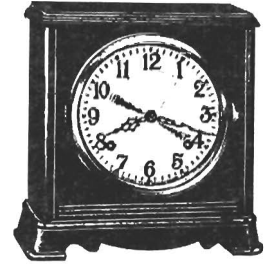


# Materials & Processes: Classic Clocks



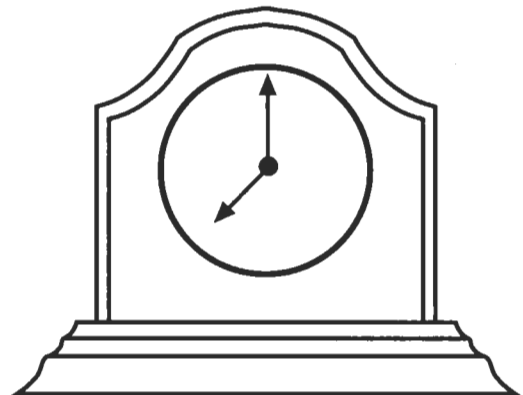
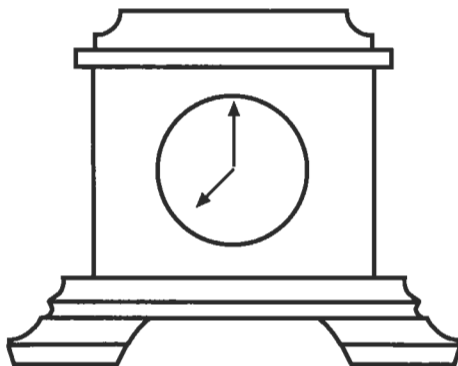
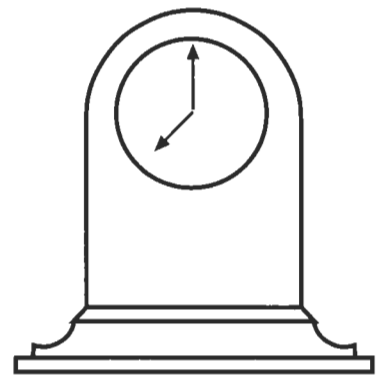
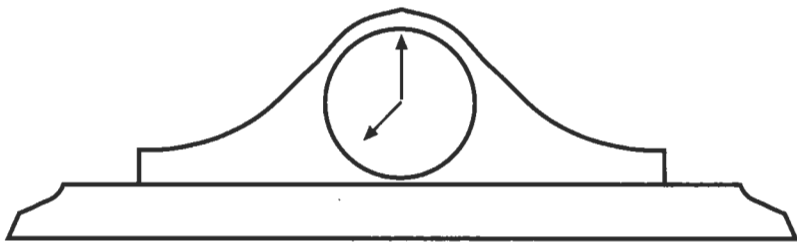
## Introduction

The **materials processing** industries are involved with the production of many consumer products which we use daily. These industries develop and use numerous material processing **technologies** to produce these products. One product of great use and importance to all of us is the clock. As you are aware, there are many different clock-case designs. In this packet you will design a **classic-wood** clock case and install a modern **clock mechanism** into the case that you have designed and **constructed**.

