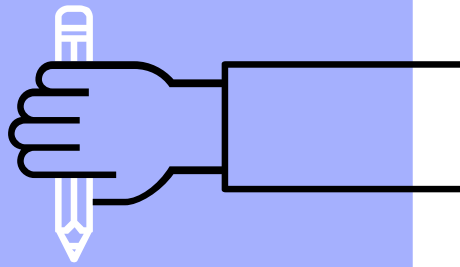
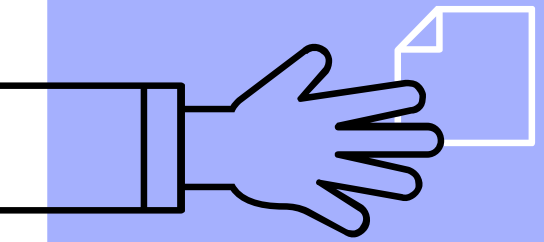
Molecular & Cellular Biology



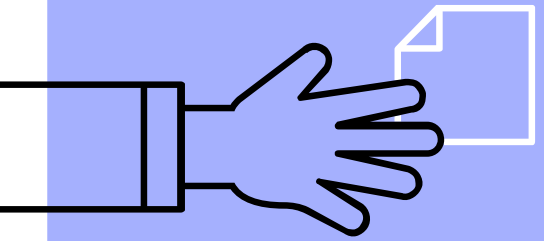


Topic(s): Wetlab techniques, Science Olympiad “bio process”



Question of the Day

Should a hotdog be considered a sandwich?

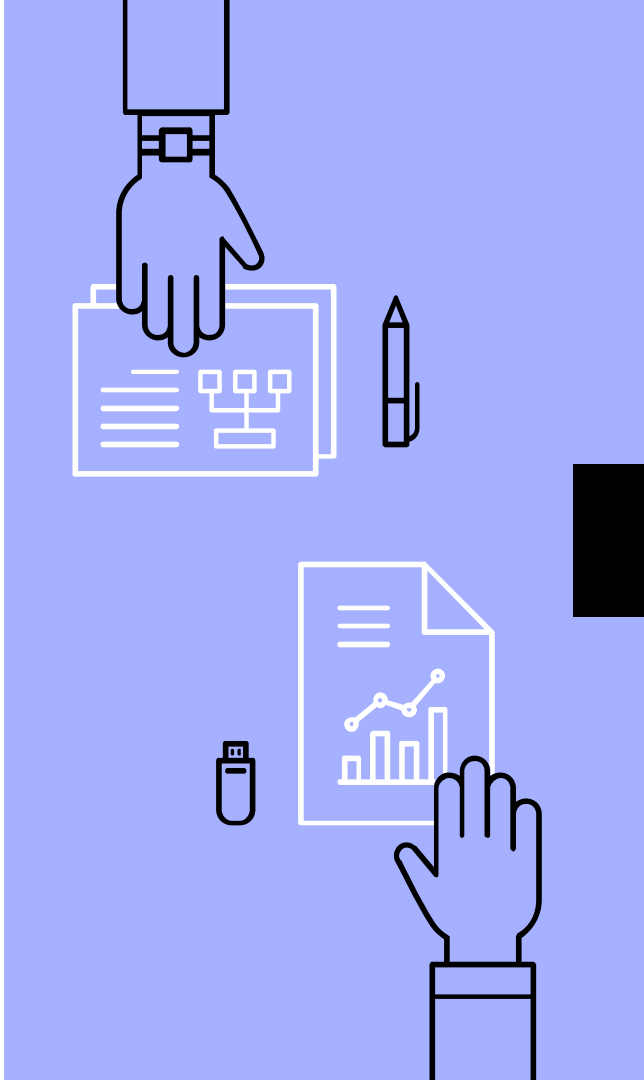




Intro to Week 2

What we will learn:

- Cell & molecular bio basics
- Lab techniques!!!
  - Microscopy, gel electrophoresis, x-rays, etc.
- Wet lab procedures
- Experimental methods
- Science Olympiad “Bio Process”



