WEEKLY JOURNAL ENTRY

CLASSROOM LECTURE / DEMONSTRATION NOTES:

Textbook Chapter: 18, 7, 12, 21, 1, 2, 10, 11
Project Booklet Pages: “Rules of thumb”, “Keeping ten fingers”

Chap. 18: Health and safety

Unsafe Acts: Individual often works carelessly or under physical or emotional stress. Carelessness: carelessness incited injury. Read watch and understand. If possible watch another person perform the process. If you have questions ask an expert. Stress: Physical illnesses are distracting. Mishaps caused by illness may result from or lead to emotional stress. Emotional stress interferes with tour concentration. Distraction: avoid distracting others. Tool Handling: carry sharp tools only by the handle. Inspect tools regularly. Never carry power tolls by the cord. Check power cords for wear. Keep your hands away from blades bits and moving parts. Switch off tool before plugging/unplugging. Leave tool neat and ready for the next person to use. Handling Materials: materials should be handled according to size shape and weight. Lift with your knees bent not your back. Two people should carry large or heavy materials near machines in operation. Walking and working surfaces: debris should be cleared from any surface. Treat liquid spills with absorbent compounds or dry wood chips. Remove compound once spill is absorbed. Non-skid mats may be applied, these reduce the slippery nature of concrete and wood floors. Keep walkways clear. Flammable Liquids: Flammable liquids ignite easily, burn readily, and are difficult to extinguish. Finishing materials and adhesives are often flammable. Flash point is the minimum temp. At which the liquid
vaporizes enough to ignite. Containers must be labeled according to class. Class I is the most dangerous because the flash point is within room temp. While filling flammable liquids storage cans should be grounded. Store flammable liquids in approved steel cabinets and safety cans. **Hazardous Substances:** Read label of any substances you use. The container might recommend wearing mask or gloves for safety. **Exhaust and ventilation:** exhaust and ventilation system is essential. Dust collection systems removes most small wood chips and dust partials. Exhaust systems for finishing rooms remove harmful vapors. **Finishing room hazards:** class I respirators should be worn by person in finishing room. Only explosion proof light fixtures can be in finishing room. Switch should be spark proof or located out side the room. Exhaust filters should control overspray. Place rags, strainers and other items in approved disposal containers. Material storage: always return tools, equipment and materials to their proper places. Store lumber horizontally on sturdy shelves or vertically in racks. Stack partial pierces flat to reduce warp age. **Electrical:** label voltages and intended use for switches circuit breakers. Machine and electrical equipment should be wired in compliance with the (NEC) National Electrical Code. Inspect power cords regularly. **Shock Protection:** power tools with plastic housing insulate you from electrical power. Double insulated tools have two prong plugs. **Electrical Grounding:** this prevents you from being shocked. Grounding is accomplished by adding a ground wire. This wire is attached to a grounding wire. **Two-slot receptacles:** inspect all two-slot receptacles for proper grounding. Do so with voltage tester. **Three-prong plug:** third prong, which is round, is the ground prong. The ground prong must never be damaged or removed. **Receptacle styles:** receptacle is rated in amperes and volts. Some power tools are equipped with twist lock plugs. Some stationary power tools require 240v or 480v three-phase power supply. **Compressed Air:** compressed air is used to power air tools. To remove dust, chips, and other debris. Limit air pressure to 30psi if pressure relief nozzle is not available. Wear safety glasses. Hoses can deteriorate due to improper use. Air talks and lines should be free of moister. **Fire protection:** fire alarms, sprinkler systems and fire extinguishers. Every one should be able to use fire extinguishers. Check the pressure rating on the extinguisher. **Selecting and using extinguishers:** class A fires: burning solid waste. Class B: flammable and combustible liquids. Class C fires: electrical fire. Not al fire extinguishers are effective for every kind of fire. Best fire extinguisher is the ABC multipurpose dry chemical extinguisher. Soda acid extinguisher is only effective for class A. the carbon dioxide extinguisher is effective on class B and C fires. Majority of extinguishers only last 30 seconds. **Respirators:** filter out harmful dust and certain gases. **Gloves:** provide protection from splinters. Vinyl gloves may be required when using harmful liquids. Remove gloves while operating power machinery. **Shoes:** Steel toed shoes reduce injury from falling objects. **Eye protection:** is essential in a shop. You can get safety glasses with prescription lenses. Goggles tend to collect moister. **Ear protection:** you should not be exposed to more than 90 decimals. Earmuffs or fitted earplugs provide approved hearing protection. **Clothes:** wear snug fitted clothes. **Mechanical guarding:** every moving part of a machine is a potential hazard. Rotary motion: circular saw blades, pulleys, belts, cutter heads, and spindles. Reciprocating motion: back and forth straight-line movement. Jig, saber saws. Straight line motion: ban saw blades and belt sanders. **Pont of operation guards:** protect your hands or body parts from cutting tool. **Enclosure guards:** completely cover moving parts other than point of operation. **Interlocking**
guards: prevent machines from operation while dangerous parts are exposed. Automatic guards: act independently of the machine operator. Remote control guards: is special purpose guard, used in automated cabinet making systems.

