Supplemental Methods:

The Report Support Program covered the preparation and revision of figures and figure captions, Materials and Methods, Results, and brief Discussion with references and in-text citations. Abstracts, Introduction, and extended Discussion sections are covered in the second year of the Biology program. We focused on the simplest report sections in first-year labs, allowing us to devote time to developing writing and revision skills. The assignments began with data presentation and descriptive writing and moved towards analysis and integration. This scaffolded approach allowed students to practice and build confidence with basic skills before attempting more complex writing tasks. A description of the major components and methods of the program follows.

1. Figure with caption (Graph)

1.1 Workshop and tutoring

This assignment was technical (data entry, graphing with MS Excel) with limited writing, and thus was not supported by an in-lab writing workshop or tutoring. Students received written feedback from instructors on the style and format of their graph, and on the contents of their figure caption. Students were permitted to correct and re-submit their graph and caption.

1.2 Written instructions

Assignment: Prepare a figure with descriptive caption.

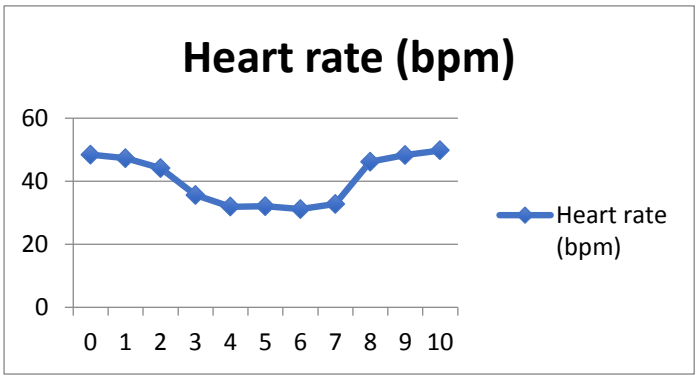
Title and author information: You do not need a separate title page. At the top of the page, type "Figure with caption." Then give your report a **descriptive title**. Next, type your name, student number, and the course title and number. Finally, type the assignment's due date. Each of these items should be separated with line breaks.

Figure and Caption: Data that have been collected need to be presented clearly and simply. Graphs are an effective method to display comparisons, show trends, or establish relationships in the data. In a lab report, graphs are referred to as "Figures," and are numbered sequentially in the order of presentation in the report (Figure 1, Figure 2, etc.). A figure legend or "key" must be included in the graph, if multiple datasets are shown. Every figure should have a caption that appears *below* the figure. The caption should include a figure number and informative title, and provide details necessary for understanding the data, such as a brief description of the graph or data collection methods, explanations of any abbreviations, and citations for any non-original data. A figure with a good caption should convey the general result to a reader who has not yet read the entire Results section, but be aware for future reports that figures are not self-explanatory and must be summarized in the paragraphs of the Results section.

Preparing a graph: The first step in making a graph is to enter your data into a table in a program like Excel. Graphing is made simpler if you set up your table properly: the first column should contain values from the independent variable. These will be placed on the x-axis. The second column should list the experimental results – the values from the dependent variable. These will be placed on the y-axis. If you have more than one dependent variable, add more columns to the right.

Time (min)	Heart rate (bpm)
0	48.3
1	47.2
2	44.1
3	35.6
4	31.8
5	32.2
6	31.1
7	32.7
8	46.1
9	48.2
10	49.7

In this example, *Daphnia* were immobilized and their heart rate (dependent variable) was measured each minute for 10 minutes (independent variable). Next, select the entire table, and ask Excel to make a chart called a *scatterplot*. The resulting graph must be edited for clarity and simplicity. Here is the default output:



Here is an example of the final graph with descriptive figure caption:

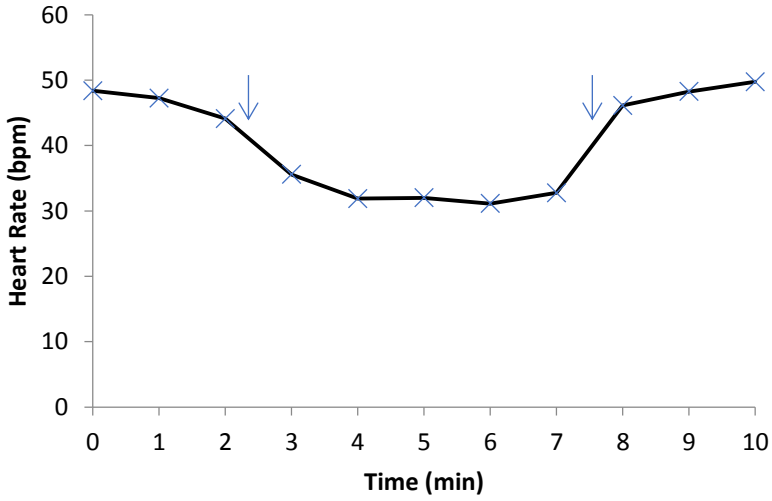


Figure 1. The effect of alcohol on the heart rate of *Daphnia*. Live *Daphnia* were immobilized in Vaseline and their heart rate was recorded each minute for 10 minutes. Alcohol was added after the second minute and was removed by rinsing after the seventh minute (arrows).

Notice both axes are labeled, including units of measure. The independent variable is on the x-axis and the dependent variable is on the y-axis. The figure is black and white, and each data point is identified with shaped dots. The line is fine, rather than thick and colored with a shadow. There is no box around the graph or grid lines within the graph. Many of these features were changed from the default graph produced by Excel.

In the caption, the figure is numbered and titled, followed with a brief description of how the data were obtained. Notice the figure title includes both the independent and dependent variables of the experiment. Also note that the graph title is in the caption, and not above the graph–you should delete the title if Excel adds one above your graph.

1.3 Scoring Rubric

Author information and Title (2 points)		
(2) "Figure report," title, course name & number, student name & number are complete and listed in the requested order. Title is concise & informative.	(1) An element of the author & report information is missing, or the order is incorrect. Title is overly wordy or too vague.	(0) No title, or the title does not describe the contents of the report. Several items of author and report information are missing or do not follow the requested format.
Graph Format (2 points)		
(2) Graph is simple and clear as described in the assignment. Prepared on a computer. General trends in the data are readily seen from the figure.	(1) Minor format errors, for example: there are thick colored lines, shadows, a box around the graph, or horizontal / vertical divisions, or a title is included above the graph.	(0) Not prepared on a computer, or the graph does not match requested format. Raw, unanalyzed data is presented.
Graph components (2 points)		
(2) The graph is organized properly with the dependent variable on the y-axis and the independent variable on the x-axis. Axes are labeled and clearly numbered, labels are informative and complete, units are included.	(1) An element is missing, incomplete, or in the wrong place.	(0) Not prepared on a computer; graph does not match requested format.
Spelling and grammar (2 points)		
(2) Correct spelling and grammar.	(1) Significant spelling or grammar errors.	(0) Significant errors in spelling and grammar.
Caption (2 pts)		
(2) A caption is included below the figure. It begins with "*Figure 1.*" The first sentence acts as a title that presents the 'message' of the figure. Caption allows the reader to interpret the figure.	(1) Caption is present but is not adequate to allow the reader to interpret the figure without other information.	(0) Caption is missing.

2. Materials and Methods (Report 1)

2.1 Workshop and tutoring

The first workshop emphasized the following concepts, which were also raised during tutoring according to each student's needs:

(1) Purposes of a Materials and Methods section: to allow someone else to replicate the experiment, and to allow the reader to assess whether the methods are appropriate to the research question (and, therefore, whether the results are valid).

(2) Choosing relevant details: for example, results will be affected by the species of bacteria used, but not by whether cells were streaked with a toothpick or a sterile loop. Likewise, it is assumed that you washed your hands and wiped the bench.

> *At this point in the workshop, students were asked to complete a LEGO construction activity where groups had to rebuild a structure using only their classmates' written instructions. In this activity, groups were given a selection of LEGO pieces, and were instructed to build a structure containing six components, while writing a description of their process (a Materials and Methods). Once complete, each group deconstructed their structure, and exchanged their LEGO pieces and instructions with another group. The receiving groups were asked to reconstruct the original structure from the descriptions provided. Before-and-after photos were used to assess success. This activity generated discussion on appropriate levels of detail in Materials and Methods sections.*

(3) Format and verb tense: describe methods in complete sentences that integrate equipment and reagents as they are used. A Methods section is not a cookbook: do not list materials or give instructions in imperative voice. Use past tense, because you are describing events that have already taken place.