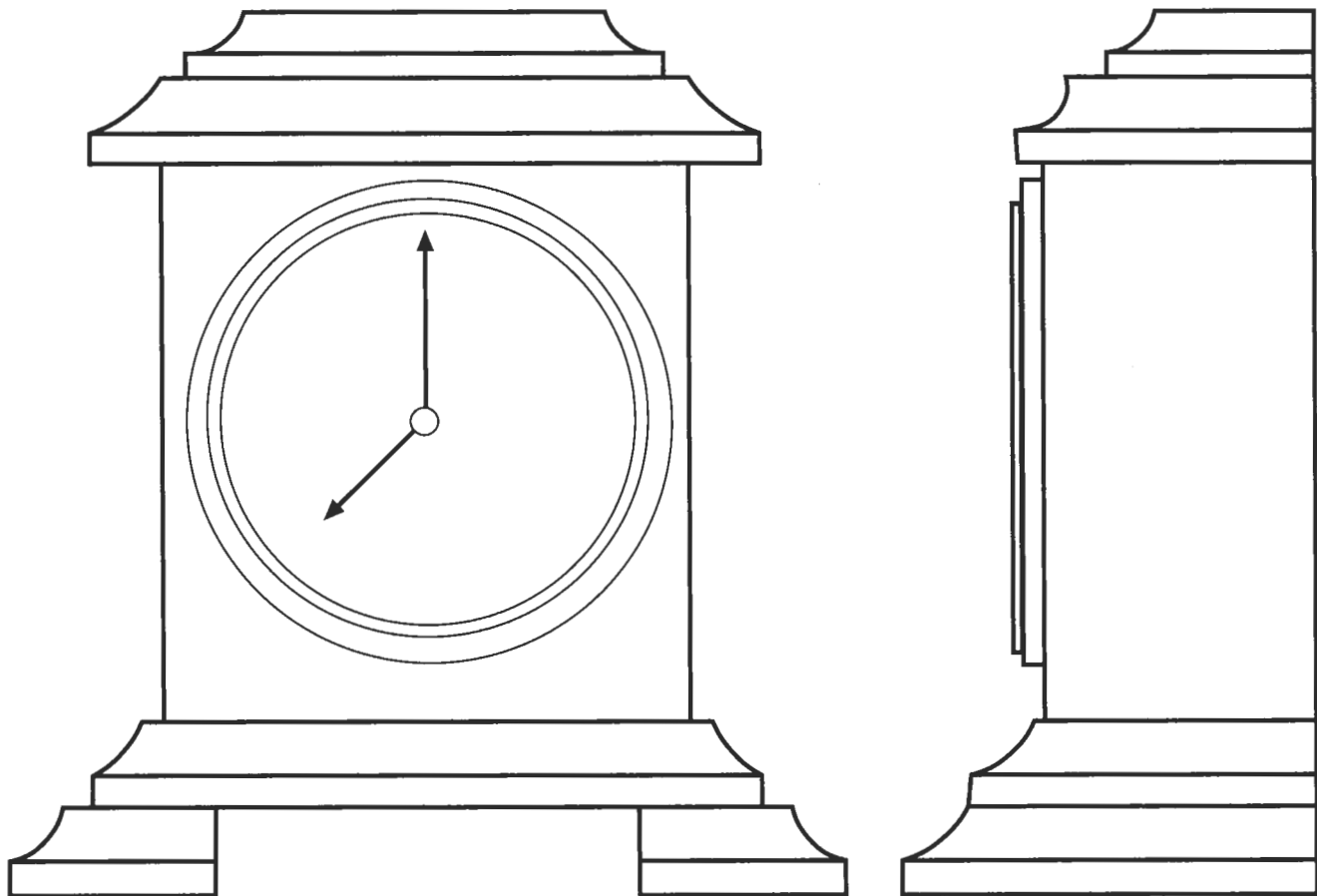
## Job Description

This activity deals with the design and fabrication of a "classic" clock case. Below you will find some examples of "classic" clock cases that are **suitable** for this activity. (See figure 1.) You will be using design skills, patterning, material processes, assembly skills, and safety knowledge in this activity. Coming up with your own design is possibly this activity's biggest challenge. Your efforts will result in a custom clock that will last many years and possibly even be passed on to the next generation.

*The designs shown here range from 4 to 8 inches high.*



*Figure 1 - Here are some sample clock designs.*



*Figure 2 - Sample two-view orthographic drawing of a classic clock.*

## Materials and Supplies

- hardwood lumber
- wood glue
- graph paper
- cardboard
- drawing instruments
- layout tools
- router bits
- clock movement
- sandpaper
- sanding sealer
- clear wood finish
- brushes
- felt or flocking

## Creating Rough Sketches

Start the design process by **sketching** several clock-case designs on paper. You may want to look in the newspaper, catalogs, stores, or magazines for some ideas that may help you create your own design. When you have selected the design you like best from your sketches, make a shop sketch of your clock case. This sketch should be a **two-view orthographic drawing**. (See figure 2.)

