# Tools

## Introduction

Having the proper tooling enables instruction and reinforces the “right tool for the job” concept with your students. Important SLOs for students in agricultural mechanics courses is learning proper tool names, proper tool use, care of tools, as well as safe tool use.

Tool inventories are valuable especially for teachers taking over a facility. Knowing what you have is important to planning instruction. Inventories should include the tool, quantity, and condition (see sample form). In addition to initial assessment of tooling, taking an annual inventory at the end of the school year will allow you to order replacements before they are needed for instruction. The tool inventory can easily be kept in a spreadsheet and updated. Tools should be of high quality, as they will last longer. Selecting the types of and to some extent, the brands of tools used in industry will be a good investment.

The quantity of a tool will depend on budget, class size, how you will organize your instruction, and space to store them. To maximize instruction you will want to avoid bottlenecks caused by lack of tools. For example if you have a project that requires a drill press, you may want to have more than one if students have to wait to use it. The lists below should be used as a guide for what typical tools might be needed. Quantities are suggested but should by modified by your individual circumstances.

Budging for replacement

### Purchasing

Initially purchasing tools in sets may be economical (and simpler), but replacements will need to be individually purchased. For example, you might purchase a simple set of sockets and end wrenches for an engines class. Over time, pieces will be lost or broken and you should be able to purchase individual items to replace them.

Manufactures may provide special discounts for their tools. These may be substantial and are available directly from the manufacturer or through dealers. Large items like welders and stationary tools are commonly considered capital assets and may need to be tracked in a separate inventory. This is especially true when such items are purchased with special funding such as grants. Larger tools commonly will need service beyond what you may be able to provide. Such items are best purchased from local suppliers who can provide the service.

### Replacement Parts

Items such as saw blades, welding tips, and drill bits should be kept in stock. These wear out or are broken. You will learn from experience how many to stock. Purchase extra with the initial purchase.

### Welding Gasses

Initially you may wish to rent bottles (pay demurrage) as this is simple for the teacher. For larger programs, purchasing bottles should be considered. Some companies offer a purchase/exchange program where you “buy” the bottle, but they will simply exchange it like a rental bottle but you save the monthly demurrage costs.

## Tool Lists

Tools lists are somewhat subjective and will vary depending on the preferences of the tool user. The lists below are not intended to be comprehensive, but rather a starting place for the skills listed. The lists below are broken down by skill area and type of course but there is some overlap. You will need one set of tools per class. If classes are offered simultaneously you will need to consider duplicate tools.

## Basic Agricultural Mechanics Skills

Most introduction to agricultural mechanics courses will contain a series of projects in different skill areas.

### Measuring

Measuring and Layout skills occur in almost all agricultural mechanics. Different tools are used for different materials, but there is much overlap and the tools listed below are common to many areas.

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| **Description** | **Quantity** | **Notes** |
| Steel Tape | 1/2 students | 12’ tapes are fine for shop projects, 25’ tapes are better for construction. |
| Combination square | 1/student | This tool can be used for layout of most small shop projects. Hint: always buy the same model as they get taken apart and parts lost. Have interchangeable part is useful. |
| Framing square | 5 | Purchase with rafter tables if you plan to teach framing |
| Rafter Square | 5 | Commonly called a “speed square” |
| Dividers | 2-4 | Rearly used in class, but have for ID |
| Inside Calipers | 1 | Rearly used in class, but have for ID |
| Outside Calipers | 1 | Rearly used in class, but have for ID |
| Steel Rule (4’) | 1 |  |
| Sheet metal gauge | 1 |  |
| Screw pitch gauge | 2 | 1 standard, 1 metric (keep with tap/die set) |
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### Metalworking

Metalworking includes working of mild steel, sheet metal as well as threading skills. Foundry and blacksmithing skills are not included.

