

2025 Agricultural Technology & Mechanical Systems CDE

NOTE: All student competitors must complete by time of event registration the web-posted Welding Log, documenting their prior welding experience, as well as a proctored/corrected “Welding Safety Test” on which they achieve a perfect score of 100%

Scoring

Participants will be scored as follows:

All 4 scores count for overall team score

	<u>Individual</u>	<u>Team Points</u>
Team Activity (Small engines) *	¼ of team	120 points
Welding (MIG and stick)	30 points	120 points
Team Activity (Electricity)	¼ of team	120 points
Sprayer prep exercise	¼ of team	<u>120 points</u>
Total points possible	120 points	480 points

Tiebreaker

The team score for the event will be determined by adding all the points earned by adding individual points as listed above. The following activities will be used to break ties between individuals and/or teams:

The highest written exam scores; if still tied top welding scores

Maine FFA Agricultural Technology and Mechanical System Skills Activity Guidelines

General Guidelines for Skills Activities

- No iPad, tablet, laptop computer or cell phone devices will be allowed in the contest area.
- Activities may involve problem solving and calculations. A calculator is highly recommended.
- Students will have 25 minutes to complete skill activities. They will be given five minutes to pass to the next skill activity.
- Students must use their own equipment for welding section, but this is not required for all other sections. Except for proper welding clothing and safety glasses, all required equipment will be provided.

Safety Glasses

- All participants must wear safety glasses during the team and skill events.
- To enter the CDE area, students must have safety glasses in their possession.
- Safety glasses must have a Z87+ rating.
- Side shields are required on safety glasses. Safety glasses must protect the eyes around the eyebrows, temples and cheeks.
- Personal prescription safety glasses are permitted only if they have a Z87+ rating, are equipped with side shields and meet the description above.
- Only in activities where students are given verbal permission to remove their safety glasses can they take off their safety glasses. Such an example would be the written exam.

Clothing

- Official FFA dress should **not** be worn during this event, except for taking team pictures prior to the event.
- Students' clothing must be appropriate for the activities.
- Open-toed shoes are not permitted. Shoes with cloth tops that welding sparks can burn through are also not permitted.
- Loose clothing with long, loose or frayed ends that can get wrapped up in power tools or equipment are to be avoided.
- Equipment for welding, such as welding helmets and gauntlet gloves, will not be provided. However, students are permitted to bring their own if they choose.

Agricultural Technology & Mechanical Systems CDE

Score Sheets 2025

Name and FFA Chapter	Sprayer Knowledge	Electrical Activity	Welding Section	Engine Activity	Total	Place
Combo Team						
1.						
2.						
3.						
4.						
Caribou 1						
1.						
2.						
3.						
4.						
Caribou 2						
1.						
2.						
3.						
4.						
Easton 1						
1.						
2.						
3.						
4.						
Easton 2						
1.						
2.						
3.						
4.						
Presque Isle 1						
1.						
2.						
3.						
4.						
Presque Isle 2						
1.						
2.						
3.						
4.						

Agricultural Technology and Mechanical Systems CDE 2025

PART A

Christmas tree Farmer Smith was getting his UTV mounted sprayer ready for storage. The first use of the sprayer is a well-timed early May insecticide application. Reid, the Smith Farms employee noticed a small oil leak at the bottom of the valve cover.

The engine fuel tank was removed and completely emptied of any traces of water and fuel. It did not look like any water was in the fuel tank.

Part of the season ending routine is to **check spark** and **replace the spark plug**.

Check the air filter for debris and decide if you need a new filter.

Change the oil so the winter storage will have new oil in the crankcase.

Those available are before you on table. Which oil is the **incorrect** oil to use for this engine at any temperature? Chose correct type and correct amount of oil that needs to be added to engine.