(4) Passive voice: we use passive voice in science methods to place emphasis on the action, not the actor. Our scientific approach is universal, so *anyone* should be able to do the work and get the same results.

Student received a handout with a sample M&M paragraph showing how all these elements come together.

This was the first report where students had the option to revise and resubmit their graded work. Due to time constraints, the process of revision could not be discussed in detail during in-class workshops. The following phases of revision were discussed with students during one-on-one tutoring sessions:

(1) Revision**:** Revision means "re-visioning" your paper. It is "big picture" work. Step back and ask yourself: does the paper you wrote respond directly to the assignment and its audience, and answer the questions that were posed? Is the argument clear? Is it sufficiently complex? Check to see if any of the ideas need to be developed, and if you've articulated the relationships among ideas. See if you need to add further evidence or support. Revision can require adding material, taking material away, working with the big strokes of the paper. It might involve changing the order of paragraphs and re-crafting topic sentences/transitions. It may demand re-drafting the introduction and checking the conclusion to see what should be brought up to the front of the paper. All of this is when you "re-vision" your paper.

(2) Editing**:** People often refer to all stages of revision as "editing," but editing is what you do *after* you revise. Editing involves crafting with a fine tool, and it leads to style and coherence. Here is where you consider your paper as a writer/artist. Try reading your paper aloud, slowly, in parts. Is the voice clear and confident? Is there a sense of rhythm and flow in each paragraph, each sentence? Do the sentences connect up with one another like well-constructed joints?

Editing is when you correct any awkwardness that may have occurred in the initial drafting or in revision (for example, revision helps clarify the big picture, but copying and pasting may create smaller-scale problems within paragraphs). The editing phase is also a good time to check the clarity of your title and the accuracy of your reference or works cited page(s). Careful editing is critical to a polished, well-written paper.

(3) Proofreading**:** Proofreading comes last and consists of a final sweep through your paper with an eye for errors. When proofreading you make your final check for errors in sentence structure, grammar, verb tense and punctuation. You also look for mistakes in spelling, use of quotations, citation details, etc. Look not just for the tricky mistakes but also for any typos. It is important to check that your name is on your paper and it is desirable to number your pages or include a word count. This is the final read-through of your paper, your last chance to impress your reader and show your commitment to your work. Reading aloud at this stage or any other stage of the revision process can help you focus more carefully on your work.

2.2 Written instructions

Assignment: Prepare a Materials and Methods section. Explain clearly how you conducted your study so a reader can evaluate your work and replicate your study.

Title and Author information: You do not need a separate title page. At the top of the page, type "Materials and Methods report". Then give your report a descriptive title. Next, type your name, student number, the course title and number. Finally, type the assignment's due date. Each of these items should be separated with line breaks.

Materials and Methods section: Begin with the heading "Materials and Methods." The Materials and Methods section of the report gives a detailed account of the procedures that were followed in the lab. Provide the reader with a clear understanding of your experimental

design. State what you are trying to measure and tell the reader how you plan to measure it. Be sure to describe any controls, treatments, variables, and what you actually observed and measured.

Describe the procedures in sufficient detail so that another student could repeat your work and obtain the same results. Include solution names and concentrations, volumes, and incubation times. When describing experimental and control treatments, use descriptive phrases rather than in-lab notations such as "tube 1" or condition "E3."

Note: If you find yourself repeating information, try to integrate the experimental design with the data collection procedures.

Describe how the data were compiled and analyzed. This includes the names of software used, and how any calculations or statistical tests were done.

There are several common mistakes in the Materials and Methods section of a lab report. One major concern is deciding upon the correct level of detail. A good guideline is to include only what is necessary to allow another first-year biology student to recreate the experiment. Keeping this in mind will lead to a Materials and Methods section that is thoroughly written, but without the kind of unnecessary detail that breaks the flow of the writing.

