2013 Iowa FFA Agricultural Mechanics Career Development Event
Team Problem - Constructing a Model Cantilever Rack and Completing a Bill of Materials

State of Iowa Department of Education
Iowa State University
Department of Agricultural and
Biosystems Engineering

CONTESTANT SCHHOL _____
CONTESTANTS _____
_____
_____
_____

Instructions:

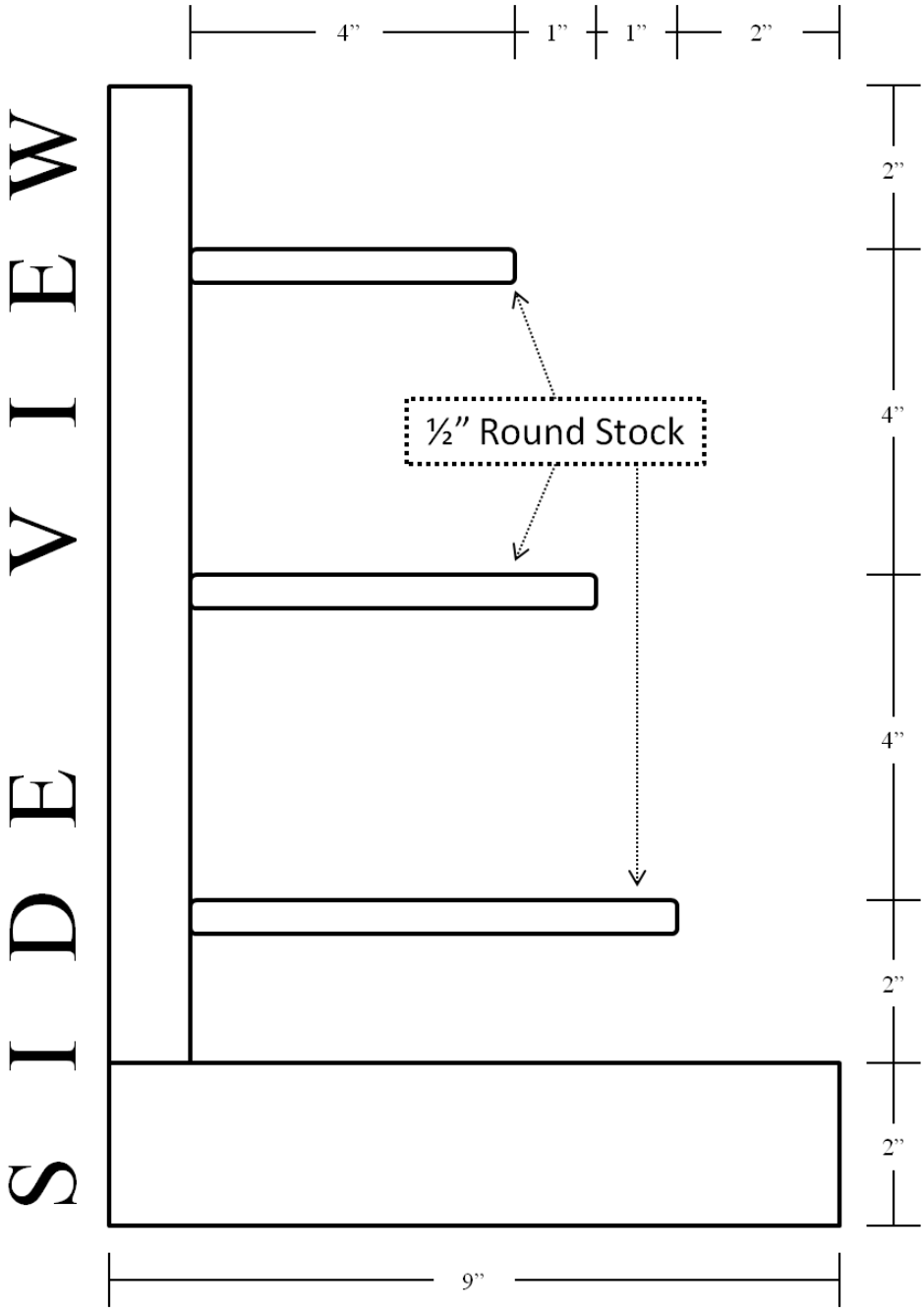
You will have 50 minutes to complete both exercises. (1) Construct a model cantilever rack following the construction procedures that meet the specifications pictured and (2) complete the bill of materials worksheet. Use safe work habits at all times.

Evaluation Score Sheet

		Possible	Earned
Model Cantilever Rack			
1.	Correct overall model cantilever rack height	7	_____
2	Correct overall model cantilever rack width	7	_____
3.	Correct overall model cantilever rack length	7	_____
4.	Correct length of top arm	7	_____
5.	Correct length of middle arm	7	_____
6.	Correct length of bottom arm	7	_____
7.	Correct spacing of arms	7	_____
8.	Quality of Welds	15	_____
Bill of Materials			
9.	Correct model cantilever height	6	_____
10.	Correct model cantilever width	6	_____
11.	Correct model cantilever length	6	_____
12.	Correct top arm length	6	_____
13.	Correct middle arm length	6	_____
14.	Correct bottom arm length	6	_____
15.	Correct cost of rectangular tubing	8	_____
16.	Correct cost of square tubing	8	_____
17.	Correct cost of round stock	8	_____
18.	Correct total cost	11	_____
Safety			
19.	Safety and safe working habits	15	_____
	Total	150	

Construction Procedure

1. Use the following images (side and front view) to construct a model cantilever rack.
2. Shielded metal arc welding (SMAW)/stick welding is to be used to fuse all joints.
3. Use 3/32 – 7018 electrodes for all welding processes.



