East Tenn FFA Ag Mechanics

Revised: 2023

ET FFA Agriculture Mechanics CDE

Team:

- Team will be 4 members

Event Components:

- Contestant scores will consist of 2 skill areas drawn at random prior to the event (75 pts. each). (30 minutes each skill) &

- 25 question Mathematical Problem Solving Test (70 minutes)

Scoring:

- Individual

  Problem Solving…….50 pts. (25 questions x 2 points each)
  Skills……..150 pts. (2 skills x 75 pts each)
  Total Individual……..200 pts.

- Team

  Top 4 individual scores…….800 pts.

Skill Areas:

-Surveying
-Land Measurement
-Welding
-Electrical Wiring
-Rafter Cutting
-Plumbing and Masonry rotate every year (masonry in 2020)
-Equipment (make, model, and type of equipment will be announced at least a month
prior to event)
-Small Engines

Problem Solving:

-The test will be made of problems from the past 5 National Ag Mechanics Knowledge Test, which is problem solving. (125 potential questions to select the 25 from).

- The format of the question will be as originally asked, but the numbers will be changed.

Masonry will be a part of the contest on EVEN years and Plumbing on ODD years.

Contestant No._____

Block Laying
Score Sheet

Height (8 pts) check height at top of each block level _____

Level (8 pts) check levelness of length and width _____

Plumb (8 pts) check wall plumb with square _____

Neatness (8 pts) precision and cleanness of project _____

Correct Design (8 pts) corner and stretcher block placement _____

Square (8 pts) corner check with square _____

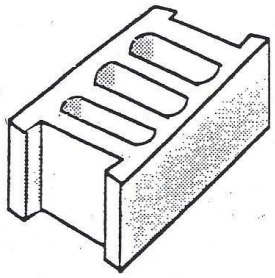
Manipulation (8pts) safe and correct tool usage _____

Uniform Joints (8 pts) properly jointed and thickness of joints _____

Mud Mixture (11 pts) adheres to block and trowel properly _____

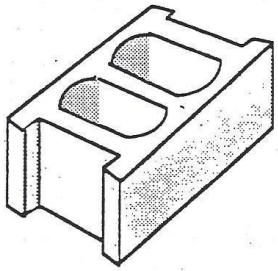
Total Points (75) _____

INFORMATION SHEET

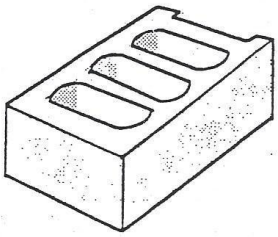


3-CORE STRETCHER BLOCK**

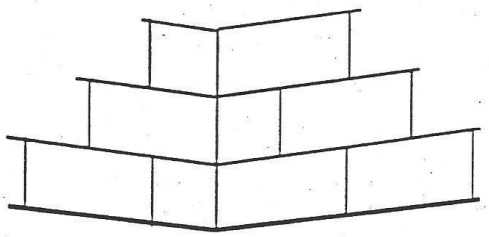
* * The actual measurement of an 8 x 8 x 16 inch block is 7 5/8 x 7 5/8 x 15 5/8 inches. If the block is laid with a 3/8 inch mortar joint, the height area will be 8 inches and the length area 16 inches.



