SPH3U

# Measurement Worksheet #1

Date:_____

1. What is the difference between random and systematic error?

A random error reflects the uncertainty generated by human estimation and random system variations. A systematic error reflects a consistent bias in the measurement due to factors such as calibration error.

2. Why would it not be sensible to record a distance measurement as 55.125 ± 0.1 m? What would be a more appropriate way to write this distance measurement?

Since the measurement uncertainty is ± 0.1 m the experimentor estimated to the tenth of a metre so there is no point in including additional decimal places. Nearest

3. State the number of significant digits in each of the following quantities:

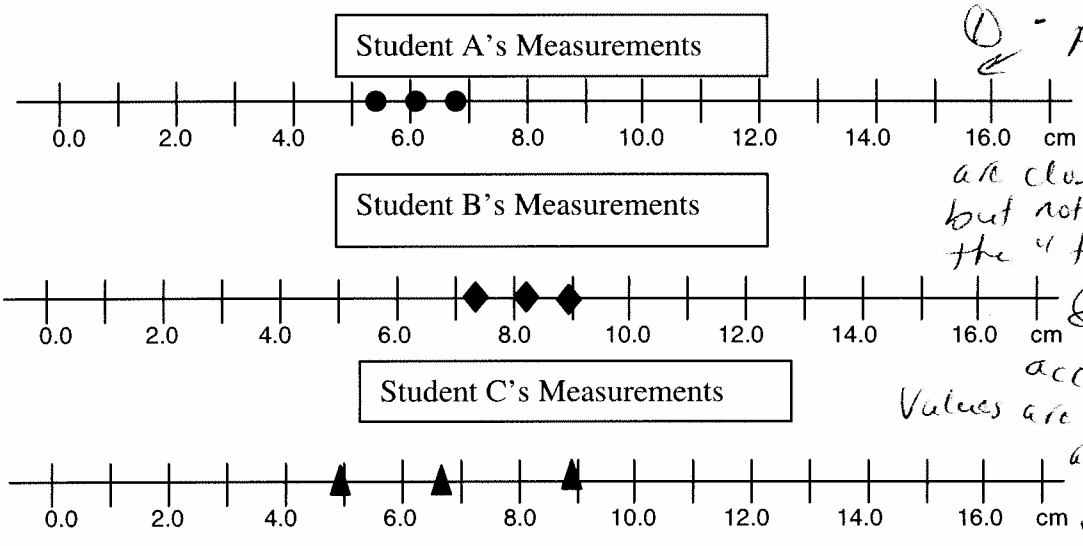
| | | | |
|---|---|---|---|
| a) 809 g | 3 | g) 15 cycles | infinite (*a count*) |
| b) 5.60 s | 3 | h) 0.0032050 m | 5 |
| c) 0.00060 cm | 2 | i) 136 000 $m^2$ | 3 |
| d) 5.795 km | 4 | j) 1000 mm/m | infinite (a *conversion factor*) |
| e) 120 m | 2 | k) 1.350 V | 4 |
| f) 0.000 003 25 kg | 3 | l) 14.50 m | 4 |

4. Circle the most precise measurement in each of the following sets of measurements.

a) 9.0 mm  23.1 mm  465 mm  **9.045 mm**

b) 2.35 g  9.675 g  **0.4875 g**  126.35 g

5. Three students have measured the length of the same metal bar. Each student measured the bar three times. Their measurements are illustrated on the number line diagrams below.




(1) - Precise but not accurate as the values are closely clustered but not centred about the "true" value.

(2) Precise and accurate as the values are close together and clustered about the true value

a) The accepted length of the metal bar (according to the manufacturer) was 8.0 cm. Using the terms "precise" and "accurate" describe each student's set of measurements. Explain your answers.

(3) Neither precise nor accurate as the values are spread apart and the average value is not close to the actual value