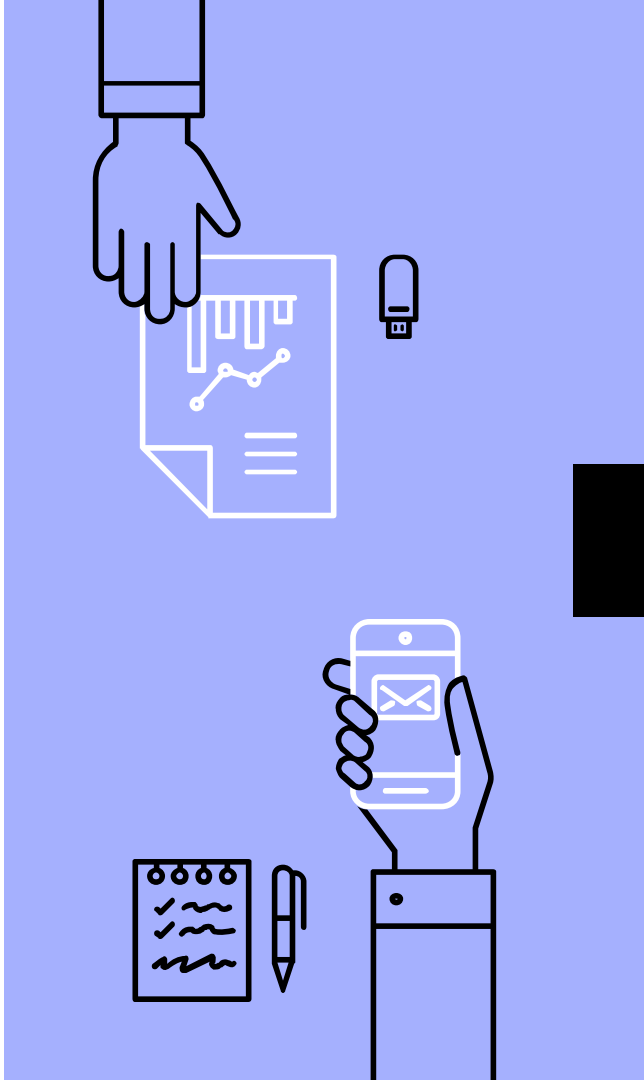
Background Information

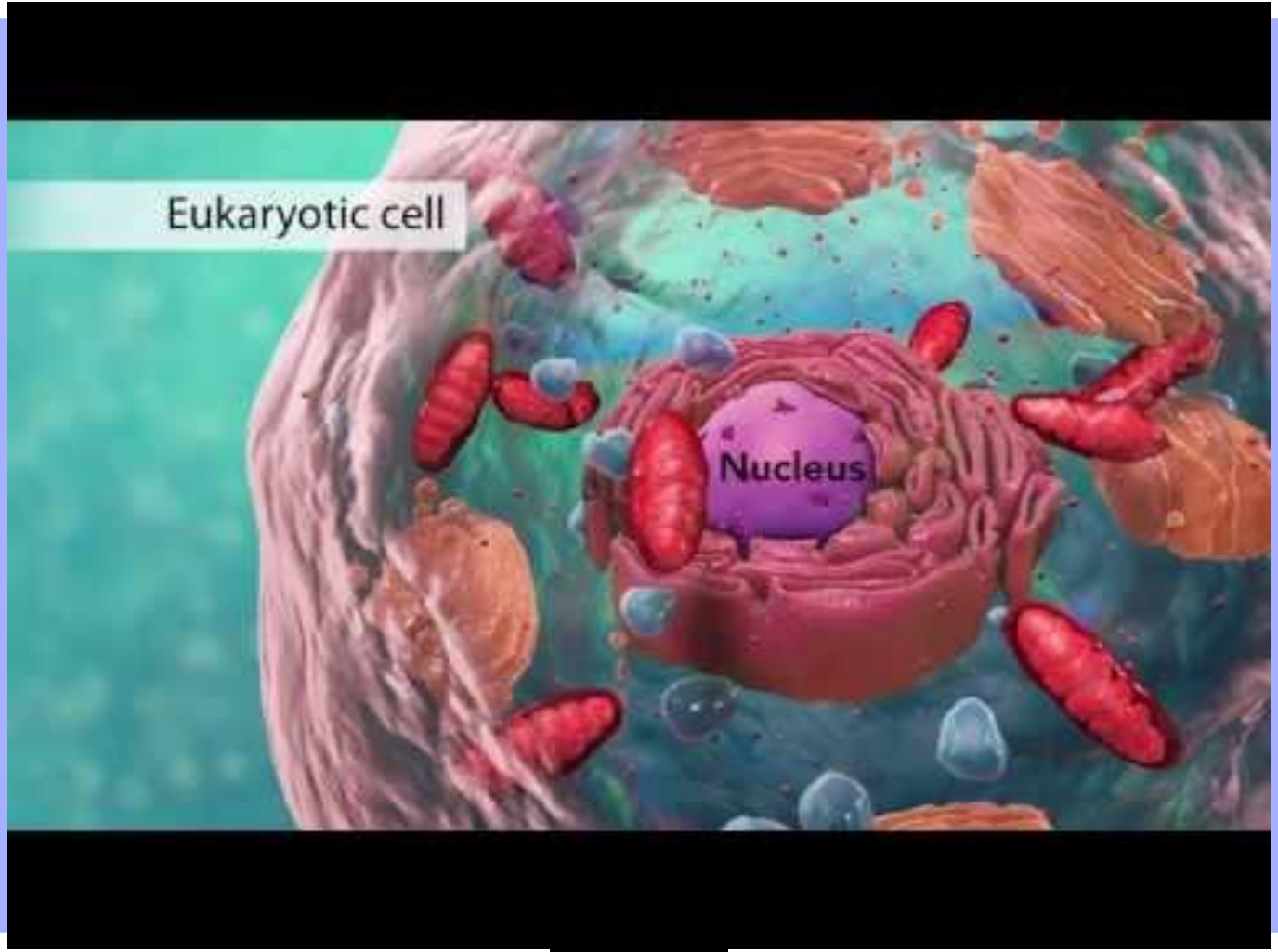
Remember, this class is about bio lab research, and less so bio content.

