Please Print

Name:	School:	
Group Number:	Individual Number:	Score:

2018 Minnesota Agricultural Mechanics Career Development Event
Building Construction

30 minutes — Skills & Problem Solving — 50 points

I.. Identification of building hardware: Use the letters from the answers below.(1 point each)

1. _____ 4. _____ 7. _____ 10. _____

2. _____ 5. _____ 8. _____ 11. _____

3. _____ 6. _____ 9. _____ 12. _____

A. 5/16" X 1 ½" carriage bolt
B. 3/8" X 1 ½" carriage bolt
C. 7/16 X 1 ½" carriage bolt
D. 5/16' X 3" lag screw
E. 3/8" X 3" lag screw
F. 7/16" X 3" lag screw
G. flat head screw
H. round head screw
I. drywall screw
J. bugle head screw

K. 6d common nail
L. 6d box nail
M. 6d galvanized nail
N. 6d finish nail
O. 8d common nail
P. 8d box nail
Q. 8d galvanized nail
R. 8d finish nail
S. 8d sinker (cement coated)
T. 8d scaffold

U. 5/16" cap nut
V. 5/16" hexagon nut
W. 5/16" castle nut
X. 5/16" self locking nut
Y. 5/16" wing nut
Z, 5/16" spring lock washer
AA. 5/16" flat steel washer
BB., 3/8" spring lock washer
CC. 3/8" flat steel washer
DD, 7/16" spring lock washer

II. Name the following hand tools (1 point each)

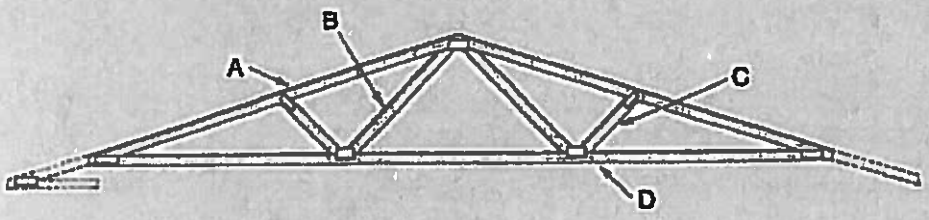
13. _____ 17. _____

14. _____ 18. _____

15. _____ 19. _____

16. _____

III. A standard W truss is shown in the drawing below. Identify the specified members.

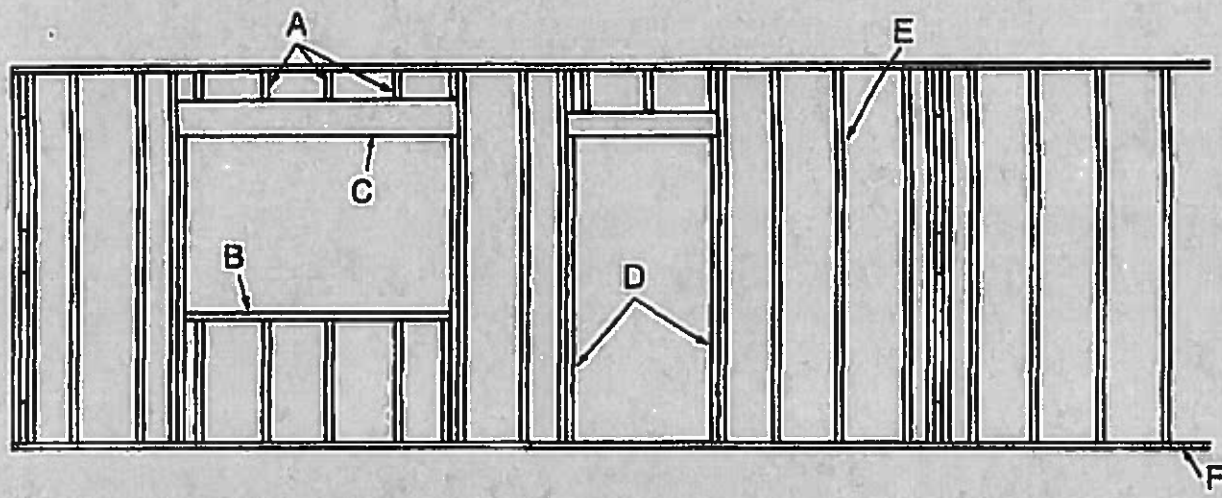


_____ 20. Bottom chord

_____ 21. Top chord

_____ 22. Compression web

_____ 23. Tension web



IV. Identify the parts of the wall frame.

_____ 24. Cripple stud

_____ 25. Header

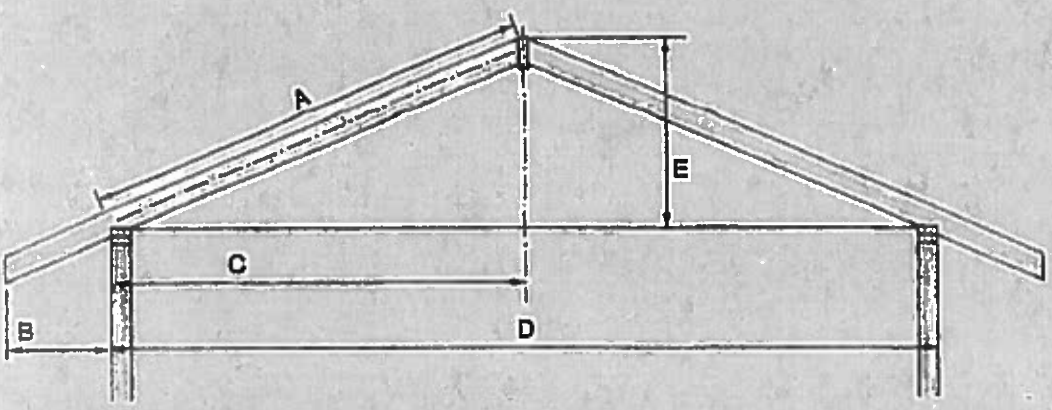
_____ 26. Rough sill

_____ 27. Sole Plate

_____ 28. Stud

_____ 29. Trimmer

V. Skill: Rafter layout- Identify each item used in roof framing



_____ 30. Rise

_____ 31. Run

_____ 32. Span

_____ 33.Overhang

_____ 34. Line length of rafter

You are to lay out a common rafter for a utility shed. The shed will have a 4 foot span. The rafter pitch will be 3/12. The overhang will be 2 inches and an one inch bird's-mouth will be required. You will be constructing the roof frame with a 1x4 ridge board. Use a framing square and pencil to mark out the rafter on the material provided.

