# The GRIT Foundation

# Mentor Quick Start Guide

GRIT FOUNDATION

*Last Revised: September 17th, 2026*

***GRIT Camp Role Recap***

***Host:*** *The individual or company organizing and supporting the GRIT Camp.*

***Host Facilitator:*** *Owns camp-day preparation and operations.*

***Education Lead:*** *A trained tradesperson who is the instructional leader for the GRIT Camp.*

***Mentor:*** *A trained tradesperson directly coaching 1–2 Students throughout the camp.*

***Volunteer:*** *An individual helping with event-day logistics and general assistance, not education.*

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## Before the Camp

Prepare in advance of the GRIT Camp, beginning with the required course several weeks ahead:

- ☐ Complete the required approximately 3-hour online Mentor course. Target completion 6 weeks before camp; the firm deadline is 3 weeks before camp. If required training is incomplete at that deadline, the camp must be postponed, and Students and parents notified.
- ☐ Get a good night's sleep before
- ☐ Double-check start time and address:
  - ☐ Arrive at _____ by _____ AM

Remember: Mentors must arrive **at least 1 hour before the camp starts**. You will have a meeting with the Education Lead to go over the camp flow, tool use, and key teaching points.

## Mentor Attire

Mentors MUST have PPE:

- ☐ Work boots or other closed-toe, safety-style shoes appropriate for a trades professional
- ☐ Safety glasses
- ☐ Safety gloves
- ☐ Hair tie (if hair is long)
- ☐ Your company's uniform (optional)
- ☐ High-vis vest (optional)

Mentors do not need to arrive with PPE on. You may put it on with the Students after the safety briefing.

## Mentor Tools to Bring

The Host may ask you to bring some tools and/or materials to help ease some of the costs and prep. **Bring only what the Host has asked you to bring.**

### Light Tools

- ☐ Rotary drill with a chuck compatible with the selected Forstner-bit shank (½" chuck recommended). Most Forstner bits do not fit an impact driver's quick-change chuck. Use the drill for screws too, or bring a separate impact driver.
- ☐ T25 bit
- ☐ 15/16" Forstner bit preferred for copper; 7/8" alternative after checking the actual tubing fit in scrap wood
- ☐ 1 ⅛" or 1 3/16" Forstner bit
- ☐ Hammer
- ☐ PVC cutter
- ☐ Copper tubing cutters
- ☐ Copper deburring tools
- ☐ Adjustable wrench
- ☐ Water pump pliers
- ☐ Volt-ohm meter (electrical multimeter)

### Optional Light Tools

- ☐ 7/64" or ⅛" pilot bit (highly recommended for dry climates to keep wood from splitting)
- ☐ Clamps
- ☐ Speed square
- ☐ Needle-nose pliers
- ☐ Swaging tool (if used instead of a cap)

### Heavy Tools

- ☐ Miter saw with a working guard and two working clamps, or its manufacturer-provided clamping system (preferred), used according to its instructions
- ☐ Sawhorses or cutting platforms
    - No circular or reciprocating saws
- ☐ Torch setup (varies by Host) w/ strikers and service wrenches as needed
    - Air-acetylene torch w/ TurboTorch A-8 and/or A-3 tips (brazing & aluminum)
    - Propane or MAP-Pro torch (soft soldering & aluminum)
    - Oxyacetylene torch rig with small tips (brazing only)

### Materials that Might Help

Hosts or Host Facilitators may ask Mentors if they can bring some of the minor consumable materials, including batteries, Teflon tape, etc., or wood and wire scraps for discovery. These may vary widely by camp.

Speak with the Host or Host Facilitator who is handling material procurement and:

- ☐ Verify the items you need to bring
- ☐ Verify the quantities you need to bring
- ☐ Write down your commitment
- ☐ Make a plan to bring them to the camp

**TIP: Use 4 stages of the Socratic method!**

- ★ **Observe:** Ask the student to describe what they see, measure, or expect.
- ★ **Ask one question:** Use one what, where, how, or why question.
- ★ **Wait:** Give the student enough silence to think, inspect, and try.
- ★ **Nudge:** If they are stuck, reduce the size of the problem. Point to the Blueprint, a meter reading, or a reference edge instead of giving the answer.

## On the Morning of the GRIT Camp

Arrive **at least an hour early**. You must attend a pre-camp meeting with the other Mentors and the Education Lead. Pay extra close attention to:

- The module & activity order
  - Whether your camp will have the aluminum & disassembly modules
- What the completed box looks like (pictured)
- Commonly missed teaching moments
  - Also in this guide
- How to take apart the screwdriver
- The GRIT Camp's torch method & procedure
- Meter use and electrical concepts
- How to use the Socratic method
  - Participate in role-play with Mentors

If anything about the camp order has changed, you will be notified during the pre-camp meeting and told how to proceed.

The Host Facilitator and Education Lead can adapt the day to the group; follow their communicated changes.

