

Name: Key School: \_\_\_\_\_ Contestant Number: \_\_\_\_\_

**2016 Cowboy Classic- Agricultural Technology And Mechanical Systems  
Electrical System Skill**

Congratulations, you have just been hired by Freemont Electric in Laramie WY, as their head electrician. Your duties include wiring around the shop and using your expertise to aid in decision making. You have been asked to wire in parallel 2 duplex receptacles into the breaker box. Additionally, you have been asked to evaluate the voltage drop in two different circuits and choose the one with the least amount of voltage drop.

**Circuit A** is composed of 215 ft. single phase #10 solid copper wire.

**Circuit B** is composed of 133 ft. single phase #8 solid aluminum wire.

The tested amperage for both circuits is 10 amps at 98 degrees Fahrenheit.

**Complete the wiring project with the tools you are provided.**

**Reference the reverse side of this document for formulas and resources.**

Circuit A	Circuit B
Calculate the specific voltage drop. <i>Show your work! Round to the nearest hundredths place.</i>	Calculate the specific voltage drop. <i>Show your work! Round to the nearest hundredths place.</i>
<b>V= (11 x 2 x 215 x 10) /10400</b>	<b>V= (18 x 2 x 133 x 10) / 16500</b>
<b>V= 47300 / 10400</b>	<b>V= 47880 / 16500</b>
<b>V= 4.55</b>	<b>V= 2.90</b>
<b>Circle the answer that experiences the least amount of voltage drop?</b>	
Circuit A	<u>Circuit B</u>

Your employer has also asked you to evaluate 5 Service Entrance Panels and determine what is wrong with them. Please match the correct answers.

Breaker Box #1	A, B, P	<ul style="list-style-type: none"> <li>a. Hot wire is not connected right in breaker box</li> <li>b. Neutral wire is not connected right in breaker box</li> <li>c. Ground wire is not connected right in breaker box</li> <li>d. Hot wire is not connected right on switch</li> <li>e. Neutral wire is not connected right on switch</li> <li>f. Ground wire is not connected right on switch</li> <li>g. Hot wire is not connected right on light</li> <li>h. Neutral wire is not connected right on light</li> <li>i. Ground wire is not connected right on light</li> <li>j. Hot wire is not connected right on outlet</li> <li>k. Neutral wire is not connected right on outlet</li> <li>l. Ground wire is not connected right on outlet</li> <li>m. Duplex receptacle break-off tab needs to be intact</li> <li>n. Duplex receptacle break-off tab needs to be removed</li> <li>o. Change of identity marker is missing</li> <li>p. Change of identity marker is not needed</li> <li>q. No problems exist in the breaker box</li> </ul>
Breaker Box #2	G, H	
Breaker Box #3	Q	
Breaker Box #4	F, B, I	
Breaker Box #5	N	

*\*Note~ there can be more than one correct answer or no answers per breaker box. Answers may be used more than once.*

Criterion	Points Possible	Points Earned
Wiring	15	
Questions (1 pt each)	13	
Safety	2	

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Wire Type	K at 77°F - 121°F	K at temp 122°F - 167°F
Solid Copper	11	12
Solid Aluminum	18	20
Stranded Copper	11	12
Stranded Aluminum	19	20

Gage	Wire area in mils
6	26300
8	16500
10	10400
12	6530

To calculate the specific voltage, drop used the following equation:  $V = \frac{K \times P \times L \times I}{A}$

V= voltage drop    K= constant    P= phase= 2 for single phase    L= wire length  
 I= current (amps)    A= wire area in mils

Criterion	Points Possible	Points Earned
Wiring	15	
Questions (1 pt each)	13	
Safety	2	