

Iowa State FFA Agricultural Mechanics Career Development Event 2017

State of Iowa
Department of Education
Iowa State University
Department of Agricultural Education
and Studies

Contestant Name: _____

Contestant School: _____

Environmental and Natural Resource Systems Soil and Water Management/Surveying Skill

Activity One: Use the equipment provided to complete this activity.

(NOTE: -1/2 point per 1" off for height, -1 point for 1° slope off, and -1/2 point per 1' off for distance)



1) Determine the height of Point A: _____

2) Determine the height of Point B: _____

3) Determine the height of Point C: _____

4) Determine the height of Point D: _____

5) What is the distance between Points A and B? _____

6) What is the distance between Points B and C? _____

7) What is the slope between Points A and B? _____

8) What is the slope between Points B and C? _____

Activity Two: Ordering Fill Dirt (Three Points)

9) Iowa State University is planning to construct a twin building to the current building to your south. Within those plans, the engineer has recommended nine inches of concrete. Using the answers from question five and six, determine the area in cubic feet.

Helpful Formulas:

Area = H x L x W

Slope = (Change in Elevation / Horizontal Distance) x 100

1 Cubic Yard = 27 Cubic Feet

Evaluation Score Card

Points

Possible

Earned

Height of Point A	3	_____
Height of Point B	3	_____
Height of Point C	3	_____
Height of Point D	3	_____
Distance	2	_____
Distance	2	_____
Slope	3	_____
Slope	3	_____
Cubic Feet	3	_____
Total	25	_____

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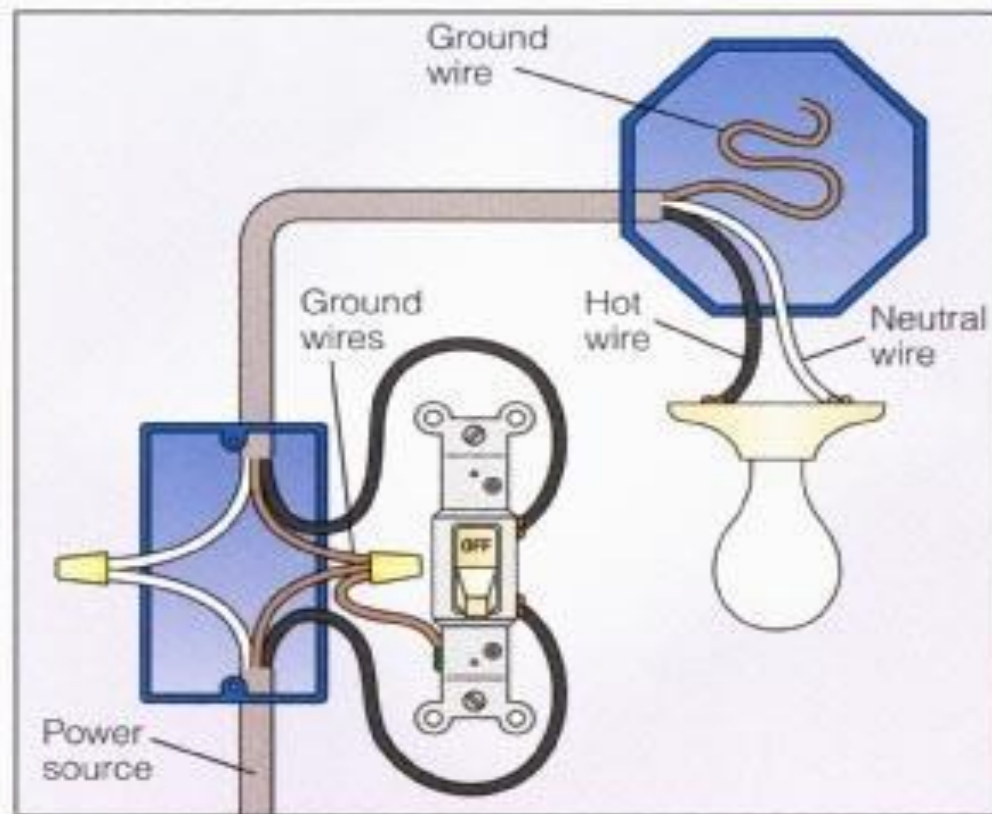
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Electrical Systems Electrical Wiring Skill

You are working to help wire up a new lighting system in the equipment shed at your family's farm. You are responsible for wiring a storage room in the shed, where you have been asked to run a single-pole switch with one light. Using the diagram provided below, wire the switch on the wiring board that is provided. NOTE: Be sure to place a wire nut over the end of the ground wire that runs to the lamp.

