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.ksre.ksu.edu/agsafe/DesktopDefault.aspx?tabid=26*
- 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, emergency evacuation procedures, location of exits, 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

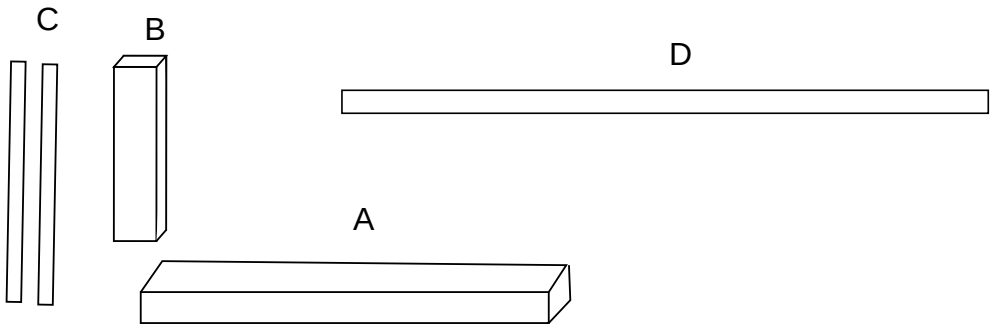
C - (2) 16-inch lattice with holes drilled 2 inches from the top

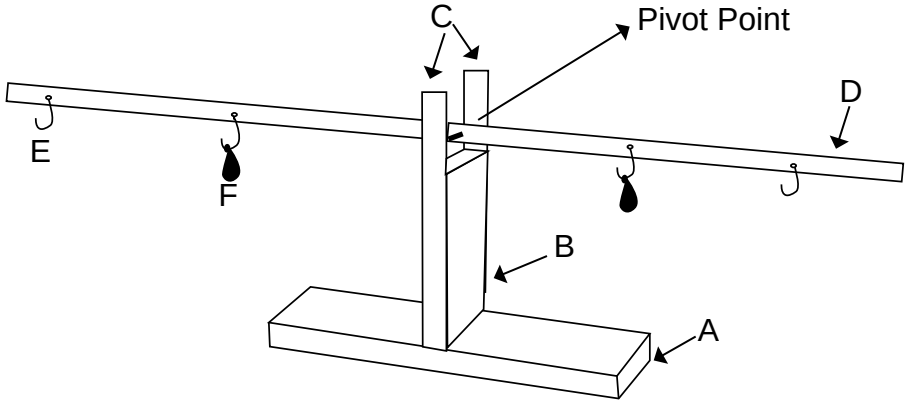
D - (1) 5-ft. lattice with a hole drilled at center and at 1-ft intervals on both sides of center (5 holes total-2 on each side of center)

E - (4) 5-inch wire hooks

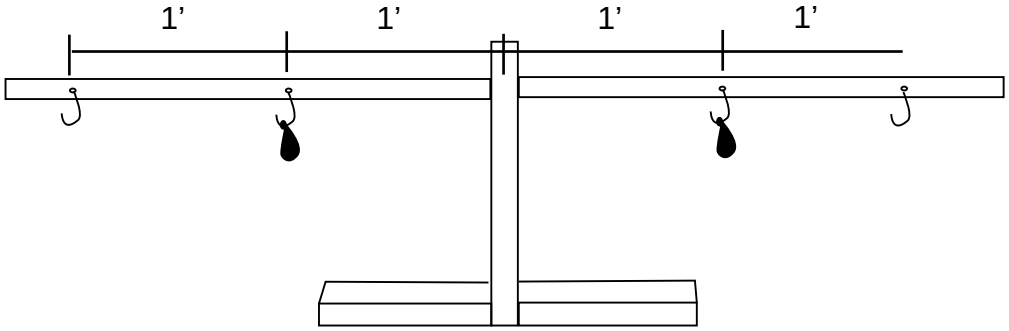
F - (3) fishing weights

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.



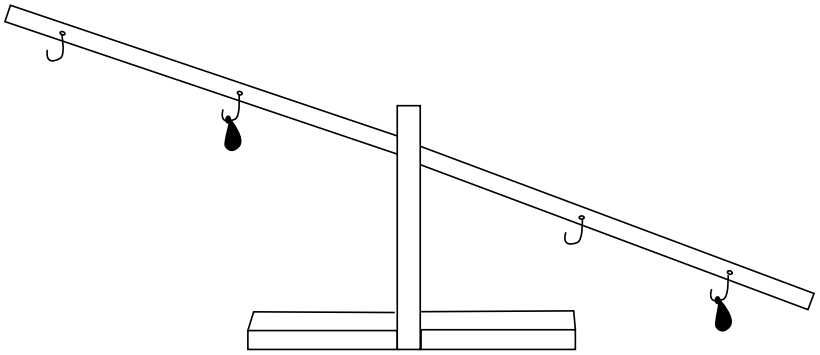


Set up the balance with two weights equally balanced; for instance, one weight 1 foot to the right of the pivot point, and one weight 1 foot to the left of the pivot point.



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.)

