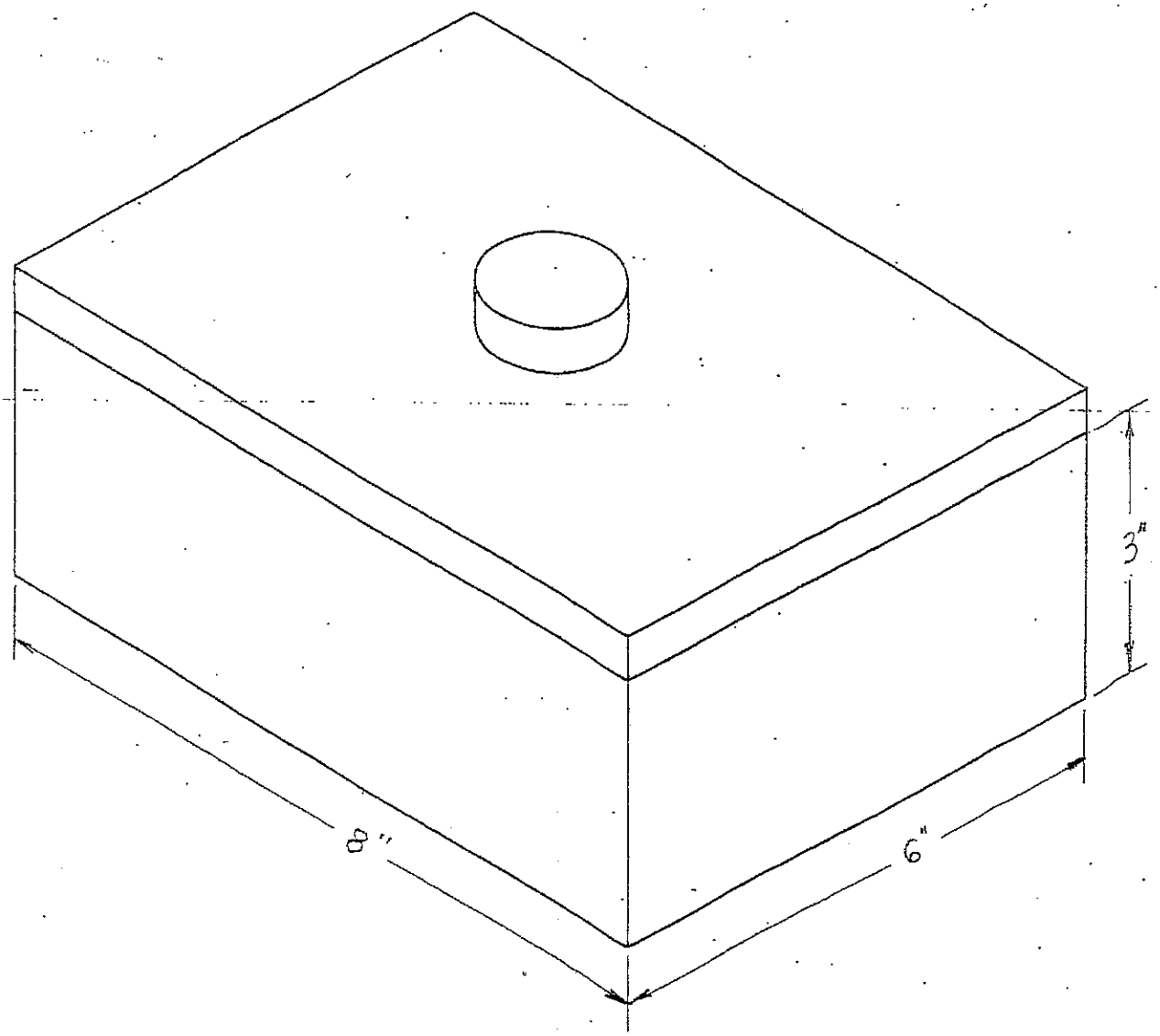
NAME:
PD:

CUSTOM WOODWORK PROJECT

BOX WITH LID



Task Title: Custom Woodworking Project: *Box With Lid*

Course: Construction & Manufacturing

System: Physical Technology

Grade Level: 9 -12

PA Academic Standards for Science and Technology:
3.2 Inquiry and Design: 3.2.10 D
3.6 Technology Education 3.6.16 C
3.7 Technological Devices: 3.7.10 A, 3.7.10 B

PA Academic Standards for Mathematics:
2.1 Numbers, Number systems, and Number Relationships: 2.1.8 A
2.2 Computation and Estimation: 2.2.8 A, 2.2.8 B
2.3 Measurement and Estimation: 2.3.8 A, 2.3.8 D, 2.3.8 F

Overview:

This activity will provide an opportunity for students to custom manufacture a product. Students will use this activity as a basis of comparison for a unit of instruction in manufacturing, culminating in a mass-produced product.

