

Instructor Guide

**For the Fruit and Vegetable Preserving
and Specialty Foods Manufacturing Industry**



*“Knowledge
for Life”*

Instructor Guide

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Disclaimer

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What's Inside?

Effective safety training requires careful planning and preparation. This instructor guide is designed to improve training techniques to better reach adult learners and a diverse workforce. This manual will guide instructors through the following training courses: machine hazards, lift truck safety, back injury prevention, fall prevention and working safely around hazardous substances. It will also assist them in planning and preparing learning activities.

Training Techniques for Adult Learners

Adults learn best when they are active partners in the learning process. Don't lecture to adults. Instead, get them involved in discussions, problem solving and hands-on activities. Give them a chance to share their experiences. Provide lots of encouragement and coaching to help them master the material.

When training adult learners:

Training should be active, not passive.

Adults learn better from doing than from listening. Provide experiences that allow for teamwork, problem solving, and practical application of skills. Participants will lose interest in training if they are not being challenged.

Participants must be able to relate to the training.

Make sure there is a clear connection between training activities and the work experiences of participants. Use realistic examples and problems as teaching tools. Incorporate familiar equipment and visual aids. Ask participants to describe how they can apply training concepts to their own jobs.

Training must address participants' immediate needs.

Concentrate on the most important safety skills participants need for their jobs. Focus on practical information. Keep training activities short and to the point.

Allow participants to have a say in the learning agenda.

Ask participants to help identify important topics for training. Find out what they hope to learn, and take time to discuss safety issues that are important to them.

Encourage participants to share experiences and knowledge during training.

Adults take pride in sharing their knowledge with others. Instead of telling them information, ask them questions and let them tell you what they know. Use the knowledge they already have as a starting point for more advanced learning.

Get their input before you begin planning.

Identify their needs.

Have a purpose and state it clearly.

Apply training to their work.

Involve participants with discussion questions and hands-on exercises.

Give them the chance to provide meaningful feedback.

Use examples, scenarios, problems and visual aids as teaching tools.

Build on the experiences of your participants.

Training in the Diverse Workforce

You must adapt your training techniques to fit the needs of your workforce.

Cultural Differences

Attitudes about safety vary from culture to culture. Make sure participants understand that safety is just as important as production in your organization.

Ask how safety was handled where they worked before:

- ▶ Did they have safety committees?
- ▶ What were the safety rules?
- ▶ Was anyone ever injured?
- ▶ What were the consequences for not following safety rules?

Make sure participants understand any differences in how safety is handled in your organization.

New employees learn by watching. Experienced workers must set an example so new employees understand that safety is expected on the job.

Language Barriers

Participants who do not understand instructions given in English may nod in agreement or say yes even when they do not fully understand what is being said. As a result, they may begin a job without knowing the safest way to perform the work. Use visual aids and hands-on exercises whenever possible. Demonstrate the tasks and check for comprehension by having participants repeat the tasks correctly.

Be aware that even if the material is in the participant's native language, some workers may not have the reading skills to understand. It can be helpful to partner new employees with more experienced bilingual workers. Mentoring is one of the most effective methods for teaching job skills to low-literacy workers.

- ▶ Always demonstrate the task — don't just talk about it. Ask the participant to repeat the same task for you and don't move on until you feel comfortable they understand.
- ▶ Identify training topics simply and clearly.
- ▶ Make it clear when you finish one topic and begin another. For instance, when training about personal protective equipment, hold up a pair of safety glasses and say, "Now we are going to discuss safety glasses." When you move on to protective gloves, hold up the gloves and say, "We have finished talking about safety glasses. Now we are going to discuss protective gloves."
- ▶ Break jobs into specific steps and show participants the safe way to perform each step.
- ▶ Use props and visual aids whenever possible.
- ▶ Ask bilingual participants to help plan and assist with training.
- ▶ If a participant is observed working in an unsafe manner, immediately explain and demonstrate how to do the task safely and have the worker repeat the task.

Always make training:

- ✓ Relevant
- ✓ Practical
- ✓ Clear
- ✓ Concise
- ✓ Active

Young Workers

Young workers may not understand dangers that are obvious to older and more experienced workers. They may be less likely to ask questions or bring up problems to persons in positions of authority.

- ▶ Evaluate every job in advance to determine if young workers can perform it safely.
- ▶ Break jobs into specific steps and demonstrate the safe way to perform each step.
- ▶ Ask the worker to repeat the demonstration until you are comfortable that s/he understands.
- ▶ Have young workers complete job-specific safety training before performing any new duties. Training should be repeated periodically and when there are changes in work procedures and equipment.
- ▶ Point out hazards whenever they are encountered.
- ▶ Always model the appropriate behavior — if long-term employees and supervisors take dangerous shortcuts, so will young workers.

Learning Activities

Participants learn best when they have a chance to discover information by applying it to their work. Below are brief explanations of the activities you can use to minimize lecture time and emphasize active participation.

Personal Introductions



Let participants know you are interested in them.

Ask questions:

- ▶ How long have you been working here?
- ▶ Have you witnessed any accidents on the job?
- ▶ What kinds of training have you had in the past?
- ▶ What do you expect to gain from this training?

Keep introduction time brief and informal. Allow enough time for meaningful expression, but keep the introductions moving.

Discussion



Allow participants to relate their experiences, share their knowledge and explore topics of discussion.

Here are a few tips:

- ▶ Don't allow a limited number of participants to dominate the discussion. Draw in hesitant participants by occasionally calling on them by name and asking them if they have anything to add.
- ▶ Don't pressure participants if they appear nervous about speaking up.
- ▶ Don't allow participants to be ridiculed for their opinions. Make sure everyone knows that all points of view are valid topics for discussion.
- ▶ Keep the discussion rolling. Move on to the next topic or activity if discussion is getting bogged down.

Case Studies



Because case studies are realistic examples, participants can apply new information to familiar situations.

Case studies present a problem and allow for discussion, development and evaluation of possible solutions. Discussion of case studies can take any of the following forms:

- ▶ The entire class can work through each case study together.
- ▶ Each individual can work through the case studies and discuss possible solutions with the group.
- ▶ The class can be broken into groups and each group can work on a different case study and report back to the class. This option often provides the best opportunity to encourage teamwork while still allowing all participants to make a meaningful contribution.

Hands-On Exercises



Whenever possible, reinforce every lesson by having participants practice each skill with the same tools and equipment they will be using on the job.

Hands-on exercises often take the following form:

1. Instructor or experienced employee demonstrates the correct technique.
2. Participants practice while instructor observes and coaches.
 - ▶ Make sure the exercise is conducted safely.
 - ▶ Provide any necessary background information.
 - ▶ Provide appropriate supervision.
 - ▶ Take necessary precautions to avoid injury.
 - ▶ Provide frequent, appropriate feedback.

Visual Aids



Help participants understand by illustrating training material with the use of visual aids:

- ▶ If it can be done safely, let participants handle the same tools and equipment they will be using on the job.
- ▶ Use overheads and slides to reinforce training topics.
- ▶ Keep visual aids relevant and make sure they serve to increase understanding.

Questioning



Keep participants actively involved and provide an alternative to lecture by asking, rather than telling them about important concepts. For instance, instead of lecturing participants about how to prevent lift truck rollovers on ramps, you can involve participants by saying, “What precautions do you take so your lift truck doesn’t roll over when you are working on a ramp?”

When using questioning as a learning activity:

- ▶ Repeat participant responses or record them on a chalkboard, overhead or flip-chart.
- ▶ Make sure all important information has been discussed and any incorrect responses have been addressed tactfully.

Contests and Competitions



Motivate participants with contest and competitions.

Some examples:

- ▶ Divide the class into groups. In turn, ask each group a multiple choice or true/false question. Each group gets one point for every correct answer. If a group misses a question, allow the next group to answer it for a point. Keep track of points and recognize the winning group. Use the questions as opportunities to discuss training material.
- ▶ Divide the class into groups. Have each group work on a hands-on task (observe safety precautions as noted for hands-on exercises above). Score each group based on a predetermined checklist.

Evaluation



Throughout the training session, use questions and hands-on exercises to evaluate participant progress and knowledge. Provide constructive feedback and ensure participants are mastering important safety concepts and procedures.

Planning and Preparation

Effective safety training requires careful planning and preparation. Address the following before training:

Training Objectives

Develop written statements of the desired knowledge or skill to be demonstrated by participants. Identify the objectives as determined by your organization and/or use those listed in the participant manual. Ask participants to share any important issues they want to address in training.

Facilities

Make sure to provide a safe physical environment for participants with adequate emergency exits, suitable climate, lighting, restrooms and seating.

Materials

Provide an adequate supply of all training materials. Visual aids and equipment should be available and in good working order.

Recordkeeping

Record attendance. A sample sign-in sheet is provided on page 205 of the Instructor Guide.

Participant Evaluation

Use hands-on performance evaluations and quizzes at the end of each lesson to evaluate participant knowledge.

Evaluation of Training

Ask participants how training can be improved. An example of a training evaluation form is provided on page 206-207 of the Instructor Guide.

This instructor guide provides learning activities related to safety in the fruit and vegetable preserving and specialty foods manufacturing industry. Review each lesson and select learning activities most appropriate for your audience, materials, facilities and time.

Machine Hazards Training Guide

Suggested Materials

- Machine Hazards* manuals (English, MF2758; Spanish, MF2758S)
- Sign-in sheet
- Pencils
- Instructor Guide*
- Training overheads/slides/projector
- Blank overheads/flipchart/blackboard/pen for listing participant responses and outlining important concepts.
- Electrical cords (rated for different usages, showing various signs of damage)
- Ear plugs and other protective equipment for hands-on exercises
- Lockout/tagout supplies (see page 20)
- Ground fault circuit interrupter

Sources of Background Information

- ▶ *Machine Hazards* safety manuals available for download:
http://www.oznet.ksu.edu/agsafe/training/OSHA_training.htm
- ▶ Control of Hazardous Energy information:
<http://www.osha.gov/SLTC/controlhazardousenergy/index.html>
- ▶ Machine Guarding information:
<http://www.osha.gov/SLTC/machineguarding/index.html>
- ▶ Electrical Safety information:
<http://www.electrical-safety.org/>
- ▶ Operator's manuals for machines

Length of Time Needed for Training

Review and select the learning activities that are most appropriate. If all discussion and hands-on exercises are included in the training it may take up to a half work day. Without the hands-on exercises, the classroom portion will take about two hours.

Welcome and Introduction

- ▶ Introduce yourself.
- ▶ Remind participants of the topic of the training.
- ▶ Discuss breaks, locations of restrooms, ending time and any tests or evaluations.
- ▶ Tell participants you expect them to play an active role by relating their experiences and knowledge.

Participant Introductions

Find out:

- ▶ Who are they?
- ▶ What is their experience with food processing machinery?
- ▶ What do they hope to learn from the training?

Questioning/Discussion

Before beginning Lesson 1:

- ▶ What do participants think are the most common types of injuries that happen with food processing machinery? List ideas on an overhead or flipchart.
- ▶ Have any participants known someone who has been killed or seriously injured in a food processing machinery accident? Would anyone care to share what happened?

Lesson 1

Take Control of Your Own Safety

Suggested Objectives

- Discuss common causes of serious injury or death.
- Identify safety messages and signs on machines and in work zones.

Discuss Accident Reports, pages 4-5 of the *Machine Hazards* manual

How well did participants' ideas for the most common causes of accidents match those on pages 4-5 of the *Machine Hazards* manual? (Refer to the overhead or flip-chart list made during the introduction.)

- ▶ Which of these hazards represents the greatest risk in your workplace?

Discuss the Safety Signs, page 7 of the *Machine Hazards* manual

Can participants recall any safety signs they have seen on food processing machinery?

Evaluation

As a group, answer the quiz items on page 8 of the *Machine Hazards* manual. Be sure to discuss each item.

Questioning

Before beginning Lesson 2:

- ▶ What precautions do participants take before they start food processing machinery on the production floor? List responses on an overhead or flipchart.
- ▶ What are some safety issues participants need to consider when shutting down food processing machinery? List ideas on an overhead or flipchart.

Prepare for Safe Operation

Suggested Objectives

- Identify safe clothing and personal protective equipment.
- Describe how to safely start up and shut down machines.

Discuss Accident Reports, page 9 of the *Machine Hazards* manual

Questioning

What is the company policy for dressing appropriately while operating machines?

Discussion

Discuss the company's personal protective equipment guidelines.

- ▶ What are some barriers that might keep some workers from wearing personal protective equipment?
- ▶ How can these barriers be removed?

Hands-on Exercise

Have participants inspect and wear any personal protective equipment that is required for their work.

- ▶ Discuss the importance of each item.

Try on hearing protection:

- ▶ follow manufacturer's procedure or use the general procedure below.
- ▶ demonstrate technique.
- ▶ provide feedback as participants practice

Types of Hearing Protection:

Ear Plugs



- ▶ Clean hands.
- ▶ Roll ear plug between fingers to compress it.
- ▶ Grasp ear from behind your head with opposite hand and pull up to straighten ear canal.
- ▶ Insert ear plug until it blocks sound, then hold in place while it expands. (Count out loud to 20 while it expands.)
- ▶ Ear plug must completely fill ear canal.
- ▶ Test fit by cupping hands over ears and then releasing. There should not be much difference in sound.
- ▶ Wash reusable plugs in warm soapy water after use/throw away disposable after each use.

Hearing Bands



- ▶ Grasp ear from behind your head with opposite hand and pull up to straighten ear canal.
- ▶ Use your hands to press the ear pads into the ear canals.
- ▶ Test fit in a noisy environment: Lightly press band inward and you should not notice much reduction in noise level.

Lesson 2



Inserting Ear Plugs

Types of Hearing Protection: cont.

Ear Muffs



- ▶ Make sure the cushions fully cover the ear and seal tightly against the head.
- ▶ Hold the headband at the crown of the head and adjust each cup.
- ▶ Test fit in a noisy environment: Gently push the cups toward your head and release. There should not be much difference in noise level.

Visual Aid

Display the overhead “What’s Wrong with This Picture?” from page 22 of this guide.

- ▶ Have participants identify and discuss all safety problems they see.
- ▶ Check participants’ observations from the overhead with the answer key on page 23.

Discuss the Accident Report, page 11 of the *Machine Hazards* manual

Discuss the company’s pre-start inspection policy for the machines participants use.

Hands-on Exercises

Ask participants to inspect electrical cords on the equipment they use and on any extension cords that are used in the plant.

- ▶ Do they have grounding pins?
- ▶ Are the cords rated to be used in wet locations? Outdoor use?
- ▶ Are the cords damaged?
- ▶ Are the cords suitable for the electric current they will be carrying?

Tour the plant and locate circuit breakers, fuses and disconnect switches.

- ▶ Discuss how these are used to shut off power to machinery.

Divide the class into groups of three to five participants.

- ▶ Ask participants to inspect the work area using the work area guidelines on page 12 of the *Machine Hazards* manual.
- ▶ Bring the class together and ask each group to report on the problems they found and how to correct them.

Discuss the Accident Report, page 13 of the *Machine Hazards* manual

Discussion

What is your company's procedure for safe startup and shutdown for each machine the participants use?

Hands-on Exercise

First demonstrate, then have participants practice safe startup and shutdown of all equipment they use. (Refer to the operator's manuals.)

- ▶ **Note:** To prevent injury, do not perform this learning activity without appropriate supervision.

Evaluation

Answer the quiz items on page 14 of the *Machine Hazards* manual either individually or as a class. Be sure to discuss each item.

Lesson 3

Safe Machine Operation

Suggested Objectives

- Describe danger zones.
- Classify areas to be guarded on machines.
- Discuss procedures for cleaning machines and clearing jams safely.
- Outline precautions for working with electricity.

Discuss the Accident Report, page 15 of the *Machine Hazards* manual

Ask participants to give specific examples of how people can get caught in or struck by moving parts in food processing machinery.

- ▶ How do participant responses compare to those on page 15 of the *Machine Hazards* manual?
- ▶ How can these injuries be prevented in the types of machines they use in their jobs?

Discuss each Danger Zone Hazards, pages 16-17 of the *Machine Hazards* manual

For each hazard, ask a participant to identify a machine in their workplace with similar dangers.

- ▶ What guards, shields or safe work practices protect participants from these hazards?

Visual Aid

Discuss overheads of machine parts provided on pages 24-25 of this guide.

- ▶ For each overhead, ask participants to identify the danger and how they would protect themselves. Answer key is provided on pages 26-27.

Discuss the Accident Report, page 17 of the *Machine Hazards* manual

Discuss reasons why some workers might bypass a machine guard or shield.

- ▶ What are the dangers of operating machines that have missing or modified guards or shields?

Discuss the guards and safety devices on the machines participants use.

Discuss the company policy relating to bypassing guards and shields.

Discuss Accident Reports, pages 18-19 of the *Machine Hazards* manual

Hands-on Exercise

Divide the class into groups of three to five participants.

- ▶ Using the information on pages 16-19 of the *Machine Hazards* manual have participants inspect the machines they use. Have them identify hazards, guards and safety devices.
- ▶ Bring the class together and have each group report on the hazards they found.
- ▶ How will the safety devices they observed protect them from injury?
- ▶ **Note:** To prevent injury, make sure machines are off. Do not perform this learning activity without appropriate supervision.

Discuss the Accident Reports, pages 20-21 of the *Machine Hazards* manual

Discuss the company policy and procedure for cleaning machines and clearing jams.

Hands-on Exercise

First demonstrate, then ask participants to practice safely cleaning and clearing jams for each type of machine participants will be using.

- ▶ **Note:** To prevent injury, do not perform this learning activity without appropriate supervision.

Discuss the information on the effects of electric current on the body, page 21 of the *Machine Hazards* manual.

How much current does it take to trip a typical circuit breaker? (Based on the chart on page 21 of the *Machine Hazards* manual, approximately 15-20 amps.)

How much current could kill you? (The chart identifies 50-100 milliamps can cause death.)

What is the purpose of a circuit breaker? (Circuit breakers prevent fires and protect machinery. They do not protect people from electrocution.)

What precautions do participants already take to protect themselves from electric shock in their workplace?

- ▶ Write answers on an overhead or flipchart.
- ▶ Compare participant answers to those on page 22 of the *Machine Hazards* manual.

Discuss the Accident Report, page 22 of the *Machine Hazards* manual

Discuss the company policy for repairing electrical equipment.

Visual Aid

Display Ground Fault Circuit Interrupters(GFCI) and discuss how they function. If none are available, use the overheads on pages 28 of this guide.

- ▶ Discuss the importance of GFCIs in wet environments.

Evaluation

Answer the quiz items on page 23 of the *Machine Hazards* manual individually or as a class. Be sure to discuss each item.

Service and Maintenance Hazards

Lesson 4

Suggested Objectives

- Identify situations when lockout/tagout is necessary.
- Give examples of confined spaces.

Discuss the Accident Report, page 24 of the *Machine Hazards* manual

Have any participants known someone who has been killed or seriously injured in an accident where a machine was started during service or repair? Would anyone care to share what happened?

Discuss the company's lockout/tagout policy.

- ▶ Who is authorized to perform lockout/tagout and when?

Hands-on Exercise

Divide the class into groups of three to five participants.

- ▶ Have each group inspect a machine and identify maintenance hazards based on the bulleted items on page 24 of the *Machine Hazards* manual.
- ▶ Bring the class together and have each group report on the maintenance hazards they identified and how they could control hazards before performing maintenance.
- ▶ **Note:** To prevent injury, make sure all machines are off. Do not perform this learning activity without appropriate supervision.

Discussion

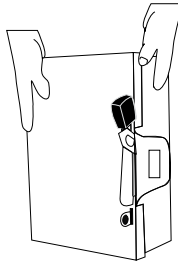
Discuss the specific lockout/tagout procedures for each machine participants will be using.

Hands-on Exercise

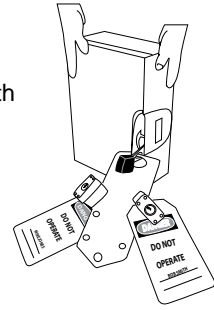
Provide examples of energy controlling devices which are free of hazards. For instance, scraps of pipe with valves attached, disconnected breaker boxes or disconnect switches. (See examples on the following page.)

- ▶ First demonstrate, then ask participants to practice lockout/tagout procedures according to company policy or guidelines on pages 25-27 of the *Machine Hazards* manual.

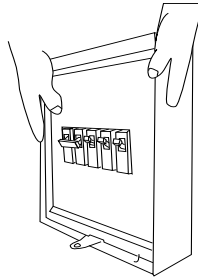
Manual Disconnect



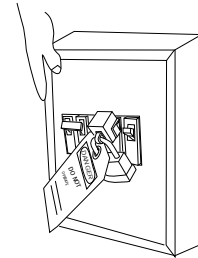
Manual Disconnect with Dual Lockout/Tagout



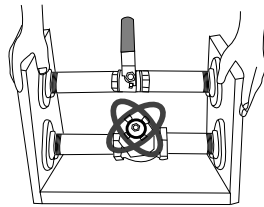
Breaker Box



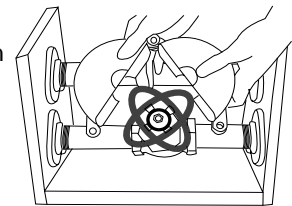
Breaker Box with Lockout/Tagout



Valve Replica for Demonstrating Lockout/Tagout



Demonstration of Lockout/Tagout



First demonstrate, then ask participants to practice lockout/tagout procedures on the equipment they use.

▶ NOTE: Do not perform this learning activity without appropriate supervision.

Discuss Accident Report, page 28 of the *Machine Hazards* manual

Have any participants known someone who has been killed or seriously injured in a confined space?

What types of confined spaces do participants encounter at their work?

- ▶ How could workers be hurt?
- ▶ What is your company policy on confined spaces?
- ▶ NOTE: This is just a brief introduction. Before participants work in permit-required confined spaces, they must complete training that is beyond the scope of this manual.

Evaluation

Answer the quiz questions on page 30 of the *Machine Hazards* manual individually or as a class. Be sure to discuss each item.

Conclusion

Contest

Break the class into small groups.

- ▶ Display the contest items provided on pages 29-39 of this guide.
- ▶ In turn, ask each group a multiple choice or true/false question from the over-heads. Each group gets one point for every correct answer. If a group misses a question, allow the next group to answer it for a point. Keep track of points and recognize the winning group.
- ▶ Use the questions as opportunities to discuss the training material. Answer key provided on page 40.

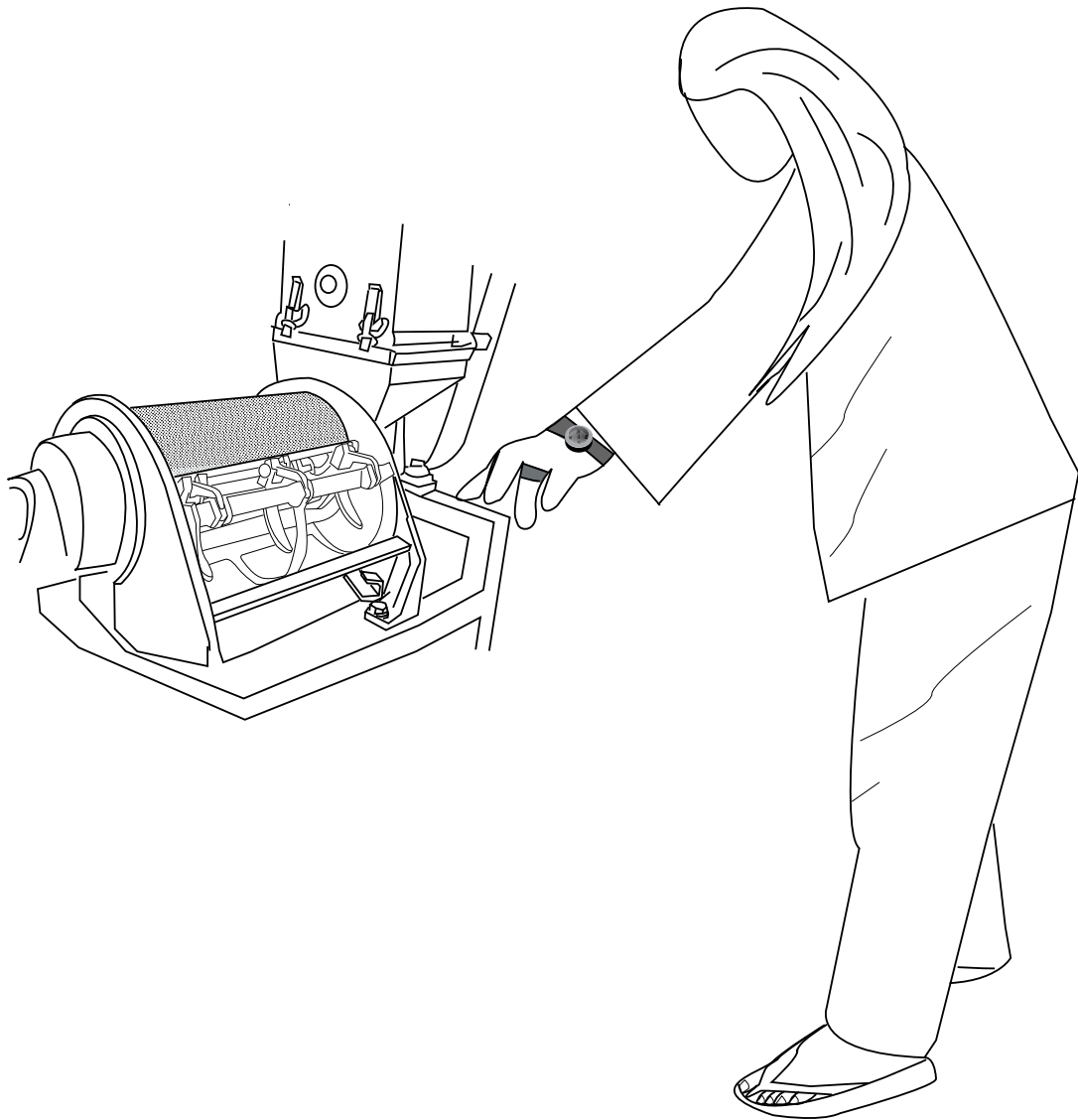
Discussion

Ask participants to share any questions or concerns they want to discuss further.

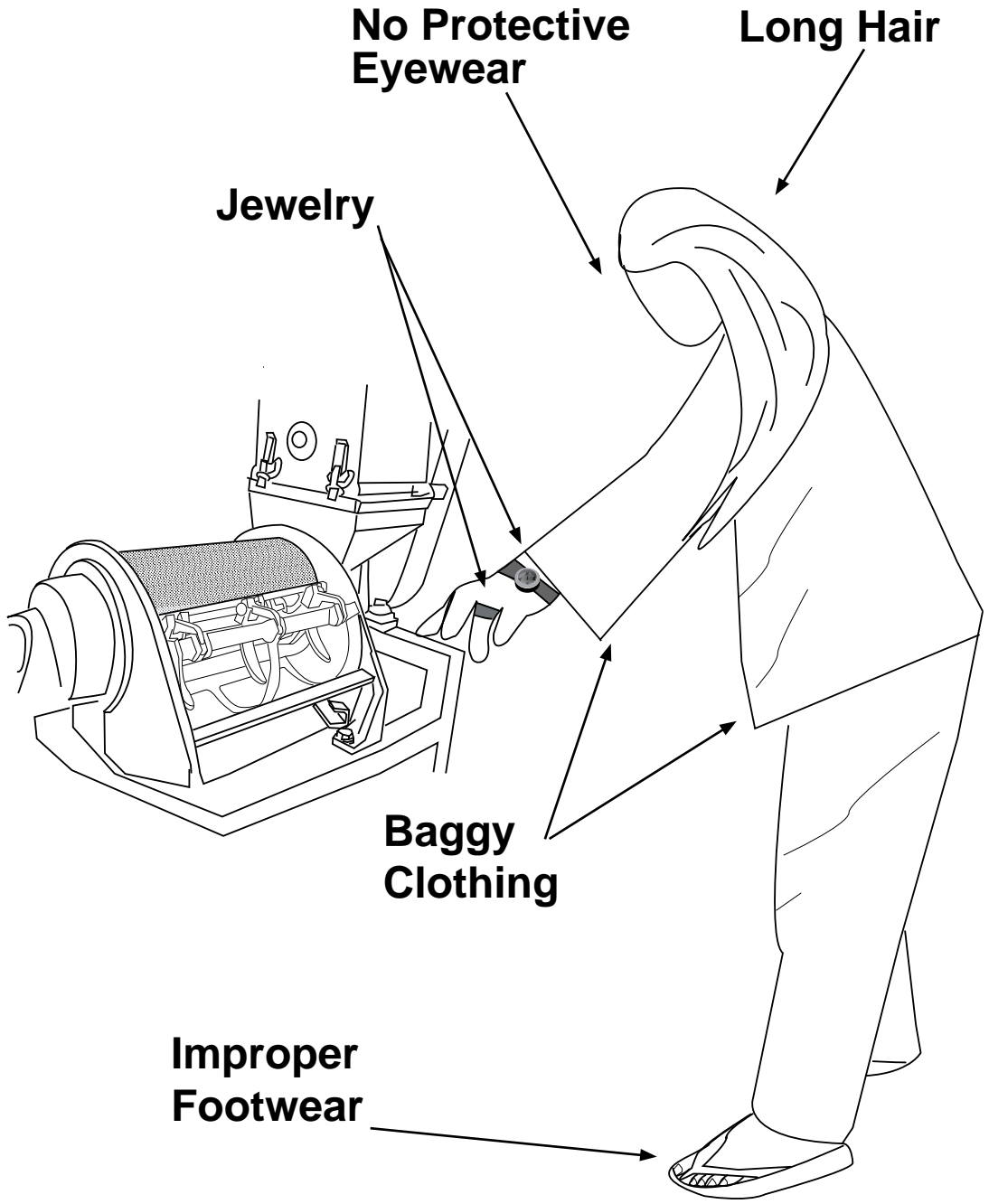
Evaluation

Answer the quiz questions on page 32 of the *Machine Hazards* manual individually or as a group. Be sure to discuss each item.

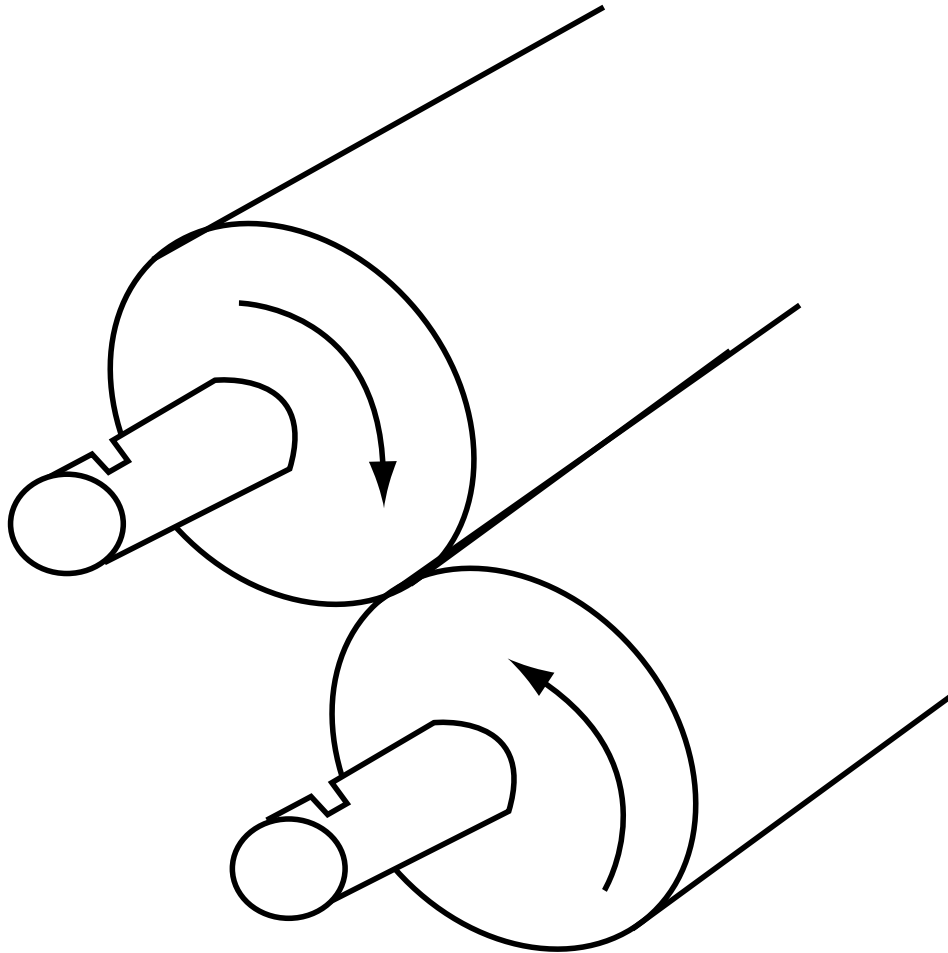
What's Wrong With This Picture?



What's Wrong With This Picture?

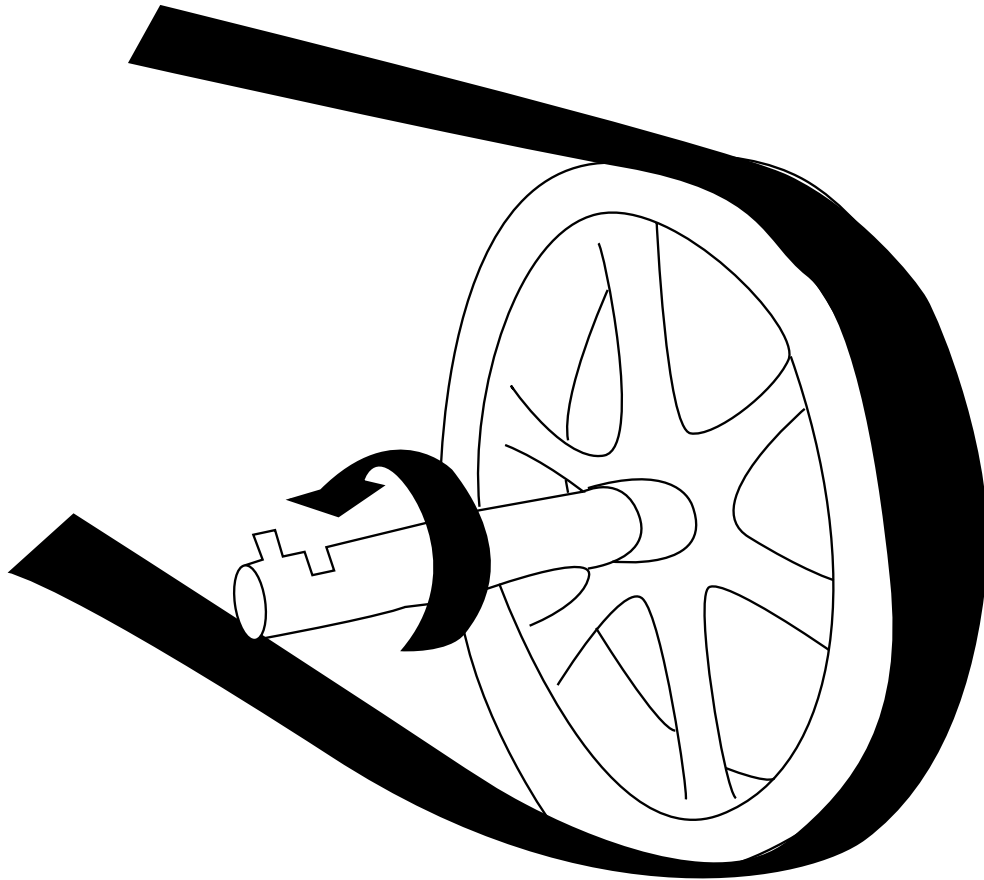


What are the Dangers?



