

HONORS BIOLOGY – LAB REPORT RUBRIC

INTRODUCTION:

- _____ / 1 The purpose or objective of the lab is clearly stated.
Relevant background information is provided and is easy to understand.
- _____ / 1 The hypothesis is clearly stated in “if, then” format and makes a reasonable prediction.
- _____ / 1 The independent variable, dependent variable, and control group are correctly identified.

PROCEDURE:

- _____ / 1 The materials used in the lab are clearly listed.
- _____ / 1 The procedure for the lab is clearly explained.

RESULTS:

- _____ / 3 The qualitative and/or quantitative observations are included.
- _____ / 2 Data is displayed in the appropriate formats, such as charts, graphs, data tables, diagrams, etc. All results sections have appropriate titles.

DISCUSSION:

- _____ / 4 The lab results are explained using CLAIM-EVIDENCE-REASONING.
All assigned lab questions are correctly answered in complete sentences.
- _____ / 2 The data is clearly cited and described using CLAIM-EVIDENCE-REASONING.
- _____ / 2 The hypothesis is analyzed using CLAIM-EVIDENCE REASONING.
- _____ / 2 The explanation discusses any problems and/or possible sources of error.

CONCLUSION:

- _____ / 2 The main points of the lab are summarized.
- _____ / 1 One or more ways to improve or modify the lab are described.

APPEARANCE:

- _____ / 1 The lab report is typed: 12 point font, single-spaced, 1” margins.
The lab report is free of spelling/grammatical/punctuation errors.
- _____ / 1 The lab report has a title page which lists the following information:
title of lab, your name, name(s) of your lab partners, date.

TOTAL POINTS EARNED:

_____ / 25

What is Inside the Mystery Boxes?

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Lab Partners: Caleb Zunick, Sarah Zunick

Date of Lab: September 4, 2019

Course: Honors Biology Period 3

NOTE: LIST THE INFORMATION SHOWN ABOVE. PROVIDE THE EXACT TITLE OF THE LAB AS SHOWN ON THE LAB HANDOUT. MAKE SURE TO CORRECTLY SPELL THE NAME(S) OF YOUR LAB PARTNER(S). STAPLE THE LAB REPORT RUBRIC TO THE FRONT OF THE LAB REPORT BEFORE SUBMITTING IT FOR A GRADE.

INTRODUCTION:

In this investigation, students will learn about qualitative observations, quantitative observations, and inferences. A qualitative observation is something that a scientist can observe using his or her senses and takes the form of a description. A quantitative observation is similar, but must include a number. An inference is something that the scientist believes to be true based on the qualitative and quantitative observations, but cannot be directly observed. The purpose of this lab is to correctly identify the contents of 10 mystery boxes without opening them. Students are allowed to shake, tap, or otherwise touch the boxes, but are strictly prohibited from looking inside.

NOTE: THE INTRODUCTION SHOULD BE APPROXIMATELY 5-8 SENTENCES LONG. INCLUDE RELEVANT BACKGROUND INFORMATION SO THAT THE READER CAN UNDERSTAND THE LAB REPORT. STATE THE PURPOSE OF THE LAB, BUT NOT THE RESULTS OF YOUR INVESTIGATION. DO NOT WRITE THE PROCEDURE IN THE INTRODUCTION.

HYPOTHESIS:

If I am given 10 mystery boxes, then I will correctly identify the contents of 7 of them.

NOTE: THE HYPOTHESIS MUST BE WRITTEN IN "IF, THEN" FORMAT. IT WILL USUALLY BE PROVIDED TO THE STUDENTS AT THE BEGINNING OF THE LAB.

EXPERIMENTAL DESIGN:

- The independent variable for this investigation is _____.
- The dependent variable for this investigation is _____.
- The control group for this investigation is _____.

NOTE: THE INDEPENDENT VARIABLE IS THE CHANGEABLE FACTOR IN THE EXPERIMENT. THE DEPENDENT VARIABLE IS THE FACTOR THAT CHANGES AS A RESULT OF THE INDEPENDENT VARIABLE.

