Participants Guide

Three (3) of the following Agricultural Mechanics Performance Skills will be selected for the state competition.

The regional rotation guidelines for the two (2) practicums are only a suggestion, and are not mandatory.

Regional rotation for the practicums is as follows. This rotation does NOT apply to State competition:
Odd years - Arc Weld
Even years - MIG weld if available
Odd years - Other practicum choose between 2-7 skills
Even years - Other practicum choose between 8-14 skills

Agricultural Mechanics Performance Skill 1.1
Make a Butt Joint Weld in the Flat Position

Length of metal (L") and type of welder, STICK or MIG will be determined by event superintendent. At the regional level, any rod can be used for arc weld; state participants will use a 7018.

Participant Name _____ Score _____

Chapter _____ Participant Number _____

Instructions to Participant

Using the proper safety and welding equipment and the electric arc welder OR MIG welder, choose two or three pieces of ¼" x 2" x L" metal and the correct electrodes from the choices provided as directed by the event superintendent. Place practice beads on the third piece of metal to adjust the welder amperage to match the metal characteristics if so desired. The practice metal is not required and will not be graded.

Perform the skill for grading using electrode(s) and two pieces of properly prepared ¼" x 2" x L" metal. This butt weld is to be performed in the flat position as a single pass bead along the L" joint with the weld bead applied evenly to the topside of both metal pieces. The weld will be judged on quality, appearance, penetration, and equal bead placement on both pieces of metal (1.1 Judges rubric as specific criteria).

L" or Length in inches may vary and will be determined by the event superintendent.
Multiple electrodes will usually be required to complete the weld.

Safety Equipment Needed:

Welding helmet with adjustable shading lens or minimum #10 shaded lens
Safety glasses and/or goggles for use at all times
Welding gloves and proper leather closed-toe shoes that cover the entire sock or skin
Clothing that covers the entire body to include the arms and legs

Agricultural Mechanics Performance Skill 1.2
Make a T Fillet Weld in the Flat Position

Length of metal (L") and type of welder, STICK or MIG will be determined by event superintendent. At the regional level, any rod can be used for arc weld; state participants will use a 7018.

Participant Name _____ Score _____

Chapter _____ Participant Number _____

Instructions to Participant

Using the proper safety and welding equipment and the electric arc welder OR MIG, choose two or three pieces of ¼" x 2" x L" metal and the correct electrodes from the choices provided as directed by the event superintendent. Place practice beads on the third piece of metal to adjust the welder amperage to match the metal characteristics if so desired. The practice metal is not required and will not be graded.

Perform the skill for grading using electrodes and two pieces of properly prepared ¼" x 2" x L" metal. Place the two pieces of metal so the *T-joint* is formed and tack weld before rotating them to rest on the provided 45° jig so that the joint to weld is facing up in the flat position (The event superintendent will provide the jig.). Then weld a single pass along the L"-length of the upward facing joint, placing the bead evenly on both pieces of the metal. The weld will be judged on quality, appearance, penetration, and equal bead placement on both pieces of metal (1.2 Judges Rubric as specific criteria).

L" or Length in inches may vary and will be determined by the event superintendent.
Multiple electrodes will usually be required to complete the weld.

Safety Equipment Needed:

Welding helmet with adjustable shading lens or minimum #10 shaded lens
Safety glasses and/or goggles for use at all times
Welding gloves and proper leather closed-toe shoes that covers the entire sock or skin
Clothing that covers the entire body to include the arms and legs

Agricultural Mechanics Performance Skill 1.3
Make an Outside Corner Joint Weld

Length of metal (L") and type of welder, STICK or MIG will be determined by event superintendent. At the regional level, any rod can be used for arc weld; state participants will use a 7018.

Participant Name _____ Score _____

Chapter _____ Participant Number _____

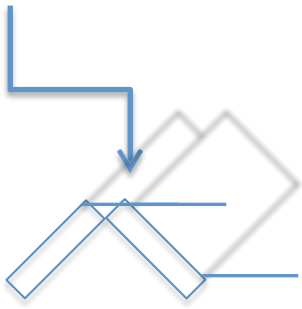
Instructions to Participant

Using the proper safety and welding equipment and the electric arc welder OR MIG, choose three pieces of ¼" x 2" x L" metal and the most appropriate electrodes from the choices provided. Place practice beads on one piece of metal to adjust the welder amperage to match the metal characteristics if so desired. The practice metal is not required and will not be graded.

Perform the skill for grading using selected electrodes and two pieces of properly prepared ¼" x 2" x L" metal. Place the metal so that the butt joint is formed as seen in the picture below. This weld is to be performed in the flat position as a single pass weld and applied evenly to both metal pieces along the upward facing L" joint. The weld will be judged on quality, appearance, penetration, and equal bead placement on both pieces of metal (1.3 Judges Rubric as specific criteria).

L" or Length in inches may vary and will be determined by the event superintendent.
Multiple electrodes will usually be required to complete the weld.