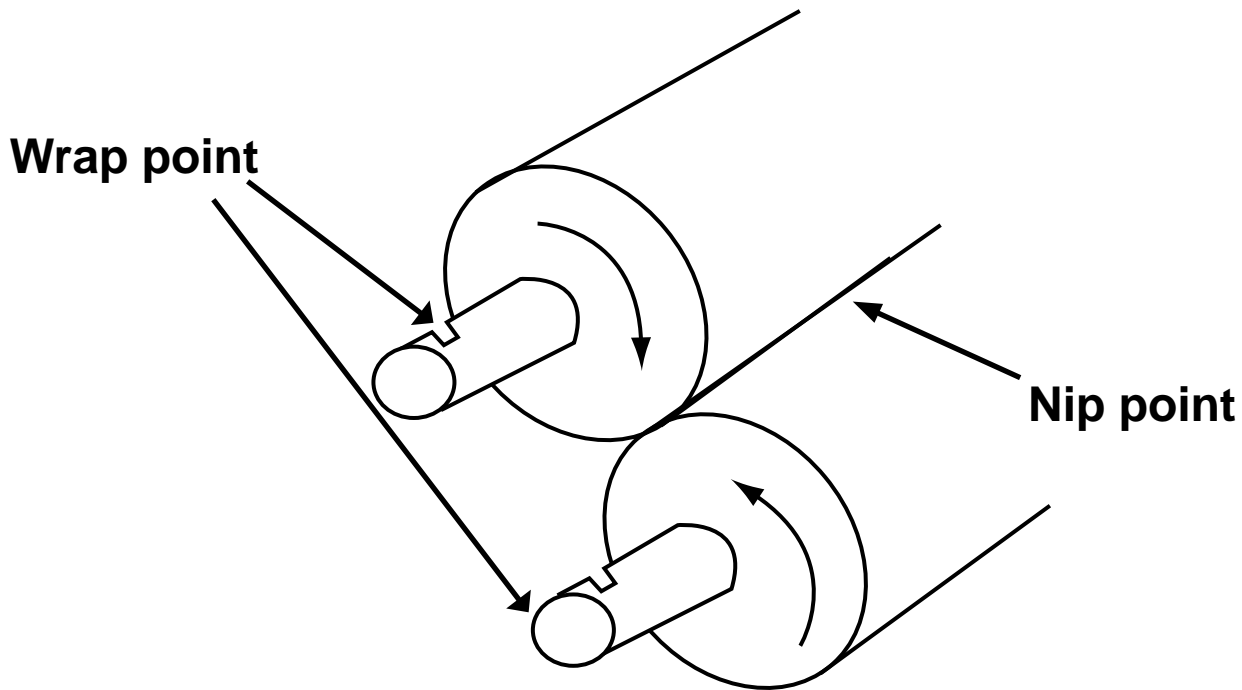
How Would You Protect Yourself?

What are the Dangers?



How Would You Protect Yourself?

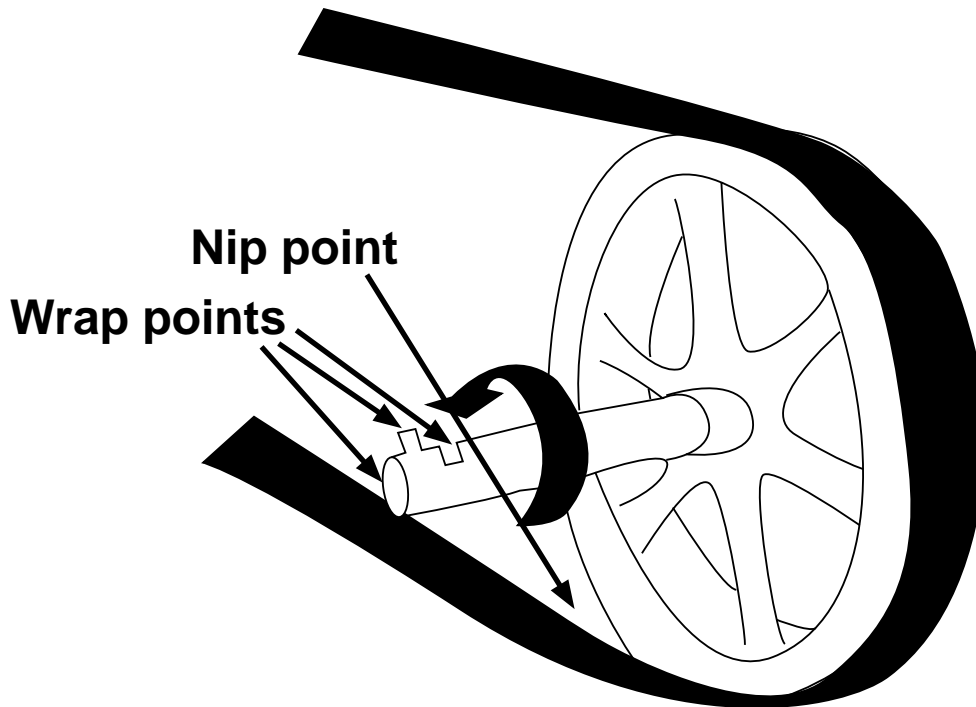
What are the Dangers?



How Would You Protect Yourself?

- ▶ Keep guards in place
- ▶ Follow company procedure for cleaning and maintenance
- ▶ Keep out of danger zones
- ▶ Wear appropriate clothing

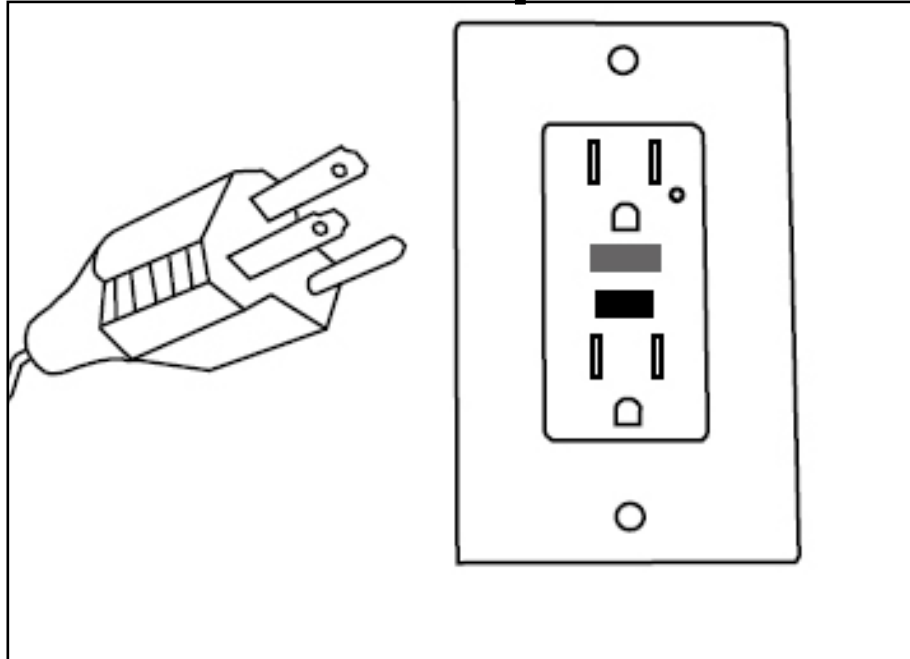
What are the Dangers?



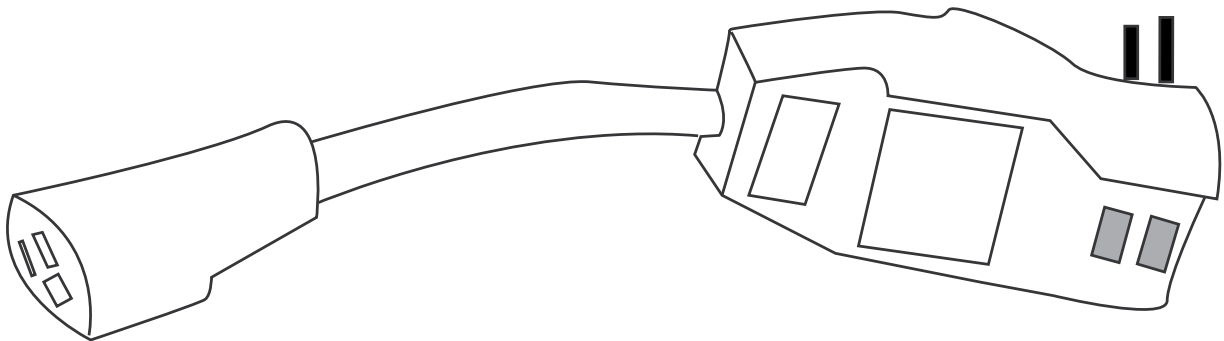
How Would You Protect Yourself?

- ▶ Keep guards in place
- ▶ Follow company procedure for cleaning and maintenance
- ▶ Keep out of danger zones
- ▶ Wear appropriate clothing

Ground Fault Circuit Interrupter



Portable Ground Fault Circuit Interrupter



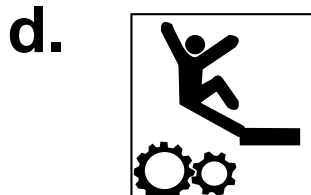
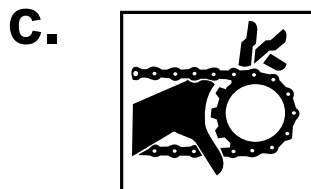
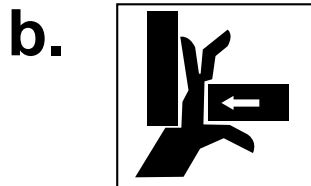
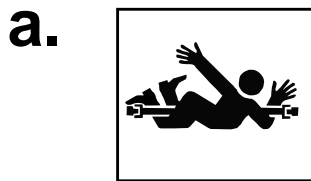
- 1. Which of the following types of hearing protection is LEAST LIKELY to be effective if you have long hair, sideburns, and eyeglasses?**
 - a. Plugs with NRR = 30**
 - b. Muffs with NRR = 30**
 - c. Canal caps with NRR = 30**

- 2. Which of the following is the BEST PRACTICE for using electrical equipment?**
 - a. Staple electrical cords to the floor so no one trips over them.**
 - b. Splice damaged electrical cords using lots of electrical tape.**
 - c. Label circuit breakers so you can find them in case of an emergency.**
 - d. Keep extension cords wet so they don't overheat.**

- 3. Which of the following is the BEST PRACTICE when servicing food processing and manufacturing machines?**
- a. Shut down and lock out power before reaching into a danger zone.**
 - b. Reach around any guards that are in your way.**
 - c. Shut off power and begin removing guards while the machine parts are coasting to a stop.**
 - d. Don't tell your co-workers what you are doing. They have enough problems of their own.**
- 4. Which of the following can be hazardous when working around food processing and manufacturing machines?**
- a. Long hair**
 - b. Jewelry**
 - c. Baggy clothing**
 - d. All of the above**

- 5. Which of the following is the BEST PRACTICE when operating food processing and manufacturing machines?**
- a. It is OK to climb over or under conveyer belts if you are in a hurry to get to the other side of the machine.**
 - b. Never reach over unguarded moving parts.**
 - c. If you notice that a guard is missing from a machine, finish your shift and then report it to your supervisor.**
 - d. It is OK to stand on a conveyer to change a light bulb if you don't have a ladder.**
- 6. Which of the following must you have BEFORE you wear a respirator?**
- a. Medical evaluation**
 - b. Respirator fit test**
 - c. Training in the use, maintenance and limitations of respirators**
 - d. All of the above**

7. Which of the following safety signs shows a nip point?

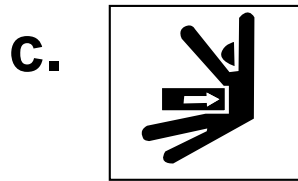
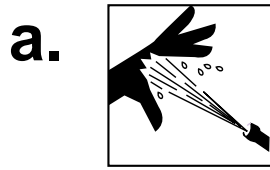


8. Which of the following is a safety device that prevents a machine from being started when a machine guard is not in a safe operating position?

- a. Two hand control
- b. Pullback
- c. Interlock

- 9. Which of the following is the BEST PRACTICE for using machines with safety devices?**
- a. Adjust pullbacks to fit the operator.**
 - b. Use two operators if the machine has “two-hand controls.”**
 - c. Disable interlocks if they interfere with your work.**
- 10. Which of the following is the BEST PRACTICE for clearing jams and cleaning food processing and manufacturing machines?**
- a. Use compressed air with a pressure of at least 60 p.s.i. to clean out small crevices in the machine.**
 - b. If you are behind schedule, it is OK to remove all guards and reach over moving parts while the machine is running.**
 - c. Shut down and lock out power before reaching into a danger zone.**

11. Which of the following safety signs shows a crush point?



- 12. After shutting off the power at its source (circuit breaker, valve, disconnect switch, etc.), what additional lockout/tagout procedures should you follow before servicing the machine?**
- a. Relieve air or hydraulic pressure, and release or control any other stored power.**
 - b. Test electrical circuits and electrical parts.**
 - c. Test the controls to make sure the equipment will not start.**
 - d. All of the above.**
- 13. Which of the following is most likely to protect you from being killed by electric current?**
- a. 20-amp circuit breaker.**
 - b. Ground-fault circuit interrupter**
 - c. Capacitor**

14. Which of the following is the BEST PRACTICE for portable electrical equipment?

- a. Never carry a tool by its power cord.**
- b. Remove grounding prongs so three-prong plugs will fit into two-prong outlets.**
- c. Use a large power strip whenever you need to plug 10 cords into an outlet that is designed for 2 plugs.**
- d. If you believe someone is being shocked, immediately grab the person and pull him/her away from the power source.**

15. True or false?

Lockout/tagout is required when servicing a machine if you remove a guard or other safety device.

16. True or false?

Lockout/tagout is required when servicing a machine if you place your hand or any other part of your body into a danger zone.

17. What is the BEST ORDER for shutting down a mixer for lockout/tagout?

- a. Inform your co-workers. Shut off the power at the circuit breaker. Make sure the mixer switch is off.**
- b. Shut off the power at the circuit breaker. Make sure the mixer switch is off.**
- c. Inform your co-workers. Make sure the mixer switch is off. Shut off the power at the circuit breaker.**

18. What is the BEST ORDER for returning equipment to service after lockout/tagout?

- a. Replace all guards. Make sure co-workers are out of the way. Remove locks/tags. Turn on power at its source. Tell co-workers when the machine is ready to be used.**
- b. Make sure co-workers are out of the way. Remove locks/tags. Turn on power at its source. Replace all guards. Tell co-workers when the machine is ready to be used.**

19. True or false?

If the power to your machine has been shut off and you find a tag that says “Do not operate,” it is OK to turn the power on and start the machine if you can see that the repair work has been completed.

20. Which of the following is most likely to be a confined space?

- a. Basement with a normal stairway and full-size door**
- b. Five-gallon bucket**
- c. 1,000-gallon storage tank with a manhole entry**
- d. Attic with a normal stairway and full-size door**

21. Which of the following confined spaces can you enter WITHOUT a written permit?

- a. Empty crawl space with good ventilation and no known hazards**
- b. Large mixing tank with moving parts**
- c. Empty hopper with a bottom that slopes into an 18-inch diameter opening.**
- d. A storage tank that has been purged with nitrogen gas.**

Answer Key

- 1. b
- 2. c
- 3. a
- 4. d
- 5. b
- 6. d
- 7. c
- 8. c
- 9. a
- 10. c
- 11. c

Machine Hazards Conclusion

- 12. d
- 13. b
- 14. a
- 15. T
- 16. T
- 17. c
- 18. a
- 19. F
- 20. c
- 21. a

Lift Truck Safety Training Guide

Suggested Materials

- Lift Truck Safety* manuals (English, MF2759; Spanish, MF2759S)
- Sign-in Sheet
- Pencils
- Instructor Guide
- Training Overheads/Slides/Projector
- Blank Overheads/Flipchart/Blackboard/Pen for listing participant responses and outlining important concepts
- Pallets
- Lift Trucks and Trailer
- Balance and weights (see page 48 for materials list)
- Pry Bar

Sources of Background Information

- ▶ *Lift Truck Safety* manual available for download:
http://www.oznet.ksu.edu/agsafe/training/OSHA_training.htm
- ▶ Powered Industrial Trucks Information:
<http://www.osha.gov/SLTC/poweredinustrialtrucks/index.html>
- ▶ Operator's manuals for lift truck (available from dealer)

Length of Time Needed for Training

Review and select the learning activities that are most appropriate. If all of the discussion and hands-on exercises are included in the training it may take up to a full work day. Without the hands-on exercises, the classroom portion will take about two hours.

Welcome and Introduction

- ▶ Introduce yourself.
- ▶ Remind participants of the topic of the training.
- ▶ Discuss breaks, locations of restrooms, ending time and any tests or evaluations.
- ▶ Tell participants you expect them to play an active role by relating their experiences and knowledge.

Participant Introductions

Find out:

- ▶ Who are they?
- ▶ What is their experience with lift trucks in the workplace?
- ▶ What do they hope to learn from the training?

Questioning/Discussion

Before beginning Lesson 1:

- ▶ Ask participants what types of serious incidents are most likely to happen with lift trucks at their workplace. List ideas on an overhead or flipchart.

Lesson 1

Take Control of Your Own Safety

Suggested Objectives

- Name the most common types of lift truck accidents.
- Identify safety signs related to lift truck use.

Discuss Accident Reports, pages 4-5 of the *Lift Truck Safety* manual

Have any participants known someone who has been killed or seriously injured in a lift truck accident while on the job? Would any participant care to share what happened?

How well did participants' ideas for the most common causes of accidents match those on pages 4-5 of *Lift Truck Safety*? (Refer to the overhead or flipchart list made during the introduction.)

Discuss the Operator Certification box on page 5 of *Lift Truck Safety*.

- ▶ What does it mean to allow an underage worker to use a forklift? Untrained worker?
- ▶ Discuss the company policy regarding underage and/or untrained coworkers operating lift trucks.

Questioning

What safety signs have participants seen on lift trucks?

Where are data plates located on the lift trucks participants use?

- ▶ What important information is located on the data plate?

Evaluation

As a group, answer the quiz items on page 7 of *Lift Truck Safety*. Be sure to discuss each item.

Questioning/Discussion

Before beginning Lesson 2:

- ▶ What items do participants inspect on their lift trucks before operating? List answers on an overhead or flipchart.

Prepare for Safe Operation

Suggested Objectives

- Describe how to inspect a lift truck before operation.
- Discuss safe startup, operation and shutdown procedures.

Discussion/Visual Aid

Refer to pages 8-9 of *Lift Truck Safety* and the overheads on pages 58-63 of this guide.

- ▶ What types of lift trucks have participants operated in the past?
- ▶ What are some unique characteristics or dangers associated with those lift trucks?
- ▶ Discuss any other lift trucks that will be used in the workplace.

Discussion Items

How well did participants' list of inspection items match the daily checklist on page 9 of the *Lift Truck Safety* manual? (Refer to the overhead or flipchart list made in Lesson 1.)

Refer to the daily checklist on page 9 of *Lift Truck Safety*.

- ▶ For each item ask a participant to describe an accident or injury that can happen if the checklist item is ignored.

Ask a volunteer to read and discuss the Accident Report on page 11 of *Lift Truck Safety*

Hands-on Exercise

Have participants inspect and wear any personal protective equipment that is required for their work. Discuss the importance of each item.

Try on hearing protection:

- ▶ Follow manufacturer's procedure or use the general procedure below.
- ▶ Demonstrate technique.
- ▶ Provide feedback as participants practice.

Lesson 2

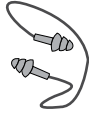
Types of Hearing Protection:



Ear Plugs



- ▶ Clean hands.
- ▶ Roll ear plug between fingers to compress it.
- ▶ Grasp ear from behind your head with opposite hand and pull up to straighten ear canal.
- ▶ Insert ear plug until it blocks sound, then hold in place while it expands. (Count out loud to 20 while it expands.)



- ▶ Ear plug must completely fill ear canal.
- ▶ Test fit by cupping hands over ears and then releasing. There should not be much difference in sound.
- ▶ Wash reusable plugs in warm soapy water after use/throw away disposable after each use.

Hearing Bands



- ▶ Grasp ear from behind your head with opposite hand and pull up to straighten ear canal.
- ▶ Use your hands to press the ear pads into the ear canals.
- ▶ Test fit in a noisy environment: Lightly press band inward and you should not notice much reduction in noise level.

Ear Muffs



- ▶ Make sure the cushions fully cover the ear and seal tightly against the head.
- ▶ Hold the headband at the crown of the head and adjust each cup.
- ▶ Test fit in a noisy environment: Gently push the cups toward your head and release. There should not be much difference in noise level.

Visual Aid

Discuss the overhead “Is This a Good Idea?” provided on page 64 of this guide.

- ▶ Ask participants to identify all safety problems indicated in the story.
- ▶ Discuss any items in Safe Start Up Procedures on pages 11-12 *Lift Truck Safety* that weren't mentioned.

Discuss the Accident Report, page 12 of *Lift Truck Safety*

Discuss Hazardous Locations (see page 12 of *Lift Truck Safety*)

What hazardous locations exist in the plant?

- ▶ Which lift trucks are permitted in these locations?

Visual Aid/Discussion

Discuss the Accident Report overhead provided on page 65 of this guide.

- ▶ How could this accident have been prevented?
- ▶ Discuss items not mentioned from Parking and Shutdown Procedures on page 13 of *Lift Truck Safety*.

Make sure participants understand the difference between parking and shutting down a lift truck.

What is the company policy and procedure for repairing and removing equipment from service?

Discuss each point of 'Be A Safe Driver' on page 13 of *Lift Truck Safety*

For instance:

- ▶ Discuss company speed limits.
- ▶ Discuss conditions when following distance between lift trucks should increase.
For instance:
 - ▶ on ramps,
 - ▶ wet surfaces, or
 - ▶ with heavy loads
- ▶ Use the Accident Report overhead provided on page 66 of this guide to discuss the dangers of horseplay.
- ▶ What causes participants to be distracted while operating lift trucks at their job?
- ▶ Why it is important to not drive straight up to an individual?
- ▶ What are some locations in the plant where there are likely to be loose objects in lift truck lanes? What should participants do when they see these objects?
- ▶ Why is it dangerous to pass another lift truck that is stopped in an aisle or at an intersection in a warehouse?
- ▶ Why is it hazardous to open freight doors with the forks of lift trucks? (Applying force with forks raised may cause the lift truck to tip over.)
- ▶ Discuss any company procedures for operating lift trucks on elevators.

Evaluation

Answer the quiz questions on page 14 of *Lift Truck Safety* individually or as a class. Be sure to discuss each item.

Hands-on Performance Evaluation

Divide the class into groups of three to five participants.

- ▶ In a safe area with adequate supervision, have each participant perform a pre-operation inspection, using the company checklist or the Pre-Operation Inspection provided on page 67 of this guide.
- ▶ Ask participants to record the maximum load and load center information from the data plate.
- ▶ Bring the class together and ask each group to share the results of their inspection.

Lesson 3

Avoid Rollover Accidents

Suggested Objectives

- Evaluate the causes of lift truck rollover accidents.
- Describe safety procedures to avoid rollover accidents.

Ask a volunteer to read and discuss the Accident Report on page 15 of *Lift Truck Safety*

Visual Aid/Discussion

Discuss the overheads “Which is Safer?” provided on pages 68-71 of this guide.

- ▶ Ask participants to identify which operating practice is safer and why. The answer key is on page 72.
- ▶ Discuss any additional items from page 15 of *Lift Truck Safety* that have not been mentioned.

Discuss the Accident Report, page 16 of *Lift Truck Safety*

Visual Aids

Discuss the Stability Triangle overhead provided on page 73 of this guide.

- ▶ Are participants aware that most lift trucks have a three-point suspension system? (Even if the lift truck has four wheels, the steer axle is usually attached to the truck by a pivot pin in the axle’s center. The three-point support forms the stability triangle.)
- ▶ Can one of the participants describe “center of gravity” in his or her own words? (The center of gravity of a lift truck is the point at which the combined weight of the lift truck and the load are concentrated.)
- ▶ Demonstrate center of gravity, using your body as an example: When you stand up straight, your body’s center of gravity is centered over your feet and you are stable. On the other hand, when you lean forward, your center of gravity shifts toward your toes. If you lean far enough, you will fall forward because your body’s center of gravity will shift beyond your feet. Likewise, a lift truck will tip if its center of gravity shifts beyond the stability triangle (for instance, beyond the front axle).
- ▶ Where is the counterweight on the lift truck pictured in the overhead?
- ▶ On the overhead, why does the center of gravity shift forward when the lift truck picks up a load?
- ▶ What happens if the weight of the load exceeds the lift trucks’ rating?

Discuss the overhead provided on page 74 of this guide.

- ▶ Discuss how the combined center of gravity in this illustration is within the stability triangle
- ▶ Is the load in a safe position for driving?
- ▶ What happens to the combined center of gravity if the forklift hits a bump, ditch, or goes down a ramp with the load in this position?
- ▶ **Note:** Instructors may illustrate by tilting the overhead forward.

Discuss the overhead provided on page 75.

- ▶ Discuss the location of the combined center of gravity in this illustration.
- ▶ What happens to the combined center of gravity if the forklift hits a bump, ditch, or goes down a ramp with the load carried low as in this illustration?

Discuss the overhead provided on page 76.

- ▶ Discuss how the combined center of gravity is outside the stability triangle and the lift truck will tip forward. (Because the forks were not inserted fully under the load.)

Discuss the overhead provided on page 77.

- ▶ Discuss how the combined center of gravity changes depending on the height of the load.
- ▶ How does this affect the stability of the lift truck?
- ▶ Discuss how the load should be carried as low as possible when driving.

Analysis

Refer to the bulleted items on page 16 of *Lift Truck Safety*.

- ▶ For each item ask a participant to describe a situation in their workplace where the rule is especially important.

Demonstration

Obtain or build a small balance such as the one illustrated below.

► This balance was made from the following materials:

A - (1) 22-inch 2 x 4

B - (1) 10-inch 2 x 4

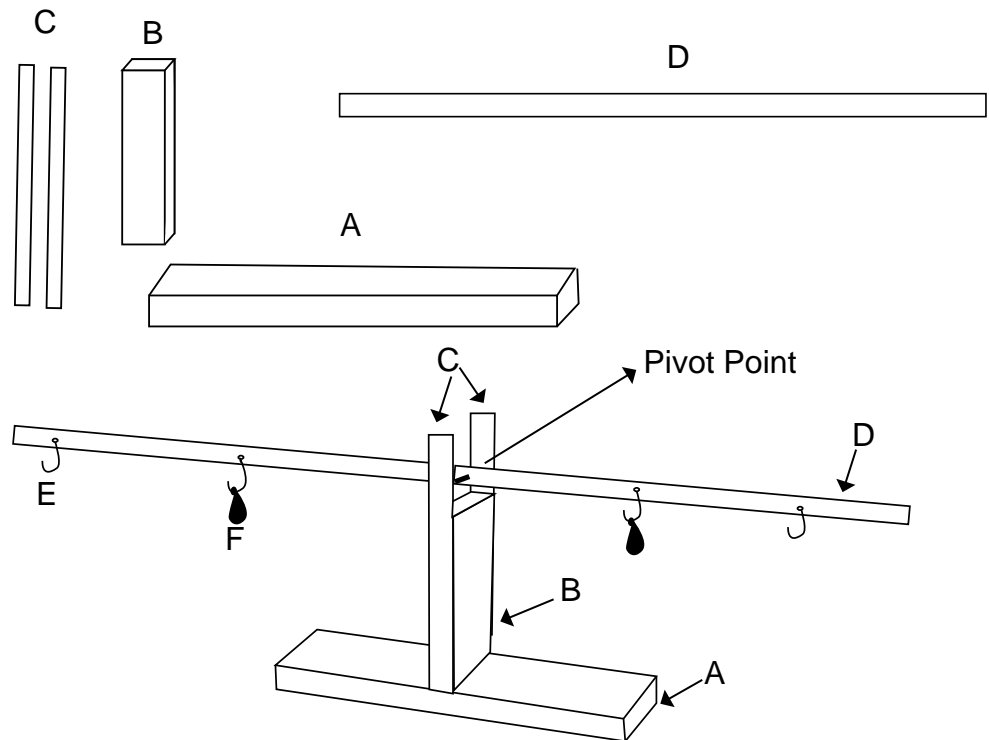
C - (2) 16-inch lattice with holes drilled 2-inches from the top

D - (1) 5-ft. lattice with a hole drilled at center and at 1-ft intervals on both sides of center (5 holes total-2 on each side of center)

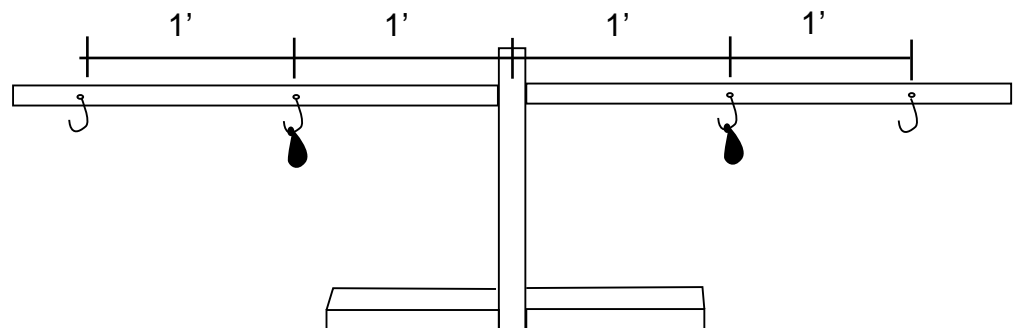
E - (4) 5-inch wire hooks

F - (3) fishing weights

► You will also need: a gutter spike or bolt to serve as the pivot point, drill and a drill bit appropriate for the spike or bolt. Finally, you will need nails and a hammer to fasten parts A, B, and C.

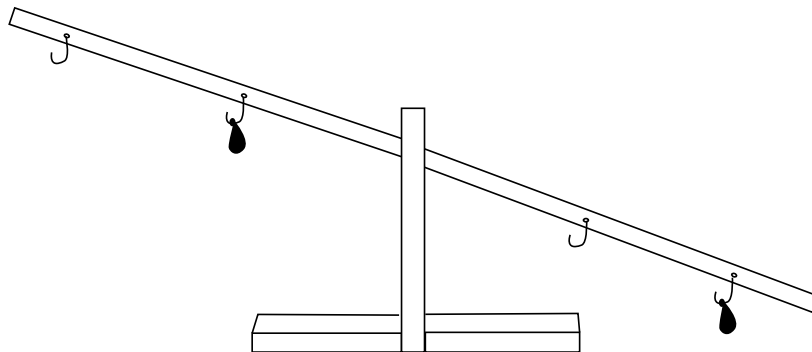


Set up the balance with 2 weights equally balanced; for instance, 1 weight 1 foot to the right of the pivot point, and 1 weight 1 foot to the left of the pivot point.



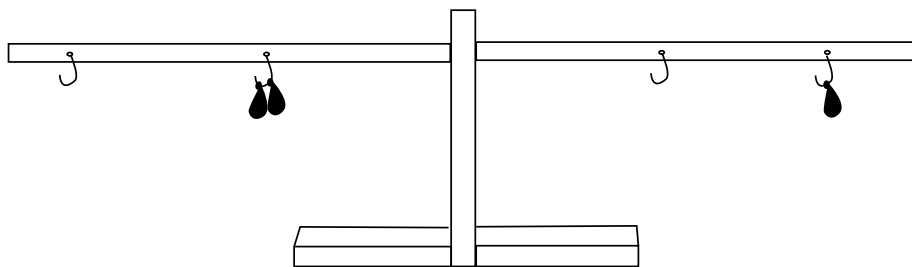
Discuss how the forces on the balance relate to the tipping forces on a lift truck. (Imagine that the pivot point represents the front axle, the forces on one side of the pivot point represent the load being lifted, and the forces on the other side represent the lift truck's counterweight.)

- ▶ What happens when the same load is applied to the forks farther from the front axle? (See illustration below.)



- ▶ What would happen to your lift truck in this situation?

Demonstrate how adding weights at various distances from the pivot results in different forces. For instance, adding one ounce two feet from the pivot results in a force that can be offset by adding two ounces one foot from the other side of the pivot. (See illustration below.) The basic concept is that the same weight exerts greater force if it is attached farther from the pivot.

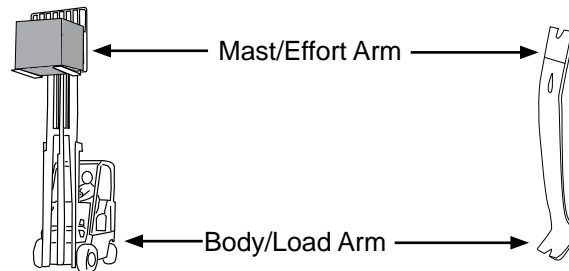


Background information for instructors who are not familiar with the concept of torque: Torque is a measure of force that results when weight is added at various distances from a pivot point. Torque is measured by multiplying weight or force times the distance from the pivot point. For instance, one pound of force applied one foot from the pivot point results in one foot-pound of torque. Two pounds of force applied one foot from the pivot point results in two foot-pounds of torque. Notice that two foot-pounds of torque also results if one pound of force is applied two feet from the pivot point. Torque can be measured in any convenient combination of force-times-distance, such as foot-pounds, inch-pounds, inch-ounces, Newton-meters, etc.

Demonstration

Show the class a pry bar.

- ▶ Discuss how torque is also used to describe the force exerted by a lever. In this case, torque equals the force applied to the lever multiplied by the distance from the fulcrum. To illustrate, if the effort arm is 6 times as long as the load arm, every pound of force applied at the end of the effort arm will exert six pounds of force at the end of the load arm.



- ▶ Discuss how the forces on the pry bar relate to the side-to-side forces on a lift truck. Imagine that the effort arm of the pry bar represents the mast of the lift truck and the load arm of the pry bar represents the body of the lift truck. If the lift truck is driven with the load raised, any side-to-side movement (e.g., hitting a bump) will exert strong forces that will tend to tip the lift truck sideways.

Analysis

Display the overhead “Finding Design Load Capacity” provided on page 78 of this guide.

- ▶ As a class, calculate the design load capacity for the lift truck on the overhead.

Display the overhead “Finding Maximum Load at Actual Load Center” provided on page 79.