Chap 7: Using working Drawings

Working drawing contain both drawing and specifications. complete set of working drawing has all the necessary information to produce the cabinet. Working drawings also include dimensions materials, supplies, and a plan of procedure. Types of Drawings: white prints are white with blue lines. Blue prints are blue with white lines. Architectural drawings: used by contractors to construct a home. Used by interior designers. Will determine the size and style of the cabinets built. Floor Plans: explain where built in cabinetry is to located. Elevations: used to represent vertical views of built in cabinetry. Used primarily for kitchens. Material specifications: List types of lumber, molding or paneling to use. Identify hinges, pulls, catches, and other hardware. Identify finishing materials. Work schedule: tells cabinetmaker when to install the cabinets. Shop drawings: are submitted to the contractor, architect or designer. Only show product. Show proper dimensions. Detail how cabinet is built. Pictorial view is often included. List in order the separate operations to construct the cabinet. Reading shop drawings: note info in the title block. Look at the reviews. Third check list of materials. Title Block: is a rectangular space on each page of the set of drawings. Includes: product or project name, revisions of the original drawings, scale of drawing, page numbers and total number of sheets. Specifies name of drawings, includes who drew them. Pictorial views: may be photograph or line drawing. More than one surface is shown. Exploded and Assembly View: show product disassembled. Parts Balloons: is a circle that may or may not have an arrow attached. Inside there is a symbol or letter. Corresponds with a list of parts. Multi-view Drawing: use two or more views to describe the product. Two View Drawing: used for cylindrical objects. Example: lamp stems, chair spindles, round table legs. Three View Drawing: show front, side, top views. Most common shop drawing. Visible lines are lines that are solid, hidden lines are dashed. Detail Drawings: individual component or joints that are drawn separately. Notes are included. Separate from main drawing. Section Drawings: allow you to see an objet as if materials were cut away. Used to show material of cabinet part. Development drawing: also called stretch outs. Show layout of the product. Assure that enough material is used to achieve the correct product size. The language of drawing: Purpose of any language is to communicate. Communicates lines, shapes, textures and color. Alphabet of lines: visible lines form the outline of the object they enclose. Hidden lines illustrate an edge or corner that is not visible in any given view. Centerlines tell you that the object is symmetrical. Extension lines make the edges or corners of the product. Dimension lines describe distances between extension lines. Leader lines have one arrowhead. The direct attention to the drawing. Radius lines show dimensions of areas and circle. Cross section lines indicate material in a section view. Phantom line shows alignment or alternate position details. Cutting plane lines revel cutaway section arrow heads show which way the reader will see the cutaway surface. Break lines limit partial view of broken section. Borderlines enclose entire drawing. Alphabet of letters and numbers: abbreviated terms. Numbers
Chap 12: Cabinet and furniture woods

Red Alder:
- Member of Birch family.
- Grows in Oregon and Washington

Ash:
- Heavy, hard, and strong
- Fairly straight grain pattern

Banaka
- Is a medium textured low density wood
- Straight grained and easy to work with

Bass Wood
- One of the softest and lightest hardwoods
- Exception satiability
- Very light brown

Beech
- Heavy, hard, and strong
- Bends easily
- Pale rich reddish brown

Birch
- Moderately heavy, hard, and strong
- Yellowish white sapwood

Butternut
- Relatively soft and weak
- Likely to split
- Light brown heartwood

Aromatic Red Cedar
- Soft wood trees
- The tree is an evergreen
- Belongs to cypress family

Cherry
- Medium weight hard and stable wood
- Heartwood is reddish brown sometimes with greenish cast
- Top furniture hardwoods

Chestnut
- Low density coarse textured durable hardwood.
- Machines easily

Cottonwood
- Soft and lightweight
- Annual rings hardly visible

Cypress
- Lightweight soft and easily worked
- Reputation for durability
Ebony
  o Dense closed grained hardwood
  o Very distinctive grain pattern
  o Dark brown Black

Elm
  o Strong tough for its weight
  o Pale brown

Douglas fir
  o Soft, coarse textured
  o Low luster

Red gum
  o Moderately hard and strong
  o Pour stability

Hackberry
  o Medium density hardwood
  o Member of the elm family

Hickory
  o Very hard, elastic, and strong hardwood
  o Light reddish brown heartwood

Lauan
  o Medium density
  o Coarse textured
  o Grows in Philippines

Limber
  o Medium hardness and texture
  o Natural blonde

Genuine mahoganies
  o Is a moderately dense wood in comparison to its weight.
  o Unsurpassed working, blending, and finishing characteristics
  o Premier Cabinet woods

African Mahogany
  o Similar cell structure to genuine mahogany
  o More coarse textured

Hard Maple
  o Heavy, strong wood
  o No odor or taste

Soft Maple
  o Medium density hardness
  o Pores are small
  o Fine texture

Oak
  o Very heavy, hard and strong
  o Dimensionally stable

Red Oak
  o Heartwood is reddish color
White Oak
  o Heartwood is tan or brownish

Paldao
  o Grey reddish brown
  o Finest Philippine cabinet woods

Pecan
  o Very heavy, hard and elastic
  o Southern wood
  o Darker than hickory

The Pines
  Ponderosa Pine
    ■ Nonporous softwood
    ■ Excellent dimension stability
  Sugar white pine
    ■ Easy to work and use
    ■ Fine soft texture
  Southern yellow pine
    ■ Ranges form clear to knotty
    ■ reddish brown

Primavera
  o Moderately lightweight hardwood
  o Slightly wavy grain
  o Marked as white mahogany

Redwood
  o Soft light in weight
  o Very resistant to decay
  o Used for siding and outdoor furniture

Rosewood
  o Beautiful and valuable hardwood
  o easy to work soft and light

Santos Rose wood
  o Heavy and hard
  o Fine textured
  o Chocolate brown to purple to black color

Sapelle
  o Substitute for mahogany
  o Is used mainly in Europe for furniture cabinets, case goods