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| **Description** | **Quantity** | **Notes** |
| Hydraulic Shear | 1 |  |
| Cut-off saw | 1 |  |
| Box Brake | 1 | For small projects like dustpans and scoops |
| Cornice Brake | 1 | A bench brake is suitable for small projects, a 8’ brake should be considered for larger projects like BBQs. |
| Foot shear | 1 | (Could be a 24” bench shear for small projects) |
| Roll (sheet metal) | 1 |  |
| Beverly Shear | 1 |  |
| Bender | 1 | (Hossfeld) |
| Machinist Vises | 1 per 2 students |  |
| Ball Peen Hammer | 10 |  |
| Black smith hammer | 2 |  |
| Tinner’s hammer | 2 |  |
| Snips, straight | 1 per 4 students | (10” are better for smaller hands) |
| Snips, duck bill | 1 per 4 students |  |
| Snips, compound | 1 | (a set of left, right, strait) |
| Scribe | 1 per student | (Combo squares may include these or use 16d sinkers sharpemed) |
| Dividers | 2 |  |
| Spot Welder | 1 |  |
| Drill Press | 1-2 |  |
| Drill Press Vise | 1-2 |  |
| Tap/Die | See Note | (1 complete set, plus extra handles and taps in specific sizes for projects) |
| Twist Drills (1/64-1/2” set) | See Notes | (1 set plus extras in specific sizes for projects) |
| Anvil | 1-2 |  |
| Bench Grinders | 4 | Some for tool sharpening and some for tool shaping. Generally 1”, but a 2” is useful for larger projects |
| Oxy-Fuel Set with Heating Tip | 1 | For bending |
| Files (mill & bastard, round, flat, semi) | 10 | Keep an assortment |
| Cold Chisel | 2 | ½” is a good size. |
| Pop Rivet Tool | 2 |  |
| Portable Drill/Driver | 2 |  |
| Hack Saw (32 tooth) | 6 |  |
| Standard screwdriver | 6 |  |
| Phillips Screwdriver | 6 |  |
| Slip joint pliers | 6 |  |
| 10” adjustable wench | 4 |  |
| 12” adjustable wench | 4 |  |
| 15” adjustable wench | 1 |  |
| Locking “C” pliers | 10 |  |
| Combination Square | 10 |  |
| Sheet metal rule (4’) | 1 |  |
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### Welding

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| **Description** | **Quantity** | **Notes** |
| GMAW (MIG) Welder | 10 | Multi process power supplies should be considered. Gas can be manifolded into welding booths. |
| SMAW Welder | 10 |  |
| GTAW (TIG) Welders | 2 |  |
| Oxy-Fuel Welding set\* | 10 | (welding and heating tips) |
| Oxy Fuel Cutting set | 2-4 |  |
| Plasma Cutting | 2-4 |  |
| Helmet (shade 10) | 1/student | SMAW/GMAW |
| Helmet (shade 12) | 2-4 | GTAW |
| Shade 5 goggles | 1/student | (Oxy and Plasma) |
| Rod Storage Oven | 1 |  |
| Arc Welding Booths (ventilated) | 10 |  |
| Oxy-Fuel Welding Stations\* | 10 | Usually a manifold |
| Cutting Stations | 2-4 |  |
| Protective Clothing | 1/student |  |
| Welding Gloves | 1/student |  |
| Slip joint pliers | 1/student |  |
| Chipping Hammer | 1/GMAW station |  |
| Wire Brush | 1/GMAW station |  |
| Locking welding clamps | 10 | (a selection of styles) |
| Hydraulic shear | 1 | (coupon cutting) |
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\* Oxy fuel welding and brazing is less common now and may not be part of the curriculum. Omit if not needed. Oxy-fuel cutting is still important.

### Woodworking

For small projects.