Single pass weld along the L" joint



Safety Equipment Needed:
Welding helmet with adjustable shading lens or minimum #10 shaded lens
Safety glasses and/or goggles for use at all times
Welding gloves and proper leather closed-toe shoes that covers the entire sock or skin
Clothing that covers the entire body to include the arms and legs

Agricultural Mechanics Performance Skill 1.4
Make a Vertical Up Butt Joint Weld

Length of metal (L") and type of welder, STICK or MIG will be determined by event superintendent. At the regional level, any rod can be used for arc weld; state participants will use a 7018.

Participant Name _____ Score _____

Chapter _____ Participant Number _____

Instructions to Participant

Using the proper safety and welding equipment and the electric arc welder OR MIG, choose two or three pieces of ¼" x 2" x L" metal and the correct electrodes from the choices provided as directed by the event superintendent. Place practice beads on the third piece of metal to adjust the welder amperage to match the metal characteristics if so desired. The practice metal is not required and will not be graded.

Perform the skill for grading using electrodes and two pieces of properly prepared ¼" x 2" x L" metal. The participant is to place the metal so that the butt joint is formed as a single pass weld along the L" joint in the vertical up position and is to apply the weld bead evenly to the facing side of both metal pieces. The weld will be judged on quality, appearance, penetration, and equal bead placement on both pieces of metal (1.4 Judges Rubric as specific criteria).

L" or Length in inches may vary and will be determined by the event superintendent.
Multiple electrodes will usually be required to complete the weld.

Safety Equipment Needed:
Welding helmet with adjustable shading lens or minimum #10 shaded lens
Safety glasses and/or goggles for use at all times
Welding gloves and proper leather closed-toe shoes that covers the entire sock or skin
Clothing that covers the entire body to include the arms and legs

Agricultural Mechanics Performance Skill 1.5
Make a Lap Joint Fillet Weld in the Flat Position

Length of metal (L") and type of welder, STICK or MIG will be determined by event superintendent. At the regional level, any rod can be used for arc weld; state participants will use a 7018.

Participant Name _____ Score _____

Chapter _____ Participant Number _____

Instructions to Participant

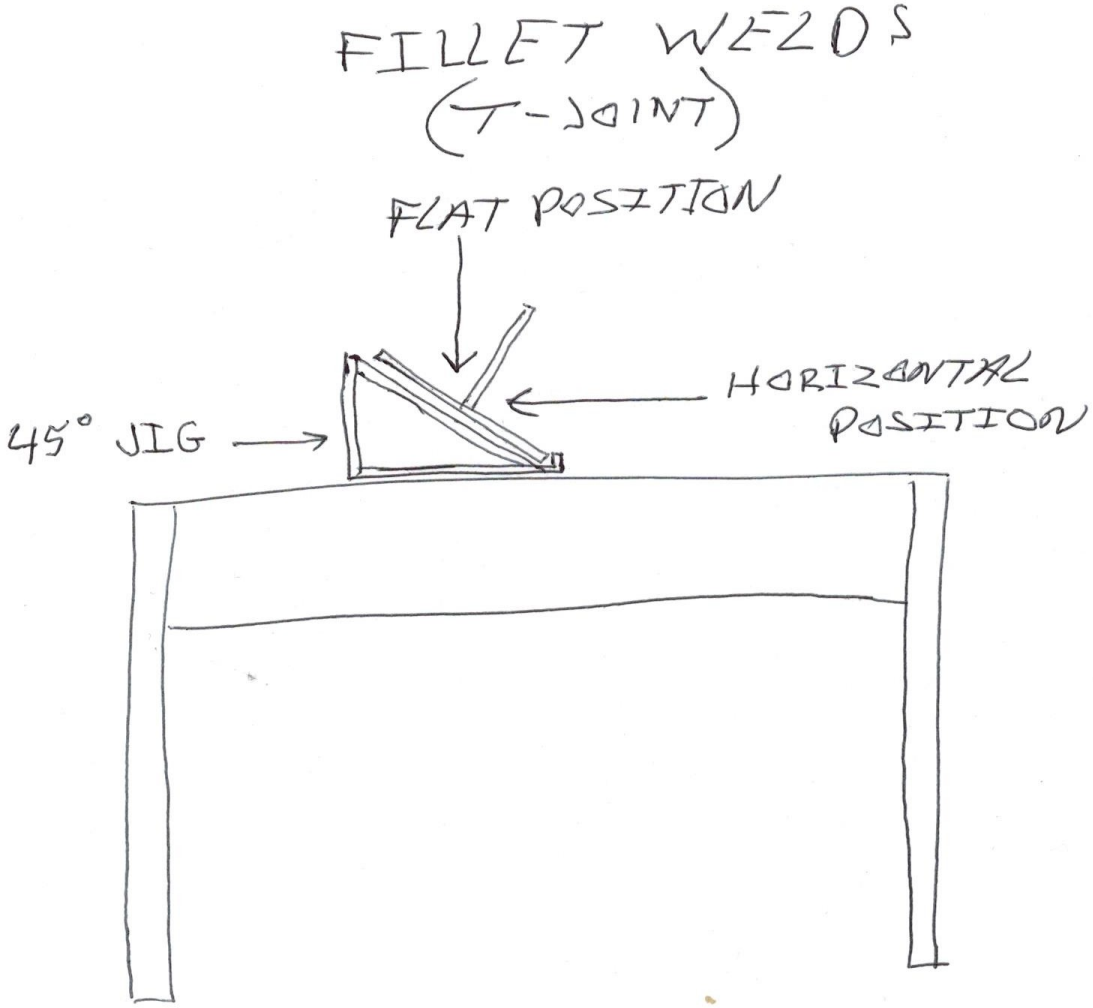
Using the proper safety and welding equipment and the electric arc welder OR MIG, choose two or three pieces of ¼" x 2" x L" metal and E7018 electrodes from the choices provided as directed by the event superintendent. Place practice beads on the third piece of metal to adjust the welder amperage to match the metal characteristics if so desired. The practice metal is not required and will not be graded.