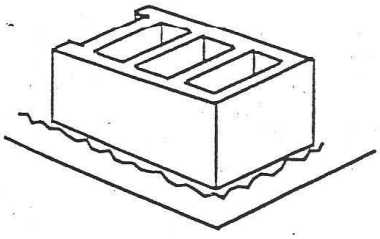
2-CORE STRETCHER BLOCK**



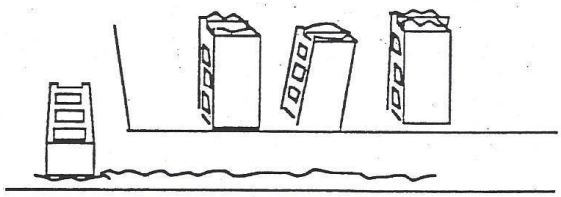
CORNER BLOCK **



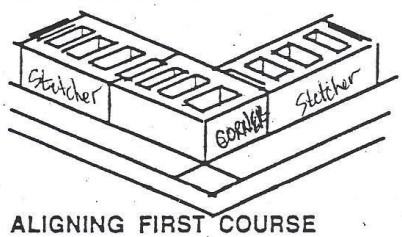
CORNER BLOCK EXERCISE



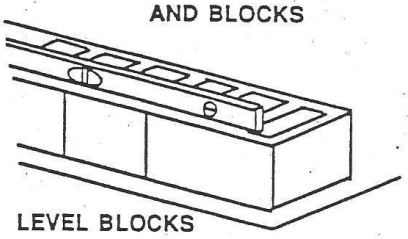
LAY CORNER BLOCK



APPLY MORTAR TO FOUNDATION AND BLOCKS



ALIGNING FIRST COURSE



LEVEL BLOCKS

Refer to Vocational Instructional Services
Texas A & M College Station, Texas
V-E-1 Basic V.A. IV for an excellent unit on masonry

3-Way Switch Installation

Contestant No._____

Score Sheet

Operates Properly (light comes on and goes off when tested) 35 pts _____pts

Correctly Wired 40 pts total (4 points each)

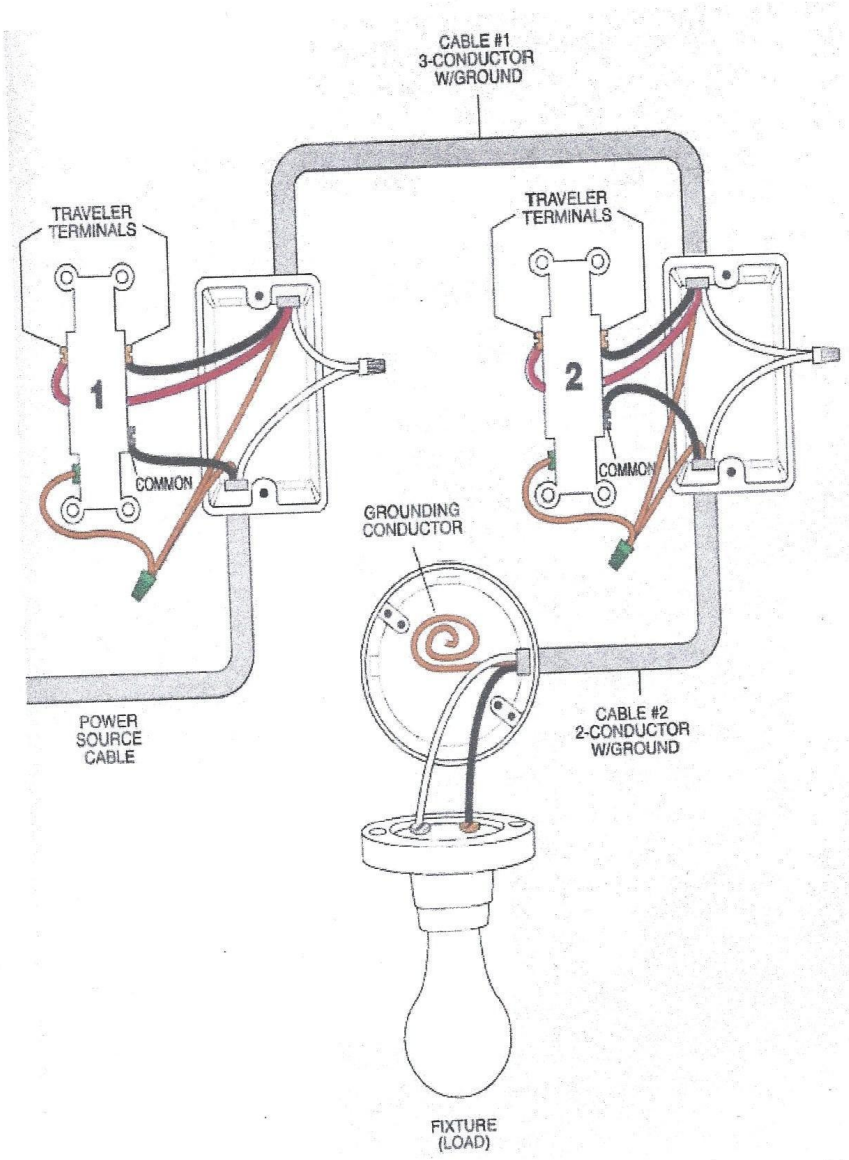
Initial Appearance:

1. Wires properly installed _____pts
2. Wires going into plastic box must be stapled within 8" of the box _____pts

Inside Appearance:

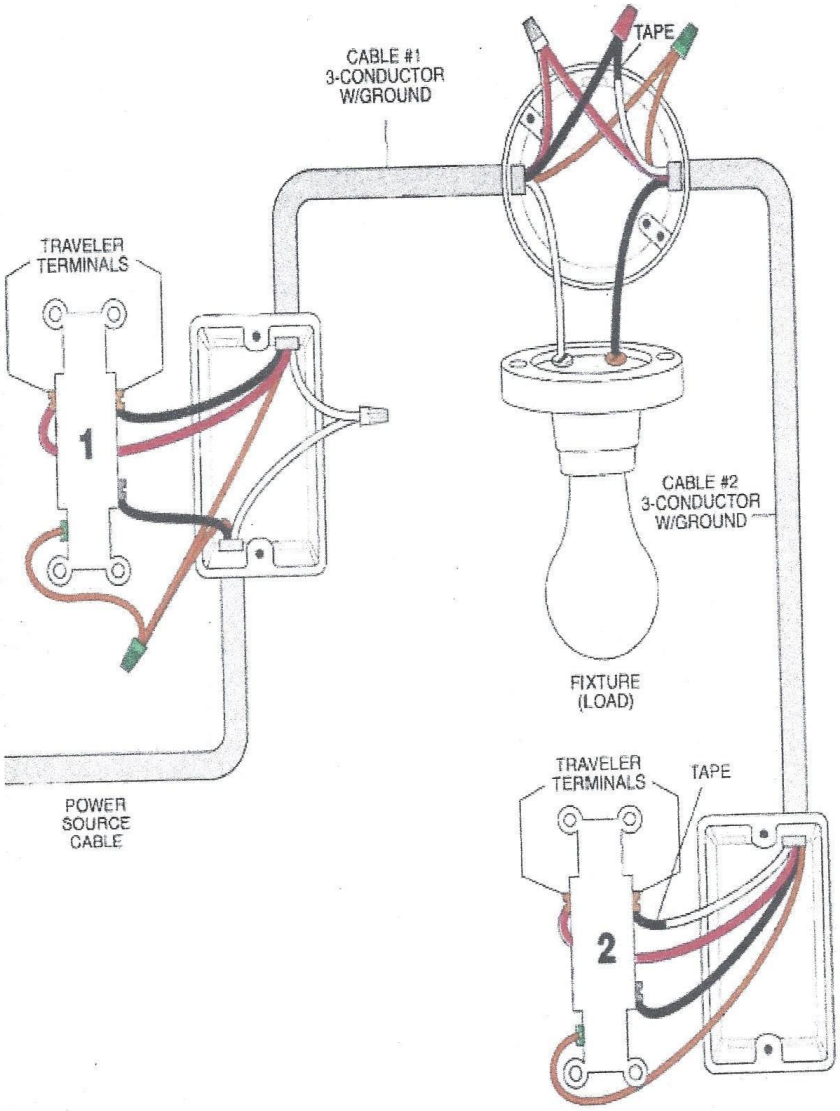
1. Insulation properly stripped (1/2" to 5/8"). Inside insulation should come up to terminal but not go under go under terminal. _____pts
2. Terminal attachment (wires tight and wrapped clockwise) _____pts
3. No nicked or cut insulation _____pts
4. Splices properly turned (clockwise) _____pts
5. Insulation under Solderless connectors (no bare wire exposed, wires twisted) _____pts
6. Loose wires (wires held tight under terminal) _____pts
7. Grounded properly _____pts
8. Length (6" From INSIDE the box) _____pts

Total Points (75 pts) **_____pts**



A three-way switched lighting circuit with the power entering at switch #1

Source – Switch – Switch – Light



A three-way switched lighting circuit with the lighting outlet between the switches. The power source enters at one of the switches.