- ▶ As a class, calculate the maximum load for the lift truck with the new load center of 36”.
- ▶ As a class, calculate the design load capacity of one of your lift trucks based on the information participants previously recorded from the data plates during the pre-operation inspection at the end of Lesson 2. (Refer to the overhead on page 78 for the formula.)
- ▶ As a class, calculate the maximum load for one of your lift trucks with a new load center. (Refer to the overhead on page 79 for the formula.)

Discuss the first Accident Report on page 18 of *Lift Truck Safety*

Discuss the company policy on safety belt use.

Discuss the purpose of rollover protection(ROPS) on company lift trucks.

Discuss the second Accident Report on page 18 of *Lift Truck Safety*

Hands-on Exercise

Divide the class into groups of three to five participants.

- ▶ Have each group inspect a trailer that has been positioned at the loading dock for training. Check the trailer using the bulleted items on page 18 of *Lift Truck Safety*.
- ▶ Bring the class together and have each group discuss with the class any problems they observed and how to correct them.

If a trailer is not available, discuss the bulleted items on Loading Dock Safety on page 18 of *Lift Truck Safety*.

Evaluation

Answer the quiz items on page 19 of *Lift Truck Safety* individually or as a class. Be sure to discuss each item.

Questioning/Discussion

Before beginning Lesson 4:

- ▶ Ask participants to describe how workers could be run over by a lift truck. List items on an overhead or flipchart.

Lesson 4

Avoid Runover Accidents

Suggested Objectives

- Recognize hazards that cause runover accidents.
- Explain safe practices for preventing runover accidents.

Discuss the Accident Reports, page 20 of *Lift Truck Safety*

Discuss the bulleted items on page 20 of *Lift Truck Safety*.

- ▶ For each item ask a participant to give an example of a location or job task where the rule is especially important in their workplace.

Refer to the list of runover accidents made by participants at the end of Lesson 3.

- ▶ Will the precautions on page 20 of *Lift Truck Safety* prevent all of these accidents?
- ▶ Can participants think of any additional precautions?

Discuss the Accident Reports, page 21 of *Lift Truck Safety*

Discuss the company policy related to driving lift trucks with loads that block the operator's view.

Discuss walking lanes and the company policy for operating lift trucks where workers are on foot.

Visual Aid

Display the overhead "Is This a Good Idea?" provided on page 80 of this guide.

- ▶ Ask participants to identify all safety problems indicated in the story.
- ▶ Discuss any additional items in Safe Parking and Shutdown Procedures on page 21 of *Lift Truck Safety* that weren't already mentioned.

Evaluation

Answer the quiz questions on page 22 of *Lift Truck Safety* individually or as a class. Be sure to discuss each item.

Questioning/Discussion

Before beginning Lesson 5:

- ▶ Describe some ways workers may be crushed by a lift truck's moving parts. List items on an overhead or flipchart.

Preventing Crushing Accidents

Lesson 5

Suggested Objectives

- Describe how people can be crushed by lift trucks.
- Discuss how to prevent crushing accidents.

Discuss all five Accident Reports in Lesson 5 of *Lift Truck Safety*

How well did participants' list of crushing injuries relate to the types of accidents described in Lesson 5? (Refer to the overhead or flipchart list made during Lesson 4.)

Contest

Divide the class into groups.

- ▶ Display the contest items provided on pages 81-85 of this guide.
- ▶ In turn, ask each group a multiple choice or true/false question from the overheads. Each group gets one point for every correct answer. If a group misses a question, allow the next group to answer it for a point. Keep track of points and recognize the winning group.
- ▶ Use the questions as opportunities to discuss the training material. The answer key is on pages 86-87.

Hands-on Exercises

Divide the class into groups of three to five participants.

- ▶ Have each group inspect different types of loaded pallets in their workplace.
- ▶ Bring the class back together and have each group discuss what hazards to consider with each type of load.
- ▶ How would participants keep these loads stable while transporting them?
- ▶ What special issues should be considered when stacking the materials in these loads?

Divide the class into groups of three to five participants.

- ▶ Have each group examine one or more lift trucks to identify areas where a worker could be crushed.
- ▶ Bring the class back together and have each group report hazards they saw and precautions they would take to avoid crushing accidents.

Visual Aid

If your class is unable to perform the above hands-on exercises, discuss the overheads of different types of lift trucks provided on pages 58-63 of this guide.

- ▶ Call on participants to identify crushing hazards and precautions for avoiding crushing accidents for each type of lift truck they will be using.

Evaluation

Answer the quiz questions on page 27 of *Lift Truck Safety* individually or as a class. Be sure to discuss each item.

Preventing Other Injuries and Illnesses

Lesson 6

Suggested Objectives

- Identify the safest practice for lifting workers.
- Recall safe maintenance and fueling procedures.
- Recognize other lift truck hazards.

Discuss the Accident Report, page 28 of *Lift Truck Safety*

Discuss the company policy and procedures for lifting personnel.

- ▶ How do company procedures compare with those listed on page 28 of *Lift Truck Safety*?

Hands-on Exercise

Demonstrate and then have participants practice attaching and operating any personnel lifting devices they will be using.

- ▶ **Note:** To prevent injury, do not perform this learning activity without appropriate supervision.

Discuss the Accident Report, page 29 of *Lift Truck Safety*

Discuss the company's policy on who can perform lift truck maintenance.

How are company vehicles tagged or marked when they are out of service?

- ▶ What special precautions and equipment do maintenance personnel currently use when repairing lift trucks?
- ▶ How do these compare with items on page 29 of *Lift Truck Safety*?

Discuss the hazards of carbon monoxide

Where and when is carbon monoxide a hazard in the workplace?

Discuss the Accident Report, page 30 of *Lift Truck Safety*

Hands-on Exercise

First demonstrate and then have participants practice fueling procedures for each type of lift truck they will be using.

- ▶ Discuss the company fueling policy.
- ▶ For gasoline-powered lift trucks, discuss the hazards of static sparks and the importance of not using gasoline as a cleaning fluid.
- ▶ For LP-gas engines, be sure to discuss ventilation and the proper way to check for leaks in fittings and hoses.
- ▶ For battery-powered trucks, discuss the importance of ventilation, personal protective equipment and first aid for acid burns.

Quick Questions

Display the overheads provided on pages 88-89 of this guide.

- ▶ Call on participants to answer and discuss questions. The answer key is on page 90.

Evaluation

Answer the quiz questions on page 32 of *Lift Truck Safety* individually or as a class. Be sure to discuss each item.

Conclusion

Case Studies

Break the class into small groups of three to five participants.

- ▶ Provide each group with one of the scenarios from pages 91-94 of this guide.
- ▶ Ask each group to answer the questions in their scenario, using the information in the *Lift Truck Safety* manual. If there are more than three groups, have more than one group work on the same scenario.
- ▶ Monitor the progress of the groups.
- ▶ Bring the class back together and ask for a representative from each group to read their problem and explain their solution.
- ▶ Ask other groups what they think of the proposed solution.

Discussion

Ask participants to share any questions or concerns they may want to discuss further.

Evaluation

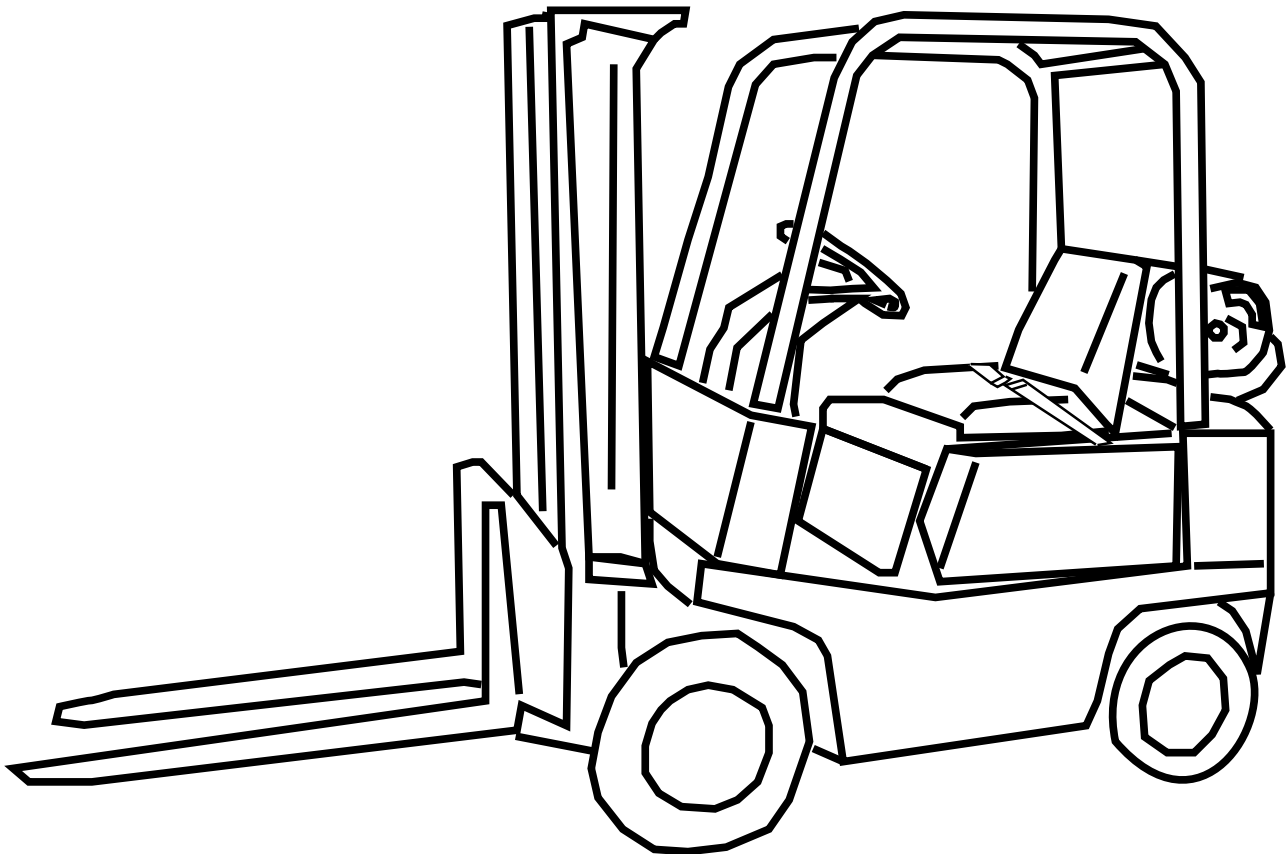
Answer the quiz questions on page 34 of *Lift Truck Safety* individually or as a group. Be sure to discuss each item.

Hands-on Performance Evaluation

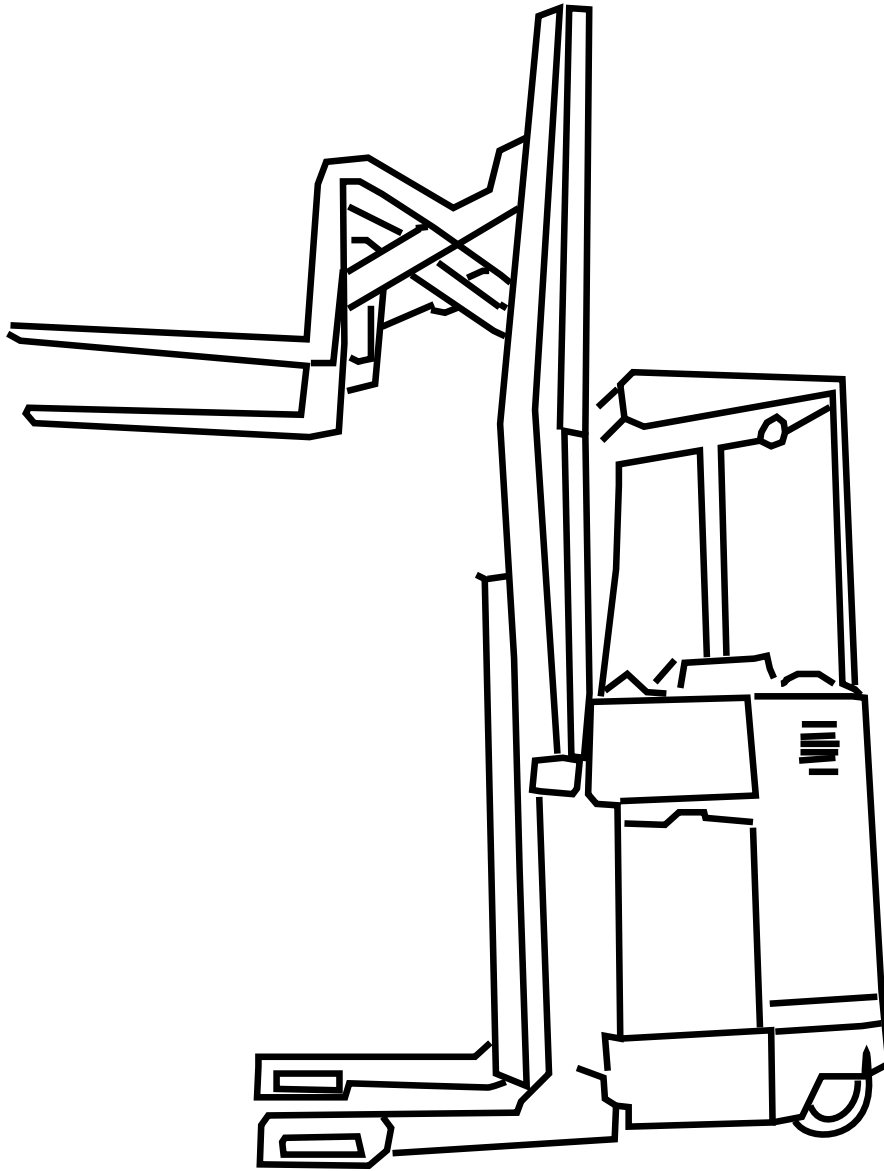
In a safe area with adequate supervision, have each participant complete a hands-on performance evaluation while operating a lift truck. The evaluation may include:

- ▶ Pre-Operation Inspection provided on page 67 of this guide.
- ▶ Safe start-up.
- ▶ Driving the lift truck, to perform a safe task.
- ▶ Safe loading and unloading.
- ▶ Safe shut-down and parking.
- ▶ A checklist for the performance evaluation is provided on page 95.

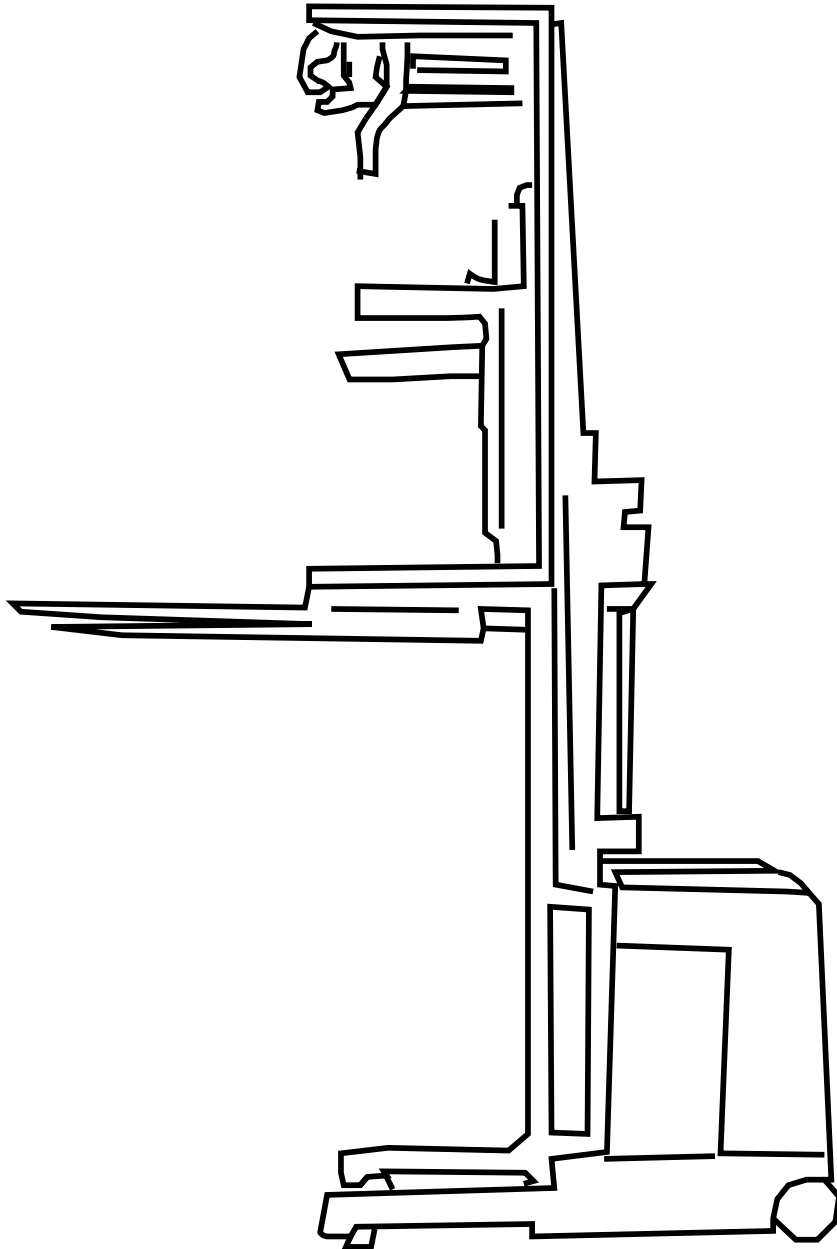
Sit-down Rider Lift Truck



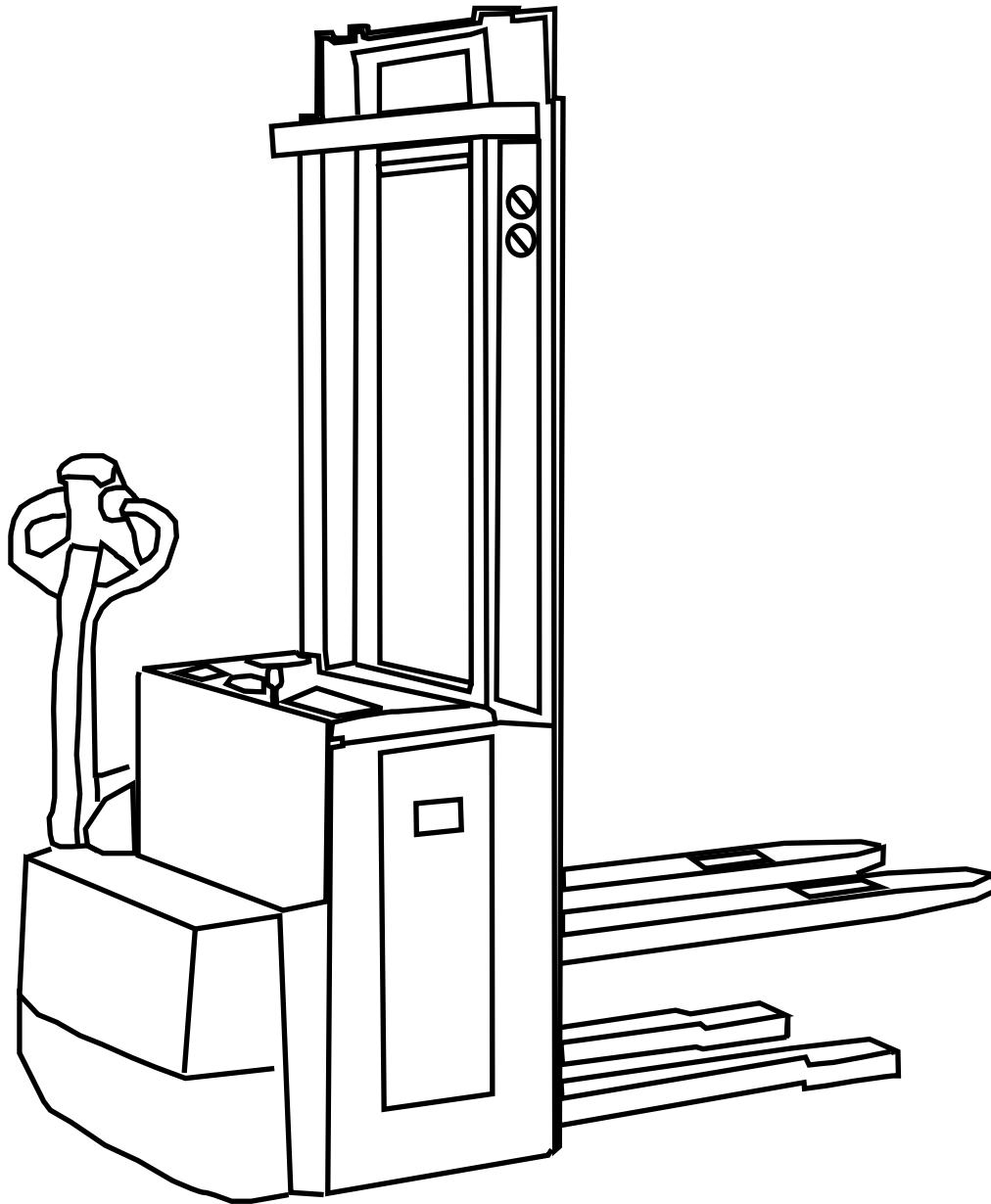
Stand-up Rider Lift Truck



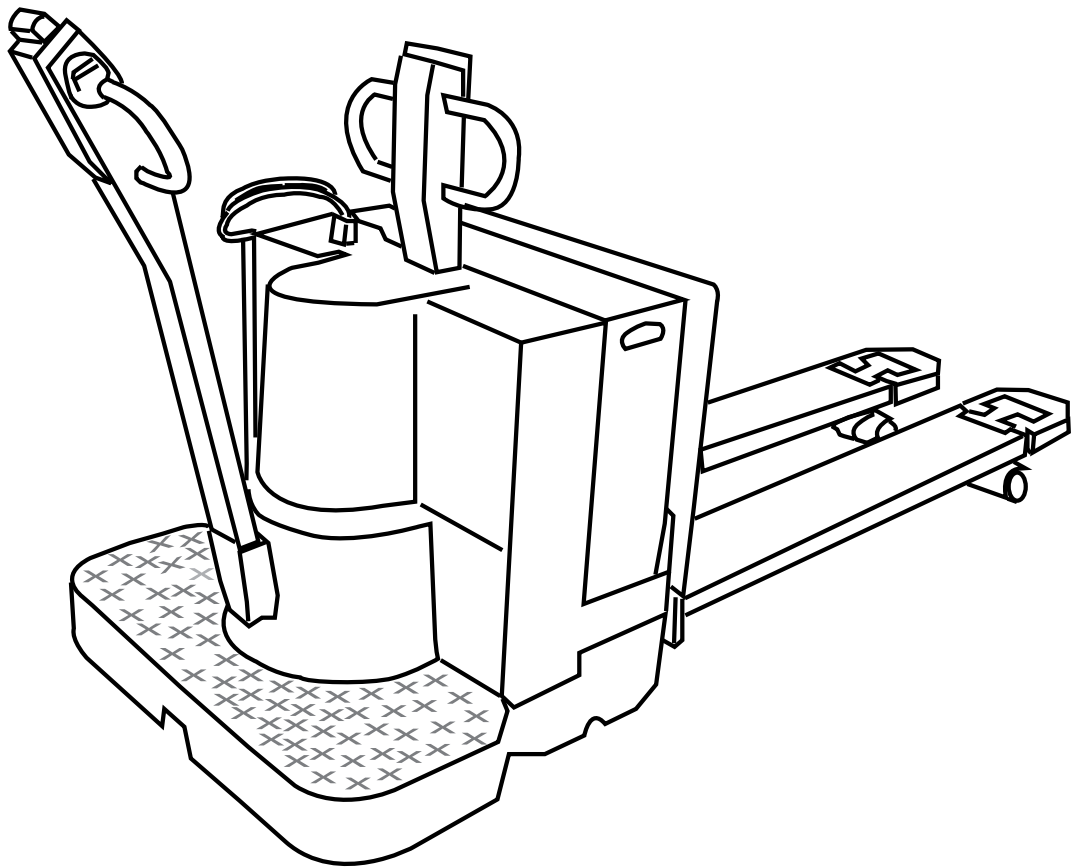
High-lift Order Picker



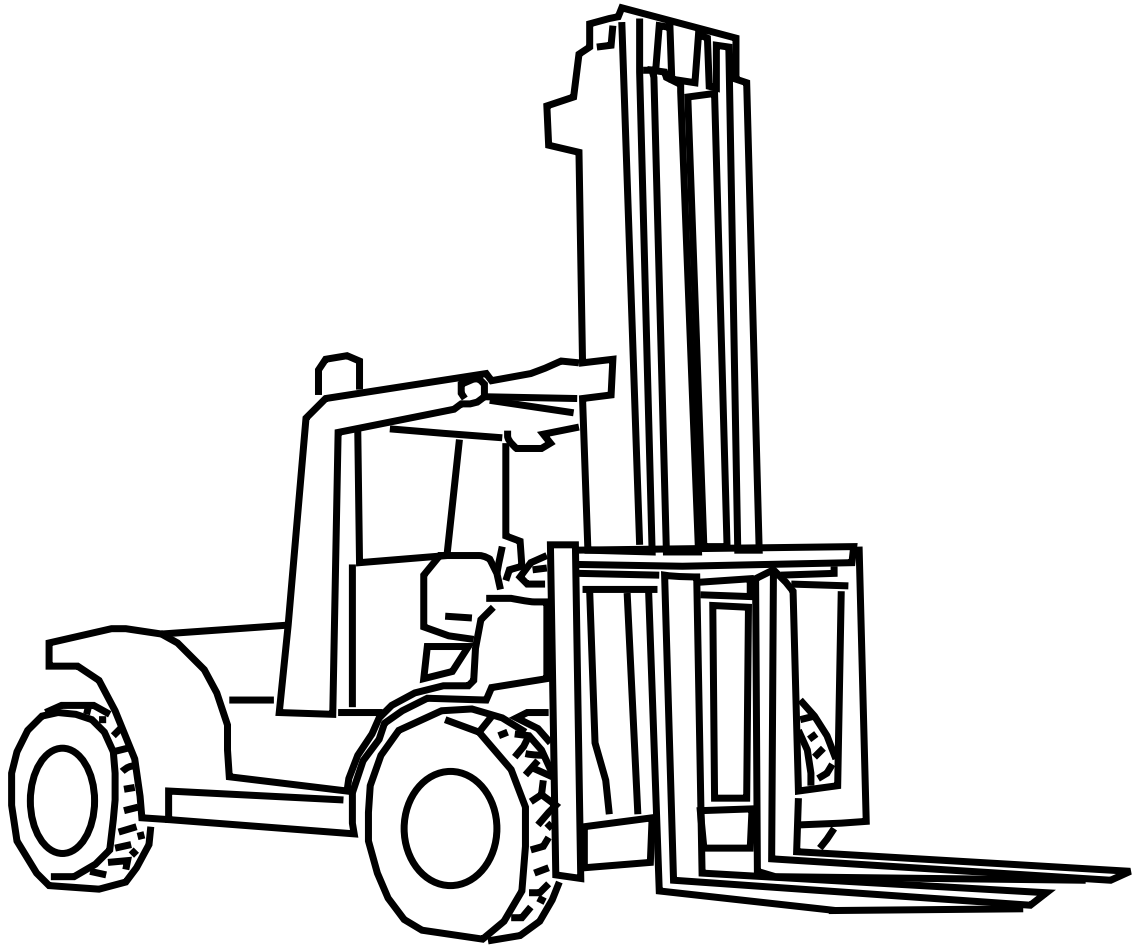
High-lift Pallet Jack



Low-lift Pallet Jack



Rough Terrain Lift Truck



Is This a Good Idea?

A supervisor told a worker to get a lift truck and move some pallets that were blocking an aisle. The worker ran to the loading dock and saw a lift truck parked with a tool box next to it. The carriage and forks of the lift truck were resting on a jack stand. The worker reached into the cab, turned the key to start the lift truck, and used the controls to raise the carriage and forks. She then walked under the forks and removed the jack stand. Finally, she grabbed one of the control handles in the cab and pulled herself up into the seat before driving off.

Accident Report Employee's Leg Injured When Run Over By Lift Truck

Summary of OSHA Accident Investigation
125583088

A worker drove a lift truck on to a trailer. He got off the lift truck, but forgot to place the controls in neutral and set the brakes. He saw the lift truck begin to roll. He pulled the accelerator handle causing the lift truck to lurch forward and run over his foot and leg.

Accident Report Employee Severely Burned as a Result of Coworker's Horseplay

Summary of OSHA Accident Investigation
0626000

An employee was refueling a lift truck with gasoline from an open 5-gallon plastic bucket. As a joke, a second employee lit a cigarette lighter less than a foot away. The vapors exploded, engulfing the first employee in flames and causing severe burns over 60 percent of his body.

Daily Pre-Operation Checklist: Lift Truck

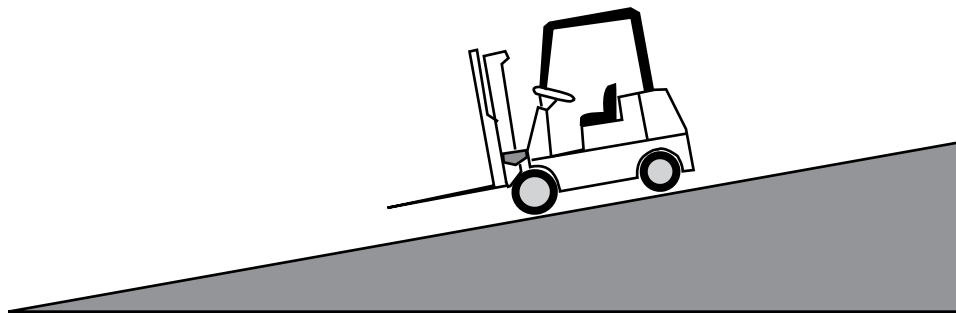
Operator: _____ Date: _____

Lift Truck ID: _____ Location: _____

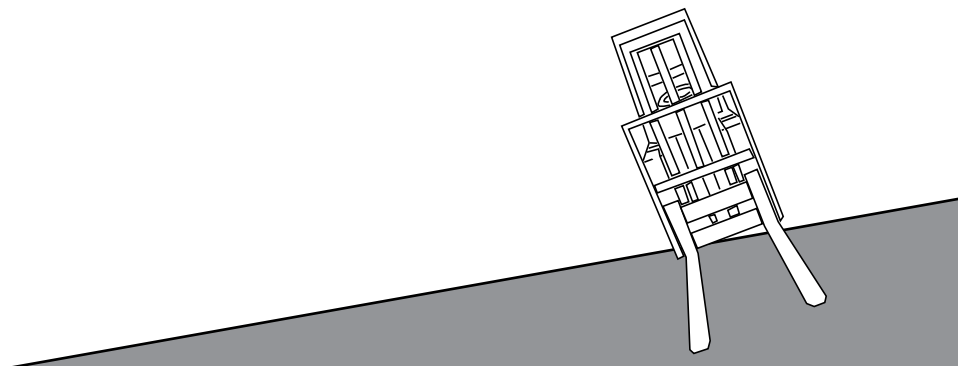
Item	OK	Needs Attention	Specific Comments
Tires <ul style="list-style-type: none"> ● Properly inflated, ballast ● No visible damage 			
Overhead Guard <ul style="list-style-type: none"> ● No broken welds ● No damaged or bent rails 			
Safety Belt/Safety Strap <ul style="list-style-type: none"> ● Undamaged ● Holds Securely 			
Forks <ul style="list-style-type: none"> ● Not mismatched, cracked, welded or bent ● Free of oil or other slippery substances 			
Mast Assembly/Lift Rollers/Chains <ul style="list-style-type: none"> ● No broken welds, missing stops or excessive wear ● No rust, smooth operation 			
Fluids <ul style="list-style-type: none"> ● No puddles under vehicle ● No drips, levels are normal 			
LP-Gas <ul style="list-style-type: none"> ● Hoses in good condition ● No gas smell 			
Battery <ul style="list-style-type: none"> ● Cables intact, insulation not damaged ● Caps and terminal covers in place 			
Operator's Platform <ul style="list-style-type: none"> ● No spills or debris ● Non-skid surface not worn 			
Horn/Lights/Mirrors <ul style="list-style-type: none"> ● Horn sounds ● Lights operational ● Mirrors clean and free of cracks 			
Data Plate <ul style="list-style-type: none"> ● Present and readable ● Truck rated for job/task 			
Vehicle Performance <ul style="list-style-type: none"> ● Controls are working properly ● Backup alarm sounds ● Brakes and steering functioning 			

Which is Safer?

Driving up or down a slope

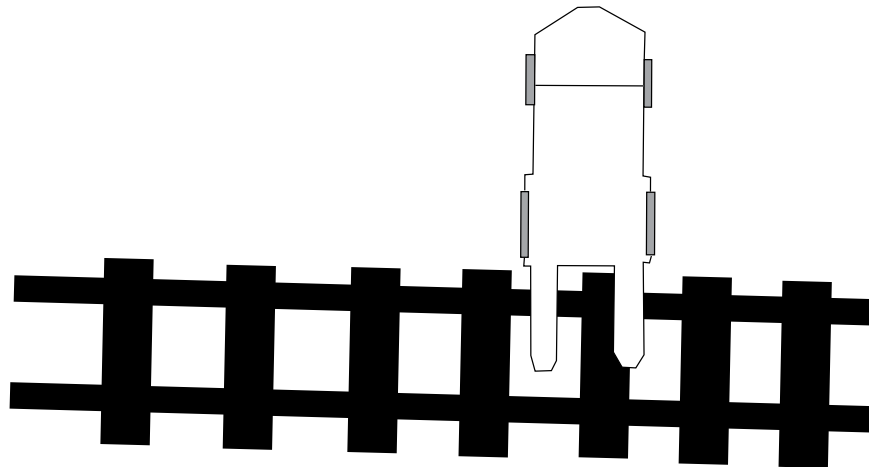


Driving across a slope

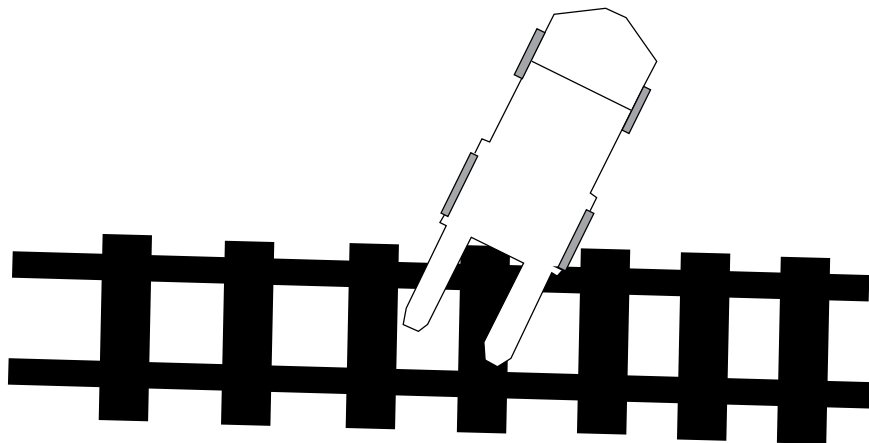


Which is Safer?

