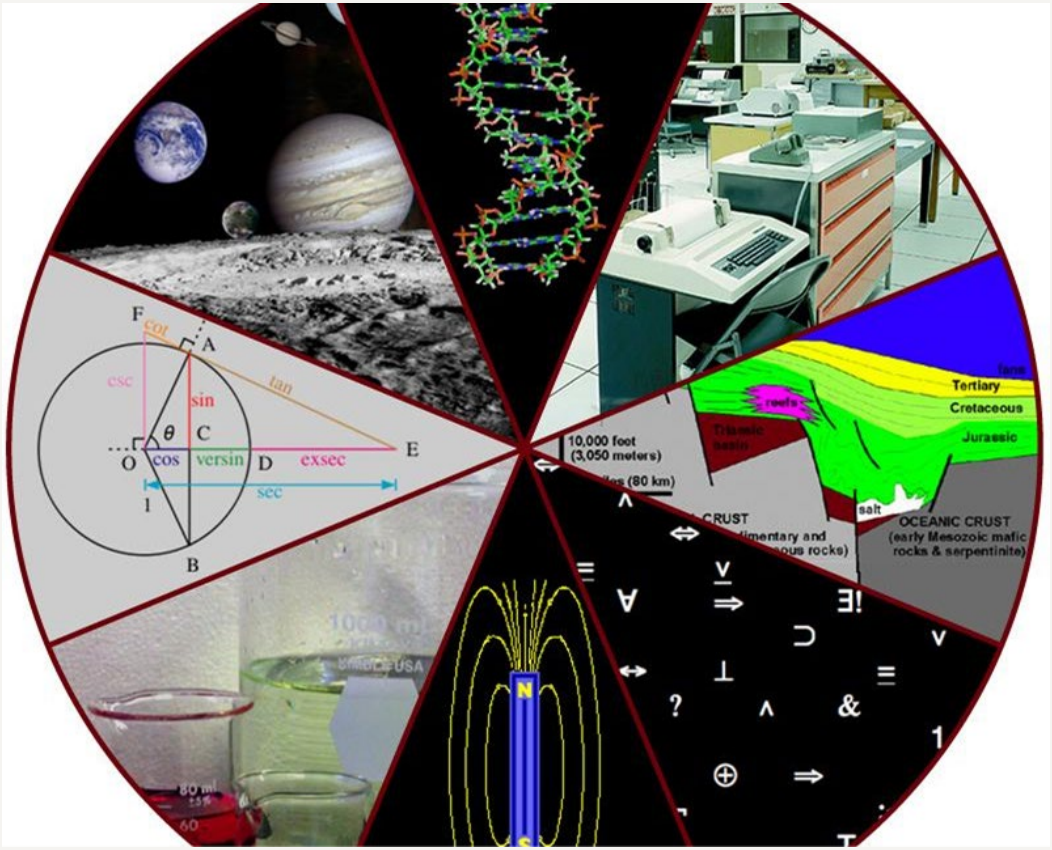
Lesson Overview:

- In this lesson, students are introduced to what scientists do by practicing observation skills and using tools in a biology classroom. Students are provided an opportunity to experience blind contour drawing to help them build their observation and drawing skills.
  - **Objective:** Students will be able to practice making observations, asking questions about their observations, and connecting with their observations.
  - **Grades:** 9th to 12th grades, adaptable to middle school.
  - **Time:** 45 minutes
  - **Author:** Sokha Wise
- **Standards:**
  - **SIN 202**. Understand the tools and functions of tools used in a simple experiment.
  - **Essential HS.L1U1.20** Ask questions and/or make predictions based on observations and evidence to demonstrate how cellular organization, structure, and function allow organisms to maintain homeostasis.
- **Lesson Components include Lecture slides and student handouts**

Introduction to Science:

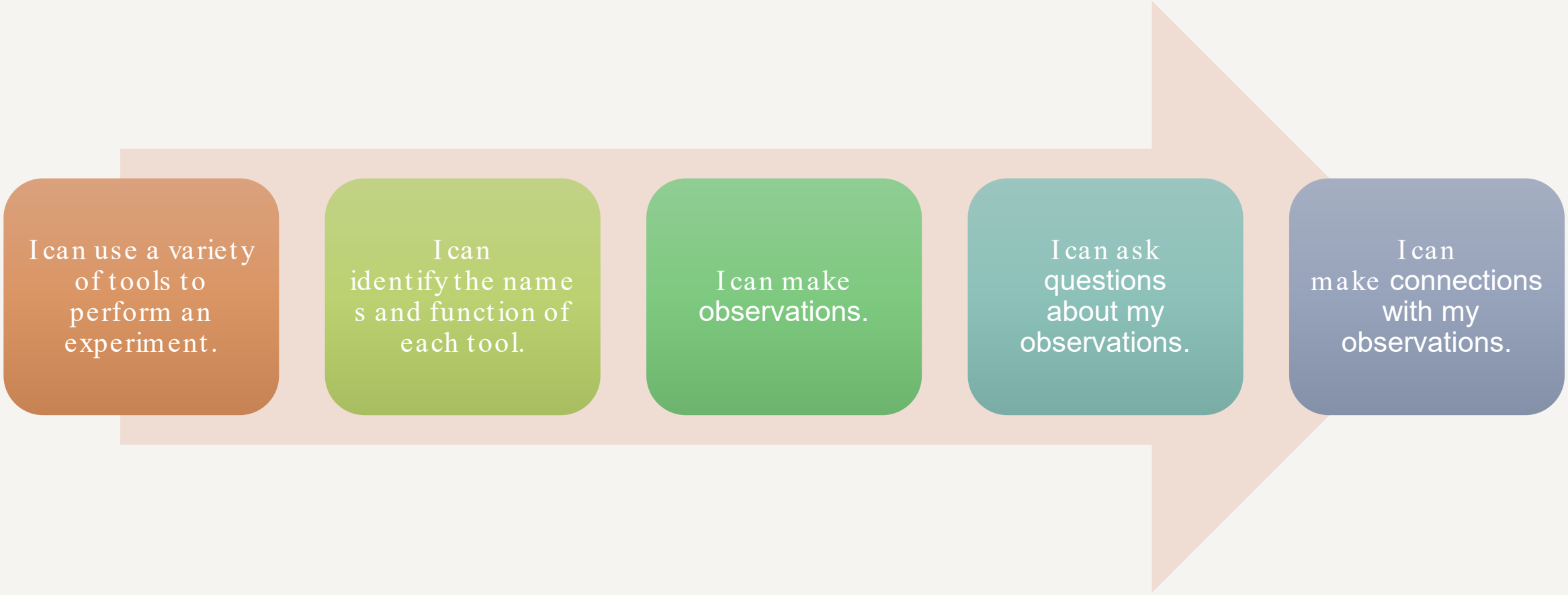


BELL WORK: WHAT DO SCIENTISTS DO?

Learning Target: What am I learning?

I am learning about what scientists do and the different tools used by a scientist.

Success Criteria: How do I know I learned it?



Why am I learning this?

✓ To build awareness of the environment we live in and our connection to it.

Santa Cruz River at the Irvington site.

Agenda:

Lecture: What Do Scientists Do?

Assigned Activity: Blind Contour Drawing Practice

Assigned Activity: River Water Sample under a Microscope

What is *science*?

Science is *about* discovering how nature works.

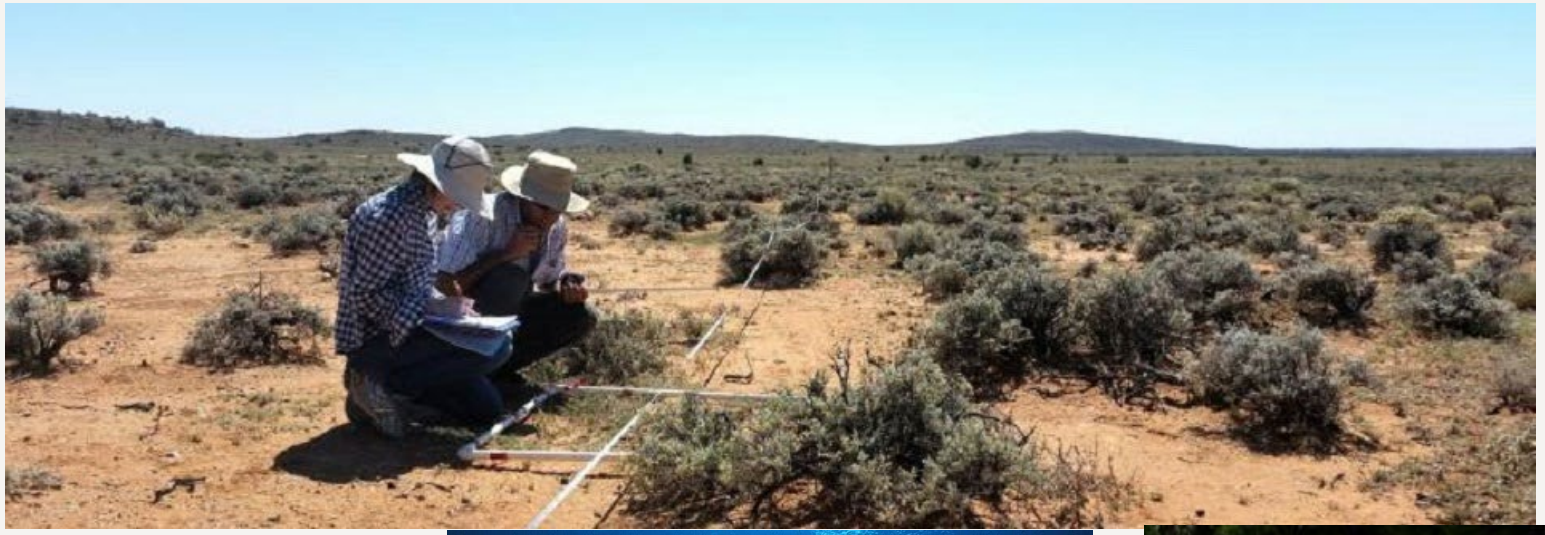
Using that knowledge to *predict and explain* what is likely to happen in nature.

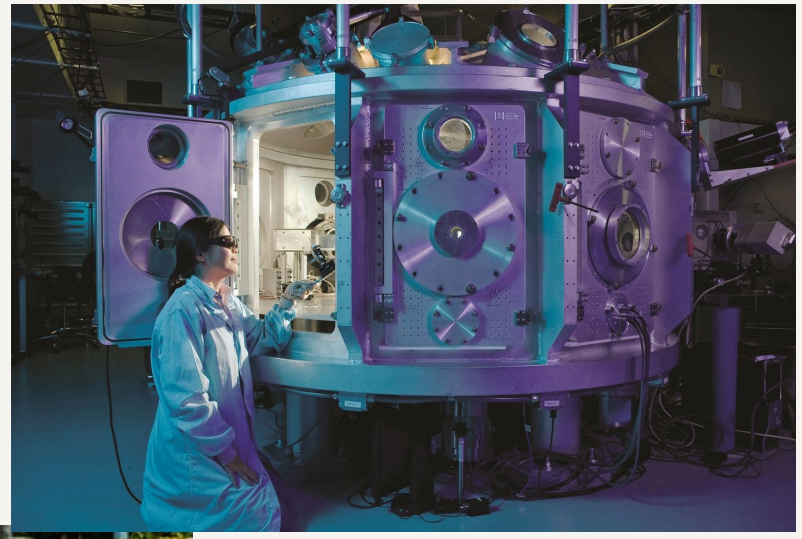
Scientists believe the world functions in a cause-and-effect pattern.

- The idea that actions or events (causes) produce certain outcomes or results (effects).
- Scientific questions are asked in a cause-and-effect format.