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| **Description** | **Quantity** | **Notes** |
| Table saw | 1-2 | Typical 10” is fine. Many schools will want to consider Saw Stop® or similar safety technologies. If you want to use a dado blade regularly it is recommended to have two saws so you don’t need to change blades and guards frequently. Purchase extra carbide blades. Typically 40-60 tooth. |
| Jointer |  |  |
| Band Saw | 2 | Purchase blades typically in ¼”,3/8”, and 1/2” width for wood (course teeth). |
| Drill Press | 1-2 | Bench sizes often work well |
| Portable Planer | 1 | Good for cutting board projects |
| Power Miter Saw | 2 | Purchase extra 60-80 tooth carbide blades |
| 16 oz Hammer | 10 |  |
| Impact Driver (battery) | 2-4 |  |
| Screwdriver/Drill (battery) | 2-4 |  |
| Framing Square | 5 |  |
| Combination Square | 10 |  |
| Smoothing or Jack Plane | 2 |  |
| Slotted Screw Driver | 5 |  |
| #2 Phillips Screwdriver | 5 |  |
| Nail Set | 2 | Sets of 3 or 4 sizes |
| Wood rasp | 4 |  |
| Sanding blocks |  | (can be made from 2x4 with sandpaper stapled to the block) |
| Belt Sander | 1 |  |
| Palm Sander | 6 |  |
| Stationary Sander | 1 |  |
| Steel Tape | 10 |  |
| Pipe clamps | 6-8 | Pipe length can very by your needs |
| Wood clamps | 10 |  |
| Paint brushes | 20 |  |
| Putty knife | 10 |  |
| Woodworking Vise | 5 |  |
| Woodwork Bench | 5 |  |
| Forstner Bits | 1-2 sets |  |
| Spade bits | 1 set |  |
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| Drill Index | 1 | (may want more 1/8 bits for pilot holes) |
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### Plumbing

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| **Description** | **Quantity** | **Notes** |
| Pipe Dies and Handle |  | (1 set plus extra die and handle for project sizes) |
| Pipe Reamer | 1 |  |
| Pipe Cutter | 1 |  |
| Pipe Threading Machine | 1 |  |
| 12”-14” pipe wrench |  |  |
| Hack Saw (24 tooth for PCV, 32 tooth for copper) | 2 |  |
| PVC Cutter | 6 |  |
| Propane Torch | 3 |  |
| Copper fitting brushes | 6 |  |
| Water pump pliers | 3 |  |
| 12” Adjustable wrench | 3 |  |
| PEX Crimp Tool | 1 | (needs to match rings) |
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### Electrical

Electrical tools for almost any wiring project using NM cable or conduit. The VOM can be used to learn circuit testing of AC or DC circuits and continuity. DC circuit and continuity testing are useful skills in teaching small engines and farm power troubleshooting.

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| **Description** | **Quantity** | **Notes** |
| Wire strippers | 10 |  |
| Diagonal Cutter | 2 |  |
| Lineman’s Pliers | 2 |  |
| Slotted Screw Driver | 6-10 |  |
| #2 Phillips Screwdriver | 6-10 |  |
| NM Cable Cutter | 1-2 |  |
| NM Cable Stripper | 6 |  |
| 16oz Claw Hammer | 2 | (installing drive clamps/NM cable Staples |
| Wiring practice boards | 1 per student | (describe options later) |
| Water Pump pliers | 2 |  |
| Needle Nose pliers | 6 |  |
| Circuit Tester (plug in) | 1 | Used for testing student project boards, plugs into DR) |
| VOM/Multimeter | See Notes | 1 for demo. If students test circuits you will need more. Commonly have “stations” and one per station. |
| ½” EMT Bender | 1-2 | (for EMT practice) |
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### Concrete

For small concrete projects like stepping stones and small sidewalks. For pouring larger slabs see the optional equipment

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| **Description** | **Quantity** | **Notes** |
| Claw hammer | 6 | Assembling Forms |
| Rafter or Combination Square | 6 |  |
| Steel Tape (25/30’) | 6 |  |
| Engineer’s Hammer | 4 | (for setting form stakes) |
| String | Roll | (for setting forms) |
| 4’ Level | 2 | (for setting forms) |
| String Level | 2 | (for setting forms) |
| Hand Floats | 6 |  |
| Steel Trowel | 6 |  |
| Edging Trowel | 4 |  |
| Square nose shovel | 2 |  |
| Mortar hoe | 2 |  |
| Contractors Wheel barrow | 2 |  |
| Concrete mixer | 1 |  |
| Power miter saw/circular saw | 1 | (cutting forms) |
| Screed board | 6 | (make yourself from 2x4) |
| Tamper | 1-2 | Larger tamps are needed for larger projects. For small project like stepping stones you can get 12” tamps. |
| **For larger projects consider** |  |  |
| Steel form stakes |  |  |
| Level & Rod | 1 | For setting form grade |
| Metal screed | 1 |  |
| Bull float & handle | 1 |  |
| Rolling Tamp? | 1 |  |
| Fresno trowel & Handle | 1 |  |