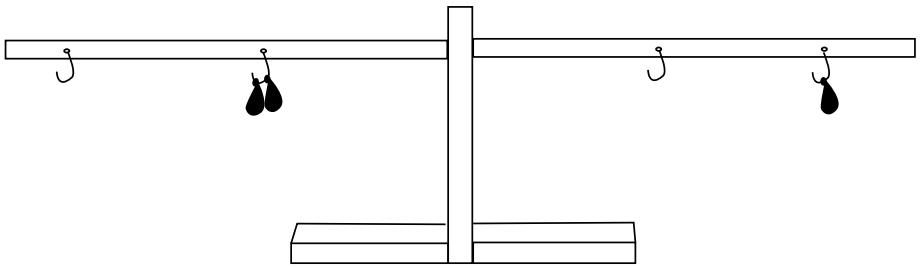
- What happens when the same load is held farther from your waist? For instance, what would happen with the weight held arm's length? (See illustration below.)



- 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.

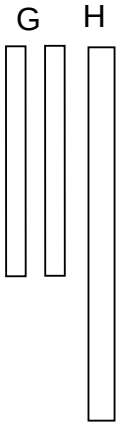
- This model of the human torso was made from the following materials:

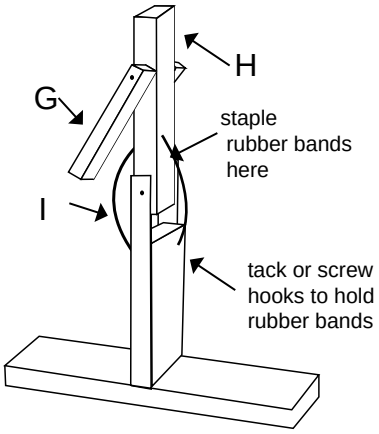
G - (2) 8-inch 1 x 2

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

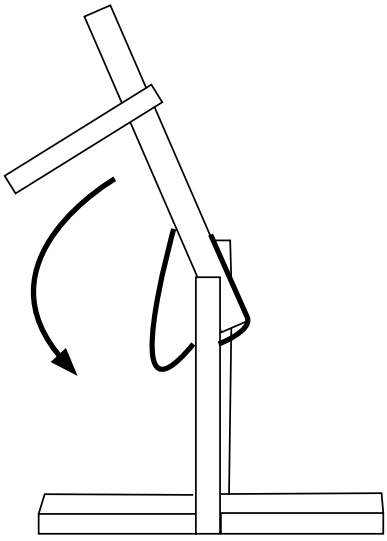
I - several rubber bands

- 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*.

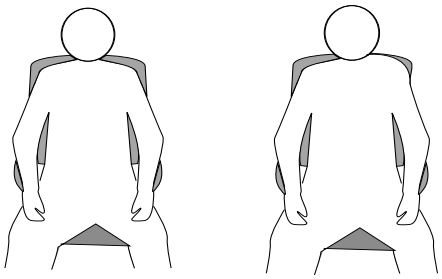
What are some ways participants may be able to compensate if their work station is uncomfortable? For example:

- 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

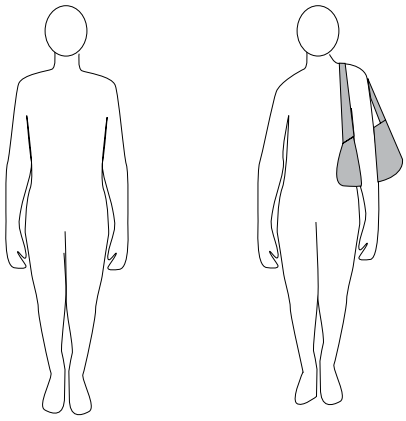
Demonstrate how sitting with a large wallet in the hip pocket can misalign the spine. (See illustration below.)

- 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/007425.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

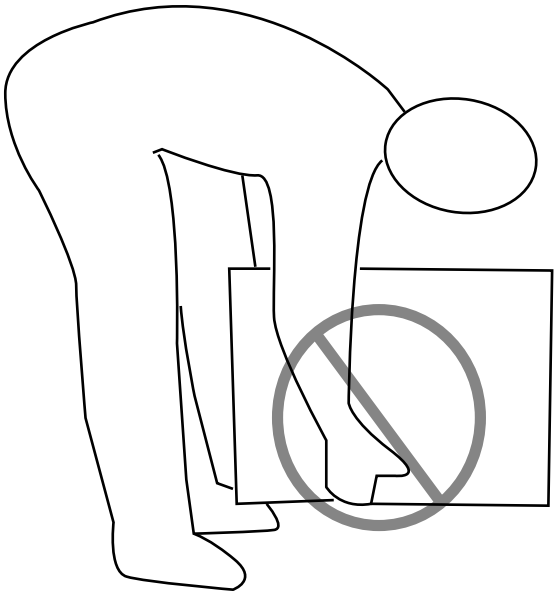
“Exercise may be the most effective way to speed recovery from low back pain … gentle exercises… help keep muscles moving and speed the recovery process.”