Driving straight across railroad tracks

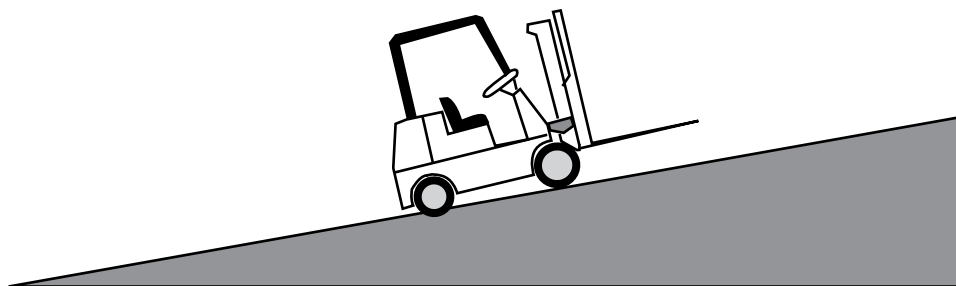


Driving across railroad tracks at an angle

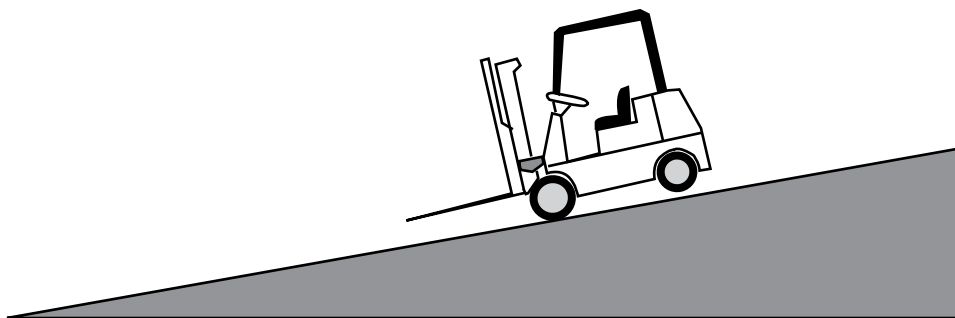


Which is Safer?

Heavy end downhill

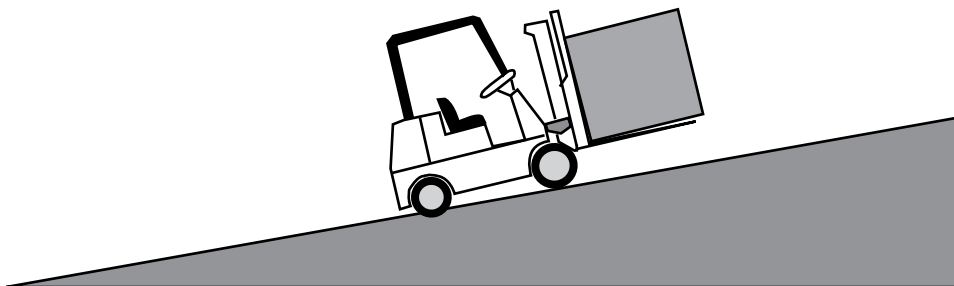


Heavy end uphill

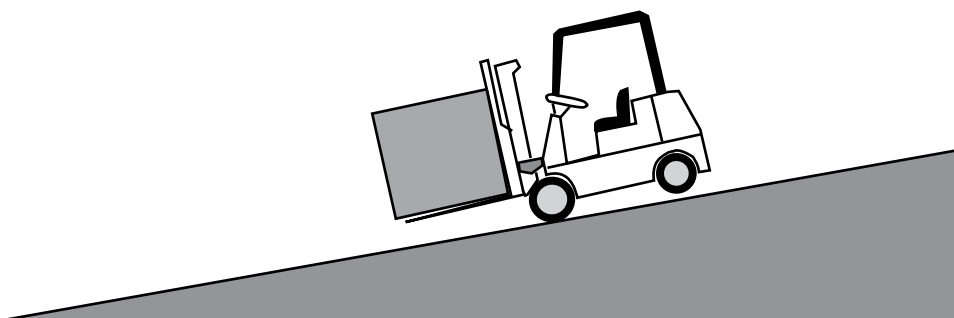


Which is Safer?

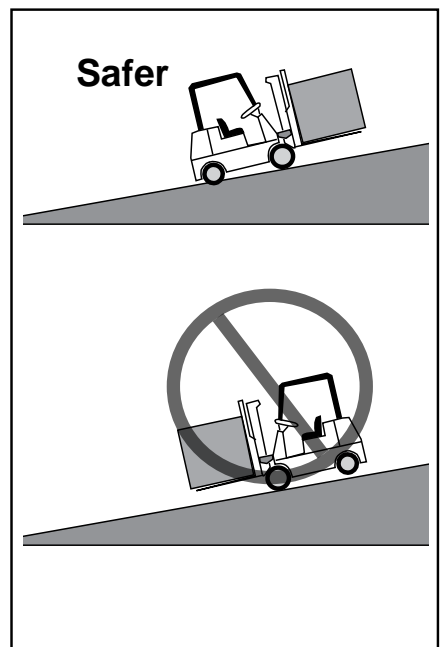
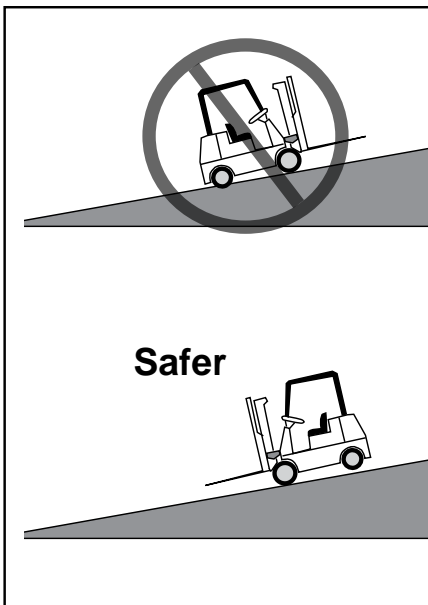
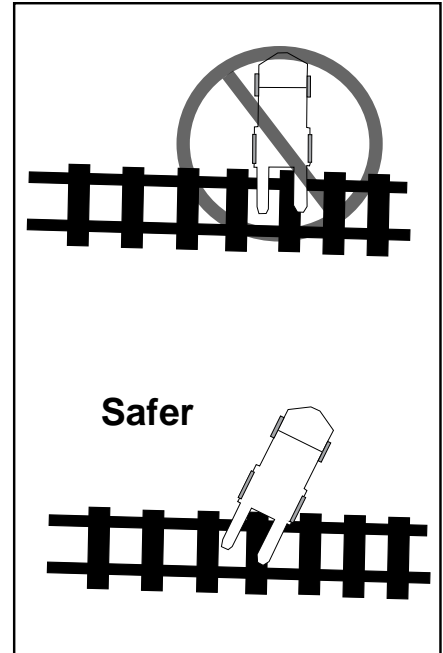
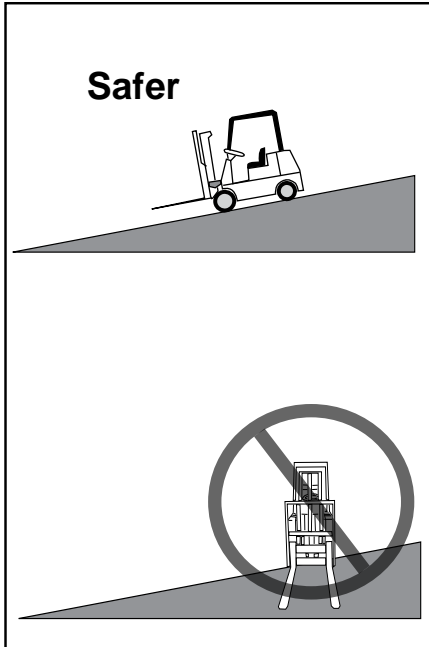
Load uphill



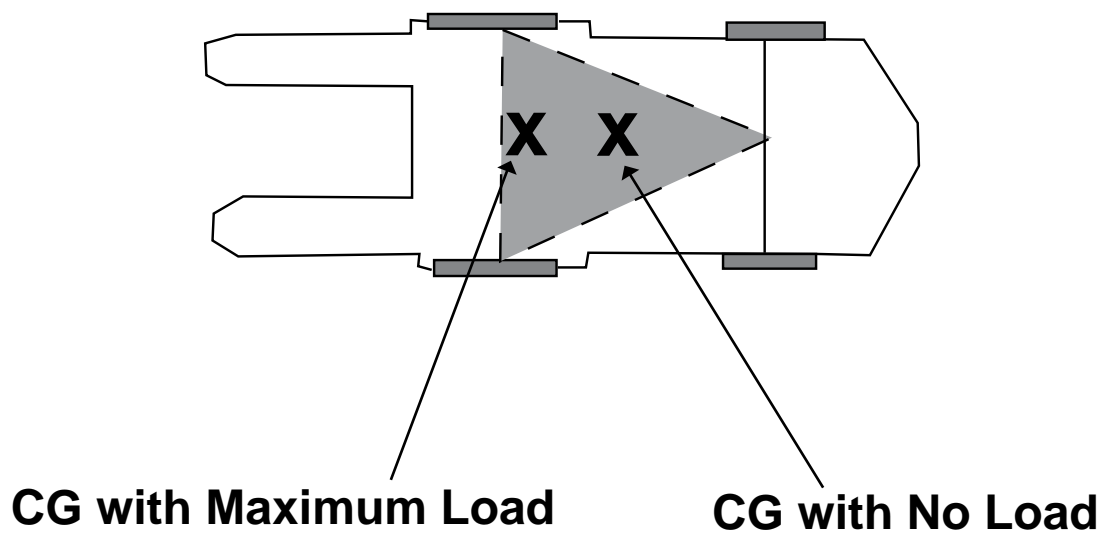
Load downhill



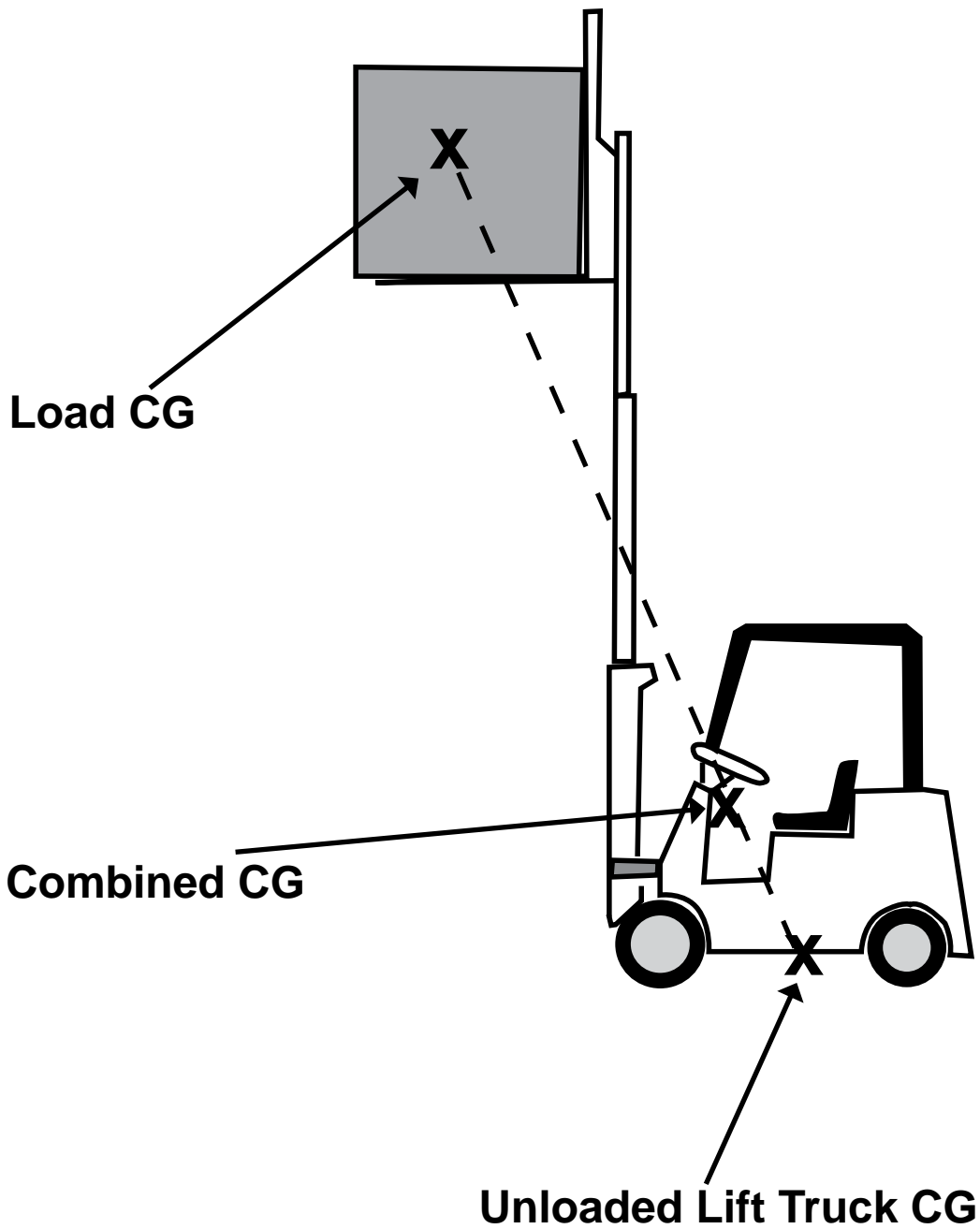
Which is Safer?



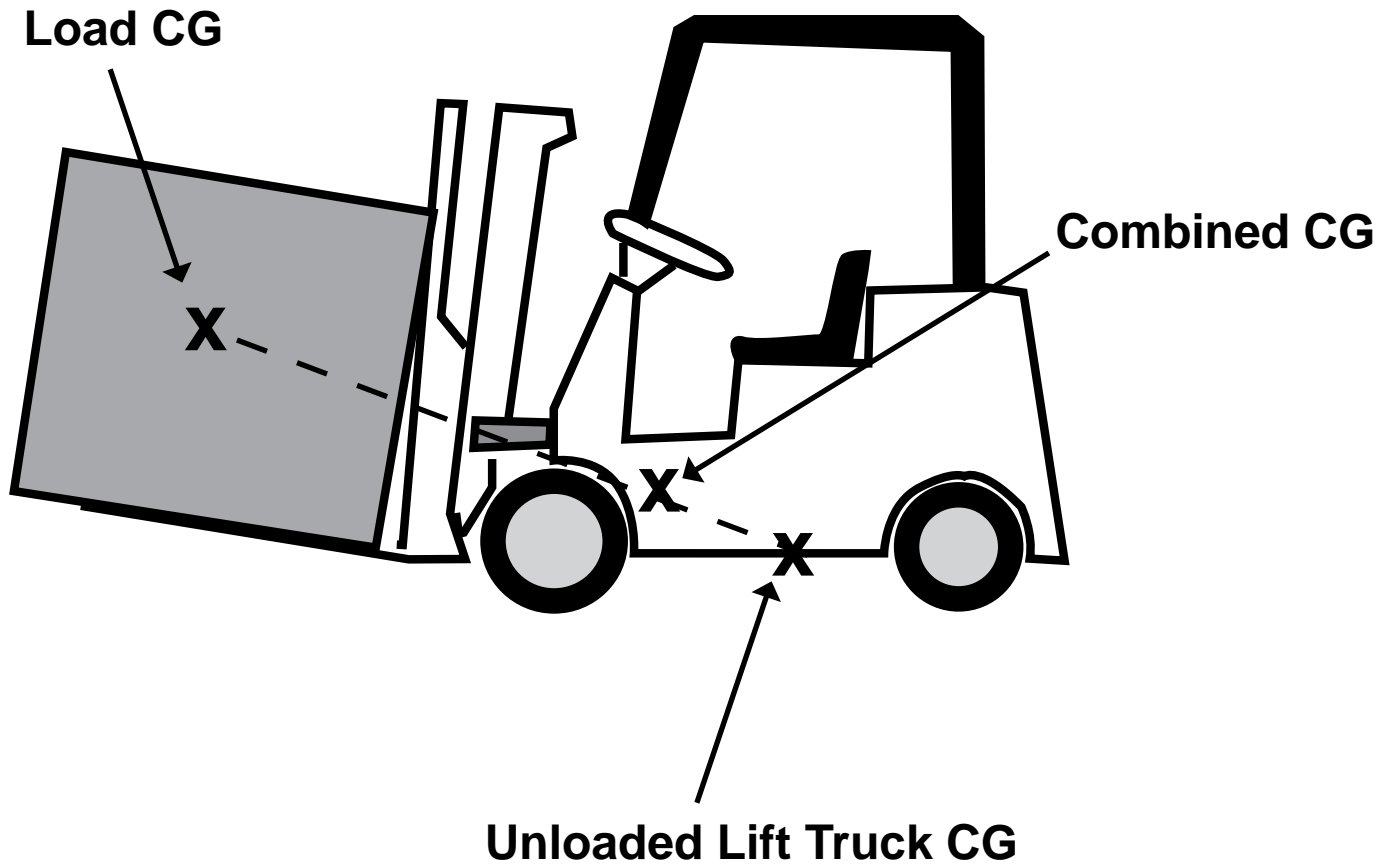
Stability Triangle



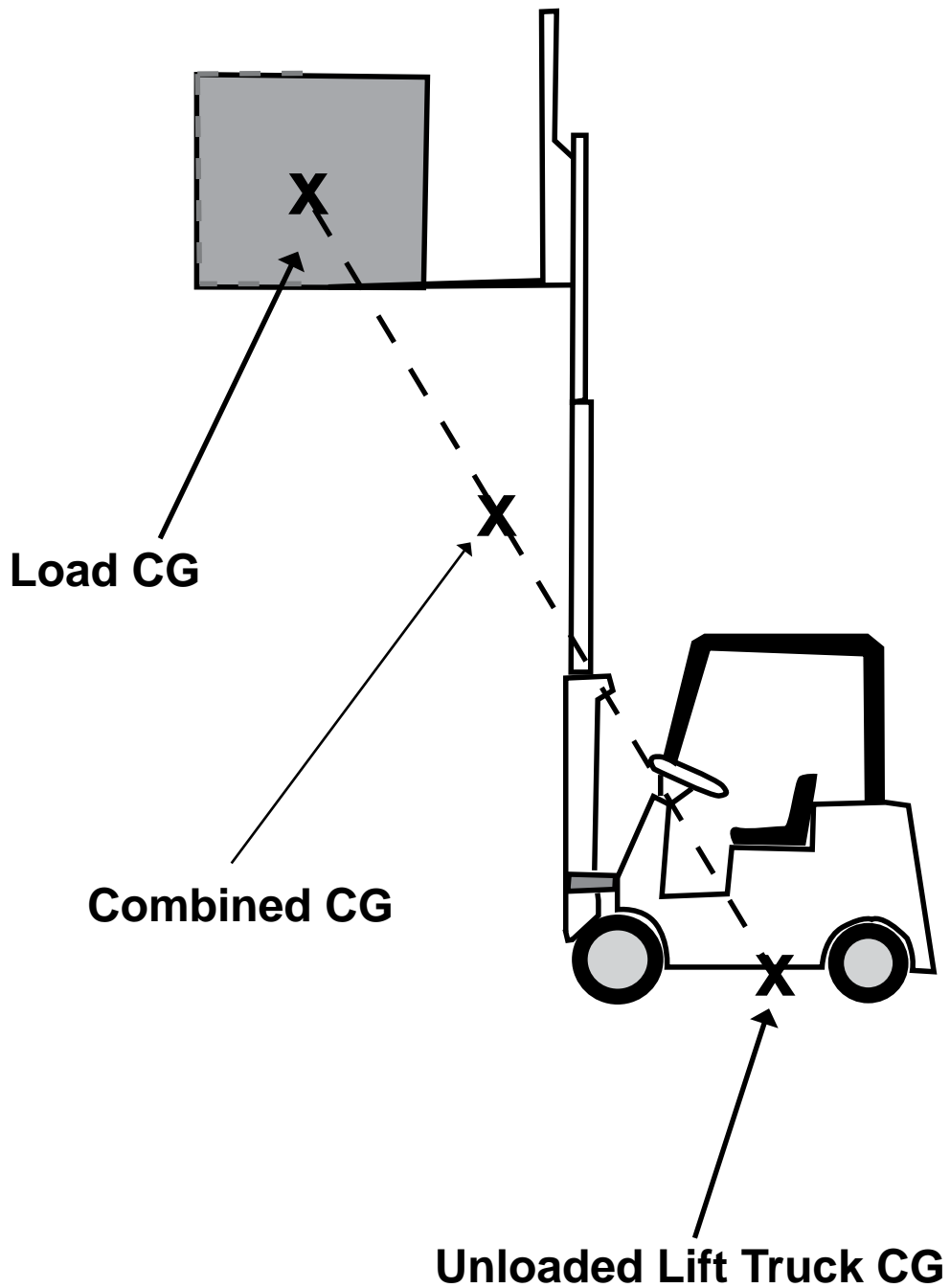
Center of Gravity (CG)



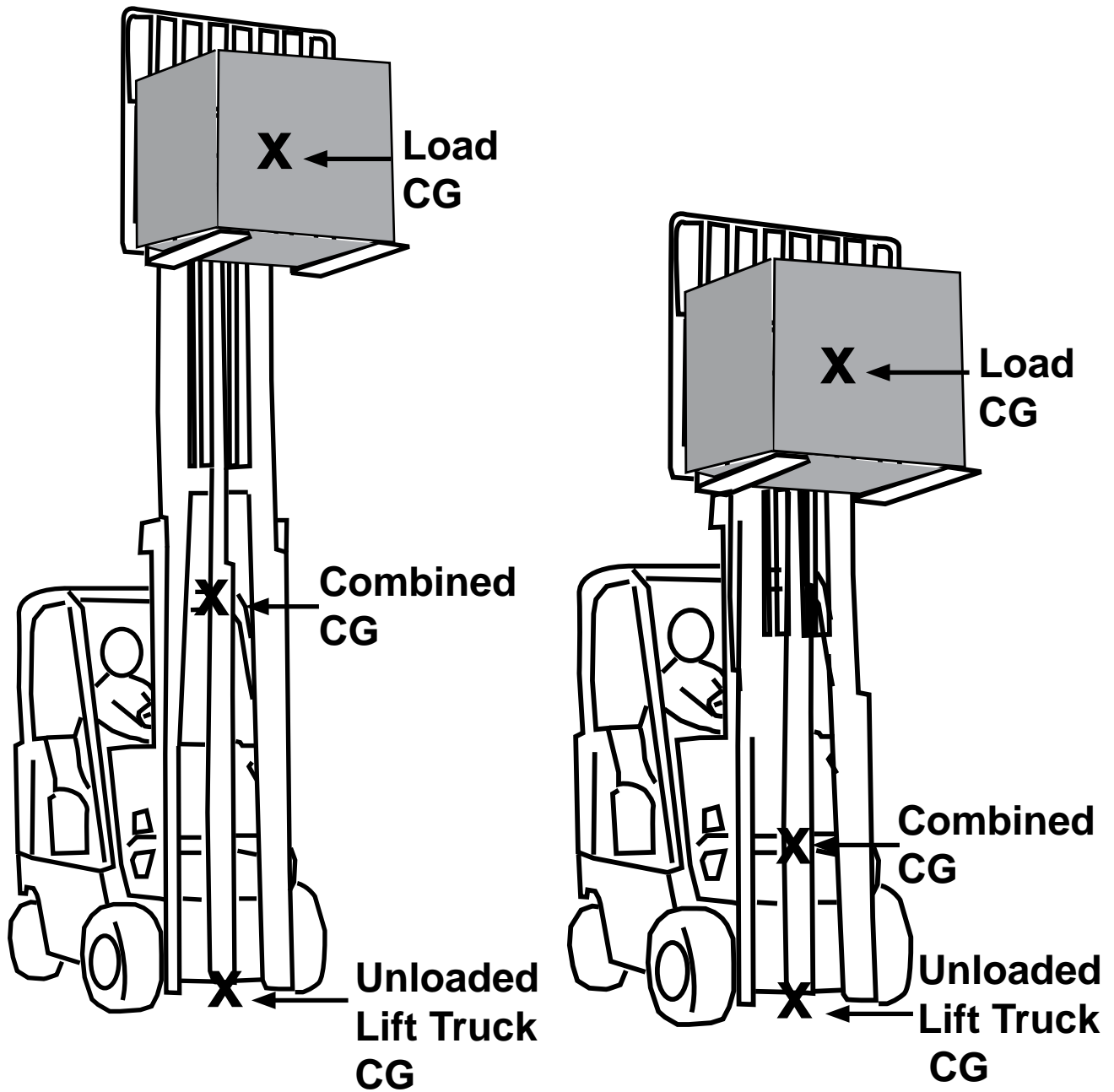
Center of Gravity (CG)



Center of Gravity (CG)



Center of Gravity (CG)

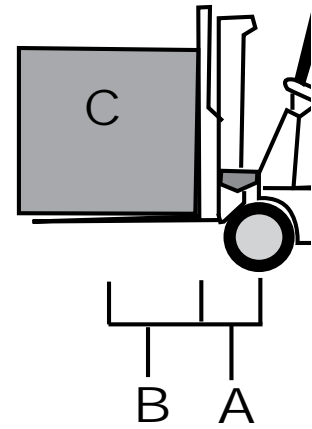


Finding Design Load Capacity

If the rated maximum load is 4,000 lbs, with a rated load center of 24", and it is 18" from the wheel to the face of the forks, the design load capacity is:

$$(A + B) \times C$$

$$(18 + 24) \times 4,000 = 168,000 \text{ in. lbs.}$$



$$(A + B) \times C =$$

Design Load Capacity

A= distance from front axle to face of the forks

B= rated load center (see data plate)

C= rated maximum load at rated load center (see data plate)

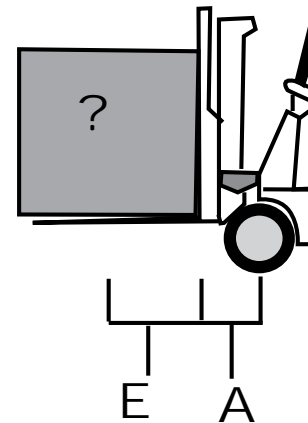
Finding Maximum Load at Actual Load Center

The design load capacity of a lift truck is 168,000 in. lbs., and the distance from the center of the front wheels to the face of the forks is 18". You need to transport a container that has a LC of 36". What is the maximum load with this LC?

$$\frac{D}{(A + E)}$$

$$\frac{168,000}{(18 + 36)} = \text{Max. Load at Actual LC}$$

$$3,111 \text{ lbs.} = \text{Max. Load at 36" LC}$$



$$\frac{D}{(A + E)} =$$

Maximum Load at Actual Load Center

A= distance from front axle to face of the forks

D= design load capacity

E= actual load center

Is This a Good Idea?

A worker was using a lift truck to take a heavy load to the warehouse. As he approached the warehouse, he saw that the overhead door was closed. He drove up to within about eight feet of the door and jumped off the lift truck. Next, he walked between the loaded lift truck and the door. After raising the overhead door, he jumped back on the lift truck and drove into the warehouse.

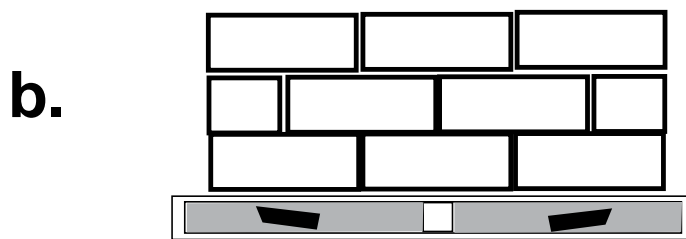
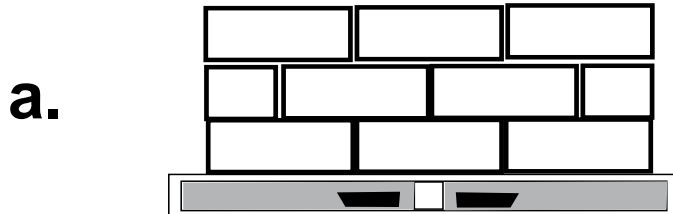
- 1. Which is the BEST PRACTICE if you are LEADING a pallet jack?**
 - a. Walk to the side of the pallet jack.**
 - b. Walk directly in front of the pallet jack.**

- 2. Which is the best practice if you are driving a lift truck and a co-worker approaches to talk with you?**
 - a. Ask him to lean into the cab so you can hear him above the engine noise.**
 - b. Tell him to stay back. Then lean out of the cab so you can hear him above the engine noise.**
 - c. Keep him away until you lower the load and shut off the engine.**

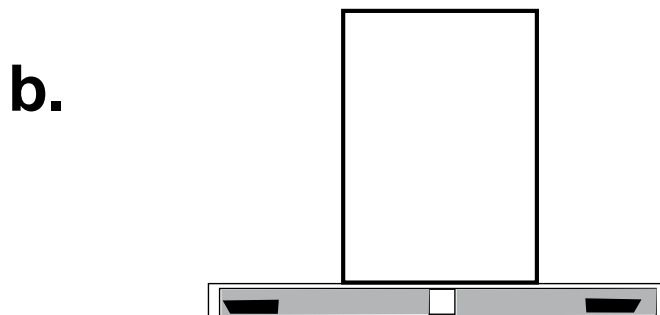
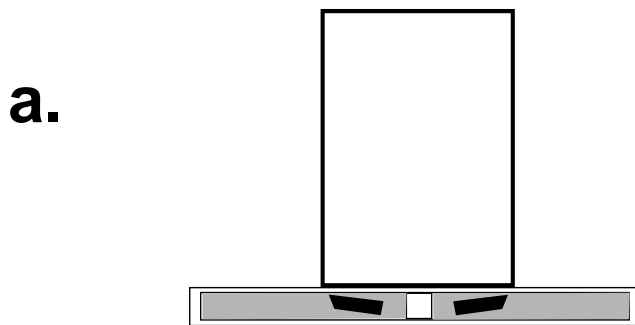
- 3. Which is the BEST PRACTICE if your load starts to shift while you are driving the lift truck?**
- a. Stay in the cab and reach your arms through the mast to straighten the load.**
 - b. Lower the load, shut down the lift truck, set the parking brake, get out of the cab, and straighten the load.**
 - c. Continue driving. Don't stop unless the load actually falls.**
- 4. Which is the BEST PRACTICE if you are traveling DOWN a ramp with a pallet jack?**
- a. Walk in front of the pallet jack.**
 - b. Walk behind the pallet jack.**

- 5. Imagine that you are operating a lift truck in a new area where you have never worked before. Also imagine that there are shelves, pipes and other objects that could enter the cab and strike you while you are operating your lift truck. Which is the BEST PRACTICE?**
- a. Visit with your supervisor about developing a plan for working safely in the area.**
 - b. Keep quiet and duck your head whenever you are backing up.**
- 6. Which is the BEST PRACTICE for a maintenance person if it's necessary to repair a lift truck with forks raised?**
- a. Support the forks and carriage with a concrete block.**
 - b. Ask a co-worker to sit in the cab and keep the lift controls in the raised position.**
 - c. Support the forks and carriage with an approved support device.**

7. Which is the best way to space your forks for the following load?



8. Which is the best way to space your forks for the following load?



9. True or false?

Always stack heavy loads on top of light loads.

10. True or false?

While moving and stacking loads, ignore any bowing of the floor or storage racks. If the floors and racks haven't given way yet, they probably never will.

11. True or false?

When loading materials onto a pallet, use cardboard or plywood between layers of bags and other irregular objects.

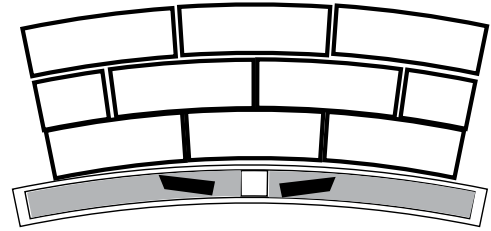
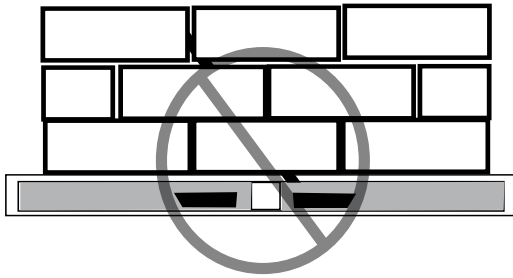
12. True or false?

It is safe to stand under a raised load as long as the lift truck has been shut down.

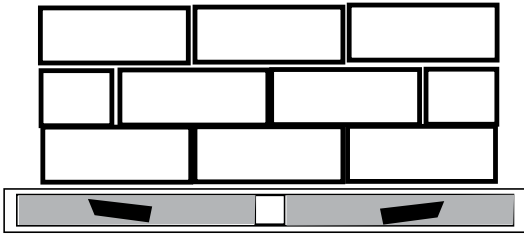
- | | |
|-------------|-----------------------------------|
| 1. a | For 7-8 refer to next page |
| 2. c | 7. b |
| 3. b | 8. a |
| 4. b | 9. F |
| 5. a | 10. F |
| 6. c | 11. T |
| | 12. F |

7.

a.

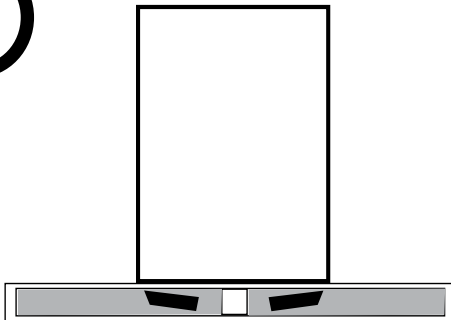


b.

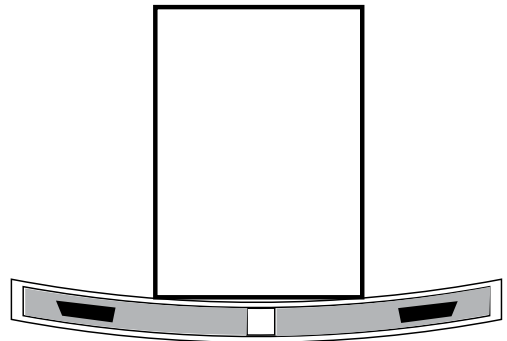
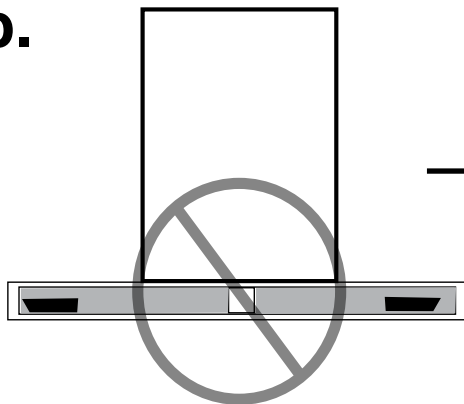


8.

a.



b.



