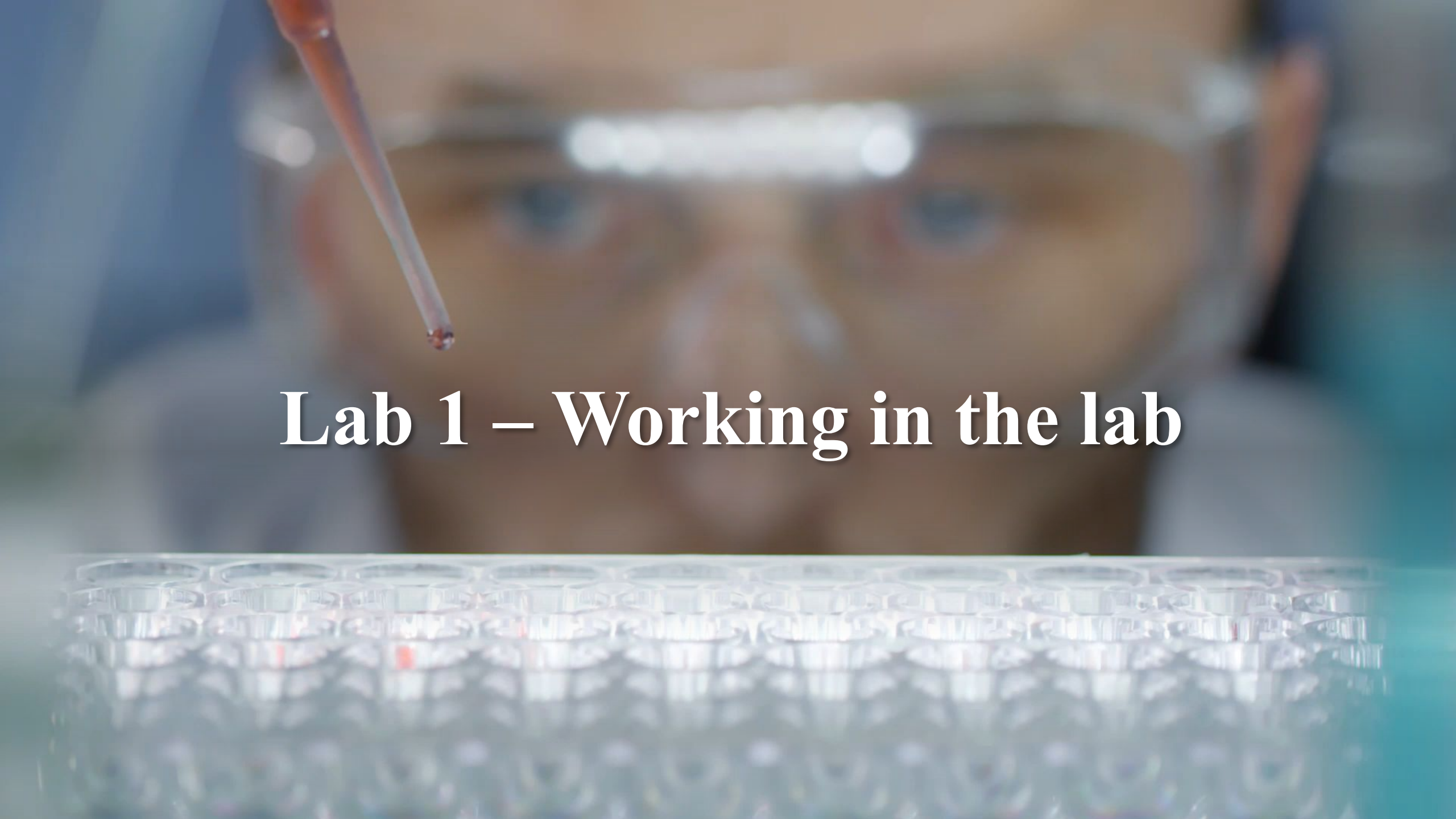


Lab 1 – Working in the lab

Welcome To Lab!

Agenda for the day & timeline

1. Introductions & Attendance
2. Lab Policies- Review Syllabus & Safety Procedures
3. Fill Out Lab Safety Agreement Form
4. Lab Activity 1- Safety in the lab case studies
5. Lab Activity 2- Proper Pipetting Technique
6. Lab Activity 3- Pipetting Liquids
7. Lab Activity 4- Working with Concentrations
8. Lab Summary & Assignment

1. Introduce yourself!

Name

Year

Major/Program

2. Lab Policies & Procedures

- Review Syllabus Policies
  - Attendance
  - Pre-lab quiz
  - Assignments/late work
- Review Lab Safety
  - General lab safety

Lab Attendance

- Lab attendance is **MANDATORY**
- **Excused Absences:**
  - "Authorized" excuses: serious illness or accident, religious holidays, family emergencies, and university-sponsored activities. Visit Student Rule 7
  - No makeup opportunities will be provided unless the student notifies the lab instructor of the absence within **2 working days** and **provides written documentation** of an authorized excuse within **one week of the absence**.
  - If you know you will have a scheduled excused absence, notify your lab instructor **IN ADVANCE,** and arrange to attend another lab section the same week, if space permits

Lab Attendance…..

