# Why this lesson, why now?

The sequencing of this lesson is to provide an offline activity for computer science week. This is a stand-alone lesson but can be used in conjunction with other computer science activities. This lesson is best used to grades 4 – 9 but can be adjusted for higher level computer science concepts, see notes in the lesson plan below for differentiated lesson ideas.

*The computer science standards covered in this lesson are:*

Human-Computer Interaction

Visualization and Transformation

Program Development

Troubleshooting

Variables

Algorithms

To find the specific computer science standard frameworks in your state go to <https://code.org/promote>, Click on your state to view the fact sheet or take action in your state to improve computer science education.

# Materials & Supplies Needed for Activity

*Copies of the FIRST* 2019 CS Activity Worksheet for Students, pencil, space for three or four obstacle courses, tape or other marker for start point and finish point, class room obstacles (tables or chairs), object cardboard box or like represent STEMMIE.

# Teacher Sequence 50 – 60-minute Lesson

#### Est. Time

#### (Mins) Teacher Actions Student Actions Notes

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| --- | --- | --- | --- |
| **10** | Ensure all students have the worksheet. Do not set up the lesson other than to read through the instructions with the students. Have each student write out their step by step instructions for getting to the planet. Do not answer any specific clarifying questions, only refer to the instructions for the activity on the worksheet. Coding Set Up, worksheet, complete 10 steps | Read worksheet instructions and write out 10 steps of instruction to get STEMMIE to Planet X. | The goal of this portion of the activity is to give students the individual space to think creatively and in a logical method. If you answer too many questions they will not have time or space to make decisions, there are no wrong answers here. |
| **10** | Ask for one or two students to share their instruction steps. Review the two review questions with the students, ask them to reflect on their answers. | Complete the reflection activity | The purpose of this portion of the activity are to point out that they may have gotten STEMMIE to the planet but there were some details probably left out. More instructions equal more data and for computer science that means more lines of code and the ability to process those instructions. Make that connection for the students at the conclusion of this section. |
| **5 - 10** | Have students read through the next section where STEMMIE has run into an issue after getting to Planet X. Group students 2 – 3 per team. Define Humanoid robot and code for the students. Give time for them to get into their teams and show them the obstacle course they will be using. Have students begin planning and writing out their code using only the symbols shown. | Uncover the fate of STEMMIE, create a solution to rescue STEMMIE with your team using computer programming | Determine objects to make a simple obstacle course, use chairs, boxes or other common objects to make a simple course. The course can be whatever works in the space you have, the diagram is just a recommendation. Have multiple courses for groups to run through in a shorter amount of time. |
| **20** | Have students go to the course and test out their programs. Remind them that robots can only do what the program says. Point out the roles that each person on the team is doing (Robot, Programmer, \*Safety Manager – Optional) | Run your program on the course to determine if you have saved STEMMIE | To make this more challenging the robot student can be blindfolded. You can have teams switch the program other teams to Beta test another teams program. If time permits allow students to change who is the robot and who is the programmer. |
| **5-10** | Bring students back together to review the activity. Sample Debriefing Questions: What were the challenges for the robot navigating the course? Who additional programming options would have been helpful to be able to use? How does this activity apply to how computer programming is used in machines? | Participate in the activity debrief | Related this activity to some skills students need to have to use computer programming beyond the knowledge of the programming languages, for example: Communication, Logical Thinking, Attention to Detail, Memory. |