**Lab: Yeast Population**

**Class Copy**

This will be a **final draft** lab. This means that you must turn it in **on a separate piece of paper,** and it must meet all of the Final Draft requirements (listed on your general rubric)

It is a good idea to write a rough draft of the pre-lab in your journal before you begin typing it up.

**Lab Instructions**

**Prelab Questions:** *Answer all of the following question in your Final Lab Write-Up in complete sentences*

1. Define each of the following terms in your own words. You will be using these terms in your hypothesis, the analysis and the conclusion.

Limiting factors:

Carrying capacity:

Exponential growth:

Logistical growth:

Density dependent factors:

1. Read the procedure. How is test tube A different from test tube B? How are they the same?
2. What needs to be done with the disposable pipette between each use?
3. How much yeast solution is put on the slide?
4. What is the dangerous part of this lab? What should you do to protect yourself?
5. Which yeast in your field of view will you be counting each time?
6. Describe a validity measure for this lab.

**Pre-Lab:** *Identify and write each of the following in your final lab write up, including copying the purpose and investigative question.*

**Purpose:** To study a population of yeast in a closed system over an extended period of time.

**Investigative Question:** What effect does time (5 days) have onyeast population growth, if only given one dose of food?

**Hypothesis**: *Write an appropriate hypothesis* ***for each test tube*** *in your lab*.

**Variables**: *Write them in your lab*.

**Groups**: *Write them in your lab.*

**Materials:**

Goggles

Sucrose Solution (30g/500ml)

Rehydrated Yeast (3.5g/50ml)

2 small (10ml) Screw-Top Test Tubes

2 Screw-Top Caps

10 ml Graduated Cylinder

1 small beaker

Disposable Pipette

1 slide

3 cover slips

Iodine (or methylene blue)

Masking tape

Permanent marker

Aluminum Foil

Heat Source

**Diagram:** *Draw a diagram of* the following procedure in your final lab write up. Be sure to include both procedures, and both test tubes! The diagram must be at least half a page

**Procedure:** Read the procedure below, *re-write it any steps that are designed to avoid contamination*

**Procedure I: Culture preparation**

1. Gather 2 small test tubes and label with masking tape. With a permanent marker on the tape, write your group name, your period and letters A or B.

**Test Tube A:**

1. Add 5 mL of **sugar** solution to test tube A using the 10ml pipette.
2. Add 1 drop of yeast solution to test tube.
3. Use your disposable pipette to mix well by slowly sucking up and squirting solution in and out of disposable pipette.
4. Place fresh water in your beaker and carefully rinse out your disposable pipette by slowly sucking up and squirting solution in and out.
5. Empty and rinse beaker.

**Test Tube B:**

1. Add 5 mL of **water** to test tube B.
2. Add 1 drop of yeast solution to test tube.
3. Use your disposable pipette to mix well by slowly sucking up and squirting solution in and out of disposable pipette.
4. Place fresh water in your beaker and carefully rinse out your disposable pipette by slowly sucking up and squirting solution in and out.
5. Empty and rinse beaker.

**Procedure II: Sampling**

**Test Tube A:**

1. Mix the contents of the test tube evenly by slowly squirting solution in and out of a clean, disposable pipette. Do this to distribute the yeast throughout the liquid evenly before sampling.
2. Using your clean disposable pipette, place one drop of yeast solution from test tube A onto a clean microscope and use clean cover slip. **Be sure to put the remaining yeast solution back into the test tube, not down the drain!**
3. Place fresh water in your beaker and carefully rinse out your disposable pipette by slowly sucking up and squirting solution in and out.

**\*\*\*Caution: Iodine is dangerous – wear eye protection!! Be careful not to mix up the iodine eye dropper with the disposable pipette. Putting the iodine dropper in your yeast culture will kill it!!!**

1. Add a drop of Iodine to the yeast drop on the slide and cover it with a cover slip. Remove excess water from around cover-slip edge with a piece of paper towel if needed.
2. On low power, find your specimens.
3. On medium power, bring your slide into focus.
4. Move to high power. Count the number of yeast cells that are in “contact” with the outside of your field of view only.
5. Record all your data in your data table.
6. Rinse your slide and cover slip.
7. Repeat steps 1 thru 9 for 2 more trails making sure you **rinse the disposable pipette** to avoid contamination.