When completed, write your name, contestant number, and school on your project and turn into the station supervisor.

Rafter Layout Scoring:

Overall rafter length is within 1/8 inch (4 pts.) _____

Correct slope of plumb cut within 1/8 inch (4 pts.) _____

Correct slope of tail cut within 1/8 inch (4 pts.) _____

Correct position, size and angle of bird's-mouth (4 pts.) _____

Total points for rafter layout skill (16 pts. possible) _____

Please Print

Name:	School:	
Group Number:	Individual Number:	Score:

2018 Minnesota Agricultural Mechanics Career Development Event
Arc Welding

15 minutes — Skill 25 points

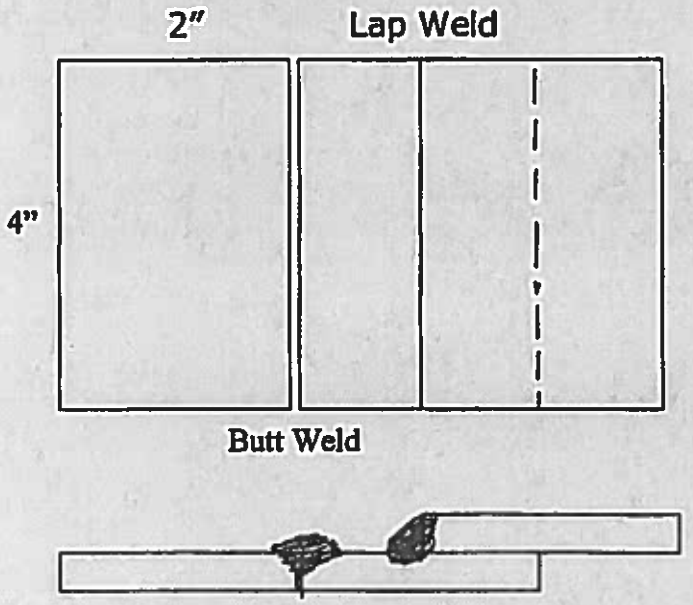
****

1. Select three precut pieces of ¼" metal, and three 1/8" E6013 electrode.
2. Take one piece of metal and run a 3" bead across the center using one electrode.
3. When you have completed cleaning to your satisfaction, cool the weld in the water furnished.
4. Take your first piece of metal with your bead and Using the 4" sides complete a Butt weld with the second piece of metal welding on only one side.
5. When you have completed cleaning to your satisfaction, cool the weld.
6. Take the 3rd piece of metal and complete a 4" lap weld with a 1" overlap.
7. When you have completed cleaning to your satisfaction, cool the weld.
8. Label your project with your name and school before turning into judge.

Evaluation score sheet:

1. Safety and work habits — 5 points _____
2. Butt weld bead quality — 5 points _____
3. Butt weld bead penetration — 5 points _____
4. Lap weld quality — 5 points _____
5. Lap weld penetration — 5 points _____

Total points _____
(25 possible)



Please Print

Name:	School:	
Group Number:	Individual Number:	Score:

2018 Minnesota Agricultural Mechanics Career Development Event
Metal Fabrication

15 minutes Problem Solving 25 points

1. A 4 foot by 6 foot of hot rolled galvanized sheet metal costs $52.00 and weighs 27 pounds. What is the cost per square foot of material for the steel?

_____ 2 points

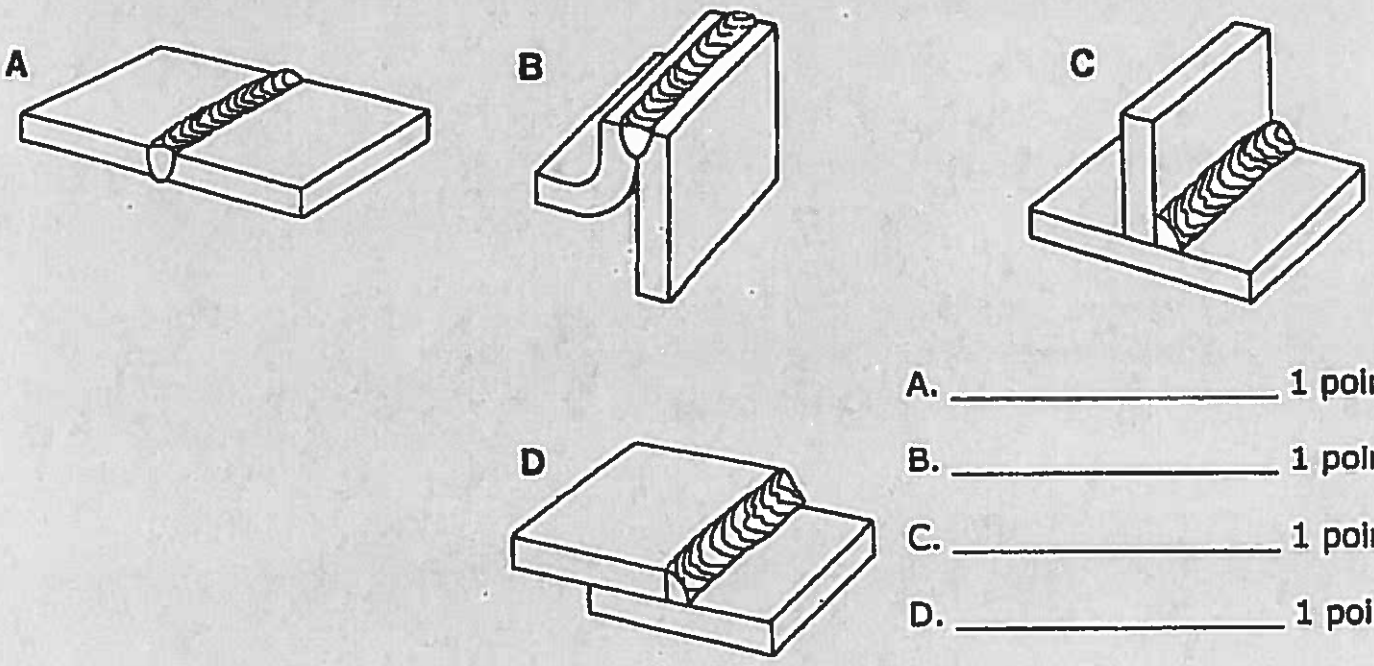
If you needed to use a 3 foot by 4 ½ foot piece to make a tool box project, what Would the cost of the metal be using the costs above?

