**Mass of an object (BCBT 100, Fall 2016)**

|  |  |
| --- | --- |
| Name: |  |
| Partner(s): |  |

***Procedure/Data Collection:***

|  |  |
| --- | --- |
| Candy Type: |  |
| *Number of Pieces:* | *Mass of Candy (grams):* | *Notes:* |
|  |  |  |
|  |  |  |
|  |  |  |
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|  |  |  |
|  |  |  |

***Mathematical Analysis #1:***

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *Highest value* |  |  |  | *Middle value* |  |  |  | *Lowest value* |
|  |  |  |  |  |  |  |  |  |

|  |  |
| --- | --- |
| Average = |  |

|  |  |
| --- | --- |
| Range (Highest value – Lowest value) = |  |

|  |  |
| --- | --- |
| Error (Range / 2) = |  |

|  |  |  |  |
| --- | --- | --- | --- |
| Reported Value = |  |  ±  |  |
|  | *Average* |  | *Error* |

Error can also be reported as a *percent error* by dividing the error by the calculated average value and multiplying by 100. Based upon the average and error you calculated above, what is the percent error in your experiment? Show your work.

{{Delete this text and type your answer here. Leave the double curly brackets.}}

Given the average value you calculated, what would you expect the mass of 352 candies to be? Show your work.

{{Delete this text and type your answer here. Leave the double curly brackets.}}

If the actual mass of each candy is (Average + error), what would you expect the mass of 352 candies to be? Show your work.

{{Delete this text and type your answer here. Leave the double curly brackets.}}

If the actual mass of each candy is (Average – error), what would you expect the mass of 352 candies to be? Show your work.

{{Delete this text and type your answer here. Leave the double curly brackets.}}

Given the variability {“error” and “% error”} you reported, how confident are you in the average value you calculated? Show your work.

{{Delete this text and type your answer here. Leave the double curly brackets.}}

***Mathematical Analysis #2:***

Using the raw data you collected, calculate the average mass of a candy piece by dividing the *total* mass of the candy for all nine samples by the *total* number of candy pieces used in all 9 samples.

|  |  |
| --- | --- |
| Average(2) = |  |

How does this number compare to the average you calculated in the previous section? Is this value within the error you reported in the previous section?

{{Delete this text and type your answer here. Leave the double curly brackets.}}

***Graphical Analysis:***

How does the slope of your fit line compare to the average mass of a candy piece you determined in the previous sections? Is the average mass {determined using the slope of the fit line} within the error you reported in the previous section?

{{Delete this text and type your answer here. Leave the double curly brackets.}}

How “tightly” do your data fit the trend line? Do the data fit the trend line better with relatively fewer pieces of candy or relatively more pieces of candy? Explain any differences you observe.

{{Delete this text and type your answer here. Leave the double curly brackets.}}

[[Insert your graph here. It can be an electronically generated graph using MSExcel or some other software program (like this: https://nces.ed.gov/nceskids/createagraph/), or it can just be a picture of a hand-drawn graph snapped with your phone. If you need a piece of graph paper, here’s a printable one: http://www.drbodwin.com/teaching/graph01.pdf ]]

***Comparing Results:***

Compare your results with another group that used the *same* type of candy ***{include their names!}***. Are the averages the same? Are the averages within the error reported for each?

{{Delete this text and type your answer here. Leave the double curly brackets.}}

Compare your results with another group that used a *different* type of candy ***{include their names!}***. Are the averages the same? Are the averages within the error reported for each?

{{Delete this text and type your answer here. Leave the double curly brackets.}}

**Grading Rubric:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ***Criterion*** | ***Poor*** | ***Average*** | ***Good*** | ***Score*** |
| Data Collection | Insufficient or overly narrow data.Data not recorded.0-1 point | An appropriate number of data points covering a reasonable range.Data is recorded.2-3 points | An appropriate number of data points, covering an appropriate range.Data is recorded clearly and completely.4-5 points | 5pts |
| Mathematical Analysis #1 | Incorrect averages and/or errors.Data presentation is sloppy or absent.Follow-up questions are not addressed or incorrect.0-1 point | Averages and errors are mostly correct with minor mistakes or inconsistencies.Data is well presented.Follow-up questions are addressed2-3 points | Averages and errors are complete and correct. Data is presented clearly and completely.Follow-up questions are addressed completely.4-5 points | 5pts |
| Mathematical Analysis #2 | Average is incorrect or missing.Little or no attempt to related to Mathematical Analysis #1.0-1 point | Average is complete and correct.Relationship to Mathematical Analysis #1 is mentioned2-3 points | Average is complete and correct.Similarity of value to Mathematical Analysis #1 is clearly and completely explained.Error is explained correctly.4-5 points | 5pts |
| Graph | Significant graph errors or missing componentsNo trend line or an unreasonable trend line.0-1 point | Minor errors in graph formattingTrend line present.2-3 points | Axes labelled, data fills graph area, data points are clearly marked.A reasonable trend line is included.4 points | 4pts |
| Graphical Analysis | Incorrect slope.Little or no comparison to previous sections.0-1 point | Reasonable interpretation of slope.Attempt to relate to previous sections.2-3 points | Correct calculation and interpretation of the slope of the trend line.Similarity to previous sections is put in context of error.4 points | 4pts |
| Comparison | No comparison or poor comparison.0 points | Comparison of data is superficial.1 point | Comparison is clear.Similarities and/or differences are put into context of the error in measurement.2 points | 2pts |