Perform the skill for grading using E7018 electrodes and two pieces of properly prepared ¼" x 2" x L" metal. This lap joint weld is to be performed in the flat position as a single pass bead along the L" joint with the bead evenly placed on the top surface of both pieces of the metal. The weld will be judged on quality, appearance, penetration and equal bead placement on both pieces of metal (1.5 Judges Rubric as specific criteria).

L" or Length in inches may vary and will be determined by the event superintendent.
Multiple electrodes will usually be required to complete the weld.

Safety Equipment Needed:

Welding helmet with adjustable shading lens or minimum #10 shaded lens
Safety glasses and/or goggles for use at all times
Welding gloves and proper leather closed-toe shoes that cover the entire sock or skin
Clothing that covers the entire body to include the arms and legs


FILLET WELDS
(T-JOINT)
FLAT POSITION
HORIZONTAL POSITION
45° JIG

Agricultural Mechanics Performance Skill 2
Sweating a Piece of Copper Pipe into a Fitting

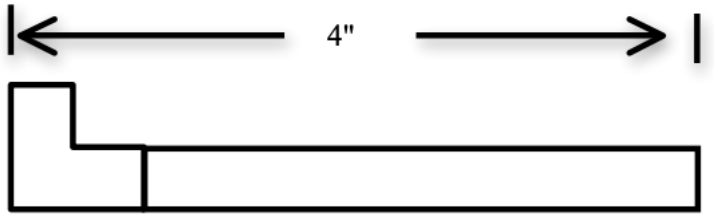
Participant Name _____ Score _____

Chapter _____ Participant Number _____

Instructions to Participant

Wear the proper safety equipment for this activity. Select and use the proper tools to cut a piece of copper pipe according to the accompanying diagram and dimensions (diagram and dimensions are subject to change without notice). Properly prepare and sweat the pipe into a copper fitting using the provided propane torch. Upon completion, use a paint pen to identify your product.

Safety Equipment Needed:
Safety glasses and/or goggles for use at all times
Leather gloves
Long pants and proper leather closed-toe shoes



What is the makeup of the solder that is being provided for this event? _____

What type gas is being provided to solder your pipe joints? _____

Agricultural Mechanics Performance Skill 3
Use proper tools to properly adjust the valves on an OHV small engine

Participant Name _____ Score _____

Chapter _____ Participant Number _____

Instructions to Participant

Wear the proper safety equipment for this activity. Select and use the proper tools to remove the valve cover, check the valve clearance, and record. Adjust valve clearance as specified by the manufacturer for a provided single cylinder small engine (the appropriate engine manual will be provided). Reinstall valve cover and use the Job Sheet below to record engine specifications and measurements. Use the measuring tools to perform measurements and record.

Safety Equipment Needed:
Safety glasses and/or goggles for use at all times
Long pants and proper leather closed-toe shoes

Job Sheet
Engine Evaluation Guide

Engine Number: _____

Engine Model-Series: _____-_____

Manufacturer's specification for valve clearance for this engine: intake _____

Manufacturer's specification for valve clearance for this engine: exhaust _____

Engine's intake valve clearance before adjustment: _____

Engine's exhaust valve clearance before adjustment: _____

Measurement of diameter of crankshaft end to nearest hundredth: _____ in.

Agricultural Mechanics Performance Skill 4
Use a small engine with head removed to inspect and record piston damage and perform cylinder and piston ring measurements

Participant Name _____ Score _____

Chapter _____ Participant Number _____

Instructions to Participant

Wear the proper safety equipment for this activity. Locate the engine model and serial number and record on Job Sheet. Select and use the proper tools to examine the piston head for damage, and record results on the Job Sheet. Take measurements of bore of the engine and record. Take measurement of thickness of the piston ring using either the dial caliper or the micrometer. Insert piston ring into top of cylinder and measure ring end gap and record. Use supplied engine manual (the appropriate engine manual will be provided) and determine if ring is in tolerance. Calculate the cubic inch of engine. The participant will submit the Job Sheet to the judge upon completion.

