

Operation STEM Challenge

How does empathy drive innovative solutions? The Operation STEM Challenge: Designed for Service will help students explore human centered designs. Students will be given real-world disaster relief scenarios and asked to assess the impact of existing products and systems to design an innovative aircraft to deliver humanitarian aid.

This challenge will involve students working together to design a physical or digital solution during the span of 3 classroom periods (45 minutes each). These resources were created to support educators and volunteers to help students solve real-world problems.

WHAT'S INCLUDED

[Designed for Service Intro video](#)

[Designed for Service Lesson PPT](#)

[Designed for Service Educator Guide](#)

[Designed for Service Student Mission Brief](#)

PREPARING FOR YOUR VISIT

Once you have been connected to an educator or after school program leader, you will want to work together to ensure a seamless visit. Set up some time together to discuss key details that will make your visit both smooth and successful.

PRESENTING TO STUDENTS

The overall collection of resources may exceed the amount of time allocated for your visit. However, they have been designed to be flexible enough to fit different volunteer durations. When previewing the activity materials, note opportunities to share real-life stories that make connections to the topics. Practice pacing sections of the challenge and make note of areas to pause for questions, engage with a personal story, or point out parts of a visual.

VOLUNTEER INTRODUCTION

Take a few minutes to introduce yourself. Start off by telling students your name and why you are visiting their class. Tell them about your experience with designs in aerospace, what your interests were at their age, and how that translated into the career you have today. Explain to them what you will be learning together and be sure to keep things brief, friendly, and relatable. Students are going to be very interested and curious with having a special guest and will likely have a lot of questions! Work with the educator to determine the best method for inviting students to ask questions before, during, and throughout the activity.

A classroom session is typically 45-minutes. Use the educator guide to help you review the instructional sequence and resources used during this challenge. It will tell you how and when to use them!

I can commit to three classroom sessions or have approximately 2.5 hours with students:

5 minutes—Introduce yourself

40-minutes—facilitate day 1 instruction (slides 1–6)

This includes introducing empathy, situations that describe humans in needs, and asks students to begin brainstorming how designs in aerospace can aid in humanitarian and rescue efforts. Students will be given scraps of paper and their student mission capture sheet to use throughout the challenge.

45-minutes—facilitate day 2 instruction (slides 7–8)

During this section, students will be inspired by Lockheed Martin designs to create their own solution. Students will begin drawing their design and have the option to make a 3D model out of clay.

20-minutes—facilitate day 3 instruction (slide 9)

Students may need additional time to complete their sketch and/or model. Provide time for students to prepare the thinking behind their solution using the guiding questions in the education guide and slide.

20-minutes—facilitate day 3 instruction (slide 9 continued)

Invite student groups to share their design solutions.

5-minutes—facilitate day 3 instruction (slide 10)

Students are asked to summarize their learning using a short writing prompt.

I can commit to two classroom sessions or 90-minutes:

Ask the educator to facilitate day 1 of instruction with students before you arrive.

5 minutes—Introduce yourself

45-minutes—facilitate day 2 instruction (slides 7–8)

During this section, students will be inspired by Lockheed Martin designs to create their own solution. Students will begin drawing their design and have the option to make a 3D model out of clay. You can help them refine their design ideas.

20-minutes—facilitate day 3 instruction (slide 9)

Students may need additional time to complete their sketch and/or model. Provide time for students to prepare the thinking behind their solution using the guiding questions in the guide.

15-minutes—facilitate day 3 instruction (slide 9 continued)

Invite student groups to share their design solutions.

I can commit to one classroom session:

5 minutes—Introduce yourself

40-minutes—Ask the educator you are working with to complete day 1 and 2 of instruction. You can then offer to facilitate students working on their aerospace sketch and/or model. OR, you can be available to listen to their final design presentation.

A FEW ITEMS YOU MAY WANT TO COVER:

Pre-visit checklist:

- Thank them for their interest in the program and provide an overview of the program and its components
- Ask if there are any advance requirements or paperwork needed by the school office or afterschool club in order for you to visit.
- Learn about the setting of your visit, how many students will you be working with, and ask if there is anything that would be helpful to know in advance.
- Discuss how much time is available for your visit.
- Decide together which of the three activities will be used.
- Determine what the educator would like your role to be in facilitating the activity that day.
- Ask if the educator will be printing out the student worksheets or if he/she would prefer you to bring them with you that day.
- Learn what technology will be available and use that to determine together how the activity will be facilitated.
- Ask for any tips! Educators have a honed expertise for connecting with students. Consider your assigned educator a valuable resource.

VIRTUAL PARTICIPATION

When a visit is requested by a group in an area not easily accessible to a volunteer, there may be an opportunity to participate virtually instead of going to the site. There are several free platforms, such as Google Hangout or Skype, that would allow you to share materials, visuals, and chat with students as they are working. Work with your assigned educator to determine the applicable items from the checklist above, along with which platform will be used to connect online. Download all software in advance and test your connection to the computer in advance of your presentation. You may want to ask the educator, based on the set up in his/her learning space, how you can help by sharing your screen and walking students

through different stages of the challenge. Regardless of whether your visit is virtual or in-person, practice a couple of times in advance. Walk through the information you will be presenting, and time yourself to help work within the time you have available for your visit that day.

THE DAY OF YOUR VISIT:

Many community centers and schools will require visitors to sign in and out at the main office and wear a visitor pass. To ensure an efficient sign-in, have your ID ready, and have a printout of the activity you will be facilitating on hand for reference when you need it.

KNOW YOUR AUDIENCE

The students you are working with are considered adolescent learners. They are intellectual, social, and emotional learners. They are very curious and enjoy interacting with peers during learning activities. They like to be active learners and are still experimenting with ways of talking and acting as they learn and grow. A student environment may include a handful of students or up to 40! Sometimes educators will have students seated in small groups and others will have students in rows. Large groups can be challenging to effectively assess if students are engaged or understanding the information presented. It is also difficult to build relationships and visit with students individually in the short amount of time. Walking around the space and making eye contact with different students can help personalize the space. As students enter the room, or as you enter, say hello and introduce yourself. And lastly, have fun! This is a great opportunity for you to reach and inspire students in your community and beyond.