Before work starts, identify the adult assigned to attendee behavior support. If a Student cannot participate safely, pause tool use and call that person while keeping the Student supervised. Use clear directions and firm, respectful boundaries; the assigned Mentor remains responsible for direct supervision.

Protect the final 90 minutes for electrical learning, customization, photos, and pickup. For a 3:30 PM finish, aim to start electrical by 2:00 PM, move to customization at 2:50 PM, and begin final photos and closing at 3:15 PM. The Education Lead calls transitions with the Host Facilitator. Adjust these targets for the camp; shorten earlier optional activities if needed rather than rushing safety or removing the electrical lesson.

**Last-Minute Setup Assistance & Safety**

Setup should be mostly taken care of by the time you arrive and especially by the time you finish the pre-camp Mentor meeting.

If setup is not yet finished, help the Host set up the following items:

- Tables (check-in, Stations, and Staging Areas)
- Signage
- Safety kits
- Supplies

Tape down extension cord wires to prevent trip hazards. Saws must be **unplugged**.

**Welcome and Student Check-In**

Make the Students feel welcome and spark their curiosity!

- Smile and wave!
- Show them where bathrooms and snacks are
- Ask the Students about themselves to break the ice
- Don't tell them exactly what they'll be doing; let it be a bit of a mystery

**COMMONLY MISSED TEACHING MOMENT: 6-in-1 Screwdriver**

**ENGAGE: Ask your Student(s) to:**

- ★ **Take it apart**
- ★ **Count the functions**
- ★ **Turn the shaft**
- ★ **Inspect both removable bits**

**ASK your Student(s):**

- ★ **What parts come out?**
- ★ **What changes when you reverse this piece?**
- ★ **Where are the nut drivers hiding?**

## Challenge Introduction

The Education Lead will own this portion of the GRIT Camp. Mentors will not need to lead any discussions at this point.

## Safety

The Education Lead leads the combined Challenge Introduction and Safety Briefing, targeting 8–10 minutes in total while covering the required safety points. (Details about general camp safety are in the **GRIT Camp Safety Guide**).

- Pay attention
- Put your PPE on with your Students
- Students will receive their Blueprints and tools

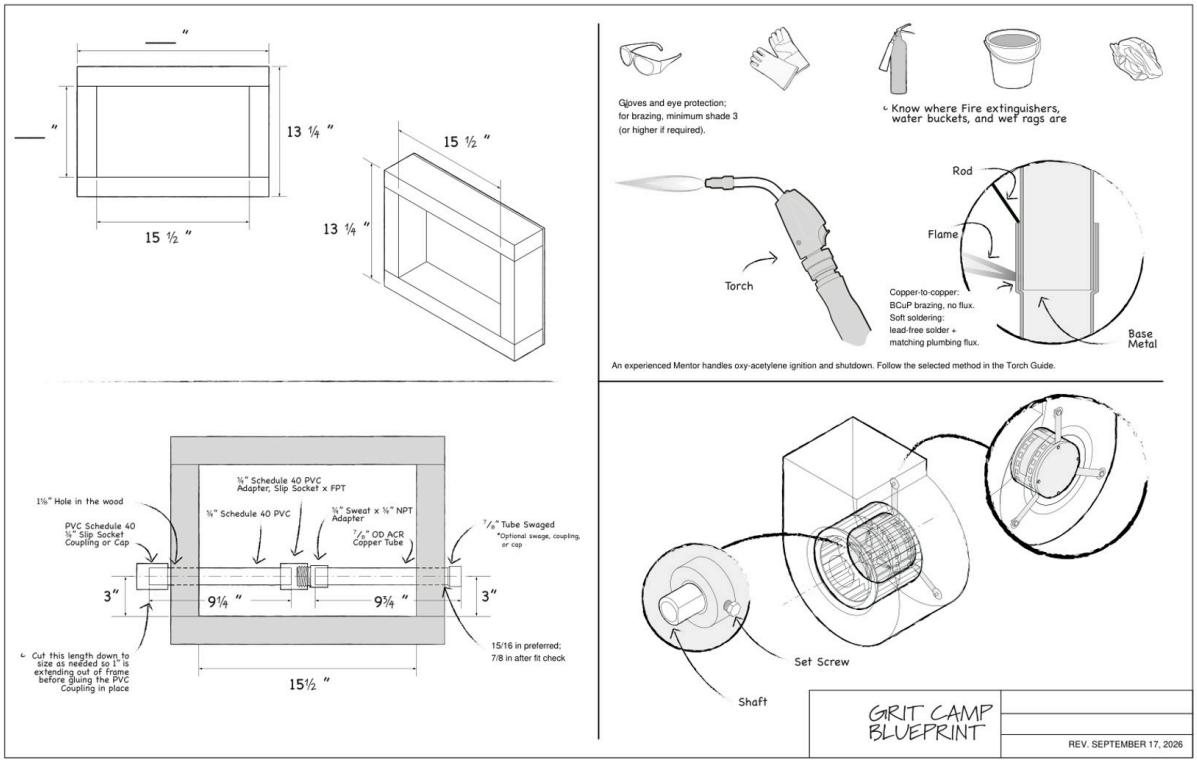
Mentor–Student pairings are announced after the combined Challenge Introduction and Safety Briefing and before work begins, allowing time for late arrivals. Once paired, encourage the Students to discover their tools and Blueprint. Encourage them to:

- Take apart their screwdriver
- Count the ticks on a tape measure
- Read their Blueprint and describe what they see

## The Blueprint

The Blueprint is NOT just a cool prop. It must be used throughout the ENTIRE day.

