**Calculations Using Significant Figures and Relative Error**

**A. Calculations Using Significant Figures**

When **multiplying and dividing**, limit and round your answer to the least number of significant figures of any of the numbers used to calculate your answer.

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| ex. 23.0 cm x 432 cm x 19 cm = 188 784 cm3The answer would be **190 000 cm3**, as the restricting factor is 19 cm which has two sig figs. |

When **adding and subtracting**, limit and round your answer to the least number of decimal places in any of the numbers used to calculate your answer.

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| ex. 123.25 mL + 46.0 mL + 86.257 mL = 255.507 mLThe answer would be **255.5 mL**, as the restricting factor is 46.0 mL which has one decimal place. |

**NEVER ROUND UNTIL THE LAST STEP!**

**B. Relative Error**

The **RELATIVE ERROR** (or RE) gives an indication of how close to the REAL or ACTUAL value an EXPERIMENTALLY derived number is. A difficulty can arise when the actual value is not known. In some cases, a value with a greater degree of precision is used as the real or actual value.

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| **RE = (experimental value - accepted value) / (accepted value) \* 100%** |

The sign of the **RELATIVE ERROR** will indicate whether or not the experimental value is less than (giving a negative number) or greater than (giving a positive number) the accepted value. Generally, the negative is dropped when expressing RE.

**Calculate the relative error.**

1. A Student measured the mass of a piece of metal on a balance with an uncertainty of +/- 0.05 g. He reported a mass of 45.52g. What is the maximum relative error of the measurement made on this balance? To do this, use 45.52 as the accepted value, and compare this to the maximum value that could be possible: 45.52 + 0.05 = 45.57.