## Making a Cutting Pattern

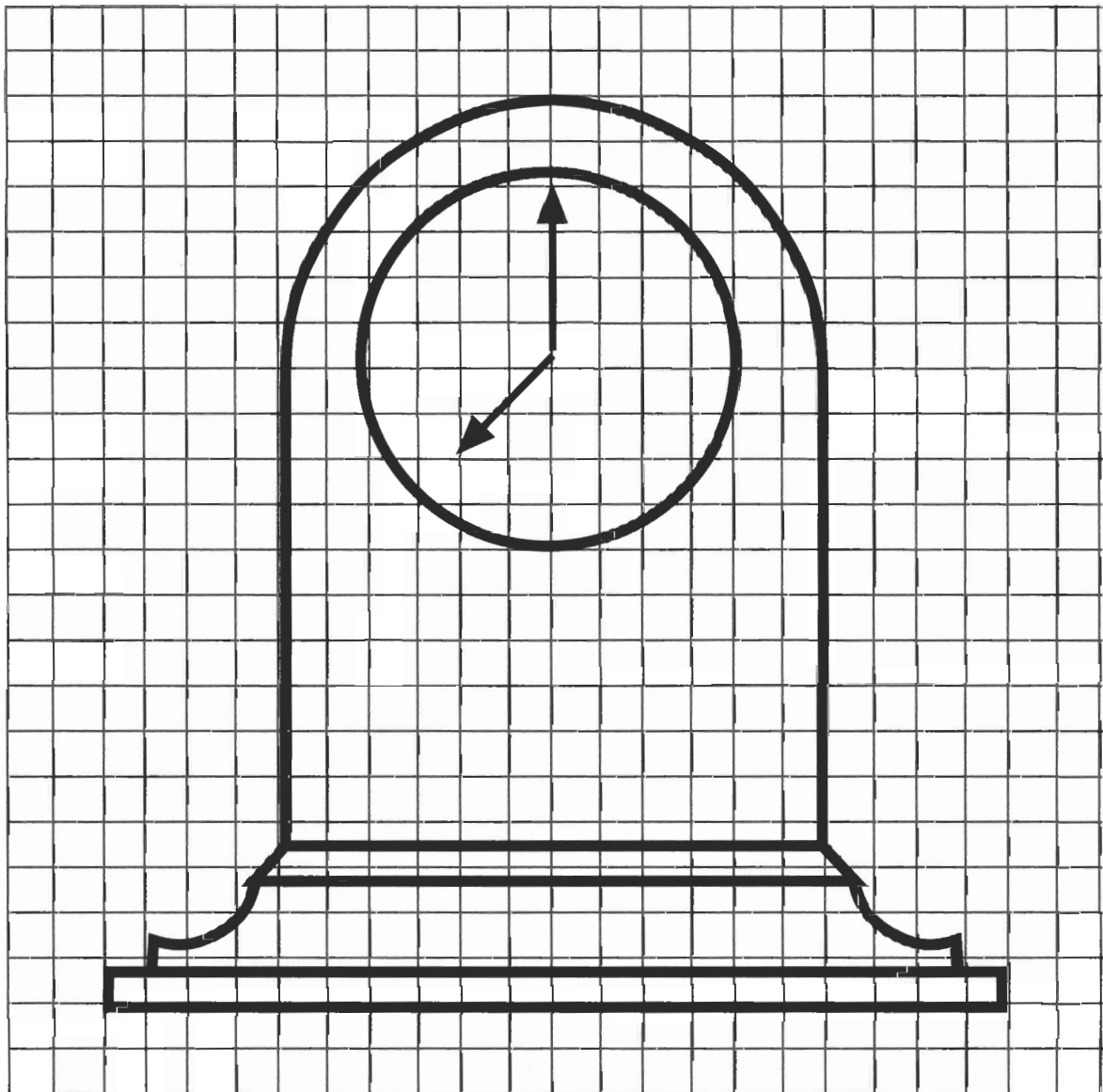
Using a sheet of 1/4-inch graph paper **suitable** for the size of your clock case, draw the front-view of your case design to full scale or size. Then cut out your design to use as a **pattern** for your clock case.