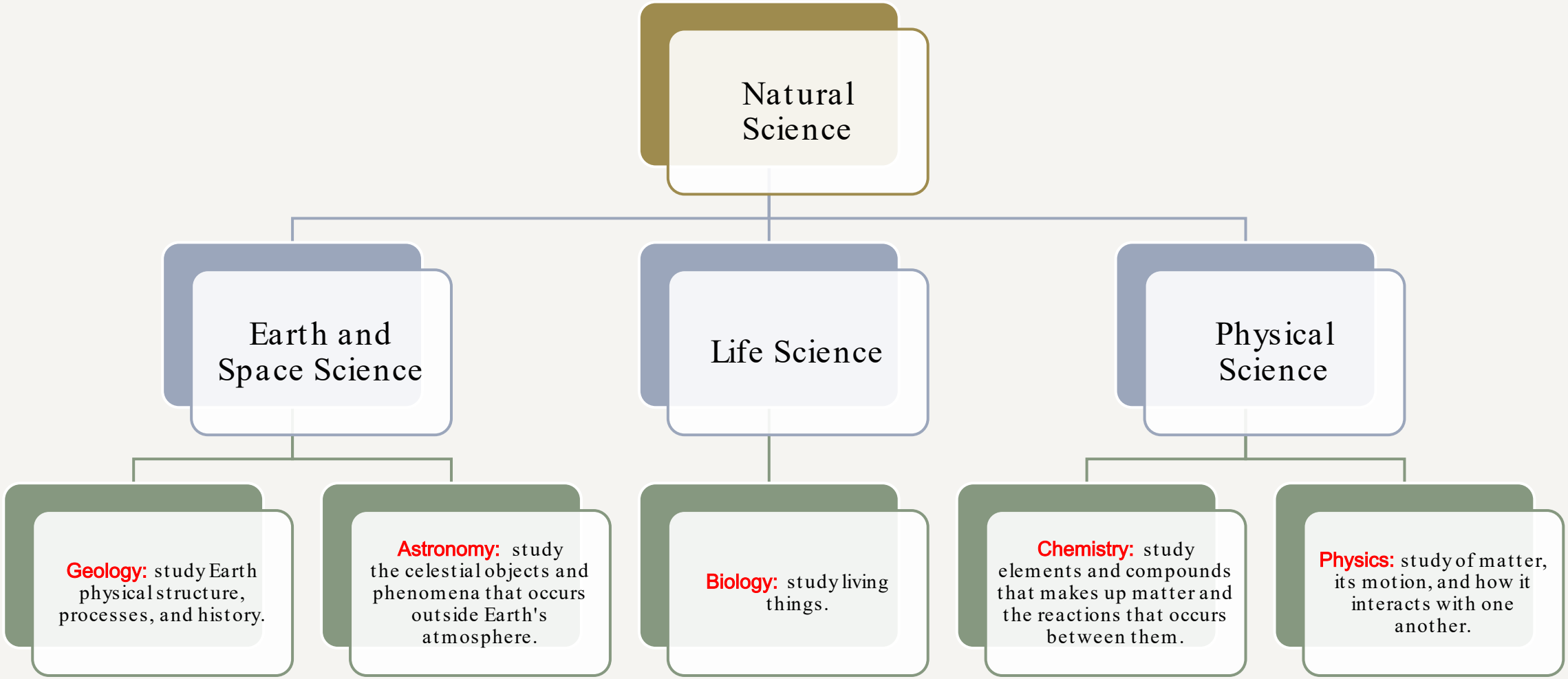
Cause	Verb	Effect
• An increase in rain.	• Creates	• An increase in plant growth.

Scientists use observations, measurements, and experimentation to understand these patterns. This is part of the Scientific Method, a research process used by all scientists to learn about how nature works.





Different branches of science focuses on a different part of the natural world.



All science usually begin from observing a phenomenon.

A **phenomenon** is an observable event that occurs which causes you to wonder.

How is a double rainbow created?

There are four essential components to the nature and process of science.

Exploration and discovery

Today we are focusing on this component.

Testing ideas

Community analysis and feedback

Benefits and Outcomes

Exploration and Discovery involves…

- ✓ **Scientific investigation usually begins with making observations** and **forming questions**.
- ✓ However, it can also begin with being inspired, from reading an interesting article, or from sharing ideas with someone.

Make observations

Asking questions

Finding inspiration

Exploring the literature

Sharing data and ideas

Recording Observations Expectations

- **Qualitative** observations: Using your 5 senses. **Describe what you see, smell, taste, touch and hear.**
- **Quantitative** observations: Using numbers for **measurements** or **counting** the amount of something.
- **Draw** or **sketch** what you see.
- Make sure to always **label** your drawings.
- We will practice using a technique called **Blind Contour Drawing.**

Assigned Activity: Blind Contour Drawing

- Individual work. 10 minutes.
- Pick a scientific tool to draw.
- Focus your eye on some part of the object and begin moving your pencil to record what your eyes observe.
- Do not look at your paper.
- Pay attention to the shapes, lines, and contours of the object.
- Move your pencil as your eyes move like an ant traveling along the edge of the object.