Another common mistake is to present a *list of materials*. Your materials and equipment should be mentioned in your methods paragraphs, as they were used during the lab. Enough detail should be included in the description of the materials so that the experiment can be repeated.

Finally, Materials and Methods should be written in the **third-person past-tense using passive voice**. For example, you could write: "*A plastic pipette was used to transfer 3 mL of 1 M $CaCl_2$ to a fresh, disposable cuvette."* It is incorrect to use instructions like "*Use a pipet to add 3*

mL of 1 M $CaCl_2$ to a disposable cuvette," or first-person active statements like "*I added 3 mL of 1 M $CaCl_2$ to a disposable cuvette."*

2.3 Scoring Rubric

Author information and Title (2 points)		
(2) "Materials and Methods report," title, course name & number, student name & number are complete and listed in the requested order. Title is concise & informative.	(1) An element of the author & report information is missing or the order is incorrect. Title is overly wordy or too vague.	(0) Several items of author and report information are missing or do not follow the requested format. No title, or the title does not describe the contents of the report.
Organization (2 points)		
(2) Procedures are presented in logical order, and steps within each procedure are described in logical order. Subheadings are used to separate different experiments.	(1) Organization makes experiments difficult to understand. Add subheadings to separate different experiments.	(0) Poorly organized. Sentences might be difficult to read because they contain too many different ideas, or their components are not in a logical order.
Methods - protocol (2 points)		
(2) Procedures are described in sufficient detail that another student could repeat the experiment. Crucial details like temperature, pH, concentration, sampling rate, or assessment criteria are included.	(1) Summarizes major steps of the protocol, but some important details are missing. May contain details that are not necessary (e.g., where the test tubes were found in the lab).	(0) Insufficient explanation provided to the reader to understand experimental design, or for another student to repeat the experiment. May be copied from the lab manual or refer the reader to the lab manual, with no explanation.
Materials (2 points)		
(2) Materials are incorporated into the methods paragraphs. The work can be repeated because the strains, specialized equipment, and solutions are described. Correct S.I. units and abbreviations are used throughout.	(1) Materials are incorporated into the methods paragraphs, but important items are missing. Minor corrections to S.I. units or abbreviations.	(0) Materials are listed (similar in format to a lab manual), or the description of materials is insufficient. Refers the reader to the lab manual with no explanation.
Spelling, grammar, and language (2 points)		
(2) Correct spelling and grammar. Passive voice, third person past tense. Language is specific (e.g., *E. coli* were spread, vs *the bacteria* were spread).	(1) Minor corrections to spelling and grammar. Inconsistent use of voice (active, passive), narrative forms (I, we), or tense (present, past).	(0) Significant corrections to spelling and grammar. Inconsistent use of voice (active, passive), narrative forms (I, we), or tense (present, past). Written as instructions (imperative voice).

3. Results (Report 2)

3.1 Workshop and tutoring

The second workshop focused on the purposes and style of a Results section. As the following concepts were introduced, students implemented them by writing and revising a practice Results paragraph:

(1) Presenting data: complex data should be presented in either a table or a figure (not both), while simpler data can be summarized in the text alone.

(2) Highlighting key results: we use the text of our Results section to draw attention to extremes, trends, and other critical features of the data.

Students received a handout of a graph with caption and were asked to draft a paragraph describing the most important results

(3) Formatting and citing: Figures and tables should contain enough information to be comprehensible without reference to the text. This may include: numbering, titles and captions, axis labels, and other features. When describing results in the text, remember to refer the reader to the data (e.g. Figure 1).

Students were asked to revise their paragraphs with these guidelines in mind. They were also reminded of the elements of scientific style and tone and told to apply those to their drafts.

(4) Content: Results sections are straightforward summaries of data without any interpretation, which is reserved for Discussion sections.

Students were given an out-of-sequence list of statements from a published journal article and asked to identify whether the sentences belonged in the Methods, Results, or Discussion section of the paper.

3.2 Written instructions

Assignment: Prepare **(1)** a figure with a descriptive figure caption and **(2)** a Results section to describe the results of this week's lab.

Title and Author information: You do not need a separate title page. At the top of the page, type "Results report." Then give your report a **descriptive title**. Next, type your name, student number, the course title and number. Finally, type the assignment's due date. Each of these items should be separated with line breaks.