Source – Switch – Light – Switch

Land Measuring

Contestant No._____

Determine your pacing factor

The two stakes in the field are 50 feet apart. Count the number of steps it takes to cover this distance. Repeat this process until you consistently take the same number of steps to cover the distance. Record the number of steps below,

Number of steps to cover 50 feet: _____

Divide 50 (the distance between the stakes) by your answer above to get your pacing factor or distance you cover with each step. Record that answer below.

Your pacing factor: _____ (5 pts if student calculated correct)

Distance and Area Determination

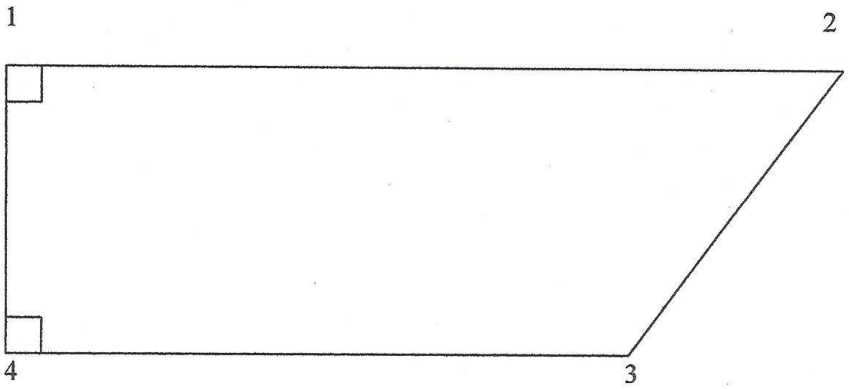
Locate the fore stakes that represent the corners of a field. You are to pace the distance between each of the stakes and record your answer below.

Stakes	No. of Paces		Distance between Stakes
1-2	_____		_____ 10 pts if calculated correct
2-3	_____		_____ 10 pts if calculated correct
3-4	_____	X _____ *(Pacing Factor)*	_____ 10 pts if calculated correct
4-1	_____		_____ 10 pts if calculated correct

Multiply the number of paces between the stakes by your pacing factor to determine the distance between stakes and record the answer above.

This is an overhead view of the field whose sides you just measured.

Drawing not to scale



Calculate the area of the field in acres to the nearest hundredth of an acre. Do your calculations in the space below and record your answer at the bottom of the page.

Area of the field: _____ . _____ _____ acres **30 points total (-10 per hundreth +/-)**

Contestant No._____

Rafter Scoring Sheet

Lower Plumb Cut

- Straightness 3 pts possible _____pts
- Squareness 3 pts possible _____pts
- Correct Angle 3 pts possible _____pts

Bird's Mouth

Vertical Cut

- Straightness 3 pts possible _____pts
- Squareness 3 pts possible _____pts
- Correct Angle 3 pts possible _____pts

Horizontal Cut

- Straightness 3 pts possible _____pts
- Squareness 3 pts possible _____pts
- Correct Angle 3 pts possible _____pts

Upper Plumb Cut

- Straightness 3 pts possible _____pts
- Squareness 3 pts possible _____pts
- Correct Angle 3 pts possible _____pts

Correct Depth 11 pts possible _____pts
Length of Overhang 11 pts possible _____pts
Rafter Length 11 pts possible _____pts