Oil brand and SAE rating **to not use** _____ (10points) _____

Oil amount needed _____ ounces (5points) _____

Oil level okay after drain and fill (5 points) _____

Check fuel tank to make sure it is empty (5 points) _____

Check and verify to judge that there is sufficient spark (5 points) _____

New spark plug with correct gap (5 points) _____

Valve cover gasket replaced correctly (15 points) _____

Safety glasses worn at all times & tools properly returned (10 points) _____

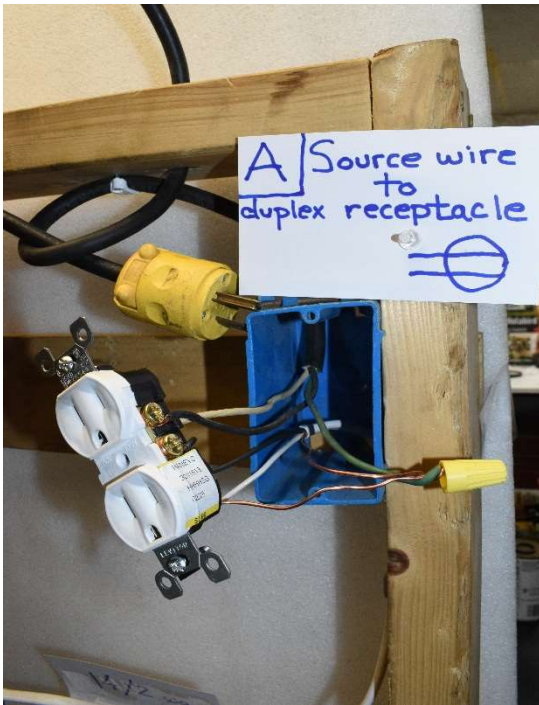
Total (60 possible) _____

Note: Briggs and Stratton 200 cc model # 130G32 0022 F1 engine is utilized. The engine is used to power a sprayer in remote locations.

**2025 Maine FFA Agricultural Technology & Mechanical Systems CDE
2025 _Electrical Wiring Box A**

Box A ---Wiring (source black pigtailed to black connection on duplex receptacle) (White source to white connector on duplex receptacle) Source ground needs wire nut to duplex receptacle and to Box B. **1 point per correct connection location)** _____(6)

Staple wire at correct distance from box A to C _____(9)



Workmanship (**5 points each**)

Box A---Stripping _____(5)

Connect ground wires _____(5)

Correct wire nuts (secure?) _____(5)

Length of leads _____(5)

Overall neatness (**5 points**) _____(5)

Total Points (40) Box A _____

2025 Electrical Wiring Box B



Box B ---Wiring (correct color wires to single pole switch) _____(5)

Properly secured ground wire to switch with correct wires in pigtail _____(5)

Code correct (staple distance from box. No extreme angles on wire entrance and exit from box.) _____ (5)

Workmanship (5 points per line)

Box B---Stripping correct length _____(5)

Clockwise around screws _____(5)

Length of leads _____(5)

Secure connectors _____(5)

Overall neatness (5 points) _____(5)

Total Points Box B (40) _____

Electrical Wiring Box C



Code correct **(2 points per line)**

Correct down wire (14/3 type NM) _____ (2)

Box wiring (red switched connection) ____ (2)

Black wire hot all times _____(2)

Properly grounded bare wire _____(2)

Connector removed on hot side _____(2)

Box C---Stripping correct length _____(5)

Clockwise around screws _____(5)

Correct wire nut _____(5)

Length of leads _____(5)

Secure connectors _____(5)