1. When operating on a public road, your lift truck must have a slow-moving vehicle sign if you will be traveling:

- a. 25 mph or less**
- b. 30 mph or less**
- c. 35 mph or less**
- d. 40 mph or less**

2. True or false?

Your lift truck must have lights if you operate on a public road at night.

3. True or false?

The best way to check for a hydraulic leak is to run your hand along the hose and feel the wet fluid.

4. True or false?

Remove hydraulic hoses only when the hydraulic system is pressurized.

5. True or false?

If your lift truck comes into contact with an electric power line, stay in your seat until the electric power is shut off.

6. True or false?

If your lift truck comes into contact with an electric power line, other workers should stay away from the lift truck until the electric power has been shut off.

1. a

2. T

3. F

4. F

5. T

6. T

#1 You have been assigned to unload pallets of materials from a flat-bed semi-trailer. The loading dock is not available (it's being repaired), so you must drive down a ramp to the parking lot, unload the truck from the side, and carry the pallets back up the ramp into the plant. The pallets are located near the center of the truck bed; it is not possible to insert your forks fully under them. The bed of the trailer is about five feet above the surface of the parking lot. What issues do you need to consider, and what precautions should you take to prevent a roll-over accident? How can you determine if it is safe to lift the center pallets with your lift truck?

#2 You have been assigned to drive your lift truck to another warehouse about a half-mile away. In order to get there, you must drive on a city street that has a speed limit of 30 MPH. Traffic on the street is busiest around 8:00 A.M., noon, and 5:00 P.M. What issues should you consider, and what precautions should you take? Can you think of a better way to get the lift truck to its destination?

#3 You have been assigned to use your lift truck to move a large container from a warehouse to the production floor. The container is about six feet wide, six feet long, and eight feet high. It weighs about 1,000 lbs. Your lift truck has a rated capacity of 2,000 lbs. with a 24-inch load center. Along the way, you will encounter a ramp and several overhead doors. What issues should you consider, and what precautions should you take?

#4 You have been assigned to lift two maintenance workers on your lift truck so they can install a new overhead light fixture. What issues should you consider, and what precautions should you take?

Evaluation/Performance Checklist: Lift Truck

Operator: _____ Date: _____

Lift Truck ID: _____ Make/Model: _____

Instructor: _____ Location: _____

	Satisfactory	Needs Improvement
Follows Pre-Operation Inspection		
Safe Entry		
● Engine off		
● Forks down		
● Do not use control levers as grab bars		
Safe Start Up		
● Safety belt fastened		
● Area is clear of bystanders		
● Test all controls		
● Check the brakes		
● Check the horn and backup alarm (if so equipped)		
Demonstrate safe picking up of a load		
● Load is appropriate for truck's capacity		
● Check load for stability		
● Approach squarely		
● Lift smoothly		
Demonstrate Driving Skills		
● Operate at safe speed		
● Operate safely on slopes or ramps		
● Start and stop smoothly		
● Avoid obstacles and hazardous areas		
● Follow safe backing procedures		
● Keep load close to ground		
● Operate in reverse if load blocks view		
Stacking Load		
● Approach squarely		
● Come to stop before raising load		
● Stack straight		
● Remove forks safely		
● Lower forks before driving off		
Loading/Unloading Trailer		
● Secure dock plate		
● Check jack stands, trailer chocks		
● Check trailer floor		
Safe Shut Down and Exit		
● Park on level surface		
● Lower the forks		
● Place the controls in neutral		
● Set the parking brake		
● Turn the engine off		

Back Injury Prevention Training Guide

Suggested Materials

- Back Injury Prevention* manuals (English, MF2762; Spanish, MF2762S)
- Sign-in sheet
- Pencils
- Instructor Guide
- Training overheads/slides/projector
- Blank overheads/flipchart/blackboard/pen for listing participant responses and outlining important concepts.
- Balance and weights (see pages 100 and 102 of this *Instructor Guide*)
- Exercise mats or carpeted floor

Sources of Background Information

- ▶ *Back Injury Prevention* manuals available for download:
http://www.oznet.ksu.edu/agsafe/training/OSHA_training.htm
- ▶ Summary of NIOSH Back Belt Studies:
<http://www.cdc.gov/niosh/beltsumm.html>
- ▶ NIOSH Web page on Ergonomics and Musculoskeletal Disorders:
<http://www.cdc.gov/niosh/topics/ergonomics/>
- ▶ National Library of Medicine Web site (use the search function to find articles on back pain): <http://www.nlm.nih.gov/>
- ▶ National Institutes of Health Web site (use the search function to find articles on back pain): <http://www.nih.gov/>

Length of Time Needed for Training

Review and select the learning activities that are most appropriate. If all discussion and hands-on exercises are included in the training it may take up to a half work day. Without the hands-on exercises, the classroom portion will take about two hours.

Welcome and Introduction

- ▶ Introduce yourself.
- ▶ Remind participants of the topic of the training.
- ▶ Discuss breaks, locations of restrooms, ending time and any tests or evaluations.
- ▶ Tell participants you expect them to play an active role by relating their experiences and knowledge.

Participant Introductions

Find out:

- ▶ Who are they?
- ▶ What do they hope to learn from the training?

Understanding Your Back and Back Pain

Lesson 1

Suggested Objectives

- Name common sources of back pain.
- Recall when muscles are likely to be injured.
- Recognize when to see a doctor.

Discussion Items

What are some activities that cause participants to have back pain? List responses on an overhead or flipchart.

Visual Aids

Discuss the overhead provided on page 106 of this guide.

- ▶ Are participants aware that research suggests about 80 percent of adults in America suffer from serious back pain at some time in their lives?

Discuss the overhead provided on page 107 of this guide.

- ▶ Are participants aware that research suggests muscle injuries and spasms cause most instances of back pain?
- ▶ Have any participants ever had a muscle spasm in their back? Would they care to describe what that is like?

Discuss “What is Back Pain” on page 6 of *Back Injury Prevention*

Can participants think of tasks or jobs that require them to twist, bend, or remain in an uncomfortable position for a long period of time?

Discuss “See a Doctor When” on page 7 of *Back Injury Prevention*

Participants who have any symptoms on page 7 should visit with a doctor before attempting any stretching exercises in Lesson 2.

Evaluation

Answer the quiz items on page 8 of *Back Injury Prevention* individually or as a class. Be sure to discuss each item.

Lesson 2

Prevention and Relief of Back Pain

Suggested Objectives

- Discuss why stretching and strengthening can help prevent back injury.
- Identify correct stretching techniques.

Discussion

What measures are participants already taking to get relief from their back pain?

- ▶ Discuss the use of stretching exercises, taking an easy walk, using ice for 48-72 hours and heat after that, or using non-steroidal anti-inflammatory drugs such as aspirin, ibuprofen, naproxen or ketoprofen.

Visual Aid

Discuss the overhead provided on page 108 of this guide.

Discuss how muscle spasms are similar to the muscle cramps that participants may experience after sports or strenuous exercise. (Most participants can easily relate to a cramp in the calf of the leg. Most participants will also understand the best way to relieve this cramp is usually to gently stretch the calf muscles. Similarly, back spasms can often be relieved by bringing the knees towards the chest to stretch the lower back muscles.)

Hands-on Exercises

First demonstrate, and then ask participants to practice the stretches on pages 10-18 of *Back Injury Prevention*.

- ▶ These exercises work best in a carpeted room or on exercise mats. Let participants know before training that they should wear comfortable, loose-fitting clothing (not tight jeans or skirts).
- ▶ Participants should visit with a doctor before practicing the stretches if: they currently have acute back pain or if they are pregnant, have arthritis, or other medical conditions.
- ▶ Any participant should stop stretching if they feel sharp pains. Let participants know it is normal for them to feel some muscle stiffness the day after practicing the stretches. Stretching on a regular basis will usually relieve this stiffness.
- ▶ Monitor participant's technique and assist those who need help.
- ▶ Emphasize the importance of breathing while stretching. See the box on page 13 of *Back Injury Prevention*. Ask participants to pay attention to tension in their muscles while they hold their breath and exhale.
 - ▶ Did participants notice how relaxed their muscles felt when they exhaled? They will be able to stretch their muscles better when they remember to exhale.

Evaluation

Answer the quiz items on page 19 of *Back Injury Prevention* either individually or as a class. Be sure to discuss each item.

Safe Work Practices

Lesson 3

Suggested Objectives

- Recall risk factors for back injury.
- Identify safe work posture.
- Recognize safe techniques for lifting.

Hands-on Exercises

Divide the class into groups of three to five participants.

- ▶ Assign each group to inspect a work area in the facility. Ask them to observe work procedures and equipment, paying special attention to awkward postures, overexertion, repetition and fatigue. (Participants should use the illustrations and text in Lesson 3 of *Back Injury Prevention* as a guide.)

Bring the class together and ask each group to report on:

- ▶ risk factors they observed.
- ▶ any equipment and work practices that employees are currently using to avoid the risk factors.
- ▶ any risk factors that are not being addressed with current equipment and work practices.

Demonstrate any special equipment or work procedures that employees will be expected to use to avoid the four general risk factors discussed in Lesson 3 of *Back Injury Prevention*. If appropriate, have participants practice using the equipment or procedures.

Visual Aid

If it is not possible to do the hands-on exercises listed above, use the overheads provided on pages 109-118 of this guide to review risk factors and how to avoid them.

- ▶ Can participants give examples of tasks or equipment in their work areas that involve these risk factors?
- ▶ Are participants currently using any equipment and work practices to avoid the risk factors?
- ▶ Are there any risk factors that are not being addressed with current equipment and work practices?

Demonstration

Obtain or build a small balance such as the one illustrated below.

This balance was made from the following materials:

A - (1) 22-inch 2 x 4

B - (1) 10-inch 2 x 4

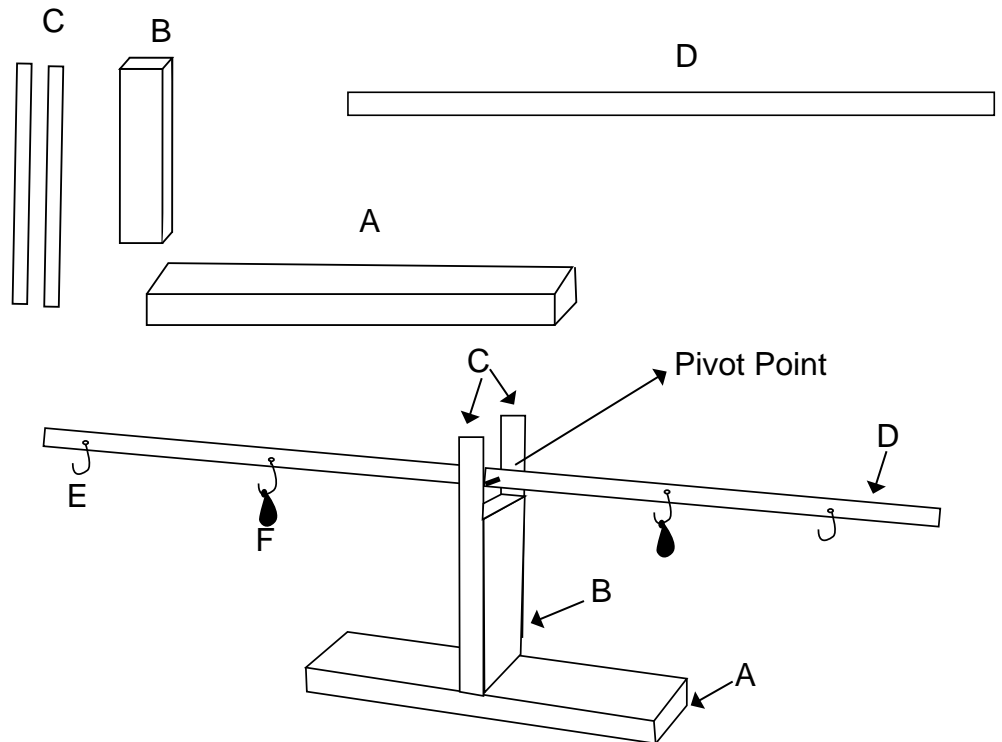
C - (2) 16-inch lattice with holes drilled 2 inches from the top

D - (1) 5-ft. lattice with a hole drilled at center and at 1-ft intervals on both sides of center (5 holes total-2 on each side of center)

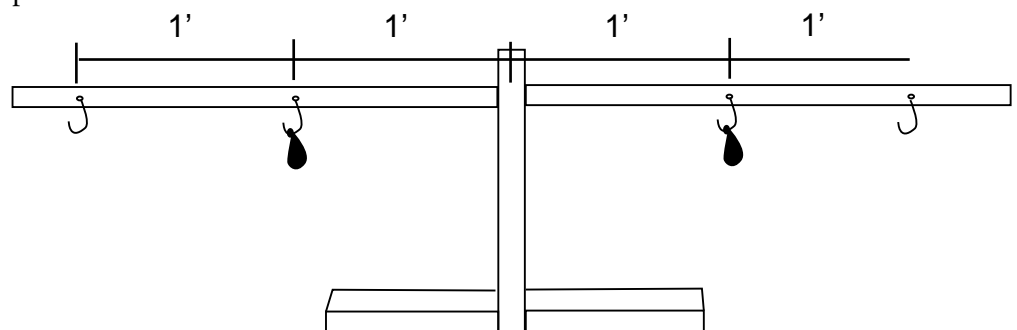
E - (4) 5-inch wire hooks

F - (3) fishing weights

You will also need: a gutter spike or bolt to serve as the pivot point, drill and a drill bit appropriate for the spike or bolt. Finally, you will need nails and a hammer to fasten parts A, B, and C.

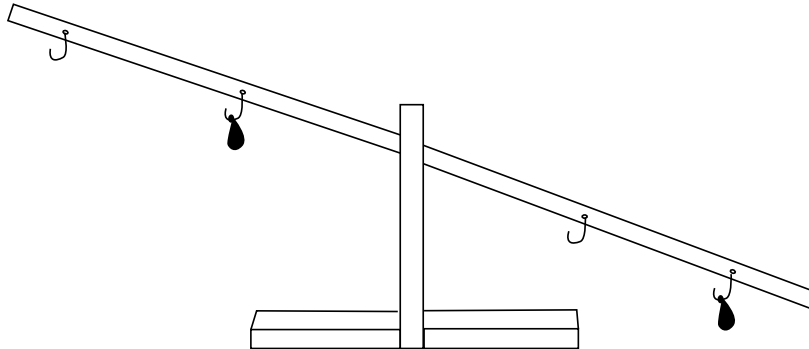


Set up the balance with two weights equally balanced; for instance, one weight 1 foot to the right of the pivot point, and one weight 1 foot to the left of the pivot point.



Discuss how the forces on the balance relate to the forces in your back when you bend or lift. (Imagine that the pivot point represents your waist, the forces on one side of the pivot point represent the load you are lifting, and the forces on the other side represent the force exerted by the muscles in your back.)

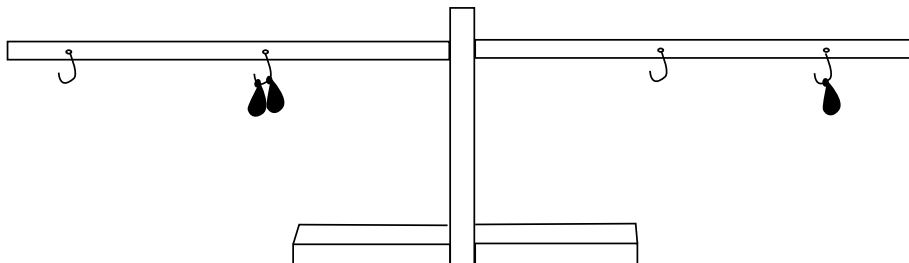
- ▶ What happens when the same load is held farther from your waist? For instance, what would happen with the weight held arm's length? (See illustration below.)



- ▶ How would this affect the forces in your back?

Demonstrate how adding weights at various distances from the pivot results in different forces.

- ▶ For instance, adding one ounce two feet from the pivot results in a force that can be offset by adding two ounces one foot from the other side of the pivot. (See illustration below.) The basic concept is that the same weight exerts greater force if it is attached farther from the pivot.



Background information for instructors who are not familiar with the concept of torque: Torque is a measure of force that results when weight is added at various distances from a pivot point. Torque is measured by multiplying weight or force times the distance from the pivot point. For instance, one pound of force applied one foot from the pivot point results in one foot-pound of torque. Two pounds of force applied one foot from the pivot point results in two foot-pounds of torque. Notice that two foot pounds of torque also results if one pound of force is applied two feet from the pivot point. Torque can be measured in any convenient combination of force-times-distance, such as foot-pounds, inch-pounds, inch-ounces, Newton-meters, etc.

Illustrate how torque increases strain on the back muscles by replacing the balance bar with a model of the human torso.

▶ This model of the human torso was made from the following materials:

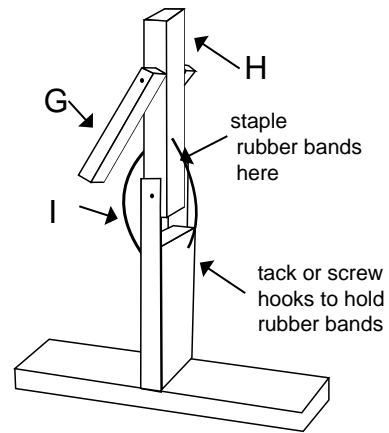
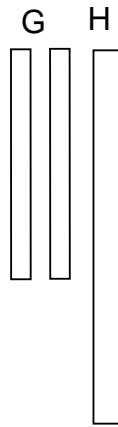
G - (2) 8-inch 1 x 2

H - (1) 18-inch 1 x 2 with a hole drilled 1 1/2 inch from the bottom

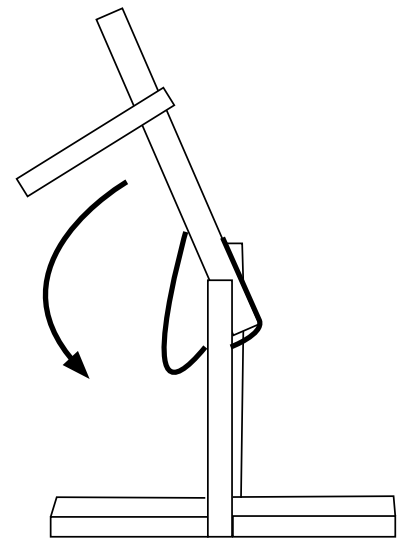
I - several rubber bands

▶ You will also need a few staples to attach the rubber bands to the torso (H); two tacks or screw hooks to hold the rubber bands to the base; and two nails to attach the arms (G) to the torso (H).

▶ Rubber bands are used to illustrate the support provided by the back muscles and tendons. Use just enough rubber bands on the front and back to support the torso when the arms are at the torso's side (representing a person holding a load close to the body).



▶ What happens when the arms are extended (e.g., when the person reaches or carries a load far from the body)? The rubber bands can no longer support the forces because the torque increased even though the weight stayed the same. If the rubber bands were muscles and tendons, the person would have experienced a back strain.



Quick Questions

Display the overheads provided on pages 119-121 of this guide.

▶ Call on participants to answer questions.

▶ Use the questions as opportunities to discuss training material. The answer key is on page 122.

Evaluation

Answer the quiz items on pages 27-28 of *Back Injury Prevention* either individually or as a class. Be sure to discuss each item.

Healthy Back Care

Lesson 4

Suggested Objectives

- Describe how posture keeps your back healthy.

Visual Aid

Discuss the overhead provided on page 123 of this guide.

- ▶ Discuss how standing relaxed places the least amount of stress on the lower back.
- ▶ Discuss how leaning back with a good lumbar support reduces the stress on the lower back while sitting.
- ▶ Are participants surprised that sitting up straight is more stressful than leaning back?
- ▶ Discuss how lifting at arm's length results in the greatest stress on the lower back.

Visual Aid

Discuss the overhead provided on page 124 of this guide.

- ▶ For participants who work while sitting, discuss good sitting posture, based on the information on page 29 of *Back Injury Prevention*.
- ▶ For participants who work while standing, discuss good standing posture, based on the information on page 30 of *Back Injury Prevention*.

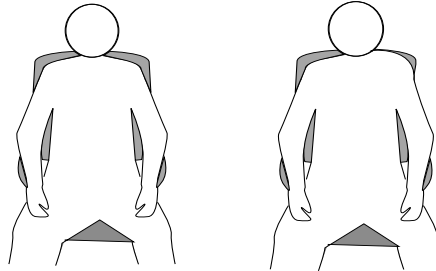
What are some ways participants may be able to compensate if their work station is uncomfortable? For example:

- ▶ use a foot rest if their chair is too high;
- ▶ use a small pillow behind the lower back for more lumbar support;
- ▶ adjust table height if the work is too high or low;
- ▶ re-arrange frequently-used materials to avoid reaching, bending, or twisting;
- ▶ visit with the supervisor about modifying the work station.

Demonstration/Visual Aid

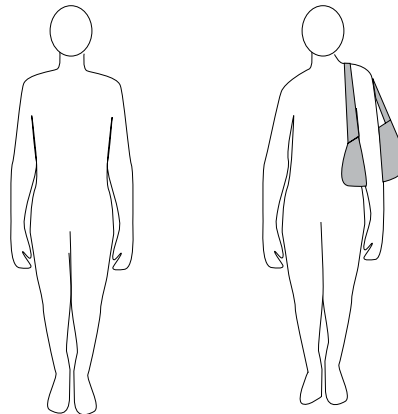
Demonstrate how sitting with a large wallet in the hip pocket can misalign the spine. (See illustration below.)

- ▶ The wallet may also press on important nerves that affect the back and legs.
- ▶ Keeping the wallet in a front pocket can relieve back pain, especially for truck drivers and participants who spend a lot of time sitting.



Demonstrate how hanging a purse on the shoulder can misalign the spine. (See illustration below.)

- ▶ Using a fanny pack or other alternative can help, especially during long shopping trips.



Discussion

Discuss company policies concerning how employees can request an ergonomic evaluation of their work stations.

Visual Aid

Discuss the overhead provided on page 125 of this guide.

- ▶ Discuss sleeping postures that can help relieve back pain.

Evaluation

Answer the quiz items on page 32 of *Back Injury Prevention* either individually or as a class. Be sure to discuss each item.

Conclusion

Hands-on Exercise/Review

Ask a few participants to identify the stretches they preferred most from lesson 2 of *Back Injury Prevention*.

- ▶ For each stretch identified as a “favorite,” demonstrate and have the participants practice the stretch once again. Participants may find that they quickly forget how to do some of the stretches.
- ▶ Strengthen their learning by showing them how to follow the instructions in the workbook and helping them to practice the stretches correctly.

Discussion

Ask participants to share any questions or concerns they may still have or want to discuss further.

Evaluation

Answer the quiz questions on page 34 of *Back Injury Prevention* individually or as a group. Be sure to discuss each item.

“Low back pain is the #2 reason that Americans see their doctor — second only to colds and flus.”

U.S. National Library of Medicine, Medline Plus

<http://www.nlm.nih.gov/medlineplus/ency/article/003108.htm>

“Low back pain from any cause usually involves spasms of the large, supportive muscles alongside the spine.”

U.S. National Library of Medicine, Medline Plus

<http://www.nlm.nih.gov/medlineplus/ency/article/003108.htm>

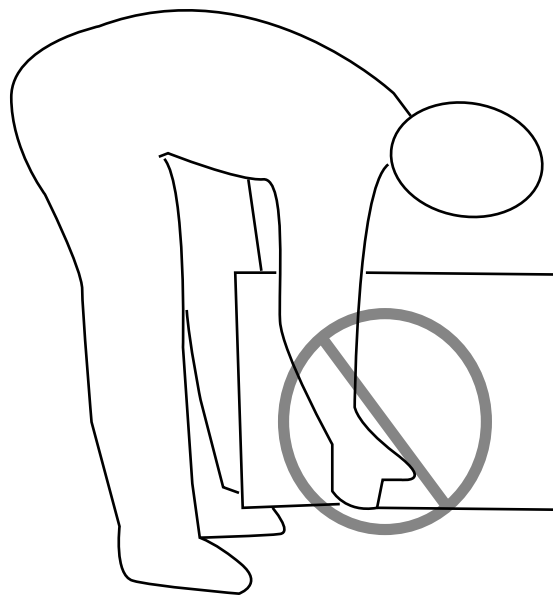
“Exercise may be the most effective way to speed recovery from low back pain ... gentle exercises... help keep muscles moving and speed the recovery process.”

National Institute of Neurological Disorders and Stroke

http://www.ninds.nih.gov/disorders/backpain/detail_backpain.htm

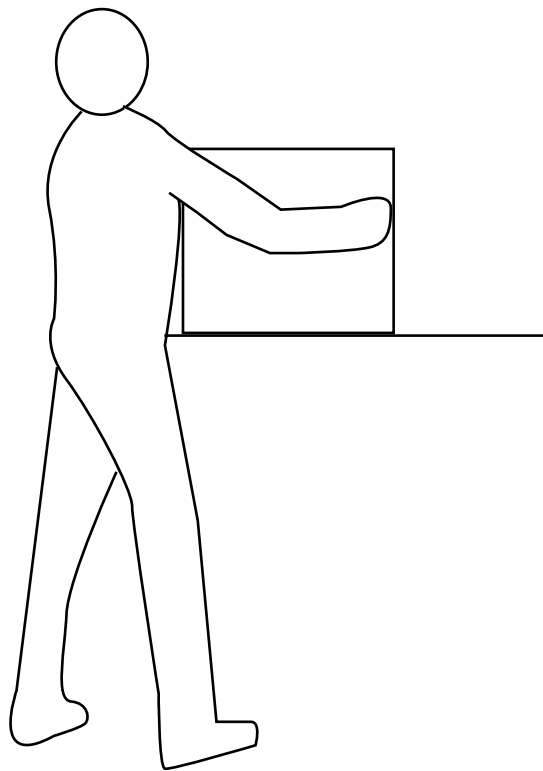
Problem #1

How Can You Avoid Bending to Lift?



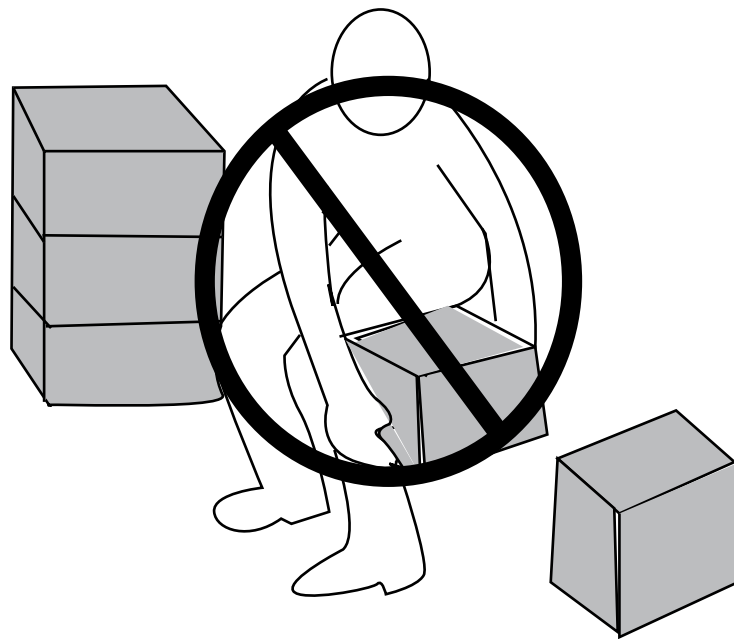
Solution #1

Raise the Work



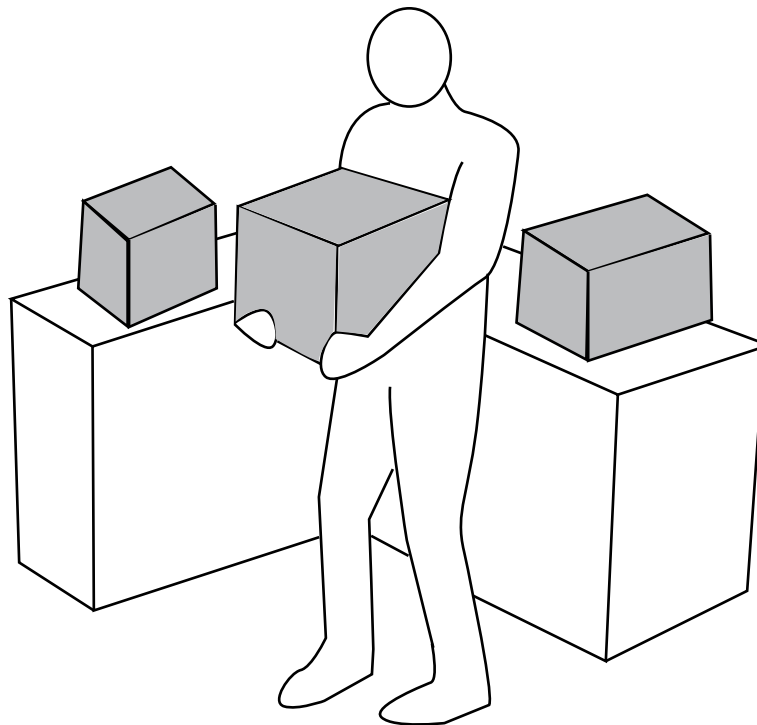
Problem #2

How Can You Avoid Bending and Twisting To Turn?



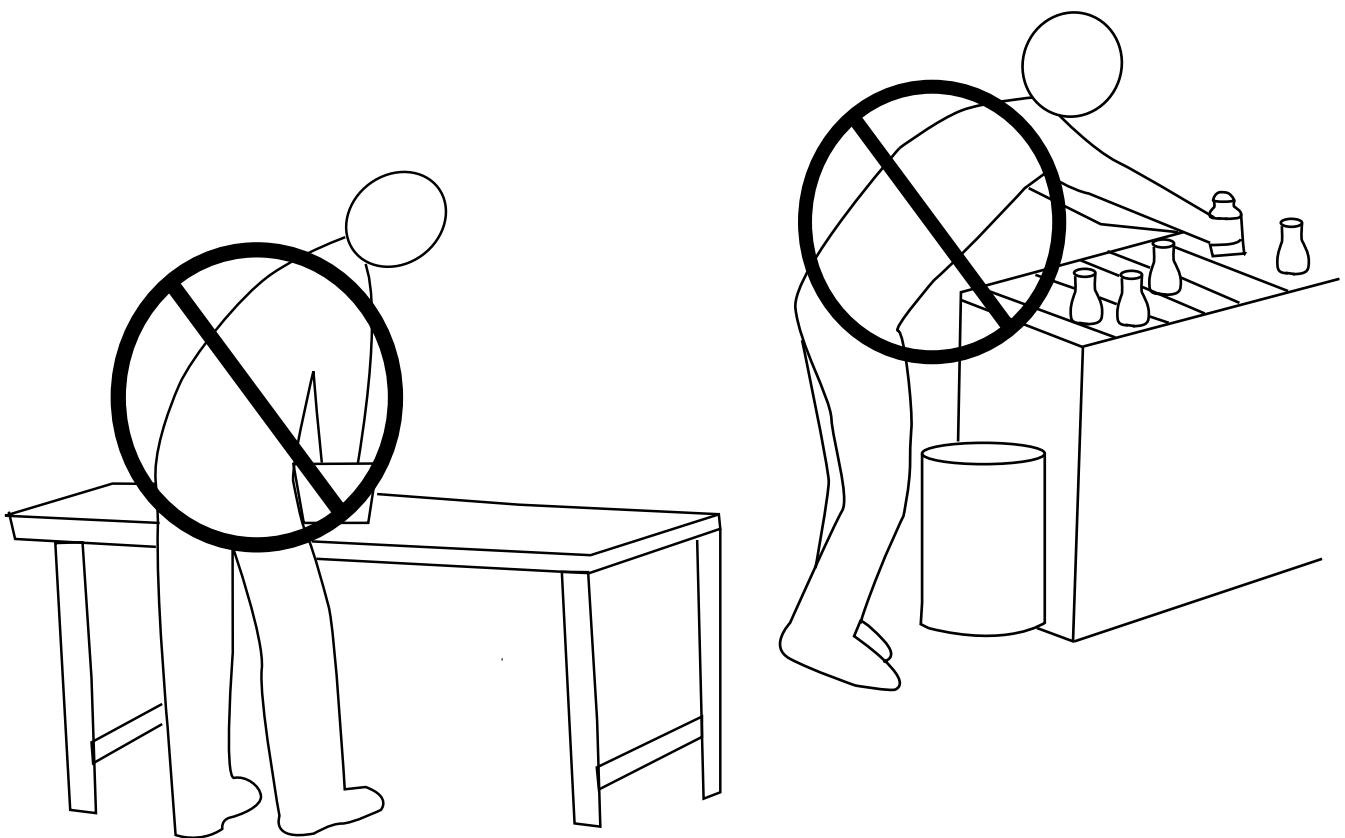
Solution #2

Store Materials at Waist Level and Move Your Feet To Turn



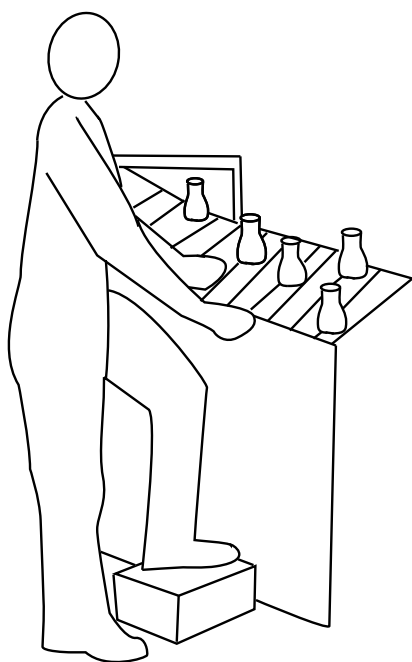
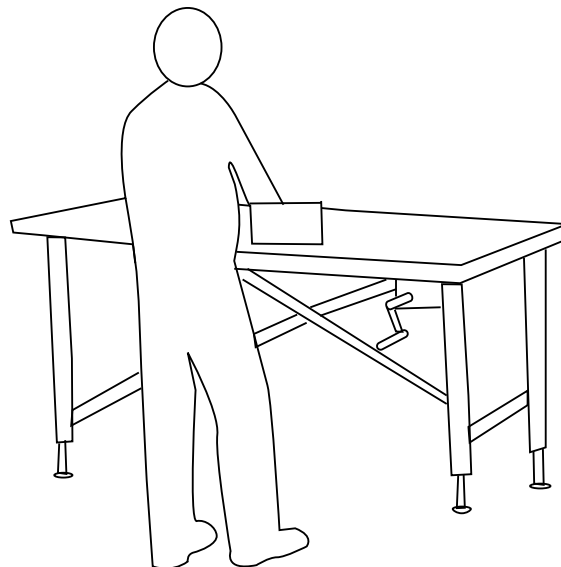
Problem #3

How Can You Avoid Bending and Reaching To Get Closer To Your Work?