Take a look at the Blueprint below:




You probably noticed:

- It has pictures!
- It has different angles!
- It has missing measurements!

These will be relevant throughout the entire camp, so ask your Students to refer to it when they are stuck.

The Blueprint becomes immediately relevant in the carpentry module.

**COMMONLY MISSED TEACHING MOMENT: Blueprint**

**ENGAGE: Ask your Student(s) to:**

- ★ **Read the Blueprint before starting any work**
- ★ **Refer back to the Blueprint when they have trouble**

**ASK your Student(s):**

- ★ **Which view tells us what this part should look like?**
- ★ **Which number gives us some information about how to cut or drill this piece?**
- ★ **From which edge are we measuring?**

## Carpentry Module

The top left square of the Blueprint is for our carpentry module. It has two views of the box frame.

Direct the Students' attention to the Blueprint and ask:

**COMMONLY MISSED TEACHING MOMENT: 2x4 is NOT 2"x4"!**

**ENGAGE: Ask your Student(s) to:**

- ★ **Use their tape measure to measure the wood's width and thickness**
- ★ **Write down what they measure**

**ASK your Student(s):**

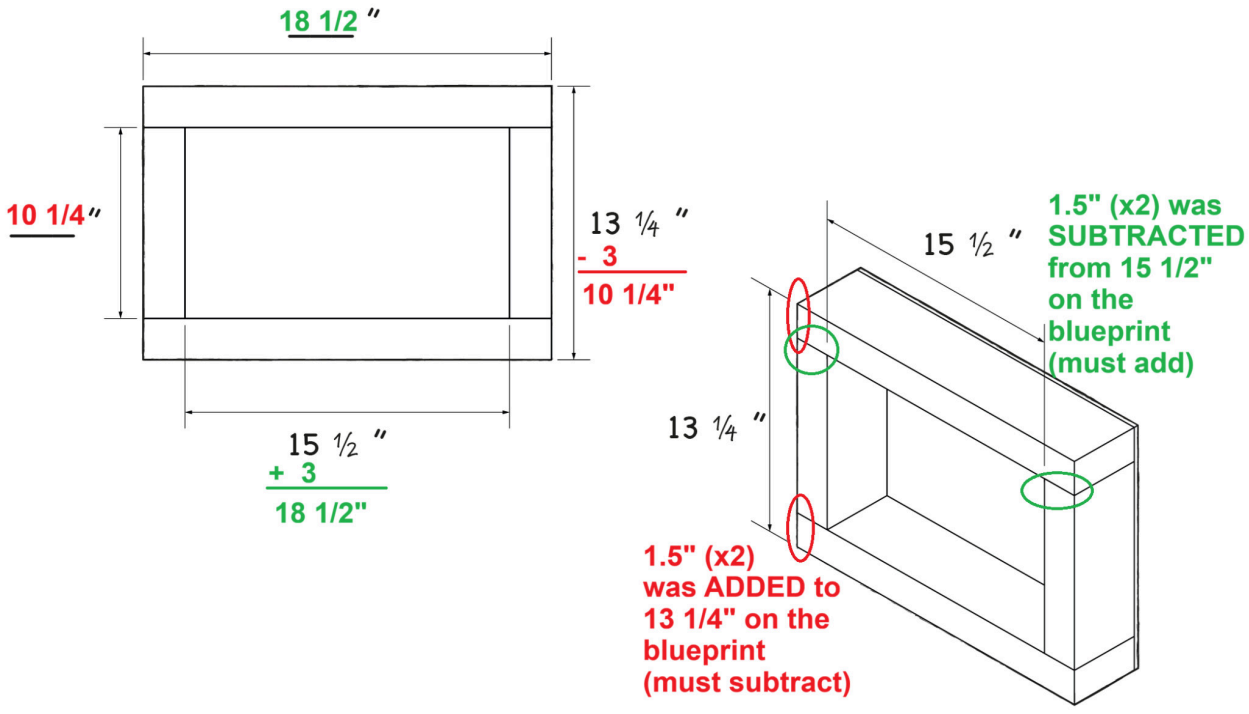
- ★ **What does the tape say?**
- ★ **Is that the name of the board or its finished size?**
- ★ **Which dimension does the Blueprint use here?**