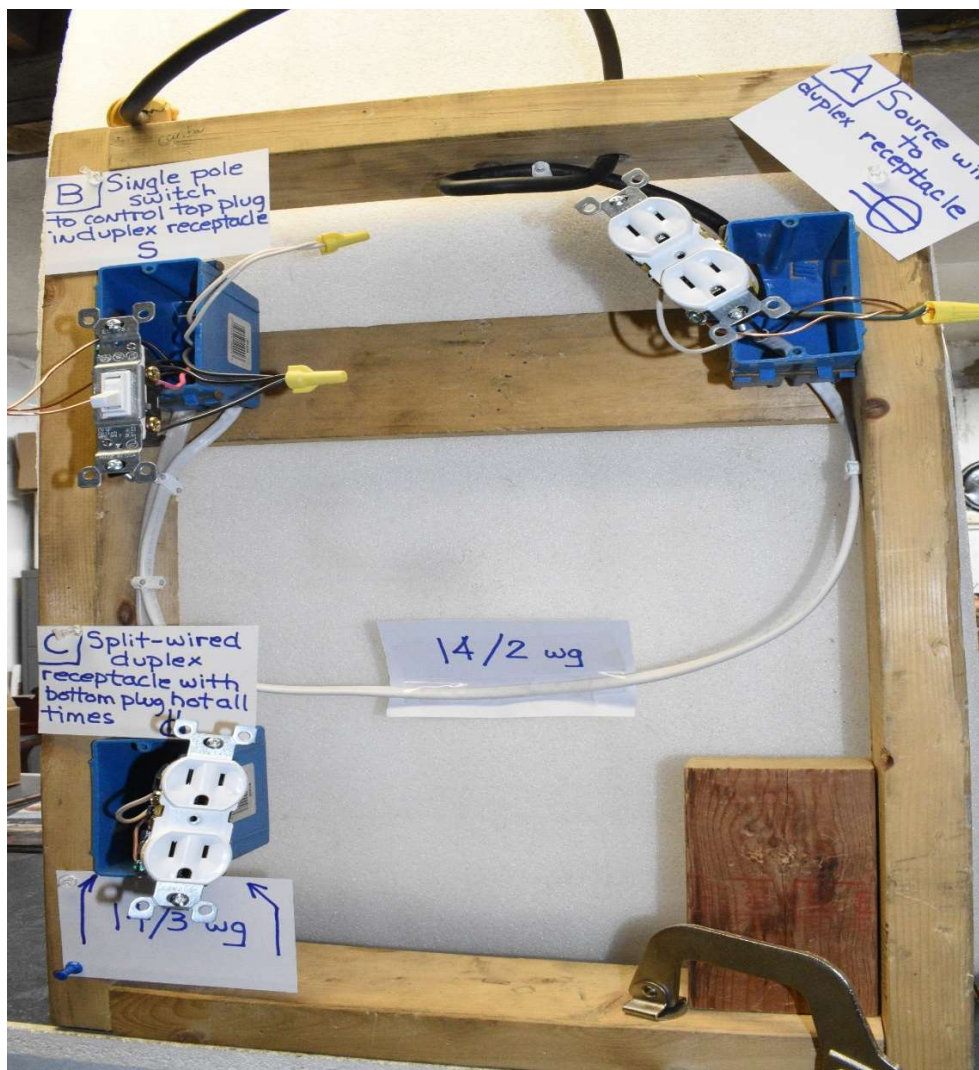
3. Overall neatness (5 points) _____(5)

Box C total (possible 40) _____

Agricultural Technology & Mechanical Systems Electrical Segment Wiring Photo
THIS IS A TEAM ACTIVITY

Wire the following devices using the tools provided. The use of safety glasses is mandatory. The source wire will begin at box A. 14/2 type NM wires from box A will run to single pole switch in box B and 14/3 type NM to split wired duplex receptacle in box C.

Do not back wire switch, use hooks only. Do not tuck the wires into the individual boxes thus allowing the judge to look at the quality of work. Plug the device extension cord into supplied portable GFCI. Carefully actuate the single pole switch to activate top receptacle on split-wired duplex receptacle in Box C. Pick up all tools and excess wiring materials before moving on to next segment.



2025 Agricultural Technology and Mechanical Systems CDE

The Agricultural Technology and Mechanical Systems Career Development Event is intended for teams of four FFA members, with all individual scores counted toward the overall team score.

For this event, students must come prepared with proper safety equipment, including welding jackets, closed-toe leather shoes, safety glasses and welding gloves. Official FFA Dress is not required for this event.