THINK OF THE INDEPENDENT VARIABLE AS THE "CAUSE" AND THE DEPENDENT VARIABLE AS THE "EFFECT". ON A GRAPH, THE INDEPENDENT VARIABLE IS FOUND ON THE X-AXIS AND THE DEPENDENT VARIABLE IS FOUND ON THE Y-AXIS.

THE CONTROL GROUP IS THE PART OF THE EXPERIMENT THAT IS NOT ALTERED BY THE INDEPENDENT VARIABLE AND IS USED FOR COMPARISON.

SOME OF YOUR LABS WILL NOT REQUIRE THIS SECTION OF THE LAB REPORT.

MATERIALS:

1. 10 mystery boxes
2. timer

NOTE: WRITE ALL OF THE MATERIALS IN A NUMBERED LIST, ONE PER LINE.

DO NOT INCLUDE BASIC CLASSROOM SUPPLIES LIKE PEN OR PENCIL, NOTEBOOK PAPER, OR LAB HANDOUT UNLESS SPECIFICALLY INSTRUCTED BY YOUR TEACHER.

PROCEDURE:

1. The teacher will split the class into 10 lab teams of 2 students each.
2. Each lab team will receive 1 mystery box.
3. The lab teams will have 2 minutes to make a list of observations for each mystery box. The lab teams will also make at least one prediction as to the contents of the mystery box. The observations and predictions will be recorded on notebook paper.
4. After two minutes, the teacher will announce that it is time to pass the boxes to the next group.
5. Repeat steps 3 and 4 for each of the 10 mystery boxes.
6. The teacher will share the contents of the mystery boxes with the class.

NOTE: COPY THE PROCEDURE EXACTLY AS IT WAS PERFORMED. INCLUDE ANY MODIFICATIONS TO THE PROCEDURE THAT WAS DISTRIBUTED IN CLASS.

RESULTS:

Data Table #1: Observations and Predictions of 10 Mystery Boxes

Box	3 Observations (Quantitative and Qualitative)	Predictions	Actual Contents	Correct?
1	-heavy when lifted -makes a loud noise when tilted -seems hard or dense	glue stick	bottle of glucose	NO
2	-seem to be a lot of objects -most likely hard objects -sounds like pencils or crayons	crayons	21½ crayons	½
3	-shakes like a ball -seems hard or dense -seems like it is small (1-2 inches)	rock or mineral	halite	½
4	-seem to be a few objects -makes a loud noise when shaken -most likely hard objects	4 pieces of candy	5 cough drops	NO
5	-the box cannot fully close -seems to be squishy -seems to be full of air	sponge	balloon	NO
6	-makes a loud “thump” when tilted -seems to be heavy -seems like it is 2-3 inches long	glass jar	scorpion in a jar	½
7	-seems like a few small objects -seems like they are light-weight -makes a slight noise when shaken	3 thumbtacks	4 paper clips	NO
8	-seems like nothing is in the box -object barely moves when shaken -makes almost no sound when shaken	small piece of paper	sheet of paper	YES
9	-seems like 2 round objects -makes a loud noise when shaken -the noise sounds like marbles	2 marbles	2 marbles	YES
10	-seems to be a number of objects -sounds like pennies when shaken -objects seem to be very small	10 pennies	14 pennies	½

NOTE: RECORD ALL OF THE DATA, INCLUDING PICTURES, DIAGRAMS, DESCRIPTIONS, AND QUANTITATIVE OBSERVATIONS, IN THE FORM OF TABLES WITH BOXES AROUND THEM. ALL DATA TABLES MUST HAVE A CLEAR AND SPECIFIC TITLE USING THE FORMAT AS SHOWN ABOVE.

DO NOT EXPLAIN YOUR DATA IN THE RESULTS SECTION. ALL OF THE EXPLANATIONS WILL BE WRITTEN IN THE DISCUSSION SECTION.

