SAFE SCIENCE
LAB SAFETY AWARENESS

CAT. NO. 2217

BLACKLINE MASTERS

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Name _____

SAFE SCIENCE:
Lab Safety Awareness

Symbols/Icons and Rules/Guidelines

Symbols	Hazard - example(s) and rules or guidelines
Glassware Hazard 	Breakables - glass containers • You will be working with easily broken material; handle it with care. • Do not use chipped, cracked or broken glassware. • Do not heat or cool glassware that is not designed to withstand large temperature changes. Use Pyrex, Kimax or TEKK glassware for heating or cooling. • Do not heat glassware that is not thoroughly dry. • Be sure you do not pick up glassware that may be hot or very cold unless you use holders or insulated materials. • Clean glassware thoroughly before putting it away.
Electrical Hazard 	Electrical hazard / sparks • Do not use long extension cords in the lab. • Do not overload one socket or circuit (it may cause a fire). • Do not use electrical equipment or touch an outlet or wire with wet hands. • Be sure plug is solidly inserted in the socket. • Remember that people conduct electricity. • Avoid getting outlets / electrical equipment wet. Most electrical appliances are NOT designed to be used with liquids. • Be sure electrical equipment is grounded.
Eye Hazard 	Eye hazard - flying object, splash • Protect your eyes with goggles. • When you heat the contents of containers (tubes, flasks, beakers), rotate the container continually, using tongs, gloves or other appropriate heat-resistant material. Hold the container so it is pointed away from your body and pointed away from others. Some labs are equipped with hot plates that have built in magnetic stirring devices. Remove magnetic stirring bars with a magnet; do not reach in to retrieve it with bare hands.
Eye Protection 	

(Continued on Blackline Master 2)

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Symbols/Icons and Rules/Guidelines (continued)

Fire Hazard

Flammable material - volatile liquid, combustibles, organic solvents

- Always wear goggles when using a flame or other heat source.
- Never heat anything in the laboratory - especially chemicals - unless instructed to do so.
- Never reach across a flame.
- Always use a clamp, tongs, or heat-resistant gloves or pot holders to handle hot objects.
- Be sure the work area is clean and uncluttered when using a flame.
- Use safety matches to light candles or torches and safety matches or strikers to light Bunsen burners.
- Be sure matches are out by dipping them in water before discarding them.

Poison Hazard

Poison

- Never smell any chemical directly from its container. Waft odors from the top of the container with your hand, guiding the fumes toward your nose; only do this when instructed.
- Do not mix chemicals unless instructed to do so.
- Do not taste chemicals unless instructed to do so.
- Do not handle chemicals unless instructed to do so.
- Keep all containers (such as jars and bottles) closed tightly when chemicals are not in use. Take out of the main supply only the amount of each chemical that you need. Extra material should not be put back in the original container.
- Dispose of chemicals according to instructions from the teacher or directions in a book or instruction sheet.
- If any chemical gets on your skin or clothing, rinse it with water FIRST. Then notify the teacher.
- Protect your hands appropriately.

Clothing Protection

Need for protective clothing

- Corrosive substances, burning substances, toxic materials flammable materials, and poisons pose hazards.
- Anyone working in a lab needs to protect him / herself and clothing from splatters, spills, broken glass, debris and stains.

(Continued on Blackline Master 3)

Name _____

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Symbols/Icons and Rules/Guidelines (continued)

Hand Hazard

Hand safety

• Protective gloves should be worn or special equipment or tools used to protect against acids, toxic substances, poisons, hot or very cold materials, or materials that may be contaminated with harmful microorganisms.
• Wear appropriate gloves (heat-resistant, acid-resistant or contamination-resistant).

Hand Protection

• Do not force glass tubing or thermometers into rubber stoppers. Moisten the glass with water, and hold the tube/thermometer with a towel. Twist firmly but without great force. If in doubt, ask the teacher for help.
• Do not pick up broken glass with bare hands.
• Do not use thermometers outside the temperature range for which they were designed; they could break.

Foot Protection

Foot safety - protective footwear should be worn to protect against liquid or solid spills, sharp objects, heavy objects falling

• Wear closed-toe shoes in the lab to minimize the risk of something heavy, burning or sharp harming your feet.

Animal Hazard

Animal safety and animal care - Reminder not to harm any animal (mammals, birds, fish, reptiles or amphibians) unnecessarily during observations or experimentation.

