Physics 4A

# **Lab 1: Results and Analysis**

Follow the directions, then answer the questions from the indicated section of the main lab. Submit this sheet for grading.

**Part 1: Statistical Variation**

Select the data for part 1 in Excel and copy to this word document. Once the data is copied over, make sure the table includes boarders. You can add boarders under ‘Table Design.’

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Coin flip # | Tail | Head | Heads 6-10 | Tails 6-10 |
| 1 | 7 | 9 | y | y |
| 2 | 7 | 9 | y | y |
| 3 | 9 | 7 | y | y |
| 4 | 8 | 8 | y | y |
| 5 | 9 | 7 | y | y |
| 6 | 9 | 7 | y | y |
| 7 | 9 | 7 | y | y |
| 8 | 10 | 6 | y | y |
| 9 | 8 | 8 | y | y |
| Average: | 8.44 | 7.56 |  |  |
| Standard deviation: | 0.96 | 0.96 |  |  |
| Percentage Uncertainty: | 11.32 | 12.65 |  |  |
| Sum: | 76.00 | 68.00 |  |  |

**1.1 Data**

1. How many times (out of 9) did you get exactly 8 heads? 2
2. What was your average number of heads? 7.56

**1.2 Expected Range**

1. How many times was your number of heads within the expected range? all
2. Was it about 2/3 of the time? No

**1.4 Standard Deviation**

1. What was the standard deviation of your data? 0.96
2. Is this similar to the expected value of 2? No
3. A measured result should be written as average ± the standard deviation. What is the measured number of heads for your data? 68 ± 1
4. Does the measured number agree with theory (does the range include the theoretical value of 8)? Yes

**1.5 Percentage Uncertainty**

1. What is the percentage uncertainty? 12.65%

**1.6 Analysis**

1. What was the total number of heads in your data? 68
2. Does this total number agree with theory? Yes

**Part 2: Measurement**

In Excel, select the data for part 2 and add all boarders to the table. Once boarders have been added, copy the data and paste in Word. You will notice that the table is too large and is cut off. After pasting, you will see an icon to the bottom right of the table appear. Click on this icon and select ‘Paste as Picture.’

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | L(cm) | W(cm) | H(cm) | m(g) | A(cm^2) | V(cm^3) | D(g/cm^3) |
| Value | 7.50 | 4.90 | 1.80 | 25.80 | 36.75 | 66.15 | 0.39 |
| Abs. unc | 0.10 | 0.10 | 0.10 | 0.10 | 1.25 | 6.05 | -0.03 |
| Max | 7.60 | 5.00 | 1.90 | 25.90 | 38.00 | 72.20 | 0.36 |
| % Unc. | 1.33 | 2.04 | 5.56 | 0.39 | 3.40 | 9.15 | 8.02 |
| Expected % |  |  |  |  | 3.37 | 7.60 | 8.41 |

**2.5. Uncertainty in Computed Quantities**

1. What are your computed area, volume, and density? Values given should include uncertainty and units (see 1.4.C. for an example of how to write a value with uncertainty).

A = 36.75 V = 66.15 D = 0.39

**2.6. Percentage Uncertainties**

1. Of the length, width, height, and mass, which one has the smallest percentage uncertainty?

mass

1. Why do you think this is the case?

Because it is a bigger number

**2.7.** **Expected Percentage Uncertainties**

1. Compare the expected percentage uncertainties of area, volume, and density to the computed values from section 2.6.