However, in order to better understand research in molecular and cellular biology, we need to have a basic understanding of the principles and terminology commonly used throughout the field.

Video link:

https://www.youtube.com/watch?v=URUJD5NEXC8&t=116s

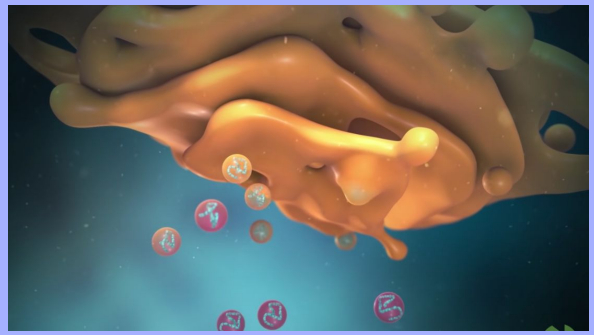



Eukaryotic cell
Nucleus

Quick summary of video

- **Eukaryotic cells:** Plant and animal cells with a nucleus and membrane-enclosed organelles
- **Prokaryotic cells:** Unicellular organisms without a nucleus or membrane-enclosed organelles
- **All cells** have a cell membrane, cytoplasm, and genetic material
- **Both** plant and animal cells have mitochondria





Wet Lab techniques









These are some pictures of common wet lab instruments used for research in molecular & cellular biology. **Discuss what you think each instrument is used for!**

Wet Lab techniques

1. Pipetting (pg. 177)
2. Spectrophotometer (pg. 172)
3. Compound Microscope (pg. 166)














VS





Important!

Pipet and **pipette** are different liquid handling devices!

While pipet/pipette are pronounced the same, when someone writes “pipet” vs. “pipette” on a lab manual or experiment instruction sheet, depending on the spelling, the type of measuring device you should use will be different.