## Construction of Product

1. Select the type of woods that you will use to produce the clock case. Some of the woods you may wish to select are **oak, mahogany, walnut, and cherry.**
2. After the wood has been **surfaced** to the proper thickness (this will depend on your design), the shape can be marked on the wood using the pattern you have made and cut to the proper size.
3. Depending on your clock-case design, it may be **appropriate** to use a **decorative** router bit

(such as a **Roman agee or cove**) and **router** to shape some of the edges on your clock case.

4. When all the **component** parts have been **fabricated** for your clock case, they should then be prepared (filed, sanded, etc.).
5. The choice of clock movement will determine what **provisions** must be made for mounting the clock movement into the case.
6. Now assemble the component parts of the case. Since designs will vary, consult with your instructor before completing this step.



*Figure 3 - Sample clock sketched on 1/4" grid paper.*

7. After the clock case is assembled, it should be finish-sanded using #220 sandpaper. A **protective** finish of your choice can now be applied.

8. Mount the clock movement that you selected.

9. As a final production step, apply **felt** or **flocking** to the bottom surfaces of the feet or base of the clock case.

## Vocabulary

materials processing  
technologies  
classic  
clock mechanism  
construct  
suitable  
sketching  
two-view  
orthographic projection  
scale  
pattern  
oak  
mahogany  
walnut  
cherry  
surfaced  
component  
fabricated  
provision  
protective  
appropriate  
decorative  
Roman agee bit  
cove bit  
production  
felt  
flocking

## Safety

All power tools used to produce this product will be used only with the instructor's permission. Safety instruction will cover two components: (1) general laboratory safety and (2) power-tool safety. You will be tested on your knowledge of both areas. This product will require the use of several power tools in its fabrication.

## Ecology

The hardwood lumbers used to construct this product are the same materials used for fine furniture production. These woods are a renewable resource. This is accomplished by selectively cutting only certain trees and then replanting areas where the trees are cut down.

The protective finishes used for this product can be harmful to the environment if used or disposed of improperly. Be sure to read the manufacturer's directions for use of these products and follow instructions carefully.

## On Your Own

1. Look for catalogs or other sources that contain examples of "classic" clocks. This will help you design a clock case that you like and/or that fits your needs.
2. You can find a number of sources for clock movements and parts in various craft and woodworking magazines. Be sure to select a movement that matches your design prior to starting production.



Division of Applied Technology  
Technology Education  
Miami-Dade County Public Schools  
Miami, Florida

## **TEACHER GUIDE**

### **MATERIALS & PROCESSES: CLASSIC CLOCKS**

Objectives: Upon completion of this packet, students will be able to:

1. Demonstrate knowledge of the design process.
2. Prepare sketches of possible product designs.
3. Choose proper materials for a manufactured product.
4. Demonstrate knowledge of the routing process.
5. Demonstrate knowledge of the gluing process.
6. Demonstrate knowledge of hand-tool operations.
7. Demonstrate knowledge of power-tool operations.
8. Demonstrate knowledge of the sanding process.
9. Demonstrate knowledge of the finishing process.
10. Complete the manufacturing of a product.