Results section: This section presents the results of the investigation. It should begin with the heading "Results." The Results section describes the outcomes of the experiments and draws attention to key findings and relationships. Present your data in paragraph form, accompanied by tables or graphs. Write this section so that another first-year university student could read the text to learn what you did and what you found. Allow the reader to form their own conclusions based on the data. Results are written in past tense because you are reporting experiments that are already completed.

A common mistake in this section is to report observations or reference figures and tables without explanation. Rather than saying, "Figure 1 shows the effect of alcohol on *Daphnia* heart rate," you should state and explain the actual results; for example, "Alcohol reduces *Daphnia* heart rate by 20%, and this effect was quickly reversed when the alcohol was removed (Figure 1)."

Present detailed data in tables and figures, which are referenced in the text. The written portion should summarize and emphasize, *not* repeat all of the details shown in the visuals. State trends in the data and relationships between variables or different figures, but avoid extensive analysis or interpretation—this should be left for the "Discussion" section.

Figure and Caption: Data that have been collected need to be presented clearly and simply. Refer to the instructions for the first lab report for help with your figure.

3.3 Scoring Rubric

Author information and Title (2 points)		
(2) "Results report," title, course name & number, student name, & number are complete and listed in the requested order. Title is concise & informative.	(1) An element of the author & report information is missing or the order is incorrect. Title is overly wordy or too vague.	(0) Several items of author and report information are missing or do not follow the requested format. No title, or the title does not describe the contents of the report.
Results paragraphs - Organization (2 points)		
(2) Results are presented in logical order. Report begins with the heading "Results." Subheadings are used to separate different experiments. Both figures are referred to in the text.	(1) Results are presented in logical order. Report does not begin with the heading "Results" or is missing subheadings to separate different experiments. Figures not referred to in the text.	(0) Organization makes experiments difficult to understand. Sentences might be difficult to read because they contain too many different ideas, or their components are not in a logical order. Missing headings, subheadings. Figures not referred to in the text.
Results paragraphs - Contents (4 points)		
(4) The question driving the experiment is stated (e.g., to examine___, ___ was done). Experimental conditions and comparisons are described without using in-lab tube numbers. Data are summarized and expressed accurately. The text states key results and trends from the figures then compares the results of different experimental conditions.	(3) Experimental design and rationale may not be clear. Experimental conditions and comparisons are not complete and in-lab tube numbers may be used. Most data are accurately presented, but with minor flaws or omissions(e.g., missing a trend, maximum value, or important comparison).	(0-2) Experimental design and rationale is not clear. Raw data may be listed without analysis. Analysis and presentation are inaccurate or incomplete. Data trends not stated, text only states 'see figure X', or text does not refer to the figure. Section may include extensive discussion of what the data means rather than a description of what was seen.
Figures (3 points x 2 figures = 6 points)		
(3) Graphs are simple and clear. Prepared on a computer. Data trends are readily seen from the figure. Figure captions describes graph contents. The graph is organized properly with the dependent variable on the y-axis and the independent variable on the x-axis. Axes are labeled and clearly numbered, labels are informative and complete, units are included.	(1-2) Minor format errors, for example: there are thick colored lines, shadows, a box around the graph, or horizontal / vertical divisions. A title is included above the graph. Figure caption is not clear or contains factual errors. Axes labels or units are missing or incomplete. In-lab tube numbers are used.	(0) Figure missing, not prepared on a computer, or the graph does not match requested format. Raw, unanalyzed data is presented.
Spelling, grammar, and language (2 points)		
(2) Correct spelling and grammar. Written in past tense. Language is specific (e.g. "yeast can ferment glucose", vs "the cells used glucose", or "yeast fermented the sugar").	(1) Minor corrections to spelling and grammar.	(0) Many corrections to spelling and grammar. Written in present tense.

4. Final Report

4.1 Workshop and tutoring

For their Final Report, for a new experiment, students were required to write: a Materials and Methods section, a Results section, and a Discussion section. After a quick review of common errors students had made in Reports 1 and 2, the workshop for the final report provided details on writing an effective Discussion section, and the correct use of in-text citations and references.