- Unexcused Absences:
  - There are **NO** make-up labs or assignments for unexcused absences.
  - First unexcused absence - no points for the missed lab session assignment/test **and** deduction of 10 laboratory points.
  - Second unexcused absence - no points for the missed lab session assignment/test, **and** deduction of an additional 10 laboratory points, mandatory scheduled meeting with course instructor.
  - Third unexcused absence - **zero lab grade for the course**.

Pre-Lab Quizzes

- 10 online quizzes worth a total of 50 points administered through Canvas.
- The quizzes will cover important concepts, procedures and safety information for that week's lab.
- The quizzes MUST BE completed before you will be admitted to each week's lab.
  - If you do not have the quiz completed before the deadline, you will be required to take a paper copy of the quiz BEFORE being allowed in lab. You will receive a grade of zero for this quiz as it's late.
- Missing lab because you did not complete the quiz constitutes an unexcused absence.

Assignments/Late Work

- There will be 11 homework assignments worth a total of 70 points.
  - Two points are automatically deducted for late assignments, and an additional point is deducted for each additional day overdue.
- Lab Exams: There will be two exams worth a total of 50 points.
- Bonus Points: There are no bonus point opportunities in lab!
- Lab Makeup Exam: At the discretion of the instructor and TA.
- Regrading: At the discretion of the lab instructor.
  - Requests for re-grading must be initiated within two weeks of the assignment being returned to the student and must be completed before the last official day of classes.
- Evidence of academic dishonesty constitutes grounds to initiate an honors system violation proceeding (see Academic Integrity).

TA Points

- Up to 5 points
- Awarded at the discretion of the TA
- My Policy: You will start with 5 points
- Points will be deducted for
  - Forgetting goggles (starting on the second time)
  - Leaving lab area messy/unclean at the end of class
  - Being distracting (talking out of turn or being off task)

3. General Lab Safety

- Absolutely no food or drink.
  - That includes water bottles on the side of your bag- zip them INSIDE your backpack!
- All bags need to be hooked or placed under the lab bench
- Stools should be tucked in when you're standing- tripping hazard
- Long hair needs to be tied back
- Correct personal protective equipment needs to be worn at all appropriate times.
  - Closed shoes are **always required**.
  - Gloves and goggles are required whenever **anyone** in lab is working with solutions, wet mounts, or dissection specimens.
- Notify me if something breaks or if a solution spills

Fill out Lab Safety Agreement

Safety Agreement
Texas A&M University
Department of Biology

By signing this form, I verify that I read, understood and agreed to follow the safety regulations required for this course as established by the Department of Biology and Texas A&M University. I have located all emergency equipment and now know how to use it. While in the laboratory, improper conduct and horseplay of any kind that may endanger others or myself will not be tolerated, and appropriate disciplinary action will be taken. I understand that I may be dismissed from this laboratory for failure to comply with the stated safety regulations.

Date_____ Course BIOL 111 Section_____

Instructor Dinuki Siriwardana

Student Name (print): _____

Address_____Phone_____

Email: _____

Person(s) to be notified in the event of an accident or emergency:

Name (Print): _____Relationship_____

Phone (Home): _____Phone (Work)_____

(Optional: Any special **medical conditions**, **allergies,** or other comments pertaining to lab safety):

Learning Objectives

- Demonstrate proper **safety protocols** and procedures in a laboratory setting.
- Accurately and precisely use **micropipettes** in a laboratory setting.
- Perform **serial dilutions** and **calculate dilution factors**.
- **Calculate concentrations and volumes of solutions**, and translate between units of measurement (grams and liters)

Lab Activity 1: Safety in the Lab

Case Study 1

1. List 5 good safety practices seen in the picture. Briefly describe why these are important.
2. List 5 unsafe activities seen in the picture. How are they unsafe?

5 good safety practices

- Wear lab safety goggles
- Wear gloves
- Wear full-coverage shoes (closed toe, and heel)
- Long hair should be tied back
- Clean the glass wares

5 unsafe activities

- Eat or Drink in the Laboratory
- Taste or Sniff Chemicals
- Don't Experiment on Yourself
- Not wearing goggles
- Not wearing gloves

Case Study 2

You and your lab mates are working on the enzyme experiments. Your lab partner took off their gloves to go to the bathroom and forgot to put on a new pair when they came back. They are now pipetting the *E. coli* bacteria into a tube without gloves on.

What hazards to your lab partner and the experiment do you see? How could this be prevented?

Case Study 3

You and your lab mates just completed the respiration and fermentation lab and are cleaning up your workspace. You take off your goggles and gloves to make clean up easier, however, the group next to you are working on the last part of the experiment involving sodium azide, which is toxic. You are walking by their table, when one of the students drops the open burette with a small amount of sodium azide in it. The liquid splashes and some of it lands in your eyes.

