Communication has always been an interesting problem in space. Internet connectivity on the ISS is structured around a network of tracking and data relay satellites that NASA engineers also use to communicate with astronauts on the ISS. Astronauts were finally able to directly access the Internet in 2010, a move that NASA said would help improve their quality of life and help them feel less isolated in space. It seems funny that it took so long to get something as simple as basic Internet up to the Space Station while humans on the ground have had complicated robotic devices and lasers doing very cool things for a long time! Now astronauts have tablets onboard they can use for various operational tasks. They also like to use them to hold video conferences with family and friends on the ground. The connection however, is incredibly slow compared with broadband Internet speed back on Earth, mostly because of the distance that data has to travel. When an astronaut clicks a link on a website in space, that request travels to a network of satellites 22,000 miles (35,000 kilometers) above Earth, even though the ISS is only 250 miles (402 kilometers) up. The satellites then send that request to a receiver on the ground, which processes the request before returning the response along the same path to the ISS.
The ISS is an amazing example of how countries from around the world can work together, even though not all of the employees, engineers and astronauts speak the same language. By working together, space agencies from the United States, Russia, Japan, Canada and several European countries have developed an orbiting research station that can benefit people on Earth. NASA and other space agency employees often go through intensive training where they must learn how to communicate with each other by using words, hand and eye movements, drawing shapes on paper and holding up for others to see, memorizing steps, singing out certain sounds or tones, and using color and “body language” (stiff, relaxed, scared, happy) to indicate to the next person what is happening or needs to be done. This exercise will introduce you and your partner to different ways of communicating and show how effective you are!

Each of the three sets of pictures (to the right) represent a section, or module of the ISS. Each member of your team will select one set of pictures and recreate that section of the ISS using matching colored blocks and connectors. One team member will be the engineer and the other team member will be the astronaut. Each will have a turn at building while the other tells the builder how to make the module. Each person will have a set amount of time to build.

Use one set of images for each module.
YOUR TASK
You will take turns building the module your teammate selected.

1 Each team should find a good place to sit, back to back. Decide who will be the ASTRONAUT and who will be the ENGINEER.

2 ENGINEER, use the blocks to build your module. Write down each step on a sheet of paper. Do not let your astronaut see what you have built.

3 ASTRONAUT, open your bag of blocks but do not take anything out yet. While your partner is building, you can sketch possible module types you think can be built.

4 ENGINEER, using the steps you wrote down to build your module, communicate with the astronaut by explaining how to use the materials to re-create what you just built.

5 ASTRONAUT, listen carefully to the engineer as he/she explains how to build the module. You may ask questions as you build. Tell the engineer when you have completed the "mission."

6 ASTRONAUT, turn around and show the engineer your completed module. Discuss if together you successfully accomplished your goal of building the same structure.

Now switch roles and repeat the steps above with your teammate.

WHAT DID YOU LEARN?

Do you think team members become more skilled at building over time? Does communication become easier over time? If it does, how?

How important does your team think communication is in this building process? Why?

Share your team results with other members of the class. Discuss the differences your teams experienced between describing how to do something versus showing how to do something. How did this lesson support the statement that not everyone learns easily in the same way?