

## 21 WOODWORKING MACHINERY

### ANSWERS—QUIZ 1

1. b
2. a
3. a
4. a
5. b
6. b
7. d
8. d
9. d
10. c
11. b
12. b
13. All saws pose potential hazards for operators. Safety and health professionals can minimize these hazards by providing training for operators, ensuring that all machinery is properly guarded, and making sure that all ANSI, NFPA, and government regulations are followed.
14. Circular saw operators are often injured when their hands slip off the stock while pushing it into the saw, or when holding their hands too close to the blade during the cutting operations. Other personnel can be injured by coming into contact with the blade when removing scrap or finished pieces from the table. Poor housekeeping practices and slippery floors are other sources of incidents involving circular saws.
15. Companies should provide employees with equipment that meets the existing standards and regulations of the following three organizations: the U.S. Occupational Safety and Health Administration (OSHA), the American National Standards Institute (ANSI), and the National Fire Protection Association (NFPA).
16. The point of operation guard must be movable to accommodate the wood, balanced so as not to impede the operations, and strong enough to provide protection to the operator.
17. The advantages of a high-blade silhouette are (1) reduced kickback potential, (2) saw tooth cuts down nearly vertical to blade, (3) saw blade is closest to spreader, (4) less power needed, (5) faster cutting, and (6) less saw blade wear.
18. To prevent a blade from cracking, operators should
  - (1) tighten the blade on the arbor for which it is designed,
  - (2) operate the saw at speeds specified by the manufacturer,
  - (3) allow sufficient clearance for the teeth to prevent burning, and, thus, heating and cracking,
  - (4) keep the blade in perfect round and balance, and
  - (5) keep the blade sharp at all times.
19. An underslung cutoff saw is commonly used to cut knots out of narrow pieces such as flooring and molding.
20. An operator should do the following to avoid kickbacks:
  - Maintain the rip fence parallel to the blade so the stock will not bind on the blade and be thrown.
  - Keep the blade sharp. Replace or sharpen anti-kickback pawls when points become dull.
  - Keep blades' guards, spreaders, and antikickback pawls in place and operating properly. The spreader must be in alignment with the blade, and the pawls must stop a kickback once it has started. Check their action before ripping.
  - Cut only material that is seasoned, dry, and flat and that has a straight edge to guide it along the rip fence.
  - Release work only when it has been pushed completely past the blade.
  - Use a push stick for ripping widths 2 to 6 inches and an auxiliary fence and push block for ripping widths narrower than 2 inches.
  - Allow the cut off piece to be unconfined when ripping or crosscutting.
  - Apply the feed force to the section of the work-piece between the blade and the rip fence.

### ANSWERS—QUIZ 2

1. a
2. a
3. a
4. b
5. b
6. a
7. c
8. a
9. b
10. c
11. d
12. To operate sanders safely, a worker should use dust

exhaust hoods, wear goggles and dust respirators during operation, inspect all belts, and be sure that hand-feed sanders have the proper distance between the sander and work rest.

13. The blade's direction of rotation makes it easy for the operator's hands to be drawn into the revolving saw. There is the additional danger to the helper and to others on the opposite side or infeed side, of the saw. Flying stock can be thrown with enough force to drive the stock through a 1-inch thick board. There have been fatalities for not observing this precaution.
14. The usual cause of band-saw injuries is operators' hands coming into contact with the blade.
15. When sawing a sharp radius, make several release cuts up to the cutting line. This prevents saw blade binding and possibly breaking the blade or causing it to jump off the guide wheels.
16. Knives must meet rigid specifications for shaper steel. Knives must be sharpened and installed only by a fully qualified person. Knives and the grooves in the collars must fit perfectly and be free of dust. The two knives must balance perfectly. They must be weighted against each other each time they are set. A knife must not be used after it has become so short that the butt end does not extend beyond the middle point of the collar. Deep cuts should be avoided. During startup, operations should apply the power in a series of short starts and stops to slowly bring the spindle up to operating speed. Listen for knives that may be out of balance.
17. Operators can reduce planer vibration by anchoring the planer on a solid foundation and by insulating it from the foundation with cork, springs, or other vibration absorbing material.
18. An operator should stop, lock out, and tag out feed rolls, cutter heads, and cylinders before placing his hands in the bed plate to remove wood fragments or make adjustments.
19. Operators should clean their machines and work surfaces with a long-handled brush after the equipment has stopped and not use their hands or air nozzles.
20. The essay should touch on the following conditions:
  - blade out of round
  - blade not straight, out of plane
  - blade out of balance
  - improper hook or pitch of teeth

- improper or uneven set
- dull blades
- gummed blades
- improper brushings
- cracked blades

## ANSWERS—CASE STUDY

1. A correct answer will provide a summary of two of the following:
  - Table saw: feed with the body to the side of stick, blade height, splinter and antikickback fingers for ripping, stock firm to fence, remove ripfence for crosscuts, blade guards.
  - Circular Saw: blade guards, binding, blade-correct type, blade-tight on the arbor, firm support for work, no obstructions, begin cut with motor at manufacturer's recommended speed for materials being cut, hand and finger position.
  - Radial Arm Saw: ripsawing-direction of feed (cut) and antikickback fingers, blade guards, pull for cross cuts, end plates on track-arm tight, clamp handles tight, material tight to fence, return cutter to rear of track, hand and finger position.
  - Band Saw: Feed with body to side of stock, guard height ( 1/2 inch clearance of material, tension and type of blade, release cuts before long curves, stop machine to remove scrap or pull out incomplete cut, flat stock, push stick for small parts.
  - Jointer/Planer: Depth of cut, length of stock, sharp cutters, no hands over cutters, push stick for small stock, guard.
  - Wood Shaper: Clamping workpiece, use correct guard, feed into knives-don't pack off, no feeding between fence and cutters, collar and starting pin work for irregular work-stock of sufficient weight, fence opening only enough to clear cutters, use stock as guard by shaping the underside of stock, spindle nut tight, shape only pieces 10 in. or longer, proper types of cutters.
  - Sander: Keep hand from abrasive surface, ventilation, belt or disk condition, sand on downward side of disk.
  - Lathe: Stock without defects, glued joints dry; power off when changing speeds on V-belt lathes, tool rest close to stock, hold tools firmly in both hands, remove tool rest when sanding or polishing.

2. Blade conditions that might cause unsafe, difficult, or unsatisfactory operation include the following:
  - blade out of round
  - blade not straight, out of plane
  - blade out of balance
  - improper hook or pitch of teeth
  - improper or uneven set
  - dull blades
  - gummed blades
  - improper brushings
  - cracked blades
3. Management can minimize the hazards posed by saws by training operators, ensuring all machines are guarded, and making sure operators follow all safety procedures.
4. Precautions to prevent saw blades from cracking include the following:
  - tighten the blade on the arbor for which it is designed
  - operate the saw at speed specified by the manufacturer
  - allow sufficient clearance for the teeth to prevent burning, and thus, heating and cracking
  - keep the blade in perfect round and balance
  - keep the blade sharp at all times-a dull blade will not cut, rather it will pound or burn itself through the wood, so that vibration, heating, and then cracking will result