
TECHNOLOGY & TRADE MODULE: WOODWORKING

Tool Caddy

WHAT WILL WE LEARN?

In this module you will learn to construct a tool caddy with the help of an adult.

WHO CAN HELP?

This involves some skill. Maybe a member has a dad who is a carpenter, or perhaps you know someone who has retired that may be able to help. Talk to your Group Leader to see if he/she can suggest someone to help with this module.

WHAT DO YOU NEED?

- Precut pieces of 1/4 inch plywood
- Dowling
- Glue
- Hammer
- 10-1/2 inch finishing nails
- Glue
- Sandpaper
- Safety goggles

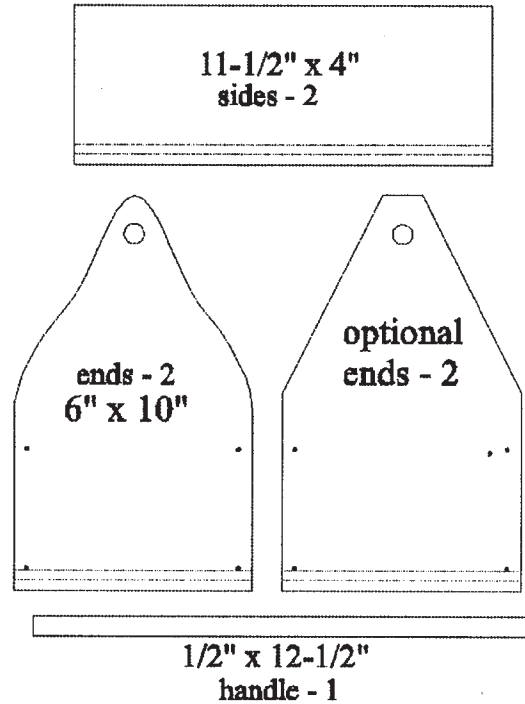
We will use this section to describe what you need to do in preparation for constructing your tool caddy. This is a very simple project when pre-cut pieces are used. The handle is made from a 1/2" dowel, the bottom from 1/4" masonite board, and the rest from 3/4" pine planking scraps.

For your adult supervisor

Use the diagrams to cut out all pieces to the specified sizes. Using a router, radial arm saw, or table saw; cut a 1/4" wide - 1/4" deep groove into the inner sides of both sides and both ends 1/4" from the bottom edges. Drill the 1/2" deep 1/2" diameter holes into the inner side of both ends near the top as shown in the drawings.

Full-size Drawings

1" = 1"



LET'S HAVE SOME FUN!

Assembly

1. Drive four finishing nails into each end piece where the black dots on the drawings indicate.
2. Drive the nails to the point they are about to go completely through or 'ever so slightly through' the wood.
3. Apply glue to the end of one side piece and position it against one end being sure the grooves in both face inside and align with each other.
4. Hammer the two nails all the way in.
5. Apply glue to the opposite end of the other side piece and position it against the same end piece, again being sure the grooves face inside and align with each other.
6. Hammer these two nails all the way in.
7. Slide the bottom into the groove in the sides and the end.
8. Apply glue to the exposed ends of the two side pieces and position the last end piece against the sides with the bottom piece fitting into the groove.
9. Slip the handle into the holes but do not glue it. You will need to open the top a little to insert it.
10. Hammer the last four nails all the way in.
11. Sand off all sharp corners.
12. Allow the glue to dry well before use.

HAMMER AND NAILS!

M Q C B T G N S A M L Y
 B E Z P R E L Z N X E T
 G W A O O I D W G S W Y
 C W O S A W K H L T O M
 Q V K N U L E P E A D P
 E U L G C R L R S I C W
 R E M M A H E I P N A X
 J Y L S K D R Z C S B R
 E U C E G F T D W N T X
 Y R I E P P Q O S R E I
 P A I N T A E O A J Y P
 S L X T B H T W B T A P

WORD LIST

ANGLES
 HAMMER
 POWER

DOWEL
 MEASURE
 SAW

EDGE
 NAILS
 STAIN

GLUE
 PAINT
 TAPE

GROOVE
 PENCIL
 WOOD

SOLUTIONS!

HAMMER AND NAILS!