**Test Tube B:**

1. Repeat steps 1 thru 9 for test **tube B** but make sure your disposable pipette has been cleaned out**.**

**Both Test Tubes:**

1. Place the screw-top caps on each test tube.
2. Cover each test tube with aluminum foil. *(Yeast can grow in the dark but many other organisms that might infect your sample cannot grow in the dark.)*
3. Return your test tube to the storage rack.
4. The instructor will put the test tube rack under a heat source.
5. Repeat the count at the same time each day for **5 days**.

**Data Collection:** *Do the following in Final Draft Format for your lab. Be sure they follow data table procedure!*

* Create a data table that will accommodate your personal data.
* Create a second data table to record the class data (done as a class).

Each pair of people conducting this lab will report their average daily yeast cell counts and an entire class average should be included in this data table. It should look similar to your personal table but with a different number of rows and columns.

**Graph and Data Analysis:** *Do the following in Final Draft Format for your lab*

After 5 days, you will create a line graph to display both sets of data (personal and class).

* You should make one graph with 4 lines; two for your own average yeast population over 5 days (experimental and control) and 2 lines for the class average yeast population over the same period of time (experimental and control).
* Include a key (legend).

Once you’ve complete the graph, answer the following questions:

1. Describe the shape of the graphs. What do your graphs reveal about yeast population growth (Is yeast population growth logistic or exponential? How do you know?)
2. Explain the population growth between days 1 and 5. Why does the yeast population change in such a manner?

**Conclusion:** *Write a conclusion to answer the Investigative Question*.

Be sure to include:

* A claim (which answers the question)
* Data (yours or the class data) to support that claim. This should be:
  + The RATE OF CHANGE(slope of the trend line) of the tube with food
  + The RATE OF CHANGE (slope of the trend line) of the tube without food
* A sentence that links your data to the claim, and a scientific reason

**Suggested Page Set-Up:**

Lab Title

Your Name, Group Member 1, Group Member 2, Group Member 3

Date, Period

Prelab Questions:

Ect…

Investigative Questions:

MV:

Rv:

2CVs:

Experimental Group:

Control Group:

Hypothesis Tube 1:

Hypothesis Tube 2:

Procedure Steps that avoid contamination:

Diagram:

Data Table:

Graph:

Graph Questions:

Conclusion:

**Investigative Question:** What effect does time (5 days) have onyeast population growth, if only given one dose of food?

**Manipulated/Independent Variable:**

**Responding/Dependent Variable:**

**Controlled Variables:**

**Experimental Group:**

**Control Group:**

**Hypothesis Tube 1:**

**Hypothesis Tube 2:**

**Procedure:** *Write out all steps that prevent contamination*

**Diagram of Set Up:** *Your diagram should*

* Include all materials and show what the set up of the experiment looks like
* Be at least half a page in total
* Be labeled with all relevant information.

**Data Collection:**

**Quantitative data:** *a data table to record your data, following data table notes.*

**Analysis:**

**Line graph on Graph Paper:** *follow in class graph notes*

Display both sets of data (personal and class).

* One graph with 4 lines; two for your own average yeast population over 5 days (experimental and control) and 2 lines for the class average yeast population over the same period of time (experimental and control).
* Include a key (legend).

**Graph Questions:** *Answer each of the following in complete sentences*

1. Describe the shape of the graphs. What do your graphs reveal about yeast population growth (Is yeast population growth logistic or exponential? How do you know?)
2. Explain the population growth between days 1 and 5. Why does the yeast population change in such a manner?

**Argumentation:** *Write a conclusion to sum up the findings of your lab. Follow Claim, Evidence, Reasoning*

Be sure to include:

* A claim (which answers the question)
* Data (yours or the class data) to support that claim. This should be:
  + The RATE OF CHANGE(slope of the trend line) of the tube with food
  + The RATE OF CHANGE (slope of the trend line) of the tube without food
* A sentence that links your data to the claim, and a scientific reason