Approximate Time:

22 class periods

Teacher Materials:

1.) Box with lid PLE
2.) Lessons, demonstrations, activity handouts
3.) Assessment rubric

Student Materials Needed:

1.) Project plans
2.) One piece of wood students' choice of species 1" x 3 ½" x 30"
3.) One piece of wood students' choice of species 1" x 6 ¼" x 8 ½"
4.) One piece tempered hardboard 1/8" x 6" x 8"
5.) One No. 6 x 1" flat head wood screw
6.) Wood glue and sandpaper
7.) Stain: penetrating oil
8.) Finish: water-base polyurethane, brushed

Teacher Directions & Procedures:

Session 1	Discuss: PLE pass out materials
Session 2-8	Lay-out & fabricate box with bottom
Session 9-13	Lay-out & fabricate top
Session 14	Design knob
Session 15-17	Fabricate knob
Session 18-22	Stain and finish completed box
Session 22	Discuss activity and complete evaluation

Prompt:

Students will interpret and apply scaled sketch plans, follow a procedure list, and use woodworking hand and power tools to produce a box with a removable lid. This activity represents an example of "custom manufacturing" and is the second activity in the *Construction and Manufacturing* course at Manheim Township High School. Activity objectives include: (a) applying knowledge gained from the basic woodworking activity, (b) learning lab procedures, (c) working safely in the wood technology lab, (d) determining the physical characteristics of select wooden materials, (e) using hand tools and power equipment to alter a board's length, width, and thickness, (g) combining wooden materials with fasteners and glue, (g) developing an understanding of custom manufacturing, and (h) applying stain and finish.

Task:

Students will, build, test, and evaluate a wooden box with a removable lid.

Procedure Steps: Write the date in the space provided for each step as it is completed.

Step One: Box Construction

1.)_____Select the species of wood that you would like to use to construct your box and write it down here_____.

2.)_____Review the safety tests for the following equipment: radial arm saw, jointer, and ~~circular~~ table saw. and surface planer.

~~3.)_____Take the safety test for the surface planer and show to your instructor.~~

4.)_____Crosscut lumber (minimum 3 ½" wide) for box sides and ends, length = 30".

5.)_____Surface plane the lumber to a thickness of ½".

6.)_____Joint the best edge of your lumber.

7.)_____Rip the lumber to a width of 3 1/16".

8.)_____Joint "ripped" edge of your lumber (finished dimension = 3").

9.)_____Cut 1/8" wide x ¼" deep dado joint ¼" from one edge of board. Be sure to select best surface for the outside of the box.

10.)_____Crosscut the lumber as follows: two pieces 8 ¼" long and two pieces 6 ¼" long.
11.)_____Cut a 45° miter on both ends of the each of the 8 ¼" and 6 ¼" pieces. Make sure that the "finished" lengths are exactly 8" and 6" after miter cutting.
12.) _____Determine the size of 1/8" tempered hardboard needed for the bottom of your box. Write down the length dimension here_____ and the width dimension here_____. Have your instructor check your work.
13.)_____"Dry fit" the sides and ends of the box together with out using glue.
14.)_____~~Take~~ Review the safety test for the band saw and show it to your instructor.
15.)_____Mark lines with a pencil and try square on one end and one side of a 6" x 8" piece of tempered hardboard using the dimensions recorded in step 12. Show this layout to your instructor.
16.) _____ Remove the extra width on the band saw. Be sure that the pencil line "shows" on the finished piece.
17.) _____ Cut off the extra length on the band saw. Be sure that the pencil line "shows" on the finished piece.
18.)_____Sand the "length" and "width" cut to the pencil line with a sanding block and 80 grit sandpaper.
19.)_____"Dry fit" the sides, ends, and bottom of the box together with out using glue. Use a band clamp for this process; check 90° at opposite corners with a try square. If the box does not fit together, do not proceed to the next step see your instructor.
20.)_____Sand the inside surfaces of the box prior to "glue up." Be sure to use the correct sequence of sandpaper (120, 220, raise grain, 220)
21.)_____Glue the box sides and ends together using a band clamp. Make sure the box bottom is in place during glue up. Don't place glue into the dado that secures the box bottom.
22.)_____ Write your name and class period on the box bottom with a sharpie pen.

