

**Chem Honors WKS: Accuracy,
Precision & Significant Figures in Measurements**

NAME _____
Period _____ Date _____

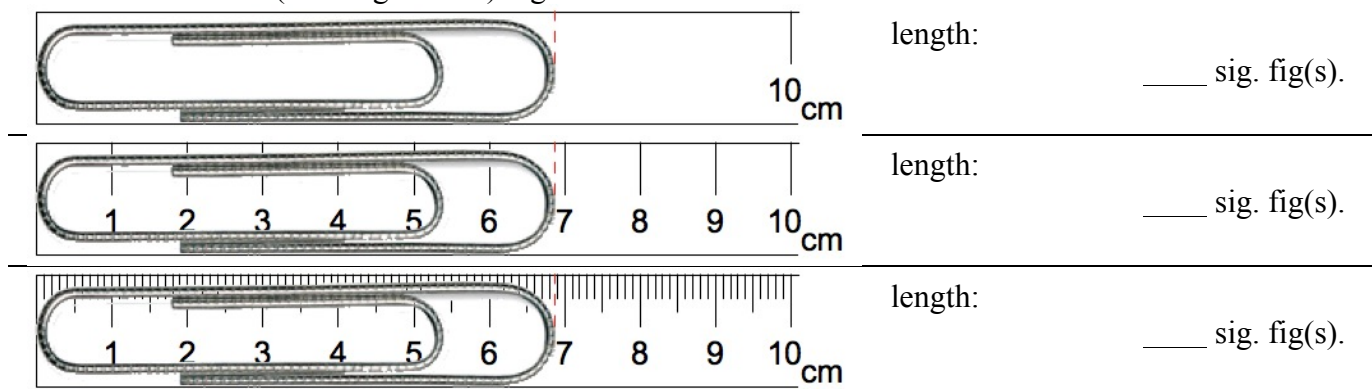
1. What is accuracy?
2. What is precision for a group of measurements?
3. What is meant by *random error*? How can you reduce random error in an experiment?
4. What is meant by *systematic error*? How can you reduce systematic error in an experiment?

5. Two students measured the densities of 3 separate samples of sucrose (accepted $D = 1.59 \text{ g/cm}^3$) and obtained the following results. Find the average density for each student, then use that average to determine each student's % error. Which student was most accurate? Which student was most precise? Explain your choices.

Density Data of Sucrose		
	Student B	Student C
Trial	Density (g/cm^3)	Density (g/cm^3)
1	1.40	1.70
2	1.68	1.69
3	1.45	1.71
Avg		

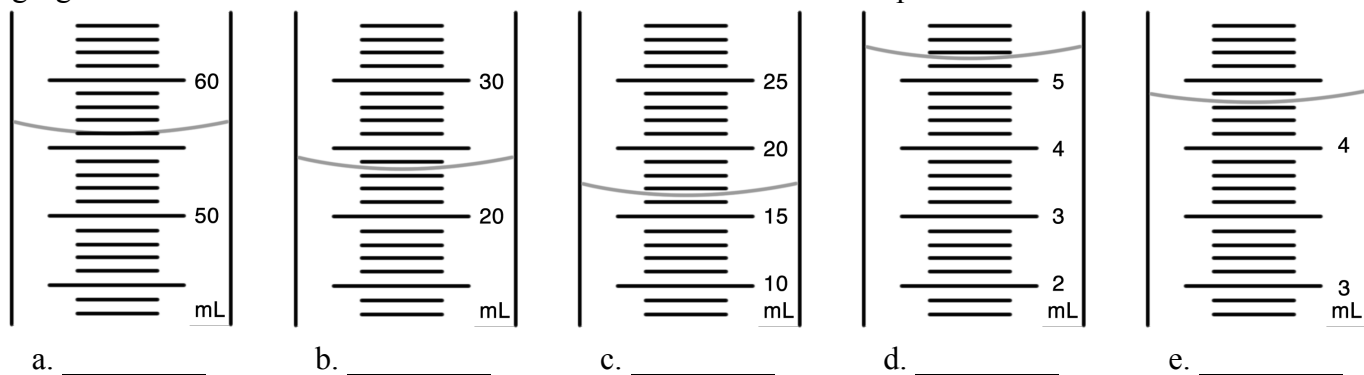
6. A piece of wood has a labeled length of 76.49 cm. You measure its length three times and record the following data: 76.48 cm, 76.47 cm, and 76.59 cm. How many significant figures do these measurements have?
7. Calculate the percent error for each measurement in problem 6 to the correct number of sig figs.
8. Are the measurements in problem 6 accurate? Are they precise? Explain your answers.
9. Which of these measurements was made with the most precise measuring device: 8.1956 m, 89.20 m, or 8.196 m? Explain your answer.

10. On the rulers below, measure the length of the paper clip, in cm. **Cover up the ruler(s) below the one you are using to prevent being influenced by them.** The measurements will NOT be identical. You must read to the calibration markings then estimate the next decimal place as the final digit. Indicate the precision as ± 1 in the estimated (least significant) digit.



- Why were the measurements different?
- Which measurement required the greatest amount of estimation? Which has the most precision? Explain.
- How did you indicate the differences in the precision in your measurements?

11. **Measuring Volume:** Determine the volume of H₂O in the following graduated cylinders, using the correct sig figs. Remember to read at the bottom of the meniscus. Indicate the precision as in #10.



12. Identify the number of significant figures (you do not need units on sig figs):

- | | |
|----------------------------|---------------------------|
| a. 3.0800 kg | b. 0.00418 m |
| c. 7.09×10^{-5} L | d. 91,600 miles |
| e. 0.003005 g | f. 38 books |
| g. 3.200×10^9 s | h. 250 °C |
| i. 780,000,000 km | j. 20 years in one score |
| k. 0.0101 mL | l. 0.00800 cm |
| m. 20,700 inches | n. 5.0002×10^8 J |

Answers: 5. % Error (B) = 5%; % Error (C) = 6.9%; 7. % Error = 0.01%, 0.03%, 0.13%