Please note that you will be provided with more than one option for wire and switches.



Evaluation Score Card**Points**

	Possible	Earned (Circle One)
Selected a single-pole switch	2	0 / 2
Selected the correct wires	2	0 / 2
Ran the neutral wires correctly	2	0 / 1 / 2
Ran the hot wires correctly	3	0 / 1 / 2 / 3
Ran the ground wires correctly	3	0 / 1 / 2 / 3
Wire stripped at appropriate length	3	0 / 1 / 2 / 3
Wires were installed in the correct direction	3	0 / 1 / 2 / 3
Connections are tight	3	0 / 1 / 2 / 3
Safe practices throughout activity	4	0 / 1 / 2 / 3 / 4
Total	25	_____

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Machinery and Equipment Systems Small Engines Skill

You have recently been hired at one of the local small engine repair shops. One of your co-workers has identified that the issue is related to the electrical system. They suspect that the spark plug is bad, but did not troubleshoot the situation. They grab a new spark plug and hand it to you to install before they are called off to meet with a customer. Before you complete the repair, answer the following questions. Note that you will need to consult the engine service manual to answer some of these questions. Be sure to wear your safety glasses during this activity.

1) Look at the label on the front of the fuel tank. What is the five-digit engine model number?

2) What type of fuel does the engine operate on? _____

3) Removing the spark plug that is in the engine and inspect it.

A) Is the spark plug currently in the engine the same as the spark plug given to you by the other employee? _____

B) Can the current spark plug be salvaged? _____

C) What is wrong with the spark plug? _____

D) What is the correct setting that would remedy the issue? Using the appropriate tool, adjust the spark plug to this setting. _____

E) What is the torque setting for re-installing the spark plug?

4) Once you have identified the issue and have reset the spark plug to the correct settings, raise your hand and have the judge observe your settings prior to re-installing the spark plug. **WHEN RE-INSTALLING THE SPARK PLUG, DO NOT TORQUE THE SPARK PLUG; ONLY PUT IT IN HAND-TIGHT! YOU MUST RECEIVE THE JUDGE'S SIGNATURE TO OBTAIN POINTS FOR THIS SECTION!**

_____ Judge's Signature

5) Does the engine currently have an air filter installed in it? _____

6) Is the engine oil level within the operating range indicated on the dipstick? _____

7) If the air temperature is 40°F, which oil type should be used in this engine? _____

8) Is there currently fuel this engine? _____

9) What is the minimum octane rating of gasoline that can be used in this engine? _____

Evaluation Score Card	<u>Points</u>	
	Possible	Earned
Model identification (1)	1	_____
Fuel type (2)	1	_____
Current spark plug (3A)	2	_____
Salvage the current spark plug (3B)	2	_____
Identified the problem (3C)	3	_____
Correct settings 3(D)	2	_____
Torque setting (3E)	2	_____
Correct adjustment / judge's signature (4)	3	_____
Air filter (5)	1	_____
Oil level (6)	1	_____
Oil type (7)	1	_____
Fuel (8)	1	_____
Octane rating (9)	1	_____
Safety	4	_____
Total	25	_____

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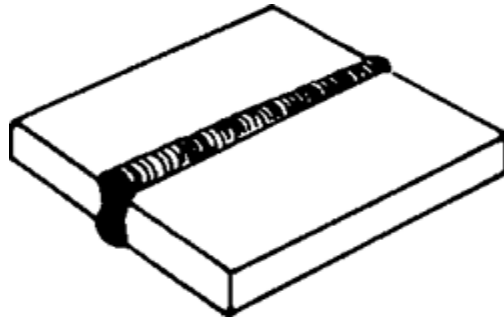
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Metals and Welding

Shielded Metal Arc Welding Skill

Using the electrodes and two welding coupons provided, you will use the SMAW process to create a flat position butt joint like the one shown below. **WELD ONLY ON ONE SIDE OF THE BUTT JOINT!** The welding machine has already been set up for use. You may do practice welds on the plates, but not at the location of the butt joint. **DO NOT ADJUST THE MACHINE! BE SURE TO WEAR ALL OF YOUR WELDING PPE!**



Evaluation Score Card	<u>Points</u>	
	Possible	Earned (Circle One)
General weld appearance	5	0 / 1 / 2 / 3 / 4 / 5
Uniform weld width and height	5	0 / 1 / 2 / 3 / 4 / 5
Appropriate weld penetration	5	0 / 1 / 2 / 3 / 4 / 5
Clean start and stop	5	0 / 1 / 2 / 3 / 4 / 5
Safety	5	0 / 1 / 2 / 3 / 4 / 5
Total	25	_____