## Woodworking -- Advanced

Consider these tools if teaching a “wood shop” course in addition to the woodworking tools.

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| Panel Saw | 1 |  |
| Shaper | 1 |  |
| Biscuit Jointer | 2 |  |
| Mortice/Tenon ??? | 1 |  |
| Face Frame Drill |  |  |
| Stationary 6” Belt / 12” Disc Sander | 1 |  |
| Stationary planer | 1 | 24” minimum |
| Spray booth | 1 | An approved booth with spray equipment |
| Dust collection system | 1 | Attach to all stationary tools |
| Flammable materials cabinet | 1 | For storing finishes |
| Stationary Dowel Drill | 1 |  |
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## Building Construction

For construction of wood structures, the emphasis is on hand and portable tools. If building on site a covered utility trailer should be considered. If projects like sheds are built in the shop or nearby shop tools can be utilized, but students should be equipped with the tools commonly used in the building trades.

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| **Description** | **Quantity** | **Notes** |
| Framing Hammer | 1 per student |  |
| 16oz Claw Hammer | 5 |  |
| Drywall Hammer | 5 |  |
| Shingle Hammer | 5 |  |
| Cat’s Paw | 5 |  |
| Utility Knife | 5 |  |
| Nail Bags | 1 per student |  |
| 25-30’ x 1” steel tape |  |  |
| Framing Square | 5 |  |
| 2’ level | 2 |  |
| 4’ level | 1 |  |
| Rafter square |  |  |
| Chalk Line | 5 |  |
| Plumb Bob | 2 |  |
| Level, tripod, and Rod | 1 | Laser preferred, but a builders level will work |
| Circular saw (worm drive) | 5 |  |
| Circular Saw (battery) | 2 | Battery tools should use same battery, commonly can be purchased in sets |
| Impact Driver (battery) | 2-5 |  |
| Screwdriver/Drill (battery) | 2-5 |  |
| Reciprocating Saw (battery) | 1 |  |
| Jig Saw (battery) | 1 |  |
| Power Miter Saw | 2 |  |
| Table Saw | 11 | (portable for field work) |
| Staple Gun | 2 |  |
| Hammer Tacker | 3 |  |
| Pneumatic Nail Guns | 1-2 each | (finish, 8D, 16D) |
| Air hose | 1 per tool |  |
| Portable air compressor | 1-2 |  |
| Hand Saw | 2 |  |
| Nail Set | 3 | (set of 4) |
| Wood Chisels | 3 | (set of 4) |
| Carpenter’s pencils | 2 per student |  |
| Lumber crayon | 5 |  |
| Crow/Pry bars | 5 |  |
| Caulking Gun | 5 |  |
| Jack Plane | 2 |  |
| Concrete Tools |  | See Concrete |
| Electrical Tools |  | See Electrical |
| Plumbing Tools |  | See Plumbing |
| Mechanics Tool Set |  | A basic set for installing tiedowns, etc. |
| Hard Hats | 1 per students | Primarily if construction is going on overhead like roof framing |
| Step Ladders | 6 | 6’ and 8’ |
| 20’ Extension Ladder | 1 | For roof access |
| 50’ 12ga extension cord | 3 |  |
| Safety Harness | 2 | For roof work |
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## Metal Fabrication

In addition to welding tools, this tools set will allow fabrication of larger projects.