1. What should you do now?

2. How could this have been prevented?

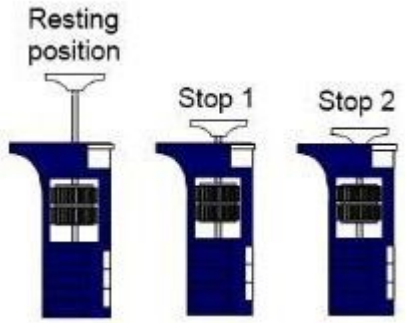
Case Study 4

In lab today, you are working with the microscope to visual onion root cells during cell division. During the beginning of lab, your hair elastic broke, and you didn't have another to put your hair up again. You figured it would be okay, so you continued. As you were looking through the microscope and adjusting it, you feel your hair being tugged and realized it become tangled in the microscope knobs you were turning. You untangle yourself and lose a few hairs along the way. During the next step of making your onion root slide, your lab partner accidentally drops the tube containing **HCl** on to the floor and it splashes on your brand-new sandals as well as your exposed toes. Ouch.

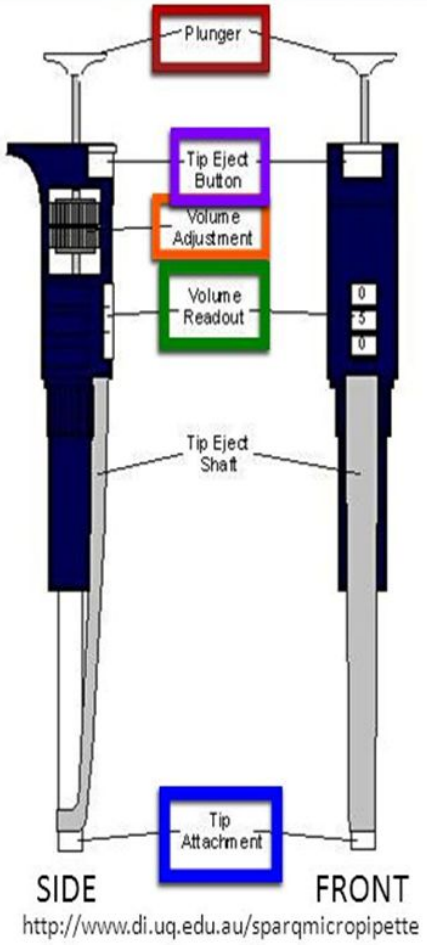
1. **What issues did you notice in this scenario?**
2. **How could these unfortunate incidents have been prevented?**
   - **Long hair tied back**
   - **Closed toe shoes must be worn**

Micropipette

Lab activity 2: Proper pipetting technique



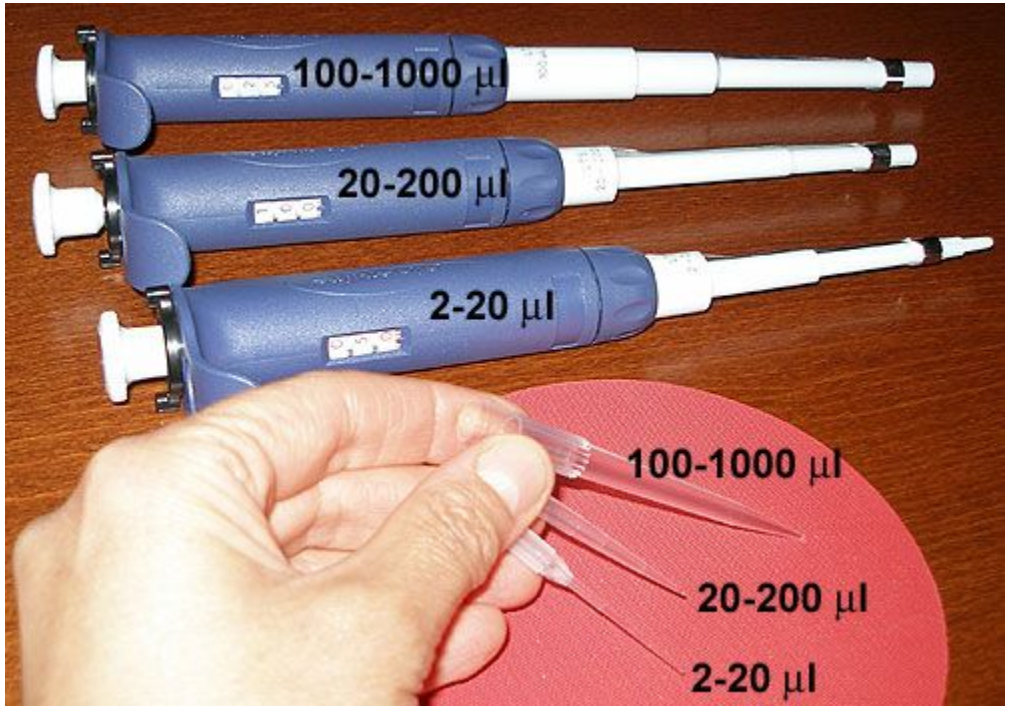
Parts of Micropipette



- **Plunger** – 3 Positions (Rest, 1st Stop, 2nd Stop)
- **Volume Adjustment** – The knob you use to adjust the volume
- **Volume Readout** – How much volume you are measuring
- **Tip Attachment** – Where the tip attaches
- **Tip Eject Button** – Button to eject tip

