LABORATORY SAFETY AND INFECTION CONTROL

	Unit/Competency/Objective	Cognitive	Performance
	LABORATORY SAFETY AND INFECTION CONTROL		
2.00	**Analyze methods for protecting the safety of biotech workers and the public.**	**5%**	**3%**
2.01	*Analyze the use of equipment and materials and apply rules for safety in the laboratory.*	*2%*	*1%*
2.02	*Use correct body mechanics.*	*1%*	*1%*
2.03	*Analyze methods of infection control.*	*2%*	*1%*

Unit Materials

EB02.01	Content	◆ Laboratory Equipment List
Activity		◆ Laboratory Equipment Quiz
Content		◆ Laboratory Safety
EB02.02	Content	◆ Body Mechanics
Activity		◆ Body Mechanics Checklist
EB02.03	PowerPoint	◆ Infection Control
Content		◆ Infection Control PowerPoint (Outline)
Activity		◆ Infection Control Notes
Activity		◆ Handwashing Checklist
Lesson		◆ Glo Germ™

Recommended Resources

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GLO GERM™

The Glo Germ product and teacher information is available at http://www.glogerm.com/

The kit can be ordered for under $100, and provides an opportunity to demonstrate the importance of proper handwashing.

Lesson Plan

EB02.01 ANALYZE THE USE OF MATERIALS AND RULES FOR SAFETY IN THE LABORATORY.

Activity	Steps	Comments
Laboratory Scavenger Hunt	1. The teacher should create a list of all equipment in the lab and divide the equipment into 4 lists. 2. Divide the class into 4 teams. 3. Give the teams 10 minutes to find and collect the items on their list. 4. Allow the group to teach the names of the equipment they found with the rest of the class. 5. Reward the team that found and correctly identified the greatest number of items on their list.	• The FUN of this activity is that students will need to figure out what they are looking for. They will build on prior learning from science classes and common sense to identify the items on their list. • When teams have their items, allow them to share their lists and the items with the rest of the class. The teacher should praise them for the items they identified correctly and clarify the correct names of all the items as part of the teaching process.
Lab Equipment Quiz	1. Administer the laboratory equipment quiz.	• The quiz could also be given by labeling the equipment with numbers and having the students write the names of the pieces of equipment next to the appropriate number on a piece of notebook paper.
Laboratory Safety	1. Give students a copy of the laboratory safety handout. 2. In small groups, have the members of the group read each rule and then answer the question, "why" for each rule. Let students know that after they review each rule in their group, you will call on groups to randomly share the group's "why" answer.	• This small group activity will help students analyze the rules. The thinking required to answer the "why" for each rule will enhance learning. • For more detailed information, refer to Chapter 10:2 in *Health Science Career Exploration*.

Optional Practice: Students with Internet access should go to http://www.quia.com/jg/393180.html - There are some internet games that will serve as a review of laboratory equipment.

EB02.02 USE CORRECT BODY MECHANICS.

Activity	Steps	Comments
Discussion	1. Introduce students to the objective by asking if they know anyone who has ever been affected by a back injury at work. Do they believe back injuries are preventable? 2. Another "thinking" question to introduce the concept of body mechanics would be to ask students to think about their dream career. When might they need to lift, move or handle heavy objects, animals or people?	• A thinking question to introduce the unit helps students identify with the "real world" applications of the lesson. • For more detailed information, refer to Chapter 10:1 in *Health Science Career Exploration*.
Body Mechanics	1. Provide students a copy of the body mechanics handout. Demonstrate the various principles of body mechanics as you review the rules with class members.	• The handout can be converted to PowerPoint and delivered as a PowerPoint presentation. • You must DEMONSTRATE the techniques for students.
Body Mechanics Activity	1. Provide students with a copy of the body mechanics activity. The activity should be done in pairs, with one member of the pair evaluating the procedure when the second member demonstrates body mechanics.	• Students will need to properly set up the activity in order to have the equipment they need to demonstrate body mechanics. • The teacher should observe each student properly using body mechanics. If desired, use the activity sheet to "check off" each student in the use of body mechanics.

