

Measurement and Significant Figures Homework

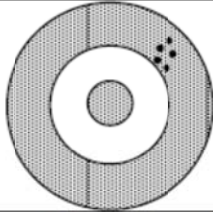
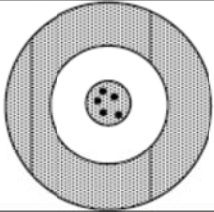
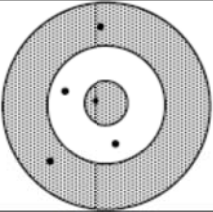
Name: _____ Period _____ Date _____

Read chapter 3 pp. 62 – 72 to complete the following.

<u>Vocabulary Word</u>	<u>Definition</u>
Precision	
Accuracy	

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 \pm range from the average.
- The precision of the measurement can be shown as average \pm range.
The precision of the measurement was _____ \pm _____ 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:

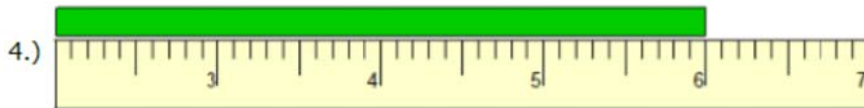
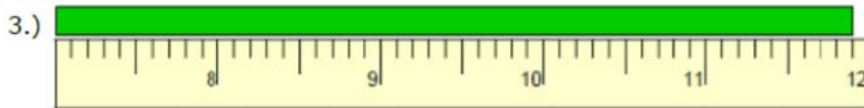
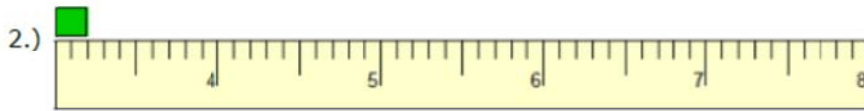
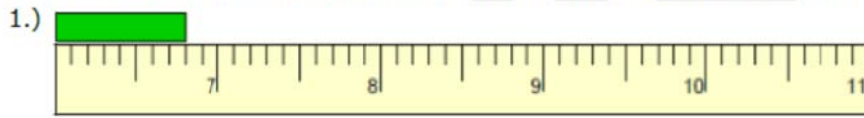
$$\% \text{ error} = \frac{\text{actual value} - \text{measured value}}{\text{actual value}} \times 100$$

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

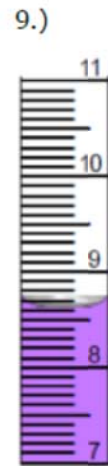
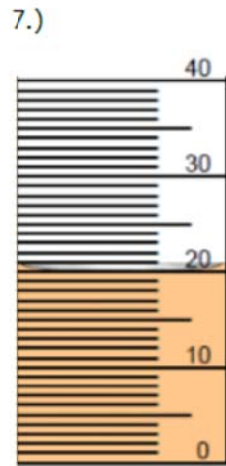
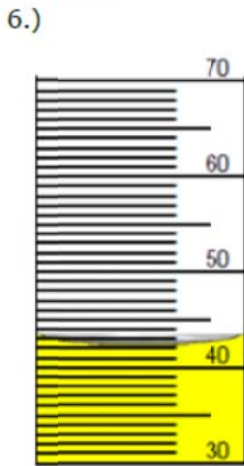
1. While doing a lab, a student found the density of a piece of pure aluminum to be 2.85 g/cm^3 . The accepted value for the density of aluminum is 2.70 g/cm^3 . What was the student's percent error?
2. A student measured the specific heat of water to be 4.29 J/g C° . The literature value of the specific heat of water is 4.18 J/g C° . What was the student's percent error?
3. A student took a calibrated 200.0 gram mass, weighed it on a laboratory balance, and found it read 196.5 g . What was the student's percent error?

PRACTICE WITH READING MEASURING DEVICES WORKSHEET

Part 1 - What are the readings on these metric rulers? Be sure to include units with your answers.



Part 2 – What are the readings on these graduated cylinders? Be sure to include units with your answers.

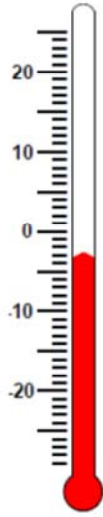


Part 3 – What are the readings on these thermometers? Be sure to include units with your answers.

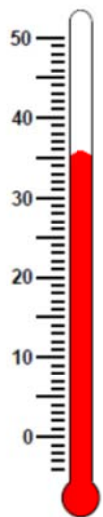
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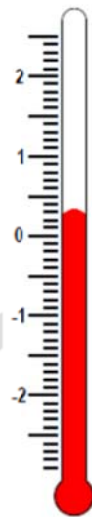
15.)



16.)



17.)



For each of the following, record the value of the measurement with correct units.

A. Measurement of length

<u>Ruler (in cm)</u>	<u>Measurement</u>

Indicate how many significant figures there are in each of the following measured values.

246.32 _____ 107.854 _____ 100.3 _____

0.678 _____ 1.008 _____ 0.00340 _____

14.600 _____ 0.0001 _____ 700000 _____

350.670 _____ 1.0000 _____ 320001 _____

Round each of the following to 3 significant figures:

a) 16.8477 L _____

b) 5.6732 _____

c) 0.14986 L _____

d) 861.85 _____

e) 4.203×10^4 km _____

f) 5.0981×10^{-3} _____

g) 0.00318756 m _____

h) 0.09025011 _____

Determine the answer for each of the following. Be sure to use the correct number of significant figures.

a) 27.34
 6.90
 $+ 13.124$

b) 2.8023
 $- 4.762$

c) $0.32 \times 14.50 \times 120 =$

d) $24.1 / 0.005 =$