Specific goals of the workshop were to:

(1) Remind students that the entire report is tied together by a scientific question. Understanding that question (i.e., the underlying reason for the experiment) guides the writing of all sections, but especially the Discussion.

(2) Explain the purposes of the Discussion section: to **discuss** (review) the key results, to **explain** what the results mean in light of the scientific question (interpretation of the data) and to **integrate** the results of the experiment with pre-existing knowledge in the field (placing results within the context of the literature).

(3) Provide a handout of a sample Discussion paragraph for students to refer to and annotate. A colour-coded version of this text was projected, and we explained the function (discuss, explain, integrate) of each sentence in the paragraph, and how they worked together to create a unified whole.

(4) Explain why citations are important and when they should be used. Examples in the sample paragraph were used to demonstrate in-text citation formats. Differences between in-text citations and reference lists—including why both are necessary, and how they work together—were presented.

We used a group activity to relieve students' anxiety about formatting citations. Each group received an APA reference sheet and a baggie containing printouts of reference list entries. Entries for different types of sources (e.g., lab manual, textbook) had been printed on different coloured stock, and each entry had been cut into individual components (e.g., author, title, city of publication). Students were required to identify the type of source and, using the reference handout, reassemble the reference list entries.

The final lab report was due at the end of term, so there was no option to revise and resubmit. Depending on their progress, students who chose to attend tutoring were offered guidance in planning, writing, revising, and proofreading.

4.2 Written instructions

Assignment: Prepare **(1)** a Materials and Methods section, **(2)** a Results section containing *two* figures with descriptive figure captions, and **(3)** a Discussion section.

Title and Author information: You do not need a separate title page. At the top of the page, type "Final lab report." Then give your report a **descriptive title**. Next, type your name, student number, the course title and number. Finally, type the assignment's due date. Each of these items should be separated with line breaks.

Materials and Methods section: Begin with the heading "Materials and Methods." You can use subheadings to organize this section. Refer to the instructions from the second lab report for a description of this section.

Results section: Begin with the heading "Results." You can use subheadings to organize this section. Refer to the instructions from the first and third lab reports for a description of what to include in this section.

Discussion section: Begin with the heading "Discussion." In paragraphs, interpret, and explain the significance of your experiments, observations, and results. Present the central conclusions of your work. Show the reader how you reached your conclusions by referring to (1) specific results that you included in the Results section, and (2) results from other publications. If your results contradict what other researchers have shown, including what is in the textbook or lab manual, and try to rationalize why your results are different. Was there something different with your assumptions, your equipment, or your technique that would produce different results?

References section: There are two parts to citing your sources. (1) **In-text citations.** Cite sources that support your reasoning, and when referring to previously published ideas. The standard format is to put the author and year in parentheses (e.g., (Campbell, 1989)) at the end of the sentence in the text. Every reference at the end of your report needs in-text citations. (2) In a separate **References** section at the end of the report, list complete references in alphabetical order. For example:

REFERENCES

Campbell, N.A., & Reece, J.B. (2005). *Biology* (7th ed.). San Francisco, CA: Benjamin/Cummings.

Dansereau, D.A. (2014). *Molecular and cellular biology lab manual* (Lab 3). Department of Biology, Saint Mary's University, Halifax, NS.

Phillips, D.C. (November 1966). The three-dimensional structure of an enzyme molecule. *Scientific American*, *215*(11), 78-82.