Optional Activity: Invite a physical therapist to class to talk about the importance of using good body mechanics at home, school and at work.

Reminder: Throughout the school year the teacher should reinforce the use of good posture and body mechanics during lab and classroom activities.

EB02.03 ANALYZE METHODS OF INFECTION CONTROL.

Activity	Steps	Comments
Infection Control PowerPoint	1. Provide students with a copy of the Infection Control Notes handout. (2 pages) Instructions are on the top of the page. 2. Show Infection Control presentation – either by using the PowerPoint presentation or overhead transparencies. Explain or discuss the important points of the lesson. 3. Following each slide, have students fill in the slide information on their handout. 4. At the conclusion of the lesson, have students work in pairs to compare their understanding and improve their Infection Control Notes. 5. When finished, allow students to ask questions of you for clarification.	▪ In preparation, be aware that the course CD contains the Infection Control content in regular PowerPoint and in a format for making transparency masters. ▪ Some school media centers have the ability to transfer PowerPoint presentations to VHS. ▪ An important part of this lesson is the student's ability to write down his/her understanding as opposed to simply copying the content on the slide. The former requires the student to think. Be sure to pause after each slide and allow students to write. ▪ For more detailed information, refer to Chapter 11 in *Health Science Career Exploration*.
Learning Activity	1. Conduct a classroom review activity to help students learn and remember the important concepts of infection control.	▪ This is a good opportunity for the teacher to implement one of his or her favorite learning activities that will help reinforce the unit content.
Handwashing	1. Provide each student with a copy of the Handwashing Checklist. 2. Demonstrate the skill. 3. Provide students with an opportunity to practice the skill. 4. Grade each student on their skill demonstration using the checklist.	▪ For skill evaluation, allow students to evaluate each other until 100% mastery is achieved. That way, all students earn a score of 100 for the activity. ▪ You may wish to find a room with multiple sinks if your classroom is not so equipped.
Glo Germ™	1. Have students participate in the Glo Germ™ Activity.	▪ These products must be pre-ordered.

Optional Activity: The Centers for Disease Control (CDC) has an excellent resource for information about Hand Hygiene at http://www.cdc.gov/handhygiene/
The resource includes a fact sheet, posters, and resource links.

Content

LABORATORY EQUIPMENT LIST

1. Beaker
2. Concave microscope slide
3. Disposable pipette
4. Flask
5. Forceps
6. Funnel
7. Gloves
8. Graduated cylinder
9. Hot water bath
10. Hot plate
11. Incubator
12. Medicine dropper
13. Monocular microscope
14. Petri dish
15. Pipette
16. Pipette pump
17. Safety glasses
18. Scalpel
19. Stirring rod
20. Test tubes
21. Test tube rack
22. Thermometer

Activity

LABORATORY EQUIPMENT QUIZ

Write the name of each item found in the laboratory in the blank beside the corresponding number. Earn one point for each item correctly identified and one point for correct spelling.

5.

9.

18.

1. _____

2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____
20. _____

Answer Key

LABORATORY EQUIPMENT QUIZ – ANSWER KEY

1. Disposable Pipette

2. Pipettes
3. Beaker
4. Thermometer
5. Medicine Dropper
6. Hot Plate
7. Test Tube Rack
8. Hot Water Bath
9. Safety Glasses
10. Test Tube
11. Flask
12. Monocular Microscope
13. Pipette Pump
14. Funnel
15. Incubator
16. Petri Dish
17. Forceps
18. Graduated Cylinder
19. Safety Glove
20. Concave Microscope Slide

Content

LABORATORY SAFETY

General Laboratory Guidelines

1. Read the entire procedure for any laboratory activity before beginning the activity.
2. Always be safety conscious and move about the laboratory in a safe manner.
3. No eating, drinking or chewing gum in the laboratory.
4. Follow all instructions, both written and verbal. If you think changes are needed or desired, check with your teacher.
5. You may only work in the lab under direct supervision of your teacher.

