## Error Analysis in Volume Measurements

Measure and record the length，width，and height of the object on your lab table in the corresponding row below（be sure to include units and all significant figures！）
For each measurement，record the number of significant figures in the cell below it．
3．Record the error value（ $\pm$ ）for each measurement，then calculate the percent error for each．
4．Calculate the volume of the object and write it in the＂not rounded＂column．
5．Add the three percent error values to find the total percent error．
6．Use the total $\%$ error and the total volume to determine the total $\pm$ error．
7．Write the volume，with the correct number of significant figures，in the right hand column（least number of sig figs determines answer）
8．Write the range of possible values by subtracting and adding the total error from／to the total volume．

Calculating \％error（Step 3）and／or $\pm$ error（Step 6）

9．Rotate to the next lab table，and repeat Steps $1-9$ until you have measured all six objects．

| $\\| ⿻ 彐 丨$ | Item name \＆ description | Length |  | Width |  | Height |  | Volume of object from calculator （not rounded） | Total <br> $\%$ error <br> Total <br> $\pm$ error | Volume rounded by <br> ＂sig figs＂rule <br> Volume range <br> （low－high） |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| \＃ |  | Value | $\pm$ error | Value | $\pm$ error | Value | $\pm$ error |  |  |  |
|  |  | \＃of sig figs | \％error | \＃of sig figs | \％error | \＃of sig figs | \％error |  |  |  |
| 1 |  |  | $\pm$ |  | $\pm$ |  | $\pm$ |  | \％ |  |
|  |  |  | \％ |  | \％ |  | \％ |  | $\pm$ | － |
| 2 |  |  | $\pm$ |  | $\pm$ |  | $\pm$ |  | \％ |  |
|  |  |  | \％ |  | \％ |  | \％ |  | $\pm$ | － |
| 3 |  |  | $\pm$ |  | $\pm$ |  | $\pm$ |  | \％ |  |
|  |  |  | \％ |  | \％ |  | \％ |  | $\pm$ | － |
| 4 |  |  | $\pm$ |  | $\pm$ |  | $\pm$ |  | \％ |  |
|  |  |  | \％ |  | \％ |  | \％ |  | $\pm$ | － |
| 5 |  |  | $\pm$ |  | $\pm$ |  | $\pm$ |  | \％ |  |
|  |  |  | \％ |  | \％ |  | \％ |  | $\pm$ | － |
| 6 |  |  | $\pm$ |  | $\pm$ |  | $\pm$ |  | \％ |  |
|  |  |  | \％ |  | \％ |  | \％ |  | $\pm$ | － |

## Answer the following questions:

1. Can you see any relationship between volume and percent error? If so, describe it below:
2. Which object has the greatest volume?
3. What is the percent error for that object?
4. Which object has the least volume?
5. What is the percent error for that object?
6. Write the relationship between an object's volume and the percent error for that object. (You may have already done this in \#1 above.)
7. Do you think this relationship is true in all cases? Can you describe situations where it might not be true? Write your thoughts below:
