LEARNING OBJECTIVES
After studying this chapter, students will be able to:
- Give reasons why shop safety is important.
- Explain why it is important to develop safe work habits.
- Recognize and correct unsafe work practices.
- Apply safe work practices when employed in a machine shop.
- Select the appropriate fire extinguisher for a particular type of fire.

INSTRUCTIONAL MATERIALS
Text: pages 23–28
Test Your Knowledge Questions, page 28
Workbook: pages 11–14
Instructor’s Resource: pages 49–56
- Guide for Lesson Planning
- Research and Development Ideas
- Reproducible Masters:
  - 2-1 Fire Extinguishers and Fire Classifications
  - 2-2 Test Your Knowledge Questions
- Color Transparency (Binder/CD only)

GUIDE FOR LESSON PLANNING
Introduce the chapter with a display of safety equipment and safety posters. Discuss the duties of a safety officer in industry. Safety cannot be overemphasized!

Have students read and study the chapter. Review the assignment and discuss the following:
- State and shop/lab safety requirements.
- Students must assume responsibility for their safety and others in the shop/lab.
- Approved eye protection must be worn while working in the shop/lab.
- No machines to be operated until instructions have been given in its operation.
- No machines are to be operated unless all guards and safety devices are in place and functioning properly.
- Permission must be received before operating a machine tool.
- Dress must be appropriate.
- Students must avoid operating machine tools and other equipment while their senses are impaired by medication or other substances.
- Safe technique for handling metal chips and cuttings produced while operating machine tools.
- Importance of washing hands thoroughly after working in the machine shop/lab.
- Safe disposal of cloths used to clean machines.
- Procedure to be followed for reporting and taking care of any cut, burn, bruise, scratch, or puncture, no matter how minor it may appear.
Technical Terms
Review the terms introduced in the chapter. New terms can be assigned as a quiz, homework, or extra credit. These terms are also listed at the beginning of the chapter.
- adequate ventilation
- approved-type respirator
- back injuries
- combustible materials
- electrocution
- OSHA
- protective clothing
- safety equipment
- unsafe practice
- warning signs

Review Questions
Assign Test Your Knowledge questions. Copy and distribute Reproducible Master 2-2 or have students use the questions on page 28 in the text and write their answers on a separate sheet of paper.

Workbook Assignments
Assign Chapter 2 of the Machining Fundamentals Workbook.

Research and Development
Discuss the following topics in class or allow students to choose topics for individual or group projects.
1. Invite a local industry safety officer to discuss typical safety programs, and why industry places so much emphasis on a safe working environment.
2. Ask a representative from your local fire department to demonstrate the proper use of fire extinguishers and what to do in case of a fire in the shop. Copy and distribute Reproducible Master 2-1.
3. Invite a safety expert from a local shop or a safety equipment supplier to evaluate your safety program and make recommendations for any necessary improvements.
4. Work with school officials to see what protective eye wear is available for each student. Prepare a table of estimated needs, cost per year, and cost in succeeding years.
5. Develop and produce a series of colorful safety posters for the shop.
6. Prepare visual aids on safe work habits to be observed when using hand and machine tools.
7. Secure samples of safety posters and other safety program features used by local industry.
8. Design and construct a bulletin board on eye safety.
10. Show a video or film on eye safety.
11. Produce a slide show or video on safe work habits when using the lathe, drill press, grinder, or vertical milling machine.

TEST YOUR KNOWLEDGE ANSWERS, Page 28
1. Evaluate individually.
2. carelessness
3. c. the entire time you are in the shop.
4. spontaneous combustion
5. Flying chips can cause serious eye injuries and vaporized oil can cause a fire and result in painful burns and property damage.
6. you have received instructions on its safe operation; all guards are in place; it has been determined that it is in safe operating condition
7. adjustments, measurements
8. brush, hands
9. adequate ventilation
- approved dust/fume mask
10. attention
11. heavy machine accessories or large pieces of metal stock
12. Check with your doctor, pharmacist, or school clinic to determine whether it will be safe for you to operate a machine.
13. Evaluate individually.

WORKBOOK ANSWERS, Pages 11–14
1. a. at all times when in the shop
2. habit
3. c. Both a and b.
4. brush, pliers
5. c. spontaneous combustion may result
6. d. Both b and c.
7. ventilation, dust mask
8. Evaluate individually.
9. d. All of the above.
10. e. Both a and c.
11. Any two of the following: when your senses are affected by medication, all guards and safety features are not in place, you have not been instructed in the safe operation of the machine.
12. a. When working in a noisy area.
   b. When handling solvents, cutting fluids, and oils.
   c. When machining produces airborne dust particles.
13. d. All of the above.
14. c. Class C Fires
15. b. Class B Fires
16. a. Class A Fires
17. d. Class D Fires
18. Evaluate individually.
19. Evaluate individually.
20. Evaluate individually.
## Fire Extinguishers and Fire Classifications

<table>
<thead>
<tr>
<th>Fires</th>
<th>Type</th>
<th>Use</th>
<th>Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class A Fires</td>
<td>Soda-acid</td>
<td>Okay for use on</td>
<td>Direct stream at base of flame.</td>
</tr>
<tr>
<td>Ordinary Combustibles</td>
<td>Bicarbonate of soda solution and sulfuric acid</td>
<td>Not for use on</td>
<td></td>
</tr>
<tr>
<td>Requires...</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>cooling-quenching</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class B Fires</td>
<td>Pressurized Water</td>
<td>Okay for use on</td>
<td>Direct stream at base of flame.</td>
</tr>
<tr>
<td>Flammable Liquids</td>
<td>Water under pressure</td>
<td>Not for use on</td>
<td></td>
</tr>
<tr>
<td>Liquids such as grease, gasoline, oils, and paints.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Requires...</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class C Fires</td>
<td>Carbon Dioxide ((\text{CO}_2))</td>
<td>Okay for use on</td>
<td>Direct discharge as close to fire as possible, first at edge of flames and gradually forward and upward.</td>
</tr>
<tr>
<td>Electrical Equipment</td>
<td>(CO(_2)) gas under pressure</td>
<td>Not for use on</td>
<td></td>
</tr>
<tr>
<td>Motors, switches, and so forth.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Requires...</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class D Fires</td>
<td>Foam</td>
<td>Okay for use on</td>
<td>Direct stream into the burning material or liquid. Allow foam to fall lightly on tire.</td>
</tr>
<tr>
<td>Combustible Metals</td>
<td>Solution of aluminum sulfate and bicarbonate of soda</td>
<td>Not for use on</td>
<td></td>
</tr>
<tr>
<td>Flammable metals such as magnesium and lithium.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Requires...</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Dry Chemical

<table>
<thead>
<tr>
<th>Dry Chemical</th>
<th>Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multi purpose type</td>
<td>Direct stream at base of flames. Use rapid left-to-right motion toward flames.</td>
</tr>
<tr>
<td>Ordinary BC type</td>
<td></td>
</tr>
<tr>
<td>Okay for</td>
<td></td>
</tr>
<tr>
<td>Not okay for</td>
<td></td>
</tr>
<tr>
<td>Okay for</td>
<td></td>
</tr>
<tr>
<td>Not okay for</td>
<td></td>
</tr>
</tbody>
</table>

### Dry Chemical

<table>
<thead>
<tr>
<th>Dry Chemical</th>
<th>Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Granular type material</td>
<td>Smother flames by scooping granular material from bucket onto burning metal.</td>
</tr>
</tbody>
</table>
Shop Safety

Name: ______________________________________________ Date: _______________ Score: ________

1. Why is shop safety so important? ______________________________________________________

____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

2. Most shop accidents are caused by ____.

3. Safety glasses should be worn ____.
   a. most of the time
   b. only when working on machines
   c. the entire time you are in the shop
   d. None of the above.

4. Oily rags should be placed in a safety container to prevent ____.

5. Why should compressed air not be used to clean chips from machine tools?

____________________________________________________________________________________
____________________________________________________________________________________

6. Never attempt to operate a machine until ______________________________________________

____________________________________________________________________________________

7. Always stop machine tools before making ____ and ____.

8. Use a(n) ____ to remove chips and shavings, not your ____.

9. When working in an area contaminated with dust or solvent fumes, be sure there is ____. A(n) ____ should also be worn when working in a dusty area.

10. Secure prompt ____ for any cut, bruise, scratch, or burn.

11. Get help when moving ________________________________________________________________

____________________________________________________________________________________

(continued)
12. What should you do before operating a machine tool if you are taking medication of any sort?

____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

13. Why is it necessary to take special precautions when handling long sections of metal stock?

____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

Name: ______________________________________________