Sassafras
  o Soft hardwoods
  o Tends to have yellowish tint

Satinwood
  o Very hard very dense hardwood
  o Found in Puerto Rico

Spruce
  o Nonporous evergreen
  o Soft and relative week
o Member of pine family
Sycamore
  o Softer hardwood
  o Density is average
Teak
  o Quite hard and strong
  o Usually straight grained
American tulipwood
  o Moderately soft low density, open grained hardwood
  o Pail olive brown color
American walnut
  o Moderately dense and hard
  o Excellent machining properties
  o Superb finishing qualities
  o Brown to often-purplish tint
Willow
  o One of the softest hardwoods
  o Light gray to dark brown or dark reddish brown
Zebra Wood
  o Light gold dark brown stripes heavy hardwood
  o Finishes to high luster

Chap 21: Sawing with stationary power machines

**Handedness** refers to whether the user is left or right handed. **Sawing straight lines**: most accurate straight line sawing is done on equipment having a circular saw blade. Diameter of the blade keeps cut straight. You must support material before and after the cut. **Tilting arbor Table saw**: may have left tilting or right tilting arbor.

**Major components:**
  o Horizontal table on a machine frame
  o Circular blade that extends up through a table insert
  o Tilting arbor that adjust the blade angle from 0 deg. To 45 deg.
  o Motor

Blade raising device changes blade height. Tilting device changes blade angle. Tilt scale displays approximate blade angle. **Guiding material**: material should be guided past the blade with a rip fence, miter gauge, or sliding table. **Rip Fence**: Guides material past blade. Fence is loaded into place by a fence clamp. **Miter Gauge**: controls cutting narrow work piece at angles other than parallel to blade. Slides in table slots. **Sliding Table**: improve accuracy when cutting, wider work pieces. Provides easier handling of large panels. **Jig**: might clamp to the rip fence or miter gauge. Attach wood strips to the jug bottom so it slides in both table slots. **Blade Guard**: keeps hands away from the blade. Helps control sawdust.

**Trunnion Mounted Guard:**
  o Bolted to saw trunnion
  o When blade angle changes guard angle changes
  o Rest over blade
Hinged to splitter
Splitter keeps lumber from squeezing blade and kicking work piece back. Anti kick back pawls: if material binds on the blade pawls dig in to stop it. Table mounted guard: attaches to edge of table. no splitter. Some have spring loaded ant kickback pawls.

Installing Saw Blades:
- Disconnect power
- Remove table insert
- Raise blade
- Place wrench on the nut and wedge piece of soft lumber against teeth
- Pull wrench toward front of saw to loosen nut
- Remove nut, collar, and blade
- Remove pitch, gum, or rust from arbor
- Install replacement blade, point teeth toward front of saw
- Thread nut finger tight
- Tighten nut, push wrench towards back of saw
- Replace table insert and guard

Setting up a table saw: saw set up includes deciding whether to use a rip fence or miter gauge. Setting the blade height, and squaring the blade.

Setting Blade Height:
- Disconnect power
- Loosen the blade raising hand wheels lock knob
- Rotate blade by hand so a tooth is pointing vertically
- Hold a ruler near the blade and adjust the height
- Tighten the lock knob

Squaring blade:
- Check blade angles between saw setups and after blade changes
- Place square on the table and against the blade

Ripping lumber: cutting along the grain. Install carbide tipped or standard rip blade. Set blade height ¼ inch above panel thickness. Crosscutting Lumber and Plywood: sawing through lumber and plywood across face grain. Install carbide tipped or standard crosscut blade. Entire carbide tip is ¼ inch above work piece. Stop Rod: attached to the miter gauge. Stop Block: may be clamped to or placed against fence. Sawing non-grain manufactured products: dull standard blades. Use carbide tipped blades. If using MDF use blade with alternate top bevel grind. Set entire carbide tip is at least ¼ inch above material. Beveling: is sawing with the blade tilted. Waste should remain on the table below the blade. Measure, make test cut, make final cut. Mitering: makes cuts with miter gauge. Install cross cut blade up to 45deg. Rip blade effective above 45deg. Resawing: creates two or more pieces from thicker lumber on edge. If stock width is greater than maximum blade height two passes are required. Blade guard cannot be used.

Two pass procedure:
- Turn switch off
- Remove guard
- Adjust blade to ¼ inch higher than half stock height
- Lock blade height and tilt
- Position fence so that the blade will separate pieces of equal thickness
- If material is more that 36inches long plan to have help or supports
- Make first pass use push sticks when enc of material comes within 12” of the blade.
- Turn material over with same face against fence.

**Ripping thin strips:** feed material with push sticks. **Radial arm saw:** most noted for sawing stock to length. Sized according to blade diameter.

**Crosscutting:**
- Well suited for crosscutting.
- Lock arm at 0 deg. Position.
- Pull saw across material just far enough to complete cut.
- Push saw back through kerf past the fence.

**Cross cutting extra wide material:**
- Cut across material as far as possible
- Flip board over and finish cut.

**Mitering:** most pivot 45deg. Both ways. Install crosscut blade. **Beveling:** crosscutting or ripping mode. Feed against the blade rotation as you would for crosscutting or ripping.

**Sawing curved Lines:** relief cuts allow waist material to break loose as your saw your workpiece.

**Use relief cuts when:**
- There is a sharp inside or outside curve
- Curve direction changes
- When cutting from large piece of work.

**Ban Saw:** makes irregular curve arcs. It can rip, bevel, and resaw. Consist of continuous thin steel blade that travels or two wheels. Exposed when it passes through table. Table tilts for beveling. Most have two wheels. Bottom wheel rives blades.