Class Discussion: Blind Contour Drawing Reflection

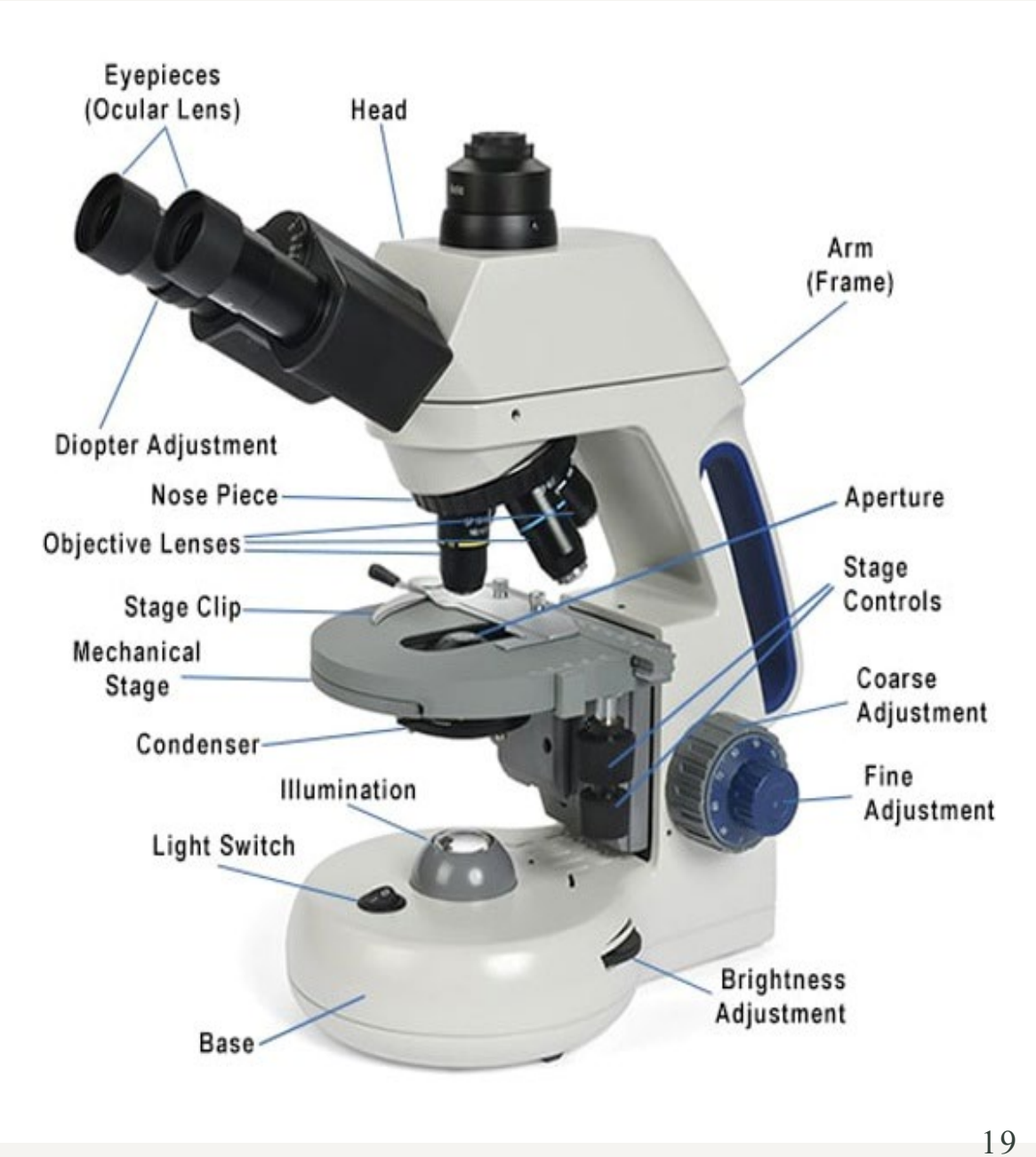
1. How do you feel doing this activity?
2. What is difficult about it?
3. What is easy about it?
4. What is a benefit from blind contour drawing?

Common Tools UseBy Biologists. Write down the name of the tool you drew next to your drawing.

- Microscopes
- Microscope slides
- Slide cover slips
- Test tubes
- Beakers
- Graduated cylinders
- Petri dishes
- Pipette
- Balance
- Thermometers
- Dissection kits

Assigned Activity: River Water Sample Under a Microscope

- Use a pipette to collect a sample of river water and drop it onto your slide.
- Place a cover slip over the specimen.
- Observe specimen at the lowest power 4x. Use coarse knob first and then fine focus knob to see the specimen.
- Move to a higher power each time.
- Make sure to sketch your observations and label.
- In notes, write what you wonder and what your observations reminds you of.



Learning Checks:

What skill does blind contour drawing work on?

Explain the purpose of phenomenon in science.

How do scientists collect evidence?