Three sizes of micropipette

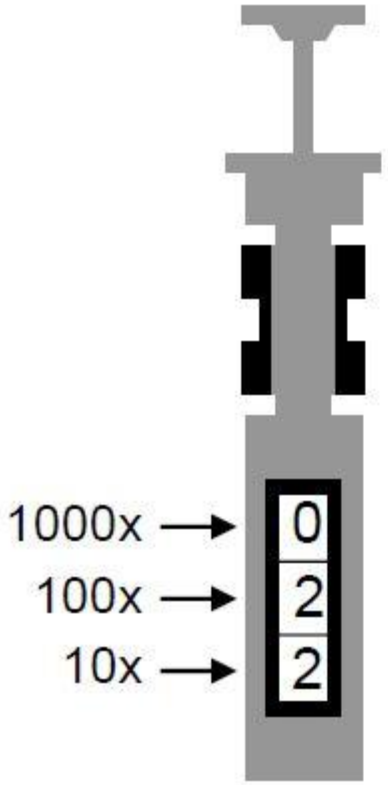
- The micropipettes in our laboratories come in three different sizes each of which measures a different range of volumes
- The three sizes are P20, P200 and P1000
- These sizes are noted on the top of the plunger button



SIZE OF MICROPIPETTE	RANGE OF VOLUME MEASURED
P20	2-20µL
P200	20-200µL
P1000	100-1000µL

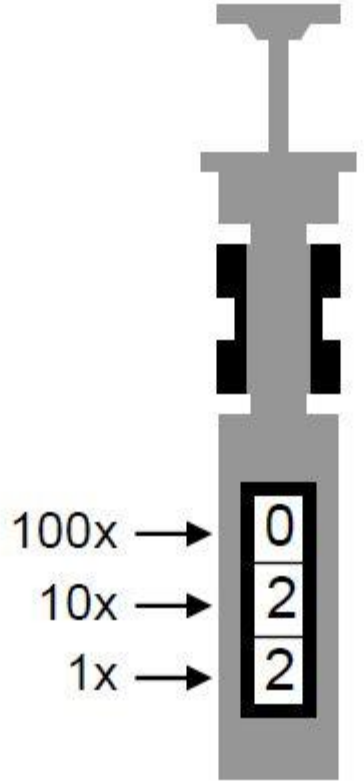
Reading a Micropipette

P 1000



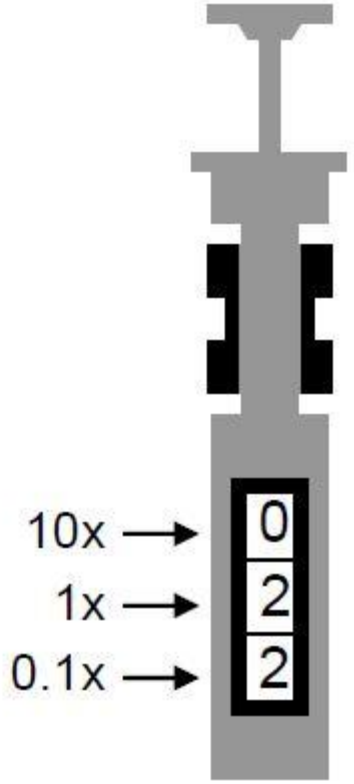
For volumes between 100/200uL-1000uL

P 200/100



For volumes between 10/20uL-100/200uL

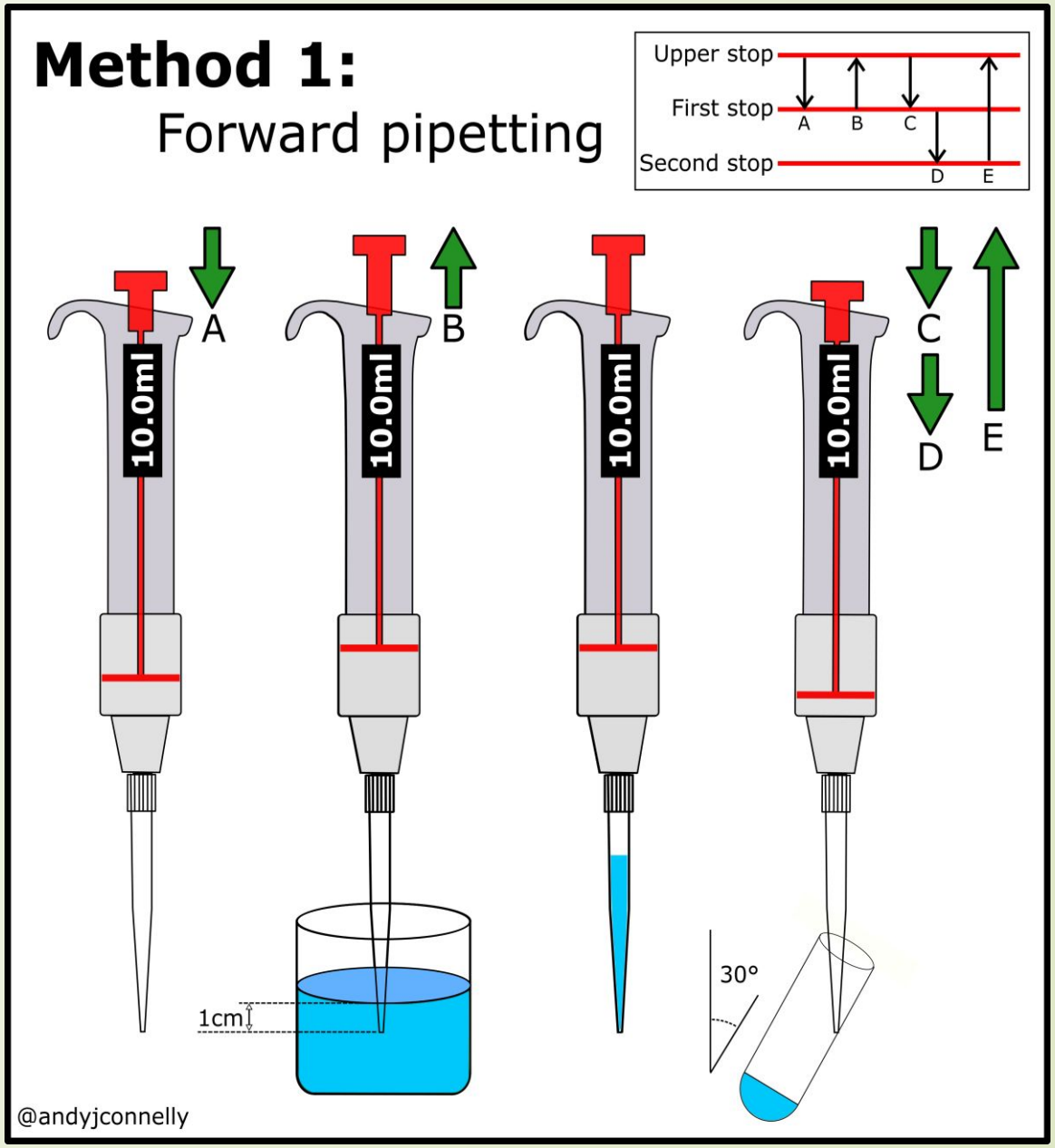