Proper Tool Use and Cleanup 6 pts possible _____pts

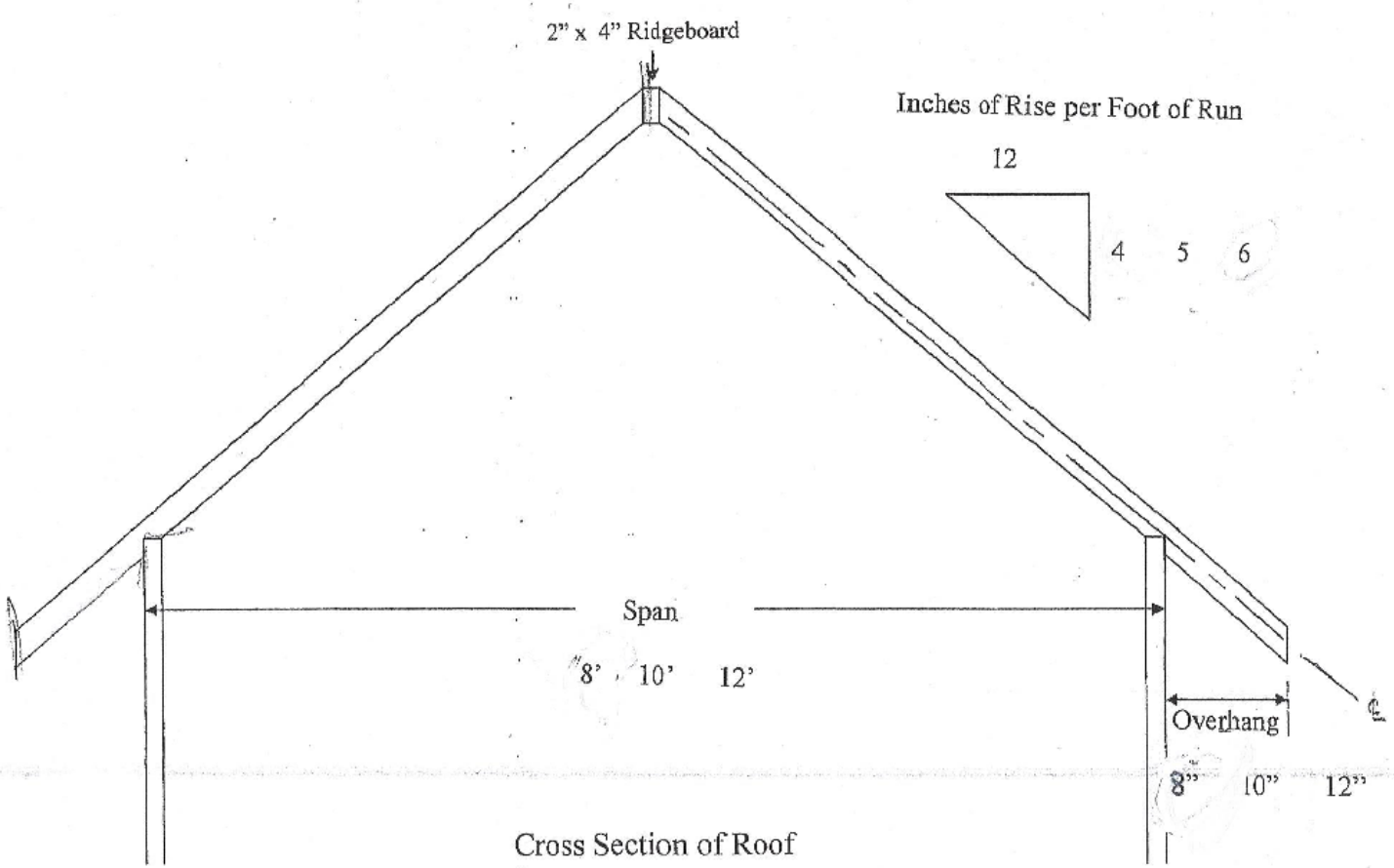
Scoring Rubric

Straightness:	3 pts	Cut is made in one smooth straight cut
	2 pts	Cut is made in multiple cuts **or** is curved
	1 pt	Cut is made in multiple cuts **and** is curved
	0	No cut attempted
Squareness	3 pts	Cut is perfectly square with board along entire length of cut
	2 pts	Cut is square with board in places but is not square in others
	1 pt	Cut is not square with board anywhere along length of cut
	0	No cut attempted
Angle	3 pts	Angle of cut matches test block perfectly
	2 pts	Angle of cut does not match test block perfectly, but the gap is less than 1/8"
	1 pt	Angle of cut creates a gap greater than 1/8" in test block
	0	No cut attempted

Correct Depth 1 pt deducted for every 1/8" off centerline of board

Overhang Length 1 pt deducted for every 1/8" too long or short

Rafter Length 1 pt deducted for every 1/8" too long or short



Cross Section of Roof

Contestant Score:_____ **Contestant Number:_____**

Small Engine Repair and Maintenance

I. Engine Parts Identification (write the name of the part that corresponds with the following numbers) (10 pts)

1._____ **6._____**

2._____ **7._____**

3._____ **8._____**

4._____ **9._____**

5._____ **10._____**

II. Measurement Skills (measure the components with the device provided) (25 pts) See list below for all possible measurements.

