Lab Write Up – Format Guidelines

First, no title page nor table of contents. Begin with the research question

Background research

- Contain background research on Independent variable. What is it and what does changing it as an IV do?
- Contain background research on Dependent variable. What is it and how is it measured?
- What is the connection between your IV and your DV? What does research say should happen when you change your IV?
- In text citations for all sources used. Do not use the text book nor Wikipedia. Use valid and reliable (and scholarly) sources. Use the citation format that matches your citations page.

Research Question

- Should be stated with IV and DV, plus indicate the ranges for your IV and the method of measure for the DV. You should have uncertainties for both based on the smallest unit of measure.
- Species must have scientific name (*Genus species*)

Hypothesis

- State and IF (IV) THEN (DV) BECAUSE of research (citation)

Variables

- State IV, range and uncertainty. How will it be changed?
- State DV, method of measure and uncertainty.
- Controls – Put in a table with a minimum of 5 controls. See format below

Control Name	How it is controlled	Why is it controlled

Materials

- Bullet point list of all materials
- Can be multiple columns to save space
- Anything with a measurement that is used MUST have uncertainties (beakers, etc)
- List species in scientific name

Procedure

- Number list of steps to complete
- Consider it a recipe and leave nothing out
- Should be 15 minimum
- Single column
- Can add in a section on making solutions, but be clear

Safety, Ethics, and Environmental Concern

- Paragraph(s) on all three
- Be reasonable but address all
- Chemicals require safety mention and disposal
- ANY living thing has all three

Qualitative Data

- Title for a table containing images work best
- Only images that act as a talking point in your conclusion
- Images of set up is not required but can be included in the procedure
- Descriptive title is important
- Number the table and/or figures sequentially

Quantitative Data

- Title (descriptive) with appropriate number
- All headers have units and uncertainties
- No units within the table
- RAW and PROCESSED data must be in separate tables
- Under each table indicate how uncertainties were selected
- Processed data has same uncertainty as the most inaccurate value used in calculation
- Section (a table works well) stating all excel formulas used and reason for each
- Example of any non-excel calculations
- Should contain minimum Average and Standard Deviation

Graph

- Appropriate graph choice (bar for non-sequential, scatterplot for sequential)
- Numbered title with description
- Axes have proper labels
- Axes have units with the correct decimals places matching uncertainty of unit
- Line of best fit for scatter plot
- Standard deviations as error bars for each data point

Analysis

- State trends in graph
- DO NOT explain WHY, only state what is observed in trends and error bars

EXTRA STATS

- Correlation is good, required for scatterplot
- TTest (or ANOVA if you need) for comparing IV results
- P value less than 0.05 means reject and there IS a significant difference between IV values

Create table for TTest (see below)Independent Values		Ho – no significant Difference	
IV Value A	IV Value B	p Value	Accept or Reject
IV Value B	IV Value C	P Value	Accept or Reject

IV Value C	IV Value D	P Value	Accept or Reject

- p Values should be in scientific notation to match the uncertainty of the values used to calculate
- Excel formula is =ttest(raw data 1, raw data 2, 2, 2) the last two values are 2

Evaluation

- Restate research question
- Restate hypothesis
- State data values that lead to conclusion, be specific
- State trends
- Discuss if data and trends match research
- Restate connected research and values
- STATE if you accept or reject your hypothesis
- Don't forget citations
- Discuss standard deviation and qualitative data

Limitations

- Use sample table below
- Should be 3 to 5

What was limitation	How did it impact RAW DATA	How can you improve the limitation and what is the impact

Strength

- What was a strength in the design and implication of lab

Extension

- What further inquiry could you make?
- What next lab would this lab encourage you to do?

Citations

- Pick a format, stick with it
- 10 minimum

Communication

- No narrow margins
- 12 (minimum 11) font
- Times new roman
- Page numbers are okay
- MAXIMUM 12 pages
- NO NAME ON THE LAB