East Rowan High School
Agricultural Education

Agriculture Mechanics 1

Course Pack

Student Name_____

Agriculture Mechanics I

Course Syllabus

Instructor:

Brandy Starnes
Email: starnesbs@rss.k12.nc.us
School Telephone: 704.279.5232 ext.133

Course Description:

This course provides instruction focused on the basic scientific principles and processes that are involved in animal physiology, breeding, nutrition, and care in preparation for an animal science career major. Topics include an introduction to animal science, animal nutrition, animal science issues, career opportunities, and animal evaluation. Skills in biology, chemistry, and algebra are reinforced in this course. Supervised agricultural experience programs and FFA leadership activities are integral components of the course and provide many opportunities for practical application of instructional competencies.

Ag. Mechanics I Course Objectives: At the end of this course you should be able too…

- Recognize the importance of ag. mechinics to our community and culture.
- Use the SAE project book to keep records and calculate finances.
- Demonstrate leadership skills such as parliamentary procedure.
- Identify and safely use various hand tools and power tools.
- Demonstrate electrical, concrete, carpentry and metal working skills, including welding.
- Calculate a cost effective plan for a project.

Grading

Exams	**30%**
Quizzes	**30%**
Daily Participation	**20%**
Notebook	**10%**
Supervised Agricultural Experience (SAE)	**20%**

This course has an End of Course Test administered by the Department of Public Instruction in Raleigh. This exam grade will count as 25% of your final semester grade.

Materials Required for Class:

- Three-Ring Binder (At Least 1.5”). Each class will have a shelf to keep it in the classroom.
- Closed Toe Shoes (these can also be kept in my room)
- Clothes That You Don’t Mind Getting Dirty (these can also be kept in my room)
- Notebook Paper
- 4 Notebook Dividers
- Writing Utensils (pens, pencils, markers)
- Calculator
- FFA Dues - $15.00

Notebooks will be graded during every nine weeks. Guidelines for grading

- Organized- chronologically order with dates
- Neat- clean, readable, no lose paper
- Complete- containing notes, returned assignments, etc.

Student Organization (FFA):

All students are highly encouraged to participate in the FFA Organization. Some opportunities offered by the FFA are local activities, career development events, travel and awards. The local chapter meets every month with a banquet in May. If chapter dues are a financial burden please let the advisor know. No child will be excluded from participating because of financial difficulties.

Laboratory:

This course will require students to participate in laboratory activities, work experiences and field trips. Students must have a **safety contract** with the appropriate signatures on file with the teacher before participating in any out of class activity. **Each student must also pass a safety test with 100% accuracy before he/she will be allowed to take part in laboratory activities.** A school insurance policy and/or a private policy is required for students taking this course.

Class Guidelines:

Classroom rules as well as the student organization will follow the guidelines set for by the "National FFA Code of Ethics." A copy of this will be posted in the classroom and is also available in the Official FFA Manual.

Consequences for failing to follow procedures

1. Warning and/or student conference
2. Detention Session (amount appropriate for severity)
3. Referral to administration

Textbook

You will have the use of a class textbook. These books can not be taken from class unless you obtain prior approval from the teacher. If you borrow a book you will be responsible for returning it.

Class Absence Policy

The class will operate on the "buddy" system. During the first few days of school you should chose a partner that is responsible for helping you in the event that you are absent from class. Each buddy is responsible for informing the other about test, class work, notes and other important information. Your buddy should also obtain extra copies of handouts when you are absent. If you miss class on the day of an exam or quiz you will be responsible for scheduling a make-up with the teacher. It is not and will not be the responsibility of the teacher to inform you of materials that you have missed.

Bathroom Policy:

You will be given 3 bathroom passes for each nine weeks. You can use these at any time to go to the bathroom, and only the bathroom, if you fill them out and turn them in when you return. Do not ask to go if you do not have a pass unless this is a one time emergency. If you still have them at the end of each nine weeks period you will be given extra credit on that nine weeks grade.

Class work/Participation

Daily Grades will be comprised of lab work, group work, quizzes, assignments, etc. To make a good grade in these three areas, follow the three requirements below.

1. **Attendance:** You must be here in order to receive a daily grade. If you are absent, you will receive a zero into your average until you make up the work you missed. If you are absent for a quiz you are not required to make up that grade. You will choose a buddy to help catch you up on anything you may have missed; do not ask me what you missed unless it is outside of class time. You are responsible for all material given on any missed day for any future tests or projects. Students are allowed eight missed days but are allowed to make up any additional hours missed. Making up this time will be done after school and should be initiated by the student!

2. **Participation:** In order to be paid by an employer, you must perform the task that they ask you do on the job site for that day. In order to receive a grade, you must participate and complete the daily assignment(s). Examples of not participating include: sleeping, daydreaming, insubordination, etc. There are some class assignments that you can not make up, so participation is key.
3. **Accuracy:** You must strive for perfection on every assignment. Products that are inferior in industry are sold at a lower cost. Employees that only do adequate work only receive adequate pay. Remember this in relation to your grades.

Tests

Tests will be given at the end of each unit. There will be 9 major units. Tests are hard and you will need to study. As long as the class participates we will always have a review day prior to a unit test. This review will include most questions on the test so pay attention and make notes. You may use www.rss.k12.nc.us/erhs/linksforus web site to study for each unit.

Participation

Participation grades not only include a student's willingness to complete assigned tasks, but also their completion of key projects. What makes Agriculture Education special is that it provides student with hands on opportunities. We will be raising animals and all students will be required to care for those animals at some point in the semester. A student's willingness and quality of completion of these hands-on tasks will determine the participation grade. Students will also have to get papers signed such as this syllabus and progress reports to add easy 100s to this participation grade.

No-Fail Policy:
You are allowed to correct/revamp/fix-up any assignment that you turn in to me to receive partial credit back on that assignment. You can also stay after school with me to retake any test. All students should have no problem succeeding!

Parental / Student Contract

Student Portion

As a student in Mrs. Starnes' class, I understand and agree to follow the plan set forth in this syllabus in order to achieve success in this class and more importantly in life.

_____ Student Signature

_____ Student Name Printed

_____ Date

Parent Portion

As a parent, I agree to help my child achieve success in this Agriculture class and more importantly in their future. I have read and understand this syllabus and will try to give any support that I can for my child to succeed.

_____ Parent Signature

_____ Parent Name Printed

_____ Date

_____ Street Address

_____ City, State, and Zip

_____ Telephone Number (Work)

_____ Telephone Number (Home)

_____ Telephone Number (Cell)

_____ Email Address

I would rather be contacted by: Email……Home Phone…..Work Phone…..Cell Phone
(please circle what applies)

Note on email correspondence
Please include at least one email address that at which a parent can be reached. Email will be the primary means of communication. I (Mrs.Starnes) will use email to make parents aware of upcoming assignments, FFA events and sales, progress reports and general correspondences. The easiest/quickest way to contact me will be through email.

****Return to Mrs. Starnes**

Supervised Agricultural Experience

Students are expected to have an SAE (Supervised Agriculture Experience) Project while enrolled in this agriculture class. An SAE is a project that is agriculturally-based, supervised by an adult, and performed by a student **outside of class time**. This is the only homework for this class!
Here are the types of SAE projects you may choose:

SAE Area	Brief Description
Entrepreneurship	Own It, Usually a business
Placement	Job, work for someone else (can be paid or unpaid)
Experimental	Agriculture Based Science Experiment
Analytical	Research Project/Paper/Presentation
Improvement	Improvement/Service Project
Supplementary	One Time Skill, Not Part of Overall SAE
Exploratory	Career Exploring

We will discuss SAE extensively in class. We will have at least two SAE days that will give students opportunity to work on organizing their SAE, talking it out with friends, or asking questions of the teacher. An SAE can help you with determining a career or hobby, earning some extra money as a high school student, or even earn you recognition through Proficiency Awards.

SAE record books will be acquired by your child DIGITALLY! They may get it off the web, by email, or bring in a drive. We will not be printing out books or any student!

Each individual student's SAE must be in one of the following four areas: Entrepreneurship, Placement, Improvement, or Experimental. Students can use Supplementary SAE skills to help them receive their total required hours.

The 1st Nine Weeks portion of your SAE, initial planning, will be due during the 8th week of class and the 2nd Nine Weeks portion, the completion of the project, will be due during the 16th week of class. The SAE Project will count as 20% of the student's grade for both 1st and 2nd Nine Weeks. A minimum hour requirement for this project is outlined in the Time Log section of each project. Students will receive SAE instruction by the end of week three in the semester.

Awards will be given to those students with be best SAE projects at our FFA banquet in May.

Guidelines for a successful SAE:

1. SAE projects must be presented in a "scrap book'" format. It must be neatly in a binder, project board, PowerPoint, etc. Loose or stapled SAE books will not be accepted!
2. Be creative! Extra points will be rewarded to the project for neatness and presentation.
3. This is a *record keeping project*! Extra credit will be given for extra hours worked with in reason.
4. ALL pictures must be mounted on paper (or other wise presented) with captions. Loose pictures will not be counted.
5. Regular housework, pets, and baby sitting does not count. This project must be within the wide realm of agriculture.
6. Jobs may be paid or unpaid. Yes, mowing hay for your grandfather, although you are not paid, does count!

Due Dates for SAE for this Semester:

NO LATE SAE PROJECTS WILL BE ACCEPTED!!!!

EAST ROWAN
Agricultural Science Department & FFA Chapter
175 St. Luke's Church Road
Salisbury, NC 28146
704.278.5232 ext 133

PERMISSION SLIP 2010-2011

The agriculture/FFA program offers students many off campus field trip opportunities during and after school hours. The purpose of this permission slip is to avoid numerous permission forms being sent home and returned throughout the school year. Listed below are examples of potential field trip opportunities, however, this is not intended to be an inclusive list.

Animal Science/Agriscience class

- Veterinarians office
- Dairy farm
- Boy Scout camp
- Greenhouse business
- Poultry processing business

Horticulture class

- Greenhouse/nursery business
- Golf course
- Florist
- Landscape job
- Equipment rental business

FFA club

- Southern Spring Show – Charlotte Merchandise Mart
- North Mecklenburg High School – Horticulture Contest
- Nursing home – Christmas caroling
- South Rowan High School – Public speaking contest

Please sign below if you grant permission for your son/daughter to participate in field trips hosted by the agriculture department at East Rowan High School.

Student's name:_____

Parent signature: _____

Agricultural Education-Safety Contract

Welcome to your agricultural education class. This semester we have many hands-on activities planned for you. You might create your own shop project, use chemicals to enhance the reproduction process of plants, or even dissect specimens to see how they work. However, before you may participate in any of these activities you must know that there are rare but certain risks that are involved in these activities. You and your parents must read the following guidelines and sign the attached document. We want you to be safe, and safety starts with awareness.