National Institute of Neurological Disorders and Stroke

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

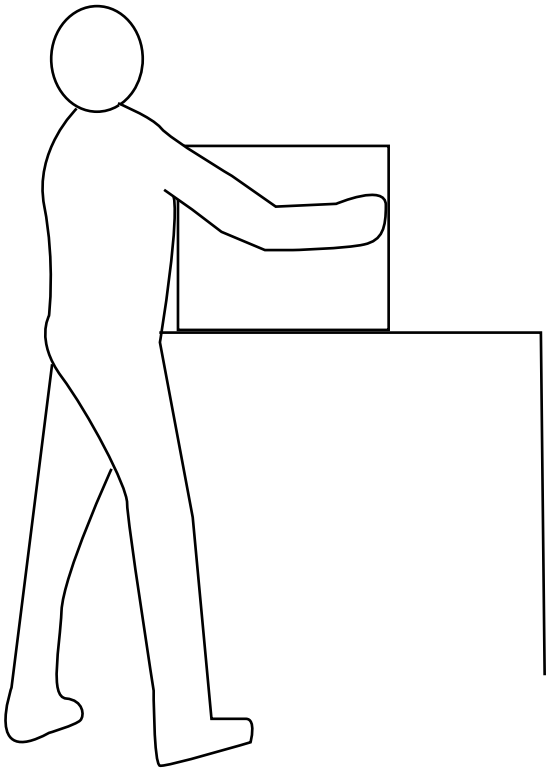
Problem #1

How Can You Avoid Bending to Lift?



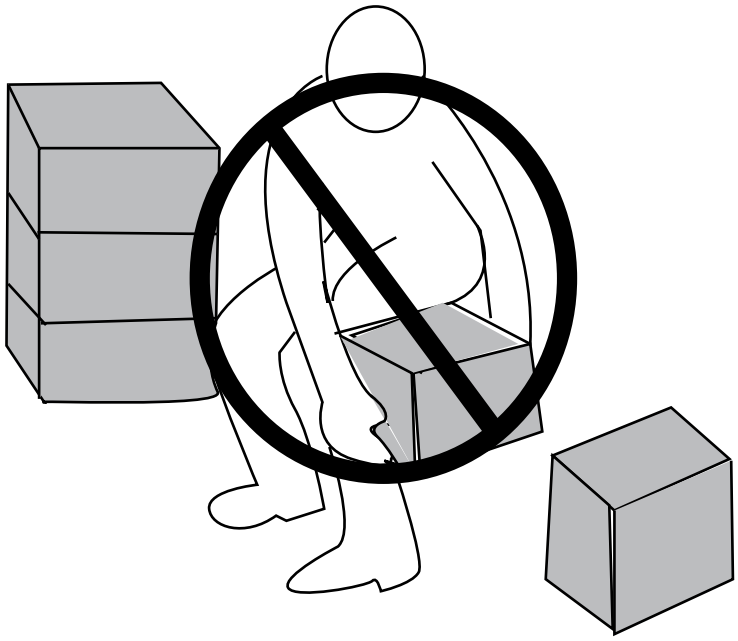
Solution #1

Raise the Work



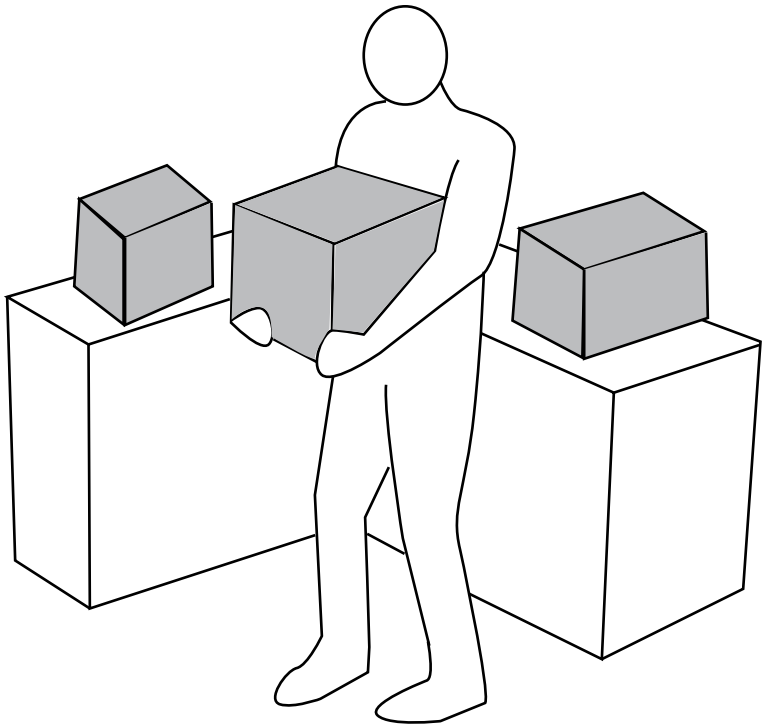
Problem #2

How Can You Avoid Bending and Twisting To Turn?



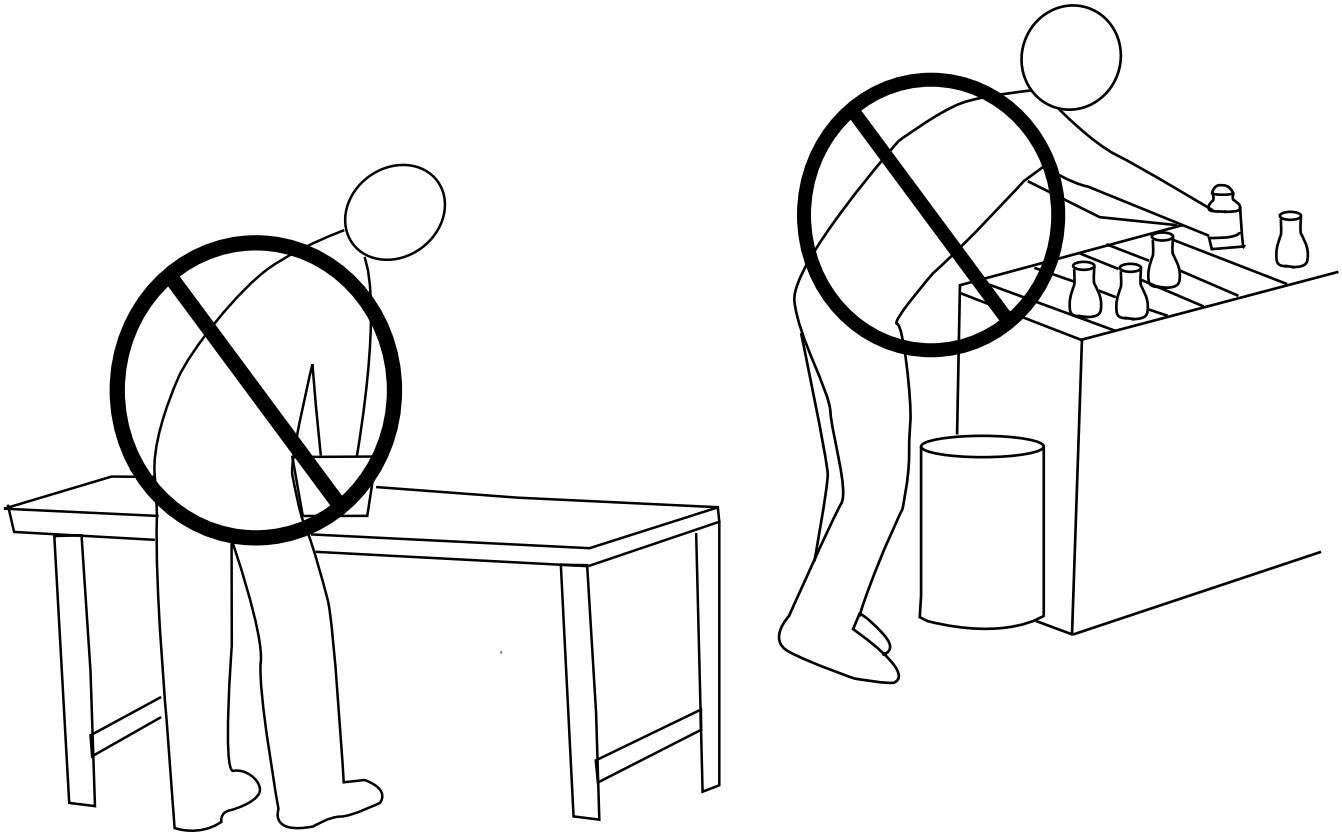
Solution #2

Store Materials at Waist Level and Move Your Feet To Turn



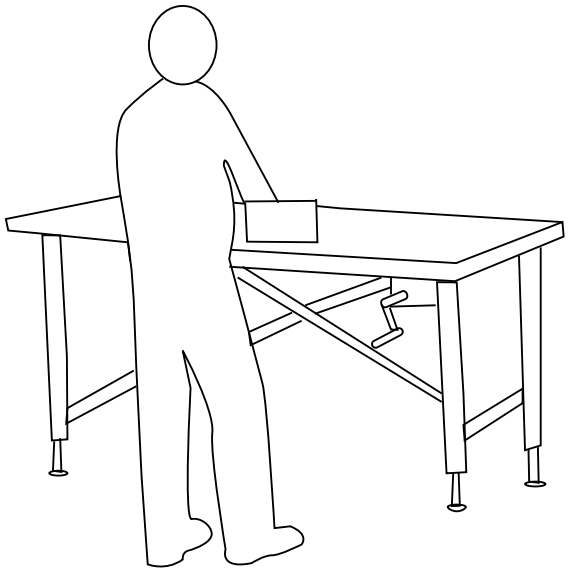
Problem #3

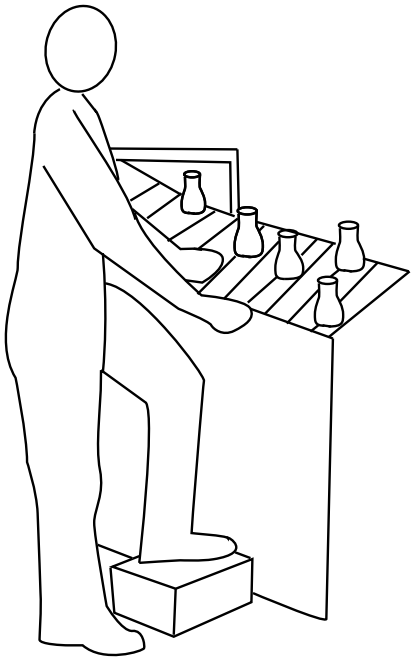
How Can You Avoid Bending and Reaching To Get Closer To Your Work?



