Plant Hanger – Hot Metal Work

Name: _____

Description:

This project allows students to use hot and cold metal working skills. Hot metal working skills are also useful for making repairs and decorative work.

Materials:

3/8" HR square steel
Spray paint
120 Grit Sandpaper

Tools:

Safety Glasses
Hack saw
Engineer's or blacksmith's Hammer
Machinist or blacksmith's Vise
Anvil
Steel Tape
Bastard File
Oxy-Acetylene torch (rosebud)
Cutting Glasses
Tongs or pliers
Welding glove
Drill press
3/16" twist drill
Center punch
Scratch Awl
Soapstone

Directions:

1) Read ALL directions before beginning
2) Cut a piece of 3/8" square stock _____ long.
3) Heat one end in the torch and "draw" it out to a 4-sided point.
4) Cool your work and use a file to clean up the work.
5) Heat up the opposite end and flatten it to shape.
6) Cool your work and use a file to clean up the project.
7) Mark the location of the two mounting holes with a center punch and drill in the drill press.
8) Layout the location of the bend, place the work in a vise and bend it cold.
9) Carefully heat the pointed tip and bend to shape over the horn of the anvil.
10) Cool your work
11) Do a final cleanup with a file.
12) Sand and paint.

Notes:

_____

_____

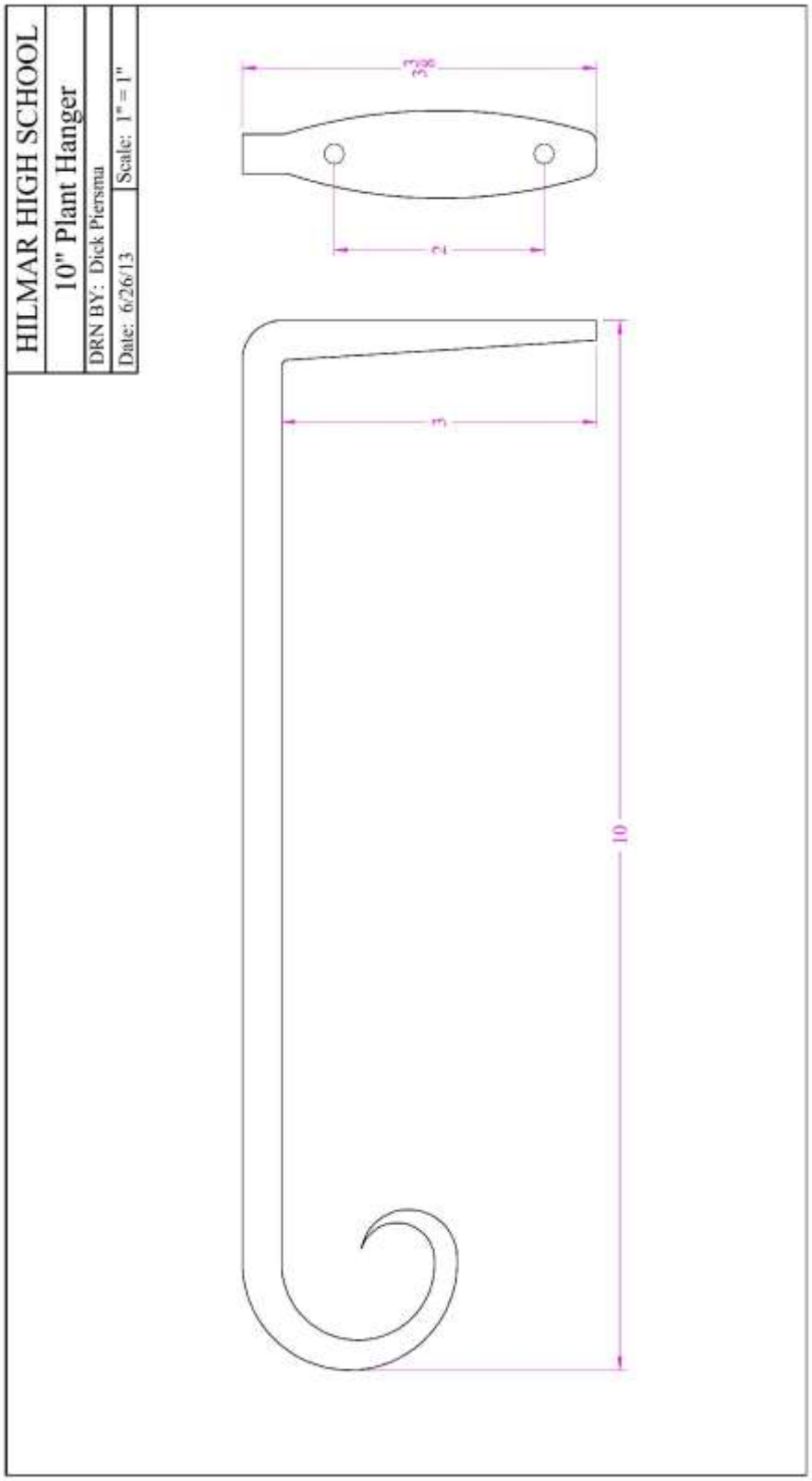
_____

_____

_____

_____

Drawing/Photo:




10 in. Forged Hook
Item 899410
Made in China

Plant Hanger Student Worksheet:

Name: _____

Complete this worksheet prior to starting the project.