General Guidelines

1. Conduct yourself in a responsible manner at all times in the shop or laboratory.
2. Follow all written and verbal instructions carefully. If you do not understand directions, ask the instructor before proceeding.
3. Never work alone. No student may work in the shop or laboratory without an instructor present.
4. When entering the shop or laboratory do not touch equipment or materials until instructed to do so.
5. Perform only those experiments authorized by the instructor. Unauthorized experiments are prohibited.
6. HORSEPLAY, PRACTICAL JOKES, AND PRANKS ARE DANGEROUS AND PROHIBITED.
7. Observe good housekeeping practices. Keep work areas clean and tidy. Excess mess can cause hazardous situations.
8. Keep aisles clear.
9. Properly store all flammable liquids in a fireproof cabinet after each use.
10. Labels and equipment instructions must be read carefully before use.
11. Know the locations and operating procedures of all safety equipment and know where all exits are located.
12. Be alert and proceed with caution at all times in the shop or laboratory. Notify the instructor immediately of any unsafe conditions you observe.
13. Report any accident or injury to the instructor IMMEDIATELY, no matter how trivial it may appear.
14. When removing an electrical plug from its socket, grasp the plug, not the electrical cord. Hands must be completely dry before touching an electrical switch, plug, or outlet.
15. Report damaged electrical equipment immediately. Look for things such as frayed cords, exposed wires, and loose connections. Do **not** use damaged electrical equipment.
16. If you do not understand how to use a piece of equipment, ask the instructor for help.
17. Long hair must be tied up securely.
18. Remove all personal accessories and loose clothing which might get caught in moving machinery. This includes rings, watches, jewelry, shop rags, ties, and open jackets.
19. This is a school rule and should be observed at all times. There is to be NO SMOKING IN THE SHOP OR LABORATORY AREA. There should also be no food or drinks in these areas.
20. Any student that is taking prescribed drugs which might cause drowsiness, lightheadedness, or disorientation in the shop or laboratory should not be used. Any student taking such medicines should notify the instructor.
21. IF YOU DON'T KNOW, ASK! There is no such thing as a dumb questions, only dumb mistakes and injuries.
22. Heated metals and glass remain very hot for a long time. They should be set aside to cook and picked up with caution. Use tongs or heat-protective gloves if necessary.

Shop Specific Rules

All of the general guidelines should be observed while in the shop area. However, there are additional guidelines that must be observed while in the shop.

1. Safety glasses are required at all times in the shop. Do not remove your glasses at any time.
2. Do not operate any power equipment that you are not familiar with.
3. Always ask for assistance when carrying large pieces of lumber or large objects.
4. Pay attention to the task you are performing. Be aware of your surroundings at all times.
5. Make sure all power cords are clear of your work area before operating power equipment. Cords should not be in the cutting path of any tool.

6. Before operating any power tools, make sure all allen wrenches, chuck keys or other foreign materials are clear of the machine's work area.
7. Always make sure that all power tools are turned off and the electrical power disconnected before leaving the machine. Never leave an unattended machine running, even for "one second."
8. Do not wear contact lenses in the welding shop. The intense light from the arc welding torches can cause contact lenses to damage your eyes.
9. Never wear open-toed shoes in the shop. Leather boots are preferred.
10. Keep your hands well away from the point of contact between the work piece and the cutter. Use push sticks to guide materials through machines.
11. Machine safety guards must be in protective safety position while the machine is in operation. The guards are put there for your protection.

Laboratory Specific Rules

All of the general guidelines should be observed while in the lab area. However, there are additional guidelines that must be observed while in the laboratory.

1. Always work in a well-ventilated area.
2. Dispose of all chemical wastes properly. Never mix chemicals in sink drains. Sinks are to be used only for water and those solutions designated by the instructor.
3. Keep hands away from face, eyes, mouth and body while using chemicals or preserved specimens. Wash your hands with soap and water after performing all experiments.
4. Handle all living organisms used in a laboratory activity in a humane manner.
5. Any time chemicals or glassware are used, students will wear laboratory goggles. THERE WILL BE NO EXCEPTIONS TO THIS RULE!
6. If a chemical should splash in your eyes or your skin, immediately flush with running water from the eyewash station or safety shower for at least 20 minutes. Notify the instructor immediately.
7. All chemicals in the laboratory area are to be considered dangerous. Do not touch, taste, or smell any chemicals unless specifically instructed to do so.
8. Check the label on chemical bottles twice before removing any of the contents. Take only as much chemical as you need.
9. Never return unused chemicals to their original containers.
10. Acids must be handled with extreme care.
11. Handle flammable hazardous liquids over a pan to contain spills. Never dispense flammable liquids anywhere near an open flame or source of heat.
12. Never remove chemicals or other materials from the laboratory area.
13. Never handle broken glass with your bare hands. Use a brush and dustpan to clean up broken glass. Place broken or waste glassware in the designated glass disposal container.
14. Do not immerse hot glass in cold water; it may shatter.

I have read the above guidelines and rules. I, _____, agree to follow these rules while in the agriculture department or participating in FFA activities. If I do not follow these guidelines and rules I know will be subject to the discipline set forth by Mrs. Starnes and the East Rowan High School administration.

_____

Student Signature Date

How to keep my Agriculture Notebook

Grading

Class notes in order/rules flowed	40%
Journals	60%

Rules

- Put the syllabus/contract that was signed by you and your parents as the first thing in you notebook. DON'T LOOSE IT!
- There should be four tabs in your Notebook
    1. Journals
    2. Notes
    3. Quizzes/Handouts/Tests
    4. SAE book
- All papers and sheets must be in the rings—not in pockets.
- Keep all papers neat and in order.
- You may keep the notebook in my classroom, but it is still your responsibility. If someone steals your notebook or Journals you will not receive a grade.
- If you are absent on grading day, you are responsible for getting your notebook to me to receive your grade. I will not track you down!

Journals

- Journals reflect what you LEAENED the previous day, not what you did.
- If absent, your day's journal will be of the last day attended. Write "absent" for the days you were not in class. Use this time to get class note and assignments from your buddy.
- Every morning you will have 10 min to do journal entries.
- Several people in your class will be asked to read journals and will be graded as class participation. If you did not do one, it will be a zero for 20% of your semester grade!

Unit A. Leadership in Ag. Mechanics

OBJECTIVE: AM01.00 Investigate organizations related to the agricultural mechanics industry

The FFA Mission Statement

_____
_____
_____
_____`.

What is FFA?
It is an organization of high school students in agricultural education
■Included students from all 50 states plus _____ and _____

FFA History

1917 – Smith-Hughes Act
■ Named after a senator from _____
■ Provided federal _____ for Vocational Agriculture in public high schools.

1920's _____
■ _____ was the first
■ _____
■ North Carolina
Young Tar Heel Farmers

1928 – _____

The 1st convention was held in the Hotel Baltimore in Kansas City, Missouri
□The first dues were 10 cents
□Current chapter dues are _____

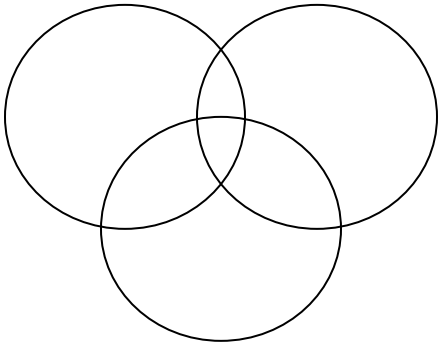
1930 - _____

1934 - _____
- Organization for _____ males in high school agriculture classes.
- Colors were _____

1950 - _____
■Gave the FFA a _____
■The law said that
_____
_____

Created **3 integral components** to an agricultural education program

1. _____
2. _____
3. _____



1965 - _____

1969 - _____

1971 - _____

- Founded for supporters of FFA, not necessarily former members

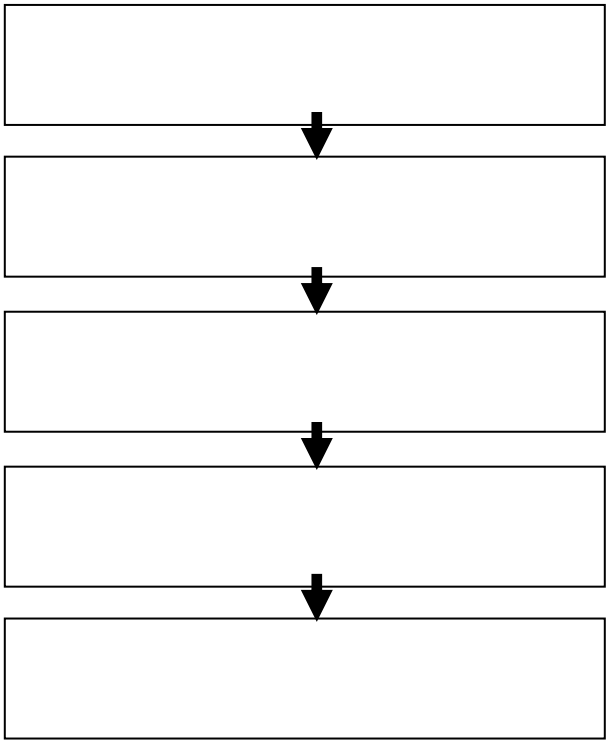
1988 - _____

1989 - _____

1990's - _____

2006 - _____

Structure of the FFA



National FFA Officers

Comprised of _____

_____ is currently the National FFA Advisor
He is employed by _____

Chapter Officers

President _____
Vice President _____
Secretary _____
Treasurer _____
Reporter _____
Sentinel _____

Southwest Regional FFA Officers
Composed of at least _____ members from the region

The FFA Emblem

The Ear of Corn-
_____
_____
_____.

The Eagle-
_____
_____
_____.

The Rising Sun
_____
_____
_____.

The Plow
_____
_____
_____.

The Owl
_____
_____
_____.

Agricultural Education" and "FFA" are _____ in the center to signify the combination of _____ necessary for progressive agriculture.

The FFA Official Colors are _____ and _____.

The FFA Motto

_____
_____
_____
_____

FFA Code of Ethics

- FFA has established
  _____
  _____
- All FFA members should follow the code and should use it as a guideline to live by.

FFA Officers and Stations

- President_____
- Vice President_____
- Secretary_____
- Treasurer_____
- Reporter_____
- Sentinel_____
- The Advisor_____

_____

Minimum of six officers
Additional officers may be established by the local chapter
- Chaplin, Historian, Parliamentarian

Ceremonies
- Rituals conducted at each meeting

Opening ceremony
Closing ceremony

Opening Ceremony- "All in Unison"

President: "FFA members, why are we here?"

All members say:
"_____, honor agricultural opportunities and _____, and
develop_____
_____ should possess."

Closing Ceremony- The FFA Salute

“_____
_____
_____
_____.”

