

Science, Measurement, and Uncertainty: Accuracy and Precision

Name _	A423				Date			
	ACCURACY AND PRECISION							
Definition	ns:							
Accuracy	- how close	a measurem	ent is to					
•								
recision	- how close	a measureme	nt is to					
recision	versus Accu	ıracy:						
ook at e	ach target a	nd decide wh	nether the "	hits" are acc	curate, prec	ise, both ac		
nd precis	se, or neithe	r accurate n	or precise:	Note: An ac	curate "hit"	is a buils ey		
					Accurate?: Yes / No			
Accurat	e?: Yes / N	No Acci	ırate?: Yes	/ No				
recision f	: Yes / N Problems: f students wheir data:	No Prec	ise?: Yes eparate teal	Y. T. Jan Britan	Precise?: ure the len			
ecision f	Problems: f students i heir data:	worked in se	eparate teal	ms to meası	ure the len	gth of an c		
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A second group of students obtained the following data:

	▶			-	42	Teem 14	
Team 8	Team 9	Team 10	Team 11	Team 12	Team 13	Team 14 2.78 cm	
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 ______t__ 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:

% 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!

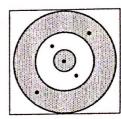
1. While doing a lab, a student found the density of a piece of pure aluminum to be $2.85 \, \text{g/cm}^3$. The accepted value for the density of aluminum is $2.70 \, \text{g/cm}^3$. What was the student's percent error?

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2. A student measured the specific heat of water to be 4.29 $J/g \cdot C^{\circ}$. The literature value of the specific heat of water is 4.18 $J/g \cdot C^{\circ}$. 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?

4. Accuracy is often expressed as an average of several measurements. Look at the target to the right. In your opinion, how well do the measurements on the target represent: (Justify your opinion.)



- a. Accuracy?
- b. Precision?