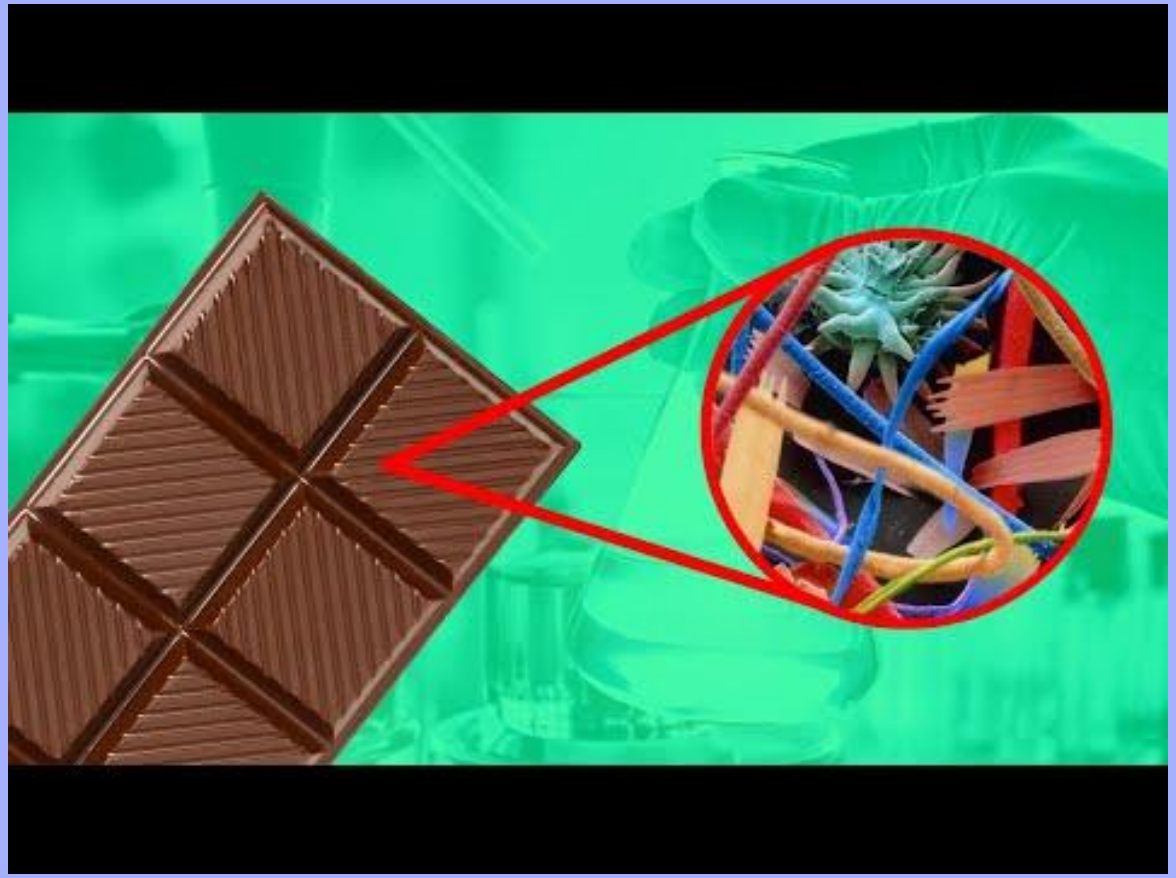
Pipet



Pipette


GENESYS 20

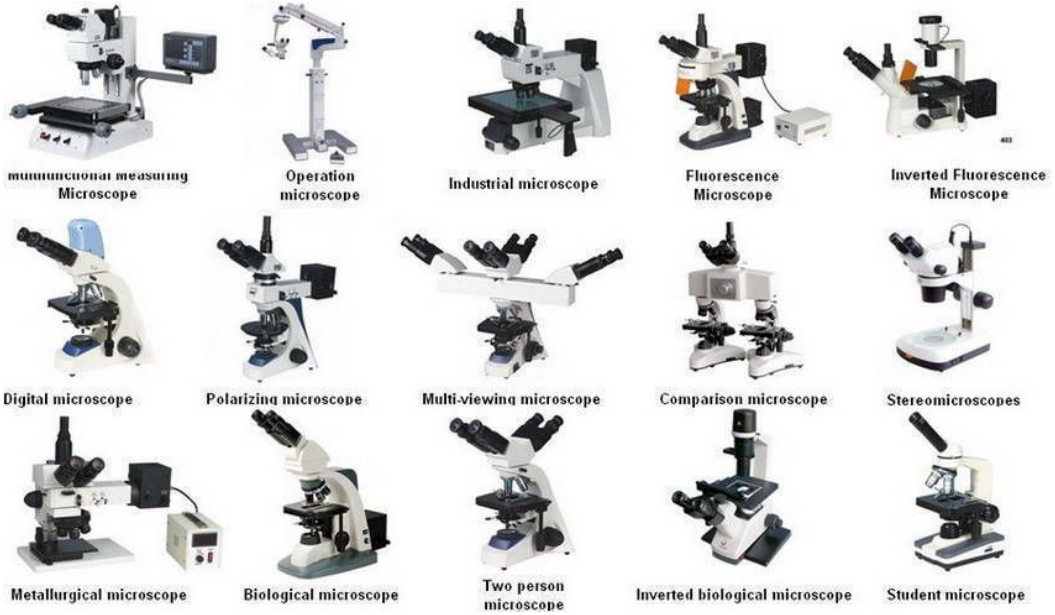




20 everyday things under a microscope

There are MANY different types of microscopes!