FFA Official Dress

Males

- _____
- _____
- _____
- Official FFA Jacket zipped to the top
- _____

Females

- _____
- _____
- _____
- Official FFA Jacket zipped to the top
- _____

FFA Degrees

- _____ FFA Degree (Middle School)
- _____ FFA Degree
- _____ FFA Degree
- _____ FFA Degree
- _____ FFA Degree

Types of FFA Membership

- Active
  - □Students in _____(up to age 21)
- _____
  - □Former active members, parents of FFA members, and others interested in and supportive of FFA
- _____
- _____

FFA Programs of Activities (_____)

- It is a plan that _____

Activities are determined by the

_____
_____

Committees are appointed to look at different areas of the POA
Voted on by the total membership

Career Development Events

Individual or team competitions covering several subjects in agriculture and leadership

Examples:

Parliamentary Procedure

_____

_____

Poultry Evaluation

_____

Conventions

- State FFA Convention
  - ☐_____
  - ☐_____
- National FFA Convention
  - ☐_____

North Carolina FFA Center (White Lake)

- _____
- _____

***OBJECTIVE: AM02.01 Explain the role of parliamentary procedure in conducting business meetings*.**

Organizing your FFA meetings with Parliamentary Procedures

What is Parliamentary Procedure?

_____
_____

Parliamentary procedure is governed by

_____
_____

Purposes of Parliamentary Procedure

_____

Extends _____

Observes the rule of the _____

Ensures the _____

The Gavel

- The _____ uses the gavel to control aspects of the meeting.
- The number of taps determines the meaning.

<u>One Tap</u>

- **Tells members to be _____**
- **Used after passing or rejecting a _____**
- **Used after the announcement that the meeting is _____**

<u>Two taps</u>

-_____

Three taps

-symbol to rise during _____

Series of taps

-used to bring _____

Presiding Officer

_____
Must be _____
Must relinquish the chair when the president desires to
_____

OBJECTIVE: AM02.02 Demonstrate key parliamentary abilities that would be used in a business meeting.

Motions

Main Motion
Used to get group approval for a new project or some other course of action
Wording: _____

Main Motion
Requires _____
_____
_____
_____
Can be _____

Amendments

_____
3 ways to amend: _____, _____, _____.
Wording: "_____"

Amendments

_____
Debatable
_____
_____
_____

Adjourn
Used to _____
Wording: "_____"

Adjourn

_____
_____
_____

Requires second

_____

Appeal

_____

Wording: "I appeal the decision of the chair"

Appeal

_____

_____

Can be reconsidered

_____

Majority vote required

Point of Order

Used when one believes a parliamentary error has been made

_____

Point of order

- _____
- _____
- Does not require second
- _____
- _____

Division of the House

_____

_____

Division of the House

_____

_____

_____

Cannot be reconsidered

_____

Lay on the table

_____

Motion must be taken from the table at the next meeting to be discussed
Wording: "I move to lay this motion on the table"

Lay on the table

- _____
- _____
- _____
- _____
- _____

Previous question

_____

Wording: "I move to previous question"

Previous question

_____
_____
_____
_____
_____

Refer to committee

Used to gain more information on a motion before voting
Wording: "I move to refer this motion to a committee to report at our next meeting."

Refer to committee

- _____
- _____
- _____
- Can be reconsidered
- _____

Business Meetings
Order of Business

- **_____**
- **An agenda or _____**

Sample Order of Business
Opening ceremony

- **Call to order by the _____**

Minutes of last meeting read
_____
_____
_____
Adjournment

UNIT B: EMPLOYABILITY SKILLS

OBJECTIVE: AM04.01 Identify agricultural mechanics industry careers and their required skills.

Agricultural Mechanics Industry Careers

- An _____ designs tractors and agricultural machines.
- A _____ keeps chainsaws and other forestry equipment running.
- A builder constructs _____.
- An electrician installs _____, _____, _____, and _____ such as thermostats and humidistats.
- An agricultural mechanic _____.
- A _____ uses _____machines to repair broken metal machinery and to construct metal equipment.
- A hardware store employee _____ tools, parts, and materials to repair agricultural machinery and equipment.
- A soil conservationist _____.
- A _____ and installer plans and installs those systems for fields, turf, landscape, and golf courses.
- A lawn equipment service mechanic repairs _____ _____.

OBJECTIVE: AM04.02 Describe various skills that are necessary for employment in an agricultural mechanics career.

A. Skills vary from _____ to _____ skilled depending on the career in agricultural mechanics. A _____ needs few skills, but an _____ needs many skills to check for quality.

B. Personal interests and qualifications include:

1.

2.

3.

4.

5.

C. Education qualifications vary depending on the careers.

1. _____ or less for unskilled entry-level jobs.

2. _____ for skilled jobs such as technician.

3. _____, _____ or _____ for most professional areas such as engineer because of required licenses, paper work, research and/or teaching.

Where can I get training?

- **http://www.bae.ncsu.edu/**
-
-
-
-
-

OBJECTIVE: AM05.01 Describe the broad field of agricultural mechanics and the different categories.

A. Definition

1. Mechanics :_____

_____.

B. Categories of Agricultural Mechanics

1. General Agricultural Mechanics _____
   Examples**: a.** **b.** **c.**

2. Agricultural Electrification, Power, and Control _____
   Examples**: a.** **b.** **c.**

3. Agricultural Power Machinery Operation _____
   Examples**: a.** **b.** **c.**

4. Agricultural Mechanics, Construction and Maintenance _____
_____
   Examples**: a.** **b.** **c.**

5. Agricultural Structures, Equipment, and Facilities _____
_____
   Examples**: a.** **b.** **c.**

6. Soil and Water Mechanical Practices _____

_____

Examples**: a.** **b.** **c.**

7. Other Agricultural Mechanics includes any category not listed above.

OBJECTIVE: AM05.02 Specify how agricultural mechanics is important to our economy.

A. _____ – money

1. _____
2. _____
3. _____

B. _____ – health and comfort

1. Maintains and repairs to prevent accidents.
2. _____
3. Provides safe food supply (_____).

C. Outlook is for the agricultural mechanics industry to remain _____ because of

_____in _____, _____, and

_____ requiring more lawn equipment.

***OBJECTIVE: AM08.01 Identify the component parts of the Supervise Agricultural Experience Record used in the agricultural mechanics course*.**

Introduction to SAE

What was the same in all 3 ads?

- _____
  _____
  _____ People who have experience have the edge in landing a job. But:
  - **How do you get _____ without first having a job?**
  - **How do you get a job without first having _____?**

Gaining Experience!!

- Question:
  - **How can you gain experience to get a job (or prepare for college)?**
- Answer:
  - **_____**

What is SAE?

Supervised Agricultural Experience (SAE) Programs consist of _____conducted outside of class time in which students develop and apply _____.

How Does a SAE Help Me?

- _____
- _____
- Develops skills that can be used in starting you own business
- Helps development management skills
- _____
- Improves analytical and decision making skills
- _____
- _____
- Develops knowledge and skills that could be helpful in college, as a hobby or for recreation.
- Provides the opportunity to win awards: _____ are based on the SAE program. In addition to winning awards, money can be won at regional, state and national levels
- FFA _____are partially based on the SAE. You must have a SAE program to advance.
- In order to be a _____ or national officer, you first must have an advanced FFA degree which is partially based on SAE.
- Will help the grade in _____ class

Types of SAE

- Entrepreneurship
- Placement
- Research
  - **Experimental**
  - **Non-Experimental**
- Exploratory
- Improvement
- Supplemental

Entrepreneurship

The student plans, implements, operates and assumes financial risks in a farming activity or agricultural business. In Entrepreneurship programs, the student owns the materials and other required inputs and keeps financial records to determine return to investments.

Entrepreneurship examples:

- _____
- _____
- Raising a litter of pigs
- _____
- _____
- Owning and operating a lawn care service
- _____

Placement

Placement programs involve the placement of students on farms and ranches, in agricultural businesses, in school laboratories or in community facilities to provide a "learning by doing" environment. This is done outside of normal classroom hours and may be paid or non-paid.

Placement Examples

- _____
- _____
- _____
- Working in the school greenhouse after school and on weekends and holidays
- _____

Research

- An extensive activity where the student plans and conducts a major agricultural experiment using the scientific process. The purpose of the experiment is to provide students "hands-on" experience in:

  1. Verifying, learning or demonstrating scientific principles in agriculture
  2. _____
  3. _____

Research Examples

- _____
- Determining the impact of different levels of protein on fish growth
- _____
- _____
- Analyzing the effectiveness of different display methods on plant sales in a garden center
- _____
- Determining the strength of welds using different welding methods

Research...

There are two major types of Research Projects -
_____

Non-Experimental Research

Students choose an agricultural _____ that is not amenable to experimentation and design a plan to investigate and analyze the problem. The students gather and evaluate data from a variety of
sources and then produce some type of finished product.

Non-Experimental Examples:

- _____
- A series of newspaper articles about the environment
- _____
- _____
- _____

Exploratory

Exploratory SAE activities are designed primarily to help students become literate in agriculture and/or become aware of possible careers in agriculture. Exploratory SAE activities are appropriate for beginning agricultural students but are not restricted to beginning students.

Exploratory Examples:

- Observing and/or assisting a florist
- _____
- _____
- Interviewing an agricultural loan officer in a bank
- _____
- _____

Improvement

Improvement activities include a series of learning activities that improves the value or appearance of the place of employment, home, school or community; the efficiency of an enterprise or business, or the living conditions of the family. An improvement activity involves a series of steps and generally requires a number
of days for completion.

Improvement Examples:

- _____
- Building a fence
- _____

- Overhauling a piece of equipment
- _____
- _____
- _____

Supplementary (Minor)

A supplementary activity is one where the student performs one specific agricultural skill outside of normal class time. This skill is not related to the major SAE but is normally taught in an agricultural program, involves experiential learning and does contribute to the development of agricultural skills and knowledge on the part of the student. The activity is accomplished in less than a day and does not require a series of steps.

Supplementary Examples:

- _____
- Changing oil in a sod cutter
- _____
- _____
- _____

Staking tomatoes

OBJECTIVE: AM09.01 Define the terminology used in financial record-keeping systems, such as asset, liability, inventory, net worth, etc.

Record Keeping
Practicing good business relations in the Ag. Mechanics Industry

What kinds of records should businesses keep?

- Assets
- Liabilities
- Net worth
- Profit and loss statement
- Cash receipts
- Non-cash receipts
- Invoice

Assets

Things that one owns and completely pays for.

- **Example: _____**

- _____-items quickly converted to cash or that will be sold within 12 months
  - _____

- _____
- _____
- _____

- Non-current-
_____
_____
_____

- **land**
- **machinery**
- **breeding livestock**

Liabilities

Things that you owe money to other people for or debts

- **Example: _____**

- Current-debts that are due to be paid this year
  - _____
  - _____
  - _____
- Non-Current-_____
  - **mortgages not due this _____**

Net Worth

One's assets minus their liabilities
You have $3000 in the bank, but you owe $1750 for your bills. Your net worth is _____

- Current Assets + Non-Current Assets=Total Assets
- Current Liabilities + Non-Current Liabilities=Total Liabilities

Inventory

An itemized _____ of things owned by a business with the beginning value and depreciated value

- Non-depreciable-items that will be used or sold within a year
  - _____
  - _____
- Depreciable-items that have a useful life of more than one year and lose value because of age, wear or becoming out-of date because of technology advancements.
- Land is NOT depreciable property
  - _____
  - _____
  - _____

Profit and loss statement

- A _____ of a business that reports the profit made by the business or the losses incurred.

Cash _____

- Cash that is paid for services or merchandise.

Non-Cash _____

- Payment for services in other ways than cash.