Personal Safety

6. Use correct body mechanics when performing any lab procedure.
7. Long hair should be tied back and loose jewelry removed.
8. Walk, don't run, in the laboratory.
9. Report any injury or accident to your teacher immediately, no matter how minor the injury.
10. If you see anyone acting in an unsafe manner, inform your teacher immediately.
11. Wash your hands frequently, before and after any procedure and anytime they become contaminated during a procedure.
12. Keep your hands away from your face, eyes and mouth.

Wash your hands frequently.

13. Dry your hands thoroughly before handling any electrical equipment.
14. Avoid horseplay and practical jokes in the lab as such behavior can cause accidents.
15. If any solutions come in contact with your eyes, immediately flush the area with water and notify your teacher.
16. If a particle gets in your eye, notify your teacher immediately. Do NOT rub your eye or try to remove the particle.
17. Broken glass is not to be handled by bare hands at any time. Broken glass must be swept up and disposed of properly.

Equipment Safety

18. Keep all lab areas clean and neat.

19. Keep lab equipment in its proper place when not in use.

20. Wear safety glasses when your teacher instructs you to do so.

21. Know the location and use of all safety equipment in the laboratory and the location of all exits from the room.

22. Do not use unlabeled chemicals or solutions – refer unlabeled containers to your teacher.

23. Read the label three times before using any liquids or solutions in the laboratory.

EMBED Word.Picture .8
Know the location and operation of fire extinguishers

24. Chemicals are never to be taken from the lab.

25. Before using anything electrical, examine the cords or wiring to be sure they are intact and not frayed.

Content

BODY MECHANICS

Healthy Body Mechanics

Your body needs to be properly aligned to work efficiently. Varying tasks, altering positions, and taking rest breaks will often reduce fatigue and muscle tension. Performing daily activities using correct body mechanics helps prevent physical strain and back injury.

Both in the lab at school and some day on the job you may need to lift, move and carry objects, animals or people. You should use proper body mechanics to:

1. Conserve energy
2. Decrease muscle fatigue
3. Prevent injury

The following tips may help improve your body mechanics at home, school and work:

Rules for Body Mechanics

- Keep head in line with shoulders and hips for proper body alignment
- Sit back in a chair with a slight inward curve in the lower back and feet on a firm surface
- To lift from a seated posture, bend from the hips
- Stand with feet flat on the floor, shoulder width apart, with your back straight and knees slightly bent
- Avoid awkward postures (twisting, bending, over-reaching)
- Turn the body as a unit by pivoting the feet, not twisting at the waist
- Use the stronger, larger muscle groups of the legs and arms to lift
- Tighten stomach muscles to protect the spine when lifting
- Bend at the hips and knees, not at the waist, and keep your head up when lifting
- Carry heavy objects close to the body
- Use both hands when lifting something
- Use your body weight to help you pull or push
- Pull, push or slide a heavy object as opposed to lifting it

Posture

Posture is the position of body parts in relation to each other. Poor posture can lead to fatigue, muscle ache, and neck and back injuries. A forward head position and rounded shoulders contribute to poor posture. Students who spend a great deal of time at a desk or in front of a computer have probably been guilty of poor posture at some point and can attest to the fact that it's a hard habit to break. Fortunately, there are a few simple exercises that can help.

Chin Tuck (cervical retraction)

- Begin by sitting or standing erect
- Gently pull your chin back to a comfortable position. (Think of a turtle bringing his head back into his shell.)
- This exercise should be performed in sets of ten, starting with one set and working up to two or three sets, several times daily.

