

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

NAME \_\_\_\_\_  
Period \_\_\_\_\_ Date \_\_\_\_\_

**III. Accuracy & Precision**

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?

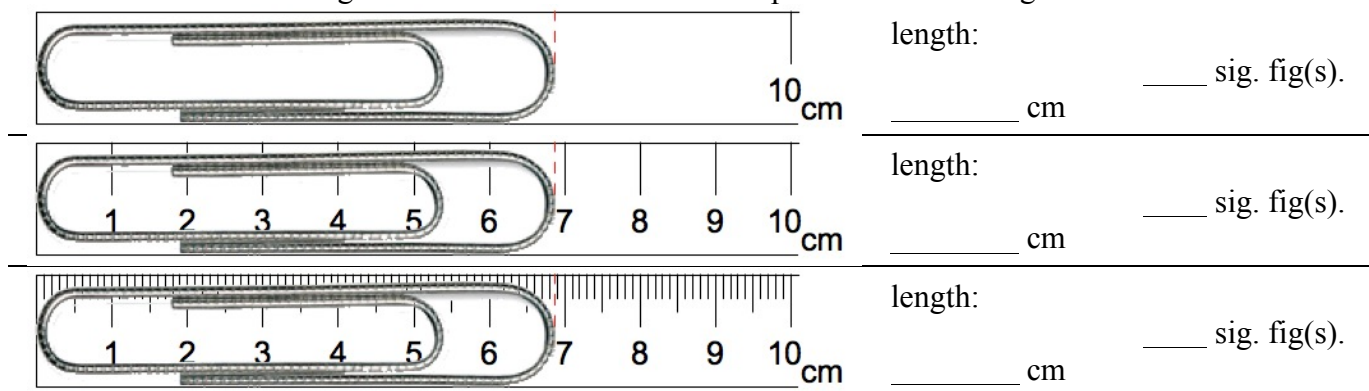
5. Two students measured the densities of 3 separate samples of sucrose (accepted  $D = 1.59 \text{ g/cm}^3$ ) and obtained the following results. Find the average density for each student, then use that average to determine each student's % error. Which student was most accurate? Which student was most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

Density Data of Sucrose		
	Student B	Student C
Trial	Density ( $\text{g/cm}^3$ )	Density ( $\text{g/cm}^3$ )
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.

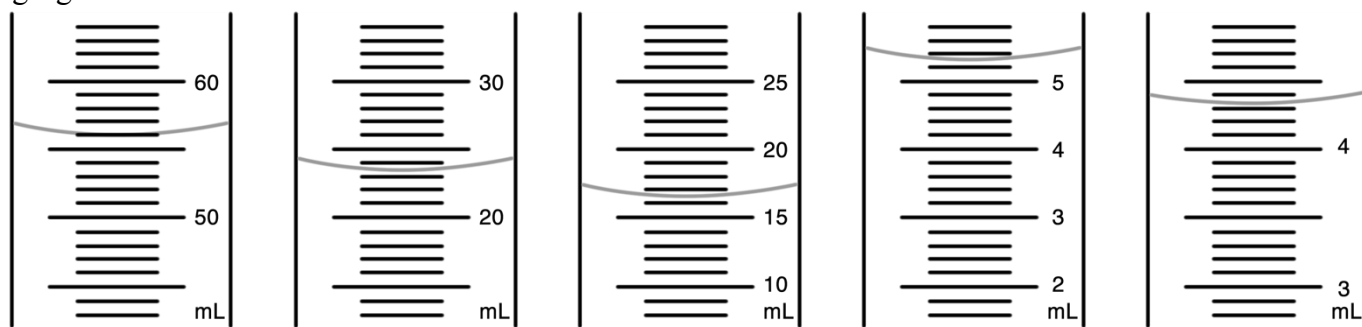
#### IV. Significant Figures in Measurements

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.



- 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 H<sub>2</sub>O in the following graduated cylinders, using the correct sig figs. Remember to read at the bottom of the meniscus.



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

- |                            |                           |
|----------------------------|---------------------------|
| a. 3.0800 kg               | b. 0.00418 m              |
| c. $7.09 \times 10^{-5}$ L | d. 91,600 miles           |
| e. 0.003005 g              | f. 38 books               |
| g. $3.200 \times 10^9$ 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. $5.0002 \times 10^8$ J |

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