Solution #3

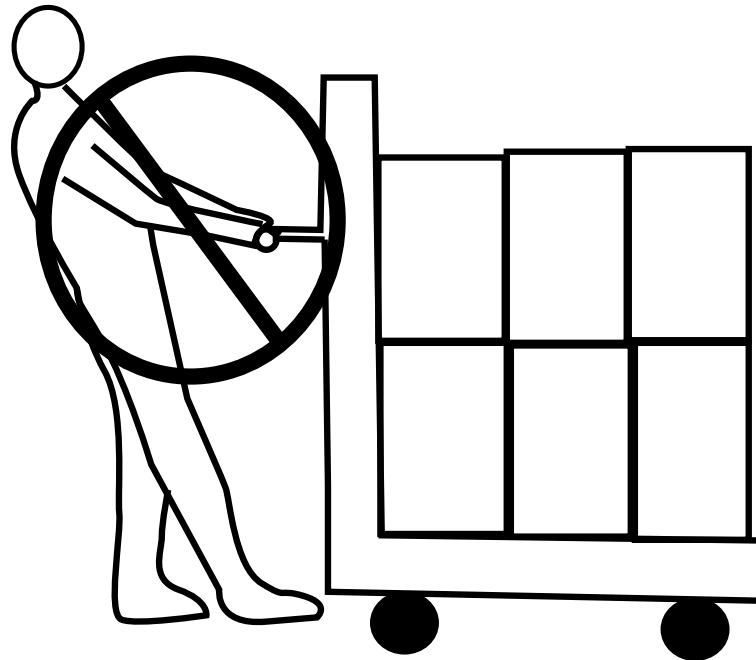
**Use an
Adjustable-
Height Table
So Your Work
Is At Waist
Level**



**Minimize
the Distance
Between You
and Your Work**

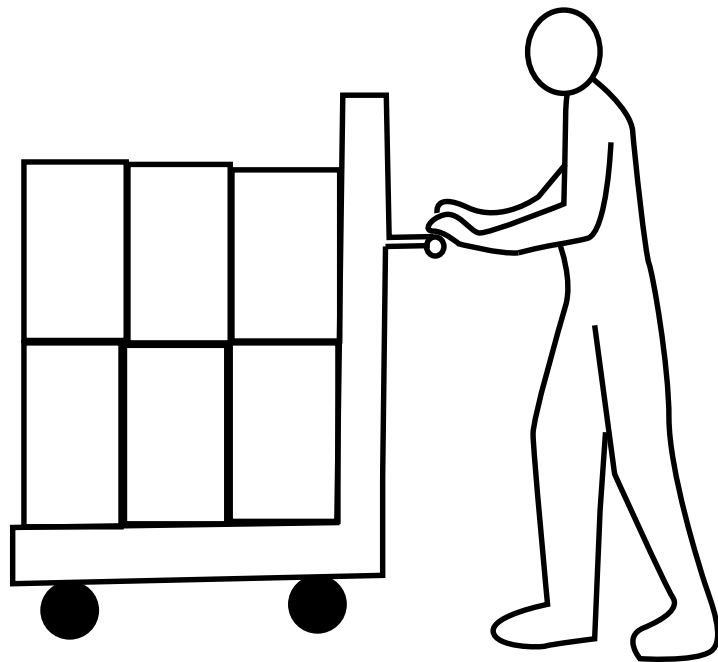
Problem #4

How Can You Avoid Pulling Loads?



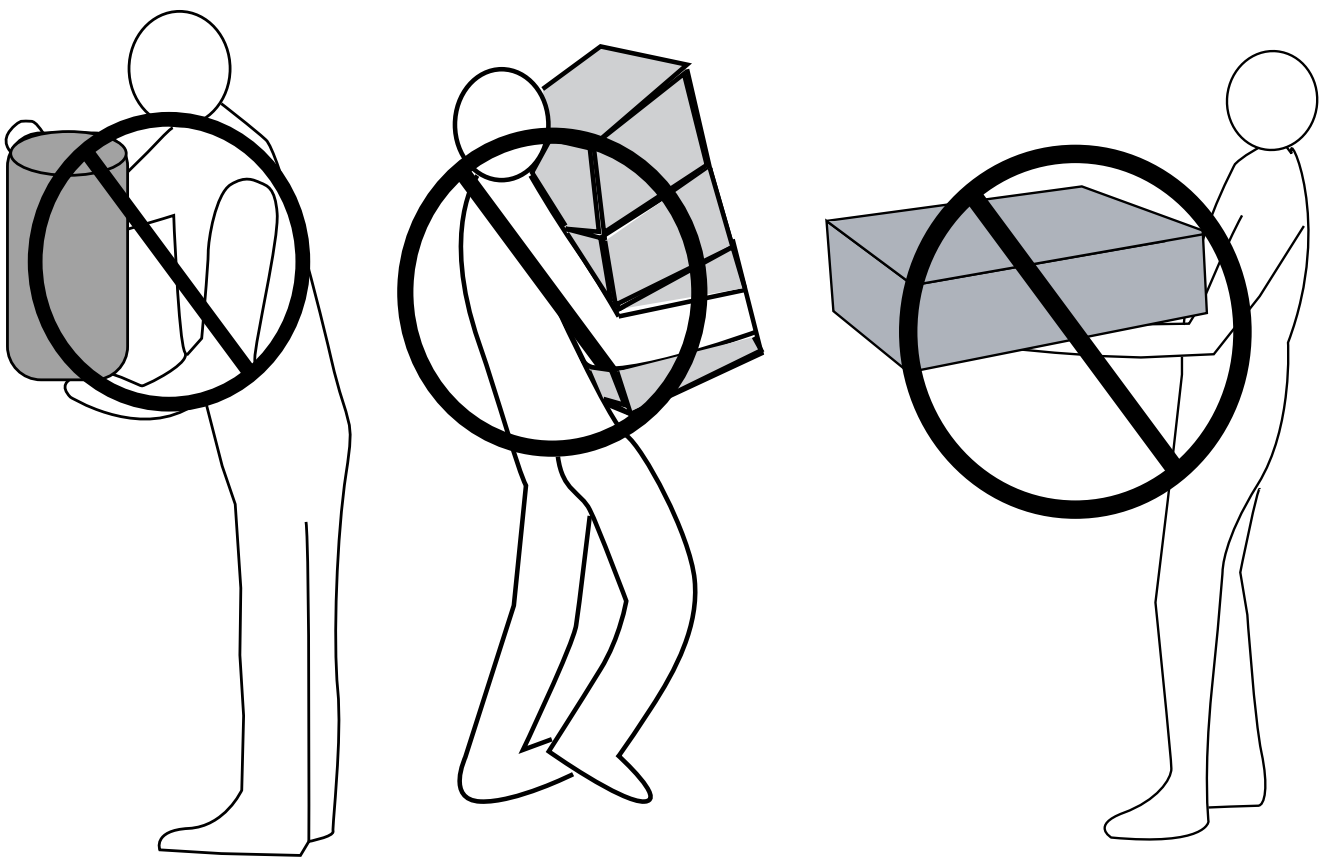
Solution #4

Push Rather Than Pull



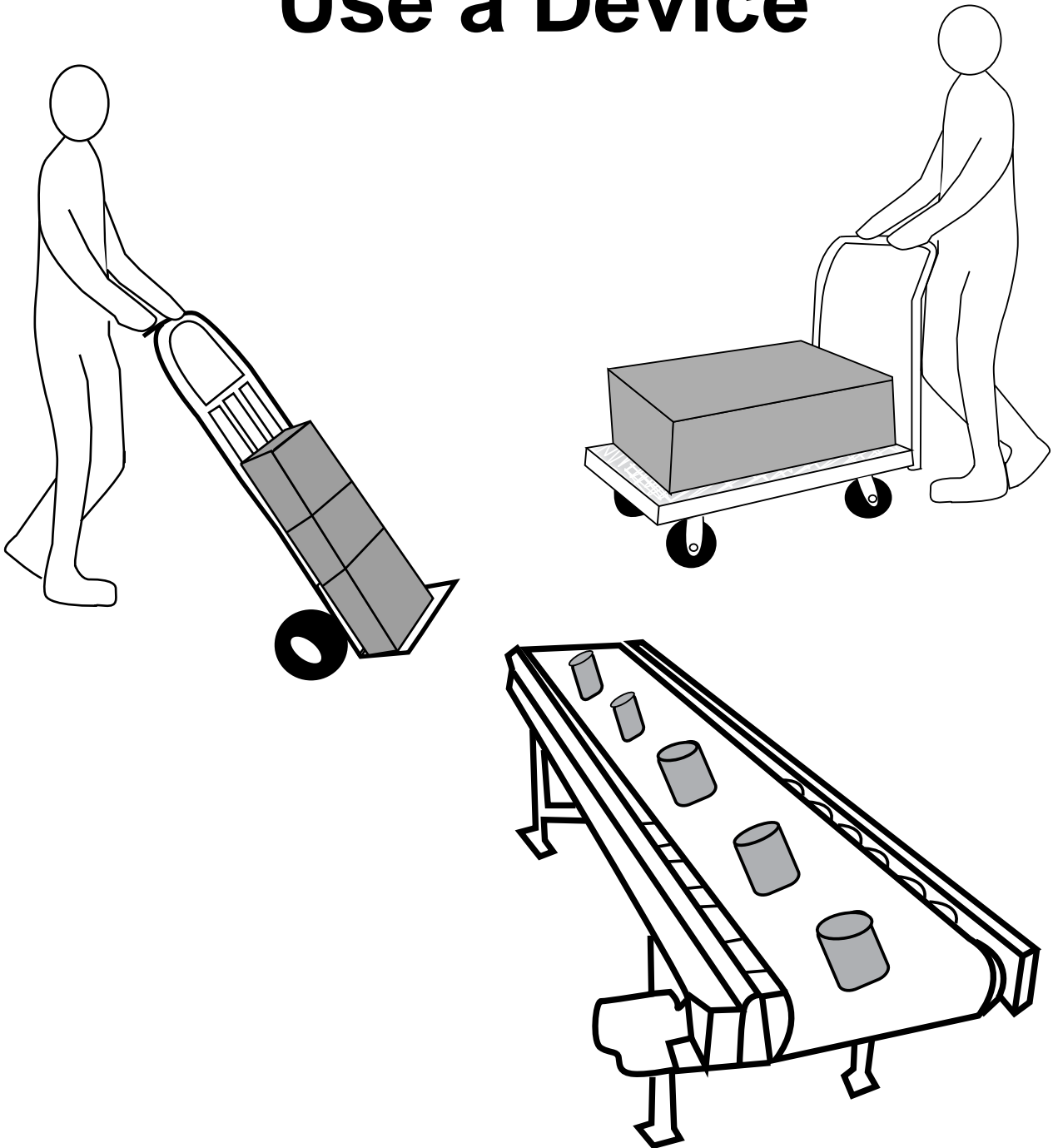
Problem #5

How Can You Avoid Lifting and Lowering Heavy and/or Awkward Materials?



Solution #5

Divide the Load and/or Use a Device



- 1. Which is the best practice for storing heavy materials?**
 - a. Store heavy materials on the floor.**
 - b. Store heavy materials at waist height.**
 - c. Store heavy materials on shelves above the shoulders.**

- 2. Which is the best practice for handling heavy materials?**
 - a. Use a cart or lift truck to move heavy materials.**
 - b. Bend at the waist when lifting.**
 - c. Carry several heavy boxes at once so you don't have to make as many trips.**

- 3. Which is the best practice when sorting or handling materials while standing at a table?**
- a. Bend and reach to get closer to your work.**
 - b. Twist your body (instead of moving your feet) to reach materials.**
 - c. Use an adjustable-height table to keep your work at waist level.**
- 4. Which is the best practice for lifting and carrying?**
- a. Use a pinch grip.**
 - b. Quickly jerk the load off the floor.**
 - c. Keep the load close to your body.**
- 5. True or false?**
- You are more likely to hurt your back when you push a load, instead of pull.**

6. True or false?

You can help protect yourself by changing tasks or postures so that you are using different muscle groups.

7. True or false?

You can help protect yourself by stretching your muscles during breaks.

1. b

2. a

3. c

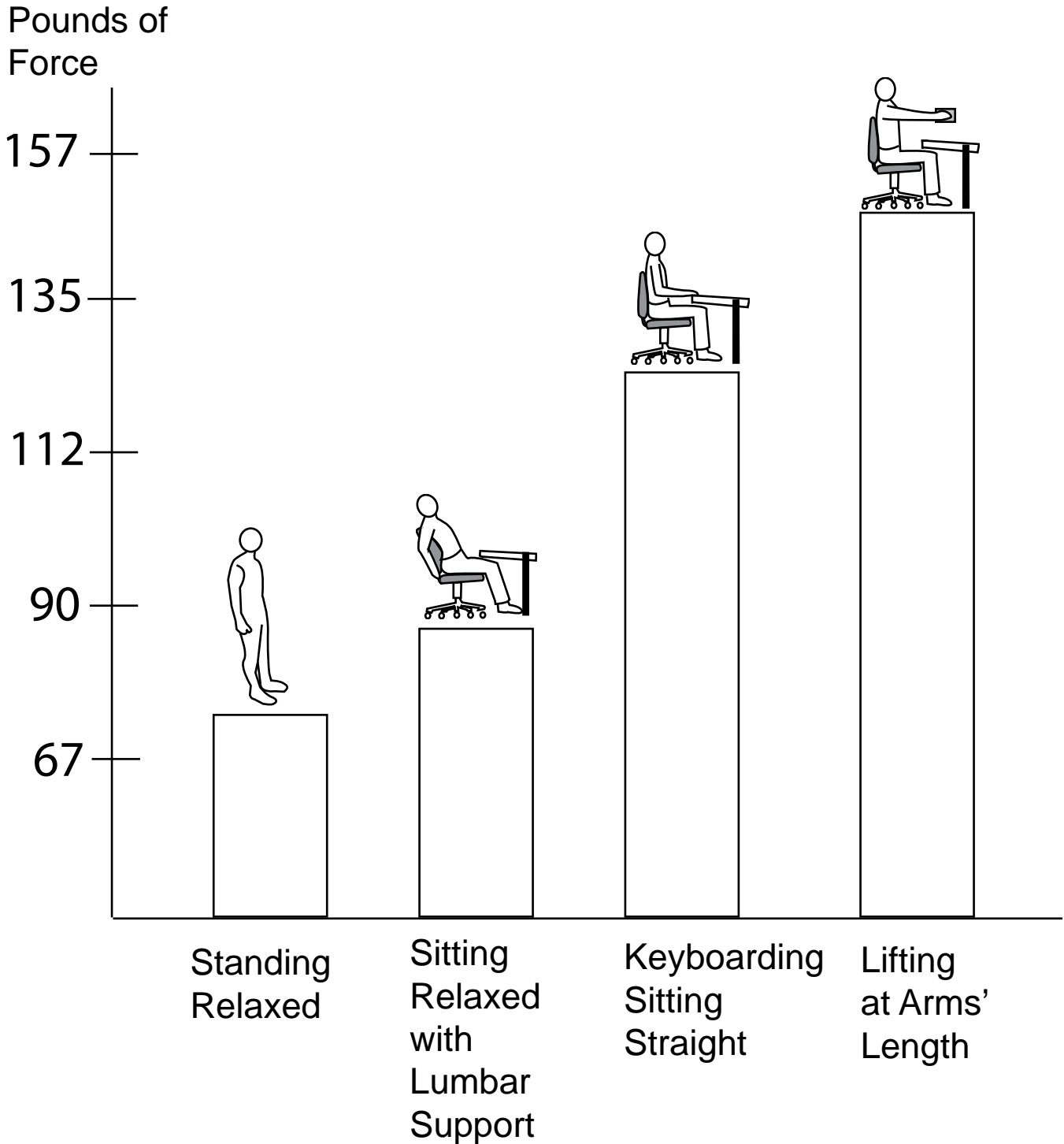
4. c

5. F

6. T

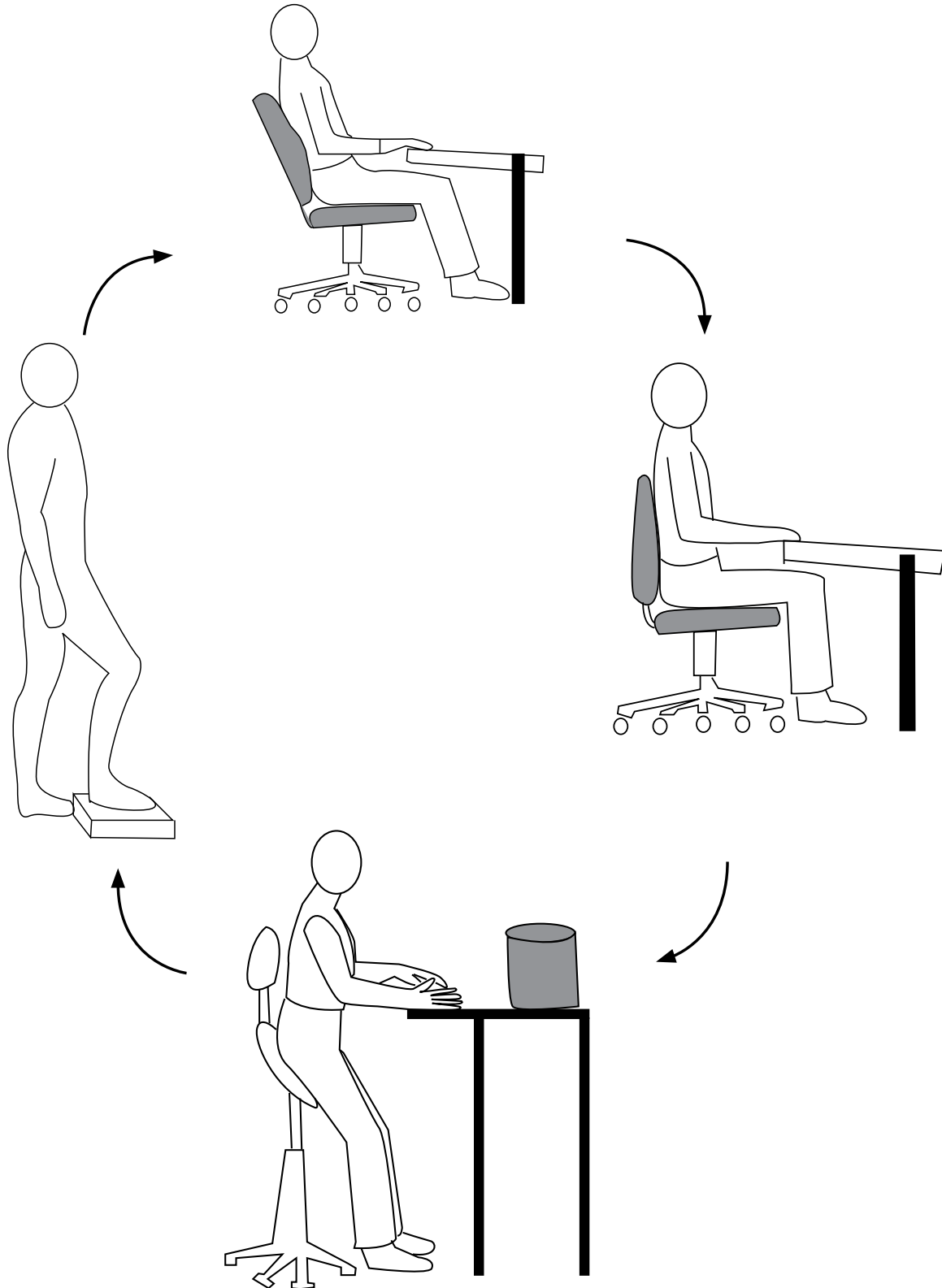
7. T

Relative Forces in the Lower Back

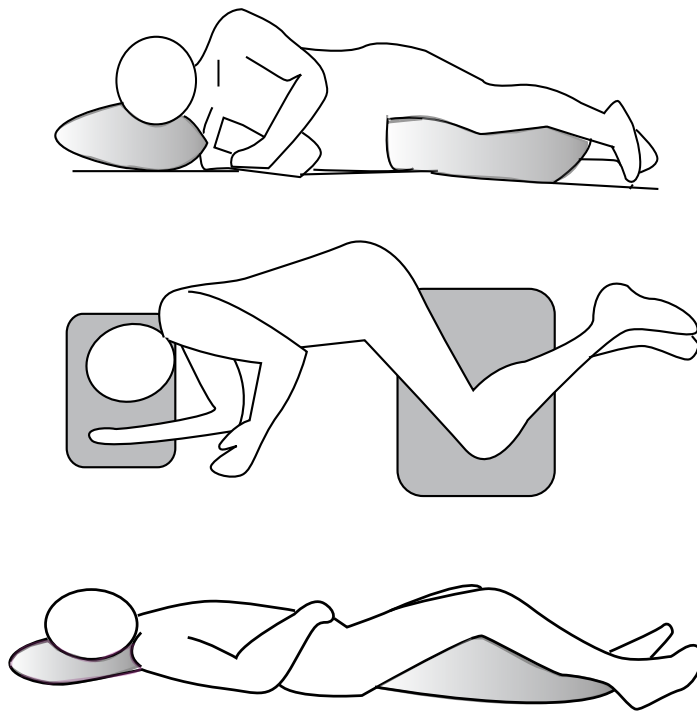


“Forces in the third lumbar disc.” Adapted from Chaffin, D.B., and Andersson, G.B.J. *Occupational Biomechanics*. New York: Wiley, 1984.

Change Work Postures



Good Sleeping Postures



“At night or during rest, patients should lie on one side, with a pillow between the knees (some doctors suggest resting on the back and putting a pillow beneath the knees).”

National Institute of Neurological Disorders and Stroke

http://www.ninds.nih.gov/disorders/backpain/detail_backpain.htm

Fall Prevention Training Guide

Suggested Materials

- Fall Prevention* safety manuals (English, MF2761; Spanish, MF2761S)
- Sign-in Sheet
- Pencils
- Instructor Guide*
- Training overheads/slides/projector
- Blank overheads/flipchart/blackboard/pen for listing participant responses and outlining important concepts.
- Ladders for hands-on exercises

Sources of Background Information

- ▶ *Fall Prevention* manuals available for download:
http://www.oznet.ksu.edu/agsafe/training/OSHA_training.htm
- ▶ NIOSH Falls Web page:
<http://www.cdc.gov/niosh/injury/traumafall.html>
- ▶ OSHA Fall Protection Web page:
<http://www.osha.gov/SLTC/fallprotection/index.html>

Length of Time Needed for Training

Review and select the learning activities that are most appropriate. If all of the discussion and hands-on exercises are included in the training it may take up to half of a work day. Without the hands-on exercises, the classroom portion will take about two hours.

Welcome and Introduction

- ▶ Introduce yourself.
- ▶ Remind participants of the topic of the training.
- ▶ Discuss breaks, locations of restrooms, ending time and any tests or evaluations.
- ▶ Tell participants you expect them to play an active role by relating their experiences and knowledge.

Participant Introductions

Find out:

- ▶ Who are they?
- ▶ What do they hope to learn from the training?

Questioning/Discussion

Before beginning Lesson 1:

- ▶ What do participants believe are the most common causes of falls in food processing facilities? List ideas on an overhead or flipchart.
- ▶ Have participants ever known of someone who was seriously injured in a fall? Would they care to share what happened?

Lesson 1

Take Control of Your Own Safety

Suggested Objectives

- Discuss common causes of falls.
- Recognize fall prevention messages and signs in work zones.

Discuss Accident Reports on pages 4-5 of *Fall Prevention*

How well did participants' ideas match the common causes of falls in the food processing industry? (Refer to the overhead or flipchart list made during the introduction.)

Hands-on Exercise

Divide the class into groups of three to five participants.

- ▶ Have each group look for safety messages and signs on equipment they will be using.
- ▶ Bring the class back together and have each group report on the safety signs they saw. (If a hands-on exercise is not practical, the instructor can ask participants to describe any safety messages they have previously seen on equipment they use.)

Evaluation

As a group, answer the quiz items on page 8 of *Fall Prevention*. Be sure to discuss each item.

Stairways, Clutter and Slippery Floors

Lesson 2

Suggested Objectives

- Discuss safe housekeeping practices for the workplace.
- Identify safe footwear.

Discuss the Accident Report on page 9 of *Fall Prevention*

Discuss what work activities require participants to use stairs?

- ▶ What precautions do they take?

What is the company policy regarding the storage of materials on stairs?

What are the safest ways to move large packages and other materials BETWEEN FLOORS in the workplace (e.g., elevators)?

Discuss the Accident Report on page 10 of *Fall Prevention*

What are some areas where slips and trips are common in the workplace?

What housekeeping policies and procedures are in effect at the workplace?

Hands-on Exercise

Divide the class into groups of three to five participants.

- ▶ Inspect areas of the workplace, using the items on page 10 of *Fall Prevention* as a checklist.
- ▶ Bring the class back together and ask each group to discuss what they observed and how any problems can be corrected.

Discuss the Accident Reports, page 11 of *Fall Prevention*

Analysis

Ask participants to read the bulleted items in “Avoid Fall Hazards” on page 11.

- ▶ In the margin, ask each participant to write an example of how they would apply one of the rules in their own job.
- ▶ When finished, ask participants to briefly describe the examples they recorded.

Discussion

What equipment is available for transporting materials ON THE PLANT FLOOR (carts, lift trucks, etc.)?

- ▶ What are the company policies and procedures for using these material handling devices?
- ▶ **Note:** Lift truck operation requires training that is beyond the scope of this manual.

What is the company policy regarding appropriate footwear?

Evaluation

As a group, answer the quiz items on page 13 of *Fall Prevention*. Be sure to discuss each item.

Lesson 3

Using Ladders Safely

Suggested Objectives

- Recognize types of ladders.
- Explain safe ladder use in the workplace.

Discuss the Accident Report on page 14 of *Fall Prevention*

What company policies apply to the use of ladders?

What types of ladders are available in the workplace

- ▶ What tasks are they used for?

Discussion

Refer to the bulleted items in "Choose the Right Ladder for the Job" on page 14.

- ▶ For each item, ask a participant to either
 - a) describe a related accident he/she has witnessed, or
 - b) discuss a specific job task for which the rule is important in the workplace.

Visual Aids

Discuss the overhead on page 135 of this guide.

- ▶ Discuss the lengths of extension ladders that are available in the workplace and requirements for overlapping the sections of these ladders.

With the overhead on page 136, discuss how to determine the proper placement of the base of a straight or extension ladder.

As a class, using the overhead on page 137, calculate the proper placement of the base of the ladder and the height above landing. (Answer key is provided on page 138.)

Hands-on Exercise

Break the class into groups of three to five participants.

- ▶ Have each group inspect and set up one or more ladders, using the information on pages 15-17 of *Fall Prevention* and the Pre-Operation Checklist provided on page 139 of this guide.
- ▶ Inspect each group's ladder setup, using the appropriate sections of the Performance Evaluation on page 140 of this guide.
- ▶ Bring the class back together to discuss:
 - ▶ The load ratings of their ladders.
 - ▶ Any problems they found in their inspections.
 - ▶ Any difficulties in setting up the ladders.
 - ▶ The proper use and limitations of their ladders — that is, appropriate and inappropriate tasks and uses of these particular ladders.

Discuss the Accident Report on page 15 of *Fall Prevention*

What is the company policy for taking ladders out of service and marking them unsafe for use?

Discuss the Accident Report on page 18 of *Fall Prevention*

Ask a volunteer to read aloud the bulleted items on pages 18-19.

- ▶ Discuss how these important rules apply in your workplace.

Visual Aid

Display the overhead on page 141 of this guide.

- ▶ Discuss how the ladder is like a lever: Any horizontal force applied at the top (by leaning, pushing, or pulling on an object) exerts large forces on the rails that can tip the ladder sideways.
- ▶ Substitute other values into the formula so workers can see how it becomes easier to tip the ladder when the height is increased (e.g., $d_2 = 16$ ft.; $d_1 = 1$ ft.; $F_1 = 225$ lbs; $F_2 = 14.06$ lbs. force).

Hands-on Exercise

Set up one or more ladders.

- ▶ First demonstrate, then have participants practice the following:
 - ▶ Three-point climbing technique, always facing the ladder.
 - ▶ Transporting tools and materials up and down (for instance, using a tool belt or rope).
- ▶ Use the work practices portion of the performance evaluation on page 151 of this guide to evaluate participant technique.
- ▶ **Note:** Do not perform this learning activity without appropriate supervision.

Evaluation

Answer the quiz items on page 20 of *Fall Prevention* individually or as a class. Be sure to discuss each item.

Lesson 4

Working Safely on Raised Surfaces

Suggested Objectives

- Discuss methods to get to hard-to-reach areas.
- Identify methods of fall protection.

Discuss the Accident Reports, page 21 of *Fall Prevention*

What is the company policy regarding climbing on materials, conveyors, and other machines?

Discuss the first Accident Report on page 22 of *Fall Prevention*

What company policies apply to the use of lift trucks for lifting personnel?

Discuss the second Accident Report on page 22 of *Fall Prevention*

What areas in the plant have guardrails to protect workers?

- ▶ What are the company policies and procedures about keeping gates closed?
- ▶ What are the company procedures regarding temporary removal of rails or gates for maintenance or other reasons?

Discuss the Accident Reports, page 23 of *Fall Prevention*

What job tasks may tempt participants to lean over guardrails?

- ▶ How can these tasks be done safely?

Discuss any catwalks or other raised surfaces that participants will be using.

- ▶ What company policies and procedures apply to these areas?

Hands-on Exercises

If appropriate, take the participants on a tour of any catwalks or other raised surfaces they will be using.

- ▶ Discuss any safety features (e.g., latches on gates) or company procedures (e.g., no running) that apply.
- ▶ Demonstrate and have participants practice latching any important gates they will be using. (This hands-on exercise can be especially important for young workers and workers with limited English skills.)

If participants will be using personal fall arrest devices (harnesses, etc.), demonstrate and have participants practice selecting, inspecting, and using these devices under close supervision in a safe area. Observe manufacturer's recommendations.

General information on personal fall arrest devices can be found at
<http://www.cbs.state.or.us/external/osha/pdf/pubs/2824.pdf>

Discuss the Accident Report on page 24 of *Fall Prevention*

Visual Aid

Discuss the overhead on page 142 of this guide.

- ▶ What company procedures must participants follow when working on roofs at the plant?
- ▶ What company procedures must be followed if a guard must be temporarily removed for repairs?

Hands-on Exercise

If participants will be using lift trucks to lift workers, demonstrate and have participants practice inspecting and using the lift truck personnel lift devices.

- ▶ Observe the guidelines on pages 24-25 of *Fall Prevention*.
- ▶ **Note:** Participants must have training that is beyond the scope of this manual before operating a lift truck.

Evaluation

As a group, answer the quiz items on page 26 of *Fall Prevention*. Be sure to discuss each item.

Conclusion

Discussion

Ask participants to share any questions or concerns about the information or how to apply it to their jobs.

Contest

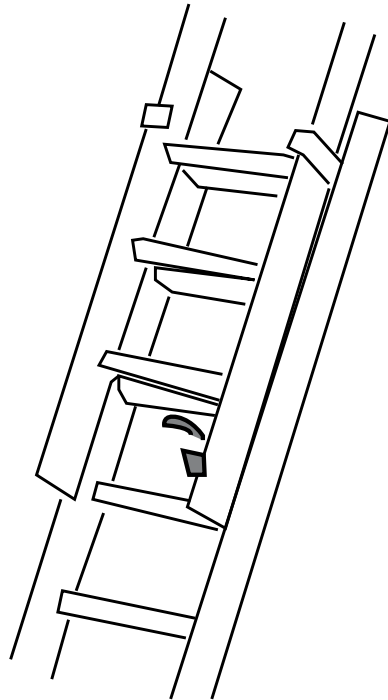
Divide the class into groups.

- ▶ Display the contest items provided on pages 143-150 of this guide.
- ▶ In turn, ask each group a multiple choice or true/false question from the over-heads. Each group gets one point for every correct answer. If a group misses a question, allow the next group to answer it for a point. Keep track of points and recognize the winning group.
- ▶ Use the questions as opportunities to discuss the training material. The answer key is on page 151.

Evaluation

Answer the quiz questions on page 28 of *Fall Prevention* individually or as a group. Be sure to discuss each item.