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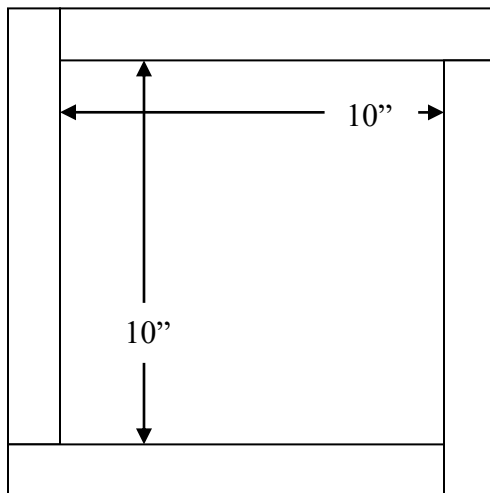
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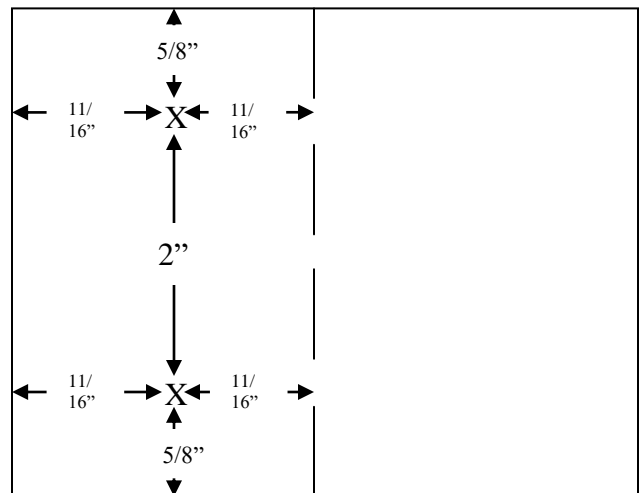
Structural Systems Concrete Skill

Using the diagram below, you are to use the tools and materials provided at your station to build a form for a miniature concrete pad. After you build your project, determine the amount of concrete, in cubic yards, that would be necessary to completely fill the concrete form shown below. Be sure to wear your safety glasses! Turn your project and evaluation form into the judge when you are finished. NOTE: The boards used in this activity are 2 x 4's.

TOP VIEW



SIDE VIEW (X = Screw)



1) In cubic yards, what is the volume of the concrete form shown above? Round your answer to the nearest hundredth.

Evaluation Score Card**Points**

	Possible	Earned
Boards cut to correct lengths (1/16" tolerance)	4	_____
Two screws used to join each board	3	_____
Screws placed according to specifications (1/16" tolerance)	2	_____
Boards is assembled correctly	3	_____
Form is square (1/16" tolerance)	3	_____
Screws not protruding from board	3	_____
Correct concrete volume calculation	3	_____
Safety	4	_____
Total	25	_____

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Environmental and Natural Resource Systems Soil and Water Management/Surveying Skill

Activity One: Use the equipment provided to complete this activity.

(NOTE: -1/2 point per 1" off for height, -1 point for 1° slope off, and -1/2 point per 1' off for distance)



- | | |
|---|----------------|
| 1) Determine the height of Point A: | 1.94' |
| 2) Determine the height of Point B: | 4.72' |
| 3) Determine the height of Point C: | 5.26' |
| 4) Determine the height of Point D: | 3.47' |
| 5) What is the distance between Points A and B? | 40' |
| 6) What is the distance between Points B and C? | 36' 6" |
| 7) What is the slope between Points A and B? | 0.0695 |
| 8) What is the slope between Points B and C? | 0.01479 |

Activity Two: Ordering Fill Dirt (Three Points)

9) Iowa State University is planning to construct a twin building to the current building to your south. Within those plans, the engineer has recommended nine inches of concrete. Using the answers from question five and six, determine the area in cubic feet. **1,095 ft³ (40.55 yd³)**

Helpful Formulas:

Area = H x L x W

Slope = (Change in Elevation / Horizontal Distance) x 100

1 Cubic Yard = 27 Cubic Feet

Evaluation Score Card

Points

Possible

Earned

Height of Point A

3

Height of Point B

3

Height of Point C

3

Height of Point D

3

Distance

2

Distance

2

Slope

3

Slope

3

Cubic Feet

3

Total

25

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1) Look at the label on the front of the fuel tank. What is the five-digit engine model number?
XT650

2) What type of fuel does the engine operate on? **Gasoline**

3) Removing the spark plug that is in the engine and inspect it.