• Handle animals only if necessary.
• Do not cause pain, discomfort or injury to an animal in the lab; treat animals humanely.
• Handle animals only as your teacher directs.
• Frightened, pregnant, feeding or nursing animals require special handling.
• After handling animals or their cages, wash your hands thoroughly.
• Do not knowingly use pregnant or sick animals in experiments without a good reason and with approval of a committee that reviews procedures dealing with animal safety.

(Continued on Blackline Master 4)

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Symbols/Icons and Rules/Guidelines (continued)

Plant Hazard

Plant safety and care

- Remember that some plants may be poisonous or have sharp components.
- Some people are allergic to plant components or oils on a plant's surface; if you think you may be allergic to something, inform the teacher.

Gas Protection

Gas precaution

- Toxic fumes may be present.

Sharpness Hazard

Sharp instrument safety

- Use single-edged razors or instruments designed for dissection or cutting in the lab; do not improvise.
- Handle sharp instruments carefully.
- Cut away from you.
- If you are cut or jabbed, report to your teacher immediately. (Remember first aid principles; hold cut hands / arms up to minimize blood loss; if an artery is cut, a tourniquet must be applied. Call an emergency number and the school nurse at once.)
- Note lab instruments are generally not sterile!

Radiation Hazard

Radiation hazard; radioactive materials are rarely used in early science training, however, if radioactive materials are used, there is need for precautions - especially since radiation isn't smelled or seen.

Explosion Hazard

Explosion hazard; early lab science training exercises rarely result in explosions, however, if there is potential for an explosion, there is extreme need for precautions (skin, eye safety in particular for even the smallest of explosions).

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Major General Laboratory Safety Rules and Reasons

RULE	REASON(s)
Never eat or drink in the lab.	You might accidentally eat something hazardous.
Never eat or drink from laboratory glassware.	Traces of harmful chemicals could be left in the glassware.
Do not run or play roughly in the lab.	You might cause an accident by interfering with someone else or tripping yourself.
Do not play practical jokes in the lab.	You might cause an accident. For example, switching chemicals might cause a fire or explosion, misplacing equipment might delay time at a critical point of an experiment or in controlling a hazardous situation.
Do not perform experiments unless instructed by your teacher. Don't mix chemicals for "fun."	You might cause an accident because of something else being done at a nearby work station, or you might not have materials to carry out your experiment, or the experimental methods may not be adequately understood which could cause hazards. Also you might produce a dangerous substance or an explosive by accident.
Avoid spilling material in the laboratory. If anything spills, call your teacher immediately. Ask the teacher about the correct procedure for cleanup.	Chemicals, even water, can pose hazards; acids can burn, incompatible chemicals may cause fires; liquid on a table or floor can cause a slip. There are different procedures for different substances. Cleaning up a spill the wrong way can make things worse.
If an accident occurs, report it to your teacher promptly.	Even the most minor accident may require first aid to prevent further harm.
Keep equipment and work areas clean and organized.	Cluttered and unclean areas can result in unintentional and sometimes dangerous reactions.
Be sure all gas jets or valves, electrical connections, and water faucets are turned off when you are through with them or at the end of the lab period.	Leaking gas can cause an explosion / fire if someone lights a match or there is a spark. Electrical equipment might short circuit or overload a line or be overlooked and may cause a shock if water is nearby, and running water may cause a flood, or at least a spill. It can also cause a chemical reaction.

(Continued on Blackline Master 6)

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Major General Laboratory Safety Rules and Reasons (Continued)