Invoice

- _____
  _____
  _____

Other business records

- Labor
- _____
- Travel

_____

- Used by banks and lending institutions to decide whether or not to lend money to specific people or businesses

School to Work Employment Plan

- Factors to consider when selecting a career:
  - **_____**
    - **pay, location**
  - **Personal contact**
    - **working with people or things?**
  - **_____**
  - **_____**
- Location of employment
- _____
- _____
- Working hours and time for leisure activities
- _____
- _____

Steps in Choosing a Career

1. Consider your interest, abilities and characteristics”
2. _____
3. Study the requirements
4. _____
5. _____

6. Be willing to pay the price
    - **education, dedication**

8. _____**!**

OBJECTIVE: AM09.02 Correctly record entries in a financial record system.

FILL OUT YOUR SAE BOOK!!!

UNIT C: SAFE WORK PRACTICES

OBJECTIVE: AM13.01 Explain safety rules including color codes and the importance of good housekeeping.

A. Safety Color Codes – used to alert people to dangers and hazards.

1. Green – _____
2. Red – _____
3. _____ – dangerous parts of equipment.
4. _____ – adjustments or controls on equipment
5. Blue – _____
6. _____ – floors

B. _____ Colors

1. Ivory – _____
2. _____ green – paints bodies of _____, stationary equipment, and _____.
3. Aluminum – _____.

C. Noise:

Unit of measurement _____.

1. Hearing losses caused by level and time exposed
2. _____ decibels or higher is dangerous.
3. How do you protect? _____

D. Safety Policy and Procedure

1. Policy is a _____.
2. Procedure is an _____.

E. Housekeeping and Organization

1. To be safe and efficient, a shop must be _____ to have reasonable space for _____ working in the shop.
2. A _____ and _____ shop decreases the chance of accidents.

3. An approved _____ cabinet improves shop safety by providing a safe place to store those materials and by automatically closing if there is a fire.

4. Tools and materials should be put in their _____ to save time and prevent accidents.

Other Safety Rules

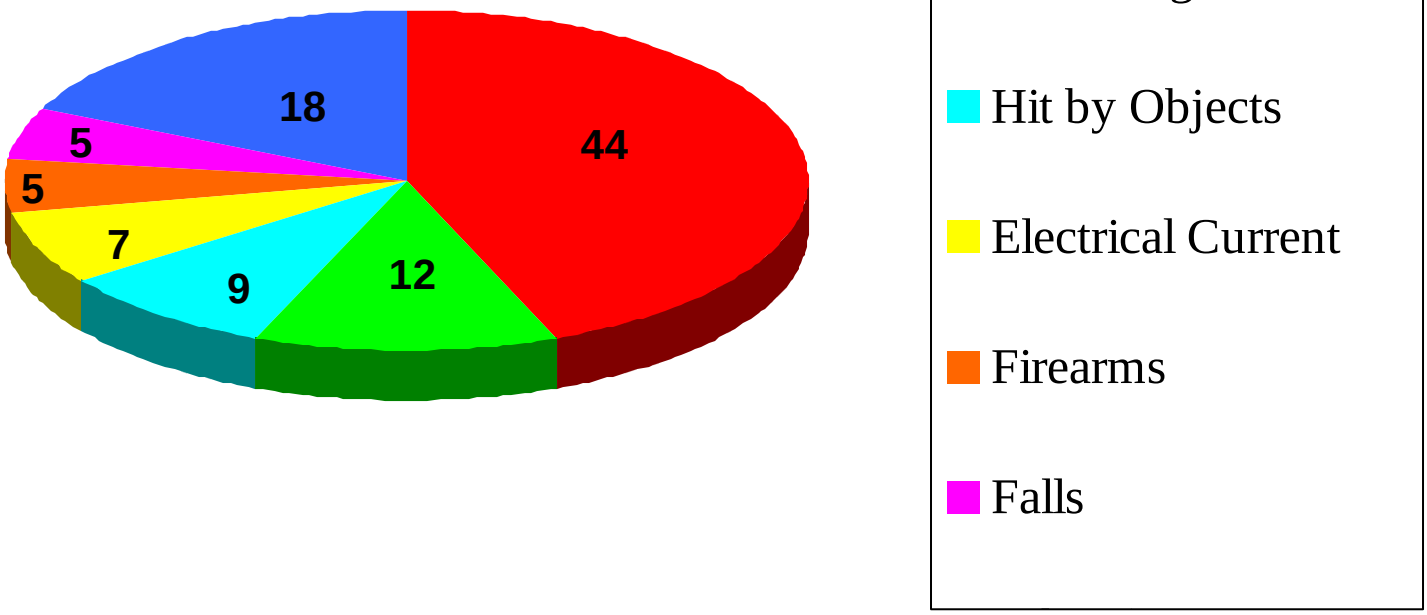
- To help prevent _____, heavy objects should be lifted with the _____, not with the _____.

- Loose clothing, jewelry, and long hair can cause serious injury by getting caught in saws, drills and other equipment with rotating or turning parts.

- The types of safety protection devices needed depend on the work being done in a shop, but the minimum protection should be wearing safety glasses.

- The best protective clothing for agricultural workers is coveralls.

G. Causes of Farm Accidents



OBJECTIVE: AM13.02 Research safety aspects of agricultural mechanics.

A. Causes and Prevention

1. Safety is _____ _____.
2. Safety in agricultural mechanics shops depends mainly on _____ _____.
3. The major causes of accidents are _____ and unsafe _____.
4. The best way to control accidents is _____. Then next best approach is to use protective devices such as safety glasses, face shields, gloves, steel toe shoes, aprons, guards, etc.

B. Classes of Fires

1. Class _____ is caused by ordinary combustibles such as _____ or _____.
2. Class _____ is caused by flammable _____ such as gasoline or solvents.
3. Class_____ is caused by _____. Symbol is a blue circle.
4. Class _____ is caused b combustible metals. Symbol is a yellow star.

*****Be sure to color your symbols!!!**

C. Types of Fire Extinguishers to Use

1. Water is used for Class _____ fires.
2. Carbon dioxide (CO_2) is used for Classes B and C fires.
3. _____ is used for Classes A, B, and C fires.
4. Only Class _____ extinguishers will work on _____.
5. Extinguishers should be located _____ above the floor so that they will be easy to reach.

UNIT D: AGRICULTURAL TOOLS

OBJECTIVE: AM14.01 Explain the uses of agricultural mechanics hand tools.

A. General Rules

1. Hand tools used for _____ should be _____ to improve safety and efficiency.
2. Using the _____ tool for the job can reduce or eliminate injuries.
3. _____ or small teeth on a saw blade make a smoother cut, but _____ or large teeth cut faster.

B. Tools and Their Uses

1. _____ is used to turn various sizes nuts and bolts.
2. _____ is used to place and spread mortar.
3. _____ is used to hammer metal objects such as punches, chisels, or parts of small engines.
4. _____ is used to cut metal.
5. _____ is used to mark 45° and 90° angles.
6. _____ is used to turn both hex and square nuts.
7. _____ is used to level concrete.
8. _____ is used to cut curves in wood.
9. _____ is used to flare the top of a hole to recess the head for a flathead screw or bolt.
10. _____ blade is used to cut across the grain of wood.
11. _____ is used to cut metal, and there should be at least three teeth in contact with the metal.
12. _____ pliers are used to reach into recessed areas.
13. _____ for wood are usually divided into 16 parts per inch or 1/16ths.
14. _____ is used to cut angles.
15. _____ is used to drive nails to fasten one board to another.
16. _____ is used to remove wood and to drive nails.
17. _____ is used to cut _____ the grain of wood.
18. _____ pliers are used to hold various sizes of materials.
19. _____ is used to find and transfer various angles.
20. _____ is used to mark _____ angle.
21. _____ are used for extra firm holding or gripping.
22. _____ are used to remove insulation from electrical wires, to gauge wires sizes, and to crimp terminals.
23. _____ is used to rip and pry wood.

OBJECTIVE: AM14.02 Use agricultural mechanics hand tools properly.

A. Hammers

1. Hold handle _____ away from hammer head to improve accuracy and leverage.

2. Large nails require the use of a _____ hammer than small nails.

3. Using nails to fasten wood is _____, but is the _____ method.

4. Many types of nails are available. The _____ should be used for the job. _____ are used most in construction, but _____ should be used when the head needs to be set _____ the surface of the wood.

B. Measuring and Marking Tools

1. "Measure _____, cut _____" is a good rule to follow to reduce the amount of wasted time and materials.

2. Most wood measuring tools are divided into _____ marks. The shortest lines on the rule are usually 1/16" measurements.

3. The string of a chalk line should be stretched tight and snapped in the middle to mark an accurate long straight line.

4. A _____, _____, or scriber can be used to mark a scratch on metal.

5. _____ is used to mark metal without leaving a permanent scratch.

C. Metal Cutting Tools

1. Files – since files only cut on the _____ stroke, pressure should be reduced on the _____.

2. Hacksaws – Teeth should point _____ from the handle because most cutting is done on forward strokes.

3. Taps and dies – When used to cut threads in metal, oil should be used for lubrication.

D. Screwdrivers

1. Use the correct size and type for the job.
2. A heavy duty screwdriver has a _____ shank so that a wrench can be used to help remove large screws.

E. Saws

1. _____ saw out the marked line because board will be too small if it was measured and marked accurately. Saw on _____ of mark.

2. Hand crosscut saw is used to cut off _____ across the grain.

3. _____is used to rip (split down the middle) a board.

4. Coping saw has a very _____, _____ blade that can be removed and inserted in a hole to saw out a hole in the middle of a board. It can be used to cope _____ and to saw _____.

F. Squares

1. Handle should be held firmly _____.
2. The combination square can be used as a miter square, _____, level, depth gauge, _____, and inside and outside try square.
3. A framing square has rafter tables. Why?

G. Sanding

1. Sand with _____ and use fine or very fine sandpaper to prevent scratches.
2. Coarse sandpaper is used to _____ when sanding, but it leaves _____ in the wood.

OBJECTIVE: AM15.01 Explain the uses of power tools to perform tasks in agricultural mechanics.

A. General Rules:

1. Care should be taken to use _____ and to keep _____ and _____away from cutting parts of tools and equipment.
2. _____.
3. _____ tools should be _____ to improve safety and efficiency.

B. Tools and Their Uses

1. _____ uses a circular blade to cut metal.
2. A _____ is used to drive nails.
3. _____ uses a thin, continuous, flexible blade to cut either curved or straight lines.
4. _____ makes straight cuts in wood.
5. _____ saw is a cutoff type saw used to cut angles and square cuts.
6. _____ makes round holes through wood or metal using a bit.
7. _____ is a stationary tool used to make round holes in wood or metal using a bit.
8. _____ shapes and smoothes metal, sharpens tools, or removes rust.

9. _____ is a stationary power tool that uses a blade with back and forth motions to cut metal.

10. _____ is used to drill holes in masonry.

11. _____ uses a back and forth (up and down) motion blade to cut curves.

12. _____ is used to straighten and smooth edges of boards or to cut bevels.

