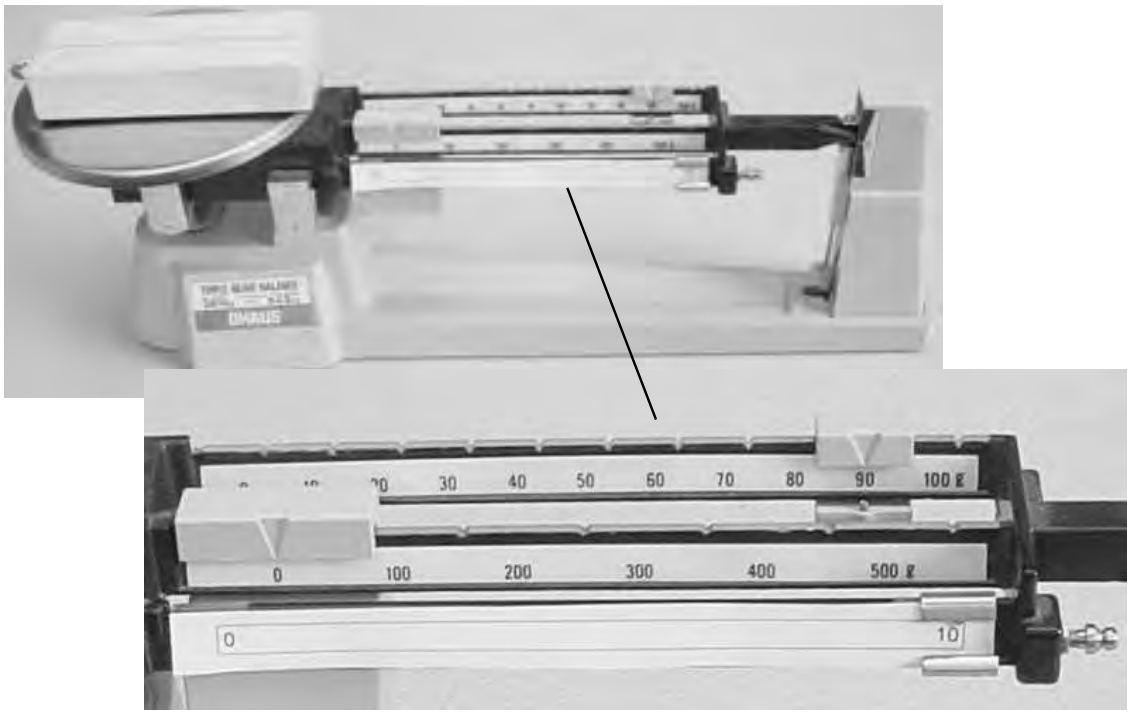
## Activity 4:
# Mass Measurements with Imprecise Labels on a Balance

| Equipment Required | Part Number |
|---|---|
| Balance labels | part of ME-9849 |
| Balance | |
| 100-gram iron masses s | |
| weighing scale | |
| | |

## Before the Lab:




1. Cut one of the labels from the sheet of labels for each balance.
2. Tape the labels to the most precise beam of the balance.
3. Review significant figures: the number of digits that are certain plus one more that is estimated.

## Procedure

1. Weigh each of the rough iron masses on the triple-beam balance with imprecise labels. Record the mass of each of the "weights" in Table 1. Don't forget to use significant figures.
2. Calculate the numerical error between the observed mass and the value stamped on it, assuming the balance readings to be correct.
3. Calculate the percentage error of each mass and determine the average percentage error of the group.

Table 1. Percentage Error of Mass Measurements with Imprecise Labels on a Balance

| Iron Mass | Standard Value | Observed Value | Numerical Error *(observed – standard)* | Percentage Error |
|---|---|---|---|---|
| **1** | 100 g | | | |
| **2** | 100 g | | | |
| **3** | 100 g | | | |
| **4** | 100 g | | | |
| **5** | 100 g | | | |
| **Average Percentage Error** | | | | |

4. Repeat the experiment using a standard weighing scale.

Table 2. Percentage Error of Mass Measurements with a Standard Weighing Scale

| Iron Mass | Standard Value | Observed Value | Numerical Error *(observed – standard)* | Percentage Error |
|---|---|---|---|---|
| **1** | 100 g | | | |
| **2** | 100 g | | | |
| **3** | 100 g | | | |
| **4** | 100 g | | | |
| **5** | 100 g | | | |
| **Average Percentage Error** | | | | |

## Post-Lab Discussion

iscuss within our group how the measuring instruments influence the accurac and precision of the measurement.

## Questions:

1. How does the type of label used influence the precision of your measurement?
2. How does the type of label used influence the accuracy of your measurement?
3. In this activity, a balance was used as opposed to a meter stick. When a meter stick is used, parallax influences the precision. What techniques were necessary to optimize the precision of the measurement?
4. Two scientists take a mass measurement of the same sample. The first scientist measures 4.3 g. The other scientist measures 4.30 g. Which scientist took the more precise measurement? How was this accomplished? Explain.