Name _____ Date _____

SAFETY GUIDELINES

BIOLOGY LABORATORY

The experiments that you will be performing in your biology labs can be both interesting and rewarding. Some labs will provide you with the opportunity to experience firsthand some of the things described in your textbook. Other labs will provide additional information and insights on topics related to those presented in the text. Laboratory work is an integral part of your biology course, and will give you the chance to develop new and valuable analytical and technical skills.

In the course of your lab work, you will be handling strong chemicals, sharp instruments, and expensive pieces of equipment. Accidents in the lab do not just happen—they are caused by carelessness, haste, and disregard for safety rules. Safety rules to be followed in the laboratory are listed below. Your teacher or school may have additional rules with which you should also become familiar. Learn these rules and follow them faithfully. It would also be wise to review all applicable safety guidelines before beginning each activity.

General

1. Know the location of emergency equipment (first-aid kit, fire extinguisher, fire shower, fire blankets, etc.) and how to use them. However, in general you should not use any of this equipment without direct instructions from the teacher.
2. Be familiar with laboratory evacuation procedures to be used in the event of a laboratory emergency.
3. Be prepared to work when you arrive in the laboratory. Read the description of the lab activity in your lab manual before arrival at the lab, so that you know what you will be doing.
4. Do not bring any food or drink into the biology laboratory.

Personal

5. Notify your teacher of any medical problems you have that may relate to lab work, such as allergies, asthma, or unusual sensitivity to irritants.
6. Clothing should be appropriate for working in the lab. Jackets, ties, and other loose garments should be removed or secured. Long sleeves should be rolled up. Jewelry that might present a safety hazard, such as necklaces, chains, medallions, or bracelets, should not be worn in the laboratory.
7. Long hair should be tied back or covered.
8. Wearing contact lenses in the laboratory presents particular hazards to their users. Students who normally wear contact lenses should change to regular eyeglasses, if possible. Notify the teacher if you have to wear contact lenses in the lab.

Lab Preparation and Procedure

9. Be sure that you understand the procedure to be employed in any laboratory activity and the possible hazards intrinsic to that lab.
10. Perform only those lab activities assigned by your teacher. Never do anything that is not called for in the laboratory procedure or by your teacher.
11. Follow all instructions, both written and oral, carefully.
12. Set up apparatus as described in the lab manual or by your teacher. Never use makeshift arrangements.
13. Always use the prescribed instruments (tongs, test tube holder, forceps, etc.) for handling apparatus or equipment.
14. Safety glasses, protective gloves, and a lab apron should be worn when you are heating substances, working with chemicals, doing dissections, or handling living or preserved specimens.
15. Work areas should be kept clean and neat at all times. Only lab manuals and notebooks should be in the work area.
16. Keep all combustible materials away from open flames.
17. Never touch or taste any substance unless specifically instructed to do so by your teacher.
18. Never put your face near the mouth of a container that is holding chemicals.
19. Any activity involving poisonous vapors should be conducted in the fume hood.
20. Dispose of waste materials as instructed by your teacher.
21. Clean and wipe dry all work surfaces at the end of class. Allow yourself adequate time at the end of each lab session for proper and adequate clean-up. Wash your hands thoroughly.
22. Report all accidents to the teacher immediately.

Handling Chemicals

23. Read and double check labels on bottles of chemicals before taking any.
24. Do not return unused or leftover chemicals to stock bottles.

25. When transferring chemicals from one container to another, hold the containers out away from your body.
26. When mixing an acid and water, *always add the acid to the water.*
27. Avoid touching chemicals with your hands. If chemicals do come in contact with your hands, wash them immediately.
28. When labeling the contents of a container, label the empty container first; then add the corresponding material to the labeled container. This procedure avoids the chance of a spill during the labeling process.

Handling Glassware

29. Do not use cracked, chipped, scored, or badly scratched glassware.
30. Never handle broken glass with your bare hands. Clean up the broken glass and dispose of it as directed by the teacher.
31. Always lubricate glassware (tubing, thermometers, etc.) with water or glycerin before attempting to insert it into a stopper. Never apply force when inserting or removing glassware from a stopper. Use a twisting motion.
32. Do not place hot glassware directly on the lab table. Always use an insulating pad of some sort.
33. Allow plenty of time for hot glass to cool before touching it. Remember that hot glass shows no visible signs of its temperature, and it can cause painful burns.

Heating Substances

34. Exercise extreme caution when using a gas burner. Keep your head and clothing away from the flame.
35. Always turn the burner off when it is not in use.
36. Never heat anything without being instructed to do so.
37. Never look into a container that is being heated.
38. Do not bring any substance into contact with a flame unless instructed to do so.
39. When heating a substance in a test tube, make sure that the mouth of the tube is not pointed at yourself or at anyone else.
40. Never leave unattended anything that is being heated.

Handling Dissecting Instruments and Preserved Specimens

41. Preserved specimens showing any signs of decay should not be used for any type of lab observation or dissection.
42. Dissecting instruments, such as scissors and scalpels, are very sharp. Always use a cutting motion directed away from yourself.
43. In performing a dissection, make sure the specimen is pinned down firmly in a dissecting tray before beginning work.
44. Use your instruments with care. In general, very little force is necessary for making incisions. Excess force will most likely damage delicate tissues.
45. Never touch your eyes while handling preserved specimens. Always wash your hands thoroughly with soap and water after working with specimens.

