image" alt="Pendulum" /></td>
<td><img src="image" alt="Bunny Traits" /></td>
</tr>
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</table>

**3D Build instructions >**  
**Build instructions >**  
**Simple Machines STEM Labs >**
Ladder Rescue Activity

Design and build a ladder to help Col. Jo rescue the trapped animal

Goal of the Activity:
An animal is 25 centimeters off of the ground and you have to build a ladder to help Col. Jo save it.

Step by Step
1. An animal is stuck 25 centimeters (about 10 inches) off the ground and you have to build a ladder to help Col. Jo save it. Use the Interactive Parts Poster and sketch out what you want your ladder to look like.
   - How many rungs will there be?
   - What will the rungs be made of standoffs or connectors?
   - How wide will the rungs be?
2. Match standoffs, connectors, and beams to your ladder plan so you can build your ladder with VEX GO pieces! Begin by laying out your standoffs, connectors, or beams to see how many rungs you will need.
3. The image to the right is one possible solution to our ladder problem. Can you think of another solution? Remember, there should be a gap between your beams so Col. Jo is able to climb the ladder.

“LEVEL UP”
- Treehouse: Build an elevated platform using VEX GO kit contents that will hold the trapped animal 25 centimeters (about 10 inches) off the ground.
- Extra Level - Another animal is stuck 50 centimeters (about 20 inches) off of the ground! Can you make a ladder that can reach this height to save the animal?

Pro Tips
Connect your ladder uprights with more than one rung. More than one connection will not allow your uprights to spin freely, as seen here.

Standard: ISTE (c) Innovative Designer - 4c: Students know and use a deliberate design process for generating ideas, testing theories, creating innovative artifacts or solving authentic problems.

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Raft Rescue Activity

Design and build a raft to help Col. Jo rescue an animal stranded on the water?

Goal of the Activity:
Build a “raft” out of connectors, large bams, pins and whatever else you think is helpful. Next, attach your ladder and save the day.

Step by Step
1. Build a “raft” out of connectors, large bams, pins, and whatever else you believe is helpful, attach your ladder, and save the day!
2. Use the Interactive Parts Poster and sketch out what you want your raft to look like. How big will it be? How many pieces will there be? How wide will it be?
3. Match large beams, plates, connectors, and pins to your raft plan so you can build your raft with VEX GO pieces!
4. The image to the right is one possible solution for inspiration. Try using different beams! Can you think of some benefits to making the raft bigger? Wider? Smaller?

‘LEVEL UP’
- Add Storage - Your raft may need somewhere to store emergency supplies. Create a small basket or cabinet for supplies using VEX GO pieces for your raft.
- Add a ladder - Sometimes both a raft and a ladder are needed. Add a ladder to your raft to make it an even better rescue vehicle.

Pro Tips
- Lay it Out
As you create your raft, think about where Col. Jo and the rescued animal will fit. If you are unsure of where to start, try drawing your raft idea and laying out the Kit pieces on top of your drawing. Use Col. Jo from your Kit to test out different ideas.

Standard: ISTE (4) Innovative Designer - Students know and use a deliberate design process for generating ideas, testing theories, creating innovative artifacts or solving authentic problems.
Mobile Rescue Activity

Make your raft mobile to help your neighbors. Attach wheels to your raft to turn it into a fire truck.

Goal of the Activity:
The neighboring town needs help. Attach wheels to your raft to make it a fire truck to drive to the town and save the day.

Step by Step

1. The neighboring town needs help! Attach wheels to your raft to make it a fire truck, drive over, and save the day.
2. Make a plan for how you will add wheels to your raft to get you to the next town. How are you going to attach your wheels? How many wheels will you use?
3. Add the wheels according to your plan. Is your fire truck able to move?
4. Once you have everything assembled, add a personal touch! Add decorations and or more pieces of equipment that you think are necessary for a fire rescue operation.

‘LEVEL UP’

- Extra Level - Can you build a ladder to reach objects at the height of 50 centimeters (about 20 inches) from the ground? Having a ladder that reaches higher allows your Fire Truck to be more dependable. Make sure to balance your chassis to hold the ladder upright!
- Movable Ladder - Can you control your ladder with a knob like this image? A ladder that can be put up or down means you can travel a lot easier with the ladder attached.

Pro Tips

Connection Point

Take note of the different holes on the wheels! The blue wheel has a round hole, while the gray wheel and green pulley have square holes. A circular hole allows you to connect the wheel to the base with pins and standoffs, while the square hole can be connected to the base with a shaft. Remember, pins snap into place, while shafts do not, meaning you have to secure it with something (like a rubber shaft collar!).