Different types of microscopes are used for different purposes







multifunctional measuring Microscope



Operation microscope



Industrial microscope



Fluorescence Microscope



Inverted Fluorescence Microscope



Digital microscope



Polarizing microscope



Multi-viewing microscope



Comparison microscope



Stereomicroscopes



Metallurgical microscope



Biological microscope



Two person microscope



Inverted biological microscope



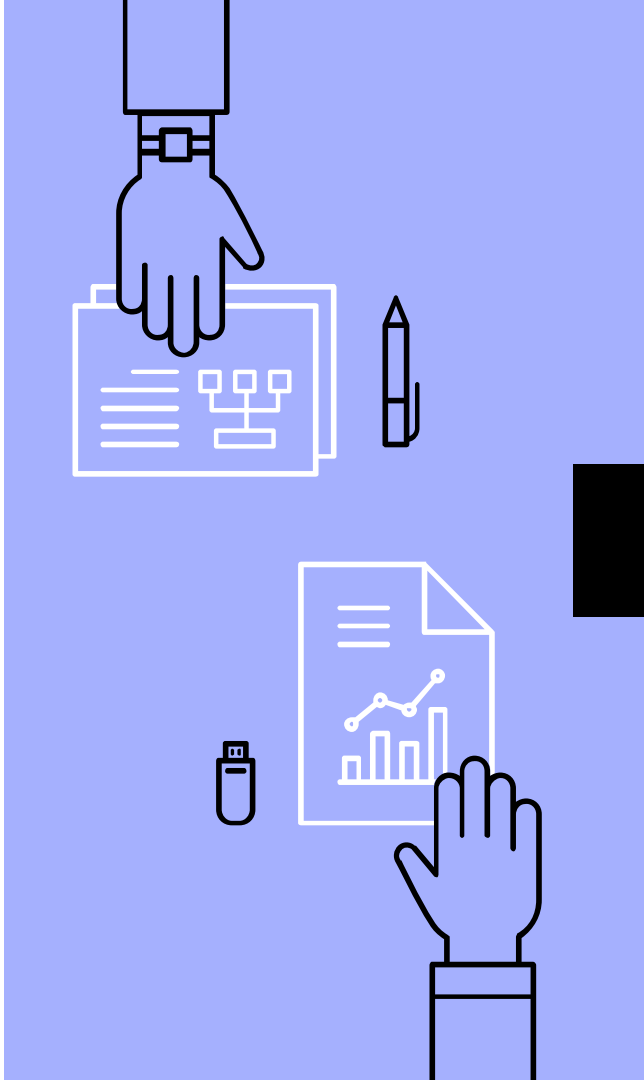
Student microscope

Let’s practice!

Technique 1: What instrument is used?

Mock scenario: A Chemistry Department has been collecting solutions of Co^{2+} and Ni^{2+} left over from student experiments. It is both illegal and irresponsible to put such solutions down the drain because of the toxicity of these metal ions. These solutions have been stored for several years, and at this point, no one knows the concentration of these two ions in the solution. The Chemistry Department must pay to have the solution disposed of, but in order to do so, they must know the amount of these metal ions in the waste.

How would you obtain results?



Let's practice!

Technique 1: Spectrophotometer

Mock scenario: A Chemistry Department has been collecting solutions of Co2+ and Ni2+ left over from student experiments. It is both illegal and irresponsible to put such solutions down the drain because of the toxicity of these metal ions. These solutions have been stored for several years, and at this point, no one knows the concentration of these two ions in the solution. The Chemistry Department must pay to have the solution disposed of, but in order to do so, they must know the amount of these metal ions in the waste.

How would you obtain results?