Solution #3

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

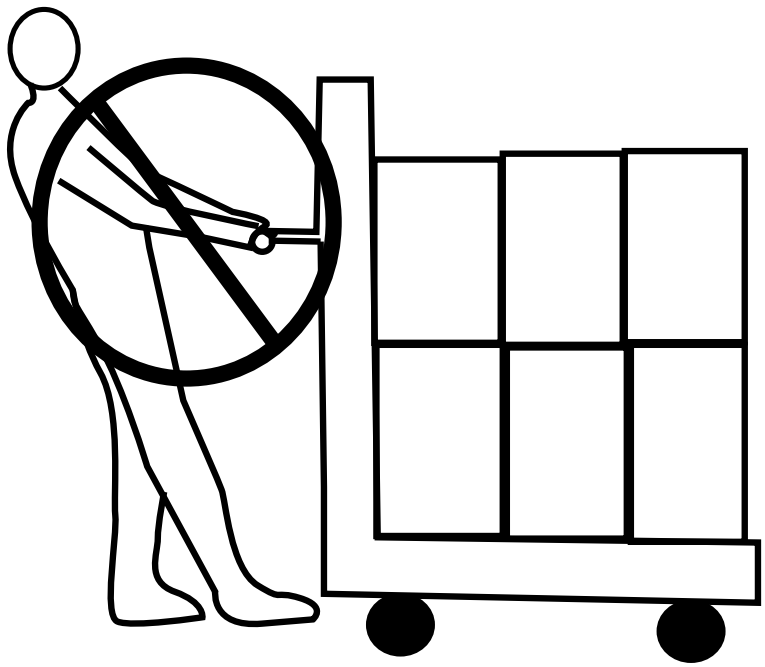




Minimize the Distance Between You and Your Work

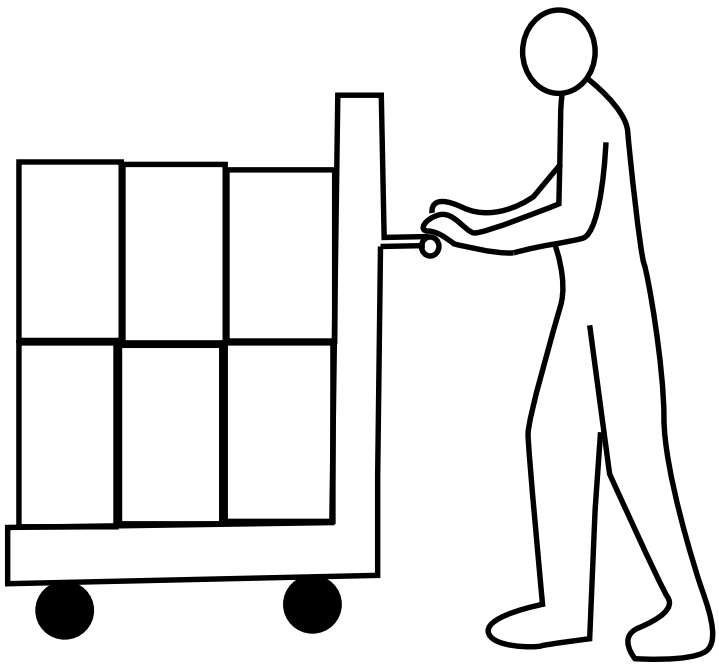
Problem #4

How Can You Avoid Pulling Loads?