- What materials do we need to build the box?
- What do the measurements on the box mean?
- How can we find the missing measurements?
- Do we need to cut the wood based on the current or missing measurements? Lead with curiosity and questions, but let the Student(s) do the work and make mistakes safely:

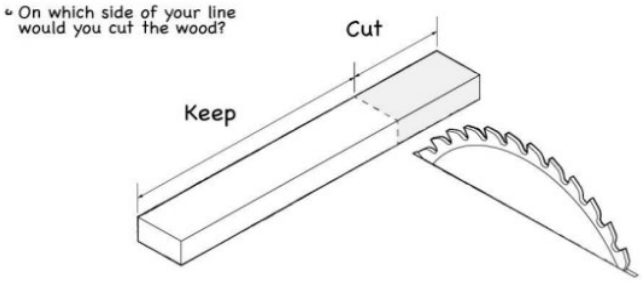
1. Grab a 2x4 so we can start building the frame! How do we figure out what we need to cut?

2. Have the Student use the tape measure to figure out the size of the wood
    a. Is it really 2"x4"?

3. Write down measurements and do the math.
    a. Here are the final measurements they should arrive at:



The Student will make the cuts. Ask them which side of the line they want to saw. It's okay if they ask to cut on the "keep" side! Let them take their time and see where/how the blade lines up when they get ready to cut the wood.




**COMMONLY MISSED TEACHING MOMENT: Saw Blades & Kerf**

**ENGAGE: Ask your Student(s) to:**

- ★ **Write down which side is the "keep" side and which side is the "waste" side**
- ★ **Pull the saw blade down WITHOUT power to verify where they're cutting**
- ★ **Measure the cut wood and verify it against the Blueprint**

**ASK your Student(s):**

- ★ **Which piece are we keeping?**
- ★ **If the blade eats this much material, where should the blade go?**
- ★ **What will we measure after the cut?**

**Saw Safety:**

- Help the Student use clamps to hold the wood to the saw
- Have the Student keep their hand that isn't on the saw **behind their back**
- **UNPLUG** saws after every use!

Measure the cut wood. If the length isn't right, ask the Student what happened and let them try again.

Now, how do we hold the boards together?

- Glue?
- Tiny finish nails?
- Screws?

Let them struggle a bit with the screws. They often try to apply force **sideways**. Ask if there's a better way!

- Try to nudge them toward drilling **vertically**
- **Let them make the decision** and feel the difference

If it still takes a while, ask if you can show them an easier way:

- Option 1: Pre-drill the hole with a 1/8" bit
- Option 2: Tap the screw with a hammer
- Option 3: Tap the screw with another board

Does everything look right? Measure it!

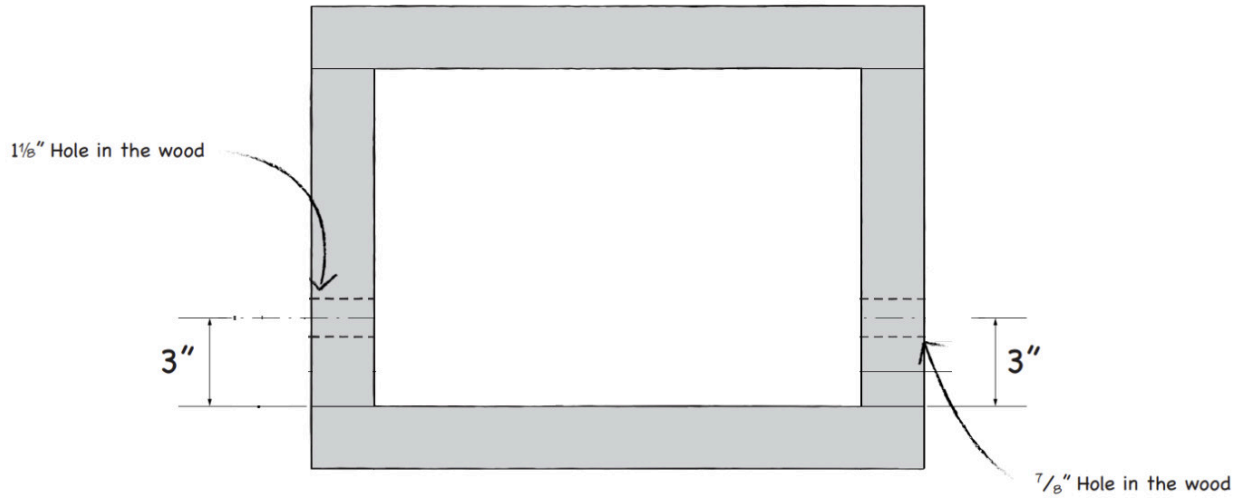

# PVC & Copper Module

There are sharp tools and fire in this module, but **let the Students do the work**.

You can help Students hold things in place and should jump in if they handle torches, cutting tools, and sealants incorrectly, but Students should do the work whenever it is safe.