**Changing blades:**
- Turn switch off
- Remove upper and lower wheels guards
- Release blade tensioner
- Remove table insert
- Remove old blade
- Slide replacement blade through table slot, between the guides and onto the wheels.
- Make sure teeth are pointed down,
- Adjust blade guides (should never touch teeth.)
- Replace wheel guards
- Reconnect power

**Band saw operation:** plan your sawing sequence before starting the band saw. Short and or relief cuts made first. Determine weather saw is on right or left side. Saw on waist side of the cutting and allow for sanding. When changing direction during cut do not push work piece against side of blade. Anticipate turning your work before you need to change the curve direction. **Straight line Sawing:** ripping and crosscutting required some sort of guide. Attach rip fence or guide to table. **Pocket cutting:** saw straight in to pocket on each side withdraw the work piece after each pass. Then cut a curve as small as your blade allows. Cut out remaining waist. Other way is to drill two turn around holes and clean out corners. **Sawing multiple parts:** stack and nail work pieces together. Make relief cuts on each side of the nails. **Resawing:** one pass process. **Scroll Saw:** much like
band saw. Makes even smaller radius curves. Will cut our interior openings. Table tilts. The blade cuts reciprocally on the downward stroke. Lower chuck drives blade. Size is based on through depth. **Selecting and installing scroll saw blades**: rule of thumb is to select blade that will have three teeth touching wood at all times.

**Changing Blades:**
- Turn switch off
- Remove table insert
- Move the lower chuck to the top of stroke by turning motor shaft
- Loosen the thumb screws and upper and lower chuck
- Remove blade
- Slip replacement blade in the blade guide
- Tighten lower chuck to secure blade
- Turn motor shaft knob to raise and lower the blade cycle
- Install table insert.

**Beveling**: much like band saw. Tilt table, adjust the hold down. **Interior cuts**: same as replacing blade except you feed the blade through the hole. **Using saber saw blades**: install saw blade in lower chuck.

**Selecting Blades**: using wrong blade can ruin work, dull blade or cause unnecessary work on jointer. Blade you choose depends on sawing operation. **Circular Blade**: used on table saws, radial arms saws, miter saws, and various portable power saws. **Diameter**: machines are described in terms of the maximum blade diameter. **Hook angle**: refers to the angle at which the front edge of the tooth contacts the material. **Cutting edge**: **Flat top grind**: larger gullets, fewer teeth, greater chip leads, higher feed rate. **Triple chip and flat grind**: two shapes of teeth. Alternating between triple edge and flat top. Cleans out center followed by flat top raker, which cleans out the rest. **Alternate top bevel grind**: severs material with shearing action alternating left to right. Higher quality of finish cut in wood. **Alternate top bevel raker grind**: two sets of alternate left and right top bevel teeth preceded by a raking flat top tooth. Excellent choice for combination blade. **Number of teeth**: suggest the performance of blade. Generally blades with larger number of teeth produce smoother cuts. **Kerf width**: sawn kerf is generally larger on large diameter blades. Thin kerf design makes stock feeding exceptionally smooth.

**Other considerations**: between each tooth is a gullet. Circular blades are either flat hollow or thin rim. Flat blades have a wider kerf. Hollow ground blade has no set leaves smoother cut edge. Thin rim blade creates narrowest kerf. Build up is a problem unless your sawing veneer. Carbide tipped blades remain sharp 10 to 20 times longer than steel. **Ban Saw Blade**: endless bounded loop thin narrow steel with teeth on one edge. Length of loop is critical. Blade width is very important. Regular blade has 0deg. Hook tooth blade has about 10 deg. Positive hook angle. Straight tooth has 0 deg hook and long gullet. Skinny tooth have raker tooth set. Better on soft woods and plastics. **Scroll Saw blades**: Vary in width and number of teeth. Typically have 7 to 10 teeth per inch beveled teeth alternately set normally at least 3 teeth should contact the material at all times. **Maintain Saw Blades**: Saw blades should be sharp to the touch, and be rust and resin free. Inspect regularly. Proper maintance include cleaning sharpening or discarding. Carbide tipped and hardened steel blades cannot be sharpened. **Maintaing power saws**: inspect, clean, adjust, and lube periodically.

**Chap 10: wood characteristics**
Tree parts: Tap root is one long tapered vertical root with small hair like root that extends deep into the ground. Fibrous root consist of many roots and root hair, it spreads out close to the grounds surface. Water and minerals are carried through the trunk to the crown were they are processed into food. This conversion is done by photosynthesis. Which is the formation of carbohydrates in the green tissues of plants exposed to light. Trees grow outward, upward, as well as downward. Growth characteristics: the layers of the tree include bark, cambium, early wood, latewood, annual rings, sapwood, heartwood, pith, and wood rays. Bark: outer layer of dead wood that protects tree from weather, insects and disease. Cambium: is the layer of cell production just beneath the bark. The phloem is the outer part of the cambium that generates new cells for the bark. Also carries food from leaves to feed branches trunk, and roots. Xylem is the two cell thick inner layer of the cambium that creates new cells for tree growth. Early wood also called springwood is where cells develop quickly, are larger, lighter colored and have thinner walls. Develops when there is plenty of water. Latewood also called summerwood is where the cells are smaller, darker colored and have thicker walls, develops when moister decreases. Annual rings are the light and dark colored rings formed by the early wood and late wood growth. When you cut through annual rings this forms grain. Sapwood is a thick section of young cells beneath the cambium. Carries water and nutrients to the leaves. Heartwood: as new growth occurs the sapwood becomes inactive this inactive wood is heartwood. Pith is a thin round spongy core at the center of the tree. This is where the young tree began. Wood rays carry water and nutrients outward from the center of the tree.