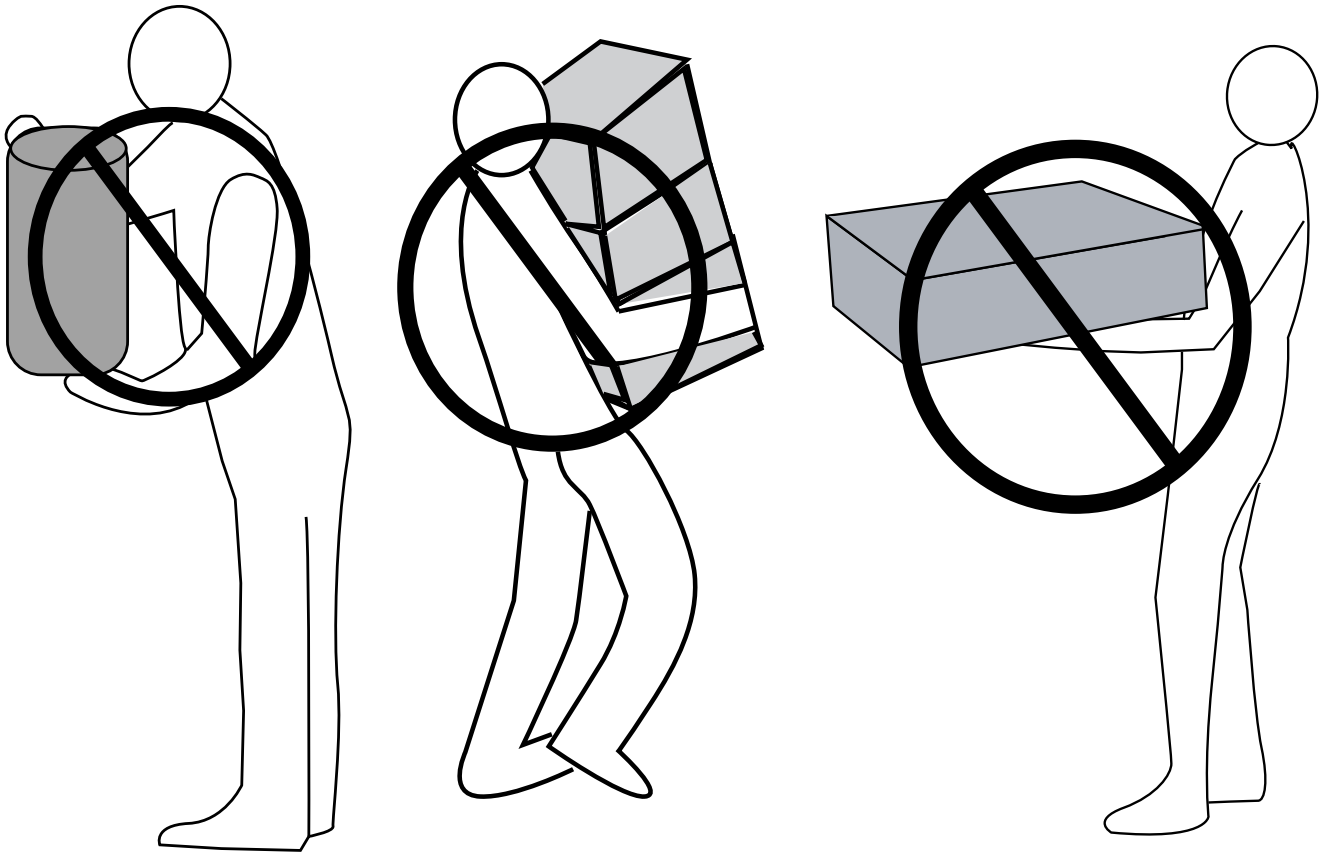
Solution #4

Push Rather Than Pull



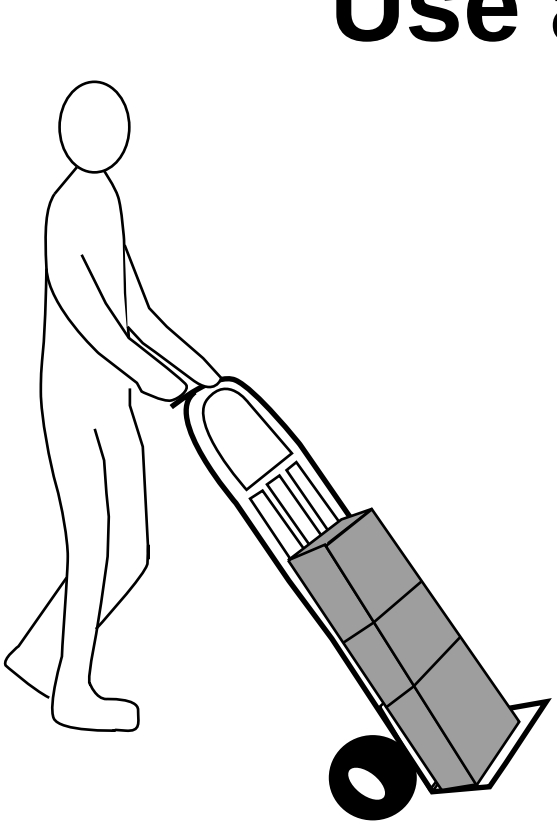
Problem #5

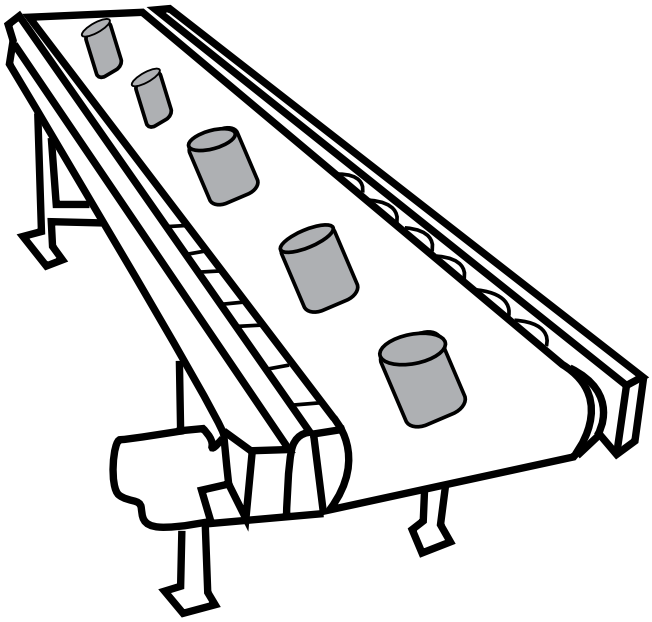
How Can You Avoid Lifting and Lowering Heavy and/or Awkward Materials?