Drilling holes:

- Drill the 1 ⅛” PVC opening and the copper opening at the Blueprint locations. Use 15/16” for copper by preference, or 7/8” only after a successful fit check with the actual tubing. Confirm hole locations against the Blueprint before drilling.
    - Not the bottom of the frame
- Students can drill holes with a Forstner bit
    - Think about horizontal vs. vertical drilling
- Mentors should drill if using a different bit or hole saw




**PVC**

Students will start by grabbing the PVC and measuring it based on the blueprint. We have a few cutting tools! What will work?

- The plastic tubing cutter with the clamping blade?
- The copper tubing cutter with the wheel?


Let the Students try the method they want on scrap PVC and see how they do!

Once the Student has a method, ask them to measure and cut the PVC. Point them

to the Blueprint if they're not sure what to do.

When it's time to glue the PVC to the fittings, we have two sealants! What should go on first?


- Purple primer?
- Clear glue?

And how? Let them figure it out! (And make mistakes! We can always cut and use a coupling.)

- The primer goes inside the fitting and on the male end
- Glue goes on top of the primer on the male end
- Be quick! The glue doesn't take long to dry out!

**Copper**

Now, we need to cut the copper. Is it the same as cutting PVC? Let the Students figure it out! Use some scrap copper first while they learn.

- Clean the copper with the emery cloth
- Tighten the cutter around the tubing (not too tight!)
- Rotate the cutter to make the cut
- Continuously tighten during the cut

After cutting the copper, there will be a ridge on the inside of the tubing.

- Don't touch it! It's very sharp!
- What might happen if we have water or vapor rushing through the tubing and smashing into that ridge?
- How can we get rid of it? The deburring tool!

Let the Students figure out how to use it. Then, ask how we can fit the adapter to the pipe.

HINT: We can't use glue for it!

**Brazing or Soldering**

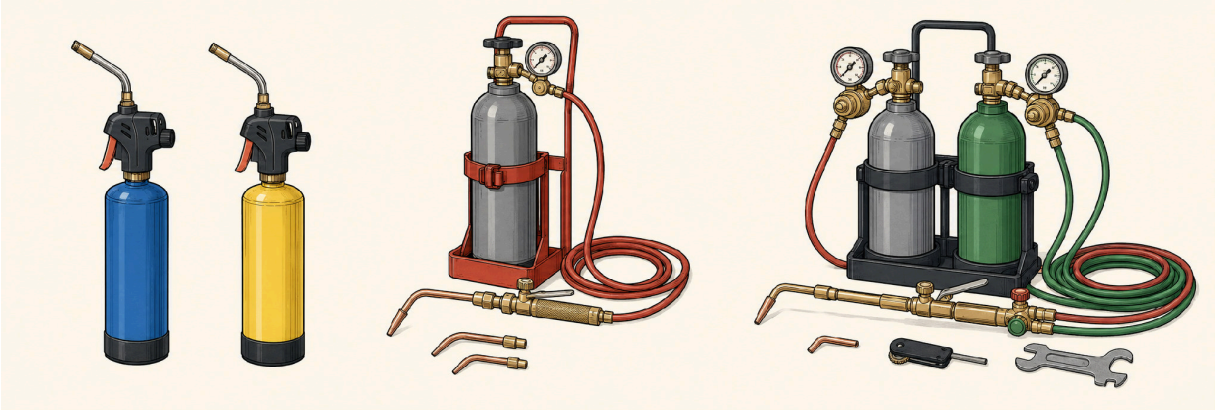
BEFORE any kind of torch work, make sure:

- ☐ Fire extinguisher and fire blankets are nearby
- ☐ Water buckets and rags are at tables

- ☐ Work surface is protected
- ☐ Gloves and appropriate eye protection are ON. For torch brazing, use properly rated shade 3 or darker protection, increasing the shade if required by the equipment manufacturer or site. Protect exposed observers too; clear glasses alone are not sufficient for brazing.

Your GRIT Camp will use ONE of three possible torch methods:

- Brazing with air-acetylene
- Brazing with oxy-acetylene
- Soft-soldering with propane or MAP-Pro gas



Know which torch system your camp is using ahead of time and what it needs. Refer to the GRIT Torch Joining Field Guide for guidance.

An experienced Mentor lights, adjusts, and shuts down oxy-acetylene. Students may handle a lit oxy-acetylene torch only under that Mentor's direct supervision.

Let the Students try to braze or solder the adapter to the tubing on their own—you're just there to guide!