Tree identification: Deciduous trees are broad leaved trees that drop their leaves in the fall. Wood from these trees is called hardwood. Coniferous trees have needles and or very small scale like leaves that remain green all year. Wood from these trees is called softwood. Wood classification does not mean that all deciduous trees (hardwood) is harder than coniferous trees (softwood). Hardwood and soft wood have different cell structures. Wood cell structure: there are about three million cells per cubic inch of wood. Cross-sectional face: seen when you cut across the annual rings. An example is the top of a stump. Radial face: seen when the tree is cut through the center. This cut is nearly perpendicular to the growth rings. Tangential face: seen by slicing an edge off the section of trunk. The surface of cut is tangent to the annual rings. On large section annual rings look like arrows. Tracheids: are vertical cells that are about 1/8 “ long with pointed ends. They make up about 90% of the trees cells. Horizontal rays: carry nutrients to outer portion of the tree. There are wood rays and fusiform rays. Wood rays are one cell wide. Fusiform rays are several cells wide. Resin ducts are formed when space between cells expand. They fill with sticky resin. Pits are the passageways among tracheids and rays. Border Pits are between two tracheids and have a ring around them simple pits are between rays and tracheids do not have a ring. Lignin is the substance that holds cells together. It is an adhesive resin. Hardwood cell structure: cells are similar to softwood, but have differences. Fibers are the vertical cells of hardwoods half as long as tracheids and more rounded on the ends. They make up 50% of the volume of the tree. Wood rays: horizontal food and liquid passages. do not contain ducts. Parenchyma cells: smaller than normal fibers used for additional food storage. Vessels are elongated cells serving as
the main passage for liquid moving from the roots to the crown. The size and length of vessels look like pores in finishes this is why hardwoods are referred to as porous.

**Diffuse and ring porous hardwood:** Diffuse porous has vessels that are the same size in early wood and latewood. Ring porous: the vessels in early wood are considerably larger than those produced in late wood.

**Properties of wood:** color, weight, density, moister content, and specific gravity. **Appearance:** includes color, grain, surface texture, and natural defects. **Color:** primarily brown is color might range from light tan to a dark reddish brown comes from chemical pigments in cells the darkest colors are found in heartwood. Difference between heartwood and sapwood is dramatic color change occurs after wood is cut because of oxidation. This causes wood to darken. **Grain pattern:** visible line sawn in lumber formed by annual rings. **Grain pattern:** forms a shape according to the cutting method. Surface Texture of cut lumber is determined by the cell structure. Large open pores are considered open grained. Woods with smaller pores are called closed grain. **Moister content (MC)** describes amount of water in wood cells. **Testing moister content:** can be tested with moister meter without a moister meters you must first weigh a sample of green wood. Gives you wet weight. Then place sample in oven at 214deg. To 221deg. When sample stops loosing weight this is called oven dry weight, may take 12 to 48 hours. **Removing water:** water in green wood is located in both the cell cavity and cell walls. Water in cell cavity is called free water. Water in cell walls is known as bound water. Once free water is removed this is called fiber saturation point. (MC) is 25% to 30%. Drying beyond fiber saturation point removes bound water. **Equilibrium moisture content:** (EMC) is a moisture percentage of interior woodwork. Depends on part of country. (EMC) represent the moisture content that the air will give or remove from the wood. It is critical to reach (EMC) before finish is applied. Finish limits amount of moisture absorbed or lost. Store wood a while to assure wood is at (EMC) If wood takes on moister the joint will tighten, if it loses moisture content joint will loosen. **Shrinkage:** wood shrinks when the moisture level is below the fiber saturation point. Cells begin to shrivel. Wood will shrink 1/30” for every % of mois ter lost. **Rate of Shrinkage:** wood shrinks at different rates and in different direction due mainly to how much early wood compared to late wood. Shrinkage is greatest in tangential direction. Annual rings attempt to straighten out. Tangential shrinkage is 4% to 12% in hardwood and 4% to 8% in softwood radial shrinkage is about half. And longitudinal shrinkage is insignificant usually less that .3% **Weight:** determined, by moister content, density, stored minerals and other materials. Primary reason is because of density. **Density:** describes weight per unit of volume. Wood is more or less dense because of the cells if the cells are smaller and closer together wood is denser if cells are larger and further apart wood is less dense. **Working qualities:** describes how wood will act during processing. If wood has low specific gravity it is easier to process. If wood has high specific gravity it tends to dull tools faster. **Dulling effect** is how the density of wood and stored minerals dull the tool. It varies between woods with different specific gravities. **Reaction wood:** is divided into reaction wood and compression wood. **Reaction wood:** expand and twist. Smooth finish might be hard to obtain may pinch blade and cause kick back. Cell structure wood with small tightly bonded cell structure tend to chip and tear. Bond is produced by overlapping fibers held together with the trees lignin. **Mechanical properties:** include strength, and elasticity partially affected by the moister content. **Strength:** anisotropic nature of wood,
which means equally strong in every direction woods greatest strength is when grain is longitudinal. Specific gravity is also another strength factor. Denser woods are stronger.

**Elasticity**: is the capability for the wood to spring back after being dented or bent. Moisture permits wood to be bent into a permanent position. Moisture can expand the wood to remove dent. Example: you can remove dents with a wet cloth and iron. Place wet cloth over dent and gently rub with a warm iron. Moisture also assists bending wood pieces. Example: soak wood until it become supple then, place in form and clamp it. When it dry’s it will retain new shape.