G + + W + S S L I A N R
 + L O + E + N E T + + E
 + O U L T I + R A + + W
 D + G E A N + U P + + O
 + N + T + + I S E P + P
 A + S + + + + A + E + +
 + + + + D H + E P N + +
 G R O O V E A M + C + +
 + + W + + + + M + I + +
 + E E D G E + + M L + +
 L W A S + + + + + E + +
 + + + + + + + + + R +

OVER, DOWN, DIRECTION

ANGLES(1,6,NE)	MEASURE(8,8,N)	STAIN(3,6,NE)	GROOVE(1,8,E)
HAMMER(6,7,SE)	SAW(4,11,W)	GLUE(1,1,SE)	PENCIL(10,5,S)
POWER(12,5,N)	EDGE(3,10,E)	PAINT(9,7,NW)	WOOD(4,1,SW)
DOWEL(5,7,SW)	NAILS(11,1,W)	TAPE(9,2,S)	

MORE MORE MORE!

1. Build a planter
2. Build a bird feeder
3. Make a shelf for your room

RESOURCES USED TO CREATE THIS MODULE

1. Big Learning, Karen Cole 2003
2. www.puzzlemaker.school.discovery.com
3. www.thewoodcrafter.net/jr.html

LIFE SKILLS MODULE: **PHOTOGRAPHY**

Photography-Composition

WHAT WILL WE LEARN?

In this module you will learn to:

1. Plan a picture considering the subject and background.
2. Simplify the picture to focus the subject.

WHO CAN HELP?

It is pretty easy to find someone who has skill in photography. You may ask parents and find someone who has expertise. Grandparents are another useful source. They may even have some good photos of you when you were a baby that you can bring and show to your friends!

WHAT DO YOU NEED?

1. A camera (The simpler the better if you are a beginner. Digital or disposable cameras are perfect).
2. Photos you like or pictures cut from magazines.

LET'S GET EDUCATED!

Purpose

Before you take a picture think about what you want the picture to do for you.

1. Do you want it to record an event? (The awards given to your speech competition winners)
2. Do you want it to tell a story? (Your friend dancing at her birthday party)
3. Do you want it to create a mood? (The feeling that comes from petting your dog)
4. Do you want it to inspire action? (A truckload of garbage dumped in a creek near your home)
5. What emotion do you want it to trigger?

Composition is a matter of taste. What some people like, others will think is boring or weird. Keep your camera ready and think about taking shots before you take them.

Some Tips To Get Better Pictures

1. Put your subject slightly off centre in the picture, either up from the middle or to the side of the middle.
2. Move close to your subject and avoid background clutter.
3. Make sure there isn't distracting background items. (A flower on the shelf behind your subject looks like it's sprouting from his/her head!)

Groups Of People

1. Arrive early where you intend to take the photo and set it up before your subjects arrive.
2. Lay string or a cord on the floor to show people where they should line up.
3. Arrange people so that their faces are at different levels for an interesting picture.
4. Have your subjects look to the side of you to prevent "red eye."
5. It isn't necessary to have everyone smile at the camera. Photos are often taken when people aren't looking at the camera at all. An example would be taking a comfortable shot of a parent doing something they love.
6. Ask everyone to close their eyes and open them just before a shot to prevent having a number of your subjects blink as you are taking the shot.

LET'S HAVE SOME FUN!

Collect pictures you like - favorite photos or magazine pictures.

1. Identify what you like about the photo.
2. Discuss what the photographer was trying to accomplish.
3. Discuss the background, the subject, the mood, the placement of the main subject.

Take photos of your club, where you meet, your home and your favorite places. Think about your photo composition, your purpose, and your likes and dislikes. Take a roll or two of film to get processed and bring the photos back to a meeting to show other 4-H members.

ENJOY!

MORE! MORE! MORE!

To learn more about photography check out the Alberta 4-H Photography Leaders Manual, Agriculture Food and Rural Development 4-H Branch.

TECHNOLOGY AND TRADE MODULE: VETERINARY SCIENCE

Do you like animals and do you care about the welfare of these animals? If you answered “yes” to these two questions then Veterinary Sciences may be something you want to learn about. Join me, as we go through this module and learn about different animals.

WHAT WILL WE LEARN?

Rather than providing you with a bunch of medical terms that you have to decipher, you will complete an activity that will teach you a little bit about Veterinary Sciences. Hopefully you find this module exciting. It is designed to help you identify and learn the differences between species and breeds of animals.

WHO CAN HELP?

The very best resource person for this module is a veterinarian, however, if there is no way to visit or contact one, a person that cares for animals could also help you - farmer/rancher, SPCA worker, dog kennel operator, etc. Someone that cares about the welfare of animals and understands and is sensitive to their needs is who you want to help you.

WHAT DO YOU NEED?

1. A scrapbook – any type of book that you can write in and glue or stick photos, magazine pictures, small posters, etc. will work just fine - a photo scrapbook would work quite well.
2. Pictures from magazines, breed associations, internet, computer clipart, newspapers etc.
3. Glue
4. Markers
5. Pen or pencil

LET'S GET EDUCATED!