_____ 2 points

How much would the metal for the tool box weigh?

_____ 2 points

2. Identify four commonly used welding joints:



A. _____ 1 point

B. _____ 1 point

C. _____ 1 point

D. _____ 1 point

3. Identify what the following items from the AWS electrode classification means. (1 point each)

Welding Position _____

E 7018 H4 R

Type of coating and current _____

Tensile Strength _____

4. Match the electrode with the letter of the type of electrode. (1 point each)

1. E6010 _____ A. Fast-freeze
2. E6012 _____ B. Fill-freeze
3. E7018 _____ C. Fast-fill
4. E7024 _____ D. Low hydrogen

5. Use the tap Drill chart to answer the following questions. (1 point each)

What is the equivalent tap size and probable % thread for the following drill sizes?

Drill size	Tap Size	Probable % thread
A. 5/64	_____	_____
B. F	_____	_____
C. 31/64	_____	_____
D. 7/8	_____	_____

TAP DRILL CHART

Tap Size	Drill Size	Probable % Thread	Tap Size	Drill Size	Probable % Thread	Tap Size	Drill Size	Probable % Thread
0 – 80	3/64	71 – 81	10 – 32	21	69 – 76	5/8 – 18	37/64	58 – 65
M1.6 x .35	1.25 mm	67 – 77	M5 x .8	4.2 mm	69 – 77	M16 x 2	35/64	76 – 81
1 – 64	53	59 – 67	12 – 24	17	66 – 72	3/4 – 10	21/32	68 – 72
M2 x .4	1/16	72 – 79	12 – 28	15	70 – 78	3/4 – 16	11/16	71 – 77
1 – 72	53	67 – 75	M6 x 1	10	76 – 84	M20 x 2.5	11/16	74 – 78
2 – 56	51	62 – 69	1/4 – 20	7	70 – 75	7/8 – 9	49/64	72 – 76
2 – 64	50	70 – 79	1/4 – 28	3	72 – 80	7/8 – 14	13/16	62 – 67
M2.5 x .45	2.05 mm	69 – 77	5/16 – 18	F	72 – 77	M24 x 3	53/64	72 – 76
3 – 48	5/64	70 – 77	5/16 – 24	I	67 – 75	1 – 8	7/8	73 – 77
3 – 56	46	69 – 78	M8 x 1.25	6.7 mm	74 – 80	1 – 12	59/64	67 – 72
4 – 40	44	65 – 71	3/8 – 16	5/16	72 – 77	1 – 14	15/16	61 – 67
4 – 48	42	61 – 68	3/8 – 24	Q	71 – 79	1-1/8 – 7	63/64	72 – 76
M3 x .5	40	70 – 79	M10 x 1.5	8.4 mm	76 – 82	1/18 – 12	1-3/64	66 – 72
5 – 40	39	65 – 72	7/16 – 14	U	70 – 75	M30 x 3.5	1-3/64	75
5 – 44	38	63 – 71	7/16 – 20	25/64	65 – 72	1-1/4 – 7	1-7/64	76
M3.5 x .6	33	72 – 81	M12 x 1.75	13/32	69 – 74	1-1/4 – 12	1-11/64	72
6 – 32	36	71 – 78	1/2 – 13	27/64	73 – 78	1-3/8 – 6	1-7/32	72
6 – 40	33	69 – 77	1/2 – 20	29/64	65 – 72	1-3/8 – 12	1-19/64	72
M4 x .7	3.25 mm	74 – 82	M14 x 2	15/32	76 – 81	M36 x 4	1-1/4	82
8 – 32	29	62 – 69	9/16 – 12	31/64	68 – 72	1-1/2 – 6	1-11/32	72
8 – 36	29	70 – 78	9/16 – 18	33/64	58 – 65	1-1/2 – 12	1-27/64	72
10 – 24	25	69 – 75	5/8 – 11	17/32	75 – 79			

Name:	School:	
Group Number:	Individual Number:	Score:

2018 Minnesota Sate FFA CDE Combine Skill 25 points

1. List the six functions of a combine in order *6 Points*
   A.
   B.
   C.
   D.
   E.
   F.
2. What two functions do the concave and rotor perform on a combine? *2 Points*
   A.
   B.
3. What to adjustments can be made at the concave and rotor area of the combine? *2 Points*
   A.
   B.
4. The rotor should contact the concave between which bars when it is fully closed? And what is this area called? *2 Points*
   A.
   B.
5. How many different concaves are available for this combine? *1 Point*