**Test your knowledge: Chap. 10**

1. Diagram the structure of tap and fibrous root systems.
   A:

2. The outer part of the cambium called the ________ generated new cells for the bark.
   A: phloem

3. The light and dark colored areas formed by the early wood and late wood growth are the ________
   A: annular rings

4. The leaves of the deciduous tree will drop______
   A: never, they are ever green trees

5. The difference between hardwood and soft wood is ________

6. There are more cells per square inch in hard wood.

7. Describe the layers seen in a cross section of a tree.

8. Bark, cambium, early wood, latewood, annual rings, sapwood, heartwood, pith and wood rays.

9. The three terms that identify faces of wood are ________, ________, ________
   A: Cross-sectional face, radial face, tangential face.

10. List five physical characteristics of wood.
    A: color, weight, density, moisture content, and specific gravity.

11. Both oxidation of wood cells and spring wood becoming inactive causes the wood to ________
    A:

12. What is the difference between free water and bound water in a wood cell?
    A: free water is the water that is in the cavity of the cells, and bound water is the water that is in the cell walls.

13. What happens when free water is removed from a piece of wood?
    A: it reaches fiber saturation point.

14. What happens when bound water is removed from a piece of wood?
    A: cells begin to shrivel and harden

15. Construction grade lumber is not adequate for cabinetmaking because of its high ________
    A: (MC) moister content

16. The direction wood shrinks is ________.
    A: mostly in the tangential direction
17. Sketch the four different samples of shrinkage.

18. Specific gravity is a measure of _____.
   A: density

19. _____ is caused by compression and tension in the tree as it grows. It does cause problems in working wood.
   A: stress

20. What is the difference between open grained and closed grained wood species?
   A: closed grained have smaller pores and open grained has larger pores.

21. Two mechanical properties of wood are _____ and ________.
   A: elasticity, strength

22. What is the method of removing dents in wood?
   A: take a wet cloth place it over the dent, rub with a warm iron.

**Chap 11: Lumber and millwork**

Harvesting lumber begins its journey to you as a mature tree being harvested. Loggers select and fell trees for market by sectional felling or systematic felling.

**Sectional felling:** is when large section of a forest are cut at one time. This is less expensive than systematic felling. Sectional felling occurs most often in softwood harvesting because those trees grow faster than hardwoods sections that are felled are replanted with seedlings. **Systematic felling:** is when trees are singled out for harvesting they may be selected because wood species is needed or they are diseased or infected with insects. Once trees are felled, small branches are trimmed from main trunk is cut into piece suitable for transporting this is called bucking. **Sawing:** each log moves into a band saw or circular saw. The saw creates rough edged planks. Angle at which lumber is cut determines grain pattern, amount of shrinkage during seasoning and cost of lumber. Lumber is sawn in three methods. **Plain Sawing:** cuts are made tangent to the annual rings. Most common method of sawing. It is less costly and less wasteful than any other method. The average length of the plank is greater. Most likely to warp also tends to check and split more. Grain pattern appears in v shapes. **Quarter sawing:** is cutting logs into four sections called quarters each quarter is than sawn at an angle. Grain pattern for most part is straight lines twist cup checks and splits less than plain sawn. **Riff sawing:** also cutting logs into quarters but the quarters are sawn at approximately at 45 deg. Advantages are the same as quarter sawn however the straight grain pattern runs length wise and is very decorative and thin. **Rip:** the flices (longitudinal section of the log) are ripped to width and crosscut to length they will be ripped to random widths and lengths. **Saw dry and rip process:** flices are ripped after drying. Both warp and stress levels are reduced. **Drying:** lumber must be dried to reduce moist content this is called seasoning. **Air Drying:** requires boards to be stacked for free air movement. Beware of air dried lumber the moisture content may remain at 15% to 19%. **Kiln Drying:** uses large ovens called kilns to reduce moisture. Lumber is stacked. Temp and humidity are controlled. Steam is added first to prevent sudden surface drying that would cause checks and splits. The humidity is then reduced and temp gradually increased to constant level until drying is complete. **Identifying lumbers defects:** three categories are natural defects, defects caused by improper seasoning or storage, and defects caused by machining. **Natural defects:** include knots, pitch pockets, bark pockets and peck. **Knots:** are encountered
when sawing across a log during growth the tree stem forms around the branch. **Branch knots**: are found in wood that was cut tangential to the annual rings. **Spike knots**: are found in wood cut radically. Saw splits branch threw the center. Knots are described as ingrown or encased as long as the branch is alive and there is continuous growth these are called ingrown. If the branch dies additional growth to the trunk will surround the branch this is called encased knot. **Checked knot** contains a split in the knot because of seasoning. **Knot hole** is caused by a loose encased knot that has been knocked out. **Pitch pockets**: are openings in wood that contains pitch found in various softwoods. **Bark pockets** contain bark material encased during growth. **Other natural defects**: **Heart rot** and peck and grub holes are other natural defects. **Heart rot** is a form of decay when the tree is still alive caused by fungi attacking the tree. Fungi attacking the bald cypress causing brown pockets called peck. **Grub holes** are voids in wood left y insects. **Defects caused by improper seasoning or storage**: include warp, splits, checks, splits, checks, shakes, honeycomb, blue stain, decay, and insect damage. **Warp**: is curving of the wood on face, edge, or length of the wood, there are five types bow, crook, twist, kink, and cup. **Bow**: is a curve lengthwise along the face of the board. **Crook**: is a curve along the board from end to end. **Kink**: is a deviation along the board caused by a knot or irregular grain pattern. **Cup**: is a curve across the face of a board from edge to edge. The shrinking of wood cells also internal stress in the wood causes the wood to warp causes warping. Warp accrue from improper storage as different surfaces are exposed to moister the grain (wood cells) expand this is minimized by stacking wood properly. **Checks and splits**: are separations in the wood fibers along the grain and across the annual rings. **Splits**: travel lengthwise. **Checks**: are short separations of the wood between two growth rings. **Honeycomb** is internal voids in wood rays caused by excessive heat during seasoning while free water is still present in the wood cells. **Blue stain**: is discoloration of wood found mostly in sapwood. **Decay**: is disintegration of wood fibers from decay producing fungi there are two types. **Brown rot**: only the cellulose is removed. Wood becomes brown in color, tends to crack across grain. **Dry rot**: both cellulose (material making up wood cells) and lignin deteriorates. Wood looses color but does not crack until it is severe. **Insect damage**: insects burrow into wood leaving small holes. **Defects caused by machining**: **Machine burn**: is a darkening of the wood caused by heat. Occurs when dulls tools are used if board is fed too slow or stays in one place while the blade keeps rubbing. **Raised Grain**: occurs by machining wood of high (MC) as the cutter knife smoothes the face it presses latewood into softer early wood. The wood recovers and expands. **Torn Grain**: occurs when wood fibers are torn from the board by the saw, shaper, jointer or plainer. **Wavy dressing**: occurs when board is fed faster than the surfacer can cut. **Skip**: is a section of the board that is unsurfaced. skips appear when board is not flat and is fed through the machine. **Dog hole**: is a scar in the board caused by a metal hook that grabs the log while it is being sawed.