13. _____ smoothes and cuts lumber to exact thickness.

14. _____ arm saw moves to cut a stationary piece of wood.

15. _____ is used in tight or close situations in remodeling work.

16. _____ is used to make molding or designs in wood surfaces, dado cuts, and rabbet cuts.

17. _____ smoothes wood surfaces.

18. _____ cuts curves in wood or other materials.

19. _____ is used to crosscut, rip, dado or miter.

OBJECTIVE: AM15.02 Use agricultural mechanics tools properly and safely.

A. Band Saw
   1. Short or sharp curves in wood require a narrow blade – _____" or less.
   2. To help prevent the wood from _____, the _____ and the rip fence should not both be used at the same time.
   3. A band saw used to cut metal must have a _____ that will slow the blade speed, and a _____ blade must be used.

C. Drill
   1. A _____ should be used to dent the metal before starting to drill a hole in _____.
   2. The bit should be tight in the chuck, and the chuck key removed before using a drill.

D. Jointer
   1. The depth of cut should be about _____" each pass.
   2. The depth of cut is determined by adjusting the _____ table.
   3. The last pass on each edge of the board should be with the grain for a smooth cut.

E. Planer
   1. About _____" of wood should be removed on each pass.

2. _____, dirt and loose knots should be removed before the board is planed.
3. The _____ end of a rough-cut board should be put in the planer _____.
4. The final pass on each side of the board should be _____ to get a smooth finish.

F. Portable Grinder
1. Operator should use _____ with a circular saw.
2. It is unsafe to use a grinding wheel after one half its original diameter is worn away.

G. Portable Saws

1. Operator should use _____ with a circular saw.
2. Circular saw is used to make _____ crosscuts or rip cuts in wood.
3. Saw teeth should point _____ front of saw used to cut wood.
4. Other types of portable saws include sabre, jig, scroll, and reciprocating.

H. Radial Arm Saw

1. The wood remains _____ on the saw table, and the saw is _____ to the wood.
2. The saw should be secured after _____.

I. Sanders

1. Belt sander requires operator to use _____ hands.
2. Belt should be turning before it is gently touched to the wood, and it should continue to run and be moved with the wood grain until it is lifted from the wood when finished.
3. After use, a belt sander should be laid on its _____.
4. A finishing sander should be used to sand _____ to get a _____ finish.

J. Table Saw

1. If a board is ripped _____ than _____" wide, a _____ should be used.
2. To get the correct board width, measure from side of fence _____ saw blade to the saw blade tooth _____ the fence.
3. Install the correct _____ for the job with the teeth pointing _____ the direction of rotation of the saw motor.

UNIT E: ELECTRIC WIRING

OBJECTIVE: AM16.01 Define common electrical terms.

A. Ampere is the rate of _____.

B. Volt is the measurement of _____.

C. Watt is the measurement of _____.

D. Kilowatt is _____ watts.

E. Circuit Breaker protects circuits from overload of current by _____ to break or open the circuit.

F. _____ protects circuits from overload by _____ in the fuse.

G. Conductors are materials such as _____, _____, or _____ that will carry or conduct electricity.

a. Does water really carry electricity?

H. _____ are materials such as rubber and plastics that will not conduct electricity.

I. Hot wire is a _____ conductor under electrical pressure.

J. Neutral wire is a current-carrying conductor _____ (has volts).

K. Ground wire is a conducting wire that _____ to minimize the danger of electrical shock.

OBJECTIVE: AM16.02 Compute electrical energy and cost.

A. Watts equal volts multiplied by amps. Formula: _____

How many watts of electricity will a 7.5 amperes electric motor use in 5 hours on a 120 volt circuit?

W = 120 x 7.5 x 5
W = 4500

B. Volts equal watts divided by amps. $V = \frac{W}{A}$

What volt circuit is needed for a 7.5 amp electric motor that uses _____ watts in one hour?

$V = \frac{900}{7.5}$
V = 120

C. Amps equal watts divided by volts. $A = \frac{W}{V}$

What should the amp rating of an electric motor be if it uses 900 watts of electricity in one hour in a 120 volt circuit?

$A = \frac{900}{120}$

$A = 7.5$

D. Ohms Law $I = \frac{E}{R}$

I (_____)

E (_____)

R (_____)

E. Cost of electricity = cost per kilowatt x number of kilowatts x hours of use
Note: kilowatt is 1000 watts

If electricity costs 12¢ per kilowatt-hour, how much would it cost to use 2 kilowatts per hour for 10 hours?
.12 x 2 x10 = $2.40

OBJECTIVE: AM16.03 Investigate safe practices involving electricity.

A. Organizations

1. _____ (NFPA) promotes and improves the science and methods of fire protection and publishes the _____ (NES).

2. Underwriter Laboratories (UL) _____ all types of wiring materials and electrical devices for _____.

B. Safety Precautions

1. Wear boots or shoes with _____heels to insulate against shock.

2. Wear clothing made of materials low in _____ to prevent fires.

3. Ground all _____, _____, service entrances, etc. to prevent shock.

4. Extension cords should not be used under _____ because of fire danger.

5. Standing in _____ or damp places or touching switches or receptacles with wet hands may cause electrical shock because _____.

6. _____ touch someone undergoing electrical shock because both people will become part of circuit, and _____ will be shocked. How do we get them off?

7. Always turn circuit breaker to "_____" position before beginning work.

8. Use _____ fuses and circuit breakers to prevent fires.

9. Use only _____ portable tools or those with _____-wire grounded cords to prevent shock.

10. The two deadliest hazards associated with electricity are _____ and _____. Precautions and common sense should be used to prevent conditions that will cause either.

OBJECTIVE: AM17.01 Describe materials used in electric wiring.

A. Wire

1. Size is measured by _____. The smaller the gauge number, the larger the wire.

2. Kinds of wire include _____ or _____ and _____ or _____.

   a. _____ is one of the best conductors of electricity. _____ wire has to be one size _____ to carry same amount of current.

3. Definitions

   a. _____is a material that allows electricity to move readily and offers low resistance. Examples: _____
   b. Insulator _____.Examples: _____.
   c. Hot wire is usually _____ or _____.
   d. Neutral wire is usually _____.
   e. Ground wire is usually _____ (no insulation) or _____.

4. Types of wire include _____ and _____.
   a. Indoor types
      1. T is _____ used for dry locations indoors.
      2. TW is _____ thermoplastic for indoor dry or wet areas.
      3. _____ is rubber and is heat and moisture resistance and is used for large appliances or service entrance in both wet and dry locations.
      4. Others include THHN, THW/THWN, RH, and XHHW.

   b. Outdoor types
      1. UF is _____ wire used for underground service and can be buried directly in soil, but not in concrete.
      2. USE is underground service entrance that has to have _____ (conduit) where wires enter and leave the ground.

3. _____ is unarmored service entrance cables used to bring service into the building.
4. ASE is armored service entrance used to _____.

B. Non-metallic sheathed cable commonly called _____™ has copper wire covered with paper and vinyl for insulation. Most wiring used in _____ construction is this type.
C. _____ provides mechanical protection for wires and may be flexible or non-flexible and metal or plastic depending on _____ Code requirements.
D. Outlet, Junction and Switch Boxes are electrical boxes used anywhere wires are spliced or connected to a switch, light, receptacle, etc.
E. Receptacles
   1. Duplex receptacle has places or holes to receive _____ plugs.
   2. A _____ receptacle has holes to receive one plug.
   3. Dryer and range receptacles are _____ with holes to receive specific shaped plugs.
   4. Porcelain receptacles for lights may have only a place for a bulb, or they may include a chain for a switch, or they may also include an outlet for a plug.

F. Switches are used to stop and start the flow of electricity.
   1. _____ has _____ terminals and controls lights from one location.
   2. Three-way has three terminals and controls lights from two locations.
   3. Four-way has four terminals and is used in combination with three-way switches to control lights from three or more locations.
   4. Blank covers are used to _____ boxes.
   5. _____ are used to cover switch and receptacle boxes.
F. Connectors
   1. _____ connectors and _____ connectors are used to fit knockouts in boxes and to connect outside wires to entrance wires.
   2. _____wire connectors are used to turn wires to make a _____ splice and to insulate the connection or splice in one operations.
   3. Others include _____, screws and clips, _____ and caps or _____, and insulators.
I. _____ is used to measure the amount of electricity used.

J. Circuit breaker is a switching device that _____
_____.

K. _____ has a strip of _____in it that melts when too much current passes through it.

OBJECTIVE: AM17.02 Explain the procedure for installing switches, making common splices, and doing other electrical wiring tasks.

A. Types of single pole switches to install include _____, _____, _____, and _____ depending on use and location.

B. A light fixture uses _____ terminals. A single pole switch has _____ terminals.

C. A _____-way switch has three terminals and uses _____ traveler wires – _____ and _____.

D. A four-way switch has four terminals and can only be installed in between two three-way switches. It has _____ traveler wires.

E. Electrical or wiring boxes must be installed at _____, _____, _____, _____ or _____.

F. Certain NEC codes require wires to be _____ conduit. Thin conduit may be cut with a hack saw or a metal cutter saw.

G. _____ cable is installed inside buildings.

H. Outdoor wire is selected based on use. UF is used to bury underground as feeder wire. USE is used to provide mechanical protection where wires enter and leave the ground (soil). SE and SEU are used to bring electrical service into a building. TW is used to provide service in areas that have moisture.

I. The wire loop should be attached to a screw terminal in the same direction the screw turns.

J. A rat tail splice is used inside junction boxes. A Western Union splice is used where strength of the splice is required.

K. _____ wire is preferred, but if aluminum wire is used, one size larger wire must be used to carry the same electrical current. Example: go from size 10 to size 8. Remember: smaller number, larger wire.

UNIT F: CONCRETE

OBJECTIVE: AM18.01 Describe characteristics of concrete ingredients.

A. Concrete is a mixture of _____, _____, _____, and _____.
   1. Portland cement is a dry powder made from _____ and is usually packaged in bags containing _____and weighs _____ pounds. When mixed with water, it forms the "_____" to hold the aggregate together.
   2. Fine _____ are sand. It should be clean of clay, silt, etc.
   3. Course aggregates are gravel, rocks, etc. over_____in diameter.
   4. Water should be _____.

B. Most (_____) of all concrete used in construction is delivered by trucks to the construction site as _____.

C. _____does not contain _____ aggregates and is used to join bricks or blocks.

D. Although many people call concrete "_____",_____ is the _____ material and concrete is the mixture of ingredients.

E. A cubic foot of concrete weighs from _____ pounds.

OBJECTIVE: AM18.02 Explain the procedure for mixing concrete.

A. Quality is determined by:
   1. **_____** is the consistency or wetness of the mixture. Stronger concrete requires less slump. If concrete has too much slump (is too wet), adding aggregates such as sand and gravel will correct problem.
   2. **_____** is thoroughly mixing all ingredients so that the "glue" which is wet cement will be around all sand and gravel particles (aggregates).
   3. **_____** refers to the ease with which concrete can be placed and shaped.