4.3 Scoring Rubric

Author information and Title (2 points)		
(2) "Final lab report," title, course name & number, student name & number are complete and listed in the requested order. Title is concise & informative.	(1) An element of the author & report information is missing or the order is incorrect. Title is overly wordy or too vague.	(0) Several items of author and report information are missing or do not follow the requested format. No title, or the title does not describe the contents of the report.
Methods - Organization (2 points)		
(2) Procedures are presented in logical order, and steps within each procedure are described in logical order. Subheadings are used to separate different experiments.	(1) Organization makes experiments difficult to understand. Add subheadings to separate different experiments.	(0) Poorly organized. Sentences might be difficult to read because they contain too many different ideas, or their components are not in a logical order.
Methods - Protocol (2 points)		
(2) Procedures are described in sufficient detail that another student could repeat the experiment. Crucial details like temperature, pH, concentration, sampling rate, or assessment criteria are included.	(1) Summarizes major steps of the protocol, but some important details are missing. May contain details that are not necessary (e.g., where the test tubes were found in the lab).	(0) Not enough explanation is provided for the reader to understand experimental design, or for another student to repeat the experiment. May be copied from the lab manual or refer the reader to the lab manual with no explanation.
Materials (2 points)		
(2) Materials are incorporated into the methods paragraphs. The work can be repeated because the strains, specialized equipment, and solutions are described. Correct S.I. units and abbreviations are used throughout.	(1) Materials are incorporated into the methods paragraphs, but important items are missing. Minor corrections to S.I. units or abbreviations.	(0) Materials are listed (similar in format to a lab manual), or the description of materials is insufficient. Refers the reader to the lab manual with no explanation.
Methods - Spelling, grammar, and language (2 points)		
(2) Correct spelling and grammar. Passive voice, third person past tense. Language is specific (e.g., *E. coli* were spread, vs *the bacteria* were spread).	(1) Minor corrections to spelling and grammar. Inconsistent use of voice (active, passive), narrative forms (I, we), or tense (present, past).	(0) Many corrections to spelling and grammar. Inconsistent use of voice (active, passive), narrative forms (I, we), or tense (present, past). Written as instructions (imperative mood).
Results paragraphs - Organization (2 points)		
(2) Results are presented in logical order. Report begins with the heading "Results." Subheadings are used to separate different experiments. Both figures are referred to in the text.	(1) Results are presented in logical order. Report does not begin with the heading "Results" or is missing subheadings to separate different experiments. Figures not referred to in the text.	(0) Organization makes experiments difficult to understand. Sentences might be difficult to read because they contain too many different ideas, or their components are not in a logical order. Missing headings, subheadings. Figures not referred to in the text.

Results paragraphs - Contents (4 points)		
(4) The question driving the experiment is stated (e.g., to examine___, ___ was done). Experimental conditions and comparisons are described without using in-lab tube numbers. Data are summarized and expressed accurately. The text states key results and trends from the figures, then compares the results of different experimental conditions.	(3) Experimental design and rationale may not be clear. Experimental conditions and comparisons are not complete and in-lab tube numbers may be used. Most data are accurately presented, but with minor flaws or omissions: missing a trend, maximum value, or important comparison.	(0-2) Experimental design and rationale is not clear. Raw data may be listed without analysis. Analysis and presentation are inaccurate or incomplete. Data trends not stated; text only states 'see figure X,' or text does not refer to the figure. Section may include extensive discussion of what the data means rather than a description of what was seen.
Figures (3 points x 2 figures = 6 points)		
(3) Graphs are simple and clear. Prepared on a computer. Data trends are readily seen from the figure. Figure caption describes graph contents. The graph is organized properly with dependent variable (y-axis) and independent variable (x-axis). Axes are labeled and clearly numbered, labels are informative and complete, units are included.	(1-2) Minor format errors, for example: there are thick colored lines, shadows, a box around the graph, or horizontal / vertical divisions. A title is included above the graph. Figure caption is not clear or contains factual errors. Axes labels or units are missing or incomplete. In-lab tube numbers are used.	(0) Figure missing, not prepared on a computer, or the graph does not match requested format. Raw, unanalyzed data is presented.
Discussion (4 points)		
(4) Growth of bacteria on each of the 4 media plates, and the purposes of adding ampicillin and arabinose to the media are clearly explained with reference to the arabinose operon and plasmid transgenes.	(2-3) Minor omissions or errors, for example, the link between arabinose and colony color is not clear.	(0-1) A logical explanation is lacking, either because several key points are missing or major errors are present.
Results and discussion - spelling, grammar, and language (2 points)		
(2) Correct spelling and grammar. Written in past tense. Language is specific (e.g., "yeast can ferment glucose," vs "the cells used glucose," or "yeast fermented the sugar").	(1) Minor corrections to spelling and grammar.	(0) Many corrections to spelling and grammar. Written in present tense.
References (2 points)		
(2) In-text citations and references in APA format, at least 3, one of which can be the lab manual.	(1) Reference list, but no in-text citations	(0) No references