

UNIT 1

Safety

UNIT OVERVIEW

UNIT NUMBER: 1

DURATION: 5 hours

SUMMARY

Building a robot requires a lot of parts, electronics, and tools. The process can easily become dangerous if not done carefully. In this unit, students will learn about and demonstrate workshop safety, as well as develop rules for conduct and tool use in the workshop.

INSTRUCTIONS

1. Discuss [General Workshop Safety](#) with your students.
2. Discuss specific [Tool Safety](#) with your students.
3. Give the [Safety Quiz](#).
4. [Certify students](#) to use individual tools.

LEARNING RESOURCES

1. [Safety Guidelines Handout](#)
2. [Hacksaw Safety](#)
3. [Power Drill Safety](#)

ASSESSMENTS:

1. [Safety Quiz](#)

TOOLS & MATERIALS

1. Jig saw
2. Hack saw
3. Drill
4. Soldering iron
5. Electric Grinder

STANDARDS ADDRESSED:

Full course standards alignments can be found [here](#).

General Workshop Safety

Go through general workshop safety with the students.

1. Present the [Safety Guidelines](#) handout to the students.
2. Talk about each rule and why it's important. If there are any rules you and/or the students wish to add, discuss them as a class and append them to the list.
3. Have the students create a poster listing the safety rules and display it in a prominent place in the workshop.
4. Give the students a quiz over the general safety rules.

TOOL SAFETY

1. Count the number of different power tools you have in your workshop. Divide your students into groups, one for each tool.
2. Have each group research the proper use of each tool and create a list of instructions. They may search online, watch training videos from this unit's learning resources, or read safety instructions from the tool's manual.
3. Each group will present their instructions to the class. Discuss with the whole class. If any important details are missing be sure to add them to the list.
4. Keep the instructions so that students may reference them at any time.

DEMONSTRATING TOOL SAFETY

Before any student may use a tool, they must demonstrate proper use of the tool. Use the general safety instructions and individual tool instructions created by the students to assess whether the student is capable of safely operating the tool.

If you have the time, it is beneficial to have every student demonstrate use of every tool. This may take a long time, however, so it's okay to let students specialize in tools at the beginning. But be sure no student uses a tool they have not demonstrated they know how to use. A printable chart is provided to help you keep track of the tools and the students that are cleared to use them.



Safety Guidelines

Building a robot requires many tools and can be dangerous. In order to keep everyone safe, we will follow the rules below at ALL times.

- NO TOOL USE when instructor isn't present!!
- Never use a tool you haven't been trained to use or shown the proper techniques by the instructor; always *ask for help* before using a new tool, or if you're not sure
- **Hand/Eye protection:** Always wear protective glasses when using tools, and work gloves if you're working with sharp edges like metal or plastic
- **Entanglement:** *Always* pull hair back so it doesn't dangle into work area; remove or tie off loose clothing, scarves, sleeves, etc.
- **Electric hazards:** *No water* around power tools - stay away from the sink! Be careful that any electrical cords are well out of the way of the cutting edge.
- **Body posture:** Keep firm grip on tools, no reaching over work zone, two hands if necessary, stabilize tools with body if possible, maximize leverage
- **Securing work pieces:** use hand clamps, C-clamps, vise grips, or vises; *never* work holding a piece up in empty space. Clamp as close to work region as possible and keep your work pieces secure so no slipping happens while you're working.
- **Sharp Edges:** *Always* file or deburr sharp edges with Dremel, deburring tool, etc. - cut metal edges can slice skin open very easily



Safety Quiz

- 1) When the teacher is not present, you may use tools _____
 - a) If you have completed the tool certification
 - b) Never
 - c) You feel comfortable using the tool
 - d) You are using the tool with a teammate
- 2) When working with materials with sharp edges such as metal and plastic, you must wear (select all that apply):
 - a) Safety glasses
 - b) Hair tie
 - c) Gloves
 - d) Steel-toed boots
- 3) If you are familiar with a tool, you may use it even if you have not passed the certification and been given permission by the instructor.
 - a) True
 - b) False
- 4) When should loose hair and clothing be pulled back or tied off?
 - a) When using power tools
 - b) When you are tired and less focused
 - c) Only when your hair is really long or your clothes are really loose
 - d) Always
- 5) Should water (or any liquid) ever be present around electronics?
 - a) Yes
 - b) No
- 6) When securing work pieces, you should always use what?
 - a) Vise grips

- b) C-clamps
 - c) Hand clamps
 - d) Vises
 - e) Any of the above
- 7) You should do what to sharp edges to avoid being cut?
- a) Cut edges at a 90 degree angle so they're flat
 - b) File them
 - c) Sand them
 - d) Not use them
- 8) Which of the following describe the proper body posture you should have while using tools?
(select all that apply)
- a) Use two hands
 - b) Position yourself to maximize leverage
 - c) Maintain a firm grip
 - d) Stabilize tools with your body if possible