The following components will be included in this event:

- (A) Welding with stick and MIG welder. Welding assignment will include a butt, lap and tee weld for the stick welding and MIG welding. See photos provided at website and on following pages.
- (B) Sprayer segment sponsored by United Ag & Turf. Team will have a Frontier LS2011 liquid sprayer with PTO pump. Teams will be doing pre-season set up and calibration tests.
- (C) Small engine segment will be two parts. Part A will be prepping a Briggs & Stratton engine for winter storage. Part B will be replacing a Briggs and Stratton Animal engine head gasket. The team must decide who will do part A and who will do Part B in order to meet the time restraint.
- (D) Electrical Circuit – Teams will wire two duplex receptacles and a switch. The source enters box A in upper right and is routed to the single pole switch in box B followed by split wired duplex receptacle in box C below it.

**2025 Agricultural Technology &
Mechanical Systems CDE
Welding Section**

Make sure your competitor number is clearly displayed on finished product that is turned in to the judge. Handle all hot metals with care. Safety glasses must be on during all parts of this CDE.

Student: Fill out top section (not scoring boxes) each sheet:

WELDING PRODUCT SCORING SHEET

NAME: _____

CHAPTER: _____

Type of Welder (circle): SMAW (Stick) GMAW (Mig)

Weld Joint: _____

Welding Position: _____

Type and size of rod used: _____

Type and thickness of base metal: _____

CRITERIA	JUDGE'S SCORE (CIRCLE ONE)
General Appearance (smooth, uniform ripples, straight)	0 2 4 6 8 10 12 14 16 18
Proper Lead and Work Angle	0 2 4 6 8
Uniform Width & Height (Speed)	0 2 4 6 8
Penetration (Proper Heat Setting)	0 2 4 6 8 10 12 14 16 18
Clean Start & Stop	0 2 4 6 8 10 12 14 16 18
Safety Procedures followed and paper filled correctly (Full Name, Date, 1.5" width steel, etc.)	0 2 4 6 8 10 12 14 16 18 20
TOTAL POINTS:	

WELDING PRODUCT SCORING SHEET

NAME: _____

CHAPTER: _____

Type of Welder (circle): SMAW (Stick) GMAW (Mig)