1. While you are completing this activity you may find you are learning important skills that you can use your whole life. Some of these skills may include communicating with others, learning to learn, developing character and acquiring and evaluating information.
2. Veterinarians are considered to be experts on animals. This doesn't only mean knowing how their digestive systems work or what kinds of diseases they need to be vaccinated for. It also means knowing the proper way to care for them and understanding their behaviour.
3. Veterinarians even have to become experts on different species of animals and different breeds within a species. They are often asked questions about different breeds. If you find a stray dog and you take it to the veterinarian for a check up one of your first questions might be "what breed do you think it is?" If someone wants to purchase a horse for their children to ride they might want to know if one breed has a quieter disposition than another breed. Some breeds of animals are also more susceptible to certain diseases. These are all bits of information that a veterinarian may need to know.
4. We are going to complete an activity that will help you learn to recognize some of the many different breeds of animals. Once you have completed the activity you will have something to refer back to at any time to refresh your memory on the things that you will learn.

LET'S HAVE SOME FUN!

SPECIES SCRAPBOOK

Discovering Differences

What Will I Do?

For this activity you will collect pictures of different animals and arrange them in a scrapbook. By using the steps below as a guide you will create a book that is fun to look at and make, but that also provides you with information. This information you will be able to use for years to come. Have fun and be creative while putting together your scrapbook!!

Goal

You are going to collect items that show or tell about different breeds of animals. These items may include photographs, magazine pictures, articles, small posters or anything you can find that shows or tells something about a specific breed of dog, cat, sheep, etc. You will display these items in a scrapbook.

Getting Organized

1. Before you start it may be helpful to create a chart like the one below. This will help you get started and keep your scrapbook organized.
2. If there are certain breeds or certain species of animals that you are familiar with start with these. Write them into the chart.
3. Use your own photos, ask friends or relatives for photos, look through magazines, books, papers, search the internet, etc. and cut out pictures and articles (if you like) of different types and breeds of animals. Write the breed of the animal in the chart. Keep track of what you have collected.

NOTE: Most breeds of animals have Breed Associations that represent them. You can probably access most of these on line, simply by typing in the breed name to a search engine. These association sites may have pictures you can use. There may also be contact information on the site. Many associations are more than happy to promote their breed and would probably send you pamphlets, brochures etc. that would have pictures in them that you could use for your scrapbook.

4. As you collect your pictures, be sure to make a note on the back of them, so you don't forget the details of the picture.

5. You may want to wait until you have collected all your materials for your scrapbook before putting them in. That way you will be able to arrange them all at once. Maybe you prefer sticking them in as you go. Either way is fine, just be sure to make a note on the back of your pictures so you don't forget details about them.
6. To keep items organized you could use a file folder, envelope, box or something similar to put the pictures, photos, articles etc. in as you collect them.

Create, Create, Create!

1. Your scrapbook will definitely need a title page. Use a combination of your computer, your own creative drawing ability, pictures, photographs etc. to create a cover page for your book.
2. Once you start putting your scrapbook together you will want to include certain information under your pictures. This could include the type of animal it is, the animal's name – if it is someone's pet, the breed, the date the magazine article was created and where you found the picture. You can discuss this with your helper/leader and determine what information you should include.
3. You may want to mount your items on a sheet of coloured paper before putting them in your scrapbook.
4. How you organize your scrapbook isn't important as long as it has some sort of order. You should probably keep your species together, but otherwise you can use your own creativity. Each page or section could have a title. You could add captions to your pictures to create some humor. Don't forget to talk with your leader/helper to decide what information to include with each picture. Remember a leader or helper will have to look at it when you're done so you want them to be able to follow what you did.

MORE! MORE! MORE!

1. To learn more about Veterinary Science ask your local vet. clinic or SPCA about doing some volunteer work.
2. Check out the 4-H Resources available for Veterinary Science.

RESOURCES USED TO CREATE THIS MODULE

1. 4-H Animal Series - Skills for Life – From Airedales to Zebras produced by National 4-H Cooperative Curriculum System, Inc.

TECHNOLOGY & TRADE MODULE: **COMPUTERS**

Drawing and Painting with a twist!! You don't need markers, pastels, paints, easels etc. for this project - just sit down in front of your computer and let your fingers do the work.

WHAT WILL WE LEARN?

This module uses some of the information provided by the Computer 1-2-3 Member Manual. You will learn how to use graphic applications to create a project in MS Paint – on a Windows computer, or ClarisWorks or AppleWorks drawing and painting on the Macintosh computer. Using one of these programs you will create a document. This document could be a title page for this module, your Exploring 4-H Binder or just something that you would like to create.