Component A: Ring End Gap _____inches

Component B: Crankshaft PTO End Diameter _____inches

Component C: Camshaft Lobe Lift _____inches

Component D: Crankshaft Bearing- Magento End _____inches

Component E: Connecting rod diameter _____inches

III. Use of the B&S Manual (30 pts) - Example Only- These questions can change but will from the manual.

A. Date of Manufacture: (M/D/Y) M_____D_____Y_____

B. Standard Cylinder Bore (range) _____inches

C. Oil Capacity _____oz.

D. Crankpin Journal Reject Size _____inches

E. Cubic Inch Displacement _____cu. In.

F. Type of Starter _____

G. Crankshaft Position _____

H. Valve Tappet Clearance-Exhaust min_____ max_____

I. Compression Ring End Gap Reject Size _____inches

J. Cylinder head torque _____in/lbs

IV. Small Engine Tool I.D. (write the name of the tool with the corresponding number (10 pts)

1._____

2._____

3._____

4._____

5._____

This List of Parts and tolls will be provided to contestants to use as a word bank, due to the many variable names used in describing parts and tools.

Small Engine Identification Parts List

- Camshaft
- Carburetor
- Carburetor Diaphragm
- Carburetor Float
- Compression Ring
- Condenser
- Connecting Rod
- Crankcase Breather
- Crankshaft
- Cylinder Head
- Exhaust Valve
- Flywheel
- Intake Valve
- Governor
- Oil Pump
- Oil Ring
- Oil Slinger
- Oil Sump
- Piston
- Piston Pin
- Rod End Cap
- Solid State Ignition
- Starter Clutch Assembly
- Valve Spring
- Valve Spring Retainer
- Valve Tappet

Small Engine Tool Identification List

- Plug Gauge
- Flywheel Holder
- Ring Compressor
- Valve Spring Compressor
- Starter Clutch Wrench
- Valve Lapper
- Spark Tester
- Compression Gauge
- Piston Ring expander
- Cylinder Hone
- Torque Wrench

List of Measurements that can be taken from Small Engine Parts

Feeler Gauge

- Valve Tappet Clearance
- Ring End Gap

Dial Caliper

- Cam Major
- Cam Minor
- Cam Lift
- Crankshaft Crankpin Journal
- Crankshaft PTO Journal
- Crankshaft Magneto Journal
- PTO Bearing
- Cylinder Bore
- Connecting Rod / Crankpin Journal Bearing

Contestant No._____

Surveying: Profile Leveling *(37 pts (7 pts placement, 30 pts elevations +/- .02) 6 pts each)*

STA	BS	HI	FS	ELEV
BM	____	____	____	100
____	____	____	____	____
0+00	____	____	____	____
0+25	____	____	____	____
0+50	____	____	____	____
0+75	____	____	____	____
1+00	____	____	____	____

Determine the elevation of the five stations relative to the elevation of the benchmark (BM).

Surveying: Cut and Fill *(23 pts (0.5 pts for each elevation placed correct, 4 pts. for each cut / fill placed correct))*

STA	ELEV	CUT	FILL
BM	____	____	____
0+00	____	____	____
0+25	____	____	____
0+50	____	____	____
0+75	____	____	____
1+00	____	____	____

You are going to construct a barn on this site. Level the site at the elevation of BM by indicating the amount of cut or fill needed at each of the five points in the survey.

Surveying: Differential Leveling ***(15 pts. Total, 8 pts for all correct placements and correct numbers=1 pt. each spot, 7 pts for the correct Loop Disclosure)***

STA	BS	HI	FS	ELEV
BM	2.27	_____	_____	100
_____	_____	_____	_____	_____
TP-1	3.42	_____	2.40	_____
_____	_____	_____	_____	_____
TP-2	3.55	_____	4.88	_____
_____	_____	_____	_____	_____
TP-3	1.55	_____	3.00	_____
_____	_____	_____	_____	_____
BM	_____	_____	2.76	_____

Loop Disclosure= _____

Fill in the differential leveling survey and

Calculate loop disclosure.