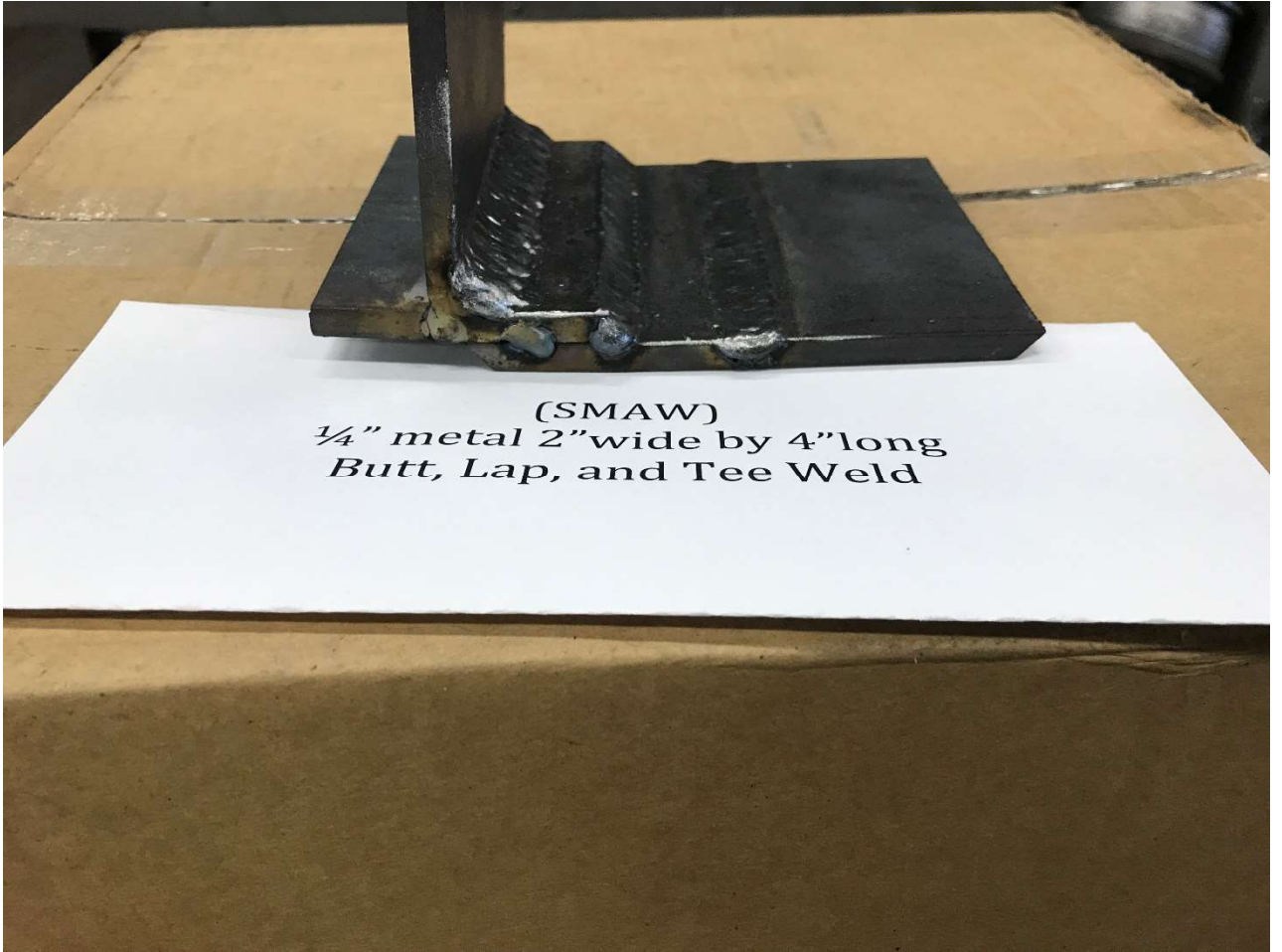
Weld Joint: _____

Welding Position: _____

Type and size of rod used: _____

Type and thickness of base metal: _____

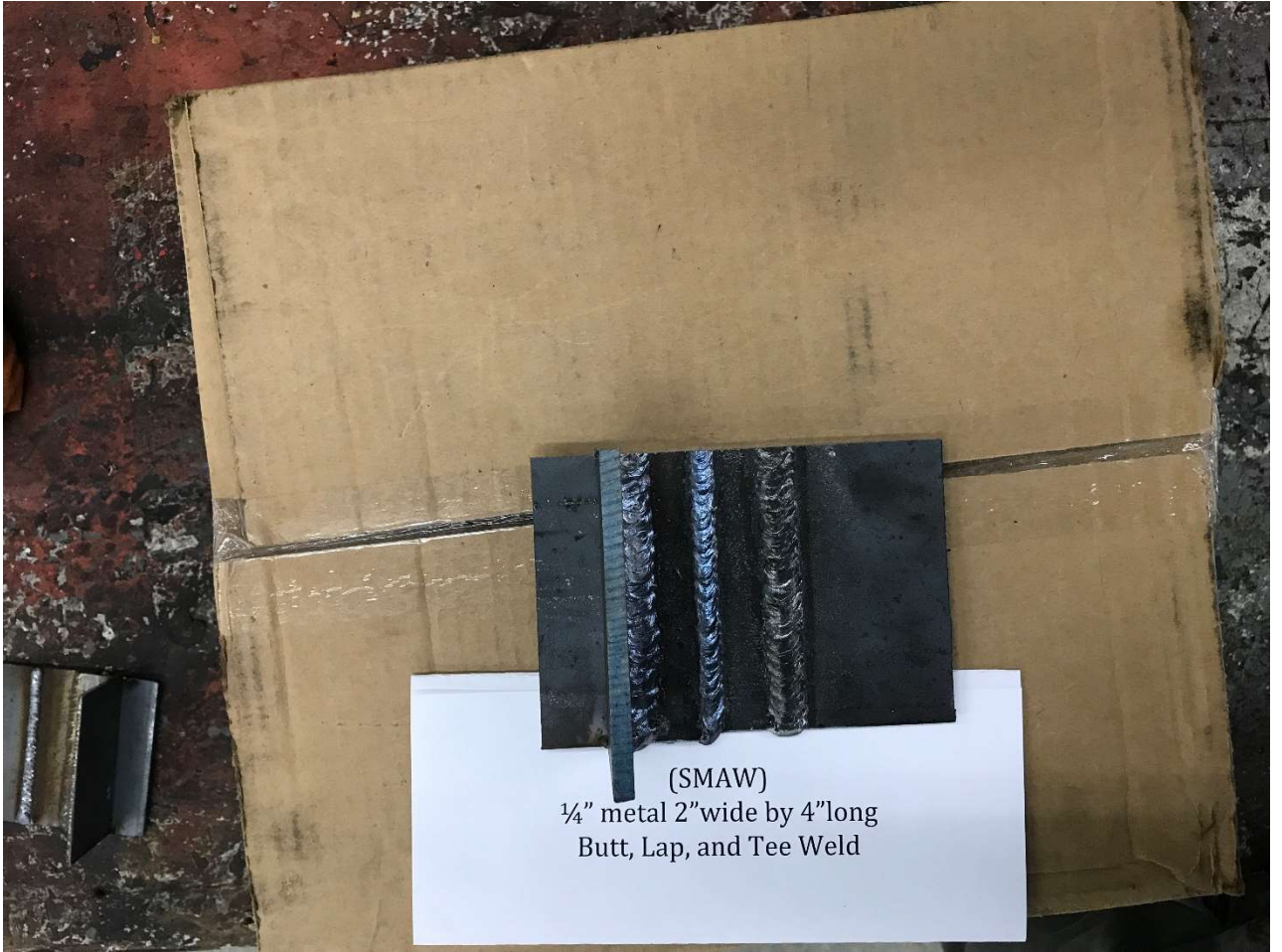
CRITERIA	JUDGE'S SCORE (CIRCLE ONE)
General Appearance (smooth, uniform ripples, straight)	0 2 4 6 8 10 12 14 16 18
Proper Lead and Work Angle	0 2 4 6 8
Uniform Width & Height (Speed)	0 2 4 6 8
Penetration (Proper Heat Setting)	0 2 4 6 8 10 12 14 16 18
Clean Start & Stop	0 2 4 6 8 10 12 14 16 18
Safety Procedures followed and paper filled correctly (Full Name, Date, 1.5" width steel, etc.)	0 2 4 6 8 10 12 14 16 18 20
TOTAL POINTS:	
TOTAL POINTS FOR BOTH WELDER TYPES:	
STUDENT NAME:	CHAPTER:



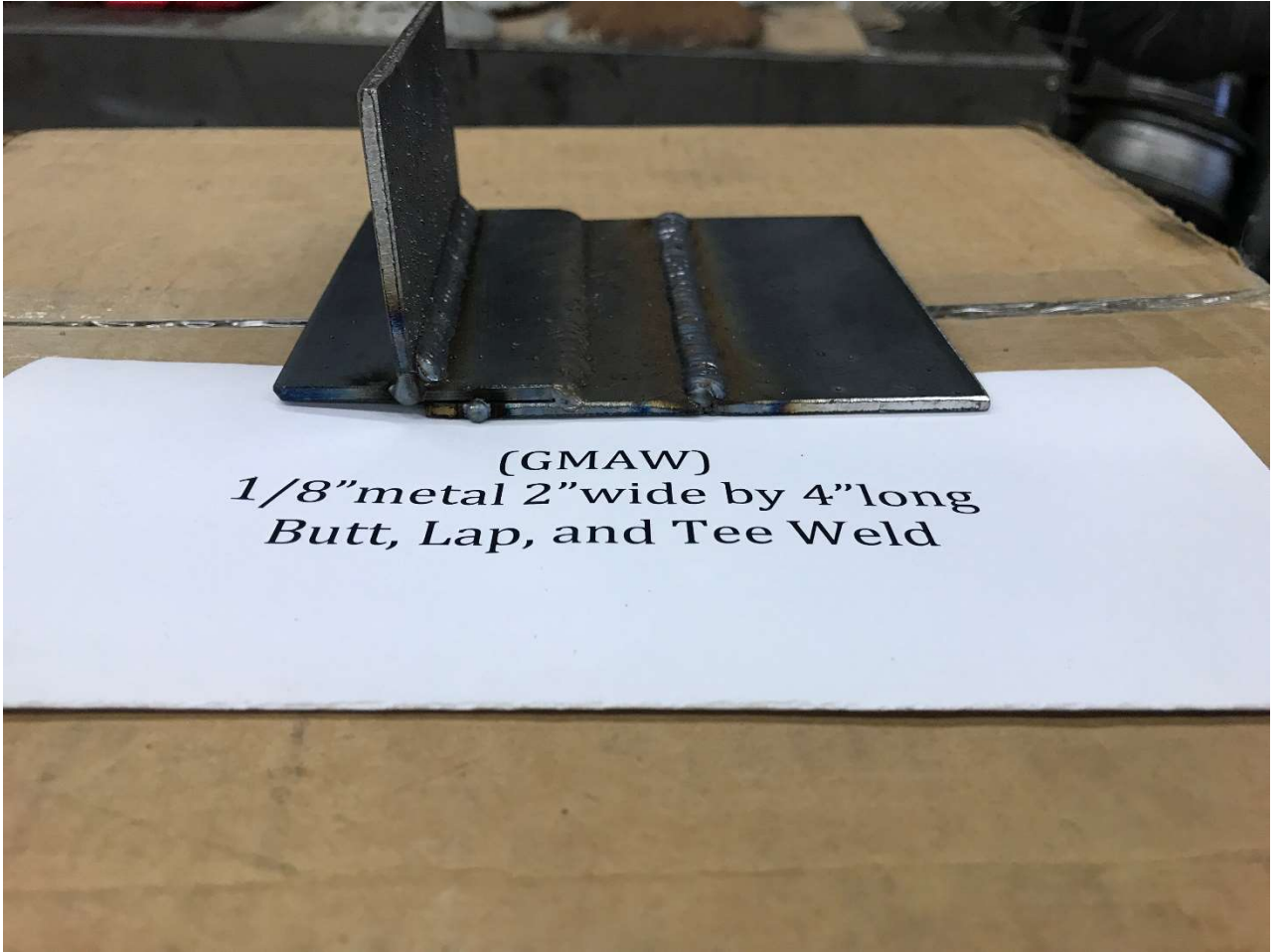
(SMAW)
1/4" metal 2" wide by 4" long
Butt, Lap, and Tee Weld