WHO CAN HELP?

You could get a leader, parent or senior member to help you out with this module, or you may want to enlist the help of your computer teacher at school, or someone that runs a computer or graphic design shop that would have a lot of experience in this area. There are many people very skilled in the use of computers. Some of them might be happy to assist you with such a project. It may be helpful to show this module to one of these people. They should be able to guide you through the module, as well as give you pointers on how to complete it more successfully.

WHAT DO YOU NEED?

1. A computer.
2. Computer paper – heavier paper will make your design have more defined lines, be more clear, and have more vibrant colors. Use at least 24lb. paper for the best effect.

LET'S GET EDUCATED!

MS Paint comes with most Windows computers; ClarisWorks or AppleWorks drawing and painting will usually come with the Macintosh computer. These programs are fairly easy to use and they give you some practice using different tools to make or change pictures. When you are first learning these programs, it is best to start experimenting with some of the basic tools like the paintbrush, pencil and fill tool or paint bucket. Once you have some practice with those tools you can begin using the other tools on your formatting palette like the line tool and curve tool. Practicing each of the tools using an online tutorial or the HELP menu from the application will let you create original images for your project.

MS Paint, AppleWorks and ClarisWorks are basic graphic design programs. They will allow you to use the computer in a creative way, while still using basic computer concepts.

There are many innovative and creative exercises you can complete if you choose to take computers as your main project in 4-H. This is just one activity that will allow you to see what types of things you could do.

It is difficult to complete this module if you are not familiar with the computer or have someone helping you with the project. So please read through the directions before starting and make sure you are familiar with the terms and steps involved. If not, be sure there is someone close by that can lend a hand. If there are a number of members in your club completing this module perhaps it could be done as a group in a computer lab if you have access to one, or at the home of someone that has more than one computer.

LET'S HAVE SOME FUN!

Now let's get down to the fun part of this module – creating!!

You are going to create a document that could be used as a title page for this module or for your Exploring 4-H Project book.

1. Find the program on your computer-MS Paint, AppleWorks or ClarisWorks.
2. Create, Open and Save a document - create the document, save it to your hard drive (desktop or into a folder that you have made). You might want to set up a folder for this project and any future 4-H projects you may want to create.
3. Quit the Drawing or Painting program.
4. Start the program again and open the document that you saved. See how easy this is!
5. If you follow directions, ask for help and stay organized, you'll do great!
6. Experiment using the pens, brushes, eraser tools and the undo command.
7. If you need help, ask someone, or use the Help menu or an on-line tutorial.
8. Use the Copy and Paste commands in a single image and between two different images.
9. You can use an image or picture that you have made or you can use a picture on the computer.
10. Each computer has different pictures that come with it, so check around and see what you may be able to use.
11. The reason you might want to copy and paste, on a picture, is to create an image that has some part of another picture in it, or has two of the same thing in one picture. For example, you could use a picture of yourself, copy your head and put it in a picture of a sports car or copy and paste your whole body into the scene of a different place. For fun, you could put yourself at the North Pole in your swimsuit.
12. Practice and experiment as much as you like. Once you start feeling comfortable with the program and like what you are creating, think about saving some of your creations. Keep creating and saving until you have a page you are happy with. Once you are pleased with your creation, print preview it and then print it.
13. What do you think? Are you happy with your creation? If so, you might want to insert it into a protective plastic sleeve to protect it.

MORE! MORE! MORE!

1. If you enjoyed using these programs – MS Paint, AppleWorks or ClarisWorks, you may eventually want to use the more powerful graphics programs that graphic designers, moviemakers and artists use. These professional programs can be quite expensive, but the websites will sometimes give free downloads of tryout versions.
2. You can access 4-H Computer Resources on-line on the Alberta 4-H website - www.4h.ab.ca - for a glimpse of the Computer Project as it is now available. This will give you an idea what this project would involve.

RESOURCES USED TO CREATE THIS MODULE

1. Computer 1-2-3 Member Manual produced by the Alberta 4-H Branch.

TECHNOLOGY & TRADE MODULE: SMALL ENGINES

How Small Engines Work

Ever notice that it is always the carpenter's house that needs work and the mechanic's car that isn't running?

WHAT WILL WE LEARN?

You will learn to identify the basic parts of a small engine. This may be done by dismantling the engine or simply by observation.

WHO CAN HELP?

Perhaps a knowledgeable parent, local handyman or mechanic would be willing to assist you with this module and answer basic questions on the workings of a small engine.