B. Ratio is expresses as a **_____**. Example: _____. The first number is parts of _____, second number is parts of _____, and the third number is parts of _____. Parts may be shovels full, pounds, cubic feet, etc. Less sand, gravel, and water are used for the same amount of water to make concrete stronger.

C. Hand mixing may be done in a **_____** or mixing box (mortar box) by using a **_____** or hoe. Add sand and <u>then</u> _____ and mix thoroughly. Then add and mix gravel. Last thing to add is water and mix well.

D. _____uses a concrete or mortar mixer. First, add about 10% of water needed so that ingredients will not stick to mixer. Then add _____, then _____, then _____, and then add remainder of _____ needed. Mix about two minutes after all ingredients are in the mixer.

OBJECTIVE: AM19.01 Distinguish between site preparation, placing, finishing, and curing.

A. Form is a _____ or _____ structure that confines concrete to the desired shape until it hardens. Trenches are dug in the ground for _____, and the soil walls are the _____.
   1. Wood or metal can be used. When wood is used_____ and other _____ size lumber is used because forms must not _____ and must be braced to prevent movement.
   2. In warm weather, forms should stay in place 2-3 days and _____that long if weather is cold.

B. Concrete should be poured or placed as _____ as possible in the forms to prevent having to move it.

C. Finishing is bringing the surface of concrete to the proper _____ and _____.
   1. _____ is using a straightedge such as a 2" x 4" board to level concreter with top of forms.
   2. _____ is used to impact the concrete at the surface and to make it easier to finish.
   3. Texture of the _____ will determine_____ of concrete surface. _____, _____, or _____ will make a gritty-non-slip surface for floors, driveways, or walkways. For a very smooth surface, a steel cement-finishing trowel should be used.

D. Reinforcement is needed because concrete has low _____ and high _____. This means it has low stretch and high compaction. Reinforcing helps equalize and prevent cracking or break.

E. Clean steel rods or bars called _____ and clean welded wire are used in concrete for _____.

OBJECTIVE: AM19.02 Demonstrate basic concrete tasks.

A. Estimating Material Needs

1. Cubic yards equal length in feet multiplied by width in feet multiplied by thickness in feet divided by 27, which is the number of cubic feet in a cubic yard. Note: Thickness of concrete is usually in inches and will need to be changed to a fraction of a foot. Examples: 3" = _____ foot, 4" = _____ foot, 6" = _____ foot.

$$\text{Formula: Cu. yds.} = \frac{L \times W \times T}{27}$$

Example: How many yards of concrete are needed to pour a driveway 100' long, 8 feet wide, and 3" thick?

$$\text{Cu.yds.} = \frac{100 \times 8 \times \frac{1}{4}}{27} = \frac{200}{27} = \_\_\_\_\_ \text{ cubic yards}$$

Example: If concrete is purchased in only whole yards and 10 % should be allowed for waste and uneven ground level, how much ready-mixed concrete should be ordered?

1.41 x 10% = _____ To get the right amount, 9 cubic yards much be purchased.

B. Wood or metal forms should be treated with _____and wet down with water before concrete is poured. _____ makes the forms easier to remove, and water will prevent swelling.

C. Water rising to the top surface of concrete poured in tall or deep forms is called bleeding. This problem can be corrected or reduced by pouring concrete slower and by using a stiffer or less watery mix.

UNIT G: CARPENTRY

OBJECTIVE: AM20.01 Describe grades of lumber and plywood.

A. Hardwood or Softwood
   1. _____ comes from deciduous trees such as _____, _____, _____, _____, and _____.
   2. Softwood comes from evergreen conifers such as _____, _____, _____, _____, and _____.

B. Roughed or Dressed
   1. Rough or nominal sized lumber is the _____ or full-dimension. A 2" x 4" is actually that size with rough surfaces.
   2. Dressed or surfaced on all four sides lumber is smaller than rough lumber and is smooth. A dressed 2" x 4" is actually _____", and 1" thick boards are actually _____" thick.

C. Select or Common
   1. Select lumber is free _____, and select grades are A,B,C, and D.
   2. _____ lumber is general-purpose wood and may have knots and blemished.
      a. Grade No. 1 is a _____wood that may have sound, smooth knots up to _____ in diameter.
      b. Grade No. 2 is used for _____ and has large knots and blemishes.
      c. Grade No. 3 has loose knots or knotholes and is used for _____
      d. Grades No. 4 and No. 5 are poor quality used for _____.

D. **_____** is made by gluing odd numbers of **_____** (layers) of wood to make 4' x 8' or 4' x 12' sheets of different thickness.
   1. Hardwood or softwood outside layers.
   2. Exterior has waterproof glue. Interior may or may not have waterproof glue.
   3. Veneer grades
      A – best, smooth, **_____**, may have some neat repairs.
      B – solid, some tight knots, splits and repairs.
      C – tight knots up to 1 ½", knotholes up to 1". splits, discoloration, and defects.
      D – knots and knotholes up to 2 ½", splits.
   4. **_____** is exterior plywood with A face and C back.
   5. **_____** is interior plywood with A face and D back.

E. OSB is _____ in the same sizes as plywood. It is made from strands, flakes, or wafers sliced from small diameter logs and bonded with exterior glue under heat and pressure. OSB is engineered so that the wood strands are _____, not randomly placed like wafer board.

F. _____is manufactured sheets of wood made from ground up scrap wood, sawdust, and glue.

G. _____is a board with a rabbet cut on each edge.

H. _____ boards have a tongue or lip on one edge and a groove on the other edge so that the lip of one side fits into the groove on another board

OBJECTIVE: AM20.02 Calculate board feet.

A. _____is a piece of lumber one inch thick, twelve inches wide, and one foot long.

B. Formula

Note: Thickness and width are inches. Length is feet.

BF =

Example: How many board feet are in a board 1" thick, 12" wide and 10' long?

BF = $\frac{1 \times 12 \times 10}{12} = \frac{120}{12} =$

C. If there is more than one piece, multiply by number pieces of lumber of same size.

D. Most construction lumber is priced per thousand board feet.

M = 1000 Example:

OBJECTIVE: AM21.01 Identify types of fasteners.

A. Nails are metal fasteners driven into the material it holds.

1. _____ are used for general construction and have a flat head and diamond-shaped point.
2. _____ nails have small heads that can be set below surface.
3. _____ are thin, short nails with small heads.
4. _____ nails are square on the ends and are used for tongue and groove board nailing.
5. Others –

B. _____ are fasteners with _____ that bite into the material they fasten.
   1. Kind based on _____– wood, sheet-metal, drywall, etc.
   2. Kind based on metal they are _____ – steel, brass, etc.
   3. Kind based on _____ – flat, round, oval, pan, etc.
   4. Size is determined by _____ (gauge) and _____ (inches) of the shank.

C. Bolts are fasteners that require a threaded nut.
   1. A lag bolt is sometimes called a lag screw because it has threads similar to a wood screw and does NOT use a nut.
   2. A carriage bolt has a round head over a square shank or shoulders.
   3. A stove bolt may have either a round head or a flat head and the shank is threaded the entire length from bottom to top.
   4. A machine bolt has either a square head or a hex head and is threaded on the bottom for about 1". It is NOT threaded all the way to the top.
   5. A _____is much like a _____but has threads the _____, is usually 2" or less in length, threads into something other than a nut, and may have different kind of head.

OBJECTIVE: AM21.02 Use wood fasteners.

A. Specific types and sizes of fasteners are used for their designed purposes.

B. Nails
   1. _____are used for construction such as framing because of their heads and size of shank.
   2. _____ are used for trim because of small heads that can be countersunk below surface of wood.
   3. _____are used to fasten tongue and groove boards and to nail some trim work.
   4. _____ are used to fasten metal on roofs because the nails are less likely to work loose and cause leaks.

C. Screws
   1. _____ **&** _____ wood screws fasten wood to wood.

2. A countersink cuts a _____ in the surface of wood so that a flathead screw will be flush or just below surface.
3. _____ screws will be above surface unless a hole is drilled deep enough to hide head of screw.

D. Bolts
1. _____are used when a strong bolt is needed, but it needs to be removed to dismantle metal equipment on a regular basis.
2. _____are used with expansion shields to fasten wood to masonry materials such as _____.
3. _____ are used to fasten lightweight metal structures.

OBJECTIVE: AM22.01 Explain major factors to consider in planning new construction or repair work.

A. Before starting new construction or repair jobs of any size, a _____, _____, or _____should be made to reduce costs, save time, improve quality of _____, and determine the need for the construction or repair project.
B. The best way to guarantee high quality materials and workmanship in construction projects is to _____.
C. _____ is a major consideration in planning agricultural construction or repairs because of the seasonal nature of farming.
D. The _____ of a project is an important factor in planning construction
E. _____is an itemized list of materials and their costs.

OBJECTIVE: AM22.02 Calculate the amount of materials needed for a construction project.

A. Many building materials are sold by the square foot or in units that combine square footage such as a square or a sheet.
1. Square foot is __ foot (___") by __ foot (___") or _____ square inches.
2. Calculate number of square feet by multiplying length times width in feet. Example:
3. A 4' x 8' sheet of plywood has _____ sq. ft.
4. A square of shingles has _____.
5. One story building costs can be estimated by using sq. ft. times cost per sq. ft. Example:

B. Board Feet

OBJECTIVE: AM22.03 Explain the purpose of sketching construction plans including the types of drawings used.

A. Plans drawn on _____ because changes are faster and less expensive to make on a plan than on the real structure.

B. Types of drawings used in construction include:
   1. _____, hand drafted _____, and _____ assisted drawings.
   2. Based on views or dimensions
      a. _____ or two-dimensional view
      b. _____ or three-dimensional view that shows object as a whole instead of parts and shows the object in a form similar to a picture, _____ perspective is similar to isometric because it is three-dimensional and appears on the drawing as it does to the eye, but it is _____.
      c. sectional view shows a _____ of the object
      d. _____ are used when a detailed description is needed
      e. a three-view drawing is used to show the _____, _____, and _____ of the object

OBJECTIVE: AM22.04 Construct a carpentry project.

A. Purpose of constructing a project in agricultural mechanics shop is to _____ of what has been learned in class.

B. The size and complexity of a project is its _____.
   1. Beginning students should start with relatively small and simple projects such as nail boxes, tool boxes, and bird houses.
   2. Advanced students should choose _____ projects that use more skills such as _____, _____, and _____.

C. Projects that will be exposed to weather should be made from _____ wood or should be painted with _____ to provide protection for the wood.

D. The _____ of wood needed for a project or for certain parts of a project depend on the use that will be made of the project. A work-bench or a livestock or horse barn requires larger sized wood than a bird house or nail box.

E. Projects made from both metal and wood should use _____ to fasten the wood to the _____.

F. Because of the nature of construction and the _____, construction of a building starts at the _____ and continues to _____.

UNIT H: PAINTS AND PRESERVATIVES

OBJECTIVE: AM23.01 Describe problems in surface preparation and paint application.

A. Surface preparation to remove _____, _____, _____ and other loose material from the surface should be done before painting. Cracks and holes should be repaired or caulked.
B. Moisture in or on the wood will cause paint to _____.
C. Expanding and contracting surfaces cause the paint to _____.
D. _____ on the surface or in the paint causes specks and rough places on the painted surface.
E. The quality of a paint job is strongly affected by _____ before painting.