**Grading**: after lumber is seasoned it is graded for quality. **Hardwood grading**: hardwood is graded as factory dimension or finished market lumber. **Factory grades**: also called cutting grade. Specify the amount of clear lumber that can be cut from the board. Each grade requires that the boards be at least 3” in width. Boards that are bigger than this are graded first and seconds (FAS) board must be at least 84% clear. Lumber is graded on the poorer face so you know the other side is as good or better. (FAS) 1-face: lumber is grade on the better surface minimum length is reduced to 2’ and minimum
width reduced to 2”. No. 1 common lumber: clear cuts can be as short as 2’ the board must be 66% clear yet most exceed 75%. No. 2 and No 3 common have the same dimensions as No.1 but no.2 only requires 50% clear and no. 3. Requires only 25% clear. **Combination grades**: FAS I face and better combination includes I face and FAS grade boards sold at a price lower than FAS the selects and better grades include shorter length boards along with higher grades. **Dimension grades**: are flats and squares. **Flats** are wider than they are thick. **Squares** are 2x2, 3x3 etc. **Softwood grading**: also applies to appearance in addition they are graded according to moister content. **Construction grades**: least expensive and has a moister content of 19% making it likely to warp. **Finish lumber**: is less than 3” thick and 12” or less in width. **A select**: fewer defects and are used where clear and stained finishes will be applied. **B select**: fewer defects and are used where clear and stained finishes are applied. **C select** and **D select** suited for painted finishes. **Factory grade**: nominal size is 1” to 4” thick and 5” or more in width has a good appearance for any type of finish. No.1 and No. 2 clear factory. No. 1,2,3 shop. **Shop grade** is used in soft woods. Selects grades include A though D select. B and better clear on both sides, C select and better clear on one side. D select contain numerous small tight, knots. **Molding grades**: exhibits characteristics of both select and shop grades, pieces are long, narrow. **Cutting grades**: contain a few too many small knots cutting grades are: no.1 shop: more hard knots and smaller cutting yields. No.2 and no.3 are not recommended for cabinetry. Common Grades contain knots they are for knotty furniture or paneling and used for shelving No. 2 common and better: tight knots. No. 3 common: larger defects. No.4 and No. 5 common contain many defects. **Ordering lumber** involves qualities, quantities and species. **Qualities**: refers to the grade. **Quantities**: unless you specify width and length, lumber will be sent in random widths and lengths. **Board feet**: is 12” long by 12” wide and 1” thick. **Cubic meter**: countries that follow metric system use the cubic meter for volume measurement. Cubic meter contains 423.77 board feet. **Surfacing**: lumber is either rough or you buy it surfaced, which removes from 1/8 to ¼ from nominal size. You specify if you want lumber to be surfaced. Codes for surfacing are: **SIS**: surfaced one side: edges and back are rough. **S2S** surfaced two sides: edges are rough. **S4S** both sides and edges are surfaced. **RGH** no sides are surfaced. **SLR1E** straight line ripped on edge this process rips a straight line. **Seasoning**: you must specify weather you want wood that has been kiln dried or Air dried or a combination of both. **Preservations**: are applied under pressure to penetrate wood layers. This prevents decay and repels insects.

**Pattern lumber**: you can specify if you want milled ends and edges, such as toungs and groves referred to as pattern lumber. **Species**: you choice depends on color, grain pattern and strength. **Millwork**: consist of molding trim and specialty items. Molding and trim decorate edges of most cabinetry furniture and doorways and windows. Each shop has its own name and varies in size. **Molding grades**: P-grade is intended for paint finishes or veneering contains two pieces of wood. N- grade is suitable for natural or clear finishes. **Spindles**: are used as both support and decoration on stair rail baby cribs etc. **Finals** are decorative knobs. **Dowels** are round stock used to strength joints a short piece of dowel is glued into two matching holes. Have spiraled groove or straight flints ordered in bundles from 25 to 1000. **Plugs and buttons** are used to cover holes over counter sunk screws flat head plugs fit flush with face of wood round head plugs
have a slightly curved surface. **Manufactured woodcarvings**: can decorate an otherwise plain surface.