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?

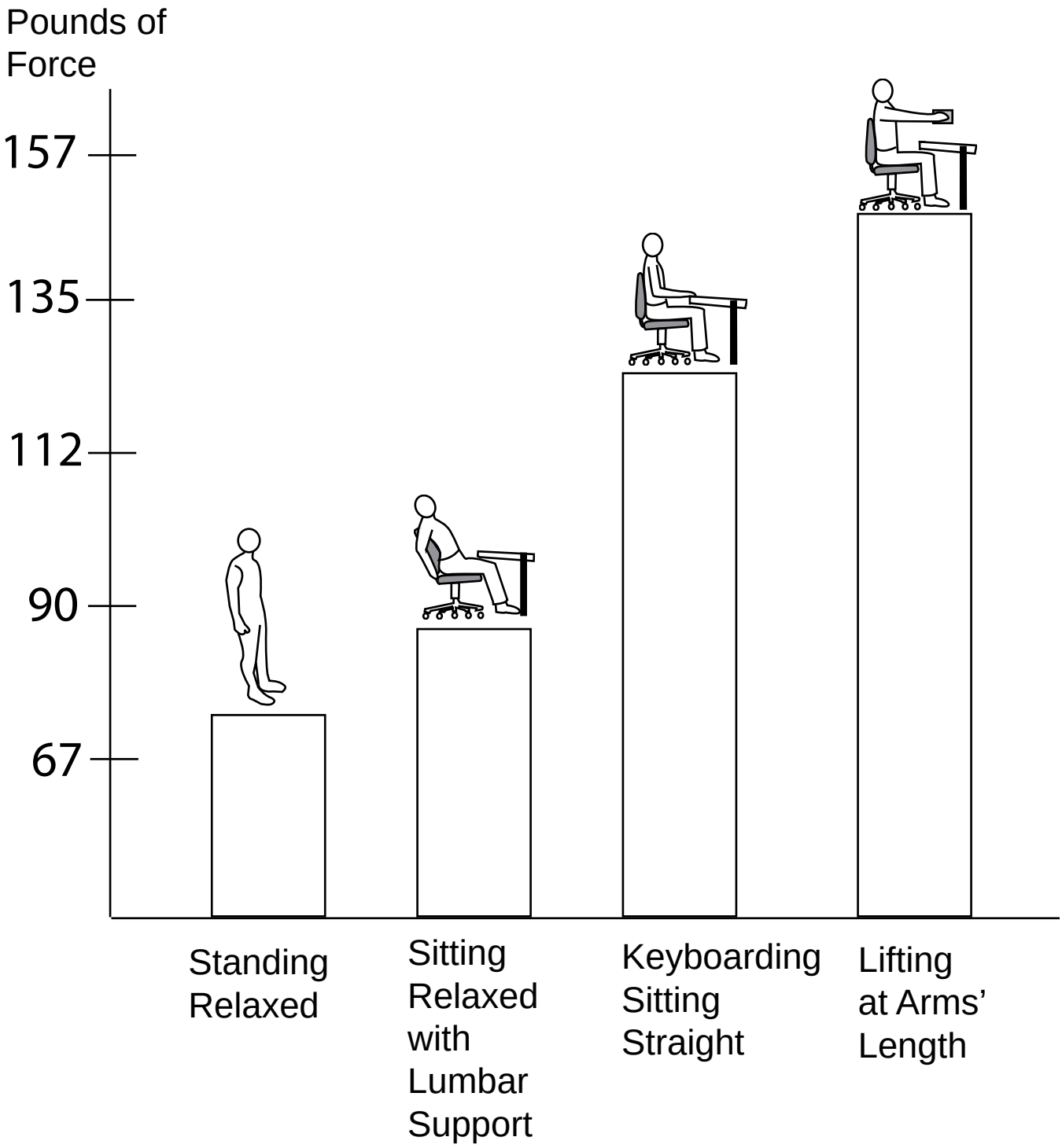
You can help protect yourself by changing tasks or postures so that you are using different muscle groups.