(SMAW)
1/4" metal 2" wide by 4" long
Butt Lap, and Tee Weld

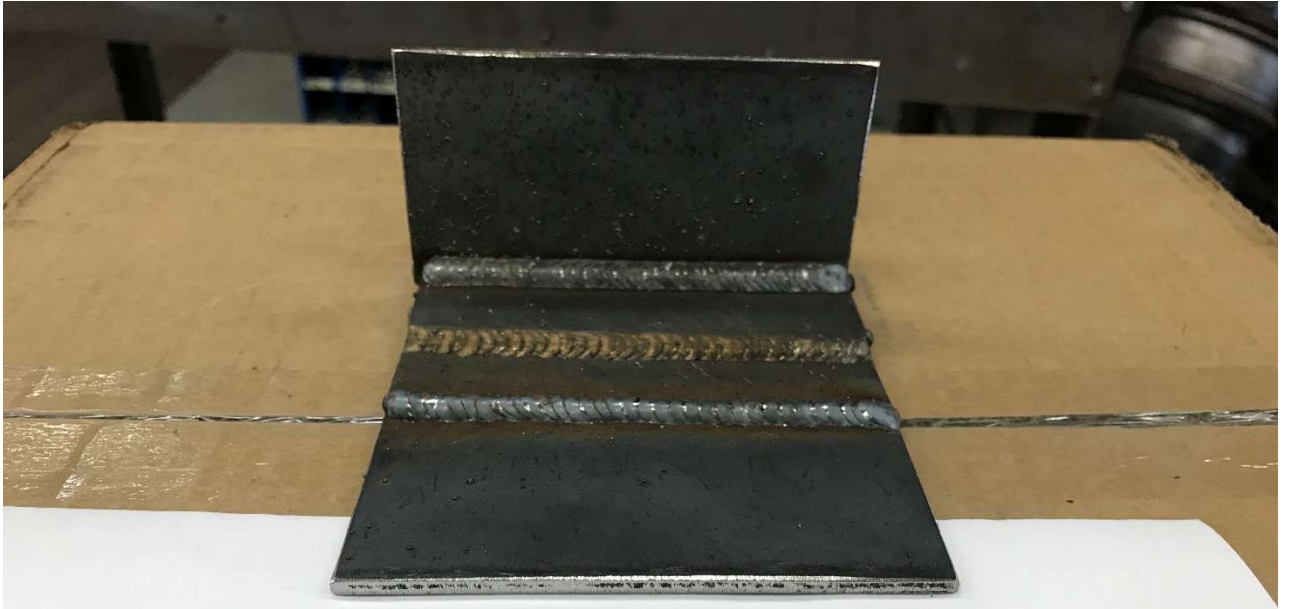


(SMAW)
1/4" metal 2" wide by 4" long
Butt, Lap, and Tee Weld



(GMAW)
1/8"metal 2"wide by 4"long
Butt, Lap, and Tee Weld





(GMAW)
1/8" metal 2" wide by 4" long
Butt, Lap, and Tee Weld

Ag Mechanics Small Engines Segment 2025 Part B

Your shop has serviced a wide variety of small engine projects over the last several years. Today nine-year old Melissa Ziegler showed up at your shop with her race kart team Ziegler Racing #10. They are in town racing at Spud Speedway's kart track.

Her regular mechanics will not be in the area for two more days. Melissa would like to get some practice time at the track; however, she noted that she heard a phutt, phutt sound from her engine and a distinct power loss.

You suspect that she has a blown head gasket. You need to do a compression test to determine a loss of compression.

Use the race engine starter to turn the engine over since she has no manual pull start mechanism.

Remove the cylinder head after you record the actual compression. Get a new head gasket from the judge and properly torque the head and adjust the valves utilizing the Animal engine torque specs.

Cylinder head torque 200 inch pounds (tighten diagonally in at least 3 steps)

Exhaust valve lash clearance .002 inch

Intake valve lash .0015-.002 inch

Compression reading before _____ psi (10 points _____)

Compression post replacement _____ psi (10 points _____)

Set valve lash correctly _____ intake(15 points _____)

_____ exhaust (15 points _____)

Head torqued correctly _____ (10 points _____)

Do not install valve cover after setting lash to allow judge to check lash _____

TOTAL Points for this segment _____

Sprayer Set-Up and Calibration Ag Mechanics 2025

Your team is setting up this Frontier LS2011 liquid sprayer for Westbrook High School. The Maine Board of Pesticide Control requires that all nozzles be tested yearly for output per nozzle. You must also set the boom so it is level by adjusting 3-point hitch arm. The pitch must be level in yaw (pitch) using center link of hitch. Each nozzle must be checked for output at **30 psi** (Note psi checkpoint!!!) Use T-Jet® nozzle chart to determine output per minute. You may want to collect output for 30 seconds, multiply by 2 to get output in ounces per minute. Determine the nozzle spacing. From that spacing number you will determine how far from the ground you will set height at nozzle tip. Use 3-point hitch lever to set height above ground.

Nozzle location	Nozzle 1 Ounces in 30 seconds	Nozzle 2 Ounces in 30 seconds	Nozzle 3 on center. Ounces in 30 sec.
Boom left			XXXXXXXXXX
Center boom			
Right boom			XXXXXXXXXX

Do any nozzles fall outside of range from AIC TeeJet® spray page. What corrections did you employ? Write answer below.

_____ 120 points based on all nozzles checked 70 points _____

Nozzle find A 10 points _____

Nozzle find B 10 points _____

Nozzle height and boom level from ground (Minus one point per degree from level) 15 points _____

Pitch level (minus one point per degree from level) 15 points _____

TOTAL (points available 120) _____