1) Read ALL directions before beginning. T F

2) How long is the piece 3/8" HR square steel _____

5) What tool was used to cut the stock? _____

3) What safety precautions are important when shaping hot metal?

_____
_____
_____
_____

6) Should you hold the torch in one spot while heating the metal? YES NO

7) What type of hammer will you use to form the metal? _____

Grading Rubric:

Criteria	Possible	Score
Measurements to plan	5	
Point (clean/square)	5	
Angle of the bend	5	
Hole properly located	5	
Overall Craftsmanship (bends, clean, paint)	5	
TOTAL	25	

Teaching Notes:

Agricultural Standards Met:

B1.0 Students understand personal and group safety:
- B1.1 Practice the rules for personal and group safety while working in an agricultural mechanics environment.
- B1.2 Know the relationship between accepted shop management procedures and a safe working environment.

B5.0 Students understand agricultural cold metal processes:
- B5.1 Know how to identify common metals, sizes, and shapes.
- B5.3 Know layout skills.
- B5.4 Know basic cold metal processes (e.g., shearing, cutting, drilling, threading, bending).
- B5.5 Complete a cold metal project, including interpreting a plan, developing a bill of materials, selecting materials, shaping, fastening, and finishing.

4.0 Technology

Students know how to use contemporary and emerging technological resources in diverse and changing personal, community, and workplace environments:
- 4.6 Differentiate among, select, and apply appropriate tools and technology.

5.0 Problem Solving and Critical Thinking

Students understand how to create alternative solutions by using critical and creative thinking skills, such as logical reasoning, analytical thinking, and problem-solving techniques:
- 5.1 Apply appropriate problem-solving strategies and critical thinking skills to work-related issues and tasks.
- 5.3 Use critical thinking skills to make informed decisions and solve problems.

6.0 Health and Safety

Students understand health and safety policies, procedures, regulations, and practices, including the use of equipment and handling of hazardous materials:
- 6.2 Understand critical elements of health and safety practices related to storing, cleaning, and maintaining tools, equipment, and supplies.
- 6.4 Maintain safe and healthful working conditions.
- 6.5 Use tools and machines safely and appropriately.
- 6.6 Know how to both prevent and respond to accidents in the agricultural industry.

7.0 Responsibility and Flexibility

Students know the behaviors associated with the demonstration of responsibility and flexibility in personal, workplace, and community settings:
- 7.1 Understand the qualities and behaviors that constitute a positive and professional work demeanor.
- 7.2 Understand the importance of accountability and responsibility in fulfilling personal, community, and workplace roles.
- 7.3 Understand the need to adapt to varied roles and responsibilities.
- 7.4 Understand that individual actions can affect the larger community.
- 7.5 Understand the importance of time management to fulfill responsibilities.
- 7.6 Know how to apply high-quality craftsmanship to a product or presentation and continually refine and perfect it.

Objectives:

By successfully completing this project students will be able to:

- Read a plan to obtain critical dimensions
- Measure and layout a project on metal
- Identify by name common cold and hot metal tools
- Select and properly used hand and power tools used for cold metal work
- Determine proper drill sizes for drilling holes

Alternate Tools/Materials:

The project can be constructed using all power tools such as using the power miter saw to cut the stock and a bench grinder to clean up the project. It can also incorporate other forms of blacksmithing methods. Metal can also be bent without the use of heat.

Safety Review:

- Use of the drill press.
- Use of oxy acetylene torch
- Working with hot metal

Project Time:

Demonstration: 15-20 minutes
Build: 1 – 2 hours

Demonstration Notes:

1. Begin by reviewing materials and tools used for the project.
1. Review the plan and show how the plan describes the project.
2. Demonstrate how to use a hacksaw.
3. Demonstrate the proper use of a file.
4. Demonstrate how to mark the steel with a scribe or soap stone. Explain the accuracy of each.
5. Demonstrate using the oxy-acetylene torch to heat the steel at the area specified in the handout. Make sure to constantly move the torch back and forth and rotate the steel while heating.
6. Demonstrate forming the stock on the anvil. Use a blacksmiths or machinists hammer to draw out the point and flatten the end. Show proper use of heat. Heat to bright read, work until cherry red. Re-apply heat as needed
7. Review drill press safety as you demonstrate drilling. Remind students that the drill is small and may easily break if work is not secured.

Bill of Materials

(Excel, update with local prices)

Projects: 24

Size		Units	Qty/Project	Cost/Unit	Order	Amount
3/8"	HR Square Steel	20' bar	0.1	$ 2.50	3	$ 7.50
	Spray Paint	Can	0.1	$ 6.00	3	$ 18.00
					TOTAL	$ 25.50

Plan developed by Mike Spiess and Dick Piersma