7. True or false?

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

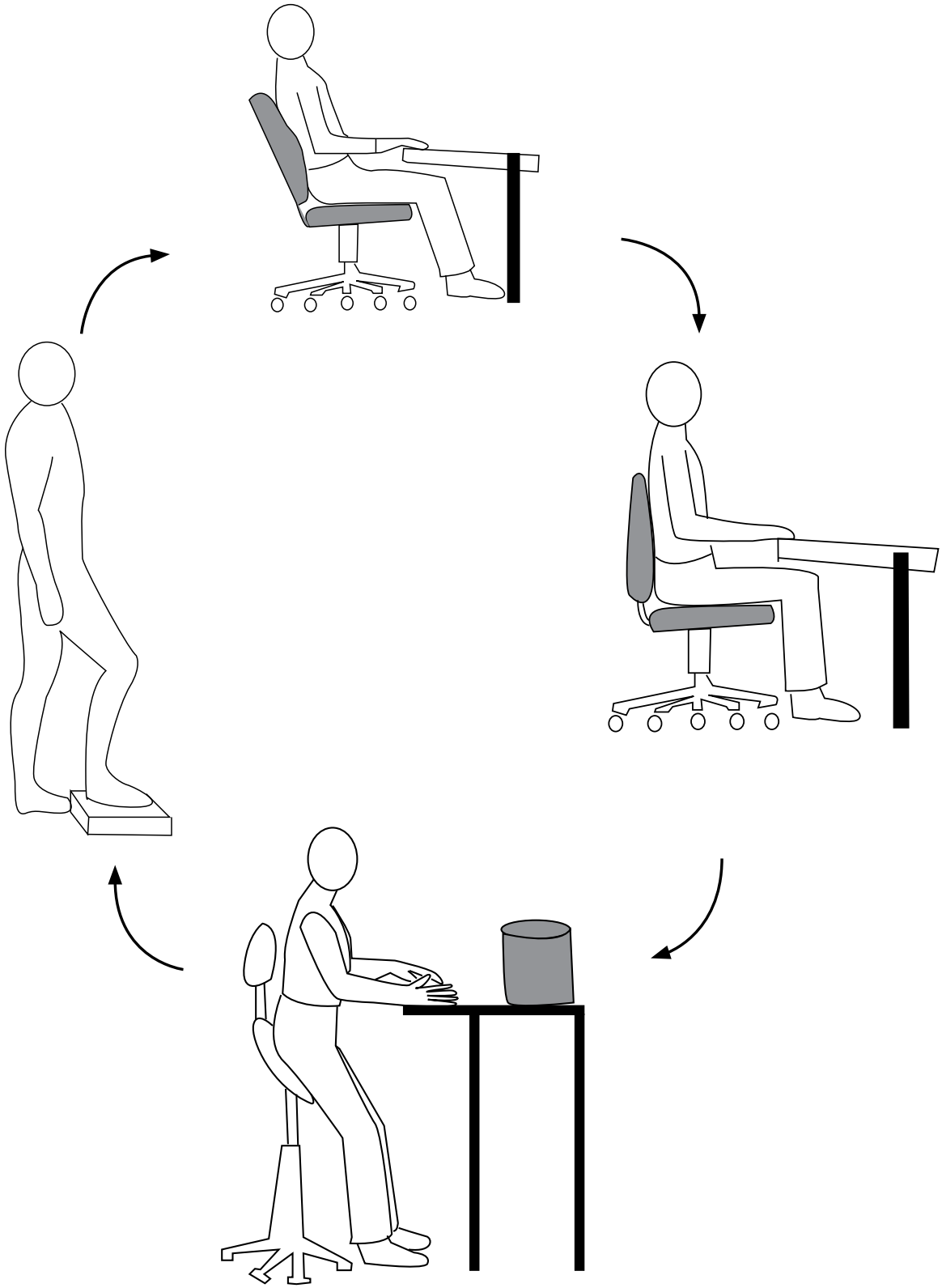
1. b
2. a
3. c
4. c
5. F
6. T
7. T

Relative Forces in the Lower Back

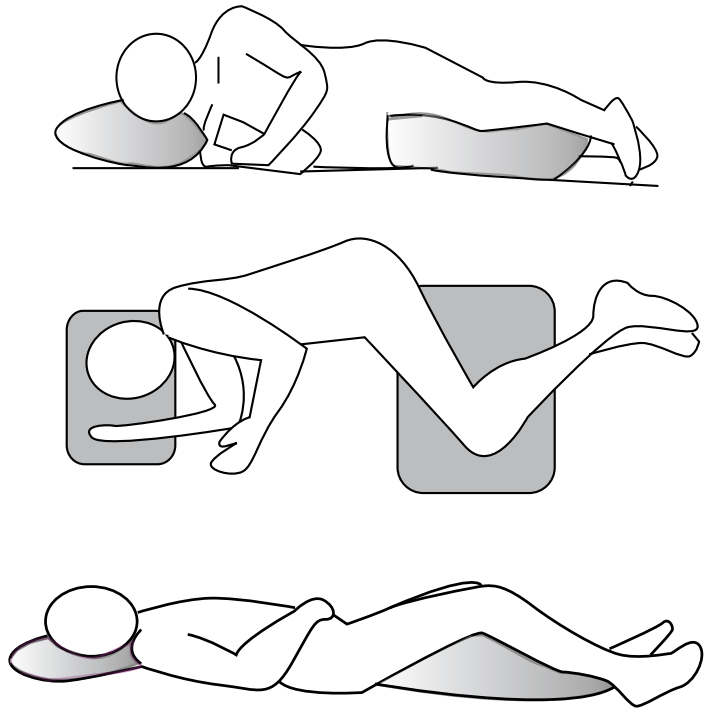


"Forces in the third lumbar disc." Adapted from Chaffin, D.B., and Andersson, G.B.J. *Occupational Biomechanics*. New York: Wiley, 1984.

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