

The build instructions will show students step-by-step instructions on how to build the Grabber. The Build Instruction Tips section will point out additional information for specific steps which will help students be successful with their build, so be sure to point out that section to students. If any rubrics are used to evaluate students, review the rubric or pass out copies before students begin working so they are clear on how they will be assessed.

The build instructions will show students step-by-step instructions on how to build the Testbed. The Build Instruction Tips section will point out additional information for specific steps which will help students be successful with their build, so be sure to point out that section to students. There is an optional rubric to evaluate the robot build on this page. If any rubrics are used to evaluate students, review the rubric or pass out copies before students begin working so they are clear on how they will be assessed.

Before starting the build, consider how your students will be organized. Will each student have their own Testbed, or will they work in pairs or teams? If working in teams, each student could build a portion of steps or each student could be given a role. The following roles can be utilized during the building of the Testbed:

Role 1: Top of Testbed (8 steps: 1-8):

Base: steps 1 to 3

Add sensors: steps 4 to 8

Role 2: Bottom of Testbed (7 steps: 9-15):

Base: steps 9 to 10

Add sensors: steps 11 to 15

Role 3: Middle of Testbed (4 steps: 16-19):

Base: steps 16 to 17

Brain: steps 18 to 19

Role 4: Assembly and Wiring (7 steps: 20-26):

Attach top, bottom, and middle of Testbed: step 20

Build and attach Smart Motors: steps 21 to 24

Wire devices: steps 25 to 26

The group is also responsible for making sure the [sensors and motors are attached to the correct ports](#) using the designated Smart Cables.

- Port 1: top left Smart Motor
- Port 2: top Touch LED
- Port 3: Color Sensor
- Port 4: Gyro Sensor
- Port 5: top Bumper Switch
- Port 6: top right Smart Motor
- Port 7: Distance Sensor
- Port 8: bottom Bumper Switch
- Port 9: bottom Touch LED
- Port 10: bottom left Smart Motor
- Port 11: bottom right Smart Motor

Note: Port 12 is not used

If there are two students in each group, the students can each choose two roles. If there are three students in a group, each could choose one role and they work together on assembly and wiring. If there are four students in a group, each student can choose one role.

Provide the list of roles and their responsibilities to the students. Once students are in their groups, allow the members to choose their role(s). Circulate the classroom and make sure that every student has a role. There is an optional collaboration rubric on [this page](#).

Remind the students of roles throughout the exploration. For roles to work, students have to feel as though they will be held accountable for fulfilling those roles. Therefore, interject if you see a student taking over someone else's role or not fulfilling their assigned role. Reminders about who is supposed to be doing what can be useful interventions.