P 20/10



For volumes between 1uL-10/20uL

Using a Micropipette

1. Hold vertically; depress plunger to the first stop (A).
2. Place tip under the surface of the liquid.
3. Release the plunger (B) with tip at a constant depth.
4. Withdraw the tip, touching against the edge of the container to remove excess.
5. Dispensing: Hold tip at 45º against the wall of the receiving container. Depress plunger to the first stop (C) and hold for one second.
6. Push the pipette to the second stop (D).



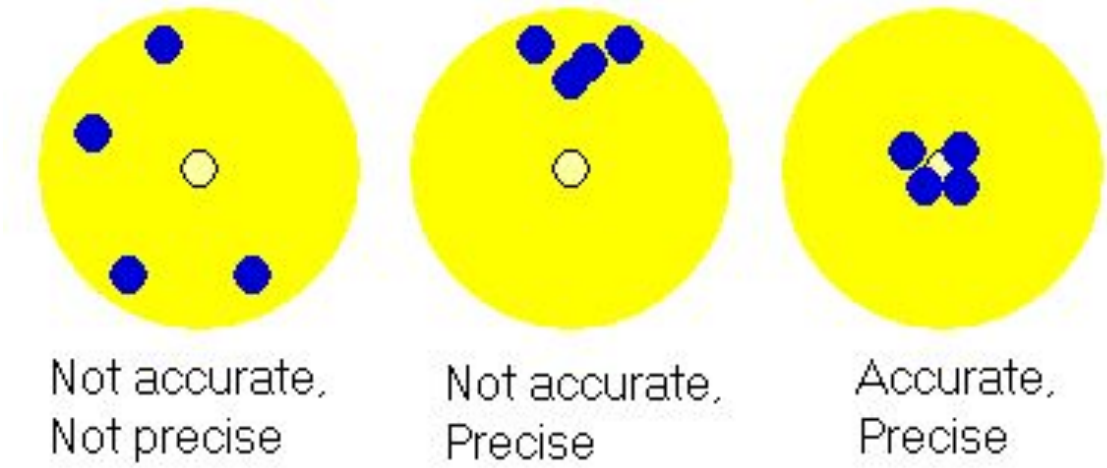
Key terms

- **Accuracy**: a measure of how close a result matches a correct or standard value