Extension Ladder Overlap



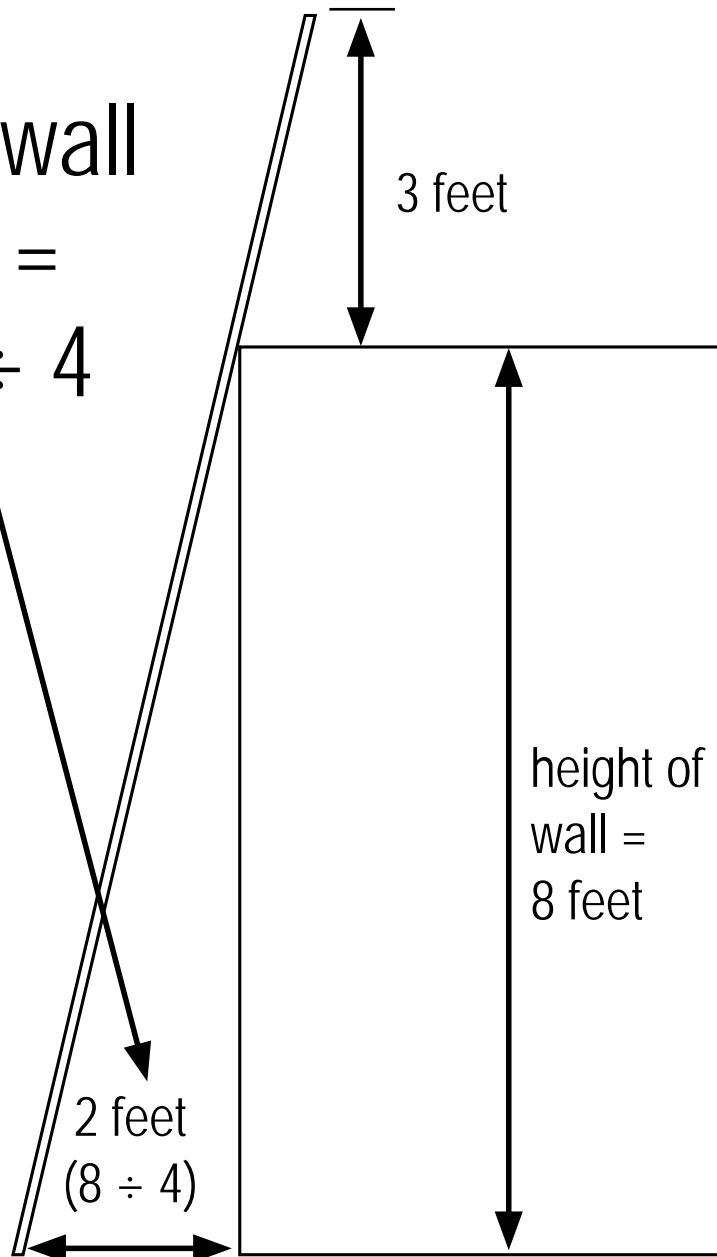
Ladders up to 36 feet...at least 3 feet

Ladders 36-48 feet...at least 4 feet

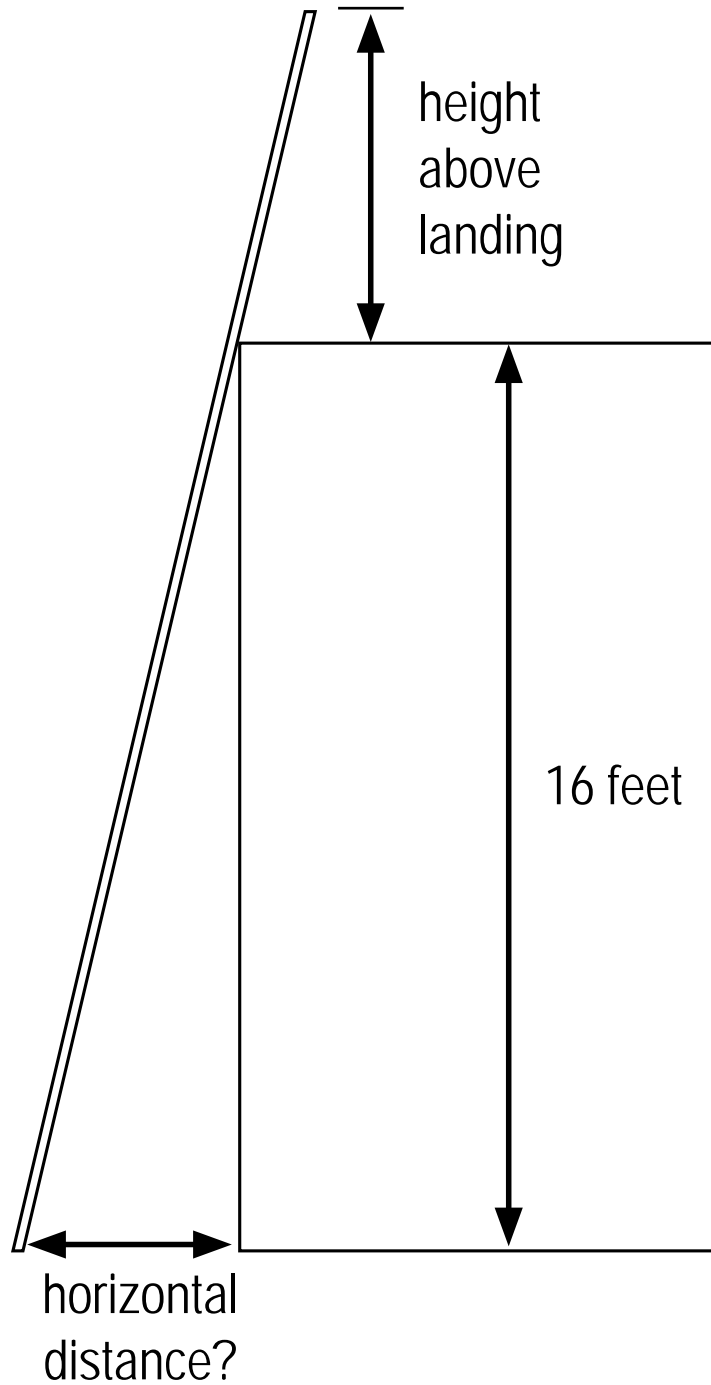
Ladders 48-60 feet...at least 5 feet

Ladder Placement

Distance from wall
to ladder base =
height of wall \div 4

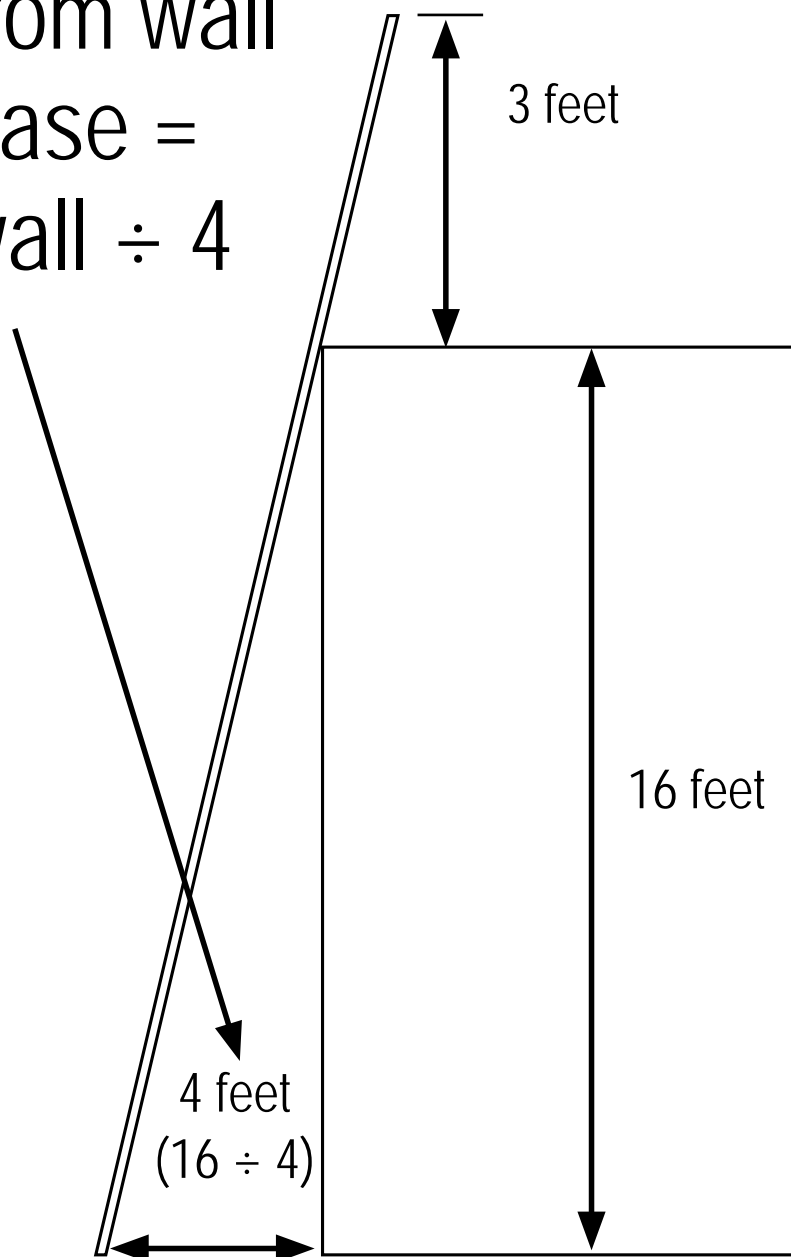


Ladder Placement



Ladder Placement

Distance from wall
to ladder base =
height of wall \div 4



Daily Pre-Operation Inspection: Ladder

Participant _____ Date _____

Item	OK	Needs Attention	Specific Comments
General <ul style="list-style-type: none"> ● No loose steps or rungs ● No loose bolts or other metal parts ● Uprights, brackets, steps and rungs undamaged ● No splinters on uprights, rungs or steps ● Nonslip bases undamaged ● No rusting ● No oil, grease or other slippery deposits 			
Stepladders <ul style="list-style-type: none"> ● Stable ● Hinge spreaders operable ● No broken, split or worn steps ● No loose hinges 			
Extension Ladders <ul style="list-style-type: none"> ● Brackets and locks operable ● Rope or pulley undamaged 			

Evaluation/Performance Checklist: Ladder/Fall Prevention

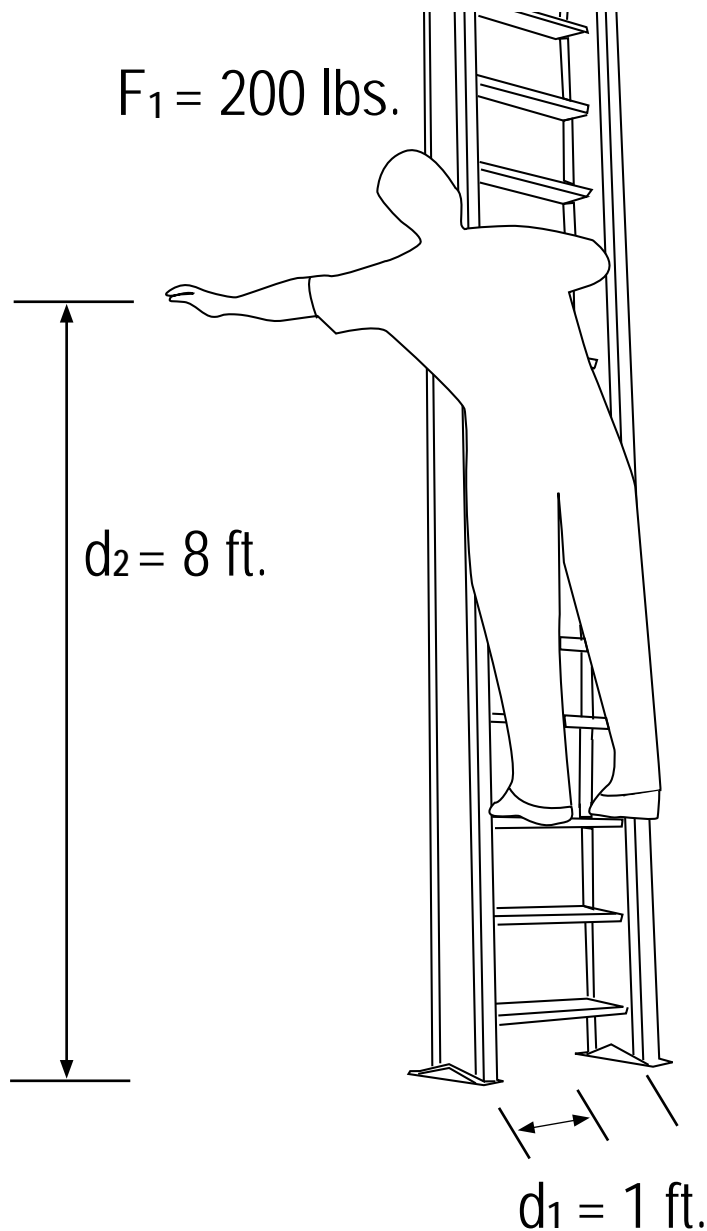
Participant: _____ Date: _____

Instructor: _____ Location: _____

	Satisfactory	Needs Improvement
Follows Pre-Inspection Checklist		
Ladder Selection		
● Length		
● Fiberglass if used near electricity		
General ladder placement		
● Solid, level surface		
● Not in front of door (unless locked/guarded)		
● Not near traffic (unless barricaded)		
Straight or Extension Ladder		
● Extensions locked in place, with appropriate overlap		
● Angle: 1 ft horizontal per 4 ft. vertical		
● Ladder extends at least 3 ft. above landing		
● Base stable and level		
● Both top rails fully supported against stable surface		
● Not leaned against window sash		
● Secured at top and bottom, if appropriate		
Step Ladder		
● Base stable and level		
● Fully open, spreader locked		
Work Practices		
● Faces ladder when climbing		
● Maintains three-point contact		
● Does not carry materials by hand		
● Stays off top steps, as marked on ladder		
● Does not lean/reach excessively to the side		

Force Required to Tip a Ladder

$F_1 =$ weight of ladder + worker/tools
 $d_1 =$ $\frac{1}{2}$ width of ladder base
 $F_2 =$ pounds of horizontal force required to tip ladder
 $d_2 =$ height from ladder base to point of force
 $F_2 = (F_1 \times d_1) / d_2$



$$F_2 = (200 \times 1) / 8 = 25 \text{ lbs. force}$$

The ladder will tip if worker exerts 25 lbs. of horizontal force by pushing, pulling or leaning.

NIOSH Recommendations for Working Near Skylights and Other Openings

- ▶ **Observe written fall prevention program.**
- ▶ **Use fall prevention systems, such as:**
 - ▶ **Covers or screens**
 - ▶ **Railings or guardrails**
 - ▶ **Personal fall arrest system**
- ▶ **A competent person should inspect the worksite before work begins.**
- ▶ **Periodically inspect the fall prevention system**
- ▶ **Provide training to each worker who may be exposed to a fall hazard.**
- ▶ **Comply with all child labor requirements (no one under 18 on a roof; no one under 16 working in construction or manufacturing).**

Source: Preventing Falls of Workers through Skylights and Roof and Floor Openings
<http://www.cdc.gov/niosh/docs/2004-156/#recommendations>

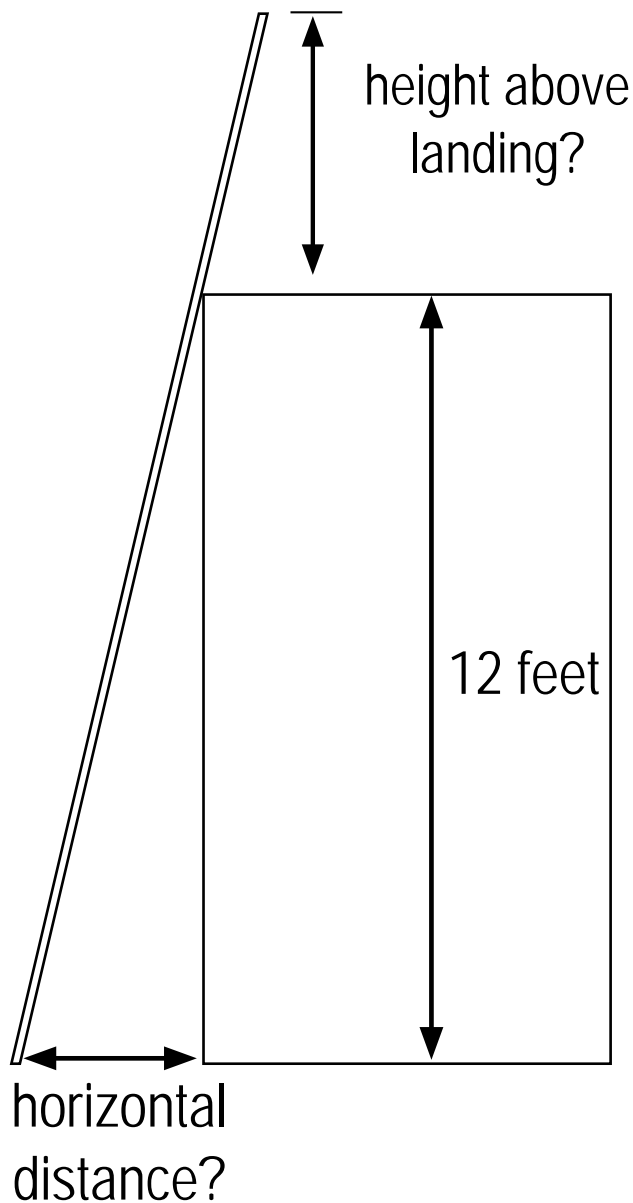
- 1. Which of the following is the best housekeeping practice?**
 - a. Store materials on stairs.**
 - b. Use a temporary sign to mark a wet floor.**
 - c. String electrical cords across doorway floors.**

- 2. Which is the most serious safety message?**
 - a. Danger**
 - b. Warning**
 - c. Caution**

- 3. What is the minimum distance the upper and lower sections should overlap when using a 24 ft. extension ladder?**
 - a. 1 foot**
 - b. 2 feet**
 - c. 3 feet**

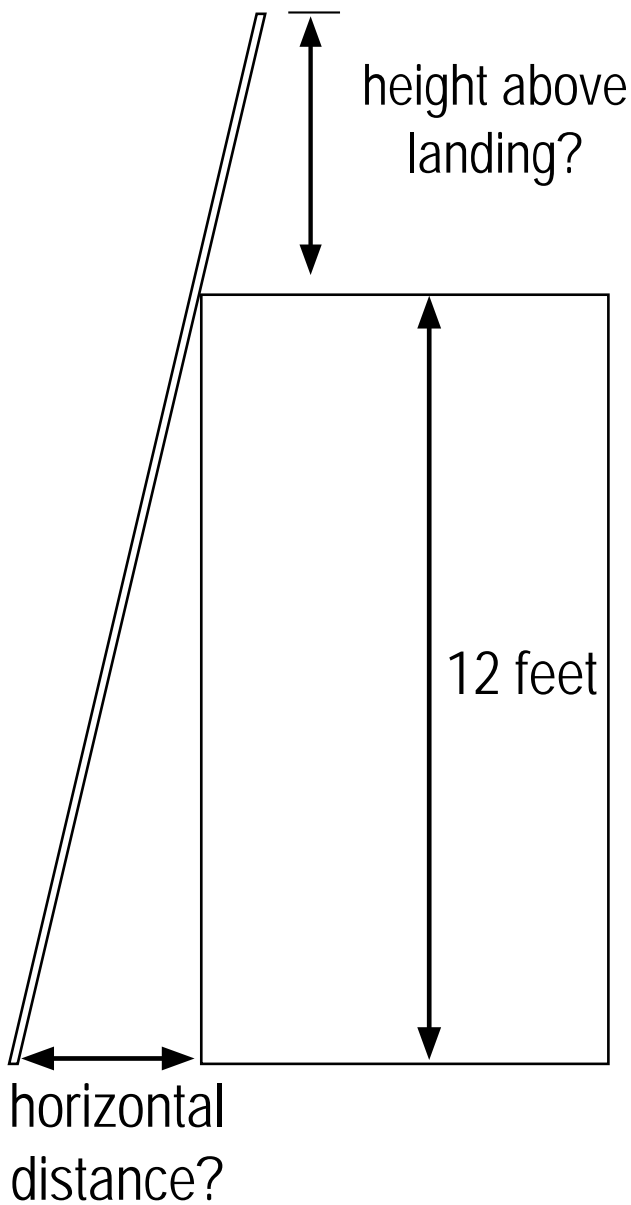
- 4. Which of the following ladders is acceptable for a 235 lb. worker with a 20 lb. tool belt?**
- a. Type 1A**
 - b. Type I**
 - c. Type II**
 - d. Both A and B**
- 5. Which is the safest ladder to use near electricity?**
- a. Fiberglass**
 - b. Wood**
 - c. Metal**

Use the diagram below to answer question 6.



6. “Height above landing” should be at least:
- a. 1 foot
 - b. 2 feet
 - c. 3 feet

Use the diagram below to answer question 7.



7. “Horizontal distance” should be:

- a. 2 feet
- b. 3 feet
- c. 4 feet

- 8. Which of the following is the best practice when your ladder isn't long enough to reach?**
- a. Splice two ladders together to make a longer one.**
 - b. Stand near the top of the ladder and reach as far as you can.**
 - c. Get a longer ladder or talk with your supervisor if a longer ladder is not available.**
- 9. Personal fall protection equipment (for instance, a harness) is required if there are no guardrails and you are working on a surface more than _____ feet above the floor.**
- a. 4**
 - b. 6**
 - c. 8**

10. Which of the following is the best practice when using a lift truck personnel lifting device?

- a. Drive slowly when workers are in the lift cage.**
- b. The lifting device should be secured to the forks or carriage before lifting.**
- c. The lift truck operator should stand outside the cab in order to see the workers overhead.**

11. Your two feet and two hands represent a total of four points. How many points must always be in contact with the ladder?

- a. One**
- b. Two**
- c. Three**

12. True or false?

You should not use a ladder if your work requires the use of both hands.

13. True or false?

Wooden ladders should be painted to protect them from the weather.

14. True or false?

If you must place an extension ladder against a window, lean it carefully against the window sash.

15. True or false?

Skylights are designed to hold your weight.

16. True or false?

Tie the ladder in position when using it to reach high places or scaffolds.

17. True or false?

Before climbing a step ladder, you should always open the ladder fully and lock the spreader.

18. True or false?

When climbing up and down, you should face away from the ladder (e.g., with your back to the ladder).

Answer Key

Fall Prevention Conclusion

1. b

2. a

3. c

4. a

5. a

6. c

7. b

8. c

9. a

10. b

11. c

12. T

13. F

14. F

15. F

16. T

17. T

18. F

Working Safely Around Hazardous Substances Training Guide

Suggested Materials

- Working Safely Around Hazardous Substances* manuals (English, MF2760; Spanish MF2760S)
- Sign-in sheet
- Pencils
- Instructor Guide*
- Training overheads/slides/projector
- Blank overheads/flipchart/blackboard/pen for listing participant responses and outlining important concepts.
- Examples of personal protective equipment. For instance:
 - ▶ Chemical resistant gloves
 - ▶ Protective eyewear
 - ▶ Face shield
 - ▶ Aprons
 - ▶ Protective clothing
 - ▶ Protective footwear
 - ▶ Any other personal protective equipment participants will be expected to use
- Permeation and breakthrough data charts for gloves (available from glove manufacturer or see “Chemical-resistant glove Web sites” below)
- Material Safety Data Sheets (MSDS) of some representative chemicals that participants will be expected to use
- Any spill response supplies that participants will be expected to use
- Empty containers of chemicals for examples of label information
- Any secondary containers and labels that participants will be expected to use
- Unlabeled chemical container (empty)
- Oily waste storage can
- Grounding and bonding wires
- Flammable liquid storage container
- Materials for fire extinguisher training, as appropriate
- Clean up materials for spill response drill, as appropriate
- Equipment for pipe/equipment opening exercise, as appropriate

Sources of Background Information

- ▶ *Working Safely Around Hazardous Substances* manuals:
http://www.oznet.ksu.edu/agsafe/training/OSHA_training.htm
- ▶ NIOSH Chemical Safety Web site:
<http://www.cdc.gov/niosh/topics/chemical-safety/>
- ▶ OSHA Hazardous and Toxic Substances Web page:
<http://www.osha.gov/SLTC/hazardoustoxicsubstances/index.html>
- ▶ OSHA Hazard Communication Web page:
<http://www.osha.gov/SLTC/hazardcommunications/index.html>
- ▶ OSHA Process Safety Management Web page:
<http://www.osha.gov/SLTC/processsafetymanagement/index.html>

- ▶ Chemical-resistant glove Web sites:
<http://www.chemrest.com/>
<http://www.ansellpro.com/>
<http://mapaglove.com/>
http://www.hazmat.msu.edu:591/glove_guide/

Length of Time Needed for Training

Review and select the learning activities that are most appropriate. If all discussion and hands-on exercises are included in the training may take 2 to 4 hours depending on the hands-on exercises used.

Welcome and Introduction

- ▶ Introduce yourself.
- ▶ Remind participants of the topic of the training.
- ▶ Discuss breaks, locations of restrooms, ending time and any tests or evaluations.
- ▶ Tell participants you expect them to play an active role by relating their experiences and knowledge.

Participant Introductions

Find out:

- ▶ Who are they?
- ▶ Have any participants ever had an accident or close call with chemicals, or have they witnessed anybody else having a bad experience that involved chemicals (either on the job or at home)?
 - ▶ Would they care to share what happened?
 - ▶ Could anything have been done to prevent the accident?

Lesson 1

Take Control of Your Own Safety

Suggested Objectives

- Identify the causes of serious injury and illness from hazardous substances.
- Recall frequently used terms found on labels and in Material Safety Data Sheets (MSDSs).

Discuss Accident Reports on pages 4-5 of *Working Safely Around Hazardous Substances*

Discussion Items

What chemical hazards pose the greatest risk at the participants' workplace?

What steps are participants already taking to protect themselves?

Hands-on Exercise

Divide the class into groups of three to five participants.

- ▶ Provide each group with one or more empty containers of chemicals that they will be using on the job. Also provide each group with one or more secondary containers (if they will be using these on the job).
- ▶ Provide the following instructions:
 - ▶ Each group should examine the label and determine the contents, proper use, hazards, and appropriate first aid procedures.
 - ▶ Each group should label a secondary container with the required information, according to company policy or according to the "Labeling" information at the top left of page 6 in *Working Safely Around Hazardous Substances*.
 - ▶ Each group should choose a representative to share what they learned about the chemicals with the rest of the class.

Discussion

Discuss the importance of labeling secondary containers by showing the class an unlabeled chemical container (empty).

- ▶ Without a label, is it possible to know:
 - ▶ How to give first aid if someone swallows it?
 - ▶ How to clean it up if it gets spilled?
 - ▶ How to dispose of it?
- ▶ What procedures should workers follow if they find an unlabeled chemical container at the worksite?

Questioning

Provide each participant with a Material Safety Data Sheet (MSDS) for one or more of the chemicals they will be expected to use.

- ▶ Ask participants to identify sections on the MSDS where they can find information about:
 - ▶ Ingredients
 - ▶ Hazards
 - ▶ Personal protective equipment
 - ▶ Storage
 - ▶ First aid
 - ▶ Spill response
 - ▶ Disposal

Quick Questions

Display the overheads provided on pages 168-170 of this guide.

- ▶ Call on participants to answer questions.
- ▶ Use the questions as opportunities to discuss training material. The answer key is on page 171.

Evaluation

Answer the quiz questions on page 8 of *Working Safely Around Hazardous Substances* individually or as a group. Be sure to discuss each item.

Lesson 2

Avoid Skin and Eye Contact with Hazardous Substances

Suggested Objectives

- Identify safe work practices that can prevent skin and eye contact with hazardous substances.
- Identify protective eyewear.
- Recall basic first aid for treating minor burns and contact with hazardous substances.

Discuss the Accident Report on page 9 of the *Working Safely Around Hazardous Substances* manual

What job tasks are most likely to result in skin or eye exposure to hazardous substances in the participants' workplace?

What precautions do participants already take to protect themselves. List responses on an overhead or flipchart.

- ▶ How does the participants' list of precautions compare with the list of bulleted items on page 9 of the *Working Safely Around Hazardous Substances* manual?

Discuss the washing instructions on page 10 of the *Working Safely Around Hazardous Substances* manual.

- ▶ For workers who use chemicals, why is it important to wash before:
 - ▶ Handling contact lenses?
 - ▶ Using the restroom?

Discuss the job tasks for which participants are required to wear protective gloves. List these job tasks on an overhead or flipchart.

- ▶ What types of gloves are available in the workplace?
- ▶ Are different types of gloves required for different jobs?

Discuss the importance of knowing the limitations of chemical-resistant gloves, using the two overheads on pages 172-173 of this guide. Display representative gloves while showing the overheads. (Alternatively, make similar overheads representing the breakthrough times for gloves and chemicals used in your plant.)

- ▶ Discuss the concept of breakthrough time:
 - ▶ Breakthrough time is the amount of time it takes for a glove to fail when continuously exposed to a specific chemical in laboratory tests.
 - ▶ Breakthrough time depends on the thickness and type of glove material, the chemical you're exposed to, and the activity involved (handling of abrasive materials, for instance).
 - ▶ Manufacturers provide information on breakthrough times for their gloves (see Web sites listed in Background Information on page 153).

Visual Aid

Discuss the importance of selecting the right glove for the job, using the two overheads on pages 174-175 of this guide. Display representative gloves while showing the overheads. (Alternatively, make similar overheads representing the breakthrough times for gloves and chemicals used in your plant.)

Discuss an example of a permeation and breakthrough data chart for the gloves participants will be expected to use (available from the glove manufacturer, or see Web sites listed in Background Information on page 153).

Discuss and show examples of gloves participants will be expected to use for specific chemical exposures in the plant.

Hands-on Exercise

First demonstrate, then have participants practice donning and removing chemical-resistant gloves.

- ▶ Remove jewelry, then check gloves for leaks and damage before donning them.
- ▶ Clean gloves can be checked for leaks by blowing air into them and then twisting the cuff. Do not touch your mouth to used chemical-resistant gloves.
- ▶ Remove gloves using the procedures on pages 11-12 of *Working Safely Around Hazardous Substances*.

Discuss the importance of washing after removing gloves.

Discuss the importance of immediately removing gloves and washing if the gloves tear or leak during use.

Discuss company policy and procedures for disposing, cleaning, and storing used gloves.

Visual Aid

Discuss the overhead on page 176 of this guide.

- ▶ How could this accident have been prevented?

Hands-on Exercise

First demonstrate, then have participants practice donning and removing any other personal protective equipment they will be expected to use.

- ▶ Discuss the purpose and limitations of various types of protective eyewear and face shields, as illustrated on page 13 of *Working Safely Around Hazardous Substances*.
 - ▶ Can participants identify the Z87 label on their protective eyewear?
- ▶ Discuss company policy and procedures for disposing, cleaning, and storing used eyewear, foot protection, and body protection.

Visual Aid

Discuss the overhead “Is This a Good Idea?” on page 177 of this guide. Ask each participant to identify a different safety problem in the story.

Questioning

Refer to the MSDSs that were provided to participants during Lesson 1. Give each participant a few minutes to find the answer to one of the following questions in the MSDS. Then, ask each participant to report to the class regarding what he/she learned:

- ▶ How does this product affect the skin?
- ▶ How does this product affect the eyes?
- ▶ Can this product be absorbed into the bloodstream through contact with the skin? If so, what symptoms might you notice?
- ▶ What type of glove (if any) is required?
- ▶ What type of eye protection (if any) is required?
- ▶ Is any protective clothing required?
- ▶ What is the pH of this product, and how does this affect the skin and eyes?
- ▶ What is the proper first aid if the product contacts the skin?
- ▶ What is the proper first aid if the product contacts the eyes?

Quick Questions

Display the overheads provided on pages 178-179 of this guide.

- ▶ Call on participants to answer questions.
- ▶ Use the questions as opportunities to discuss training material. The answer key is on page 180.

Evaluation

Answer the quiz items on page 16 of *Working Safely Around Hazardous Substances* individually or as a class. Be sure to discuss each item.

Avoid Inhaling Hazardous Substances

Lesson 3

Suggested Objectives

- Recognize how hazardous substances can be harmful when breathed in.
- Identify safe work practices that can prevent you from breathing in hazardous substances.

Discuss the Accident Report on page 17 of *Working Safely Around Hazardous Substances*

What job tasks are most likely to result in participants breathing hazardous substances in their workplace?

- ▶ What precautions are participants already taking to protect themselves?
 - ▶ How do these precautions compare with the bulleted items under “Work Safely” on page 17 of *Working Safely Around Hazardous Substances*?

Visual Aids

Discuss the overhead on page 181 of this guide.

- ▶ What is the company policy if an employee finds an unknown chemical?

Discuss the overhead on page 182:

- ▶ How might the activities of participants affect others in the workplace?
- ▶ What precautions do they observe to protect others?

Discussion

Discuss the company policy regarding use of respirators.

- ▶ **Note:** Use of a respirator requires training that is beyond the scope of this manual. For more information, see Occupational Safety and Health Administration, CFR 1910.134, *Small Entity Compliance Guide for the Respiratory Protection Standard*:
http://www.osha.gov/Publications/SECG_RPS/secg_rps.html

Visual Aid

If participants will be expected to use local exhaust ventilation, discuss the overheads on pages 183-185.

- ▶ Discuss the proper use and limitations of any local exhaust ventilation the participants will be expected to use.

Hands-on Exercises

If participants will be expected to use local exhaust ventilation, first demonstrate and then have participants practice using the equipment.

Questioning

Refer to the MSDSs that were provided to participants during Lesson 1. Give each participant a few minutes to find the answer to one of the following questions in the MSDS. Then, ask each participant to report to the class regarding what he/she learned:

- ▶ How does this product affect you if you breathe the substance?
- ▶ What type of ventilation (if any) is required?
- ▶ What type of respiratory protection (if any) is required?
- ▶ What is the proper first aid if someone breathes the substance?
- ▶ What precautions should rescuers observe before rushing in to help someone who has been overcome by substance?

Evaluation

Answer the quiz items on page 21 of *Working Safely Around Hazardous Substances* individually or as a class. Be sure to discuss each item.

Avoid Swallowing Hazardous Substances

Lesson 4

Suggested Objectives

- Identify ways to avoid swallowing chemicals.
- Recognize treatment and first aid for swallowing chemicals.

Discuss the Accident Report on page 22 of *Working Safely Around Hazardous Substances*

Refer to the bulleted items in “Work Safely” on page 22 of *Working Safely Around Hazardous Substances*. For each item, ask a participant to describe how a hazardous substance might be swallowed if the precaution isn’t observed.

Visual Aid

Discuss the overhead on page 186 of this guide.

- ▶ What is the company policy regarding food and drink in chemical use and storage areas?
- ▶ What do participants think of the worker’s decision to drive himself to the hospital?
- ▶ What do participants think of the worker’s decision to take the chemical label to the hospital?

Discuss the hand washing guidelines on page 23 of *Working Safely Around Hazardous Substances*

Questioning

Refer to the MSDSs that were provided to participants during Lesson 1. Give each participant a few minutes to find the answer to one of the following questions in the MSDS. Then, ask each participant to report to the class regarding what he/she learned:

- ▶ How does this product affect you if you swallow it?
- ▶ What type of face protection (if any) is required?
- ▶ What special hygiene practices (if any) are required?
- ▶ What is the proper first aid if someone swallows the product?

Discuss the First Aid procedures on page 25 of *Working Safely Around Hazardous Substance*

Why should vomiting not be induced unless specifically instructed?

Evaluation

Answer the quiz items on page 26 of *Working Safely Around Hazardous Substances* individually or as a class. Be sure to discuss each item.

Lesson 5

Avoid Fires and Explosions

Suggested Objectives

- Describe how to work safely around flammables.
- Recognize flash point.
- Describe how to ground and bond containers to prevent fires and explosions.

Discuss the Accident Report on page 27 of *Working Safely Around Hazardous Substances*

What job tasks are most likely to result in fires or explosions in the participants' workplace?

- ▶ What precautions do participants already take to protect themselves? (List on an overhead).

Analysis

Ask participants to silently read "Work Safely Around Flammables" on page 27 of *Working Safely Around Hazardous Substances*.

- ▶ In the margin, ask each participant to write an example from their own work of how they would apply one or more of the rules.
- ▶ When finished, ask volunteers to briefly describe the examples they recorded.

Discuss the Accident Report on page 28 of *Working Safely Around Hazardous Substances*

What is the company policy concerning the use of flammables as cleaning agents?

Visual Aids

Discuss the overheads on pages 187-188 of this guide.

- ▶ What job tasks require participants to dispense or transfer flammable liquids?
- ▶ Discuss how static charges can be created when flammable liquids are poured or pumped from one container to another.

Discuss the overheads on pages 189-190.

- ▶ Discuss the importance of grounding and bonding when dispensing and transferring flammable liquids.

Discuss the overhead on page 191.

- ▶ Discuss how spontaneous combustion can occur if oily or solvent-soaked rags are disposed improperly.

Show participants examples of oily waste storage cans and discuss their use in the plant.

Discuss flash point, based on the information on page 30 of *Working Safely Around Hazardous Substances*

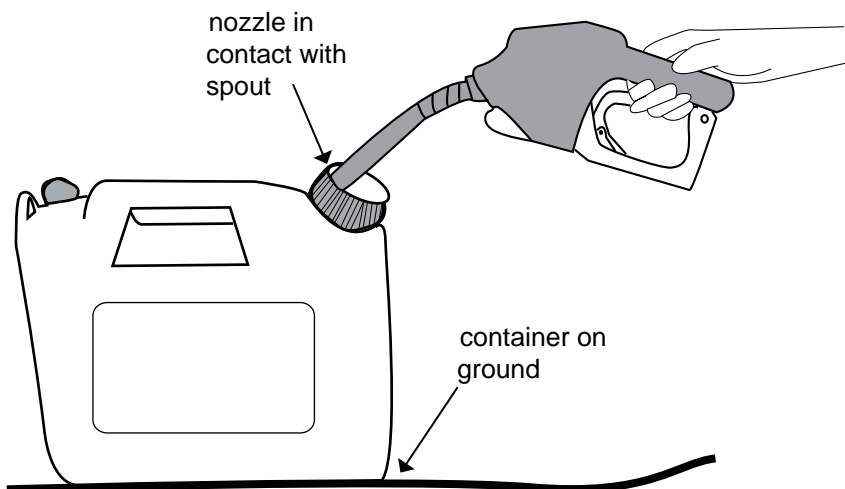
What are the flash points of some of the common chemicals participants will be using on the job? (In advance, prepare an overhead showing the flash points of flammable and combustible liquids used in the plant.)