Safety Equipment Needed:
Safety glasses and/or goggles for use at all times
Long pants and proper leather closed-toe shoes

Job Sheet Information
Engine Evaluation Guide

Engine Number: _____

Engine Model-Series: _____-_____

Does piston have damage? Yes/No _____

Bore of engine: _____ to the nearest hundredth

Piston ring thickness: _____ to the nearest hundredth

Piston ring end gap: _____ to the nearest hundredth

Is the piston ring end gap in tolerance? Yes/No _____

Calculate cubic inch of engine: _____

Agricultural Mechanics Performance Skill 5
Determine difference in elevation between two points and the distance from the rods to the transit

Participant Name _____ Score _____

Chapter _____ Participant Number _____

Instructions to Participant

Wear the proper safety equipment for this activity. Take two elevation readings from given points and record the findings on the Job Sheet below. Determine the difference in the elevation for the two points and record the difference on the Job Sheet. Use the stadia hairs in the transit OR pacing and determine the distance from the rods to the transit and submit to the judge upon completion of this activity.

Safety Equipment Needed:
Safety glasses and/or goggles for use at all times
Long pants and proper leather closed-toe shoes

Job Sheet
Use of Transit Skill

Elevation Reading on Grade Stick 1 (to the nearest tenth of a foot) _____

Elevation Reading on Grade Stick 2 (to the nearest tenth of a foot) _____

Difference in elevation between Grade Stick 1 and Grade Stick 2 _____

Distance from grade stick 1 to the transit _____

Distance from grade stick 2 to the transit _____

Agricultural Mechanics Performance Skill 6
Construct a frame according to specified dimension using designated fasteners

Participant Name _____ Score _____

Chapter _____ Participant Number _____

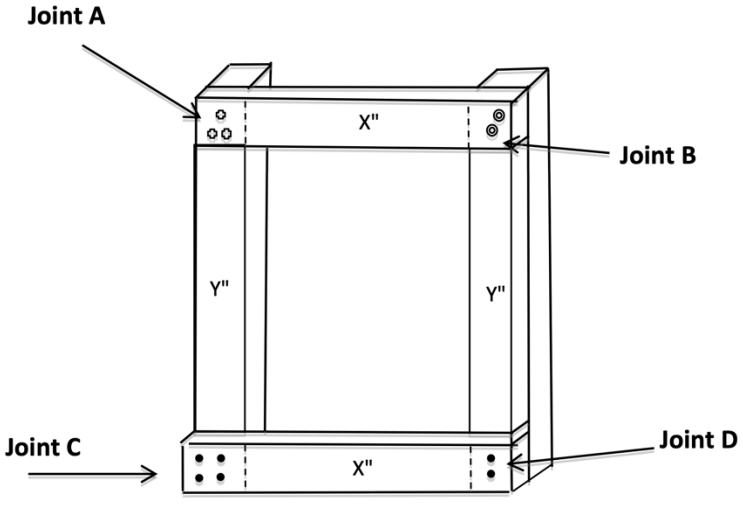
Instructions to Participant

Wear the proper safety equipment for this activity. Use the provided equipment and pre-cut 2" x 4" x 12" wood pieces and materials to secure, mark, and assemble four pieces of lumber according to drawing dimensions. Assemble the cut pieces to form a rectangular frame using the fasteners and pattern specified for the drawing.

Joint A – Three 12 gauge 2 ½" wood screws placed in a triangle pattern 1" apart.
Joint B – Two ¼" x 3 ½" size carriage bolts placed in diagonal 1" apart.
Joint C – Four 8d finishing nails placed in square pattern 1" apart.
Joint D – Two 8d common nails placed in vertical pattern.

Safety Equipment Needed:
Safety glasses and/or goggles for use at all times
Long pants and shirt; proper leather closed-toe shoes

(See the drawing below.)



Agricultural Mechanics Performance Skill 7
Light and adjust the oxy-fuel torch to cut a (thickness to be determined by judge) thick steel plate to squared and specified dimensions prior to properly shutting down the oxy-fuel system

Participant Name _____ Score _____

Chapter _____ Participant Number _____

Instructions to Participant

Wear the proper safety equipment at all times for this activity. Use the oxy-fuel equipment and tools provided for this activity to properly cut a section of steel plate. The judge will provide dimensions and the steel plate. Upon giving the tip size and make of the torch, the participant will record the proper pressure settings on the job sheet using the chart provided (judge will provide proper chart depending on make of torch). Upon being given the dimensions, use the appropriate square and soapstone to mark the plate for cutting. Once the plate is positioned for cutting, turn the oxy-fuel system on and adjust to appropriate pressures. Assume the correct torch cutting position and proceed to cut the steel plate. After cutting the plate, properly shut down the oxy-fuel system. Prior to leaving the skill area, cool and properly identify the plate and present it to the judge for inspection.

