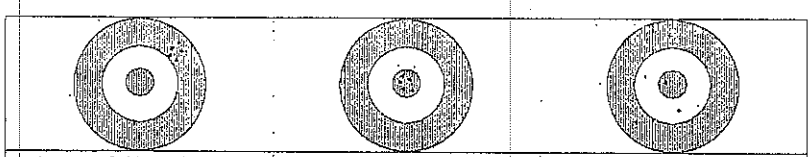
Name _____ Period _____ Date _____

ACCURACY AND PRECISION

Definitions:
Accuracy – how close a measurement is to _____

Precision – how close a measurement is to _____

Precision versus Accuracy:
Look at each target and decide whether the "hits" are accurate, precise, both accurate and precise, or neither accurate nor precise: (Note: An accurate "hit" is a bulls eye!)



Accurate?: Yes / No Precise?: Yes / No	Accurate?: Yes / No Precise?: Yes / No	Accurate?: Yes / No Precise?: Yes / No

Precision Problems:
A group of students worked in separate teams to measure the length of an object. Here are their data:

Team 1	Team 2	Team 3	Team 4	Team 5	Team 6	Team 7
2.65 cm	2.75 cm	2.80 cm	2.77 cm	2.60 cm	2.65 cm	2.68 cm

- The average length is _____ cm.
  This is the mean or average.

- Subtract the highest value from the lowest value: _____ cm.
  This is the range or spread.

- Divide this number by 2: _____ cm.
  This is the approximate ± range from the average.

- The precision of the measurement can be shown as average ± range.
  The precision of the measurement was _____±_____ cm.

A second group of students obtained the following data:

Team 8	Team 9	Team 10	Team 11	Team 12	Team 13	Team 14
2.60 cm	2.70 cm	2.80 cm	2.75 cm	2.65 cm	2.62 cm	2.78 cm

- The average length is _____ cm.

- The precision of the measurement was _____±_____ cm.

In comparing groups, the first or the second, which group was more precise or was the precision the same? Justify your answer.

Expressing Errors in Measurement:
Scientists often express their uncertainty and error in measurement by giving a percent error. The percent error is defined as:

$$\% \text{ error} = \frac{\text{actual value} - \text{measured value}}{\text{actual value}} \times 100$$

Answer the following four questions. Pay attention to significant figures, and show your work!

1. While doing a lab, a student found the density of a piece of pure aluminum to be 2.85 g/cm$_3$. The accepted value for the density of aluminum is 2.70 g/cm$_3$. What was the student's percent error?