- ▶ Do these chemicals require any special precautions that have not already been discussed?

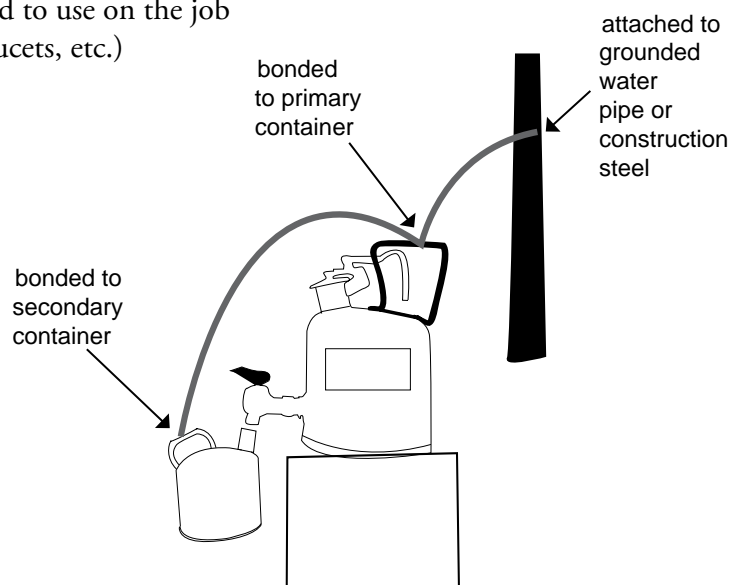
Hands-on Exercises

First demonstrate, then ask participants to practice any of the following tasks they will be expected to perform. (Observe procedures in equipment operator's manuals or follow the general guidelines on pages 28-31 of *Working Safely Around Hazardous Substances*.)

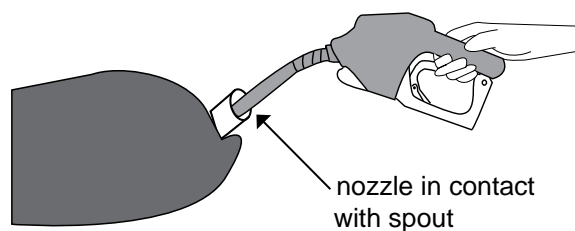
- ▶ Filling portable containers, including any necessary grounding/bonding procedures.



- ▶ Operating any specialized equipment they will be expected to use on the job (e.g., self-closing faucets, etc.)



- ▶ Fueling equipment



Questioning

Refer to the MSDSs that were provided to participants during Lesson 1. Give each participant a few minutes to find the answer to one of the following questions in the MSDS. Then, ask each participant to report to the class regarding what he/she learned:

- ▶ What is the flash point of this product?
- ▶ What special storage and use procedures are necessary to prevent fires and explosions when using this product?
- ▶ If the product catches fire, what special extinguishing procedures are required?
- ▶ What is the proper first aid if you are burned when using this product?

Hands-on Exercise

If participants will be expected to use fire extinguishers, first demonstrate then ask participants to practice using extinguishers in a safe, controlled setting, according to the extinguisher manufacturer's instructions.

- ▶ **Note:** Many fire extinguisher sales and service companies will provide this training free of charge to their customers. Check with the company that services your extinguishers to see if they will provide this training at your location.
- ▶ For additional background information on fire extinguisher selection and use, see OSHA's Evacuation Plans and Procedures e-Tool:
<http://www.osha.gov/SLTC/etools/evacuation/index.html>

Evaluation

Answer the quiz items on page 34 of *Working Safely Around Hazardous Substances* individually or as a class. Be sure to discuss each item.

Working Safely with Hazardous Substances

Lesson 6

Suggested Objectives

- Recognize safe procedures for labeling, mixing, disposing and storing chemicals.
- Identify precautions for opening systems containing hazardous materials.

Discuss the accident report on page 35 of *Working Safely Around Hazardous Substances*

What chemical reactions are most likely with the hazardous substances participants will be using in the plant? (In advance, prepare an overhead outlining any chemical reactions that are likely.)

- ▶ What precautions are required to prevent or control these reactions?

Questioning

Refer to the MSDSs that were provided to participants during Lesson 1. Give each participant a few minutes to find the answer to one of the following questions in the MSDS. Then, ask each participant to report to the class regarding what he/she learned:

- ▶ With what other chemicals is this product incompatible?
- ▶ What reactions are likely to occur?

Hands-on activity:

Break the class into groups of three to five participants.

- ▶ Using the list of items in “Store Chemicals Properly” on page 35 of *Working Safely Around Hazardous Substances*, ask each group to inspect one or more chemical storage areas.
- ▶ Bring the groups back together and ask a representative from each group to report regarding the conditions they observed.

Discussion

Discuss the company policy and procedures regarding response to spills of hazardous substances.

Hands-on Exercise

If participants will be expected to respond to chemical spills, conduct a spill response drill based on company policies or on the general procedures on page 36 of *Working Safely Around Hazardous Substances*.

- ▶ Select a specific hazardous substance that will be the subject of your drill. If desired, a spill may be simulated with a small amount of water, sand, or other harmless substance. Do NOT intentionally spill a hazardous substance during the drill.
- ▶ Use the drill to provide participants with experience using the same absorbents, equipment, and procedure they would use during an actual spill.
- ▶ Evaluate the drill after completion using the spill drill assessment form on page 192 of this guide.
- ▶ Note: This training is designed to address “non-emergency” spills. Additional training is required that is beyond the scope of this manual if participants will be expected to respond to “emergency” spills. See Appendix E of OSHA Directive CPL 02-02-059 for guidance on what is considered an “emergency” spill: http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=DIRECTIVES&p_id=1572

Discussion

Discuss the company policy and procedures for storage and disposal of hazardous waste.

- ▶ What substances in the workplace are identified as hazardous waste?
- ▶ What procedures are participants expected to observe if they generate or handle hazardous waste?

Discuss the accident report on page 36 of *Working Safely Around Hazardous Substances*

What job tasks may involve exposure to hazardous materials in pipes and equipment?

- ▶ What company policies and procedures apply to opening or servicing these pipes or equipment?

Hands-on Activity

If participants will be expected to open or service pipes or equipment that may contain hazardous substances, first demonstrate and then have teams of participants practice these activities under appropriate supervision.

- ▶ Use lockout/tagout procedures as appropriate (See *Machine Hazards*: http://www.oznet.ksu.edu/agsafe/training/OSHA_training.htm)
- ▶ Observe company procedures for servicing pipes and equipment, or use the general guidelines on page 37 of *Working Safely Around Hazardous Substances*.
- ▶ Evaluate participant teams using the scoresheet on page 193 of this guide. For each item, ask a participant to describe how a hazardous substance might be swallowed if the precaution isn't observed.

Evaluation

Answer the quiz items on page 38 of *Working Safely Around Hazardous Substances* individually or as a class. Be sure to discuss each item.

Conclusion

Discussion

Ask participants to share any questions or concerns about the information or how to apply it to their jobs.

Contest

Divide the class into groups.

- ▶ Display the contest items provided on pages 194-202 of this guide.
- ▶ In turn, ask each group a multiple choice or true/false question from the over-heads. Each group gets one point for every correct answer. If a group misses a question, allow the next group to answer it for a point. Keep track of points and recognize the winning group.
- ▶ Use the questions as opportunities to discuss the training material. The answer key is on page 203.

Evaluation

Answer the quiz questions on page 40 of *Working Safely Around Hazardous Substances* individually or as a group. Be sure to discuss each item.

- 1. A worker set her bottle of soda next to a container of drain cleaner. Without paying attention, she accidentally drank some of the drain cleaner. This is an example of:**
 - a. Acute exposure**
 - b. Chronic exposure**

- 2. An employee refused to wear protective gloves while using a disinfectant solution that contained formaldehyde. He used the cleaning solution without gloves every day for five years. After a while, he developed a severe rash every time he came in contact with any product containing formaldehyde. This is an example of:**
 - a. Corrosion**
 - b. Sensitization**

- 3. A worker accidentally mixed ammonia and bleach. The solution began releasing hazardous chlorine gas. The gas was released because ammonia and bleach _____ on contact:**
- a. Explode**
 - b. React**
- 4. A maintenance worker removed a pipe from a large kettle that had just been cleaned with a solution of sodium hydroxide. When she removed the pipe, some of the solution spilled out and severely burned her eyes. Her eyes were burned because sodium hydroxide is a:**
- a. Corrosive**
 - b. Sensitizer**

- 5. For years, a maintenance worker carelessly chipped asbestos insulation off pipes when fixing plumbing leaks. He eventually died of lung cancer due to repeated breathing of asbestos fibers. This is an example of:**
- a. Acute exposure**
 - b. Chronic exposure**
- 6. Soon after entering a walk-in freezer, a worker noticed a mild burning sensation in her eyes. The maintenance department was called, and they discovered that an ammonia refrigerant line was leaking. The worker felt discomfort in her eyes because ammonia is a/an:**
- a. Irritant**
 - b. Sensitizer**

1. a

2. b

3. b

4. a

5. b

6. a

Medium-duty nitrile gloves (15-mil) will protect me against which of the following chemicals?

- a. Acetone
- b. Phosphoric acid 85%
- c. Benzene
- d. Sulfuric acid 97%
- e. All of the above
- f. None of the above

Medium-duty nitrile gloves (15-mil) will protect me against which of the following chemicals?

- a. Acetone (Not Recommended)
- b. Phosphoric acid 85%
(480 minutes)**
- c. Benzene (2 minutes)
- d. Sulfuric acid 97% (Not Recommended)
- e. All of the above
- f. None of the above

Which of the following gloves will give me the best protection if I am handling ethyl alcohol (ethanol)?

- a. Heavy-duty neoprene
- b. Medium-duty nitrile (15-mil)
- c. Thin nitrile exam glove (8-mil)

Which of the following gloves will give me the best protection if I am handling ethyl alcohol (ethanol)?

- a. Heavy-duty neoprene (480 minutes)**
- b. Medium-duty nitrile (225 minutes)
- c. Thin nitrile exam glove (24 minutes)

Accident Report

Worker's Eyes Burned By Splashing Chemical

Summary of OSHA Accident Investigation
0352410

A worker was pouring a solvent cleaner from a one-gallon container into a one-quart container. The substance splashed into her eyes, and she was hospitalized for a burned cornea.

Is This a Good Idea?

An employee was wearing gloves while he cleaned out a chemical storage room. The room was hot and it was lunch time, so he wiped the sweat out of his eyes, took off his gloves, and then sat down to eat his lunch. Afterwards, he used the bathroom, smoked a cigarette, put his gloves on again, and went back to work.

- 1. If a hazardous chemical contacts your clothing, you should:**
 - a. Immediately remove the clothing.**
 - b. Wash the affected skin.**
 - c. Both A & B.**

- 2. If a hazardous chemical contacts your eyes, you should gently flush your eyes for:**
 - a. 15 minutes**
 - b. 10 minutes**
 - c. 5 minutes**

- 3. If your skin is mildly burned (skin is not broken) you should place the burn under:**
- a. Cool water**
 - b. Warm water**
 - c. Hot water**
- 4. If the skin is severely burned and the skin IS broken you should:**
- a. Place the burn under cool water.**
 - b. Keep the burn dry and get medical attention immediately.**
 - c. Apply petroleum jelly to the burn.**

1. c

2. a

3. a

4. b

Accident Report Worker Sickened After “Testing” Unknown Substance by Breathing It

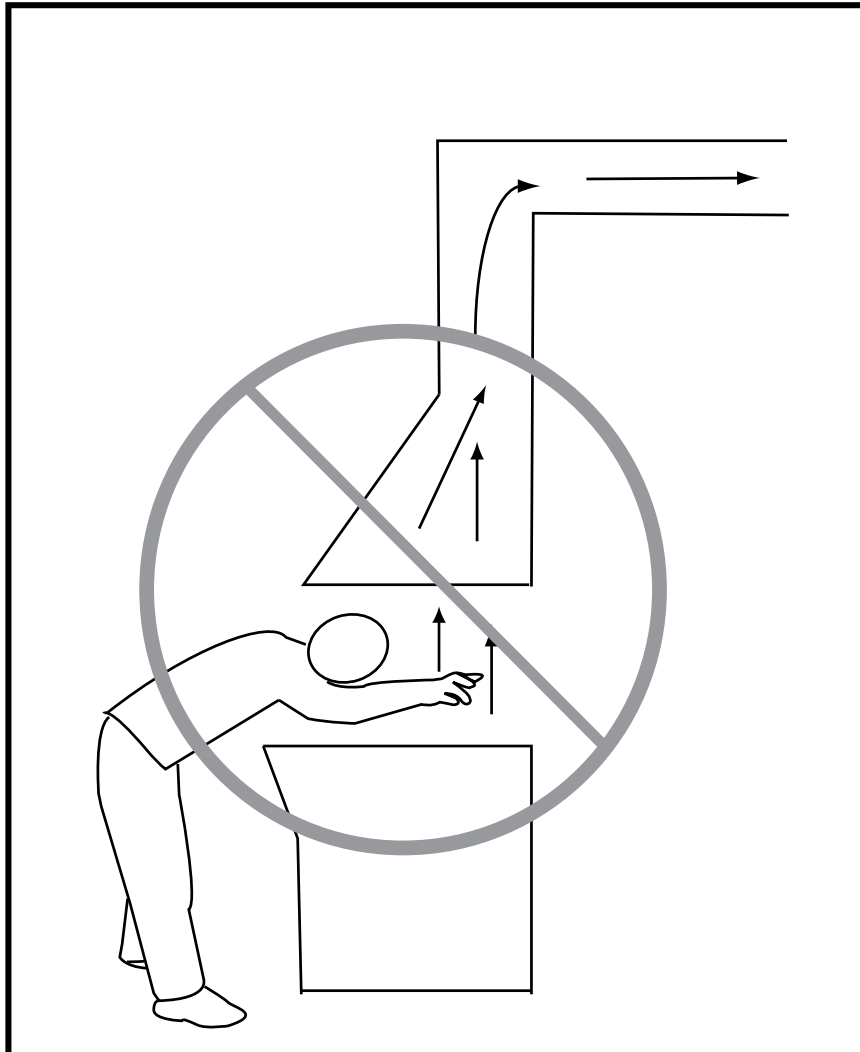
Summary of OSHA Accident Investigation
0854910

A worker saw an unmarked one-gallon container in a trash bin. He wanted to make sure someone hadn't been throwing hazardous chemicals in the trash, so he picked up the container, removed the lid, and smelled it. The worker was sickened by the vapors, and he was hospitalized.

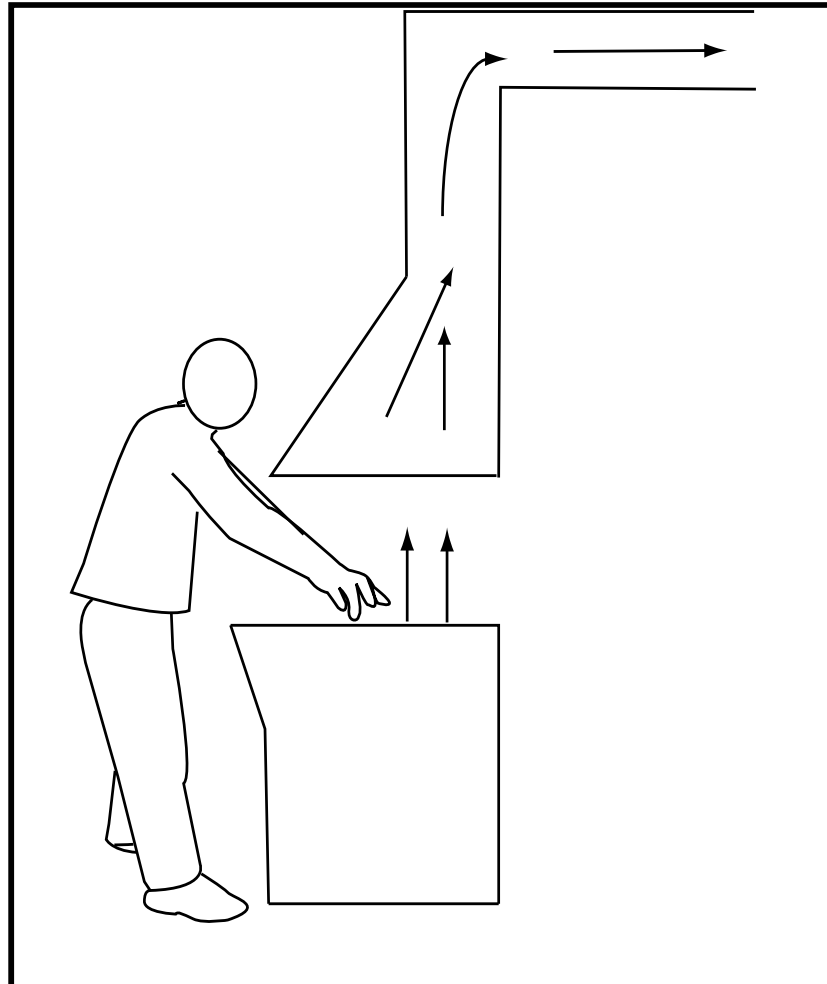
Accident Report Co-workers Sickened by Chemical Mixture

Summary of OSHA Accident Investigation
0751910

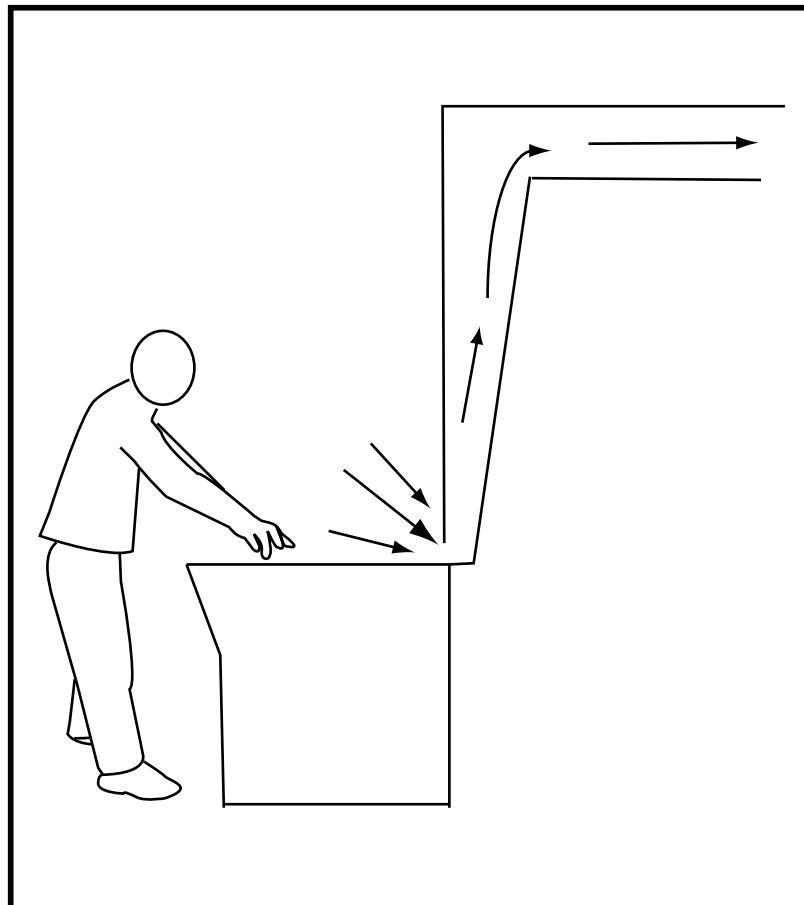
A worker was painting shelves under a return air intake inside a building. The vapors from the paint and primer went through the ventilation system and into the offices on that floor. As a result, 13 employees were overcome by paint and primer vapors and had to be hospitalized.



NO
Never place your head between
the work and the hood.



YES
Keep your head away from the hazardous vapors.



YES
Position yourself so the hood
draws vapors away from
your head.

Accident Report

Worker Poisoned By Contaminated Coffee

Summary of OSHA Accident Investigation
0950645

A worker entered a chemical storage shed. He carried a cup of coffee into the shed, sat down on the bags of chemicals, and began moving the bags around to find the one he needed. He picked up a 2-pound bag of a toxic chemical. The bag was wet and broke, spilling chemical dust over much of the shed. Some of the chemical spilled into his coffee, which he later drank. As his throat began to close, he grabbed the chemical label and drove himself to the hospital.

What if...

I poured a flammable liquid from one container into another without grounding and bonding the two containers?

Accident Report

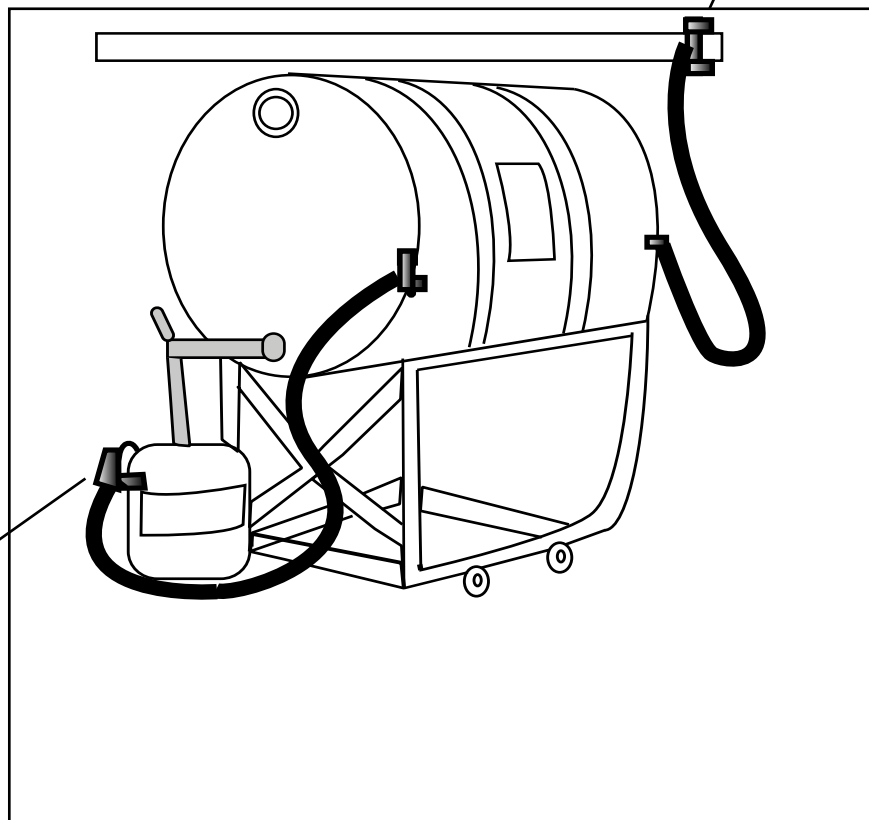
Static Spark Ignites Flammable Solvent

Summary of OSHA Accident Investigation
0418100

A worker transferred toluene (a flammable solvent) from a tank into a smaller container. The toluene was being transferred with a hose that did not provide electrical continuity between the tank and container. When the container was about half full, a static spark ignited the toluene, burning the worker's face and hands.

Example of Grounding and Bonding Flammable Liquid Containers

Ground the drum to construction steel, water pipe or other low-resistance ground.

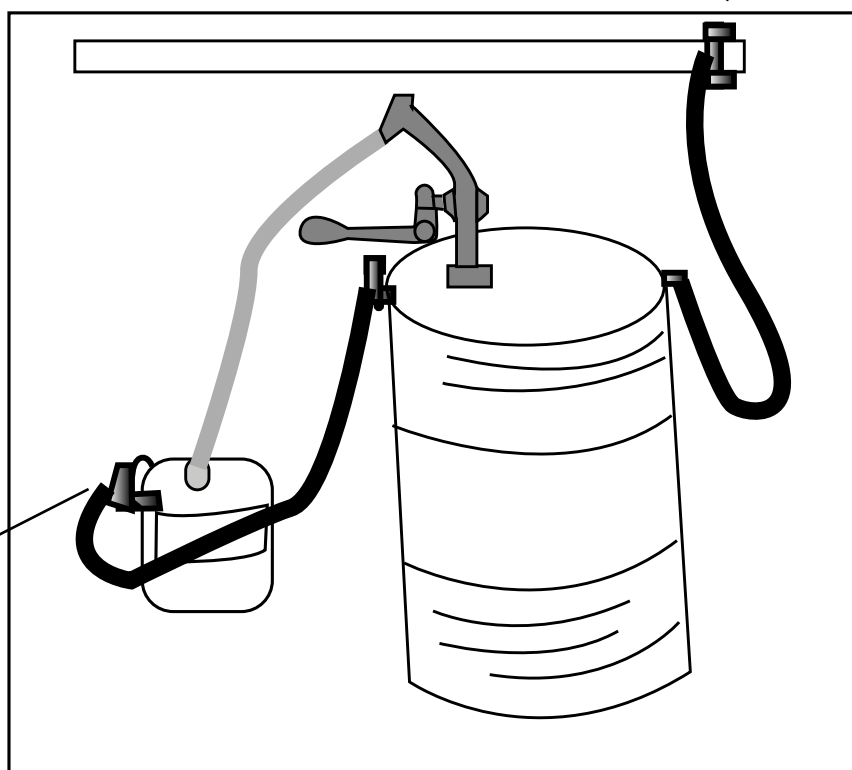


Bond the portable container to the drum.

Example of Grounding and Bonding Flammable Liquid Containers

Ground the drum to construction steel, water pipe or other low-resistance ground.

Bond the portable container to the drum.



Accident Report

Solvent-Soaked Rags Burst Into Flames

Summary of OSHA Accident Investigation
0111500

A worker was using naphtha solvent to clean a metal surface. When he finished, he threw his rag onto a pile of other used rags next to the 5-gallon container of naphtha. Later, the rags burst into flames. The worker tried to carry the naphtha container outdoors, but he dropped it when he bumped into a coworker. The container exploded, and the employee suffered second- and third-degree burns.

Spill Drill Assessment

Location: _____ Date: _____

Trainer: _____

Participants: _____

1. Identify any barriers that interfere with alerting people who would be affected by the spill.

2. Describe any problems that prevent Material Safety Data Sheets (MSDS) from being used effectively.

3. List any difficulties in selecting and using appropriate personal protective equipment.

4. Describe any problems with equipment shut-off procedures.

5. Discuss any obstacles to ventilating the area of the spill.

6. Specify any difficulties in selecting and using spill control materials (absorbents, etc.).

7. Identify any problems related to emergency phone numbers, eyewash stations, emergency showers, and first aid kits.

8. List any goals for improvement.

Evaluation/Performance Checklist: Opening and Servicing Pipes with Hazardous Substances

Participants: _____

_____ Date: _____

Instructor: _____ Location: _____

	Satisfactory	Needs Improvement
● Wears necessary personal protective equipment		
● Uses a rubber mat or other appropriate shielding		
● Uses buddy-system		
● Does not spill or drip contents on people and equipment		
● When working overhead, moves people and equipment		
● Performs necessary lockout/tagout		
● disconnects and locks out any heating mechanism and allows time for cooling		
● shuts off and locks control valves or caps or blanks the lines		
● does not vent toxic, flammable or explosive substances directly into the air		
● allows adequate time for venting and draining open lines		
● maintains open bleed		
● Loosens bolts slowly and away from self and others		
● Loosens the bottom bolts first (for pipes containing liquids)		
● Separates stuck flanges carefully with wedges or appropriate tools		

- 1. If you transfer a chemical product into another container (and don't use the product immediately), you must label the second container with:**
 - a. Contents only**
 - b. Warnings only**
 - c. Contents AND warnings**

- 2. Sulfuric acid and caustic soda are both examples of:**
 - a. Corrosives**
 - b. Flammables**
 - c. Mutagens**

- 3. While cleaning a mixing tank, a worker was overcome by vapors from the cleaning solution and passed out. This is an example of:**
 - a. Chronic effects**
 - b. Acute effects**
 - c. Latent effects**

4. If you work with hazardous substances, you MUST wash your hands:

- a. BEFORE eating**
- b. BEFORE handling hazardous substances**
- c. AFTER drinking**

5. True or false?

You may use a face shield INSTEAD OF goggles to protect your eyes from splashes of hazardous substances.

6. True or false?

If a hazardous chemical contacts your eyes, you should flush your eyes with water for 10 minutes or less.

7. If a hazardous substance contacts your skin, you should:

- a. Remove any contaminated clothing.**
- b. Wash the affected area.**
- c. Both A and B**

8. True or false?

Use cool water to treat minor burns.

9. Which of the following provides the MOST EFFECTIVE protection from toxic vapors?

- a. Exhaust hood**
- b. Open window**
- c. Air conditioning system**
- d. Respirator**

10. Which of the following is the BEST practice when using an exhaust hood?

- a. Open a nearby window for cross-ventilation.**
- b. Position yourself so the hood draws vapors away from your head.**
- c. Move quickly whenever you are near the hood.**

11. Which of the following is the BEST practice when helping a co-worker who has been overcome by hazardous vapors in the air?

- a. Hold your breath and rush in to help the victim.**
- b. Size up the situation and make sure you don't endanger yourself before rushing in.**
- c. Keep the victim AWAY from fresh air, which might create an explosive mixture in his/her lungs.**

12. True or false?

If you use hazardous substances, you must wash your hands AFTER removing chemical-resistant gloves.

13. Which of the following is the BEST practice for storing hazardous substances which require refrigeration?

- a. Store hazardous substances in a refrigerator in the employee break room.**
- b. Store hazardous substances in empty soft-drink containers.**
- c. Store hazardous substances in a separate refrigerator marked “No Food. Chemicals Only.”**

14. Which of the following is the BEST practice if a worker accidentally swallows a hazardous substance?

- a. Immediately call 911 or check the label or MSDS for instructions.**
- b. First induce vomiting. Then check the label or MSDS for further instructions.**
- c. Ask the victim to drive himself/herself to the hospital.**

15. Which of the following is the BEST practice when using flammable liquids?

- a. Use gasoline to clean grease from your hands, floors, and other surfaces.**
- b. Make sure the area is adequately ventilated.**
- c. Leave lids off flammable liquid containers to prevent pressure from building in the container.**

16. True or false?

One way to reduce static electricity is to use a long funnel when pouring flammable liquids.

17. True or false?

Rags soaked in oil or solvents can burst into flames if they are not stored properly.

18. Which of the following is the BEST practice when dispensing a flammable liquid from a bulk tank into a portable container?

- a. Ground the bulk tank by connecting a wire from the tank to a grounded water pipe or building steel.**
- b. Bond the portable container to the tank with a bonding wire.**
- c. Both A and B.**

19. True or false?

If the flash point of gasoline is about -50° F (minus 50°), then gasoline is also flammable at a temperature of -100° F (minus 100°).

20. Which of the following substances represents a greater fire hazard in a plant where the temperature of the substance is kept at or below 90° F?

- a. Substance with flash point of 70° F**
- b. Substance with flash point 120° F**
- c. Substance with flash point 200° F**

21. True or false?

If skin is severely burned, with charred and broken skin, cool the burn under running water.

22. Which of the following is the best practice for storing hazardous substances.

- a. Store incompatible substances together in the same storage cabinet.**
- b. Store large quantities of flammable substances at each employee's work station.**
- c. Protect stored substances from extreme temperatures.**

23. Which is the best practice for a MINOR spill of a hazardous chemical?

- a. Use water hoses to flush the chemical into a floor drain.**
- b. Absorb the spill using a compatible absorbent material.**
- c. Allow the spill to evaporate naturally.**

24. Which of the following precautions is/are necessary when servicing pipes or equipment that contain hazardous substances?

- a. Observe lockout/tagout procedures.**
- b. Use appropriate shielding and personal protective equipment.**
- c. Use the buddy system.**
- d. All of the above**

25. True or false?

Only properly trained personnel may respond to a MAJOR chemical spill.

Answer Key

Hazardous Substances Conclusion

- | | |
|--------------|--------------|
| 1. c | 13. c |
| 2. a | 14. a |
| 3. b | 15. b |
| 4. a | 16. T |
| 5. F | 17. T |
| 6. F | 18. c |
| 7. c | 19. F |
| 8. T | 20. a |
| 9. a | 21. F |
| 10. b | 22. c |
| 11. b | 23. b |
| 12. T | 24. d |
| | 25. T |

Training Attendance

Training Topic: _____

Date: _____ **Trainer:** _____

Location: _____

PRINTED Name	Signature	Job Title

Training Evaluation Form

Training Topic: _____

Date: _____ Trainer: _____

Location: _____

Instructions: Please use this form to help us improve the safety training. For each of the following items, circle the letter next to the answer that best describes your opinion. You may write in additional comments if you wish. Do not put your name on this form.

- 1. Was the training easy to understand?
 - a. Yes. I understood everything we talked about.
 - b. Mostly. I understood most of the things we talked about.
 - c. No. I did not understand the training.

Use this space to list anything that was hard to understand. If possible, let us know if there is anything we can do to make it easier to understand. _____

- 2. Did the training address the most important dangers related to the training topic?
 - a. Yes. It definitely included all of the most important dangers.
 - b. Mostly. It included nearly all of the most important dangers.
 - c. No. It left out many important issues.

Use this space to list any important dangers that should be added to the training _____

- 3. Did the training describe all of the most important safety practices that workers should observe related to the training topic?
 - a. Yes. It definitely included all of the most important safety practices.
 - b. Mostly. It included nearly all of the most important safety practices.
 - c. No. It left out many important safety practices.

Use this space to list any important safety practices that should be added to the training _____

- 4. Did you learn some important things today that you didn't know before?
 - a. Yes. I learned a lot of important new information.
 - b. Mostly. I learned some important new things
 - c. No. The information wasn't very important.
 - d. The information was important, but I already knew most of it.

Use this space to list anything you think we should add to the training _____

- 5. Will you use the information you learned in today’s training to work more safely in the future?
 - a. Yes. I will definitely use the information to work more safely in the future.
 - b. Maybe. I might use the information to work more safely in the future.
 - c. No. I will not follow the safe work practices that we talked about in the training.
 - d. I am already following all of the safe work practices we talked about, and I will continue to do so in the future.

Use this space to list any reasons why you might not follow the safe work practices that we talked about

- 6. Was the training worthwhile?
 - a. Yes. It was definitely worth my time.
 - b. Mostly. It was somewhat helpful.
 - c. No. It was a waste of my time.

Use this space to list any reasons why you might not follow the safe work practices that we talked about

- 7. Would you recommend the training to other fruit and vegetable and specialty food workers?
 - a. Yes. It would definitely be helpful to others.
 - b. Probably. It would probably be helpful to others.
 - c. No. It would not be helpful to others.

- 8. Use this space for any other comments you have about the training:_____



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In each case, credit Instructor Guide: For the Fruit and Vegetable Preserving and Specialty Foods
 Manufacturing Industry, Kansas State University, February 2008.

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