6. List the following settings for corn *5 Points*
   Rotor speed _____to _____rotor gear range_____
   Concave indicator ____to ___concave type ____
   Chafer settings: Front _____to _____ middle _____to _____ Rear _____to_____
   Shoe setting _____to _____ fan speed _____to _____Great type

7. List the Product Identification number for this Case IH 5088 Combine. *1 Point*

8. Locate the following adjustments on the 5088 combine *2 Points*
   Rotor gear range _____Shoe _____Chamfer setting: Front _____middle _____rear _____

9. Check the tailings elevator conveyor chain for proper adjustment is it in adjustment? Yes / No *1 Point*
10. Explain how to determine when an elevator conveyor chain is in proper adjustment. *2 Points*

11. When replacing the outside tailings auger bearing on this combine which way should the bearing lock collar be locked? *1 Point*

2018 Corn Loss Minnesota State FFA AG Mechanics CDE Problem

Ear loss

Total ear loss	
Preharvest ear loss	
Machine ear loss	

Preharvest ear loss		
Ears found behind combine		

Machine ear loss = total ear loss - preharvest ear loss

Total kernel loss Behind the combine

Row number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Total	Average
Kernel loss																		

Kernel loss header

Row number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Total	Average
Kernel loss																		

Separator kernel loss

Behind combine kernel loss				
minus kernel loss header				
Separator loss			bushel loss	

Kernels on cob loss

Row number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Total	Average
Kernel on cob under header																		

Row number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Total	Average
Kernel on cob behind combine																		

Threshing loss

Kernels on cob behind combine				
Kernels on cob under header				
Threshing loss			bushel loss	

Machine Ear loss in Bushels =		
Separator loss =		
Threshing loss =		

Header loss

Total Loss =

Is this level of loss acceptable?

What level of loss can a Combine be held to ?

Please Print

Name:	School:	
Group Number:	Individual Number:	Score:

2018 Minnesota Agricultural Mechanics Career Development Event
Electric Circuits

15 minutes — Problem solving-25 points

Equations E = I x R P = I x E — 1 point each

1. A branch circuit for a clothes dryer is being planned. The nameplate of the dryer that will be served by the circuit lists the wattage as 4800 watts. When calculating the load on this branch circuit, the load must be calculated as __ _____ watts.
   A. 5000 watts
   B. 80% of 5000 watts or 4000 watts
   C. 4800 watts
   D. 80% of 4800 watts or 3840 watts

2. Standby generating equipment is installed to serve a poultry building at times when electrical power to the building is interrupted. If the generating equipment is operating, the generator can feed power back into the power company's lines, thus endangering the lives of persons working on the lines. To prevent the generator from feeding power back into the power company's lines,
   A. An automatic start switch for the generator must be installed
   B. A double throw transfer switch must be installed
   C. A manual start switch for the generator must be installed
   D. Another service entrance panel must be installed in the building

3. The receptacles in a bathroom
   A. Must have ground fault circuit interrupter protection and may be supplied from any general purpose branch circuit in the building
   B. Must have ground fault circuit interrupter protection only if located within 36" of the basin and must be supplied from a bathroom branch circuit
   C. Must have ground fault circuit interrupter protection and must be supplied from a bathroom branch circuit
   D. Must be supplied from the same branch circuit that serves the bedroom that is adjacent to the bathroom

4. What size conduit should be used to run 3 conductors that are each number 12 AWG copper?
   A. 1/2 inch
   B. 3/4 inch
   C. 1 inch
   D. 2 inch

5. The continuous load supplied by a circuit should not exceed ____% of the branch circuit rating. A load that is expected to operate at maximum current for 3 hours or more is considered continuous.
   A. 10 %
   B. 20 %
   C. 50%
   D. 80%

2 points each

6. How much does it cost to operate computer monitor that is left on continuously for 1 month (30 days) if it is rated at 1.4 amps on a 120 volt circuit? Assume electricity costs $.0925/kwh.

7. How much would it cost to watch your television for one week if you averaged watching 5 hours per day? The television is rated at 250 watts and electricity costs $.0925/kwh.

8. How much does it cost to keep a swine confinement building lighted at night for one year (365 days) if the lights are kept on an average of 10 hours per day? There are twenty 13 watt LED light bulbs used for lighting and electricity costs $.12/kwh.

9. Determine how many amps of current are flowing through a 120 volt circuit that is using 1,650 watts of electricity.

10. How many watts of electricity are being used on 120 volt circuit that is using 17.5 amps of current?

11. How many ohms of resistance are in a toaster on a 120 volt circuit that has 6.7 amps of current flowing?

12. Given an appliance that has 12.8 ohms of resistance, how many amps of current are flowing in a 120 volt circuit?

1point each

Instructions. Match the term with the correct response. Write the letter of the term by the definition.

a. resistance	d. amperes
b. watts	e. multimeter
c. ohms	f. electromotive force

_____ 1. A device used to measure two or more electrical characteristics.
_____ 2. Term used to measure electrical power.
_____ 3. Referred to as voltage. It is what causes electrons to flow through a conductor.
_____ 4. A measure of the rate of electrical current flow.
_____ 5. The characteristic of any material to oppose the flow of electricity.
_____ 6. Term used to measure the amount of electrical resistance.

Please Print

Name:	School:	
Group Number:	Individual Number:	Score:

2018 Minnesota Agricultural Mechanics Career Development Event
Electric Circuits

15 minutes Skills-25 points

General Information/Directions

Assume you are installing a wiring circuit. Your customer wants to be to be able to operate a light from one switch but keep the duplex hot at all times. The power will enter the duplex then to the switch then to the light. (See diagram on board). You will be required to complete the circuit on the display board including connecting to the service. Complete your wiring and leave wires exposed for scoring purposes. You will be scored on the proper use of tools, correct procedures for cutting and stripping wires, correctness and placement of wires and safety.

