

# Furniture Manufacturing: Grades 9, 10, 11, 12

Adopted 2004

## Trees

**A001.** Discuss a structural diagram of a tree A001

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**A002.** Explain the functions of different parts of a tree A002

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**A003.** Name and identify conifers and broad leaf species A003

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**A004.** Explain processes and functions of a tree on the microscopic level, such as photo synthesis, movement of water, etc. A004

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## Forestry

**B001.** Identify major forest regions in the United States B001

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**B002.** Discuss local forest regions and their impact on local economies B002

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**B003.** Practice forest measurements on a short timber cruise B003

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**B004.** Discuss forest protection (fires, insects, and diseases) B004

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## Environmental Issues

**C001.** Discuss the issue of protecting forests (local forest, rain forests, etc.) C001

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**C002.** Explain the term "sustainable forestry" and view video by Patrick Moore C002

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**C003.** Explain the terms "selective cutting" and "clear cutting" and their applications C003

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**C004.** Discuss current environmental issues, such as the Kyoto Protocol, global warming, depletion of the ozone layer, etc. C004

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## Lumber and Lumber Grading

**D001.** Collect and identify samples of various wood species D001

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**D002.** List the working characteristics of various wood species D002

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**D003.** List natural defects in wood D003

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**D004.** Name grades of softwood lumber D004

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**D005.** Name grades of hardwood lumber D005

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**D006.** List different sawing patterns for lumber and their preferred use D006

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**D007.** Identify the commercial value of various wood species in different lumber grades D007

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## Wood Moisture Relationship and Lumber Drying

**E001.** Explain the term "relative humidity" as it relates to lumber E001

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**E002.** Explain the transport of water in lumber E002

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**E003.** Describe the process of shrinkage and swelling in wood E003

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**E004.** Describe problems caused by wood moisture in manufacturing wood products E004

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**E005.** Measure the moisture content of different wood samples using a moisture meter E005

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**E006.** Measure wood movements under changing climatic conditions E006

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**E007.** Describe ideal conditions for storing lumber E007

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**E008.** List methods of drying lumber E008

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**E009.** Explain the process of drying lumber in a kiln E009

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**E010.** Describe drying-related defects in lumber and their causes E010

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## Veneer and Wood Composites

**F001.** Describe different methods and applications in producing veneers F001

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**F002.** Describe the correct storage and handling of veneers F002

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**F003.** Define the field of wood composites F003

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**F004.** List advantages and disadvantages of wood composites F004

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**F005.** Identify the commercial value of different wood composite materials F005

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## Design

**G001.** Describe good principles in design G001

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**G002.** Discuss methods of constructing furniture G002

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**G003.** Explain design and function of a project G003

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**G004.** Discuss aesthetic proportions and features of wood components and furniture G004

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**G005.** Discuss the impact that grain patterns, stains, colors, etc., have on a selected project G005

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**G006.** Discuss appropriate surfaces (visible and nonvisible) for the selected project **G006**

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**G007.** Select an appropriate connection method **G007**

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**G008.** Discuss the characteristics of functional and nonfunctional design **G008**

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## Information Gathering

**H001.** Select project components and raw materials from books, catalogues, Internet, etc. **H001**

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**H002.** Discuss assembly drawings and assembly directions for project components **H002**

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**H003.** Discuss norms and regulations (i.e., OSHA, ISO, etc.) that pertain to the project **H003**

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## Work Flow

**I001.** Sequence work steps for the project **I001**

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**I002.** Evaluate the effectiveness of machinery and tools required for the project **I002**

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**I003.** Discuss appropriate preventive measures for job safety and health protection **I003**

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**I004.** Determine labor hours for the project (including time for helpers) **I004**

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**I005.** Develop a format for customer invoicing **I005**

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## Project Presentation

**J001.** Review bill of materials and labor estimates **J001**

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**J002.** Determine the total overhead cost for the project **J002**

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**J003.** Discuss advantages of design features and workmanship incorporated in the project **J003**

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**J004.** Prepare a customer presentation **J004**

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## Measurement

**K001.** Measure length using a rule or tape measure **K001**

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**K002.** Measure objects using a slide caliper and micrometer **K002**