DISCUSSION:

As shown by data table 1, I correctly identified the contents of 4 out of the 10 boxes. There were two instances in which I was very accurate. For example, I was 100% accurate at identifying boxes 8 and 9. I was also correct in identifying the contents of boxes 2 and 10, but I did not accurately predict the right number of objects. For boxes 3 and 6, I was close enough to be considered half correct, but I lacked sufficient detail. For example, I knew that box 6 contained a jar, but had no idea that it had a scorpion inside. I based my prediction on the fact that I heard a loud “thump” when I tilted the box. Also, I predicted the box 3 would contain a rock or mineral, but I did not state that it was halite. I don’t think that it was possible for me to identify the mineral as halite without opening up the box. Although my hypothesis was not correct, I was very close to being correct. I predicted that I could identify the contents of 7 boxes. In reality, I correctly predicted the contents of 4 boxes.

In this lab, we recorded three types of data: qualitative observations, quantitative observations, and inferences. A qualitative observation is a description. For example, the phrases “heavy when lifted” or “seems to be dense” are qualitative observations. A quantitative observation is one that includes some sort of number. For example, the phrases “2 inches long” or “contains 20 milliliters of water” are quantitative observations. An inference is something you determine to be true based on logic. For example, the phrases “objects seem to be very small” and “seems hard” are examples of inferences. All three types of data were used in this investigation.

The biggest problem with this lab is that I was limited in my observations. This lab could be improved if we were blind-folded and then able to directly touch the objects. Some of the “predictions” truly were just guesses. I feel that if I could have touched the objects (without seeing them), I would have correctly identified at least 8 or 9 of them. I also feel that 2 minutes per mystery box is not enough time. If I were the teacher, I would increase that time to 4 minutes per mystery box.

NOTE: EXPLAIN THE MEANING OF THE DATA AND DETERMINE WHETHER OR NOT THE HYPOTHESIS WAS CORRECT USING THE CLAIM-EVIDENCE-REASONING MODEL. EXPLAIN ALL RELEVANT VOCABULARY TERMS AND CONCEPTS. CLEARLY SHOW HOW THEY RELATE TO YOUR DATA. DO NOT SIMPLY RESTATE ALL OF THE DATA FROM THE RESULTS SECTION IN PARAGRAPH FORM. INSTEAD, INTERPRET THE DATA AND USE YOUR RESULTS TO ANALYZE YOUR HYPOTHESIS.

ANSWER ALL ASSIGNED PRE- AND/OR POST-LAB QUESTIONS IN PARAGRAPH FORM. DO NOT WRITE THE QUESTIONS. INSTEAD, INCORPORATE THE ANSWERS THROUGHOUT THE DISCUSSION SECTION.

DESCRIBE ACTUAL OR POSSIBLE SOURCES OF ERROR DURING THE LAB. STUDENTS WILL NOT BE GIVEN CREDIT FOR GENERIC ANSWERS SUCH AS “NOT ENOUGH TIME” OR “I FELT RUSHED”. THE SOURCES OF ERROR MUST INCLUDE AN EXPLANATION.

THE DISCUSSION SHOWN ABOVE IS AN ABBREVIATED SAMPLE. THE LENGTH OF THE DISCUSSION SECTION VARIES FOR EACH LAB REPORT, BUT GENERALLY RANGES FROM 1-2 PAGES.

CONCLUSION:

This lab introduced our class to qualitative observations, quantitative observations, and inferences. My partner and I used quantitative and qualitative observations to make an inference about the contents of the mystery boxes. We also learned that quantitative observations always include a number, whereas qualitative observations do not. Although my hypothesis was not correct, I was able to identify 4 of the 10 objects. I would modify this lab by allowing students to touch the objects while being blind-folded. This would allow the students to record more detailed and accurate observations.

NOTE: SUMMARIZE THE MAIN POINTS FROM THE LAB REPORT BY DESCRIBING THE MOST IMPORTANT THINGS YOU LEARNED BY COMPLETING THIS LAB. DO NOT GO INTO ANY LENGTHY EXPLANATIONS BECAUSE THEY SHOULD HAVE ALREADY BEEN INCLUDED IN THE DISCUSSION SECTION. HIGHLIGHT THE MAIN IDEAS THE READER SHOULD KNOW FROM READING THE LAB REPORT.

FINALLY, STATE AT LEAST ONE WAY TO IMPROVE THE LAB AND PROVIDE A BRIEF EXPLANATION.

THE LENGTH OF THE CONCLUSION SECTION SHOULD BE ONE PARAGRAPH OF APPROXIMATELY 6-8 SENTENCES.