Procedures:

1. Safety: Safety glasses must be worn at all times and the safe use of tools.
2. Wires are pre-cut to correct length needed. ***Leave 6" exposed***
3. Run wires
4. Strip and prepare wire to be connected.
5. Assemble the circuit-see diagram for reference (attached to display board)

a. Make all the necessary connections.

Use screws on switches - do not use quick connect fittings.

b. Use proper size solderless connections for connecting wires
c. Properly ground each box
d. Tighten all screws and connectors

6. Clean-up area and leave score sheet on the table.

Activity Score Sheet		**Graded Item Possible Score**
1. Correct use of tools		3 _____
2. Correct wiring connections	a. Box # 1 with Duplex	4 _____
	b. Box # 2 with Switch	5 _____
	c. Box # 3 with Light	3 _____
3. Quality of wiring connections		3 _____
4. Correct solderless connectors used		2 _____
5. Cable connectors tightened		3 _____
6. Safety/Work habits/Clean-up		2 _____

Total points: (double check point value and enter at top) 25 _____

Please Print

Name:	School:	
Group Number:	Individual Number:	Score:

2018 Minnesota Agricultural Mechanics Career Development Event
Power and Machinery
Small Engine

30 minutes Skill & Problem 50 points

****

1. (One point) identify this tool. _____
2. (One point) Identify the intake valve – Circle one A or B
3. (One point) identify this bolt _____.
4. (One point) what is the torque of a 9/16 – 12 grade 8 dry bolt? (List in foot pounds.) _____
5. (One point) Using the sheet provided. What size drill bit is used to tap a 7/16 course thread bolt. _____
6. (Two points) this tool is used for:
   A. measure preload
   B. measure sleeve height
   C. measure shaft movement
   D. measure backlash
7. (Three points) identify this bolt.
   A. Length _____.
   B. Diameter of this bolt _____.
   C. Identify the threads of this bolt _____.
8. (Two points) identify the two sleeves. Circle the correct answer.
   A. wet or dry B. wet or dry

9. (Two points) What is the serial number of this small engine_____

10. (Three points) Using serial number from #8 above and the attached informion answer the following questions.

What type of carburetor is on this engine?

a. Vacu-jet
b. Wabor carb
c. Flow-jet carb
d. Pulsa-jet

What is the cubic inch displacement of this engine?

a.17
b.12
c.9
d.13

What type of bearings does this engine have?

A.plain bearing auxiliary drive (PTO)
B. plain bearing auxiliary drive parallel to crankshaft
C. plain bearing flange mounting
D. ball bearing gear reduction.

11. (Two points) identify the intake valve clearance.

A .04
B .004
C .006
D .002

12. (Two points) Measure the cam lift of the this camshaft _____

13. (Three points) identify this bolt.

A. Length _____
B. Diameter of this bolt _____
C. Identify the threads of this bolt _____.

14. (One point) identify this part. _____

15. (5 points) - Joe has refaced his valves for his four-stroke cycle engine. He checks the thickness of the margin of the valve and it is 1/32" thick, what should he do with the valve?

A. He should reface the valve again and check the thickness again before installing the valve.
B. He should install the valve in the engine, because it in within the manufacturer's specifications.
C. He should discard the valve and purchase a new valve to install in the engine.
D. He does not have to check the thickness of the margin of the valve, because the thickness does not affect the operation of the engine.

16. (5 points) - Given a Briggs & Stratton cast iron cylinder engine, what is the ring end gap reject size for the oil ring?

A. 0.020"
B. 0.030"
C. 0.035"
D. 0.045"

17. (5 points) - You are in the process of rebuilding a Briggs & Stratton small engine that has an aluminum block, you measured the cylinder bore of your engine and it measures 3 3/8 inches in diameter. What would be the correct stone set number that you should use when honing the cylinder of the engine?

A. #19206
B. #19213
C. #19207
D. #19304

18. (5 points) - While considering whether to repair a Briggs & Stratton model 120000 engine, you measure the cylinder bore and found that the cylinder bore is 2.6955". If you plan to rebuild the engine, which of the following would you need to do to the engine?

A. The cylinder does not need to be resized, and a standard set of piston rings may be used when reassembling the engine.
B. The engine may be oversized to .005".
C. The engine may be repaired by over sizing the cylinder bore by .010" over standard and using stock oversize piston and piston rings.
D. The cylinder does not need to be resized, but chrome rings must be used.

19. (5 points) - When installing the connecting rod bolts on a Briggs & Stratton 230000 series engine they should be torqued to _____inch pounds.

A. 100
B. 165
C. 185
D. 190

Please Print

Key

Name:	School:	
Group Number:	Individual Number:	Score:

2018 Minnesota Agricultural Mechanics Career Development Event
Building Construction

30 minutes — Skills & Problem Solving — 50 points

I.. Identification of building hardware: Use the letters from the answers below.(1 point each)

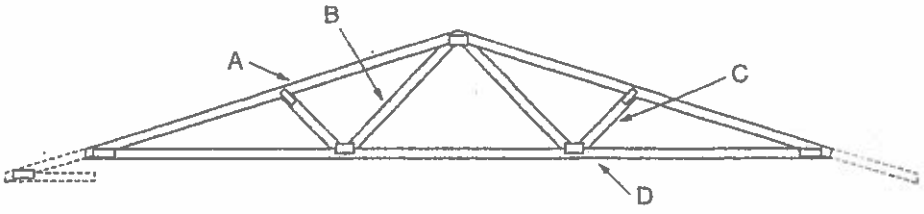
1 _____	4. _____	7. _____	10. _____
2. _____	5. _____	8. _____	11. _____
3. _____	6. _____	9. _____	12. _____