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**K003.** Measure objects using metric and customary measuring systems **K003**

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**K004.** Perform basic mathematical computations used in measurement **K004**

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**K005.** Explain the term "board foot" **K005**

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**K006.** Determine the board footage of actual boards **K006**

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**K007.** Calculate the board footage of volumetric objects, such as a bunk of lumber, capacity of a dry kiln, etc. **K007**

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**K008.** Describe other measuring systems common in the national and international trade of forest and wood products, such as chord, bole, etc. **K008**

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## Area and Volumetric Calculations

**L001.** Calculate material requirements for square and triangular areas **L001**

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**L002.** Apply formula for calculating area and circumference of a circle in an industry-specific application **L002**

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**L003.** Calculate the ft<sup>3</sup> of a wooden block **L003**

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**L004.** Calculate the volume of wood in a log **L004**

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## Angles

**M001.** Review basic geometric concepts **M001**

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**M002.** Draw different angles, and determine their degrees **M002**

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**M003.** Measure different angles on woodworking machinery **M003**

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**M004.** Add and subtract angles **M004**

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**M005.** Discuss application of compound angles **M005**

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## Percentages

**N001.** Calculate percentages using industry examples **N001**

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**N002.** Calculate reject rates of machine runs **N002**

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**N003.** Calculate total material requirements **N003**

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## Wood Moisture Calculations

**O001.** Determine moisture content in wood **O001**

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**O002.** Observe and measure dimensional changes in wood **O002**

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**O003.** Calculate incremental, dimensional changes in wood **O003**

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## Project Cost

**P001.** Discuss prices for different raw materials **P001**

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**P002.** Calculate total material cost of a project **P002**

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## Feed Speed

**Q001.** Measure feed rates of various woodworking machines **Q001**

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**Q002.** Calculate expected machine output **Q002**

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**Q003.** Observe and discuss surface qualities at different machine speeds **Q003**

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## Planning a Project with a Working Drawing

**R001.** Sketch an example of each type of drawing technique R001

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**R002.** Discuss "exploded view" R002

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**R003.** Produce a working drawing R003

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**R004.** Draw the selected class project in the appropriate drawing style R004

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**R005.** Sketch and dimension a floor plan R005

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## Bill of Materials

**S001.** Determine a bill of materials for project construction S001

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**S002.** Develop a format for customer invoicing that shows bill of materials and costs S002

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## Safety

**T001.** Explain the term "OSHA," and state some regulations covered by OSHA T001

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**T002.** Recite the emergency plan for the shop T002

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**T003.** Discuss hearing loss T003

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**T004.** Describe personal protective equipment (PPE) used in a woodworking facility T004

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**T005.** Explain the term "MSDS" and the information it contains T005

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**T006.** Discuss machine guards and the importance of having them in place at all times T006

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**T007.** Name the basic safety rules for electrical equipment T007

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**T008.** Practice a "lock-out – tag-out procedure" on one stationary woodworking machine in your facility T008

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## Hand Tools

**U001.** Review hand tools used in the woodworking trade U001

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**U002.** Discuss basic safety rules for using hand tools U002

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**U003.** Discuss typical applications of hand tools U003

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**U004.** State proper techniques for using hand tools U004

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## Tool Sharpening

**V001.** Describe safety precautions followed while sharpening hand tools V001

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**V002.** List different tool materials, their properties, and preferred applications V002

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**V003.** Explain operation of the grinder V003

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**V004.** Practice sharpening tools using a grinder V004

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**V005. Discuss advantages of automatic grinding equipment** V005

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**V006. Practice sharpening and honing** V006

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## Use of Power Tools

**W001. Explain general safety procedures for the use of power tools** W001

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**W002. Explain specific safety procedures for portable power tools** W002

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**W003. Practice operation of portable power tools, applying appropriate safety procedures** W003

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**W004. Explain specific safety procedures for stationary power tools** W004

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**W005. Practice operation of stationary power tools, applying appropriate safety procedures** W005

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## Operation of Power Tools (apply to each machine installed in the shop)