**Test your knowledge: Chap 11**

1. Why is wood considered a renewable resource?
   A: because tree mature to full size within a persons lifetime
2. Two methods of harvesting are _____ and _______.
3. Sectional, and selective
   A: Plain sawn- less waiste, less stable more likely to warp. Quarter sawn more expensive less likely to warp, more stable. Rift sawn- more expensive, more stable, and less likely to warp.
5. After lumber is sawed, it is dried to reduce the _____.
   A: moister content (MC)
6. The moisture content of construction grade lumber is approximately______% 
   A: 19%
7. List five classifications of knots.
   A: encased, spike, intergrown , knot hole, checked mot.
8. Three defects caused by mold and fungus are _____, _______, and ______
   A: clue stain, decay, insect damage
9. Illustrate five types of warp
   A: crook, kink, cup, bow, twist
10. List three wood defects caused by improper seasoning.
    A: Honey comb, shake, splits checks
11. Describe the lumber defects often incurred during surfacing.
    A: burning torn grain, wavy dressing, skipped dressing, dog hole, raised grain
12. Identify four hardwood factory grades for cabinet making lumber.
    A: clear two sides, clear one side, paint, core, sound
13. An example of finished market grade lumber is ________.
    A: D. molding
14. Two grading systems for softwoods are ______ and ______
    A: construction grades, remanufactured
15. What is the difference between factory grade hardwood and factory grade softwood.?
    A: hardwood is graded on the amount of lumber that can be used from the board and soft lumber is based on appearance.
16. Remanufacture grade softwoods have a moisture content that ranges from ______% to ______%
    A: 6% to 12%
17. Lumber grading systems are established by _____ and ________.
    A: national hardwood lumber association. And American lumber standards committe
18. Random width and lengths (RWL) lumber is sold by______
    A: board feet
19. Determine the board feet in two pieces of ½” x 8” x 6” kiln dried willow which is FAS grade 
A: 66

20. Determine the board feet in three pieces of 1 1/32 “ thick x 9 ½” x 10’ kiln- dried 
white pine, which surfaced on two sides and A select finish grade. Write an order for the wood.
A: 2041

21. Explain the difference between spindles, finial, and dowels.
A: Spindles are used to support and decorate stair rails and baby cribs. 
Finials are ornamental decorative knobs.

Chap 1: introduction to Cabinetmaking

Function and Form: function describes the reason for having the cabinet or piece of furniture. Form is the appearance of the cabinet. Ready to assemble: the product is purchased unassembled in a neatly packaged compact carton. Quality and productivity: quality also involves productivity. When work falls short of the goals, corrective action must be taken.

Chap 2: Cabinetry styles

Early cabinetmaking: pieces were produced with hand tools like shaper planes and shaped scrapers. Modern cabinetmaking: powerful machines in operation today simplify the cabinetmaking process. William and Mary style introduced the gate leg table and highboy. Queen Anne: the new elegance in English furniture brought refinements in design and joinery in the 18th century. Chippendale style evolved during the last half of the 18th century. Thomas Chippendale designed and built highly carved mahogany and walnut furniture. Hepplewhite designed mahogany cabinet front, including curved doors and drawers. Sheraton influenced furniture designs in the late 1700s and early 1800s. Provincial styles: refers to simplified versions of European traditional styles. American colonial period lasted from 1620 to about 1790. Most of the products were very crude. French provincial styles come from the middle 1600s to 1900. Noted for having graceful curved edges. Pennsylvania Dutch: most products were straight line and square edged design. Shaker is a plain style produced from 1776 to the mid 1800s. They have very few decorations. Windsor style originated from the Windsor castle. It involved bent wood armrest, backs, and rockers. Duncan Phyfe was the first American designer to adapt European and Asian styles. Contemporary Styles: existed since about 1925. It is not a individual style with specific features. Early American furnishings combine colonial and plain styles. American Modern usually means clean, undecorated products. Oriental Modern combines straight lines and curve geometric shapes. Shaker modern is an updated version of the original shaker features. Single rooms: furniture within a single room should have the same style. Multiple rooms: matching styles of multiple rooms increases the effect of authenticity.
interiors and exteriors: many homes coordinate the interior style of furniture with the exterior.

Rules of Thumb
- Accidents are inevitable
- Safety is a state of mind
- Tools are not toys
- Never use a tool unless you have been shown how to use it properly
- Always use the tool the way you were shown
- Don’t hurry or work tired.
- If it makes you nervous don’t do it
- Heed to manufacturers warning
- Wear eye protection
- Protect hearing
- Protect lungs
- Keep shop clean and unluttered
- Prevent accidents, but prepare for them
- Protect your property

Keeping Ten Fingers
- Table saw responsible for 42% of all injuries
- Table saw out number radial arm saws 5 to 1
- Attempting to rip short narrow pieces on a table saw invites an accident
- Kickback can cause your hand to be pulled into the blade
- Kickback happens from knotty wood or binding of the blade and more.
- Jointer accidents happen for most of same reasons from ripping something too small.
- Ban saw is involved in the fewest injures
- In this survey a quarter of the injuries were permanent
- 1/3 was the loss of fingers
- 75% required visit to doctor of emergency room

WEEKLY JOURNAL ENTRY: Your entry is a reflection of your learning experience in the classroom specific to that day. What goals did you set for yourself and accomplish. What were your successes and any setbacks that you encountered? How did you successfully problem-solve any setbacks and turn them into positive learning experiences. What goals are you setting for yourself for next class session's learning experience? What were your accomplishments relative to your classroom project?

These past weeks I have learned more than I ever though I could learn in two weeks! It has been very exciting so far. These past weeks we have learned how to use the table saw correctly and also the radial arm saw. I'm super excited to start putting the top
together. We have been using the jointer a little bit but next week we are supposed to learn more about the jointer and planer. I'm very excited to keep learning and practicing and perfecting my skills.