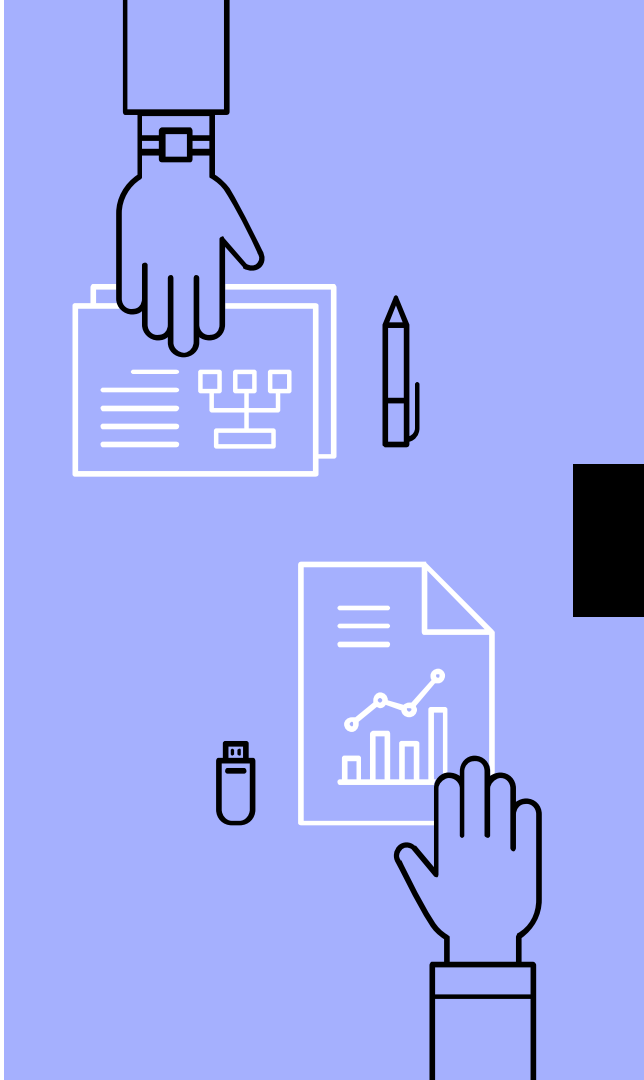



Let’s practice!

Technique 2: What instrument is used?

Mock scenario: In biochemistry class, you are trying to figure out how much base is needed to neutralize an acid. You realize that you need 100 mL of base in order to do this. However, because you made some errors in precision, the actual volume of base you need is 101 mL, and you need to transport this liquid in a separate container in order to proceed with the lab assignment.

How would you do this?



Let's practice!

Technique 2: Pipette (one 100 mL pipette + one 1 mL pipette)

Mock scenario: In biochemistry class, you are trying to figure out how much base is needed to neutralize an acid. You realize that you need 100 mL of base in order to do this. However, because you made some errors in precision, the actual volume of base you need is 101 mL, and you need to transport this liquid in a separate container in order to proceed with the lab assignment.

How would you do this?









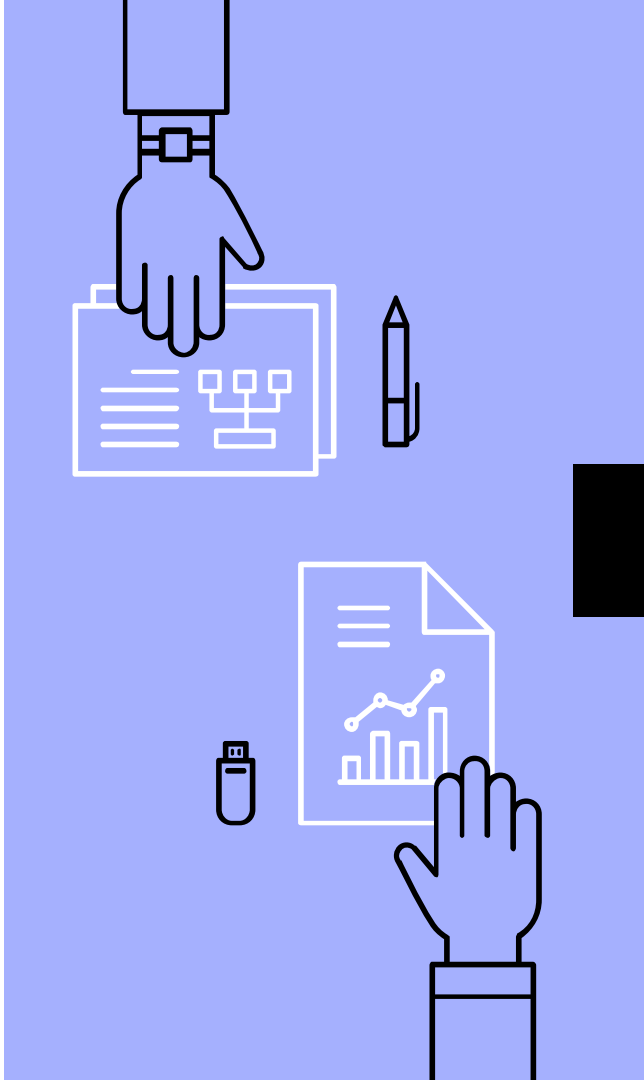


Let’s practice!