Safety Equipment Needed:
Safety glasses and/or goggles for use at all times
Safety shaded lens #5
Long pants and shirt, closed-toe shoes

Proper Oxygen pressure according to chart? _____

Proper Acetylene pressure according to chart? _____

Sample Chart for Skill 7

VICTOR®

ACETYLENE

CUTTING TIP CHART
Cutting Tip Series 1-101 and 3-101

Metal Thickness	Tip Size	Cutting Oxygen (PSIG)***	Preheat Oxygen (PSIG)*	Acetylene Pressure (PSIG)	Speed I.P.M.	Kerf Width
1/8"	000	20/25	3/5	3/5	20/30	.04
1/4"	00	20/25	3/5	3/5	27/30	.05
3/8"	0	25/30	3/5	3/5	24/28	.06
1/2"	0	30/35	3/6	3/5	20/24	.06
3/4"	1	30/35	4/7	3/5	17/21	.07
1"	2	35/40	4/8	3/6	15/19	.09
2"	3	40/45	5/10	4/8	12/15	.11
3"	4	40/50	5/10	5/11	9/12	.12
4"	5	45/55	6/12	6/13	8/11	.15
6"	6**	45/55	6/15	8/14	6/8	.15
10"	7**	45/55	6/20	10/15	4/5	.34
12"	8**	45/55	7/25	10/15	3/5	.41

** Applicable for 3-hose machine cutting torches only. With a 2-hose cutting torch, preheat pressure is set by the cutting oxygen.*

*** For best results use appropriate capacity torches and 3/8" hose when using tip size 6 or larger. Torches with flashback arrestors require up to 25% more pressure as tip size increases (15 PSI maximum acetylene pressure).*

**** All pressures are measured at the regulator using a 25' X 3/8" hose for tip size 6 and larger.*

⚠ CAUTION

At no time should the withdrawal rate of an individual acetylene cylinder exceed 1/7 of the cylinder contents per hour. If additional flow capacity is required, use an acetylene manifold system of sufficient size to supply the necessary volume.

Agricultural Mechanics Performance Skill 8

Wire a light fixture controlled by a single-pole switch in the middle of a run with power being first supplied to the light fixture. The student will include a duplex receptacle beyond the light fixture which is to remain hot at all times.

Participant Name _____ Score _____

Chapter _____ Participant Number _____

Instructions to Participant

Wear the proper safety equipment at all times for this activity. Use the non-metallic sheathed cable, wire nuts and/or Stacons (connectors), and wiring tools provided to complete this wiring exercise in accordance with electrical materials provided. Leave all connections outside the box as if waiting for electrical inspection. Prior to leaving the area, ask the judge to inspect all work.

Safety Equipment Needed:
Safety eyewear, long pants, closed-toe shoes

Agricultural Mechanics Performance Skill 9
Wire a light fixture controlled by a single-pole switch with power being first supplied to the single-pole switch. The student will include a duplex receptacle beyond the light fixture which is to remain hot at all times

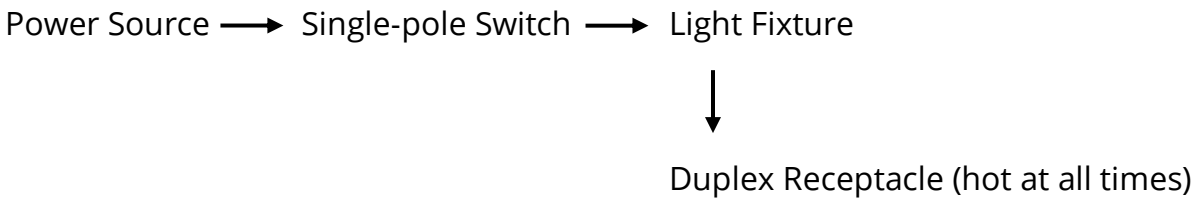
Participant Name _____ Score _____

Chapter _____ Participant Number _____

Instructions to Participant

Wear the proper safety equipment at all times for this activity. Use the non-metallic sheathed cable, electrical devices, wire nuts, "Stacon" wire connectors (if provided), and wiring tools to complete this wiring exercise in accordance with the diagram given below. Leave all connections outside the boxes as if waiting for electrical inspection. Prior to leaving the area, ask the judge to inspect all work.

Safety Equipment Needed:
Safety eyewear, long pants, closed-toe shoes



Agricultural Mechanics Performance Skill 10
Wire a light fixture controlled by three-way switches when the power is first supplied to one of the switches and with the light located between the switches

Participant Name _____ Score _____

Chapter _____ Participant Number _____

Instructions to Participant

Wear the proper safety equipment at all times for this activity. Use the non-metallic sheathed cable, electrical devices, wire nuts, "Stacon" wire connectors (if provided), and wiring tools to complete this wiring exercise in accordance with the diagram given below. Leave all connections outside the boxes as if waiting for electrical inspection. Prior to leaving the area ask the judge to inspect all work.