RULE	REASON(s)
Wear eye protection, aprons or lab coats, closed-toe shoes and other safety protection as directed by your teacher or the instructions in your book.	Fragments of glass or harmful substances can damage eyes. Clothing should be protected to minimize risk of fire or burning, or other harm to clothes and skin. Exposed toes may be damaged by sharp objects or substances that burn or cause other damage to tissue.
Read labels on containers with care before using their contents.	Materials with similar names or concentrations may react very differently.
Carry microscopes and other pieces of equipment with both hands, using one hand to support the instrument from underneath.	It is easy to drop a heavy piece of equipment if you are jarred or surprised or simply trip. This could hurt you as well as what you are carrying!
Follow instructions with care about the handling and management of live animals.	The care and safety of live animals should always be of major concern.
Follow safety instructions precisely as stated in your book and/or by your teacher. Always obtain permission from your teacher before experimenting on your own. Do not perform any activities that have not been approved by your teacher.	A small change in a method can make a big change in what happens, and while you should be prepared for the unexpected, prevention of harm is always better than minimizing harm. You may not be aware of what someone near you will do and vice-versa.
Never use broken or chipped glassware. If you notice a chip, crack, or break, inform your teacher immediately. Dispose of the glassware in the proper container.	Glassware that is chipped, cracked or broken can cause cuts. Material placed in broken or chipped glassware may leak. Glassware that is not intact may crack when heated. If squeezed or bumped or shocked by change in temperature, damaged glassware can break relatively easily.
Learn the meaning of every safety symbol used in the lab.	Symbols will remind you of hazards and how to prevent accidents and protect yourself.
Always wash your hands after each laboratory experiment, or whenever your hands have been exposed to anything that might harm you.	It is a good habit to avoid risk of exposure to anything that may hurt your skin or damage your tissue in any way.

(Continued on Blackline Master 7)

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Major General Laboratory Safety Rules and Reasons (Continued)

RULE	REASON(s)
Wash your hands after handling animals or animal cages.	Your hands may have come in contact with fecal material or other matter in the cage that may cause you harm.
Read instructions for an experiment several times. Be sure you understand each of them. Follow directions exactly. For example, add acid to water, not water to acid. If you are not sure about any part of the directions, ask your teacher for help.	Mixing some combinations of materials (in cluding water) can cause accidents. Heating certain materials or combinations of materials can cause accidents. If someone near you is working with chemicals (including water), fire, bulky equipment or tubing that may interfere with what you are doing, it could cause an accident.
Never return chemicals to their original containers. Dispose of extra material you do not need according to your teacher's directions.	Putting chemicals back in their original containers may cause contamination and therefore, unpredictable reactions.

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Major General Laboratory Safety Rules and Reasons

RULE	REASON(s)
Never eat or drink in the lab.	
Never eat or drink from laboratory glassware.	
Do not run or play roughly in the lab.	
Do not play practical jokes in the lab.	
Do not perform experiments unless instructed by your teacher. Don't mix chemicals for "fun."	
Avoid spilling material in the laboratory. If anything spills, call your teacher immediately. Ask the teacher about the correct procedure for cleanup.	
If an accident occurs, report it to your teacher promptly.	
Keep equipment and work areas clean and organized.	
Be sure all gas jets or valves, electrical connections and water faucets are turned off when you are through with them or at the end of the lab period.	
Wear eye protection, aprons or lab coats, closed-toe shoes and other safety protection as directed by your teacher or the instructions in your book.	
Read labels on containers with care before using their contents.	
Carry microscopes and other pieces of equipment with both hands, using one hand to support the instrument from underneath.	

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Major General Laboratory Safety Rules and Reasons (continued)

RULE	REASON(s)
Follow instructions with care about the handling and management of live animals.	
Follow safety instructions precisely as stated in your book and / or by your teacher. Always obtain permission from your teacher before experimenting on your own. Do not perform any activities that have not been approved by your teacher.	
Never use broken or chipped glassware. If you notice a chip, crack or break, inform your teacher immediately. Dispose of the glassware in the proper container.	
Learn the meaning of every safety symbol used in the lab.	
Always wash your hands after each laboratory experiment, or whenever your hands have been exposed to anything that might harm you.	
Wash your hands after handling animals or animal cages.	
Read instructions for an experiment several times. Be sure you understand each of them. Follow directions exactly. For example add acid to water, not water to acid. If you are not sure about any part of the directions, ask your teacher for help.	
Never return chemicals to their original containers. Dispose of extra material you do not need according to your teacher's directions.	

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Examples of Emergencies and Response

Example of Emergencies	Response
You accidentally cut yourself with a scalpel.	Report this to the teacher immediately.
You see a small fire; the teacher has stepped out of the room.	Walk (don't run) to the fire blanket (you must know where it is) and smother the fire or use a fire extinguisher (you must know where it is) to extinguish the fire. Follow procedures that have been explained. DO NOT USE WATER to put out fires in the lab.
In cleaning up at the end of the lab period, you need to pick up a beaker that is full of water that recently boiled.	You need to put on heat-resistant gloves or use the other special equipment according to procedures used in the school.
A chemical accidentally spatters on your face.	Immediately proceed to wash out your eye(s) and rinse your face. Contact your teacher as soon as possible (but rinse first). (You must know where the eye wash materials are and/or area for rinsing).
You observe that a classmate has spilled water near an electric hot plate.	Call the teacher at once.