OBJECTIVE: AM23.02 Compare different painting techniques and the tools and supplies needed.

A. Painting with a paintbrush is _____ than with a paint spray gun, but the paint brush _____.
B. Painting with a paint _____ requires that paint be _____, and the must be cleaned after each use to prevent clogging.
C. A spray gun or spray can nozzle should be held about _____ from the surface being painted. Holding too close causes _____ on the surface, and holding too far causes the finish to look and feel _____.
D. Paints, thinners, and cleaners are _____, and care should be taken to prevent _____. They also have _____ that can be harmful if _____ over long periods of time. Use ventilation and/or respirator.

UNIT I: METAL SKILLS

OBJECTIVE: AM24.01 Explain which skills are needed to perform cold metal tasks.

A. _____ so that its characteristics will be known before trying to do other cold metal and welding tasks.

B. Cutting cold metal is done to make it the correct size – length or width. Cutting thin cold metal is done by using _____, shears, or a cold chisel. Cutting thick cold metal is done with a hacksaw or a metal cutting saw blade in band saws, jigsaws, or reciprocating saws.

C. Drilling is the method used to make round holes in cold metal using drills and metal cutting bits.

D. Bending cold metal <u>not more</u> than 3/8" thick can be done with a ball peen hammer and machinists vise. Metal <u>thicker than 3/8"</u> should be heated before bending.

E. Shaping cold metal can be done by _____, _____, _____, or _____ or combining any of these skills.

F. The main reason to file metal is to _____, but filing is also used to _____ some tools.

G. Grinding is the procedure used to _____ or edges of cutting tools made of high carbon steel.

OBJECTIVE: AM24.02 Identify, cut, drill, bend, shape, file, and grind cold metals.

A. Identifying Metals

1. _____ contain iron, non-ferrous do not have _____. Ferrous metals will rust and have to be painted or oiled to protect.
2. Metals can be identified by color, weight, texture, use, shape, forge or cast marks, and spark test.
   a. _____, _____, _____, _____, and _____ of sparks are used to identify metals using spark test.
      1) cast iron has _____ lines
      2) _____ steel has yellow lines with _____-
      3) wrought iron has long straw-colored lines _____
3. _____ steel should be identified because it gives off _____ when heated for cutting or welding.

B. If metal is too thick, snips or shears will not cut. Thick metal should be cut with a metal cutting saw such as hacksaw, band saw, or abrasive cut-off (chop saw).

C. Drilling metal is done by _____ in a machinist's vise, using a _____ and ball peen hammer to dent the metal to prevent the drill bit from wandering from the desired location, and using a drill and bit to drill the hole.

D. A machinist's vise should be used to secure cold metal for cutting, drilling, filing, or bending.

E. The inside of a drilled hole should be smoothed with a _____ file. Flat files can be used to smooth the _____.

F. _____ is used to shape and sharpen the hollow-ground cutting edge of tools such as wood chisels.

OBJECTIVE: AM25.01 Examine oxy-fuel procedures.

A. Oxy-fuel combines _____ which will not burn until combined with a combustible fuel gas such as _____, _____, or _____.
_____ is the combustible fuel used by most agricultural mechanics.

B. Heat from the oxy-fuel process is used to _____or _____ and to heat for bending, shaping and tempering metal.

C. Safety

1. Use _____ to check lines, valves, and soft plugs for leaks
2. Acetylene pressure should NOT be more than _____ per square inch (psi).
3. The _____ cylinder tank valve should be opened _____ turn for use.
4. Oxygen and acetylene cylinders should be turned _____ quickly before attaching regulators to _____.
5. When the oxyacetylene unit is _____, the regulator adjusting screw should be _____ until it is loose.
6. Oxygen and acetylene tanks should be upright and _____ when transported. Caps should also be screwed on.
7. Use only a spark lighter (_____) to light a torch. Do NOT use _____ or _____ to light torch or to check for leaks.

D. Types of Flames

1. When first lit, the flame has excess acetylene and is carbonizing flame.
2. Oxygen is added to produce a neutral flame used for heating, cutting, and welding.

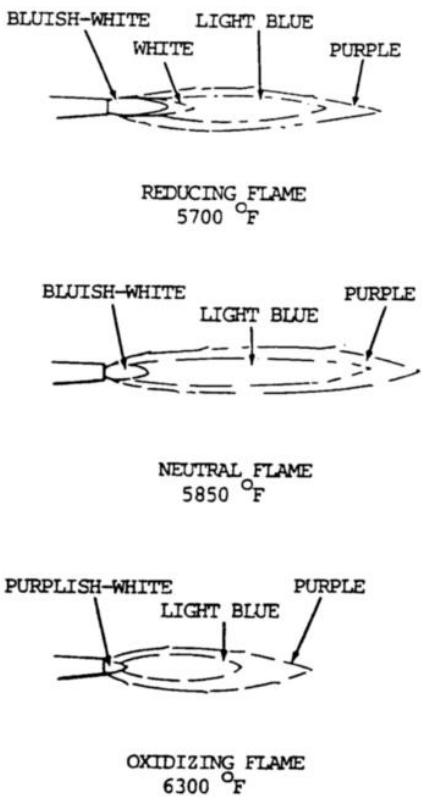


Figure 11-2. Oxyacetylene flames.

3. Adding extra oxygen makes an oxidizing flame which is the hottest flame used for special applications.

OBJECTIVE: AM25.02 Explain the proper cutting and welding tips are used to cut and weld metal.

A. Welding tips have a_____ where oxygen and acetylene combine to make the flame at the tip.

B. Cutting torch has an _____, to blow metal from the cut and a tip with more than one orifice (hole). The center hole is the _____, and the holes around the center hole are the _____.

C. When cutting or welding tips are attached to the torch body, they should be _____.

D. The safe way to light either the welding or the cutting torch is to use a torch lighter, NOT a match or a cigarette lighter.

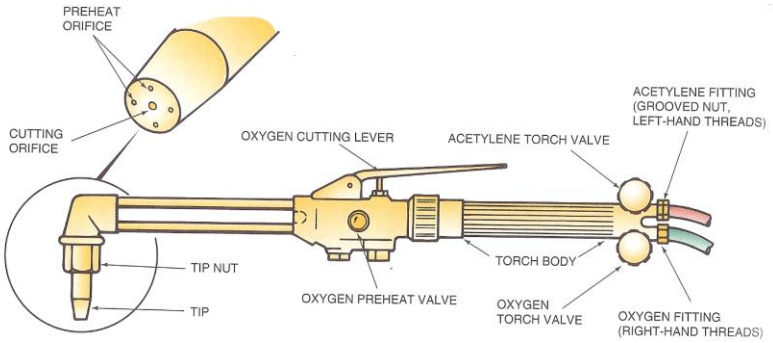
E. Touching the tip to metal when cutting may cause _____.

F. Tip cleaners are used to remove metal spatter from the holes in cutting and welding tips. Use right size.

G. A uniform puddle width usually indicates correct oxyacetylene welding speed and correct torch height.

H. The correct angle between the _____ and _____ to cut thick metal with the oxyacetylene torch is_____°.

I. A correct cut with the oxyacetylene cutting torch will have a _____ _____ and slightly _____.



J. If speed is too _____, oxygen pressure too _____ or too high, or too much acetylene is used, the cut will be _____.

OBJECTIVE: AM26.01 Compare types of arc welding machines, welding equipment, and electrodes.

A. Types of Welding Machines

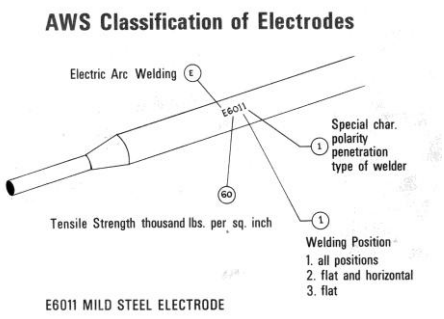
1. AC (_____ current) used for most agricultural arc welding jobs and has _____ compared to other arc welders.

2. DC (_____current) are generator operated and can be used where _____ is not available.
3. AC/DC welders use a rectifier to change regular AC current to DC. These welders can be used as either AC or DC.
4. TIG (T_____ I_____ G_____) welders have an electric power unit, a pressure reducing regulator, electrode holder, tungsten electrode, nozzle, cables and hoses, and a gas supply unit. The two gases used are _____. The tungsten electrode is _____ (burned) and there is _____ on the bead. TIG is good for welding _____ and _____ because it is stronger and more free of corrosion than other welders.

5. MIG (M_____ I_____ G_____) welders are _____ welders that use a consumable wire fed automatically through the torch and can be used in industries as an _____.

B. Welding Equipment
   1. Welding protection:
   2. _____ removes slag, and wire brush removes rust and dirt.
   3. _____ and vise grip clamps are used to hold metal in place for welding.

C. _____ are wire cores or rods usually covered in flux.
   1. Size is the _____ of the metal rod not including _____.
   2. Classification code system has a letter and four numbers such as E6011 or E6013.
   3. _____ is the most commonly used electrode for welding for welding farm projects because it can be used for _____ of mild steel, has _____, and can be used with both AC and DC welders.
   4. E6013 is a good general-purpose electrode but only has _____ penetration.



OBJECTIVE: AM26.02 Describe the uses of arc welding equipment.

A. An electric arc welder is used to weld two pieces of metal by _____ and joining the edges of each using an electrode to help fill the space between them.

B. _____ welders are best for welding aluminum and _____.

C. _____ welders are the best welder for welding _____ metals.

D. A shade _____ in a welding helmet protects the eyes of the person welding or the person watching someone weld

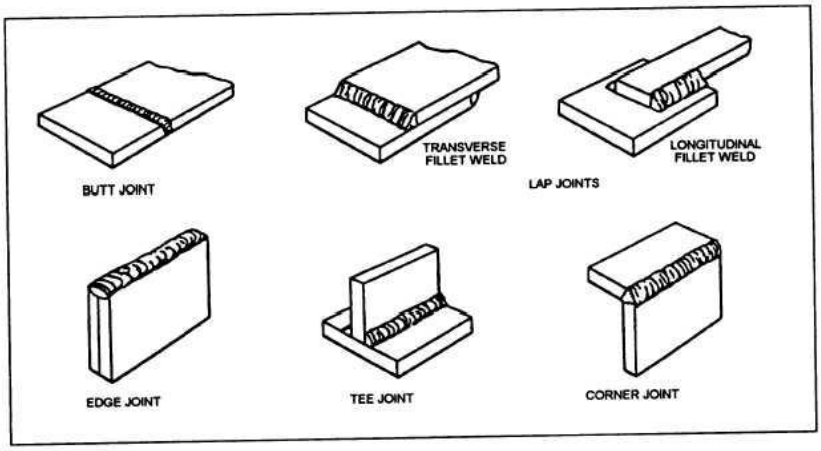
E. A chipping hammer is used to remove the _____ a welded bead.

OBJECTIVE: AM27.01 Explain basic arc welding procedures.