Shoulder Squeezes (scapular retractions)

- Begin by standing
- Bring your elbows behind you while squeezing your shoulder blades together.
- This exercise should be performed ten to twenty times while holding the squeeze for a count of five.
- This motion increases mobility in your neck and back, making it easier to stand erect.

Both exercises should be performed without pain. STOP if you start to feel any discomfort.

Activity

Name _____ Date _____

BODY MECHANICS CHECKLIST

Partner's Name _____

For this activity you will be asking your partner to perform certain movements using healthy body mechanics. Evaluate your partner in step as follows:

O = Outstanding
S = Satisfactory
N = Needs Improvement

_____ 1. Instruct your partner to **sit in a chair**.

Evaluate proper body alignment and proper posture in the chair. (Sitting up straight, slight inward curve of the back, feet flat on the floor.)

_____ 2. Instruct your partner to **stand**.

Evaluate if partner stood by bending at the hips, keeping back straight, then stood with feet flat on the floor, shoulder width apart, with the back straight and knees slightly bent.

_____ 3. Be sure there is a heavy object on the floor. Instruct your partner to **lift the object.**

Evaluate if partner bends at the hips and knees to get close to the object, then holds the object close to the body while standing with back straight and head up.

_____ 4. Instruct your partner to turn and **place in the object on a chair**.

Evaluate if partner pivots feet rather than twisting at the waist.

_____ 5. Instruct your partner to **move a heavy object** (such as a table) two inches.

Evaluate if your partner pushed or pulled the object instead of lifting it.

Content

INFECTION CONTROL POWERPOINT

The Infection Control PowerPoint is available on your course CD. Content points from the PowerPoint are provided below.

Infection Control

Exploring Biotechnology

Microorganisms

- Microorganism (microbe)
  - Small living organism
  - Need a microscope to see it
- Pathogens
  - Can cause disease or infection
- Normal flora
  - Microbes that are beneficial when present
  - Not all microbes are pathogens

Microorganisms

- Bacteria
  - One-celled
  - Multiply rapidly
  - Cocci = round
  - Bacilli = rod-shaped
  - Spirilla = spiral
  - Antibiotics kill bacteria
  - Gonorrhea, strep throat, tetanus, botulism

Bacteria (Illustration)

Microorganisms

- Protozoa
  - One-celled animal-like organism
  - Many flagella – aids in movement
  - Malaria, amebic dysentery
- Fungi
  - Plant-like
  - Live on dead organic matter
  - Yeasts and molds are common forms
  - Ringworm, athlete's foot, thrush

Microorganisms

- Rickettsiae
  - Parasitic – live inside other living organisms
  - Live in fleas, lice, ticks – whose bite transmits disease to humans
  - Rocky Mountain Spotted Fever
- Viruses
  - Smallest, seen with electron microscope
  - Reproduce inside other living cells
  - Spread by blood and other body secretions
  - Common cold, measles, mumps, chicken pox, AIDS

Microorganisms

- Most grow best in environment that is:
  - Warm
  - Moist
  - Dark
- Aerobic
  - Require oxygen to live
- Anaerobic
  - Live and reproduce without oxygen

Pathogens

- Cause infection in different ways
  - Some produce toxins (poison)
  - Some cause allergic reaction in the body
  - Some attack and destroy living cells
- Nosocomial infections
  - Transmitted in a health care facility
- Opportunistic infections
  - Occur when body defenses are weak

Pathogens

- Transmission of disease
  - Person-to-person contact
  - Contaminated hands!!!
  - Contaminated substances
- Food
- Soil
- Insects
- Equipment
  - Droplets in the air (cough, sneeze)

Infection Control

- Asepsis
  - Absence of pathogens
- Aseptic technique
  - Handwashing
  - Good personal hygiene
  - Disposable gloves
  - Proper cleaning of equipment and environment

Handwashing

- Most effective way to prevent the spread of infection
- Wash your hands:
  - Whenever they become contaminated.
  - Before and after lab procedures.
  - After personal use of the bathroom.
  - After you cough, sneeze or use a tissue.
  - Before and after eating, drinking, and using contact lenses.

