



BIO LAB Basics

Essentials of lab concepts, use & safety—including helpful hints & tips

LAB SAFETY & FIRST AID

Biology labs should be interesting and informative, but most importantly they need to be **safe**. Because biology labs often manipulate living organisms, there are several chemicals and pieces of equipment that can be dangerous if used improperly. The following are some basic safety guidelines common to most introductory biology labs.

• Pre-lab preparation

- Read and understand the lab materials. The most important step a student can take is to be well prepared and familiar with what will be covered in lab for each session. Lack of preparation makes labs take longer to complete properly. Uncertainty can easily lead to carelessness and accidents; having to redo work is always time consuming.

• Specific lab safety guidelines

- No food or drink** in the lab at any time. Chemicals someone else used and didn't clean up properly can get on your food.
- Do not apply cosmetics or contact lenses.** You really don't want to put strange chemicals into your eyes.
- Keep the lab bench clear** of unnecessary items (e.g., books, laptops, and cell phones).
- Never touch a hot plate** to determine its temperature.
- Test tubes** that are being heated should be aimed away from you and others.
- Wear appropriate gloves, goggles, and lab coats** when required.
- Dispose of all chemicals, specimens, and sharp objects/tools** (e.g., scalpels and broken glass) in designated containers. Discarded sharp objects have injured many patients. Long hair should be tied back.
- Wear appropriate clothing.** It shouldn't be too loose and should cover most of your body. Always wear closed-toe shoes—**never** sandals.

- Wash hands** with soap and water after every lab (and possibly multiple times during a lab, depending on the activity) so you don't take chemicals home with you.
- Know the location of **fire extinguishers, fire blankets, gas shutoff valves, fume hoods, safety showers, eye washes, and first aid kits** and how to use them.
- Fire extinguishers** come in several different types and their effectiveness depends on what is burning. Only trained personnel should handle fire extinguishers.
- Fire blankets** are used when a person's clothing is on fire. They are used to smother the fire by trapping a person inside one.
- Gas shutoff valves** are located in particular locations (usually near fire extinguishers). In case of a gas fire, gas to the entire room can be shut down quickly.
- Fume hoods** are intended to protect the user from chemicals inside the hood. Room air is pulled into the hood and expelled through special chemical scrubbers to denature and protect against airborne chemicals.
- Safety showers** are intended to wash away larger chemical spills on a person just like taking a shower at home cleans away dirt.
- Eye washes** are located near certain sinks and are used to squirt water into the eyes and wash chemicals from them. Eyes are very fragile and extra care should be taken to avoid getting chemicals in them. One should never put gloved hands to the face; if your hands need protection, your face will too!

• First aid

- Labs are required to have a first aid kit; however, students will not normally administer first aid to another student.
- All accidents, regardless of severity, should be reported immediately to the lab instructor.**
- These guidelines are for the instructor and injured student: in all cases of severe injury and/or intense pain, the instructor should immediately contact medical professionals.
- Specific injury recommendations**
 - Small cuts:** In consultation with the instructor, wash the cut with water and then use topical antibiotic ointments and bandages from the first aid kit.
 - Large cut:** In consultation with the instructor, apply pressure to the injured area to stop the bleeding; immediately contact medical professionals.
 - Small burn:** In consultation with the instructor, apply cold water until the pain subsides; if necessary, contact medical professionals.
 - Large burn:** In consultation with the instructor, immediately contact medical professionals.
 - Eye injuries:** In consultation with the instructor, the eye wash station should be used for chemical or fluid splashes. All eye injuries are potentially serious; thus, immediate contact with medical professionals is recommended.
 - Additional injuries or medical conditions** of many kinds and severity can occur in labs (just as they can anywhere else); thus, it is best to be safe. In consultation with the instructor, medical professionals should be contacted.

ESSENTIAL METHODS & TOOLS

SCIENTIFIC METHOD

- Children learn by experimentation; they learn about the world through how they interact with it. When they touch a hot burner on a stove, it burns.
 - The child then most likely speculates that if he/she touches hot stoves again, it burns, so he/she must.
- The scientific method works the same way. Scientists observe phenomena and formulate **testable, repeatable** hypotheses about the world they observe.
 - Hypotheses that are **untestable** are of little use in science.
 - Observations that are not repeatable cannot be used to predict future events.
- The scientific method is formalized into four distinct stages:
 - 1. Observation:** Viewing or examining events as well as the circumstances of the event.
 - 2. Hypothesis:** A prediction or educated guess about what is being observed.
 - 3. Experiment:** A test of the hypothesis, usually involving a manipulation of some variable that might affect the observation.
 - a. Treatment:** The part of an experiment where a variable is manipulated.
 - b. Control:** The part of an experiment where no manipulation takes place (i.e., a baseline).
 - 4. Theory:** A prediction that is checked by at least one (but usually many) experiments.
- There are specific mathematical tests for comparing treatments and controls. These are known as **statistics**, with different tests depending upon what data has been collected.
- Methods used to test hypotheses should be repeatable. Can other people carrying out the same experiment get the same results?
 - Introductory biology lab exercises involve doing experiments in which data about the living world can be recorded and analyzed to increase our understanding of how science actually reaches its conclusions.