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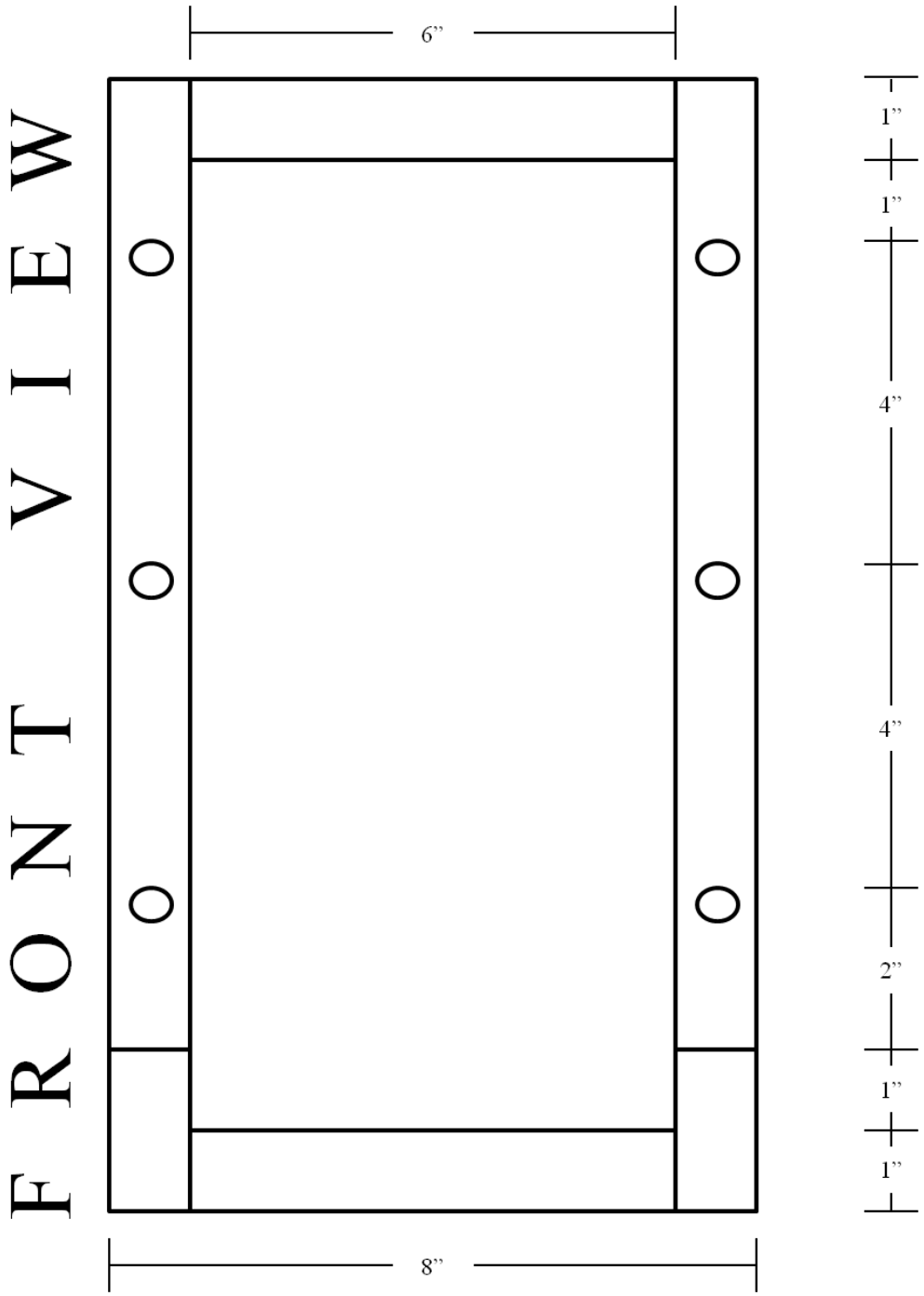

Bill of Materials

Scenario: Big Dog Manufacturing wants to construct cantilever racks for their new manufacturing warehouse. However, they want to develop a few smaller scale models first to explore any potential fabrication issues that may arise. They have turned to the local FFA chapter for assistance. Your chapter is charged with making 5 model cantilever racks according to the plans outlined earlier.

Directions: Using the plans outlined earlier (front and side view images), answer the following questions.

1. How tall is the model cantilever rack? _____Inches
2. How wide is the model cantilever rack? _____Inches
3. How long (rectangular tubing) is the model cantilever rack? _____ Inches
4. How long is the top cantilever arm? _____ Inches
5. How long is the middle cantilever arm? _____ Inches
6. How long is the bottom cantilever arm? _____ Inches

Cost of Materials:

Rectangular Tubing	1” x 2” x 14 ga. (W x H x T)	-	$ 2.40 per foot
Square Tubing	1” x 1” x 14 ga. (W x H x T)	-	$1.80 per foot
Round Stock	1/2" ID	-	$0.80 per foot

7. Bill of Materials for **5** model cantilever racks.

Item	Quantity (inches)	Cost for **5** model racks
Rectangular Tubing		
Square Tubing		
Round Stock		

8. What is the total cost of the **5** model cantilever racks? _____