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Using the Classroom App
Using the Classroom App - Troubleshooting

<table>
<thead>
<tr>
<th>Port</th>
<th>Type</th>
<th>Reading</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Motor</td>
<td>36 degrees</td>
</tr>
<tr>
<td>2</td>
<td>Bumper</td>
<td>Released</td>
</tr>
<tr>
<td>3</td>
<td>Magnet</td>
<td>N/A</td>
</tr>
<tr>
<td>4</td>
<td>Motor</td>
<td>-47 degrees</td>
</tr>
</tbody>
</table>

- **Eye**: Brightness - 76%, Color - N/A, Hue - 74 degrees, Proximity - Far
- **Inertial**: Acc X - 0.02515 Gs, Acc Y - 0.004639 Gs, Acc Z - -0.9904 Gs, Pitch - 0 degrees, Roll - 0 degrees, Yaw - 54 degrees

**Robot 1**
- Locate
- Rename
- Update
- Show Device Info

- **Motor** selected
- **Bumper** deselected
Ocean Emergency

3 Labs

Apply coding skills to help clean up the ocean using Code Base and VEXcode GO.
VEXcode VR - GO Playgrounds

GO Competition - Mars Math Expedition
What is VEXcode VR?
VEXcode VR Reach

- Launched April 2020
- 215+ Countries Reached
- 14.6+ Million Coding Sessions
- 5.5+ Million Unique Users
- 6.1+ Million Hours of Coding
- 260+ Million Projects Ran
- 80+ Minutes Average User Engagement
Variety of Playgrounds
<table>
<thead>
<tr>
<th>Activities</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Castle Color Match</td>
<td>Program the VR Robot to pick up and place disks around the Castle!</td>
</tr>
<tr>
<td>Draw a House</td>
<td>Showcase your artistic skills by programming the VR Robot to draw a house.</td>
</tr>
<tr>
<td>Dynamic Wall Maze</td>
<td>Create an algorithm to navigate the VR Robot through multiple wall mazes in this constantly changing challenge.</td>
</tr>
<tr>
<td>Color Counting Algorithms</td>
<td>Program the VR Robot to detect the color and location of lines.</td>
</tr>
<tr>
<td>Coral Reef Cleanup</td>
<td>Help clean the Mangrove Reef by collecting as much trash as you can before the solar-powered batteries on your robot run down.</td>
</tr>
<tr>
<td>Disk Mover</td>
<td>Use the electromagnet to pick up and place colored disks into different colored goals to complete challenges.</td>
</tr>
<tr>
<td>Sensing Colors</td>
<td>Program the VR Robot to draw and detect different colored lines.</td>
</tr>
<tr>
<td>Mondrian Patterns</td>
<td>Program your VR Robot to create a work of modern art inspired by Mondrian.</td>
</tr>
<tr>
<td>Counting Lines</td>
<td>Program the VR Robot to track the number of black lines detected using variables.</td>
</tr>
<tr>
<td>Cross Every Number</td>
<td>Program the VR Robot to cross off each number from 1-100.</td>
</tr>
<tr>
<td>Encoded Message</td>
<td>Use sensors on the VR Robot and lists (arrays) to decode the message represented by binary ASCII characters.</td>
</tr>
<tr>
<td>Robot Vacuum</td>
<td>Program the VR Robot to move like a robotic vacuum.</td>
</tr>
<tr>
<td>Word Search</td>
<td>Solve a word search puzzle by highlighting words with your VR Robot.</td>
</tr>
<tr>
<td>Castle Color Match</td>
<td>Program the VR Robot to pick up and place disks around the Castle!</td>
</tr>
<tr>
<td>Crash the Castle</td>
<td>Create an algorithm to knock over different Castle layouts using the VR Robot in this constantly changing challenge.</td>
</tr>
<tr>
<td>On Target</td>
<td>Hit the bullsye by drawing angles with your robot!</td>
</tr>
</tbody>
</table>
Teacher Portal

Computer Science Level 1 Resources

- Pacing Guide and Standards Mapping
- Email Home
- Quiz & Exam Answer Keys for Blocks and Python
- Challenge Solutions for Blocks and Python

VEXcode VR Activity Resources

- Pacing Guide and Standards Mapping
- Email Home
- Activity Answers
Questions?

Contact Me

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