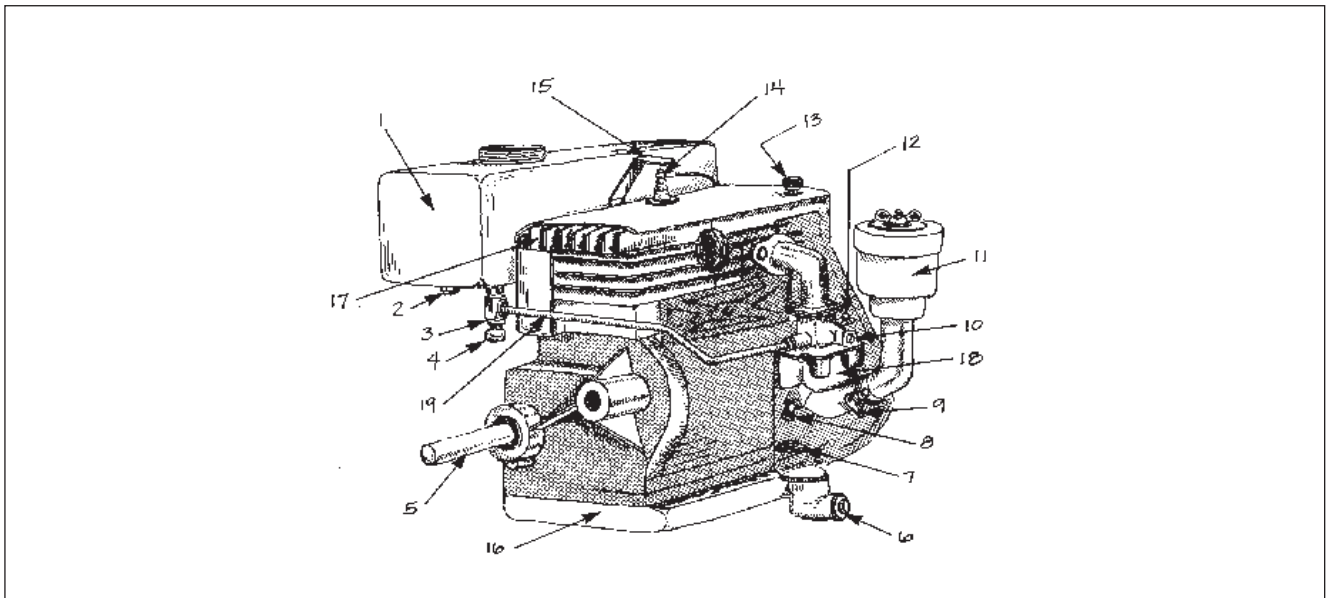
WHAT DO YOU NEED?

To complete this module you will need:

1. A lawn mower, motorcycle or some other machine, that has a small engine. Perhaps who ever you get as a resource person/leader could help you find one.
2. A pair of coveralls or some old clothes that can get dirty would also be helpful.
3. A wrench and socket set, screwdrivers, and pliers if you will be dismantling the engine.

LET'S GET EDUCATED!

MAJOR PARTS OF A SMALL ENGINE



- | | | |
|--------------------|--------------------|-------------------|
| 1. Fuel Tank | 8. Needle Valve | 15. Stop Switch |
| 2. Drain Plug | 9. Choke Lever | 16. Oil Sump |
| 3. Fuel Filter | 10. Idle Valve | 17. Cylinder Head |
| 4. Fuel Valve | 11. Air Cleaner | 18. Carburetor |
| 5. Power Shaft | 12. Idle Screw | 19. Fuel Line |
| 6. Oil Drain Plug | 13. Governor Screw | |
| 7. Oil Filter Plug | 14. Spark Plug | |

Demonstration

Ask your guest or parent leader to point out the parts of a small engine. Explain in general how an engine works and the function of each part.

Do the member activity to solidify the key parts of an engine and their general purpose.

LET'S HAVE SOME FUN!

ENGINE EXPERT?

This activity has been modified from **"Proverbs"** an activity found in the 4-H Fun Pack.

1. The questions or phrases and their corresponding answers (from the SOLUTIONS section of the module) are written on index cards.
2. Each member is handed an index card with either an engine part or it's corresponding question or phrase.
3. Members are asked to find their partners by walking around and trying to find the corresponding answer or question.
4. Leaders can walk around encouraging discussion and problem solving with members until each member has the correct partner.
5. Members must then introduce their part and point it out on the engine or the picture.
6. If it is not practical to have the entire club participate in this activity, members could write the answers to the questions on cards, and try to figure out which question they answer.
7. If you like, you can simply go through the questions below and write in the answers from what you have learned.