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| **Description** | **Quantity** | **Notes** |
| GMAW Welders | 6 | (movable in shop) |
| Angle Grinder | 4 |  |
| 2” bench grinder | 2 |  |
| Hydraulic Shear | 1 |  |
| Cut-off saw | 1 |  |
| Horizontal band saw | 1 |  |
| Plasma Cutter | 2-4 | (portable) |
| Locking welding clamps | 20 | An assortment of styles |
| Framing Square | 5 | Aluminum |
| Magnetic corners | 10 |  |
| Steel tape | 10 |  |
| Mechanics Tool Set | 1 | A basic set for installing lights, hitches, etc. |
| Drill Press | 1 |  |
| Drill index (1/64-1/2”) | 1 |  |
| Hole Saw Set | 1 |  |
| Portable Drill (1/2" | 2 |  |
| CNC Plasma Cutter | 1 | 4’x4’ minimum |
| Large drill press (Morris Taper) | 1 | Optional |
| Morris Tape drills ½”-1” | 1 | Optional |
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## Farm Surveying/Land Measurement

Equipment suitable for doing differential leveling, setting grade stakes, setting forms, measuring irrigation slopes, and learning about GPS. Survey grade (RTK) GPS is very expensive, but it is in common use for surveying and land leveling.

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| **Description** | **Quantity** | **Notes** |
| Laser Level & Tripod | 4 |  |
| Direct Elevation Rod | 4 |  |
| 300’ tape | 4 |  |
| Chaining pins | 30 |  |
| Level & Tripod |  | (old technology) |
| Philadelphia Rod |  | (old technology) |
| GPS | 10 | (wide range of options depending on desired SLO) |
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## Small Engines

A typical tool set for repair and maintenance of small gasoline engines. Plan to purchase 1 engine for every 2-3 students. Since older engines use inch size tools and newer engines use metric size tool both are listed. If the instructor is starting from scratch purchase of complete sets may be economical.

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| **Description** | **Quantity** | **Notes** |
| **Tools set - 1 per engine** |  | **Sets may be kept in toolboxes or in portable tool racks. Typically 2-3 students per engine.** |
| Combination end wrenches (8-14 mm) | 1 |  |
| Combination end wrenches (3/8”-3/4”) | 1 | For older engines. |
| Slotted Screwdriver | 1 |  |
| #2 Phillips Screwdriver | 1 |  |
| Torx screwdriver set | 1 |  |
| “C” clamps | 2 | To clamp engine to work bench |
| 3/8” drive sockets (8-14mm) | 1 | May wish to purchase a 3/8” drive set. |
| 3/8” drive sockets (3/8”-3/4”) | 1 | May wish to purchase a 3/8” drive set. Older engines are not metric. |
| 3/8” drive ratchet | 1 |  |
| 3/8” extensions (3”, 6”) | 1 |  |
| Allen wrench set |  |  |
| 16 mm spark plug socket (3/8” drive) | 1 |  |
| 3/8” inch pound torque wrench | 1 |  |
| ½” drive flex handle | 1 |  |
| ½” drive sockets (15mm-22mm) | 1 |  |
| Strap Wrench | 1 |  |
| Flat feeler gauge | 1 |  |
| Round spark plug gauge | 1 |  |
| Needle nose pliers | 1 |  |
| Slip joint pliers | 1 |  |
| Gasket scraper | 1 |  |
| Nut driver set | 1 | metric |
| Parts Trays | 2 | Old muffin pans work well for this |
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| **Class Tools** |  | **Shared by all students** |
| 3/8” foot pound torque wrench | 1 |  |
| Digital Caliper | 2 |  |
| Micrometer set | 1 | 0-1”,1-2”, 2-3” |
| 19620 B&S Fuel Removal Tool | 2 |  |
| 19368 B&S Spark Tester | 2 |  |
| 19070 B&S Ring Compressor | 2 |  |
| Flywheel knock-off tool | 1 |  |
| Funnel | 2 |  |
| Oil Pan (for draining fluids) | 2 |  |
| 1 gallon Fuel container | 1 |  |
| Tachometer | 1 |  |
| Leak Down Compression Tester | 1 |  |
| VOM/Multimeter | 2 |  |
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## Farm Power / Machinery (operation)

