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Your Name: _____

Participation Number:

Two letter state abbreviation.

State code (0301, 0302, to 0350)

Team member number (01, 02, 03, or 04)

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Students please do not write or mark within this box.

Judges, after this skill sheet has been scored and double checked, write the total score for this activity in the blank below.

Skill Activity Score: _____

Judges Initials: _____

2023 National Agriculture Technology & Mechanical Systems Career Development Event Electrical Systems Skill Activity

Situation: You have been asked to install new, 120-volt lighting circuits inside a 54' x 500' commercial broiler house. The farmer is moving away from incandescent to new LED bulbs. The new bulbs are 100-watt equivalent 1100-lumen bulbs. Each bulb is rated at 11 watts. Lighting outlets will be installed in two rows; each running the full length of the house. Each lighting row will be divided into 2 -250-foot-long separate circuits. The duration of time that the lights will run is 23 hours a day. The farmer has requested that he be able to control each lighting section from the front, middle, and back of the house.

Directions: Answer the following questions about lighting circuits using the references provided. Use information determined from these questions and the references provided to determine the correct size overcurrent protection and the correct size branch circuit conductor that should be used for this circuit.

Using the supplied electrical floor plan and ladder diagram wire the lighting circuit. You will select the correct size overcurrent protection for this circuit, and make the needed connections between the switches and the lighting circuits. You should only strip the ends of the cable, **DO NOT CUT ANY CONDUCTOR, DO NOT ATTACH ANY DEVICES TO THE BOXES, DO NOT TUCK ANY OF THE CONDUCTORS INTO THE BOXES, DO NOT BACK WIRE ANY DUPLEX RECEPTACLES OR SWITCHES.**

1. Lighting outlets will be placed on 10' centers. How many total lighting outlets are required if two rows of lighting are installed the full length of the broiler house?

Answer: _____ (2 pts)

2. Calculate the total lighting load in amps for one 250-foot lighting circuit in accordance with NEC Article 210.2(A).

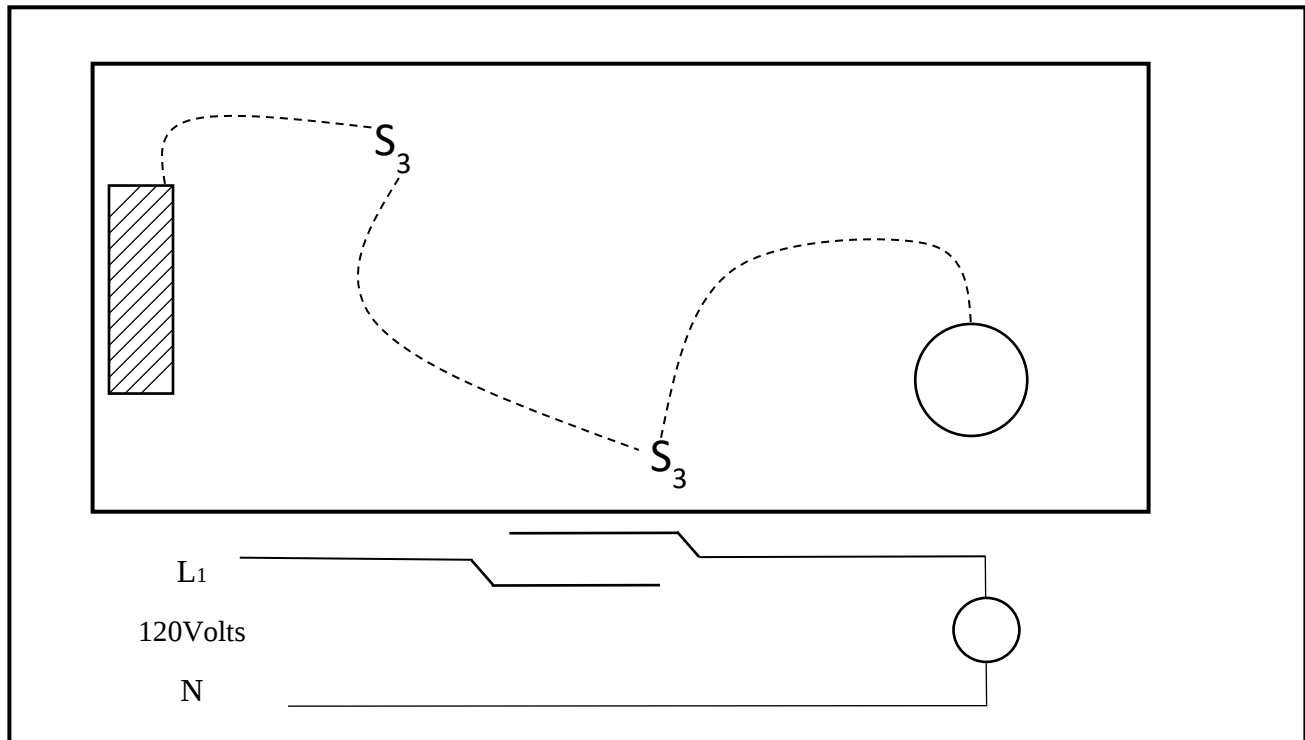
Answer: _____ (2 pts)

1. Using the supplied tables from the Agriculture Wiring Handbook Section 34, determine the correct size **copper NM conductor** that will be required for each 120-volt, Single-phase 250 ft lighting circuit if **voltage drop is limited to 4%**

Answer: _____ (2 pts)

Skill: Complete each task as described:

1. Select the correct overcurrent protection for this circuit.
2. Make the connections between the conductor's switches and lighting outlets.



Chapter Name: _____			Points Possible	Points Earned
1.		Circuit Installation and Wiring		
	a.	Correct size overcurrent protection. 20 amp	5	
	b.	Wire connections made and used properly # of Opportunities 10	10	
	c.	Used White wire Correctly (Identified) # of Opportunities 3 (One Opportunity per box)	3	
	d.	Ground (Bond) wire properly used # of Opportunities 3 (One Opportunity per box)	3	
	e.	Splicing Connectors (size, tight, no exposed wire) # of Opportunities 3 (One Opportunity per box)	3	
2.		Answers to Questions - 2 pts. Each	6	
Total Points			30	

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Electrical Systems Skill Activity**

Key

2. Lighting outlets will be placed on 10' centers. How many total lighting outlets are required if two rows of lighting are installed the full length of the broiler house?

Answer: _____ **100 Lighting Outlets** _____

500 ft broiler house/10 ft lighting outlet centers = 50 lighting outlets per side x 2 sides = 100 lighting outlets

3. Calculate the total lighting load in amps for one 250-foot lighting circuit in accordance with NEC Article 210.2(A).

Answer: _____ **2.86 Amps** _____

1 250' circuit = 25 lighting outlets x 11 watts/outlet = 275 Watts

275 Watts x 1.25 (continuous load) = 343.75 watts/120 volts = 2.86 Amps

4. Using the supplied tables from the Agriculture Wiring Handbook Section 34, determine the correct size **copper NM conductor** that will be required for each 120-volt, Single-phase 250 ft lighting circuit if **voltage drop is limited to 4%**?

Answer: _____ **12 AWG** _____