Handwashing

- Soap
- Warm water
- Friction
- Clean all surfaces
- Fingertips pointed down
- Dry paper towel for turning the faucet on and off

Alcohol-Based Handrub

- Used in healthcare facilities
- Used between patients when hands not soiled

Activity

Name _____ Date _____

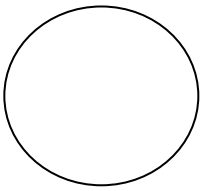
INFECTION CONTROL NOTES

Your teacher will show you slides or transparencies on the important facts about infection control. Following each slide, define or describe the concepts presented in your own words.

If you cannot remember a specific term, leave it blank. Time will be provided for you to work with a partner to compare notes and clarify understanding.

Slide 1
A microorganism is also called a _____. Pathogen: Normal Flora:

Slide 2
Bacteria:

Slide 3
Draw and label the three shapes of bacteria: 

Slide 4
Protozoa: Fungi:

Slide 5
Rickettsiae: Viruses:

Slide 6
Where do microbes like to grow? What is the difference between aerobic and anaerobic microbes?

Slide 7
How do pathogens cause infection? Nosocomial: Opportunistic:

Slide 8
How is an infection transmitted?

Slide 9
What is asepsis? What are examples of aseptic technique?

Slide 10
What is the most effective way to prevent infection? When should you do it?

Slide 11
What are the 3 essential ingredients for handwashing? What are 3 important tips to remember when washing your hands?

Slide 12
What is alcohol-based handrub?

Should our school provide alcohol-based handrub? _____ If yes, where should it be located? If no, why not?

Activity

Name _____ Date _____

HANDWASHING CHECKLIST

Handwashing Procedure (Time: 2 minutes)	Possible	Awarded
1. Removed jewelry	1	
2. Turned faucet on with paper towel, adjusted temperature (water should be warm) and discarded towel in waste container	3	
3. Wet hands and wrists thoroughly with fingertips pointing down	2	
4. Applied soap to get a lather on hands	1	
5. Put the palms of hands together and rubbed them using friction and a circular motion for 10-15 seconds	3	
6. Put the palm of one hand on the back of the other hand, rubbed together several times and repeated after reversing position of hands	3	
7. Interlaced fingers on both hands and rubbed them back and forth	2	
8. Cleaned nails with an orange/cuticle stick and/or hand brush	2	
9. Rinsed hands with fingertips pointed downward	2	
10. Dried hands thoroughly, from tips of fingers to wrist, and discarded towel	2	
11. Turned faucet off with dry paper towel and discarded towel in wastebasket	2	
12. Avoided touching inside of sink	3	
TOTAL POINTS	**26**	

Lesson

GLO GERM™

The Glo Germ product and teacher information is available at http://www.glogerm.com/
The kit can be ordered for under $100, and provides an opportunity to demonstrate the importance of proper handwashing.

According to the Glo Germ website:

Glo Germ is a product that helps you teach handwashing, isolation techniques, aseptic techniques and general infection control.

Since 1968 **Glo Germ** has provided teaching hospitals, long-term care facilities, food service, day-care, public school systems, clinics and other institutions with this unique product. The proven safe inert ingredients in the **Glo Germ** lotion or powder cast a revealing glow when exposed to standard UV light. **Glo Germ** gives a visual demonstration to show when improper cleaning or handwashing has taken place.

Options for use of Glo Germ:

1. Divide the class into 3 groups. Have one group wash their hands using proper handwashing technique, one group using alcohol-based handrub, and the third group without washing their hands. Compare the results.

2. A similar site with infection control products, including a "GlitterBug™" kit, is available at http://www.glitterbug.com/

3. Another source for the Glo Germ video and supplies is at http://www.pocketnurse.com/products/infection.asp - select "Browse Other Items."