Here's how you can **guide** the Student without doing the work for them:

1. Ask the Student what they need to do to the pipe and fitting to get the best possible bond (clean it!).
2. **If soldering (not brazing)**, ask the Student if the pipe needs anything to help it fit together (flux!).
3. Ask if the Student thinks the copper is seated far enough into the adapter (should be fully seated).
4. Set up the bricks to clamp the pipe in place.
5. Ask if the Student wants the flame or the base metal to melt the filler (base metal!).
6. If filler beads up, ask them to stop, let it cool, and retry.
7. For this non-service GRIT practice assembly, leave the copper joint supported and undisturbed for approximately 30 seconds after removing the flame, and until the filler has solidified. The Mentor may then supervise wet-rag cooling or water quenching, keeping hands clear of steam and hot water. Keep the work in the marked cooling area and confirm it is cool before handling.

**ENGAGE: Ask your Student(s) to:**

- ★ **Look at the materials in front of them (alloys/solder, flux, adapter, etc.)**
- ★ **Think through how each item helps the pipes fit together (or patches holes)**

**ASK your Student(s):**

Here are some mistakes to look out for:

- Burr left inside the tubing
- Dirty or loose fit
- Tube not fully seated
- Too much plumbing flux or burned flux
- Flame melts the filler instead of letting the hot base metal melt it
- Joint moved or quenched before it sets

**Joining Copper and PVC**

Now, it's time to fit the pipes together in the box!

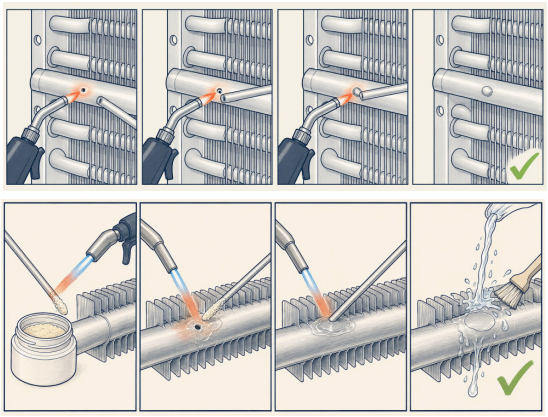
- Can we put something on the threads to make a tighter connection? Teflon tape!
- Threaded male end (copper) goes into the threaded female end (PVC) and twists tight.

- Grab and rotate the pipes with tools that can grab for leverage—what can do that? Pliers and/or wrenches!

The Student should check their work against the Blueprint. If everything looks good, they can install the backing board.

- Which fasteners should they use? (Finish nails!)
- Which tool should they use? (Hammer!)

## Aluminum Repair

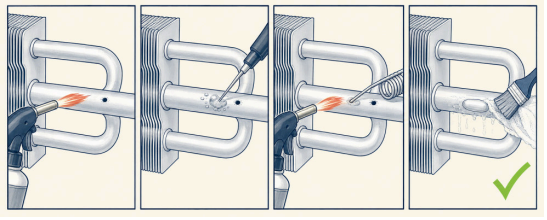


Some GRIT Camps may NOT have aluminum repair, so check with your Host ahead of time. You will use either a propane or MAP-Pro torch or an air-acetylene torch for aluminum repair work.

The Host selects optional modules and lunch demonstrations in advance with the Education Lead. Their materials and staffing are required only when selected. On-site leaders may adapt that selection when time, materials, and competent supervision permit.

As with the pipefitting module, there are a few different methods. These differ by flux type:

- Flux-cored rod (no external flux)
- Powder flux
- Liquid flux



You will use ONE, so check with your Host ahead of time. Specific directions for each flux type are in the **Soldering, Brazing & Aluminum Repair Quick Start Guide**.

You'll either have HVAC evaporator coils or aluminum cans (or both). You may need to drill a hole, or the Host may have done that for you already; the same is true of degreasing the repair area.

Aluminum is different from copper! Ask the Students:

- How do we clean it?
- Do we use the same heating method we used with the copper?
- What do you think will happen if we use the same amount of heat we used on the copper?
- Do we use the same filler metal?

Let the Students try to patch a coil or cans on their own. Guide them with questions:

- Do you think that metal is hot enough?
- Do you think you've melted the flux enough?

In any case, you want to make sure the decision is put BACK into the Student's hands.

If it looks like they've successfully patched a can, see if it holds water!

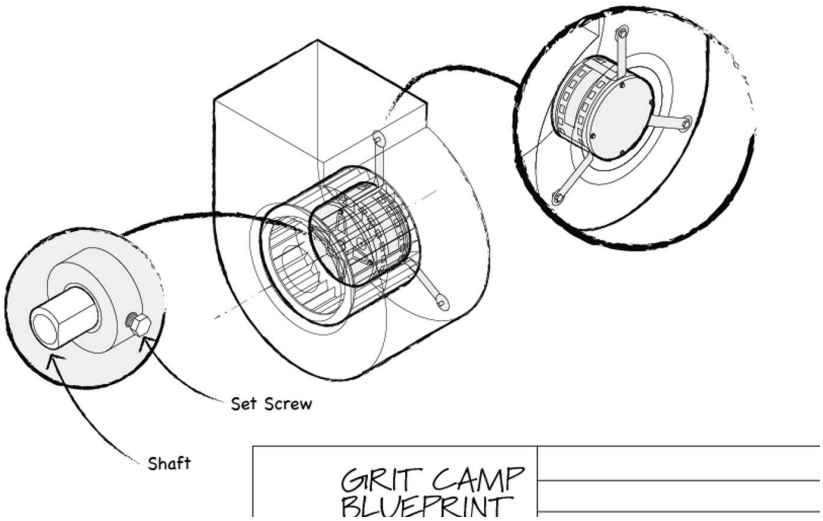
## Disassembly

Not every GRIT Camp will have disassembly, so check with your Host ahead of time. If disassembly is in the plan, you may have a variety of objects to work with:

- Blower
- Condenser fan
- Furnace
- Toaster
- Hair dryer
- Electrical panel

WITH GLOVES ON, Students may touch these assemblies, spin moving parts, etc., to see how they work.

The blueprint shows us some key disassembly points of an HVAC blower, including the shaft and screws.




Ask them what they can use to get the fasteners off. Hint: They have them!

- GRIT 6-in-1 screwdriver
- Adjustable wrench

If the Student has trouble, ask them to see if there are other nearby objects at the supply table that could make it easier. Let them figure it out, but they will eventually land on:

- Assembly lubricant
- Sandpaper

Have them reassemble what they've taken apart if there's time! If not, that's okay, too!

## Electrical

The entire back of the Blueprint is all electrical!

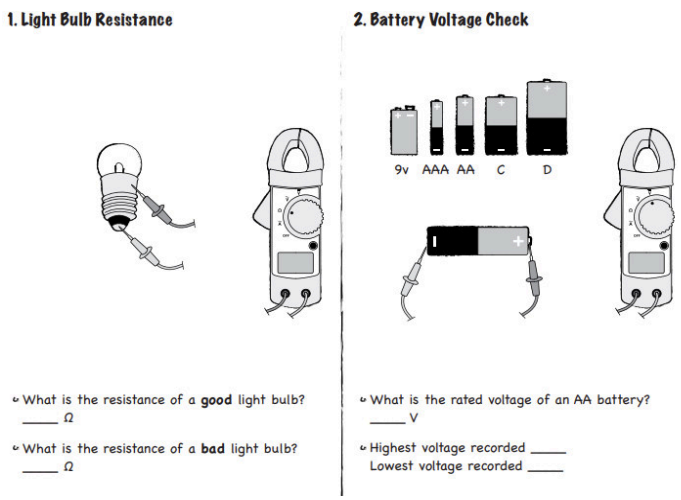
All the hardware in this module comes in kits. We just have to grab electrical meters (black lead in COM, red lead in the VΩ jack). Ask about the meter settings to introduce electrical topics.

| Idea | Plain-Language Explanation | What Students Can Observe |
|---|---|---|
| **Voltage, volts (V)** | Electrical potential difference between two points. “Electrical pressure” can be a useful analogy, but it’s not literally pressure. | A meter reads across two points, such as the two battery terminals. |
| **Current, amps (A)** | The rate at which electric charge moves through a complete path. | A lamp lights only when there is a closed path. More load usually changes the current drawn from the source. |
| **Resistance, ohms (Ω)** | Opposes current. Loads, such as lamps, use electrical energy and have resistance. | An unpowered component or path can be checked for resistance or continuity with the meter. |
| **Circuit** | A source, a complete path, and a load. A switch opens or closes the path. | A single loose connection or open switch can stop the whole series path. |

We can use the meters to find good batteries and bulbs!

- What setting do we use for the batteries?
- What’s the highest voltage you found? The lowest?
- What setting do we use for the bulbs?
- After taking a few readings, which ones look good? Bad?

Let the Students figure out what looks good and what looks bad.



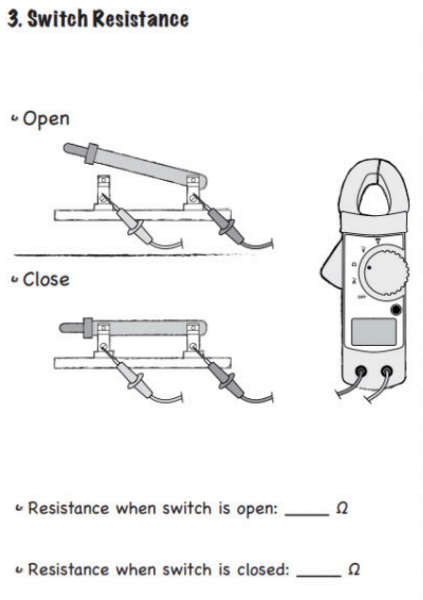

Do NOT move the red lead to the current jack or attempt an amp measurement. GRIT uses DC voltage and, with circuit power removed, resistance/continuity only. The Mentor controls meter-mode changes.

Students can discover a bit about the switch by using the resistance setting and reading across a switch when it’s open and when it’s closed.