A. Metal should be cleaned before it is welded. A grinder is the fastest way, but a wire brush or other methods may be used to remove paint, rust, dirt, oil, etc.

B. Metal more than ¼" thick should be beveled at a 30 degree angle and placed 1/16" to 1/8" apart before two pieces are welded together.

C. Types of Weld Joints



1. Butt – two pieces of metal lying in the _____ such as end-to-end or edge-to-edge in flat position.
2. T or "T" two pieces of metal placed together to form a T or a ⊥ or ┤, two pieces at _____ angle to each other.
3. A _____ weld is used to fuse the two pieces permanently.
4. Lap – two pieces of metal overlap each other.
5. Corner – two pieces of metal make a _____ corner.
6. _____ – two pieces placed _____ to one another or stacked on top of each other.

D. Welding _____, _____, and _____ are used to determine _____ setting.

1. Amperage too low causes a _____, _____ bead with poor penetration.

2. Amperage too high caused a _____ bead with excessive spatter.
3. Correct amperage helps make a uniform bead with bead width and penetration depth _____ to each other.

OBJECTIVE: AM27.02 Practice basic steps of arc welding in flat position.

A. Before metal is welded, it should be _____, _____ and _____ to correct size (if needed).
B. If an electrode sticks to the metal, the electrode should be _____, or it should be _____ from the electrode holder.
C. The maximum thickness of the beveled edge of metal should be the same as the _____ used to make the weld. A 1/8" electrode for a _____" thick bevel.
D. _____ and _____ bead are caused by amperage that is too high. A high narrow bead with poor penetration is caused by amperage that is too low.
E. _____ methods can be used to strike an arc (starts a weld).
F. _____ should be the same as the diameter of electrode.
G. Many different electrode movements or weaves are used to make a bead. Regardless of the movement used, the pattern should be uniform to make a strong weld.

FFA AGRICULTURAL TOOLS AND MATERIALS CAREER DEVELOPMENT EVENT

Name	Proper Use of Tools, Equipment or Materials
45° pipe elbow	Making a 45 degree turn with pipe
90° pipe elbow	Making a 90 degree turn with pipe
90° street elbow	Making a 90-degree turn with galvanized pipe when threads are inside on one end and outside on the other
Adjustable wrench	Turning various size nuts and bolts
Allen wrench	Turning hex head socket screws
Aviation snips	Cutting sheet metal
Ball pain hammer	Hammering metal
Bar clamp	Clamping large sections of wood together
Bent nose pliers	Reaching obstructive or awkward places
Bolt cutters	Cutting bolts and steel rods
Bolt die	Cutting threads on bolts and rods
Bolt die stock	Holder for bolt die
Bolt tap	Cutting inside threads
Box end wrench	Turning hex head nuts and bolts
Brick jointer	Smoothing and designing masonry joints
Brick trowel	Placing and spreading mortar
Bulb planter	Planting and transplanting bulbs
Bush axe	Cutting bushes and under growth
Butt hinge	Hinge for narrow fencing
C clamp	Clamping two or more pieces *of* metal together
Carriage bolt	Used for bolting wood to wood or wood to metal
Castrator	Tool for sterilizing small animals
Center punch	Starting holes in metal
Chain saw file	Sharpening chain saw chain
Chalk line reel	Marking straight lines
Chipping hammer	Removing slag from welds
Circuit breaker	Protection from overload in electrical circuits
Circular carbide saw blade	Blade for use on a portable electric saw
Cold chisel	Cutting metal
Combination oil stone	For sharpening and honing cutting tools
Combination square	Determining 45° and 90° angles
Combination wrench	Turning hex and square nuts and bolts
Common nail	For nailing boards together where holding power is desired
Compass	Drawing circles
Compass saw	Cutting wood in close places
Concrete finishing trowel	Smoothing concrete
Concrete float	Leveling concrete
Coping saw	Cutting curves and irregular cuts
Cordless drill	Drilling holes with a tool that uses a battery pack
Countersink	Flaring top of hole for recessing head for flathead screw or bolt
Cutting torch	Cutting metal with heat
Deep socket	Turning nuts and bolts in depressed areas
Dehorner	Removing horns from cattle
Diagonal cutting pliers	Surface and diagonal wire cutting
Drift punch	Aligning holes
Drill press vise	Holding stock while drilling
Duplex receptacle	Used to plug in electrical units
Dust mask	Protects the respiratory system from airborne particles
Ear tagger	Labels individual animals for identification
Electrical multimeter	Performs various tests on electrical circuits
Emery dresser	Smoothing face of grinding wheel
End cutting nippers	Cutting ends of wire, nails and small bolts
Expansion shield	anchoring a lag screw into concrete, brick or block
Extension	Extends reach of socket

Eye bolt	Bolt used to attach wire onto
Fence pliers	Building and repair of wire fences
Fence staple	For nailing up fencing
File card	Cleaning cutting grooves of file
Finishing nail	Nailing boards where head will not be noticed
Flaring tool	Flaring ends of tubing
Flathead stove bolt	for fastening wood or metal to metal with a wrench and leaving a flat surface
Flathead wood screw	for fastening wood to wood where a flat surface is required
Framing square	Squaring cut corners and laying out stairs & rafters
Fuse puller	Removing cartridge fuses
Gate valve	For cutting off water supply on a main line
Glass cutter	Cutting glass
Grafting tool	Preparing woody parts for grafting
Grease gun	Lubricating through grease fitting
Groove joint pliers	Gripping when greater pressure is needed
Hack saw	Sawing metal
Half hatchet	Cutting and fitting wood
Half round file	Curve and flat filing
Hammer drill	For power drilling in concrete, brick or block
Hand screw clamp	Clamping wood together
Hedge shears	Trimming and shaping hedge
Hinge handle	Socket handle to be used when flexibility is needed
Hose bib	Valve for attaching a water hose and turning water supply on and off
Implant gun	Injects growth hormones in animals
Impulse sprinkler	For overhead irrigation of plants where rotation is water driven
Increment borer	Checking growth rate of trees
Junction box	Box used to join several electrical wires into a circuit
Lag screw	Screw used where great pressure to turn is required
Level	Leveling and plumbing
Line level	Leveling between long distance points
Long nose pliers	Reaching into recessed areas
Lopping shears	Cutting large branches when pruning shrubbery
Machine bolt	For fastening metal to metal with a wrench
Machinist's vise	Holding metal firm while working
Mason hammer	Chipping and shaping masonry material
Mason level	Leveling and plumbing masonry materials
Masonry bit	Boring a hole in concrete, brick or block
Masonry nail	Nailing in concrete, brick or block
Mill file	Filing metal
Miter box	Cutting angles
Nail hammer	Driving nails
Nail set	Countersinking nail heads
Nailing gun	Rapid nailing using air, gas or electricity
Nut driver	Socket permanently attached to a handle for turning small nuts and bolts
Obstruction wrench	Reaching nuts & bolts around obstructions
Open end wrench	Turning square head nuts & bolts
Phillips screwdriver	Turning Phillips head screws
Pin punch	Driving out metal pins
Pipe bushing	Reducing pipe size
Pipe cap	Closing the end of a pipe by going over the pipe end
Pipe coupling	Joining two pieces of pipe
Pipe nipple	Adding length to a piece of pipe
Pipe plug	Closing the end of a pipe, threads on outside
Pipe reducer	Reducing pipe size
Pipe stop & waste	For turning off water and draining the line
Pipe tee	For joining pipe at 90° angles
Pipe union	Joining two pieces of pipe where neither side can be

	turned
Pipe wrench	Turning and holding metal pipe
Piston ring compressor	Compressing ring for inserting into cylinder
Planting bar	Setting out tree seedlings
Plumb bob	Vertical plumbing to locate points
Portable circular saw	Sawing wood in construction projects
Portable electric drill	Drilling holes with an external source of electricity
Portable jig saw	Making irregular cuts
Portable electric sander	Smoothes surface with an external source of electricity
Pruning saw	Sawing limbs from shrubbery and trees
Pruning shears	Cutting and shaping shrubbery
Putty knife	Applying and smoothing putty
PVC cutter	Cutting non-metallic pipe
Regular socket	General purpose socket for turning nuts & bolts
Reversible ratchet	Reverse rotation of socket turning
Roofing nail	For nailing tin, aluminum, fiberglass or asphalt roofing
Round file	Filing inside holes
Roundhead stove bolt	For fastening wood or metal to metal with a screwdriver and wrench
Roundhead wood screw	For fastening wood to wood
Router	Makes edges or designs in wooden surfaces
Rubber mallet	Hammering to avoid marring surface
Safety glasses	To protect eyes from the impact of foreign objects
Safety goggles	To protect eyes from liquids and vapors
Screw extractor	Removing broken bolts, studs & screws
Screwmate	Drills & countersinks flat head wood screw holes
Sheet metal screw	Joining two pieces of sheet metal
Side cutting pliers	Holding and/or cutting wire
Sledge hammer	Heavy hammering
Slip joint pliers	Adjust for holding various size materials
Slotted screwdriver	Turning slotted screws
Solderless wire nut	Joining two or more electrical wires
Soil auger	Boring into soil to get samples
Soil thermometer	Determining soil temperature
Soil tube	Obtaining soil for testing
Soldering gun	Melting solder
Spark plug gauge	Gauge and set spark plug gap
Spark plug socket	Install and remove spark plugs
Speed bore bit	Wood-boring bit for electric drill
Speed handle	Rapid turning of socket
Straight shank drill bit	Drilling metal
Strap hinge	Hinge used where major strength or support is required
Switch box	Used to install toggle switches or duplex receptacles
T-hinge	Used where strength is required but one facing is narrow
Tap wrench	Holding bolt tap
Tape rule	Straight or curved measuring
Thickness gauge	Determining gaps
Timing light	Timing ignition
Tip cleaners	Cleaning welding and cutting tips
Tire chuck	To inflate tires
Tire gauge	Checking tire air pressure
Toggle bolt	Anchoring into a hollow space
Toggle switch	Turning current on and off
Toggle switch plate	Cover for toggle switch
Torch lighter	Light acetylene and propane
Torque wrench	Measure amount of torque
Torx screwdriver	Turning torx-head screws and bolts
Tree diameter tape	Measure circumference of trees
Triangular file	Filing saws

Try square	90° squaring
Tube cutter	Cutting soft tubing
Universal joint	Holding socket for angle turning
Universal socket	Socket of angle turning
Valve spring compressor	Compressing valve spring for removal and insertion
Vise grip pliers	For extra firm gripping
Vise grip welding clamp	For extra firm gripping of welding materials
Water breaker	Reduces the impact of water pressure on soil and plants
Welding gloves	Protects welders hands
Welding goggles	Protects welders eyes
Welding helmet	Protects face and eyes from welding flash
Welding torch	Heats and fuses metal
Wheel puller	Remove wheel from axle
Wire scratch brush	Cleaning metal
Wire strippers	Removing insulation from electric wire
Wood chisel	Dressing and shaping wood
Wood mallet	Driving non-metallic objects
Wood rasp	Coarse filing of wood
Wrecking bar	Ripping and prying