# TOOLS AND TECHNIQUES SECTION 1-3

# Measurement Systems

Key Idea: The International System of Units is used by all scientists because scientists need to share a common measurement system. SI is also preferred by scientists because it is scaled in multiples of 10, which makes the system easy to use.

# SI is the official name of the metric system.

**Some SI Prefixes**

| Prefix | Abbreviation | Factor of base unit |
|---|---|---|
| giga | G | 1,000,000,000 |
| mega | M | 1,000,000 |
| kilo | k | 1,000 |
| hecto | h | 100 |
| deka | da | 10 |
| deci | d | 0.1 |
| centi | c | 0.01 |
| milli | m | 0.001 |
| micro | μ | 0.000001 |
| nano | n | 0.000000001 |
| pico | p | 0.000000000001 |

# Measurement System

- SI is a decimal system, so all relationships between SI units are based on powers of 10.

| Unit | Prefix | Metric equivalent | Real-life equivalent |
|---|---|---|---|
| Kilometer (km) | *Kilo-* | 1,000 m | About two-thirds of a mile |
| Meter (m) | | 1 m (SI base unit) | A little more than a yard |
| Centimeter (cm) | *Centi-* | 0.01 m | About half the diameter of a Lincoln penny |
| Millimeter (mm) | *Milli-* | 0.001 m | About the width of a pencil tip |
| Micrometer (µm) | *Micro-* | 0.000001 m | About the length of an average bacterial cell |
| Nanometer (nm) | *Nano-* | 0.000000001 m | About the length of a water molecule |

# Lab Techniques

Key Idea: In the lab, scientists always keep detailed and accurate notes and perform precise measurements. Many scientists also use specialized tools, such as microscopes, and specialized procedures, such as sterile techniques.

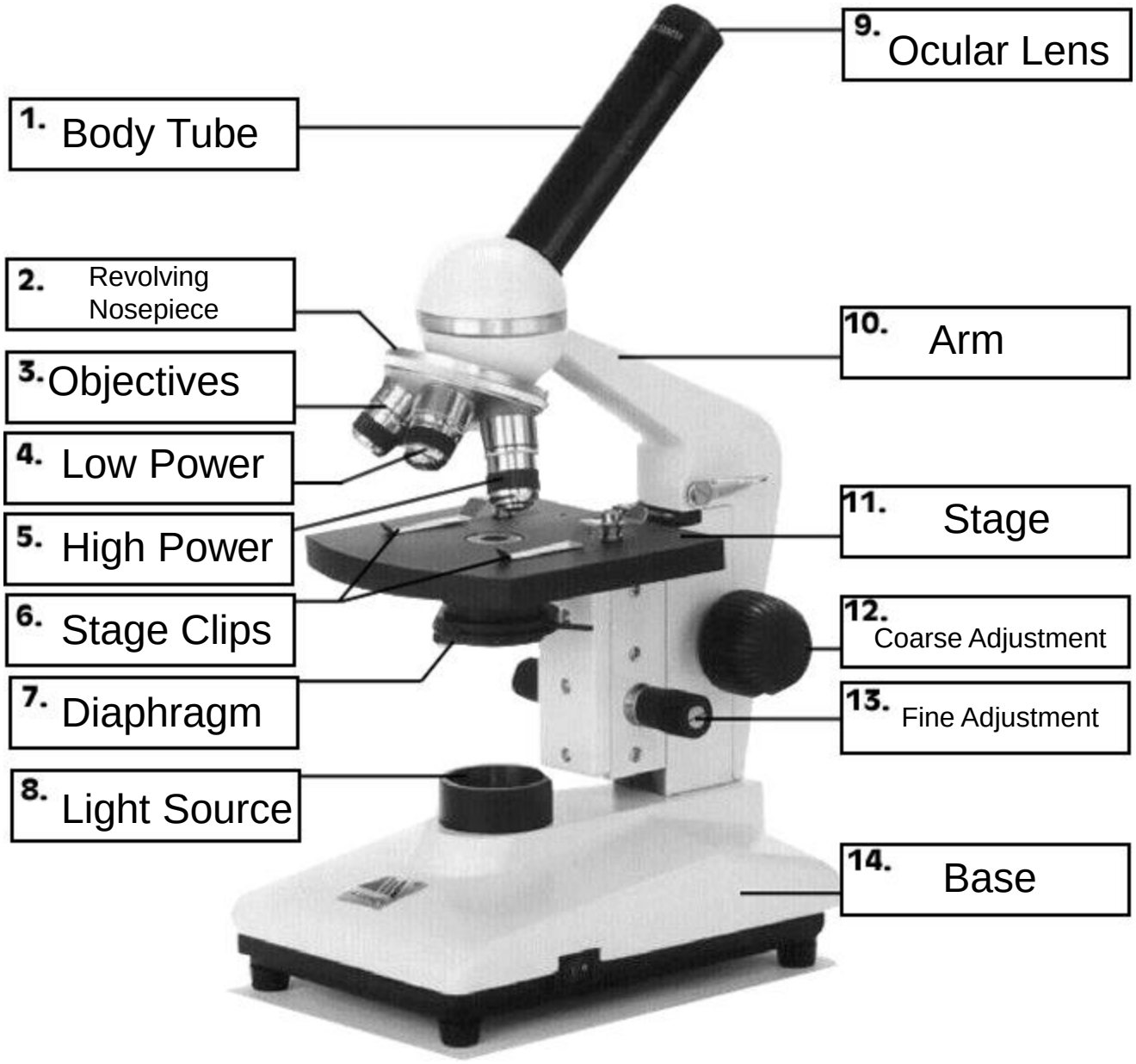
- A technique is a way of doing something.

# Sterile Technique

- Sterile technique is a method of keeping unwanted microorganisms out of a lab in order to minimize the risk of contamination.

# Microscopy

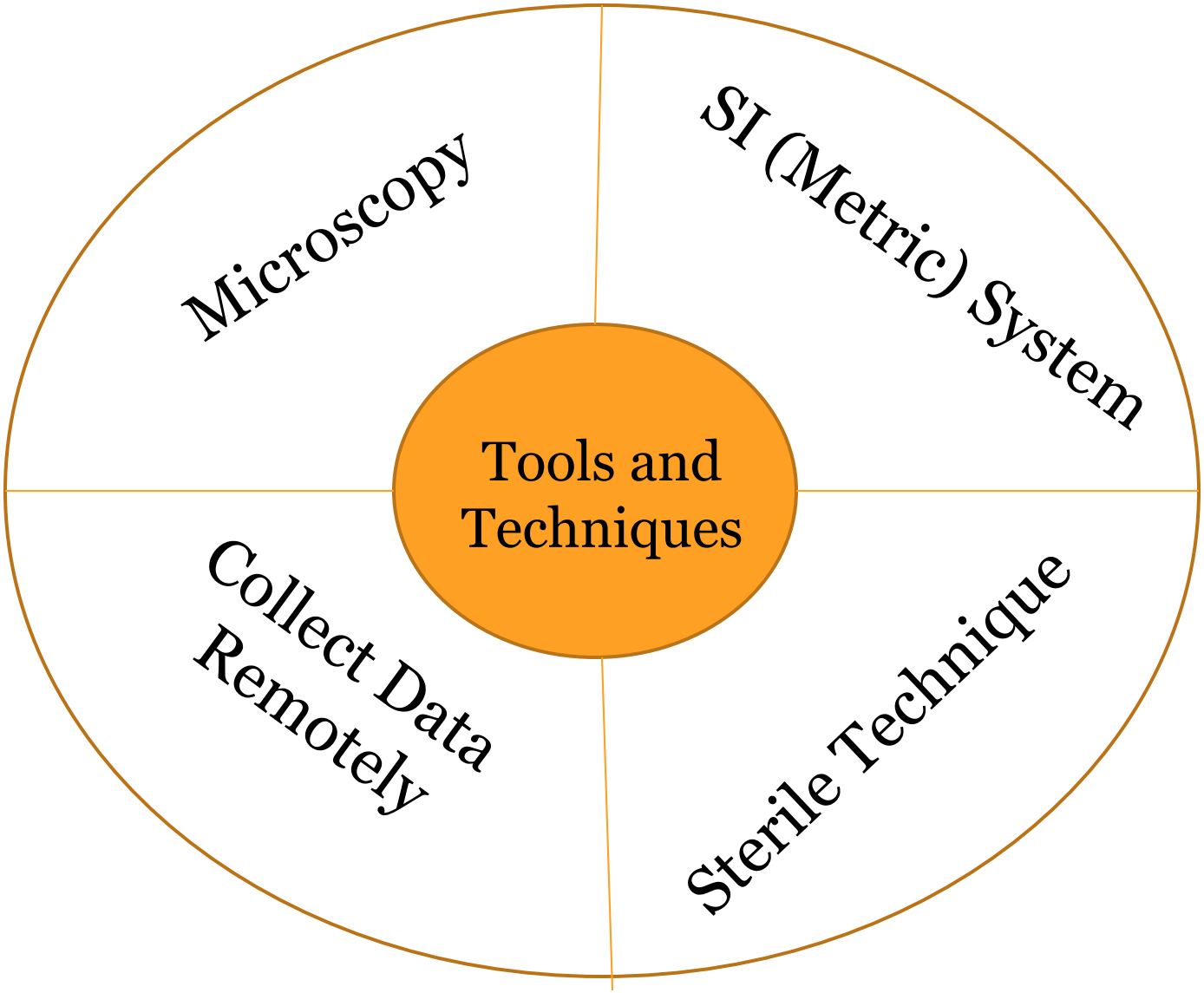
- Scientists use microscopes to view objects and organisms that are too small to see with the unaided eye.


1. Body Tube
2. Revolving Nosepiece
3. Objectives
4. Low Power
5. High Power
6. Stage Clips
7. Diaphragm
8. Light Source
9. Ocular Lens
10. Arm
11. Stage
12. Coarse Adjustment
13. Fine Adjustment
14. Base

# Collecting Data Remotely

- Scientists also collect data remotely using devices such as satellites. These devices help scientists conduct research that would not have been possible in the past.

- Complete the idea wheel.



# Safety

Key Idea: Scientists must use certain caution when working in the lab or doing field research to avoid dangers such as chemical burns, exposure to radiation, exposure to infectious disease, animal bites, or poisonous plants.

- Some guidelines for working safely in a lab are:
  - Listen carefully to your teacher, and follow all instructions.
  - Read your lab procedure carefully before beginning the lab.
  - Keep your lab clean and free from clutter.
  - Never taste or smell any materials or chemicals that you use in a lab unless your teacher instructs you to do so.

# Safety

- If an accident occurs while in the lab, remain calm. Make sure you are safe and that no one else is in danger. Then inform your teacher.