**X001. Explain the function of each machine** X001

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**X002. Perform tool change and bring each machine back into operational status** X002

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**X003. Perform preventive maintenance procedures on each machine** X003

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## Preparing Stock for Layout

**Y001. Select the appropriate stock for a job** Y001

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**Y002. Glue stock to rough size using proper clamping procedures** Y002

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**Y003. Square rough stock to actual size for the job** Y003

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## Wood Sanding

**Z001. Explain the purpose of sanding** Z001

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**Z002. Define terms used in sanding wood** Z002

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**Z003. Describe different abrasives and their common applications** Z003

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**Z004. Sand wood parts using a hand held abrasive** Z004

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**Z005. Sand wood parts with a power sander** Z005

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**Z006. Change abrasive on a power sander** Z006

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## Fasteners

**AA001. Identify types and purposes of fasteners related to woodworking** AA001

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**AA002. Explore style, functionality, and cost of fasteners from catalogues and the Internet** AA002

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**AA003. Use at least three different kinds of fasteners in woodworking projects** AA003

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Adhesives	<p><b>BB001.</b> Identify appropriate adhesives for assembling various projects <b>BB001</b></p> <hr/> <p><b>BB002.</b> Apply adhesives <b>BB002</b></p>
Cutting Joints with Power Equipment and Hand Tools	<p><b>CC001.</b> Explain the technique for constructing basic joints <b>CC001</b></p> <hr/> <p><b>CC002.</b> Lay out wood joints on stock <b>CC002</b></p> <hr/> <p><b>CC003.</b> Construct examples of basic joints <b>CC003</b></p>
Assembly Techniques	<p><b>DD001.</b> Explain procedures for assembling a job <b>DD001</b></p> <hr/> <p><b>DD002.</b> Complete a trial assembly <b>DD002</b></p> <hr/> <p><b>DD003.</b> Assemble a job using prepared stock and appropriate adhesives, clamps, and fastening devices <b>DD003</b></p>
Finishing	<p><b>EE001.</b> Discuss terms related to finishing wooden furniture <b>EE001</b></p> <hr/> <p><b>EE002.</b> State safety procedures related to finishing wooden furniture <b>EE002</b></p> <hr/> <p><b>EE003.</b> Describe the safe storage of finishes <b>EE003</b></p> <hr/> <p><b>EE004.</b> Identify types of finishes and their purpose <b>EE004</b></p> <hr/> <p><b>EE005.</b> Select an appropriate finish for a job <b>EE005</b></p> <hr/> <p><b>EE006.</b> Apply finishes using manual devices such as a sponge, paint brush, or roller <b>EE006</b></p> <hr/> <p><b>EE007.</b> Explain the proper care, cleaning, and maintenance of manual devices used in applying finishes <b>EE007</b></p> <hr/> <p><b>EE008.</b> Apply finishes with a spray gun <b>EE008</b></p> <hr/> <p><b>EE009.</b> Clean equipment, store supplies, and dispose of excess materials properly <b>EE009</b></p>
Wood Veneers and Laminates	<p><b>FF001.</b> Define terms involved with laminates and veneers <b>FF001</b></p> <hr/> <p><b>FF002.</b> Apply laminates and veneers to wood parts <b>FF002</b></p>
Assembling an Advanced Project	<p><b>GG001.</b> True up stock for project construction <b>GG001</b></p> <hr/> <p><b>GG002.</b> Clamp all stock to rough size <b>GG002</b></p> <hr/> <p><b>GG003.</b> Square rough stock to correct size <b>GG003</b></p>

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**GG004. Sand stock using power sander** GG004

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**GG005. Cut all joints laid out on stock** GG005

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**GG006. Assemble project using prepared stock and appropriate fastening devices** GG006

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**GG007. Perform finish sanding and scraping** GG007

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**GG008. Apply finish to advanced project** GG008

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**Careers in Wood  
Manufacturing Industry**

**HH001. Discuss careers within the wood manufacturing industry** HH001

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**HH002. List local business and industries involved in wooden furniture making** HH002

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**HH003. Visit a local business or industry involved in the wood manufacturing industry** HH003