1. What turns the engine off? _____

2. What do you need to use in order to start a cold engine? _____

3. What protects the engine from dust in the air? _____

4. Where do you put the gasoline that runs the engine? _____

5. What ignites the fuel mixture? _____

6. Where would you need to remove the dirty oil from? _____

7. Where is the gas and the air mixed? _____

8. If the engine is running too slow what do you turn? _____

9. The engine turns this mechanism. _____

10. The gas moves from the tank to the engine through this. _____

SMALL ENGINE SEARCH

B E T O P T J G L R N S D Z J
 F N I R H Q P P O V T R O P J
 J I S B M T T T V O A A Z P V
 P L Q N B L E C P I S H A F T
 L S N R C R U H N P Q S J Q J
 U S R D U T A O W K A I X Q R
 G I W B F P Z K Y V R V D E L
 A E R I D U B E B Y E A W K W
 B A L F T R E V E L V O P G E
 C C K D J C Q L P M P T Y S R
 M Q D I I Q H G I C K N A T C
 O I L P C L E A N E R V L I S

WORD LIST

AIR	LEVER	OIL	SWITCH
IDLE	SHAFT	STOP	FUEL
SCREW	CHOKE	DRAIN	POWER
CARBURETOR	LINE	PLUG	TANK

SOLUTIONS!

1. Stop switch
2. Choke lever
3. Air cleaner
4. Fuel tank
5. Spark plug
6. Oil plug
7. Carburetor
8. Idle screw
9. Power shaft
10. Fuel line

SMALL ENGINE SEARCH

+	E	+	+	+	+	+	+	R	+	S	D	+	+	
+	N	+	+	+	+	+	O	+	T	R	+	+	+	
+	I	+	+	+	+	T	+	O	A	+	+	+	+	
P	L	+	+	+	+	E	C	P	I	S	H	A	F	T
L	+	+	+	+	R	+	H	N	+	+	+	+	+	+
U	S	R	+	U	+	+	O	+	K	+	+	+	+	R
G	I	W	B	F	+	+	K	+	+	R	+	+	E	+
A	E	R	I	+	U	+	E	+	+	+	A	W	+	W
+	A	L	+	T	R	E	V	E	L	+	O	P	+	E
C	+	+	D	+	C	+	L	+	+	P	+	+	S	R
+	+	+	+	I	+	H	+	+	+	K	N	A	T	C
O	I	L	+	C	L	E	A	N	E	R	+	+	+	S

OVER, DOWN, DIRECTION

AIR(1,8,NE)

IDLE(5,11,NW)

SCREW(15,12,N)

CARBURETOR(1,10,NE)

LEVER(10,9,W)

SHAFT(11,4,E)

CHOKE(8,4,S)

LINE(2,4,N)

SPARK(14,10,NW)

CLEANER(5,12,E)

OIL(1,12,E)

STOP(12,1,SW)

DRAIN(13,1,SW)

PLUG(1,4,S)

SWITCH(2,6,SE)

FUEL(5,7,SE)

POWER(11,10,NE)

TANK(14,11,W)

MORE! MORE! MORE!

1. More resources can be found in the “Small Engines” Leader’s Guide available from the 4-H Branch in Edmonton.
2. Another activity may be to create your own crossword puzzle after the demonstration and dismantling of the engine.

RESOURCES USED TO CREATE THIS MODULE

1. www.small-engine.com

TECHNOLOGY AND TRADE MODULE: **WELDING**

Arcs, electrodes, clamps, welding shields, spatter, slag – what do all these words have in common? Once you have completed this module you will be able to answer this question.

WHAT WILL WE LEARN?

As welding is more of a project for intermediate or senior members we are going to use this module to introduce a few concepts and suggest taking a look at some welding projects. Welding is something that should be done by older members under the supervision of an adult.

WHO CAN HELP?

It would be beneficial if you could talk to a welder and visit a welding shop. Because welding is largely hands on, it would be good for you to look at some welding jobs to understand the teachings in this module.

WHAT DO YOU NEED?

Everything you need is included in this module.

LET'S GET EDUCATED!

BASIC PRINCIPLES OF WELDING

If you were to take two ice cubes from the refrigerator, the outer surfaces under the heat of the day will begin to melt to ice water. Place the two wet cubes one on top of the other back in the refrigerator and within a short time the two cubes are welded together to form one block of ice. The addition of heat has melted a portion of the two parts to be joined. As they cool down they become one structure - the melted section becoming an intimate part of the bond. This is the basis of welding.

THINGS TO KNOW

Let's look at some equipment that may be used by a welder. By learning correct terminology you will be able to identify some of the items in the welder's shop when you visit one. For this module, we will focus on arc welding.

WHAT IS ARC WELDING?