Ex: how close a dart is to the bullseye in a dartboard is an indicator of accuracy

- **Precision**: a measure of variability

Ex: three darts placed close together on a dartboard indicate high precision, but if this cluster of darts is far from the bullseye it would also indicate low accuracy

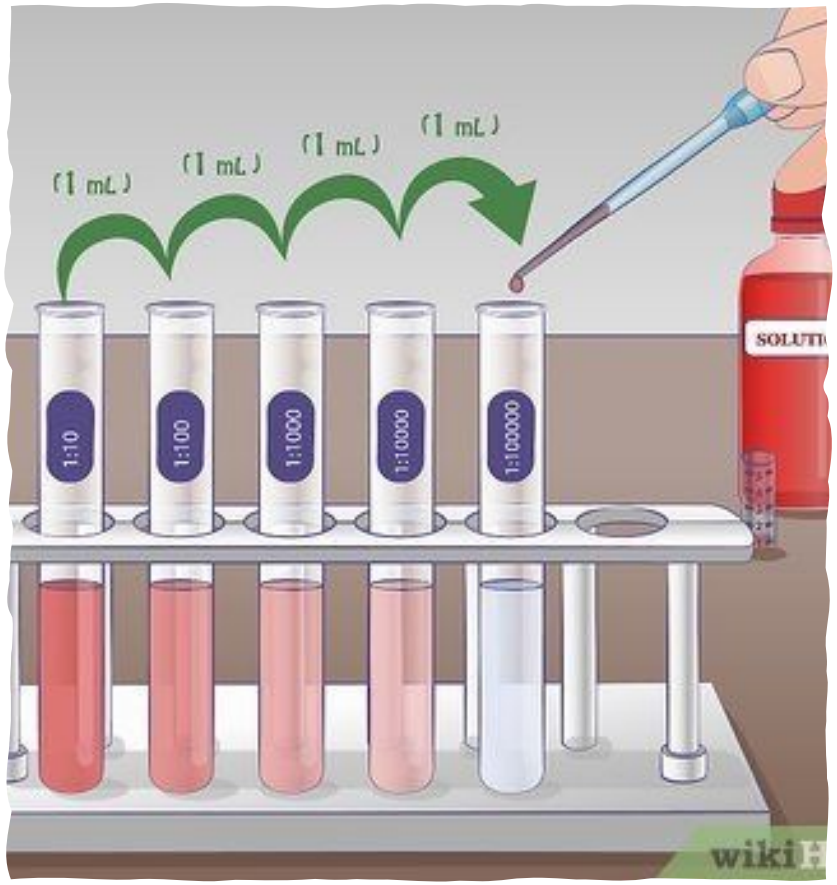


Pipetting liquids

- Take a square of parafilm
- Draw 25ul of water and release it on the parafilm
- Draw 50ul of water of water and release it on parafilm
- Draw 75ul of water and release it on parafilm

Do you see any difference?