A. 5/16" X 1 ½" carriage bolt	K. 6d common nail	U. 5/16" cap nut
B. 3/8" X 1 ½" carriage bolt	L. 6d box nail	V. 5/16" hexagon nut
C. 7/16 X 1 ½" carriage bolt	M. 6d galvanized nail	W. 5/16" castle nut
D. 5/16' X 3" lag screw	N. 6d finish nail	X. 5/16" self locking nut
E. 3/8" X 3" lag screw	O. 8d common nail	Y. 5/16" wing nut
F. 7/16" X 3" lag screw	P. 8d box nail	Z, 5/16" spring lock washer
G. flat head screw	Q. 8d galvanized nail	AA. 5/16" flat steel washer
H. round head screw	R. 8d finish nail	BB., 3/8" spring lock washer
I. drywall screw	S. 8d sinker (cement coated)	CC. 3/8" flat steel washer
J. bugle head screw	T. 8d scaffold	DD, 7/16" spring lock washer

II. Name the following hand tools (1 point each)

13. _____	17. _____
14. _____	18. _____
15. _____	19. _____
16. _____	

III. A standard W truss is shown in the drawing below. Identify the specified members,

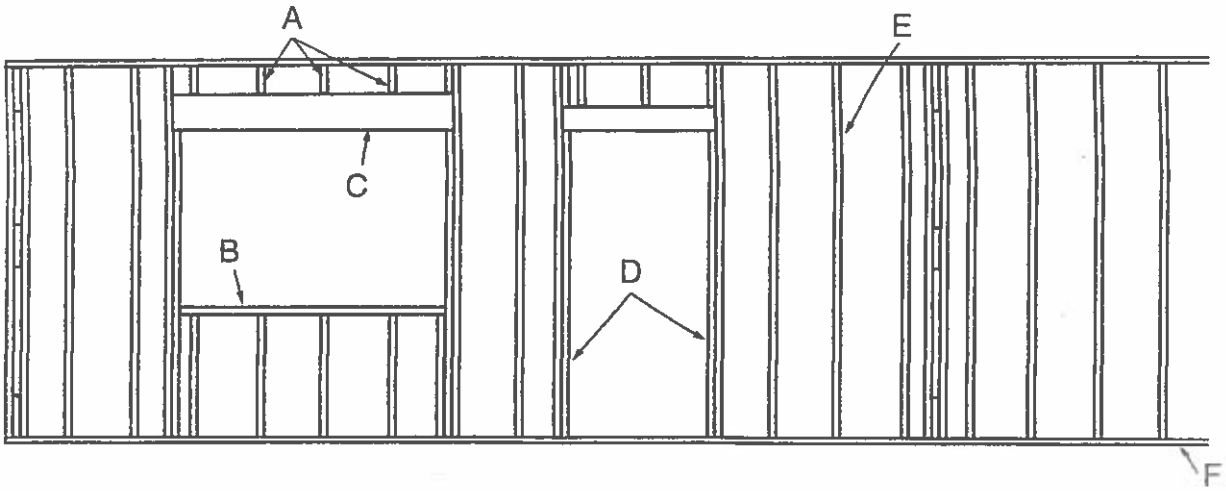


B 20. Bottom chord

A 21. Top chord

C 22. Compression web

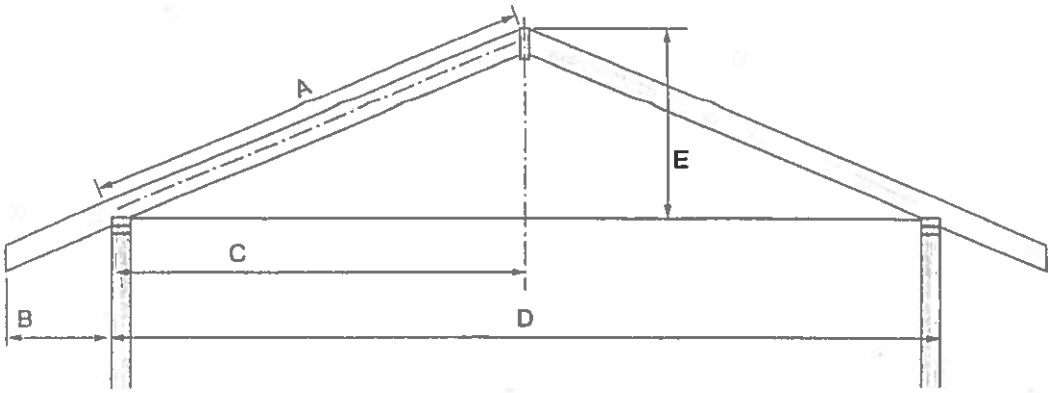
D 23. Tension web



IV. Identify the parts of the wall frame.

A	24. Cripple stud	F	27. Sole Plate
C	25. Header	E	28. Stud
B	26. Rough sill	D	29. Trimmer

V. Skill: Rafter layout- Identify each item used in roof framing



E	30. Rise
C	31. Run
D	32. Span
B	33.Overhang
A	34. Line length of rafter

You are to lay out a common rafter for a utility shed. The shed will have a 4 foot span. The rafter pitch will be 3/12. The overhang will be 2 inches and an one inch bird's-mouth will be required. You will be constructing the roof frame with a 1x4 ridge board. Use a framing square and pencil to mark out the rafter on the material provided.

When completed, write your name, contestant number, and school on your project and turn into the station supervisor.