Contestant No._____

Welding Exercise

- **Metal Preparation (10 pts) _____**
  Bevel Edges

- **Flat Weld (20 pts) _____**
  Location (3 pts) _____
  Appearance- temperature, speed (5 pts) _____
  Penetration (5 pts) _____
  Bead Width (5 pts) _____
  Slag Removal (2 pts) _____

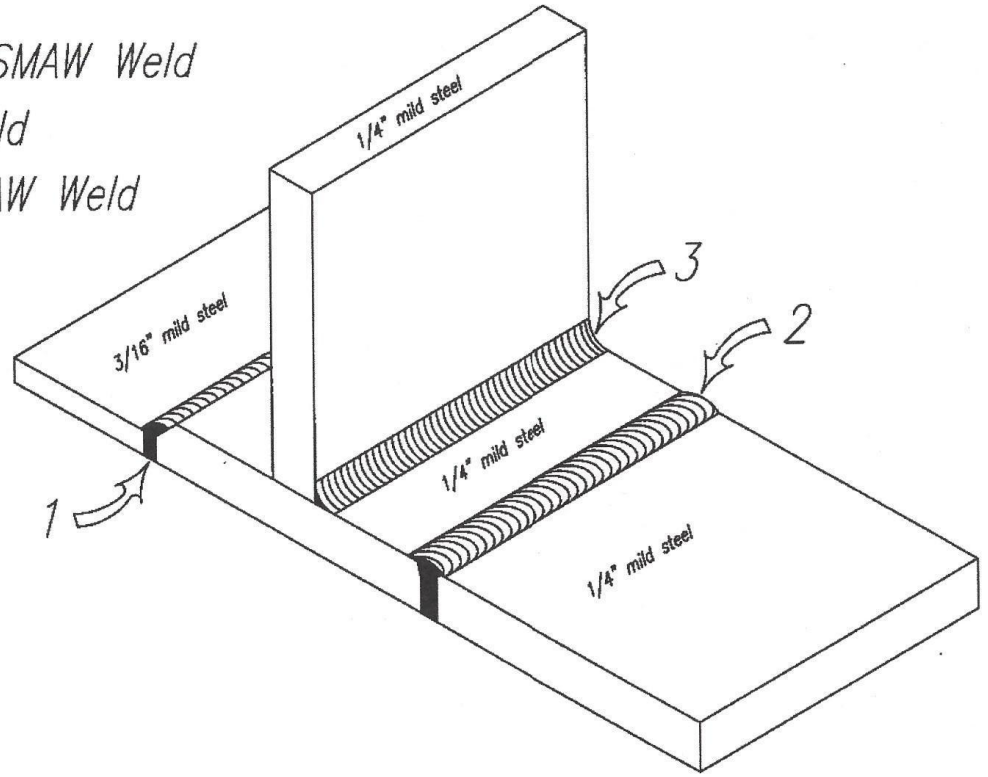
- **Fillet Weld (20 pts) _____**
  Location (3 pts) _____
  Appearance- temperature, speed (5 pts) _____
  Penetration (5 pts) _____
  Bead Width (5 pts) _____
  Slag Removal (2pts) _____

- **Vertical Weld (20 pts) _____**
  Location (3 pts) _____
  Appearance- temperature, speed (5 pts) _____
  Penetration (5 pts) _____
  Bead Width (5 pts) _____
  Slag Removal (2 pts) _____

  Cooled Project (5 pts) _____

Total Score _____

1. Vertical Butt SMAW Weld
2. Flat SMAW Weld
3. Flat Fillet SMAW Weld



WELDING PROJECT

Plumbing will be a part of the contest on ODD years and Masonry on EVEN years.

Contestant #: _____

East Tennessee FFA Plumbing Scoresheet

Assembled according to diagram (10 pts.) = _____
(materials and fittings in correct locations)