Dilutions

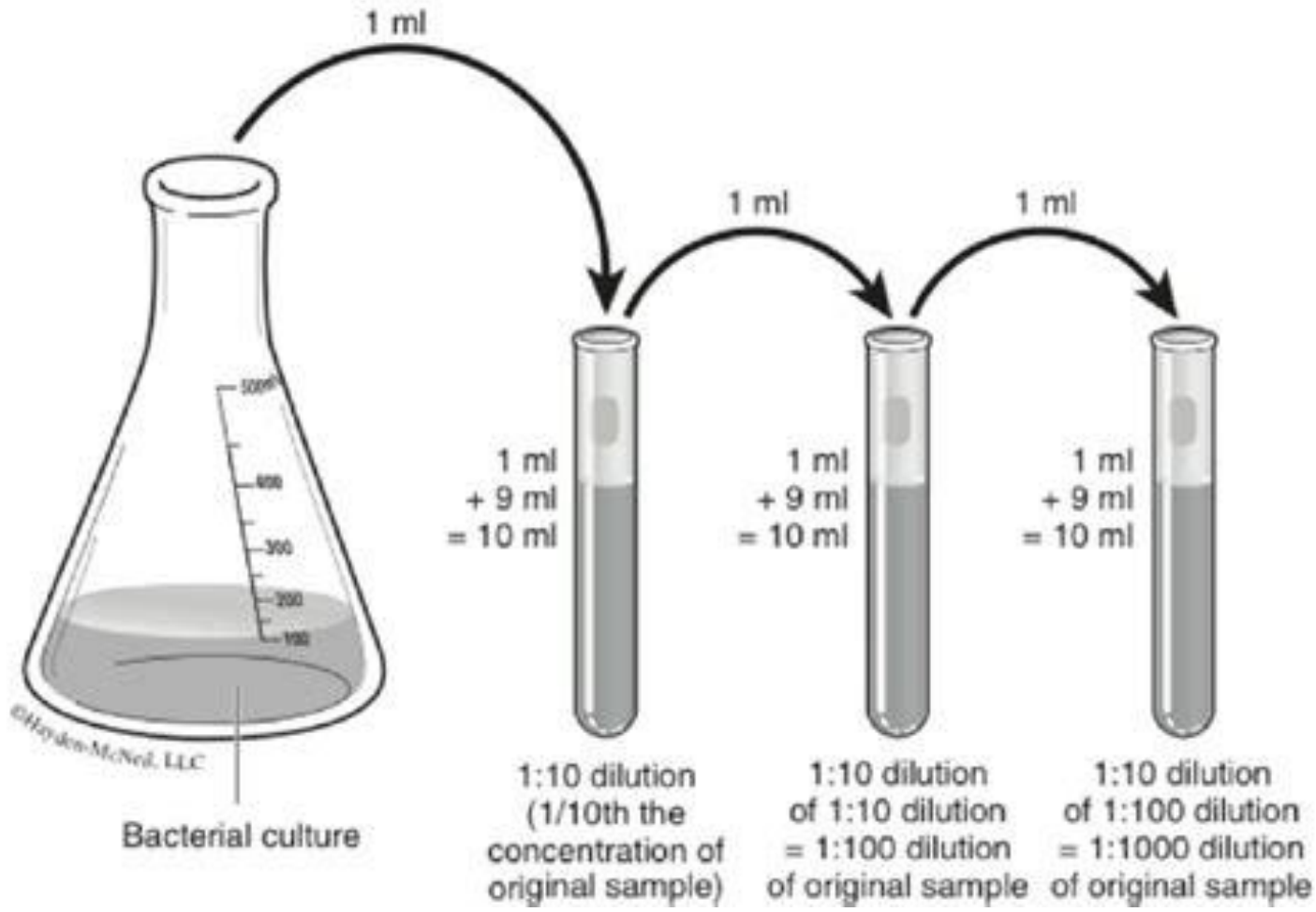


- Dilutions allow us to convert a solution of a higher concentration to a lower concentration
  - Solute: A substance dissolved by a solvent (salt for example)
  - Solvent: Responsible for dissolving a solute (water for example)
  - Solution: A liquid mixture in which the minor component (solute) is uniformly distributed within the major component (solvent) (salt water for example)
  - Concentration: the amount of solute per unit of solvent
- To dilute a solution means to add more solvent without the addition of more solute