Safety Equipment Needed:
Safety eyewear, long pants, closed-toe shoes

Power Source ⟶ Three-way Switch ⟷ Light Fixture ⟷ Three-way Switch

Agricultural Mechanics Performance Skill 11
Wire a GFCI receptacle with multiple-location protection for a single-pole switch controlling a light downline

Participant Name _____ Score _____

Chapter _____ Participant Number _____

Instructions to Participant

Wear the proper safety equipment at all times for this activity. Use the non-metallic sheathed cable, electrical devices, wire nuts, "Stacon" wire connectors (if provided), and wiring tools to complete this wiring exercise in accordance with the diagram given below. Leave all connections outside the boxes as if waiting for electrical inspection. Prior to leaving the area ask the judge to inspect all work.

Safety Equipment Needed:
Safety eyewear, long pants, closed-toe shoes

Power Source ⟶ GFCI Duplex Receptacle ⟷ Single-Pole Switch ⟷ Light Fixture

Agricultural Mechanics Performance Skill 12
Wire a 240-volt welder plug and receptacle after selecting proper gauge wire from scenario and chart

Participant Name _____ Score _____

Chapter _____ Participant Number _____

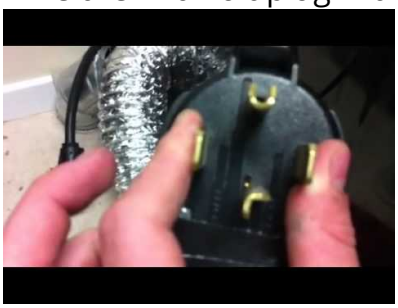
Instructions to Participant

Wear the proper safety equipment at all times for this activity. Use the non-metallic sheathed cable, electrical devices, wire nuts, "Stacon" wire connectors (if provided), and wiring tools to complete this wiring exercise in accordance with the diagram given below. Leave all connections outside the boxes as if waiting for electrical inspection. Prior to leaving the area ask the judge to inspect all work.

Select proper gauge wire *using the chart* to obtain a _____amp current using copper wire and allowing for a 2% drop to run a 240-volt welder with type _____ wire with a _____ feet run of wire. **(Blanks to be determined by judge.)**

What gauge wire is needed for above scenario? _____

Wire the 240-volt plug with proper wire.



Wire the 240 volt receptacle with proper wire.

Chart for Skill 12

COPPER UP TO 400 AMPERES, 230-240 VOLTS, SINGLE PHASE, BASED ON 2% VOLTAGE DROP

Minimum Allowable Size of Conductor				Length of Run in Feet																			
In Cable, Conduit, Earth			Overhead In Air*	Compare size shown below with size shown to left of double line. Use the larger size.																			
Load in Amps	Types R, T, TW	Types RH, RHW, THW	Bare & Covered Conductors	50	60	75	100	125	150	175	200	225	250	275	300	350	400	450	500	550	600	650	700	750	800
5	12	12	10	12	12	12	12	12	12	12	12	12	12	12	10	10	10	10	8	8	8	8	8	6	6
7	12	12	10	12	12	12	12	12	12	12	12	10	10	10	10	8	8	8	8	6	6	6	6	6	6
10	12	12	10	12	12	12	12	12	10	10	10	10	8	8	8	8	6	6	6	6	4	4	4	4	4
15	12	12	10	12	12	12	10	10	10	8	8	8	6	6	6	6	4	4	4	4	4	3	3	3	2
20	12	12	10	12	12	10	10	8	8	8	6	6	6	6	4	4	4	4	3	3	2	2	2	1	1
25	10	10	10	12	10	10	8	8	6	6	6	6	4	4	4	4	3	3	2	2	1	1	1	0	0
30	10	10	10	10	10	10	8	6	6	6	4	4	4	4	4	3	2	2	1	1	1	0	0	0	00
35	8	8	10	10	10	8	8	6	6	4	4	4	4	3	3	2	2	1	1	0	0	0	00	00	00
40	8	8	10	10	8	8	6	6	4	4	4	4	3	3	2	2	1	1	0	0	00	00	00	000	000
45	6	8	10	10	8	8	6	6	4	4	4	3	3	2	2	1	1	0	0	00	00	00	000	000	000
50	6	6	10	8	8	6	6	4	4	4	3	3	2	2	1	1	0	0	00	00	000	000	000	4/0	4/0
60	4	6	8	8	8	6	4	4	4	3	2	2	1	1	1	0	00	00	000	000	000	4/0	4/0	4/0	250
70	4	4	8	8	6	6	4	4	3	2	2	1	1	0	0	00	00	000	000	4/0	4/0	4/0	250	250	300
80	2	4	6	6	6	4	4	3	2	2	1	1	0	0	00	00	000	000	4/0	4/0	250	250	300	300	300
90	2	3	6	6	6	4	4	3	2	1	1	0	0	00	00	000	000	4/0	4/0	250	250	300	300	350	350
100	1	3	6	6	4	4	3	2	1	1	0	0	00	00	000	000	4/0	4/0	250	250	300	300	350	350	400
115	0	2	4	6	4	4	3	2	1	0	0	00	00	000	000	4/0	4/0	250	300	300	350	350	400	400	500
130	00	1	4	4	4	3	2	1	0	0	00	00	000	000	4/0	4/0	250	300	300	350	400	400	500	500	500
150	000	0	2	4	4	3	1	0	0	00	000	000	4/0	4/0	4/0	250	300	350	350	400	500	500	500	600	600
175	4/0	00	2	4	3	2	1	0	00	000	000	4/0	4/0	250	250	300	350	400	400	500	500	600	600	600	700
200	250	000	1	3	2	1	0	00	000	000	4/0	4/0	250	250	300	350	400	500	500	500	600	600	700	700	750
225	300	4/0	0	3	2	1	0	00	000	4/0	4/0	250	300	300	350	400	500	500	600	600	700	700	750	800	900
250	350	250	00	2	1	0	00	000	4/0	4/0	250	300	300	350	350	400	500	600	600	700	700	750	800	900	1M
275	400	300	00	2	1	0	00	000	4/0	250	250	300	350	350	400	500	500	600	700	700	800	900	900	1M	
300	500	350	000	1	1	0	000	4/0	4/0	250	300	350	350	400	500	500	600	700	700	800	900	900	1M		