A) Is the spark plug currently in the engine the same as the spark plug given to you by the other employee? **No**

B) Can the current spark plug be salvaged? **Yes**

C) What is wrong with the spark plug? **Incorrect air gap**

D) What is the correct setting that would remedy the issue? Using the appropriate tool, adjust the spark plug to this setting. **0.030" (0.76 mm)**

E) What is the torque setting for re-installing the spark plug? **20 foot pounds
(27 Newton meters)**

4) Once you have identified the issue and have reset the spark plug to the correct settings, raise your hand and have the judge observe your settings prior to re-installing the spark plug. **WHEN RE-INSTALLING THE SPARK PLUG, DO NOT TORQUE THE SPARK PLUG; ONLY PUT IT IN HAND-TIGHT! YOU MUST RECEIVE THE JUDGE'S SIGNATURE TO OBTAIN POINTS FOR THIS SECTION!**

_____ Judge's Signature

- 5) Does the engine currently have an air filter installed in it? **Yes**
- 6) Is the engine oil level within the operating range indicated on the dipstick? **No**
- 7) If the air temperature is 40°F, which oil type should be used in this engine? **10W-30**
- 8) Is there currently fuel this engine? **No**
- 9) What is the minimum octane rating of gasoline that can be used in this engine? **87**

Evaluation Score Card	<u>Points</u>	
	Possible	Earned
Model identification (1)	1	_____
Fuel type (2)	1	_____
Current spark plug (3A)	2	_____
Salvage the current spark plug (3B)	2	_____
Identified the problem (3C)	3	_____
Correct settings 3(D)	2	_____
Torque setting (3E)	2	_____
Correct adjustment / judge's signature (4)	3	_____
Air filter (5)	1	_____
Oil level (6)	1	_____
Oil type (7)	1	_____
Fuel (8)	1	_____
Octane rating (9)	1	_____
Safety	4	_____
Total	25	_____

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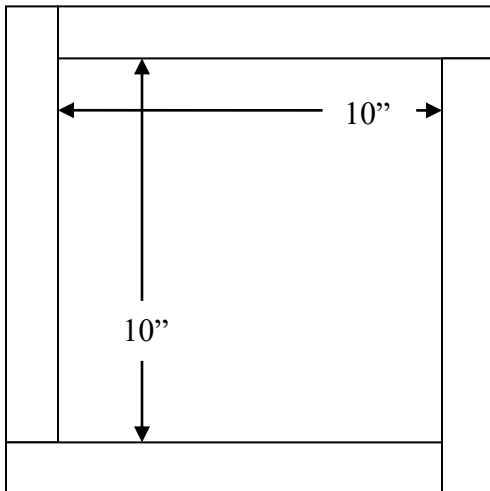
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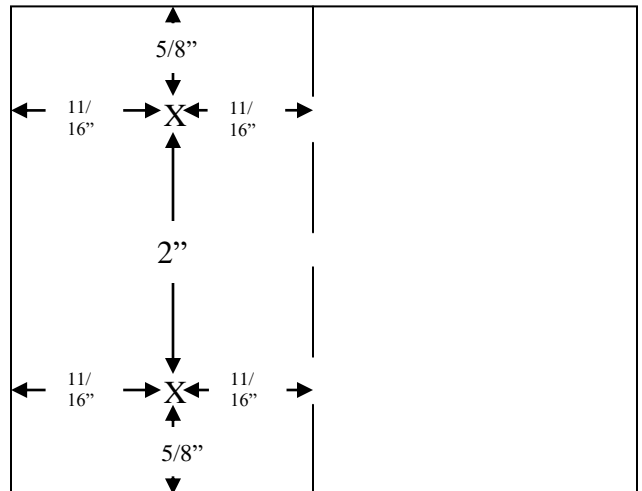
Structural Systems Concrete Skill

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TOP VIEW



SIDE VIEW (X = Screw)



1) In cubic yards, what is the volume of the concrete form shown above? Round your answer to the nearest hundredth.

0.01 yd³

Evaluation Score Card**Points**

	Possible	Earned
Boards cut to correct lengths (1/16" tolerance)	4	_____
Two screws used to join each board	3	_____
Screws placed according to specifications (1/16" tolerance)	2	_____
Boards is assembled correctly	3	_____
Form is square (1/16" tolerance)	3	_____
Screws not protruding from board	3	_____
Correct concrete volume calculation	3	_____
Safety	4	_____
Total	25	_____