MEASUREMENTS

- Scientists make two different types of measurements:
 - Qualitative measurements:** A relative description characterizing an important aspect of a phenomenon (e.g., a bear displayed its teeth aggressively).
 - Quantitative measurements:** A numerical description of an aspect of a phenomenon (e.g., a bear displayed its teeth 4 times during a 30-minute observation period while growling at 22 decibels).
- There are two major systems of measurement:

Characteristic Measured	American Standard	Metric System
length	inches/feet/yards/miles	centimeters/meters/kilometers
volume	cups/gallons/barrels	milliliters/liters/hectoliters
temperature	Fahrenheit (°F)	Celsius (°C)/Kelvin (K)
weight	ounces/pounds	grams/kilograms

Science almost exclusively uses the metric system.

Metric System

The metric units all have a base unit of measure (e.g., meter, liter, and gram), and when appropriate, also have a prefix before.

Metric Prefixes					
Prefix	Symbol	Power of 10	Prefix	Symbol	Power of 10
pico	P	10 ⁻¹²	deci	d	10 ⁻¹
nano	N	10 ⁻⁹	centi	c	10 ⁻²
micro	μ	10 ⁻⁶	milli	m	10 ⁻³
milli	m	10 ⁻³	deci	d	10 ⁻¹
centi	c	10 ⁻²	centi	c	10 ⁻²
deci	d	10 ⁻¹	deci	d	10 ⁻¹
deci	d	10 ⁻¹	deci	d	10 ⁻¹

Bio Lab Basics Quickstudy Academic

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Bio Lab Basics W. Randy Brooks, 2008-05-19 Focusing on safety and ease of laboratory use this 2 panel guide is a one stop resource for all biology lab students It covers everything from dissection to microscopes Bio Lab Basics Frank Miskevich, Randy Brooks, 2025-05 The study of life in all its glory animals and plants we see around us the tiny organisms we can't see that affect us every day and even the molecules which make up life Learning biology we ask questions about nature Lab experiments are HOW we ask the questions This guide shows how we ask questions in biology what are the tools terms and major approaches scientists use to learn about the living world It includes some of the major ideas biologists study as well as descriptions of techniques and instruments used This guide is intended for a high school or early college student or anyone interested in understanding how biologists make the discoveries reported in the news daily 6 page laminated guide includes Lab Safety First Aid Essential Methods Tools Scientific Method Measurements Statistics Common Biology Lab Equipment Microscopy Essential Concepts Cell Structure Cell Transport Respiration Photosynthesis Enzyme Activity Organismal Diversity Mitosis Meiosis Molecular Genetics Mendelian Genetics Field Biology Biology Lab Basics (Speedy Study Guides) Speedy Publishing LLC, 2015-04-25 You are exposed to many different types of hazards in a biology lab but you can curtail these risks by going through the theoretical basics first This quick study guide teaches you the safe way to prepare solutions dispose of buffers and chemicals as well as work with equipment and DNA Safety in the laboratory can be made possible if you order a copy today *Subject Guide to Books in Print*, 1991 **Biology Lab Basics (Speedy Study Guides)** Speedy Publishing, 2015-04-24 You are exposed to many different types of hazards in a biology lab but you can curtail these risks by going through the theoretical basics first This quick study guide teaches you the safe way to prepare solutions dispose of buffers and chemicals as well as work with equipment and DNA Safety in the laboratory can be made possible if you order a copy today Biology, 1999 American Education, 1981 **Data Sources**, 2000 *Invulnerable Super Hero RPG Vigilante Edition* Joshua Kubli, 2014-08-30 *Invulnerable Super Hero RPG Vigilante Edition* is here *Invulnerable's* flexible point based system emphasizes versatility and roleplaying *Invulnerable* heroes gain a wide variety of Power Enhancements to show the amazing feats they can perform and their Motivations and Central Contradiction tell you what kind of hero they are behind the mask Heroes need a world to protect *Invulnerable* includes a detailed setting Earth Omega filled with heroes to join and villains to trounce and legacies to uphold So what are you waiting for Grab Some Dice And Save The World **Bio Lab Basics** Pamphlet Master, 2014-08-14 This *Bio Lab Basics* study guide is created by Pamphlet Master for students everywhere This tool has a comprehensive variety of college and graduate school topics subjects which can give you what it takes to achieve success not only in school but beyond Included in the pamphlet are Science Principles Processes and Disciplines Science Principles Hypotheses Theories and Change Pasteurization Molecular Structure Basics The Electron Shell Biology Lab Techniques Classification of Organisms

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