Handling Living Specimens

46. In some labs you will be using live specimens. In these labs, it is particularly important that you understand clearly the purpose and procedure of the activity before you begin work. If you have any questions, consult your teacher.
47. Animals should be handled gently so as not to produce undue excitement or trauma.
48. Avoid subjecting specimens to stressful conditions such as exhaustive exercise or painful stimuli.
49. When working with cultures of microorganisms, it is best to assume that harmful organisms are present. Avoid skin contact with the culture. Wash hands thoroughly with soap and water after working with cultures.

Name _____ Date _____

LABORATORY AND SAFETY SKILLS ASSESSMENT

Safety Activity

Identifying Laboratory Hazards

BACKGROUND

Science laboratories, like all other places in our world, contain objects and substances that can cause harm if they are not handled with care. Each year in the United States, nearly 100,000 people are killed in accidents and nearly 10 million suffer disabling injuries.

Science laboratories become safer places when you know what the potential hazards are, how to protect yourself against them, and what to do in the event of an accident or emergency. The first step in working safely in the lab is to identify hazardous situations.

There are eight basic types of laboratory hazards:

1. biological
2. chemical
3. electrical
4. mechanical
5. noise
6. physical
7. pressure/vacuum operations
8. radiation

Biological Hazards

Biological hazards are those associated with infectious agents such as bacteria and viruses. These agents may be present in specimens of living organisms.

Chemical Hazards

People are increasingly concerned today about hazardous chemical substances. When these substances are used improperly, their effects may be poisoning or chemical burns (toxicity), fires (flammability), or explosions (reactivity). Hazardous substances may be found not only in the science lab, but also in the car, workplace, or home.

Electrical Hazards

Electrical circuits and appliances can cause harmful shocks. Injury may occur when an electric current of sufficient size passes through the person's body. The presence of water greatly increases the chance of a dangerous shock in a hazardous situation. Special protective devices called ground fault interrupters are now required for this reason in all new construction of bathrooms and swimming pools.

Mechanical Hazards

Mechanical hazards are those presented by machinery and other moving objects. These objects can pinch fingers or hands, or catch loose clothing or hair. You must constantly pay attention to what you are doing when you are near such hazardous objects. Among them are such simple things as drawers and doors, as well as more complex devices, such as belts and pulleys, electric mixers, and the like.

Noise Hazards

If you have ever attended a rock concert, you have some idea of the effect of loud sounds. The damage to the ear caused by loud sounds is irreversible and cumulative.

Physical Hazards

Physical hazards include objects that are sharp, pointed, fragile, or simply in the way as you try to move from one place to another.

Pressure/Vacuum Hazards

Pressure and vacuum operations hazards are situations where a pressure greater or less than normal atmospheric pressure is produced. The chief danger is breakage or explosion of the vessels in which the pressure change occurs. This hazard occurs in experiments or equipment where gas pressures are increased or decreased. Some examples are vacuum distillation, evacuated bell jars, and air-pressure experiments.

Radiation Hazards

Radiation hazards refer especially to the emissions from radioactive materials. However, they also include X-rays, ultraviolet and microwave radiation, and laser light beams. Even ordinary light of extreme brightness belongs in this group of hazards.

Name _____

LABORATORY AND SAFETY SKILLS ASSESSMENT

Safety Activity Identifying Laboratory Hazards (continued)

OBJECTIVES

In this activity you will:

1. Learn about the eight most common types of hazards.
2. Observe examples of these hazards in your lab.

MATERIALS

safety goggles, pencil, notepaper

PROCEDURES AND OBSERVATIONS

Part I. Types of Hazards

Listed below are examples of the major types of hazards that might be found in a biology laboratory at school. For each example listed, indicate to which major type of hazard it belongs.

1. disease-causing microbes — 1. _____
2. concentrated acids and bases — 2. _____
3. frayed wires — 3. _____
4. alcohol — 4. _____
5. a loud exhaust fan — 5. _____
6. an unguarded fan blade — 6. _____
7. a Thermos bottle without a protective cover — 7. _____
8. using direct sunlight to illuminate a microscope sample — 8. _____
9. metallic sodium or potassium — 9. _____
10. an unprotected scalpel — 10. _____
11. a chair in the aisle — 11. _____
12. diseased animals — 12. _____

Toxic and infectious agents have several different routes of entry into the body. Ingestion (eating and drinking), inhalation (breathing), and skin contact are three of the ways in which entry occurs. Identify the route of entry that is blocked by each of the following good lab practices.

13. fume hoods — 13. _____
14. rules that prohibit food in the lab — 14. _____
15. rubber gloves — 15. _____
16. immediate washup of all spills — 16. _____

Name _____

LABORATORY AND SAFETY SKILLS ASSESSMENT

Safety Activity Identifying Laboratory Hazards (continued)

Part II. Inspecting the Laboratory

Inspecting the laboratory is the best way to identify hazardous conditions and anticipate possible problems before they arise. For the same reasons, many companies conduct regular inspections of their workplaces to detect hazards before they result in accidents or injuries.

Walk around your laboratory and look for examples of potential hazards. They will be examples of the eight major types of hazards discussed above. **CAUTION:** Do not touch any equipment or materials without your teacher's permission. Make a list of all possible hazards you observe. Indicate to which major type of hazard each example belongs.

	Hazard	*Type*
17.		
18.		
19.		
20.		
21.		
22.		

CONCLUSIONS AND APPLICATIONS

23. Why is hazard identification important? _____

24. If you were going to do an experiment, when would be the best time to identify the hazards? Why? _____

25. Considering the three routes of entry of hazardous substances into the body, what would be good protective equipment and good safety practices to minimize the danger of exposure? _____