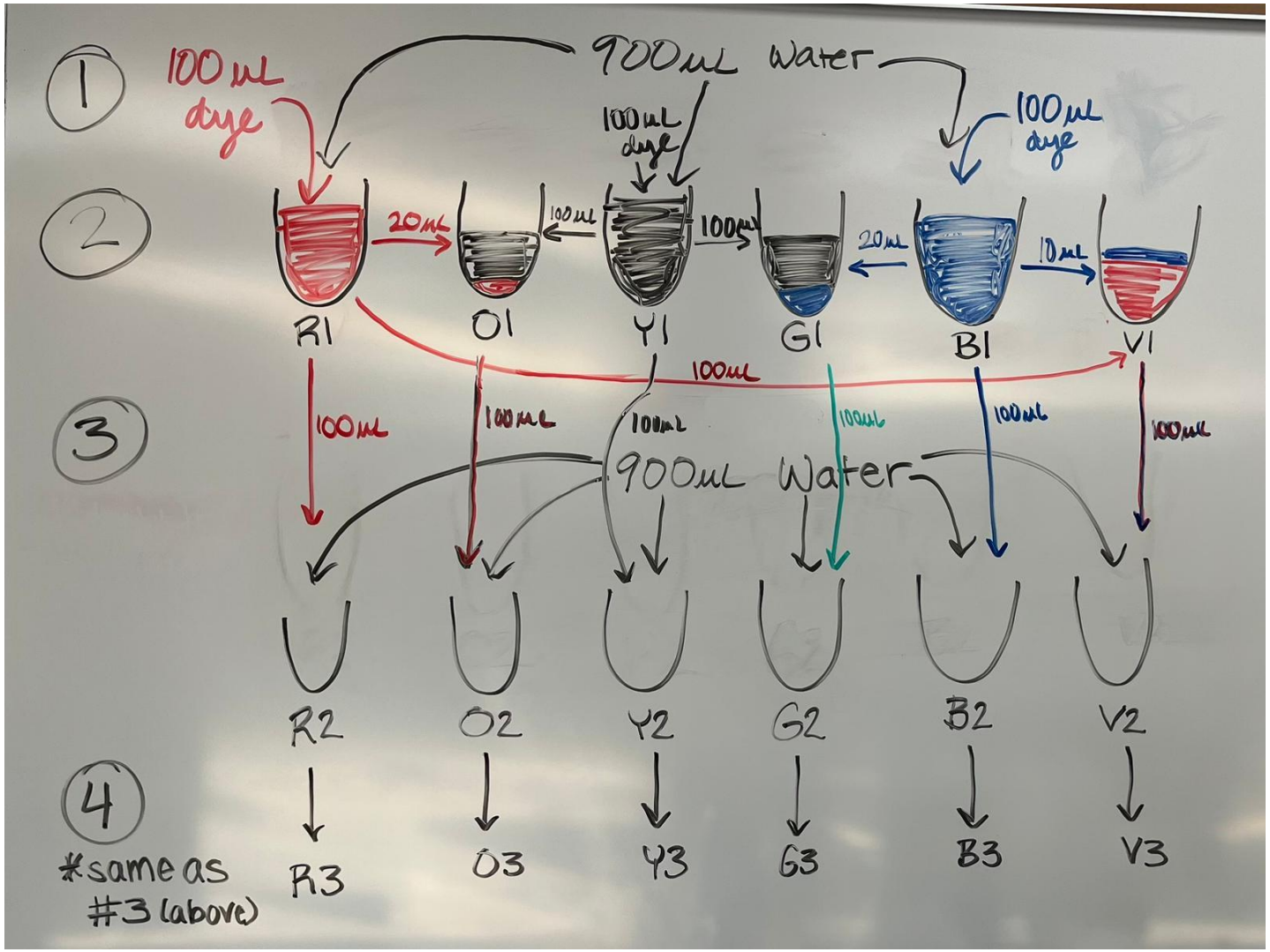
Serial Dilution

- df=Vf/Vi

- dilution factor= final volume/volume transferred



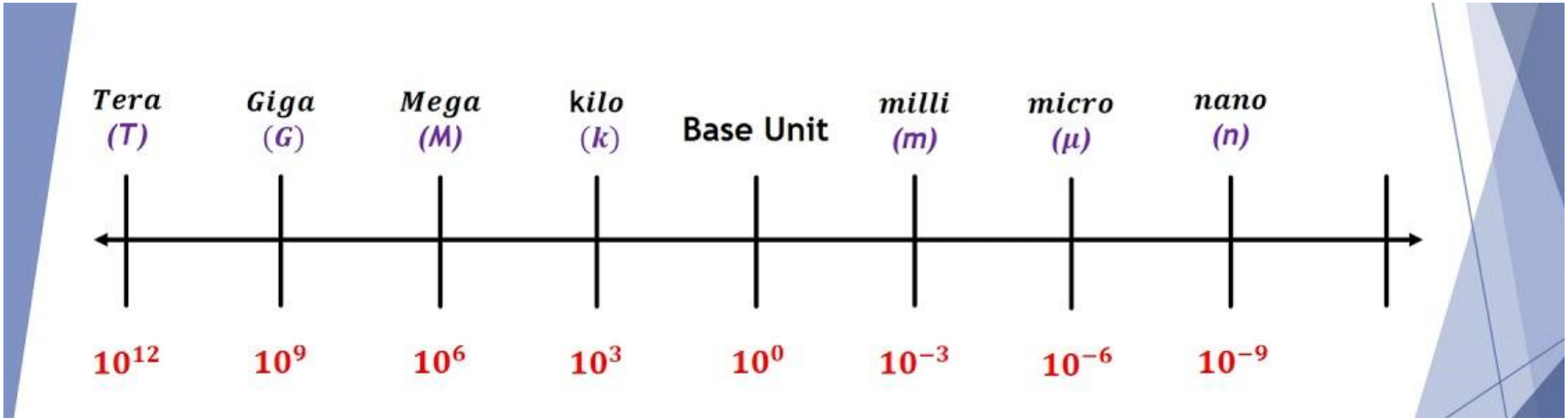
Follow the instructions



What you will see after serial dilution?

What to do when you need a specific concentration?

- We can use $C_1V_1=C_2V_2$
  - C_1 is concentration of stock
  - V_1 is volume of the stock you need to add to the diluent
  - C_2 is the final/target concentration
  - V_2 is the final volume (stock added +diluent)



Concentration Problems:

How many uL of your stock solution (2mg/mL) would you need to add to get a final concentration of 500ug/mL in a volume of 1mL? A: 250uL

Convert 500ug/mL to mg/mL: 500ug/mL(1 mg/mL/1000ug/mL)= 0.5mg/mL
C1V1 = C2V2

C1 = 2mg/mL
V1 = ?
C2 = 0.5mg/mL
V2 = 1mL

2 X V1 = 0.5 X 1

V1 = (0.5 X 1) / 2

V1 = 0.25 mL
= (0.25 X 1000) uL
= **250 uL**

SUMMARY

- What is dilution?
- What do you mean by serial dilution?
- How will you measure 325uL of a liquid?
- What will happen if you have three unexcused absence?
- By when should you turn in your Lab 1 assignment?
- What are the essential lab safety protocol you should follow?

Resources for Serial dilutions

This is a great video explaining serial dilutions and calculating the dilution factor!

https://www.youtube.com/watch?v=VBs8Qe4A4-8

dilution factor= volume transferred/total volume

this is also a good video- https://www.youtube.com/watch?v=kpOx3hzIEyQ

Here is a great video explaining C1V1=C2V2

https://www.youtube.com/watch?v=EBIeZVBye7w