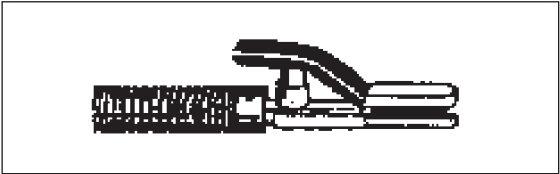


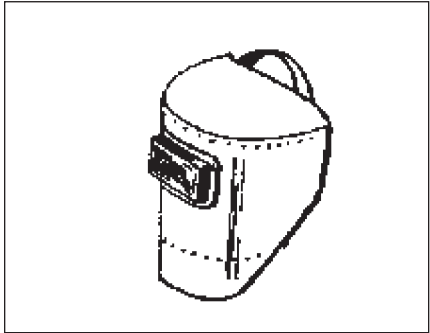
Arc welding is a method of joining two pieces of metal into one solid piece. To do this, the heat of an electric arc is concentrated on the edges of two pieces of metal to be joined. The metal melts, while the edges are still molten and additional melted metal is added. This molten mass then cools and becomes one solid piece.

WELDING TERMS AND TOOLS

Arc – The bright spark that happens when electricity jumps from the electrode to the metal being welded.

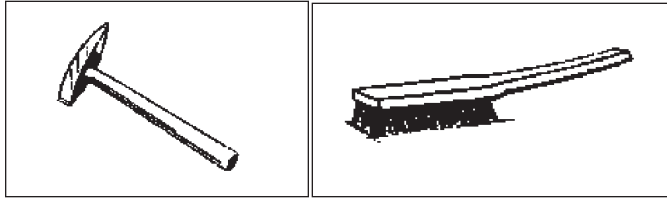
Electrode – the long grey metal rod which is used to weld metals together; the electrode melts while in use.

Welding Equipment

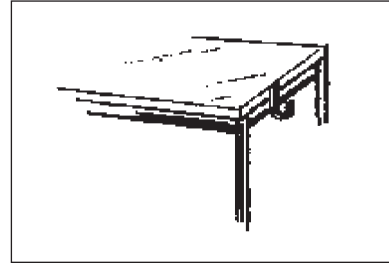
- **Electrode Holders** - The electrode holder is the hand clamp which must hold the electrode to be used for the weld. Some professional welders call the electrode holder the “stinger”. A good electrode holder is rugged but light.
- **Ground Clamp** - The ground clamp is the clamp that must be clamped either to the part to be welded or to the table on which the welding will be done.
- **Cables** - One three-wire heavy cable called a “pig tail” connects the welder to the power. This “pigtail” is much the same as the cable used on the electric stove in the kitchen. Two single conductor cables are used to carry the current to the welding table. One of these is hooked to the ground clamp and the other to the “stringer” electrode holder. These cables must be large enough to carry a lot of current without getting hot.
- **Head Shield** - Never look at the arc or try to weld without a shield. There is a lot of spatter of hot metal and slag flying around which will be painful and damaging if you get some of it in your eyes. The arc itself gives off some rays known as ultraviolet and infrared which will burn your eyes much like the sun will give you a sunburn. Looking at the arc may not bother you much at the time, but four or five hours later you will be in real pain. Your eyes will feel like someone threw a handful of salt in them.

- **Chipping Hammer and Wire Brush -**

When you are doing a welding job, you need a chipping hammer to chip off the slag. You should always remove the slag from the weld before running another pass. A wire brush is handy to clean off rust and burnt paint, etc. If you do not have a chipping hammer, it is easy to make one by welding a short rod to an old cold chisel.



- **Welding Table** - You need a table to work on when you are welding small parts. A piece of sheet metal 45 x 60 cm and about 6mm thick works out very well for a table top. Pipe or angle iron can be used for legs. Weld spatter doesn't stick to copper or cast iron. If you can find either a fairly large piece of flat cast iron or copper sheet, use it on the top of your table to place your weld jobs on.



Slag – the waste material left on a weld that must be chipped off so that a weld can be seen.

Spatter – red hot bits of metal and slag that fly away from the bead while welding.

WELDING SAFETY

Because there are a lot of precautions that welders need to be aware of it is important that we point out what they are.

1. Never look at welding arc with the naked eye.
2. Always use a helmet or face shield that is in good condition. Wear safety glasses.
3. Replace any cracked or poor-fitting lenses in the helmet or shield.
4. Wear suitable clothing to protect all parts of your body from spatter and arc burns.
5. Any part of your body left exposed to the arc can be burned by the ultraviolet radiation (just like a sunburn!). Cover up!
6. Do not strike an arc or weld until you are sure those in the vicinity have protective equipment or will look in the other direction.
7. Do not weld around combustible materials.
8. Do not pick up hot metal. Even if it's black, it can still be quite hot. Use pliers.
9. Do not weld in confined spaces without adequate ventilation.
10. Do not leave the electrode holder on the welding table or in contact with a grounded metal surface.
11. Do not use worn or frayed cables.
12. Keep your welding area clean.

