Accuracy and Precision

Pg. 13-14

Sheila performed an experiment in order to understand the difference between accuracy and precision. She weighed herself using three different scales. She used a bathroom scale, the scale in the nurse's office at school, and a scale in the gym. She recorded the following measurements:

Bathroom Scale	Nurse's Scale	Gym Scale
144	185	139
134	153	138
139	154	140

She observed that the measurements from the bathroom scale were not very close in value to each other and therefore not very precise. Unlike the bathroom scale, the scale from the nurse's office gave results that were reproducible; but since Sheila knew she did not weigh that much, these measurements were not accurate. The scale from the gym gave results that were both reproducible and close to her true weight, 139 pounds; these measurements were both accurate and precise.

Accuracy is how close a single measurement is to the true value of whatever is being measured. Precision is how close several measurements are to each other. Precise measurements have repeatability.

standard value

Apply

The following measurements were made on a piece of copper whose true mass is known to be 1.55 gram: 1.53 g, 1.40 g, 1.65 g, and 1.67 g.

1. Which two measurements are the most precise? Why are they the most precise? precision = repeatable
   1.65g & 1.67g (closest to each other);
2. Which measurement is the most accurate? Why is it the most accurate?
   1.53g most accurate (means closest to correct)
3. What are some of the steps you could take during an experiment to make sure that your measurements are both accurate and precise? repeat experiment; be sure equipment is working properly

1–6 Review and Reinforcement

Working With Numbers

Complete the following statements by inserting either "are" or "are not" in the blanks provided.

1. Zeros between two significant digits are significant.
2. Zeros to the right of a decimal point that precede all nonzero digits are not significant.
3. All nonzero digits are significant.
4. One or more final zeros used after the decimal point are significant.
5. Zeros used solely for spacing the decimal point are not significant.

Count the number of significant digits in each of the measurements listed below. Write your answer in the space provided.

	Significant Digits
6. 230.005 m	6
7. 109,000 kg	3
8. 328.46 mm	5
9. 0.00607 cm^3	3
10. 5.017 L	4
11. 8000 km	1
12. 0.057 g	2

Sig-Fig

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"All of the certain numbers plus the first uncertain number"

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The "Atlantic-Pacific Trick" to Significant figures

1. Pretend the number you are trying to determine significant figures for is the United States.
2. Ask the question, is there a decimal present or absent in the number? If the decimal is Absent, go to the Atlantic side of the number, if there is a decimal Present, go to the Pacific side of the number.
3. From the correct side, cross off all zeros, until you get to your first nonzero digit.
4. All other digits are significant!

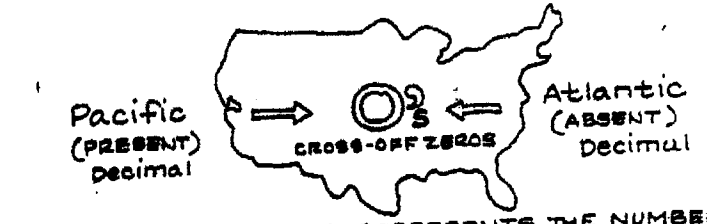
Example: 0.5210 mm pacific side 0.5210 atlantic side → ∅.5210

A decimal is present, so I start from the pacific side and cross off all zeros, until I get to my first nonzero digit (the 5). All other digits are significant, therefore 0.5210 = 4 sig. fig.

Example: 73,900 cm pacific side 73,900 atlantic side 73,9∅∅ ←

A decimal is absent, so I start from the atlantic side and cross off all zeros, until I get to my first nonzero digit (the 9). All other digits are significant, therefore 73,900 = 3 sig. fig.

See, It's easy!!! Try the problems on page 24, and on this sheet.



THE U.S. REPRESENTS THE NUMBER

33.6	3	.004	1
33.0	3	.0004	1
410	2	.00041	2
4,100	2	.000410	3
5,002	4	10.004	5
62,000.	5	10.00041	7
62,000.0	6	15,000,000.50	10