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| **Description** | **Quantity** | **Notes** |
| Slotted Screwdriver | 2 |  |
| #2 Phillips screwdriver | 2 |  |
| ½” drive socket set (metric/standard) | 2 |  |
| Combination end wrench set | 1 | (3/8”-1 ¼”) |
| Engineers hammer | 1 |  |
| Selection of hitch pins |  |  |
| Lynch Pins | 10-20 |  |
| 12” adjustable wrench | 2 |  |
| 15” adjustable wrench | 2 |  |
| 18” pipe wrench | 2 |  |
| Air Compressor | 1 |  |
| Air Hose | 1 |  |
| Air Impact Wrench & Sockets | 1 |  |
| Air Chuck | 1 |  |
| Jack stands, chocks, & blocks |  | 2-4 stands, block, and tire chocks |
| Floor Jack | 1 |  |
| Bottle Jack | 1 |  |
| Tire Pressure Gauge | 4 |  |
| Needle nose pliers | 2 |  |
| Slip joint pliers | 2 |  |
| Jumper Cables | 1 |  |
| Battery Charger | 1 |  |
| Oil can or funnel | 1 |  |
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## Farm Power (Overhaul)

The basic tools needed in addition to the above for working on machinery. The quantity is highly variable and depends largely on class size and organization. If students work in groups then a basic set of tools should be provided for each group.

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| **Description** | **Quantity** | **Notes** |
| Gasket scraper | 4 |  |
| ½” Torque wrench (foot pounds) | 2 |  |
| 3/8” Socket Set | \* | Standard & metric, includes deep sockets |
| ½” Socket Set | \* | Standard & metric, includes deep sockets |
| Combination end wrench set | \* | (3/8”-1 ¼”, 8mm-22mm) |
| Engine hoist | 2 |  |
| Engineers hammer | 4 |  |
| Ball Peen Hammer | 10 |  |
| Retaining ring pliers | 2 | (inside & Outside) |
| 12” adjustable wrench | \* |  |
| 15” adjustable wrench | \* |  |
| 18” pipe wrench | 2 |  |
| Jack stands, chocks, & Blocks | 4 min. |  |
| Floor Jack | 2 |  |
| Bottle Jack | 2 |  |
| Air Compressor | 1 |  |
| Air Hose | 1 |  |
| Air Impact Wrench & Sockets | 1 |  |
| Air Chuck | 1 |  |
| Needle nose pliers | \* |  |
| Slip joint pliers | \* |  |
| Pin Pinch Set | 2 |  |
| Flat feeler gauge | \* |  |
| Round spark plug gauge | \* |  |
| Digital Caliper | 4 |  |
| Micrometers | 1 set | (choose sizes based on engine sizes) |
| VOM/Multimeter | 2 |  |
| Compression Tester | 2 |  |
| Tachometer | 2 |  |
| Timing light | 1 | (Gas engines) |
| Spring compressor | 2 |  |
| Gear puller | 2 |  |
| Ring compressor | 2 | Choose size based on engines |
| VOM/Multimeter | 2 |  |
| Oil drain pan | 1 | Large capacity |
| Parts Trays | 2 per engine | Old muffin pans work well for this |
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\* Sets

## Painting

Note that painting equipment such as spray gun have been omitted from wood working and metal fabrication. These types of projects are commonly finished with a spray gun. You may be required to have a spray booth to use this equipment and operator should use a respirator. If you plan to spray paint yourself check with local requirements before ordering equipment.

If you cannot comply with local regulations to spray projects consider using a local business for finish work.

Hand painting (including spray cans) or staining is usually not a problem. Be sure to have appropriate PPE and good ventilation for students depending on the material being applied.

## Inventory Form

The following form can be created in a spreadsheet and kept updated electronically. The list can be sorted by location for easy use. Save each inventory separately to have a record of tools. Use the inventory to plan tool purchases.