Technique 3: What instrument is used?

Mock scenario: In 3080, humans have moved from Earth to a different planet and life has changed completely. You are a biology student working with a team of researchers trying to figure out the basic features of an unknown cell. This cell is NOT visible to the naked eye. You want to visualize the cell up close in order point out its key differences to your supervisor.

How would you obtain results?



Let’s practice!

Technique 3: Compound microscope

Mock scenario: In 3080, humans have moved from Earth to a different planet and life has changed completely. You are a biology student working with a team of researchers trying to figure out the basic features of an unknown cell. This cell is NOT visible to the naked eye. You want to visualize the cell up close in order point out its key differences to your supervisor.

How would you obtain results?













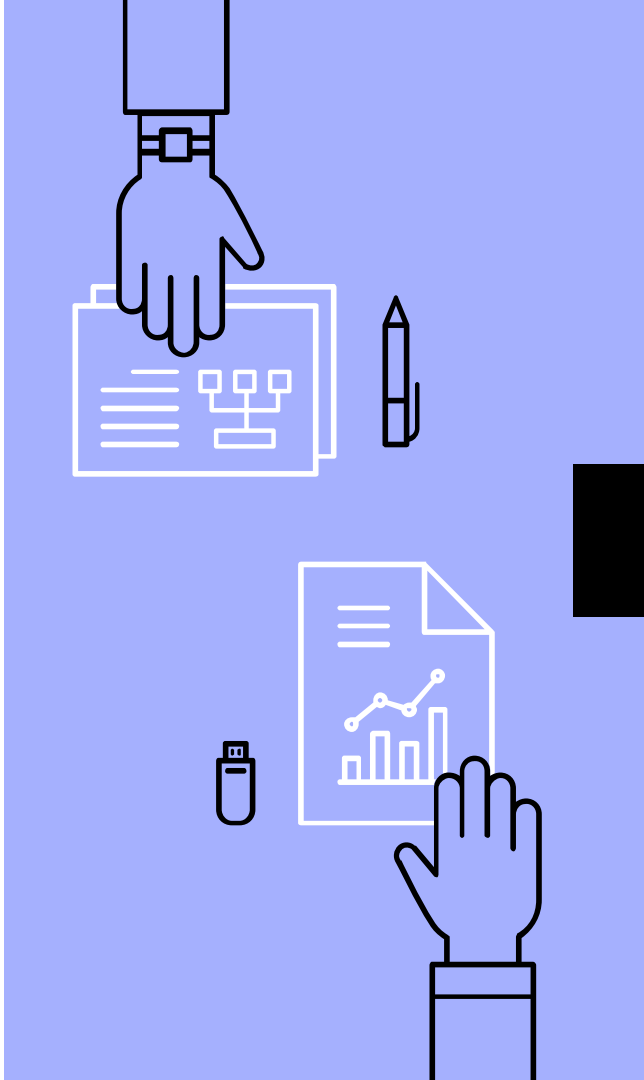
To be continued...

Next class:

- More advanced techniques (running gels, electrophoresis, NMR, chromatography, etc.)
- Importance of molecular & cellular biology research
- Discussion of what *you* would like to possibly do with cells in the future

Friday's class:

- Science Olympiad "Bio Process"





Please comment on the most recent discussion post so that we can plan a great lesson for Friday (we will be going over the "Bio Process" event for Science Olympiad)!!!

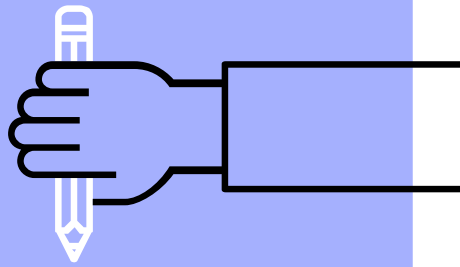
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Kahoot activity on what wet lab techniques to apply for various scenarios that could arise in the lab





End of Day 4

Any questions?
Please ask away!