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QUIZ

Directions: Answer the following questions:

1. A safety symbol that resembles an electric plug reminds you about

   a. the need to prevent injury to lab animals
   b. the danger of working with electrical equipment
   c. the hazards of working with breakable material
   d. wearing goggles in the lab
   e. using a fire blanket appropriately

2. A safety symbol resembling a flame cautions you to

   a. wear safety goggles
   b. protect an animal from fire
   c. be careful when working with material that is flammable
   d. sweep up broken glassware
   e. wear acid-resistant gloves

3. The safety symbol of a razor blade reminds you to be careful when working with

   a. hot objects
   b. laboratory animals
   c. chemicals
   d. glassware
   e. sharp instruments

4. Correct the wrong word or words in the following sentences or add words to correct the statements:

   a. Always add water to acid carefully when making dilutions.

   b. Heat material in a closed container or vessel.

   c. You should identify unknown white powders in the laboratory by tasting them.

   d. Mixing two chemicals together without waiting for your teacher's instructions or without following instructions in your book shows initiative and is safe.

   e. For efficiency, always pour more chemicals into a flask than required for a given experiment.

   f. It is safest to sit while working with volatile chemicals in the lab.

   g. Pyrex or Kimax or TEKK test tubes may be heated in a flame by holding them with your hands.

   h. When heating material in a test tube, point the mouth of the test tube toward yourself.

   i. It is safe to eat or drink from laboratory glassware as long as it looks clean.

   j. It is not necessary to report minor laboratory accidents such as cuts.

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TRUE/FALSE Laboratory Safety Awareness Test (TEST-A)

This test is to determine whether you know and understand safety rules and procedures for working in the laboratory. The statements below may or may not be correct. Read each statement. If it is correct, write the word True in the space provided to the left of the statement. If the statement is false, write False in the space provided.

_____ 1. The laboratory is an ideal place for practical jokes.

_____ 2. Never leave an open flame unattended.

_____ 3. Always read the label on a container before removing any of the material in the container.

_____ 4. It is a good idea to show your independence by performing experiments that have not been approved by your teacher.

_____ 5. Always return unused chemicals to their original containers so as not to waste them.

_____ 6. It is generally necessary to place your nose directly over a container to smell the material in the container.

_____ 7. If you wear contact lenses, it is not necessary to wear safety goggles in the laboratory.

_____ 8. If you are not working with chemicals, it is all right to wear open sandals in the laboratory.

_____ 9. The open end or mouth of a test tube should never be pointed toward you or anyone else.

_____ 10. When anything spills in the laboratory, the teacher should be notified right away.

_____ 11. It is necessary to report even minor laboratory accidents to the teacher.

_____ 12. Long hair should be tied back when working in the laboratory with chemicals.

_____ 13. It is safest to heat the contents of test tubes in a flame while seated.

_____ 14. The location of a fire extinguisher and fire blanket should be known by everyone in the laboratory.

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TRUE/FALSE Laboratory Safety Awareness Test (TEST-B)

This test is to determine whether you know and understand safety rules and procedures for working in the laboratory. The statements below may or may not be correct. Read each statement. If it is correct, write the word True in the space provided to the left of the statement. If the statement is false, write False in the space provided.

_____ 1. It is a good idea to show your independence by performing experiments that have not been approved by your teacher.

_____ 2. If you are not working with chemicals it is all right to wear open sandals in the laboratory.

_____ 3. When anything spills in the laboratory, the teacher should be notified right away.

_____ 4. Always read the label on a container before removing any of the material in the container.

_____ 5. The location of a fire extinguisher and fire blanket should be known by everyone in the laboratory.

_____ 6. If you wear contact lenses, it is not necessary to wear safety goggles in the laboratory.

_____ 7. It is generally necessary to place your nose directly over a container to smell the material in the container.

_____ 8. The laboratory is an ideal place for practical jokes.

_____ 9. Never leave an open flame unattended.

_____ 10. Always return unused chemicals to their original containers so as not to waste them.

_____ 11. It is safest to heat the contents of test tubes in a flame while seated.

_____ 12. Long hair should be tied back when working in the laboratory with chemicals.

_____ 13. It is necessary to report even minor laboratory accidents to the teacher.

_____ 14. The open end or mouth of a test tube should never be pointed toward you or anyone else.

Name_____

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Video Quiz, Part 1

Directions: Answer the following questions as directed by your teacher.