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| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Condition | | | |  |  |
| Tool | Quantity | Good | Fair | Replace | Unsafe | Location | Desired Qty |
| Slip Joint Pliers | 9 | 7 |  | 2 |  | Cabinet 1 | 12 |
| Hack Saw | 6 | 6 |  |  |  | Cabinet 1 | 6 |
| Strait Snips | 6 | 4 | 2 |  |  | Cabinet 1 | 8 |
| 2” bench grinder | 2 | 1 |  |  | 1 | Metal Shop | 1 |
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## Tool Manufacturers (as of 6/2017)

The list below is not comprehensive, but provided as a starting point. While web sites may list prices teachers are urged to contact dealers and manufacturers for educational discounts

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| Manufacturer | Type | Web Site |
| Miller | Welding |  |
| Lincoln | Welding |  |
| Victor | Welding |  |
| HyperTherm | Welding |  |
| PlasmaCam | Welding |  |
| Craftsman | Hand Tools |  |
| Proto | Hand Tools |  |
| Dewalt | Power Tools |  |
| Stanley | Hand Tools |  |
| MillerFalls | Concrete |  |
| Makita | Power Tools |  |
| Milwaukee | Power Tools |  |
| Jet | Power Tools |  |
| Saw Stop | Table Saw |  |
| Greenlee | Tap/Die |  |
| Klein | Electrical |  |
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## Associated Files

Tool Lists (Word)

Tool Inventory (Excel)

Activity (Excel)

## Activity

Assume that you want to start a small engines course. Download the spreadsheet for the activity. Using the Craftsmen and Briggs and Stratton web sites determine the cost for the small engine tool list if the following conditions are true:

* Course will have 20 students and students will work 2 per engine (10 tool sets).
* Assume Craftsman and Briggs and Stratton will offer a 15% educational discount.
* Assume tax will be 8% and shipping 10% (or use actual numbers).
* In addition to the tools estimate the cost of 10 small engines.
* The estimated costs for gaskets, fuel, oil, and replacement parts is $20/engine per year.

Complete the spreadsheet and write a one page justification for the course including an estimated initial budget (tool purchases) and operating budget (ongoing costs).

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Description** | **Quantity** | **Vendor** | **Cost** | **Amount** | **Notes** |
| Combination end wrenches (8-14 mm) |  |  |  |  |  |
| Slotted Screwdriver |  |  |  |  |  |
| #2 Phillips Screwdriver |  |  |  |  |  |
| “C” clamps |  |  |  |  |  |
| 3/8” drive sockets (8-14mm) |  |  |  |  |  |
| 3/8” drive ratchet |  |  |  |  |  |
| 3/8” extensions (3”, 6”) |  |  |  |  |  |
| 16 mm spark plug socket (3/8” drive) |  |  |  |  |  |
| 3/8” inch pound torque wrench |  |  |  |  |  |
| ½” drive flex handle |  |  |  |  |  |
| ½” drive sockets (15mm-22mm) |  |  |  |  |  |
| Strap Wrench |  |  |  |  |  |
| Flat feeler gauge |  |  |  |  |  |
| Round spark plug gauge |  |  |  |  |  |
| Needle nose pliers |  |  |  |  |  |
| Slip joint pliers |  |  |  |  |  |
| Nut driver set |  |  |  |  |  |
| Tool box (for above tools) |  |  |  |  |  |
| 3/8” foot pound torque wrench | 1 |  |  |  |  |
| Digital Caliper | 2 |  |  |  |  |
| 19620 B&S Fuel Removal Tool | 2 |  |  |  |  |
| 19368 B&S Spark Tester | 2 |  |  |  |  |
| 19070 B&S Ring Compressor | 2 |  |  |  |  |
| Funnel | 2 |  |  |  |  |
| Oil Pan (for draining fluids) | 2 |  |  |  |  |
| 1 gallon Fuel container | 1 |  |  |  |  |
| Tachometer | 1 |  |  |  |  |
| Leak Down Compression Tester | 1 |  |  |  |  |
| Multimeter | 2 |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| Tax | | | |  |  |
| Shipping | | | |  |  |
| TOTAL | | | |  |  |