Rafter Layout Scoring:

Overall rafter length is within 1/8 inch (4 pts.)	_____
Correct slope of plumb cut within 1/8 inch (4 pts.)	_____
Correct slope of tail cut within 1/8 inch (4 pts.)	_____
Correct position, size and angle of bird's-mouth (4 pts.)	_____
Total points for rafter layout skill (16 pts. possible)	_____

Key

Please Print

Name:	School:	
Group Number:	Individual Number:	Score:

2018 Minnesota Agricultural Mechanics Career Development Event
Metal Fabrication

15 minutes Problem Solving 25 points

1. A 4 foot by 6 foot of hot rolled galvanized sheet metal costs $52.00 and weighs 27 pounds. What is the cost per square foot of material for the steel?

$4 \times 6 = \frac{52.00}{24} = \$2.1666$ $\$2.17$ 2 points

If you needed to use a 3 foot by 4 ½ foot piece to make a tool box project, what Would the cost of the metal be using the costs above?

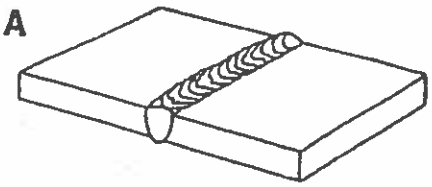
$3 \times 4.5 = 13.5 \times 2.17 = 29.295$ $\$29.30$ 2 points

How much would the metal for the tool box weigh?

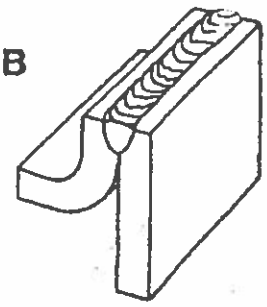
$\frac{x}{27} = \frac{13.5}{24}$ $24x = 364.5$ $x = 15.1875$ 15.2 lbs 2 points

2. Identify four commonly used welding joints:

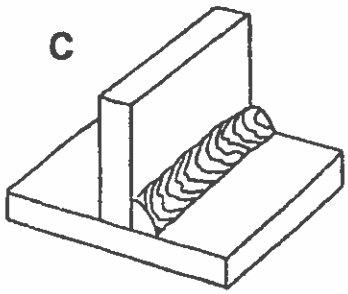
A



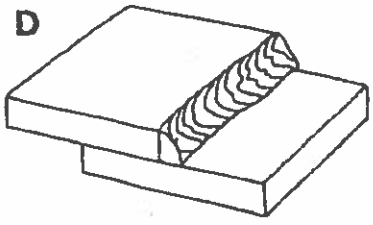
B



C



D



A. Butt 1 point

B. Edge 1 point

C. Tee 1 point

D. Lap 1 point

3. Identify what the following items from the AWS electrode classification means. (1 point each)

E 7018 H4 R

Welding Position All positions

Type of coating and current iron powder, low hydrogen/ac, d

Tensile Strength 70,000 psi minimum

4. Match the electrode with the letter of the type of electrode. (1 point each)

1. E6010 A
2. E6012 B
3. E7018 D
4. E7024 C

A. Fast-freeze
B. Fill-freeze
C. Fast-fill
D. Low hydrogen

5. Use the tap Drill chart to answer the following questions. (1 point each)

What is the equivalent tap size and probable % thread for the following drill sizes?

Drill size	Tap Size	Probable % thread
A. 5/64	3-48	70-77
B. F	5/16-18	72-77
C. 31/64	9/16-12	68-72
D. 7/8	1-8	73-77

TAP DRILL CHART

Tap Size	Drill Size	Probable % Thread	Tap Size	Drill Size	Probable % Thread	Tap Size	Drill Size	Probable % Thread
0 – 80	3/64	71 – 81	10 – 32	21	68 – 76	5/8 – 18	37/64	58 – 65
M1.6 x .35	1.25 mm	67 – 77	M5 x .8	4.2 mm	69 – 77	M16 x 2	35/64	76 – 81
1 – 64	53	59 – 67	12 – 24	17	66 – 72	3/4 – 10	21/32	68 – 72
M2 x .4	1/16	72 – 79	12 – 28	15	70 – 78	3/4 – 16	11/16	71 – 77
1 – 72	53	67 – 75	M6 x 1	10	76 – 84	M20 x 2.5	11/16	74 – 78
2 – 56	51	62 – 69	1/4 – 20	7	70 – 75	7/8 – 9	49/64	72 – 76
2 – 64	50	70 – 79	1/4 – 28	3	72 – 80	7/8 – 14	13/16	62 – 67
M2.5 x .45	2.05 mm	69 – 77	5/16 – 18	F	72 – 77	M24 x 3	53/64	72 – 76
3 – 48	5/64	70 – 77	5/16 – 24	I	67 – 75	1 – 8	7/8	73 – 77
3 – 56	46	69 – 78	M8 x 1.25	6.7 mm	74 – 80	1 – 12	59/64	67 – 72
4 – 40	44	65 – 71	3/8 – 16	5/16	72 – 77	1 – 14	15/16	61 – 67
4 – 48	42	61 – 68	3/8 – 24	Q	71 – 79	1-1/8 – 7	63/64	72 – 76
M3 x .5	40	70 – 79	M10 x 1.5	8.4 mm	76 – 82	1/18 – 12	1-3/64	66 – 72
5 – 40	39	65 – 72	7/16 – 14	U	70 – 75	M30 x 3.5	1-3/64	75
5 – 44	38	63 – 71	7/16 – 20	25/64	65 – 72	1-1/4 – 7	1-7/64	76
M3.5 x .6	33	72 – 81	M12 x 1.75	13/32	69 – 74	1-1/4 – 12	1-11/64	72
6 – 32	36	71 – 78	1/2 – 13	27/64	73 – 78	1-3/8 – 6	1-7/32	72
6 – 40	33	69 – 77	1/2 – 20	29/64	65 – 72	1-3/8 – 12	1-19/64	72
M4 x .7	3.25 mm	74 – 82	M14 x 2	15/32	76 – 81	M36 x 4	1-1/4	82
8 – 32	29	62 – 69	9/16 – 12	31/64	68 – 72	1-1/2 – 6	1-11/32	72
8 – 36	29	70 – 78	9/16 – 18	33/64	58 – 65	1-1/2 – 12	1-27/64	72
10 – 24	25	69 – 75	5/8 – 11	17/32	75 – 79			