#### **Helpful Hints**

1. Show students as many examples of different types of materials as possible; it will generate greater interest.
2. Have a large selection of router bits available for decorative routing of the clock case.
3. Obtain several clock-part supply catalogs. A source for these is woodworking, craft, and "how-to-use" magazines.
4. Obtain as many design examples as possible for the students to preview.
5. Show students how the design process can be applied to many other products.
6. Discuss the basic principles of design: balance, rhythm, proportion, contrast, and unity. Discuss how these elements apply to product design.

**LANGUAGE ARTS APPLICATION**  
**MATERIALS & PROCESSES: CLASSIC CLOCKS**

---

Student Name

In all types of jobs, you will find that you need the ability to communicate your thoughts and ideas effectively. Writing skills are necessary in all occupations. Here is an example of how writing skills are related to this activity.

In this activity package you will be manufacturing a consumer product. Like all manufacturing activities, there are specific steps and procedures. Using the proper technical terms from this packet, write a detailed "List of Procedures" covering all the steps necessary to manufacture the product.

**MATH APPLICATION**  
**MATERIALS & PROCESSES: CLASSIC CLOCKS**

---

Student Name \_\_\_\_\_

In all types of jobs and occupations you will need the ability to apply mathematics effectively. Here are a few examples of how math skills are applied in relation to this activity.

This materials processing activity requires you to use hardwood lumber which is sold by the board foot. A board foot of lumber measures 12" wide by 12" long by 1" thick.

In order to calculate the cost of this product, it is necessary for you to calculate the number of board feet of hardwood lumber required to construct the product. In order to calculate board footage, you will need to list all of the pieces for the product by thickness, width, and length. This list will also be very helpful when you start cutting parts for the clock case to needed sizes. Below is the formula for calculating board footage and an example of how to apply the formula to a certain problem.

**Board-Footage Formula**

$$\text{number of pieces} \times \text{thickness} \times \text{width} \times \text{length} \times .007 = \text{Board Footage}$$

**Example:** If you have two pieces of oak stock 1" thick, 3" wide and 12" long, you would use the board -footage formula (B.F.) as follows:

$$2 \times 1 \times 3 \times 12 \times .007 = .504 \text{ B.F.}$$

Solve the following problems:

1. 1 piece  
2" thick  
4" wide  
24" long  
B.F. \_\_\_\_\_
  
2. 3 pieces  
1" thick  
6" wide  
18" long  
B.F. \_\_\_\_\_
  
3. 4 pieces  
1" thick  
5" wide  
36" long  
B.F. \_\_\_\_\_

4. 6 pieces  
2" thick  
10" wide  
20" long

B.F. \_\_\_\_\_

5. 2 pieces  
1" thick  
8" wide  
48 " long

B.F. \_\_\_\_\_

To calculate the total cost of a product multiply the board footage times the cost of the material to be used (unit cost).

**Example:** B.F. x Unit Cost = Total Cost

Solve the following problems:

6. 3.0 B.F. @  
\$1.50 Unit Cost

Total Cost \_\_\_\_\_

7. 2.0 B.F. @  
\$2.50 Unit Cost

Total Cost \_\_\_\_\_

8. 4.5 B.F. @  
\$3.00 Unit Cost

Total Cost \_\_\_\_\_

9. 1.8 B.F. @  
\$1.75 Unit Cost

Total Cost \_\_\_\_\_

10. 5.0 B.F. @  
\$2.25 Unit Cost

Total Cost \_\_\_\_\_



**QUIZ**  
**MATERIALS & PROCESSES: CLASSIC CLOCKS**

\_\_\_\_\_

Student Name

1. List two hardwood lumber types that are suitable for fabricating a classic clock case.

\_\_\_\_\_

2. What is the meaning of the term *classic*?

\_\_\_\_\_

\_\_\_\_\_

3. In a two-view orthographic drawing, which two views would be most commonly used?

\_\_\_\_\_

4. Name two types of router bits that you might use on a clock case.

\_\_\_\_\_

5. List two components of the safety instruction.

\_\_\_\_\_

6. The \_\_\_\_\_ will determine the proper thickness of the clock-case material.