1. When you see a fire in the laboratory, what should you do immediately? (More than one answer may be correct.)

a. Get the fire extinguisher and put out the fire thoroughly.
b. Pour water over the fire.
c. Get the fire blanket, and smother the fire.
d. Run from the room, leaving the door open for easy access, to call an emergency number.

2. While you are using a piece of electrical equipment, you notice it has a frayed wire. Put the following steps in proper order.

a. Unplug the equipment.
b. Continue the experiment with a replacement piece of equipment.
c. Alert the teacher.
d. Turn off the circuit breaker or unplug the fuse to turn off the power.
e. Turn the power on.

3. Which of the heating sources listed below can cause an electrical hazard if not properly used?

a. Candle
b. Bunsen burner
c. Hot plate

4. What is/are the appropriate symbol or symbols for hazards posed by the Bunsen burner? (More than one answer may be correct.)

a. symbol/icon for fire hazard
b. symbol/icon for poison hazard
c. symbol/icon for electrical hazard
d. symbol/icon for eye hazard
e. symbol/icon for hand hazard

5. Which of the following pieces of safety gear is not essential for all laboratory sessions?

a. Eye protection or goggles
b. Clothing protection or apron
c. Foot protection
d. Rubber gloves

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Matching Exercise

Match the safety symbol or symbols (hazard or protection) and the activity or activities related to awareness of laboratory safety. More than one symbol may go with one activity. Symbols may be used more than once.


Symbol A


Symbol B


Symbol C


Symbol D


Symbol E


Symbol F


Symbol G


Symbol H


Symbol I


Symbol J

Symbol(s) Laboratory Activity

____ 1. Using a scalpel to dissect a flower

____ 2. Observing the way a frog moves

____ 3. Collecting plant specimens

____ 4. Inserting a thermometer into a rubber stopper

____ 5. Placing an unknown solid in acid

____ 6. Heating a solution in a test tube

____ 7. Using a hot plate to check the boiling point of a solution

____ 8. Using a flame to sterilize a dissecting needle

____ 9. Placing a hot test tube in a beaker of room temperature water

_____ 10. Cutting a piece of rubber tubing

Name_____

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Matching Exercise

Directions: Match the safety symbol or symbols and the rule(s) or guideline (s) related to awareness of laboratory safety. More than one symbol may go with one activity. Symbols may be used more than once.


Symbol A


Symbol B


Symbol C


Symbol D


Symbol E


Symbol F


Symbol G


Symbol H


Symbol I


Symbol J

Symbol(s) Rule or Guideline for Laboratory Safety

____ 1. Never taste the contents of a bottle in a science laboratory.

____ 2. Keep flammable materials away from open flames.

____ 3. Handle animals with care.

____ 4. Wear safety goggles.

____ 5. Use tongs, test tube holders or heat protective gloves when handling hot glassware.

____ 6. Turn off electrical equipment when not in use.

____ 7. Wear protective laboratory clothing when working with chemicals.

____ 8. Be careful when working with breakable materials.

Name_____

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Video Quiz, Part II

Directions:
1a. Correct the student in the picture on Blackline Master 17a by identifying 6 mistakes. Find 6 errors (circle them) and describe them in the space provided.

Mistake No. Description

1. _____

_____

2. _____

_____

3. _____

_____

4. _____

_____

5. _____

_____

6. _____

_____

1b. What is one thing the student is doing correctly?

2. What safety symbol or symbols are associated with the following activity: cutting a piece of rubber tubing to a convenient length to use with a Bunsen burner.

a. Symbol for poison hazard
b. Symbol for fire hazard
c. Symbol for eye hazard
d. Symbol for hand hazard
e. Symbol for sharpness hazard

3. It is a rule not to eat or drink in the laboratory. Why? (More than one answer may be correct.)

a. You could eat something harmful, sickening or poisonous.
b. You could eat something you didn't mean to by mistake.
c. You could eat something contaminated by chemicals or germs.

17a

Name_____

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Directions: Answer the questions on Blackline Master 17 using this picture.

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