Agricultural Mechanics Performance Skill 13
Use multimeter to perform various skills

Participant Name _____ Score _____

Chapter _____ Participant Number _____

Instructions to Participants

Wear the proper safety equipment at all times for this activity.

Place the leads into the correct jack of the multimeter.

Use the multimeter and choose the proper setting to determine the voltage of the battery.

Use the multimeter and choose the proper setting to test the fuse and determine the resistance of the fuse.

Use the multimeter and choose the proper setting to test the continuity of the piece of wire.

Calculate the Amps using the readings if the battery and fuse were in a circuit. I=V/R

Voltage measurement of battery: _____

Resistance measurement of fuse: _____

Does the wire have continuity: yes/no _____

Amps of circuit using the voltage and resistance readings: _____

Agricultural Mechanics Performance Skill 14
Use tap and die and chart to select proper tap, die and perform skill

Participant Name_____Score_____

Chapter_____Participant Number_____

Instructions to Participants

Wear the proper safety equipment at all times for this activity. Use the provided equipment and materials to select, secure, and perform the correct tap into the ¼ x ¾ x 2-inch block and perform the correct die onto the ¼ x 4-inch rod and make threads 1 inch long. Answer questions on Job Sheet. **(Use the chart to answer questions.)**

What size drill was used in the block for you to tap the hole for the ___" UNC/UNF tap provided? **(Tap size and thread pitch to be determined by judge.)**

_____ fractional

_____ decimal

Thread the block using the correct tools available to you.

What size die will you need to use to thread UNC/UNF (determined by judge) threads on the ¼ inch rod? _____

Thread the rod using the correct tools available to you.

Chart for Skill 14

Dayton Rogers MANUFACTURING COMPANY

Providing Metalforming Solutions to Industry Since 1929

INCH / METRIC TAP DRILL SIZES & DECIMAL EQUIVALENTS

DRILL SIZE	DECIMAL EQUIVALENT	TAP SIZE
80	.0135	
79	.0145	
1/64	.0156	
78	.0160	
77	.0180	
76	.0200	
75	.0210	
74	.0225	
73	.0240	
72	.0250	
71	.0260	
70	.0280	
69	.0292	
68	.0310	
1/32	.0312	
67	.0320	
66	.0330	
65	.0350	
64	.0360	
63	.0370	
62	.0380	
61	.0390	
60	.0400	
59	.0410	
58	.0420	
57	.0430	
56	.0465	
3/64	.0469	0 - 80
55	.0520	
54	.0550	
53	.0595	1 - 64, 72
1/16	.0625	
52	.0635	
51	.0670	
50	.0700	2 - 56, 64
49	.0730	
48	.0760	
5/64	.0781	
47	.0785	3 - 48
46	.0810	
45	.0820	3 - 56
44	.0860	
43	.0890	4 - 40
42	.0935	4 - 48
3/32	.0938	
41	.0960	
40	.0980	
39	.0995	
38	.1015	5 - 40
37	.1040	5 - 44
36	.1065	6 - 32
7/64	.1094	
35	.1100	
34	.1110	
33	.1130	6 - 40
32	.1160	
31	.1200	
1/8	.1250	
30	.1285	
29	.1360	8 - 32, 36
28	.1405	
9/64	.1406	
27	.1440	
26	.1470	
25	.1495	10 - 24
24	.1520	
23	.1540	
5/32	.1562	
22	.1570	
21	.1590	10 - 32
20	.1610	
19	.1660	
18	.1695	
11/64	.1719	
17	.1730	
16	.1770	12 - 24
15	.1800	
14	.1820	12 - 28
13	.1850	
3/16	.1875	
12	.1890	
11	.1910	