LET'S HAVE SOME FUN!

Now that you have a few of the basics of welding, this may be the time to visit a welding shop.

1. Take a look at some welding projects and see if you can identify the equipment we talked about in the Let's Get Educated section above. If you have a farm machinery dealership near you, take a look at the equipment. Any piece of machinery that is made with metal will have some welding on it. Check out where the machinery is welded and the quality of the welds. You will probably notice that not all welding jobs connect two pieces of iron that are parallel to one another. Sometimes joints will be done at an angle, or in a difficult location.
2. **Welding Cryptograms** - To find the solutions to the two cryptograms below, transfer the letters identified by each number, into the blanks under the code.

WELDER'S WORK

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
2	16	5	22	1	18	21	7	14	10	15	8	13	20	24	17	9	26	23	19	11	12	3	25	4	6

2 26 5 9 1 8 22 14 20 21 14 23 2 13 1 19 7 24 22 24 18
 10 24 14 20 14 20 21 19 3 24 17 14 1 5 1 23 24 18 13 1 19 2 8
 14 20 19 24 24 20 1 23 24 8 14 22 17 14 1 5 1

WELDER'S AWARENESS

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
7	9	6	18	13	26	12	5	15	24	2	4	10	16	25	1	19	23	20	22	8	3	11	14	21	17

16 13 3 13 23 4 25 25 2 7 22 11 13 4 18 15 16 12 7 23 6
 11 15 22 5 22 5 13 16 7 2 13 18 13 21 13 7 4 11 7 21 20
 8 20 13 7 5 13 4 10 13 22 25 23 26 7 6 13 20 5 15 13 4 18
 22 5 7 22 15 20 15 16 12 25 25 18 6 25 16 18 15 22 15 25 16
 11 13 7 23 20 7 26 13 22 21 12 4 7 20 20 13 20

SOLUTIONS!**WELDER'S WORK**

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
2	16	5	22	1	18	21	7	14	10	15	8	13	20	24	17	9	26	23	19	11	12	3	25	4	6

A R C W E L D I N G I S A M E T H O D O F
 2 26 5 3 1 8 22 14 20 21 14 23 2 13 1 19 7 24 22 24 18
J O I N I N G T W O P I E C E S O F M E T A L
 10 24 14 20 14 20 21 19 3 24 17 14 1 5 1 23 24 18 13 1 19 2 8
I N T O O N E S O L I D P I E C E .
 14 20 19 24 24 20 1 23 24 8 14 22 17 14 1 5 1

WELDER'S AWARENESS

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
7	9	6	18	13	26	12	5	15	24	2	4	10	16	25	1	19	23	20	22	8	3	11	14	21	17

N E V E R L O O K A T W E L D I N G A R C
 16 13 3 13 23 4 25 25 2 7 22 11 13 4 18 15 16 12 7 23 6
W I T H T H E N A K E D E Y E . A L W A Y S
 11 15 22 5 22 5 13 16 7 2 13 18 13 21 13 7 4 11 7 21 20
U S E A H E L M E T O R F A C E S H I E L D
 8 20 13 7 5 13 4 10 13 22 25 23 26 7 6 13 20 5 15 13 4 18
T H A T I S I N G O O D C O N D I T I O N .
 22 5 7 22 15 20 15 16 12 25 25 18 6 25 16 18 15 22 15 25 16
W E A R S A F E T Y G L A S S E S .
 11 13 7 23 20 7 26 13 22 21 12 4 7 20 20 13 20

MORE! MORE! MORE!

1. To help you remember what you have learned in this module create a journal/scrapbook. Take photos of the welding shop you visit and of machinery that has been welded. Journal what the photos are of and add a fact, or a piece of information about each one. You should also write a date and location beside each photo. You can probably get pictures from the internet or magazines as well. Make a cover page for your journal/scrapbook and keep the book with your Exploring 4-H Project material.
2. If you enjoyed what you learned in this module and would like to learn more talk to your leader about the Welding Project. You may not yet be quite old enough to pursue this topic further, but check it out and see what the possibilities are.

RESOURCES USED TO CREATE THIS MODULE

1. 4-H Welding Project Book produced by The 4-H Branch, Agriculture, Food and Rural Development
2. www.puzzlemaker.com
3. www.aussieweld.com.au