Step Two: Lid Construction

23.) _____Select the species of wood that you would like to use to construct your lid and write it down here_____.
24.)_____Review the safety tests for the following equipment: radial arm saw, jointer, circular saw, and surface planer.
25.)_____**With a partner,** cross cut lumber (minimum 6 ¼" width) length = 18.
26.)_____Surface plane the lumber to a thickness of ¾".
27.)_____Joint the best edge of your lumber.
28.)_____ Rip the lumber to 1/16" greater that the width of ~~your~~ the widest box.
29.)_____Joint the "ripped" edge of your lumber (finished dimension = box width).
30.)_____ Square one end of your lumber.
31.)_____Cut the lumber to the exact length of your box on the radial arm saw.
32.)_____Take the safety test for the shaper and show it to your instructor.
33.)_____Form the molding of the top of the lid with the shaper.
34.)_____Cut the rabbet joints on the bottom surface of the lid (2 ends and 2 sides).
35.)_____Review the safety test for the drill press.

36.)_____Find the center of your lid with a rule and pencil. Drill a 5/32" shank hole through your lid at its center point.
37.)_____Counter sink the bottom of the lid to a width of ¼".
38.)_____Sand the top and bottom surfaces of the lid and also the rabbet joints.

Step Three: Knob

39.)_____Sketch several ideas for your knob on ¼" graph paper
40.)_____Select your favorite idea and develop a working drawing complete with dimensions. Make sure your design is drawn to scale. on KNOB DESIGN Sheet.
41.)_____Fabricate your knob.
42.)_____Drill a 3/32" hole 5/16" deep in the bottom (centered) of the knob.

Step Four: Finishing

43.)_____Sand all surfaces except the tempered hardboard of the box. Sand the lid and knob (120, 220).
44.)_____Raise the grain with water on the box, lid, and knob and sand with 220.
45.)_____Select and apply a ~~penetrating oil~~ stain to your project. Be sure to follow your instructor's and the product instructions. The stain must dry for 24 hours prior to applying the clear coat finish. Please do not stain the tempered hardboard bottom. Place your knob on your box prior to applying the clear coat.
46.)_____Apply a clear coat finish to your box. Be sure to follow your instructor's and the product instructions.
47.)_____Prepare your completed project, and all required papers, for evaluation.

Assessment: (~~120~~ 170 points)

Completed Procedure Sheet (10 points)

Students are required to mark each procedure step with the date of completion. Partial credit will be given at the teacher's discretion for incomplete responses.

Completed bill of materials (10 points)

Students are required to complete a bill of materials for this project. Credit will be assigned for the completeness and accuracy of responses.

Personal Reflection ***(50 points)***

Students will receive this when they begin the finishing process.

Completed Project ***(100)***

See next page for rubric.

Name:_____

Date: _____

Class: _____

Bill of Materials: Project Name =_____

Part No.	Quantity	Part Name	Material	Dimensions	Unit Of Meas. (UOM)	Unit Cost	Item Cost
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

TOTAL COST

Name: _____ PD. ____ Date: _____

Box With Lid Project Personal Reflection *(50 points)*

Please summarize the experiences you had making the wood box with lid directly on this paper. Include information about the following: (a) machine and personal safety, (b) making woodworking joints, (c) wood species identification, (d) staining and finishing the project and (e) likes and dislikes making this project. **Be sure to use proper woodworking terms.**

a.) Machine and personal safety (Explain 2 general rules and 2 examples of special setups/procedures) 10 pts.

b.) Making woodworking joints (Identify all four wood joints and the machines, setups, ~~and processes used to make them) 20 pts. PSSA~~

Name: _____ PD. ____ Date: _____

c.) Wood species identification (Species you used for each part) 5 pts.

d.) Staining and finishing the project (Explain how you finished your project) 10 pts.

e.) likes and dislikes making this project 5 pts.