DRILL SIZE	DECIMAL EQUIVALENT	TAP SIZE
10	.1935	
9	.1960	
8	.1990	
7	.2010	1/4 - 20
13/64	.2031	
6	.2040	
5	.2055	
4	.2090	
3	.2130	1/4 - 28
7/32	.2188	
2	.2210	
1	.2280	
A	.2340	
15/64	.2344	
B	.2380	
C	.2420	
D	.2460	
1/4	.2500	
E	.2500	
F	.2570	5/16 - 18
G	.2610	
17/64	.2656	
H	.2660	
I	.2720	5/16 - 24
J	.2770	
K	.2810	
9/32	.2812	
L	.2900	
M	.2950	
19/64	.2969	
N	.3020	
5/16	.3125	3/8 - 16
O	.3160	
P	.3230	
21/64	.3281	
Q	.3320	3/8 - 24
R	.3390	
11/32	.3438	
S	.3480	
T	.3580	
23/64	.3594	
U	.3680	7/16 - 14
3/8	.3750	
V	.3770	
W	.3860	
25/64	.3906	7/16 - 20
X	.3970	
Y	.4040	
13/32	.4062	
Z	.4130	
27/64	.4219	1/2 - 13
7/16	.4375	
29/64	.4531	1/2 - 20
15/32	.4688	
31/64	.4844	9/16 - 12
1/2	.5000	
33/64	.5156	9/16 - 18
17/32	.5312	5/8 - 11
35/64	.5469	
9/16	.5625	
37/64	.5781	5/8 - 18
19/32	.5938	
39/64	.6094	
5/8	.6250	
41/64	.6406	
21/32	.6562	3/4 - 10
43/64	.6719	
11/16	.6875	3/4 - 16
45/64	.7031	
23/32	.7188	
47/64	.7344	
3/4	.7500	
49/64	.7656	7/8 - 9
25/32	.7812	
51/64	.7969	
13/16	.8125	7/8 - 14
53/64	.8281	
27/32	.8438	
55/64	.8594	
7/8	.8750	1 - 8
57/64	.8906	
29/32	.9062	

DRILL SIZE	DECIMAL EQUIVALENT	TAP SIZE
59/64	.9219	1 - 12
15/16	.9375	1 - 14
61/64	.9531	
31/32	.9688	
63/64	.9844	1 1/8 - 7
1	1.0000	
1 3/64	1.0469	1 1/8 - 12
1 7/64	1.1094	1 1/4 - 7
1 1/8	1.1250	
1 11/64	1.1719	1 1/4 - 12
1 7/32	1.2188	1 3/8 - 6
1 1/4	1.2500	
1 19/64	1.2969	1 3/8 - 12
1 11/32	1.3438	1 1/2 - 6
1 3/8	1.3750	
1 27/64	1.4219	1 1/2 - 12
1 1/2	1.5000	

METRIC TAP DRILL SIZES

METRIC TAP	TAP DRILL (mm)	DECIMAL (Inch)
M1.6 x 0.35	1.25	.0492
M1.8 x 0.35	1.45	.0571
M2 x 0.4	1.60	.0630
M2.2 x 0.45	1.75	.0689
M2.5 x 0.45	2.05	.0807
M3 x 0.5	2.50	.0984
M3.5 x 0.6	2.90	.1142
M4 x 0.7	3.30	.1299
M4.5 x 0.75	3.70	.1457
M5 x 0.8	4.20	.1654
M6 x 1	5.00	.1968
M7 x 1	6.00	.2362
M8 x 1.25	6.70	.2638
M8 x 1	7.00	.2756
M10 x 1.5	8.50	.3346
M10 x 1.25	8.70	.3425
M12 x 1.75	10.20	.4016
M12 x 1.25	10.80	.4252
M14 x 2	12.00	.4724
M14 x 1.5	12.50	.4921
M16 x 2	14.00	.5512
M16 x 1.5	14.50	.5709
M18 x 2.5	15.50	.6102
M18 x 1.5	16.50	.6496
M20 x 2.5	17.50	.6890
M20 x 1.5	18.50	.7283
M22 x 2.5	19.50	.7677
M22 x 1.5	20.50	.8071
M24 x 3	21.00	.8268
M24 x 2	22.00	.8661
M27 x 3	24.00	.9449
M27 x 2	25.00	.9843
M30 x 3.5	26.50	1.0433
M30 x 2	28.00	1.1024
M33 x 3.5	29.50	1.1614
M33 x 2	31.00	1.2205
M36 x 4	32.00	1.2598
M36 x 3	33.00	1.2992
M39 x 4	35.00	1.3780
M39 x 3	36.00	1.4173

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