2018 Corn Loss Minnesota State FFA AG Mechanics CDE Problem

Ear loss

Total ear loss	4
Preharvest ear loss	2
Machine ear loss	2

Preharvest ear loss		2
Ears found behind combine		4

Machine ear loss = total ear loss - preharvest ear loss

Total kernel loss Behind the combine

Row number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Total	Average
Kernel loss	7	7	7	6	6	6	6	6									51	3.1875

Kernel loss header

Row number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Total	Average
Kernel loss	4	3	4	3	3	3	3	3									26	1.625

Separator kernel loss

Behind combine kernel loss	3.2	8		
minus kernel loss header	1.6	0.8		
Separator loss	1.6	0.8	bushel loss	0.8

Kernels on cob loss

Row number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Total	Average
Kernel on cob under header	0	3	2	2	2	0	1	5									15	0.9375

Row number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Total	Average
Kernel on cob behind combine	1	1	1	2	1	1	6	6									19	1.1875

Threshing loss

Kernels on cob behind combine	1.2	0.1		
Kernels on cob under header	0.9	0.5		
Threshing loss	0.3	-0	bushel loss	0.1

Machine Ear loss in Bushels =		2
Separator loss =		0.8
Threshing loss =		0.1
Header loss =		0.8
Total Loss =		3.7

Is this level of loss acceptable? **No**

What level of loss can a Combine be held to ? **Losses can be held to a half a bushel or to 1% of crop yield.**

Please Print KEY KEY KEY

2018 Minnesota Agricultural Mechanics Career Development Event
Electric Circuits

15 minutes Problem solving-25 points

Equations E = I x R P = I x E 1 point each

1. A branch circuit for a clothes dryer is being planned. The nameplate of the dryer that will be served by the circuit lists the wattage as 4800 watts. When calculating the load on this branch circuit, the load must be calculated as ___ _____ watts.
   - **A. 5000 watts**
   - B. 80% of 5000 watts or 4000 watts
   - C. 4800 watts
   - D. 80% of 4800 watts or 3840 watts

2. Standby generating equipment is installed to serve a poultry building at times when electrical power to the building is interrupted. If the generating equipment is operating, the generator can feed power back into the power company's lines, thus endangering the lives of persons working on the lines. To prevent the generator from feeding power back into the power company's lines,
   - A. An automatic start switch for the generator must be installed
   - **B. A double throw transfer switch must be installed**
   - C. A manual start switch for the generator must be installed
   - D. Another service entrance panel must be installed in the building

3. The receptacles in a bathroom
   - A. Must have ground fault circuit interrupter protection and may be supplied from any general purpose branch circuit in the building
   - B. Must have ground fault circuit interrupter protection only if located within 36" of the basin and must be supplied from a bathroom branch circuit
   - C. **Must have ground fault circuit interrupter protection and must be supplied from a bathroom branch circuit**
   - D. Must be supplied from the same branch circuit that serves the bedroom that is adjacent to the bathroom

4. What size conduit should be used to run 3 conductors that are each number 12 AWG copper?
   - **A. 1/2 inch**
   - B. 3/4 inch
   - C. 1 inch
   - D. 2 inch

5. The continuous load supplied by a circuit should not exceed ____% of the branch circuit rating. A load that is expected to operate at maximum current for 3 hours or more is considered continuous.
   - A. 10 %
   - B. 20 %
   - C. 50%
   - **D. 80%**

2 points each

6. How much does it cost to operate computer monitor that is left on continuously for 1 month (30 days) if it is rated at 1.4 amps on a 120 volt circuit? Assume electricity costs $.0925/kwh.
1.4 x 120 = 168 watts
168 x 24 hours x 30 days = 120960 watts / 1000 = 120.96 kwh
120.96 kwh x .0925 = $11.18 or $11.19

7. How much would it cost to watch your television for one week if you averaged watching 5 hours per day? The television is rated at 250 watts and electricity costs $.0925/kwh.
250 watts x 5 hours x 7 days = 8750 watts / 1000 = 8.75 kwh
8.75 x .0925 = 81 cents

8. How much does it cost to keep a swine confinement building lighted at night for one year (365 days) if the lights are kept on an average of 10 hours per day? There are twenty 13 watt LED light bulbs used for lighting and electricity costs $.12/kwh.
20 x 13 watts x 10 hours x 365 days = 949000 watts / 1000 = 949 kwh
949 x .12 = $113.88

9. Determine how many amps of current are flowing through a 120 volt circuit that is using 1,650 watts of electricity.
1650 watts / 120 = 13.75 amps

10. How many watts of electricity are being used on 120 volt circuit that is using 17.5 amps of current?
17.5 amps x 120 volts = 2100 watts

11. How many ohms of resistance are in a toaster on a 120 volt circuit that has 6.7 amps of current flowing?

120 volts / 6.7 = 17.9 ohms

12. Given an appliance that has 12.8 ohms of resistance, how many amps of current are flowing in a 120 volt circuit?

120 / 12.8 = 9.4 amps

1point each

Instructions. Match the term with the correct response. Write the letter of the term by the definition.

a. resistance	d. amperes
b. watts	e. multimeter
c. ohms	f. electromotive force

___E___ 1. A device used to measure two or more electrical characteristics.
___B___ 2. Term used to measure electrical power.
___F___ 3. Referred to as voltage. It is what causes electrons to flow through a conductor.
___D___ 4. A measure of the rate of electrical current flow.
___A___ 5. The characteristic of any material to oppose the flow of electricity.
___C___ 6. Term used to measure the amount of electrical resistance.