- What do they think OL means?
- Why is it just about 0 when closed and OL when it’s open?

It’s all about having a pathway! The Blueprint shows how to make a few different circuits. Here are some assembly tips:

- Battery holders clip together
- Switches and components connect by wires

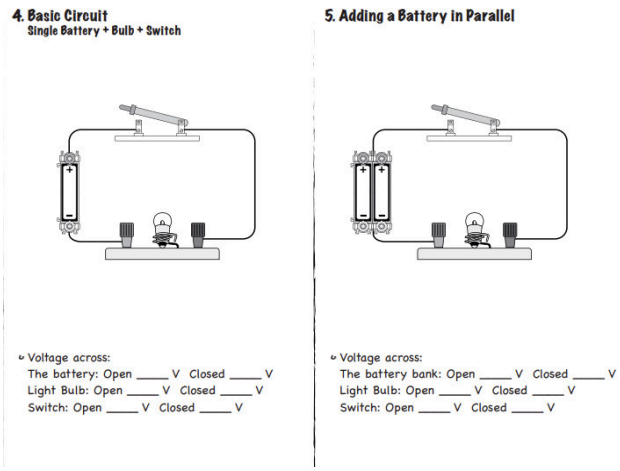


For each circuit, encourage the Student to:

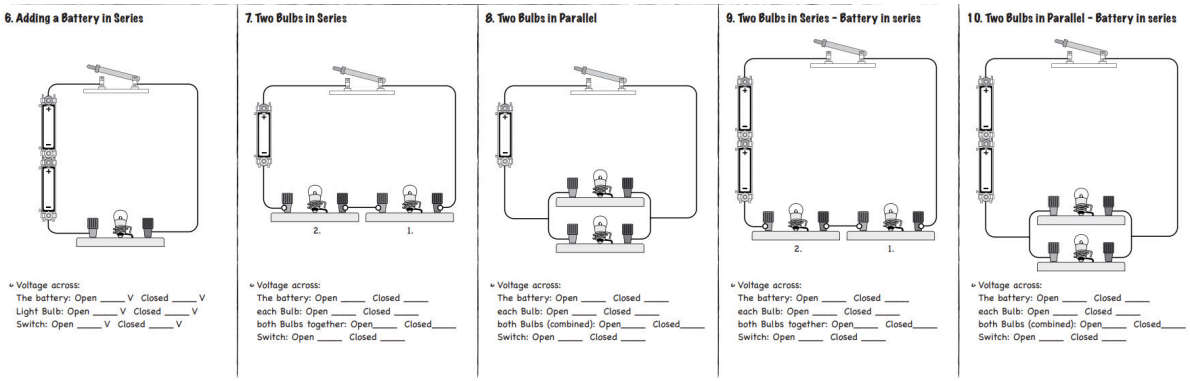
- Close the switch
- Read voltage across each part with an open switch AND when it's closed:
    - Battery (power supply)
    - Bulb (load)
    - Switch

The Blueprint offers several opportunities for your Student to use their meter and observe things across several parallel and series circuit designs:

- Changes in voltage
- Changes in resistance
- Dimming bulbs




That's your cue to ask your Student why they think those things are happening!




## Final Customization

The Students made it! They've put together some cool stuff with the trade skills they learned!

Now it's time for them to apply personal touches to the box and really show off their creativity.

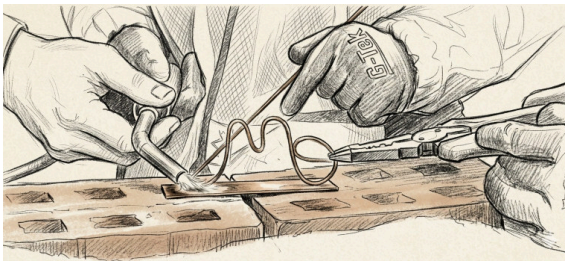
As the Mentor, you have three jobs:

- Reinforce the safety rules
- Encourage sharing and fair behavior
- Encourage their Students' creativity


While the craft items will vary by GRIT Camp, there will always be hot glue guns. Keep an eye on the Students and make sure they don't accidentally burn themselves.

Depending on your Host's plans, you may also have this fun activity:

- Help your Students bend scrap wire to make their initials with pliers
- Let the students flatten scrap copper with a hammer
- Supervise them joining the wire to the stand with the selected soft-soldering or brazing method

This is a great opportunity for them to practice their soft-soldering or brazing skills from earlier and create something truly unique!

You can also encourage them to make a **functional modification** to their box, which could include:

- Dividers
- Access panel
- Pocket (for tools or pencils)

## Final Words

Mentors are the ones who inspire Students to learn hands-on skills. We've seen older Students graduate from the GRIT Camp and go to trade school. You will likely have a notable impact on their lives, and you may be the reason why one of your Students chooses a career in the skilled trades.

Make the most of the preparation phase, and have fun on the day of the GRIT Camp!