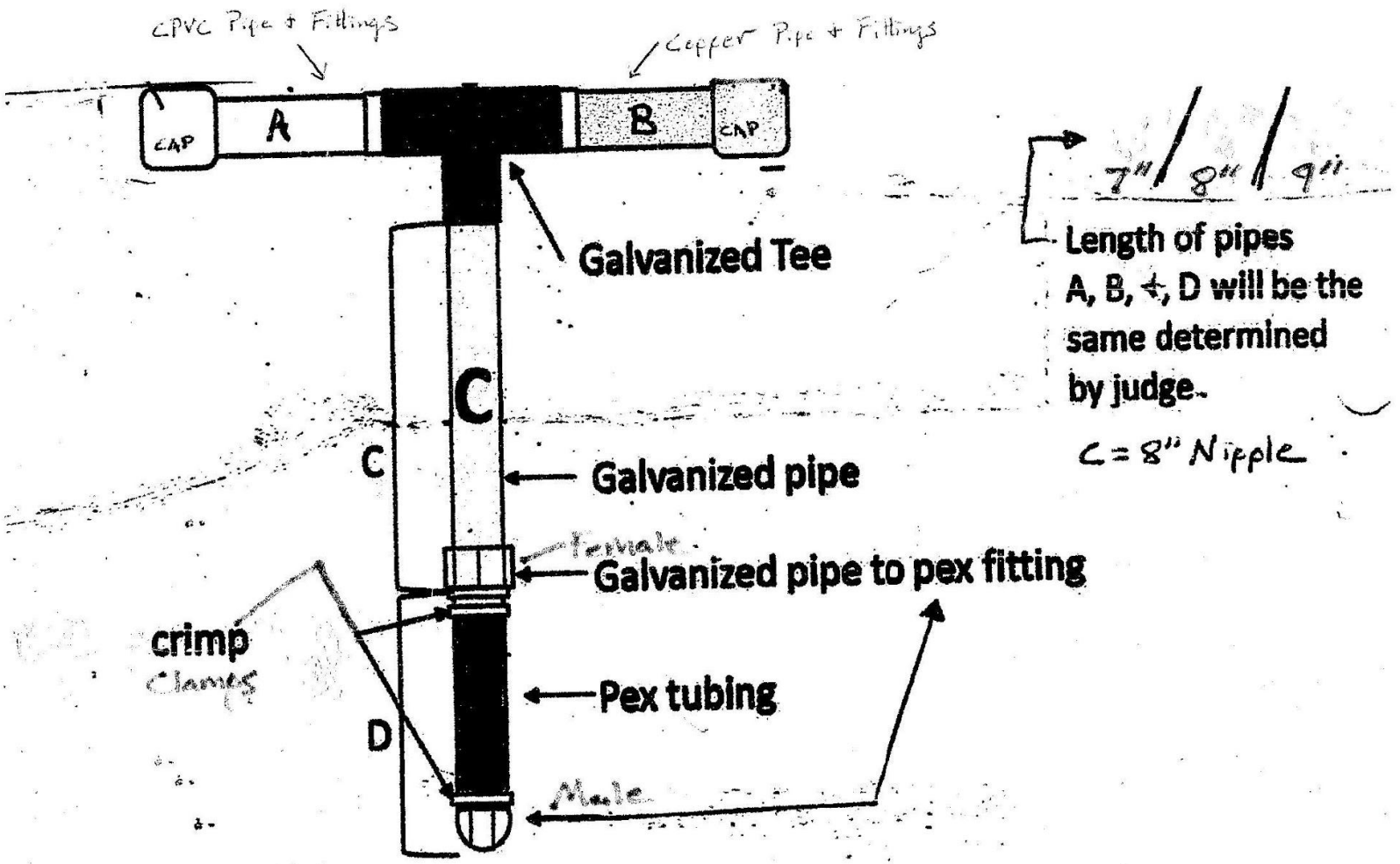
Proper measurements used (8 pts.) = _____
(look for uniformity in pipe cut pipe lengths)

General professional appearance (14 pts.) = _____
(smooth soldering, clean prime and glue, and etc……)

Water Leak Test by applying 80 psi to fixture (38 pts.) = _____
(project attached to air supply and submerged under water)

Safety practices followed and tools used properly (5pts.) = _____

Total Project Score = _____


cPVC Pipe + Fittings
Copper Pipe + Fittings
CAP
A
B
CAP
Galvanized Tee
C
C
Galvanized pipe
Female
Galvanized pipe to pex fitting
crimp
clamps
Pex tubing
D
Male
7" / 8" / 9"
Length of pipes
A, B, C, D will be the
same determined
by judge.
C = 8" Nipple

The item in bottom left is the tool built for testing the fixture. On the right is the type of clamp that will be used on PEX, along with the tool that tightens the clamp.