Teacher Facilitation Guide
Castle Crasher + Coding Activity

This Facilitation Guide offers a step-by-step guide for how to facilitate as your students complete the Castle Crasher+ Coding Activity with VEXcode VR. You know your students best, so tailor your teaching and implementation to best suit your students. The activity is designed to be flexible so that you can meet students where they are, giving them the time, space, and instruction necessary to make the most of their learning.

Overview of Castle Crasher+

Code the robot to knock over castles and push the pieces into the water to clear the Playground!

- To learn more about the challenges for the Castle Crasher+ activity, see this reference sheet.

CSTA Standard

- **2-AP-15** Seek and incorporate feedback from team members and users to refine a solution that meets user needs.

Prepare for the Activity

- Be sure you have access to a printer so that students can print their certificates at the completion of the activity.
- **Try the activity yourself!** A brief experience with the activity will allow you to field questions and support students.
- Decide how your students should be grouped for this activity. If the groups will be predetermined, organize this ahead of time.
- Ensure students will have a device and web browser that supports VEXcode VR.
    - For more information about accessing VEXcode VR, view this page.
- Decide how you would like to distribute the reference sheet for this activity. If you are providing it digitally, decide how you will distribute the link. If you are printing them out and handing them to students, have them printed ahead of time.
- Check out the VEXcode VR Leaderboard! Think about how you can use the leaderboard to motivate your students. They can see the highest scores of their class and challenge themselves to try to make it into the top. You may want to project the leaderboard to motivate students as they play the game.

Teaching the Activity

This section will guide you through the steps to implement this activity in your classroom. Step by step instructions are provided for how to introduce the activity to your students and what direct instruction is recommended before having students complete the challenges within the activity.

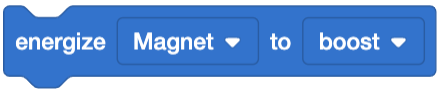
1) Introduce the activity to your students.
    a) Let them know that they will be coding a VEXcode VR robot to knock down castles! First, students will learn basic commands to make the robot move, then they'll code it to drive and knock down the castles, and then clear them from the Playground.
    b) Assign students to their groups.

2) Have students launch VEXcode VR. They can access it at vr.vex.com.

3) Tell students that they must first understand how the robot moves before they can participate in the activity. Guide them through the following instructions to give students a basic understanding of how to use the Drivetrain commands:
    a) In VEXcode VR, have students open the Castle Crasher+ Playground.

    b) Drag in a [Drive for] block and connect it to the {When started} block.
        - Explain that this block is used to drive the robot forward or in reverse a specified distance.
    c) Run the project.
    d) Show students that you can change the parameters of the [Drive for] block (forward/reverse, distance, and units of measurement).
    e) Drag in a [Turn for] block and attach it after the [Drive for] block.
        - Explain that the [Turn for] block is used to turn the robot left or right a specified distance.
    f) Run the project again.
    g) Drag in a [Set drive velocity] block and attach it after the {When started} block.
        - Change the parameter from 50% to 100%.
        - Explain that the [Set drive velocity] block sets the speed of the Drivetrain.
    h) Run the project again to test it.

4) Next, explain the details of the activity to the students. Provide them with this reference sheet that they can use while participating in the activity.
    a) Tell students to start by knocking over castle pieces and pushing them into the water.
        - Encourage them to plan a path for how they want their robot to drive around the Playground before they begin coding.
    b) Once students understand the basic Drivetrain commands to make the robot move, and are familiar with the activity, allow them to work on the challenge in their groups.
    c) If students need an additional challenge to help them focus their project and planning, ask them to see how many castle pieces they can clear from the Playground in less than 3 minutes.
        - You can also ask them to find the hidden plow and pick it up using the [Energize magnet] block.



Note: Groups may move at different paces. Walk around the room as groups are actively working to gauge their progress and answer any questions they may have.

Facilitating Discussions During the Activity

Castle Crasher+ is designed to be an open-ended coding exploration. To help students stay focused and learn from and with one another, engage them in frequent coding conversations as they are working.

Here are some questions to encourage iteration and problem solving in your students as they progress through the game:

- How can you improve your project to knock down more castle pieces?
- What is your strategy to ensure you knock these pieces off of the Playground?
- How are you using the [Drive for] block in your project?
- How are you using the [Turn for] block in your project?
- Did you pick up the hidden plow? What blocks did you use?
- What went well with your project? What do you need to improve for your next try? How will you create code to make your project more effective?
- What did not go well for your robot this time? What can you learn from this that you can improve on for the next run?

After the Activity

Celebrate success! After the activity has ended, celebrate with your students! Choose one or two of these ideas to share your success with others!

- Print out certificates for each student and display them in your classroom!
- Create a classroom display using the data from the students' certificates, and add up the weight of castle pieces knocked off of the Playground. Play the game over multiple days, and create a graph showing student improvement over time.
- Share photos and videos of your classroom event on social media. Tag @VEXRobotics so we can celebrate with you!
- Have students take screenshots of the coding projects they are proud of and write a sentence or two about why they feel good about that particular project. Display them around the classroom.

Sample Solution

While there are many different ways to complete this activity, you and your students may need inspiration for where to get started. If needed, share the code below with your students in chunks or use it to help guide them through some of the logic for finding the hidden plow and picking it up.

This code includes [Comment] blocks, which are used to organize the code and plan the path. Because the challenge is to get the most castle pieces into the water, the sample 'solution' ends after pushing the first bit of castle. Have students work to get the rest into the water and clear the Playground!