HPS Measurement Packet Questions 2 Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Per \_\_\_\_\_

OBJECTIVE: measure length, volume, and mass with correct accuracy and precision using a variety of measuring devices. (Obj 2)

BACKGROUND INFO: No measure is exact due to errors in instrumentation and measuring skills. Therefore, all measurements have inherent uncertainty that must be recorded. When you report a number as a measurement, the number of digits and the number of decimal places tell you how exact the measurement is. That is precision.

1. What is the degree of freedom? (The packet refers to it as the “estimate” on the last line of the first paragraph on page 1.)  
   The last recorded digit in a measurement is your estimate or degree of freedom.
2. List and describe the three parts of a COMPLETE measurement along with an example of a measurement.  
   A. Measurement

1. Write what know

2. Include the degree of freedom

B. Uncertainty (random error)

1. ½ smallest division on the scale

2. Determined by the measuring tool/device

C. Units

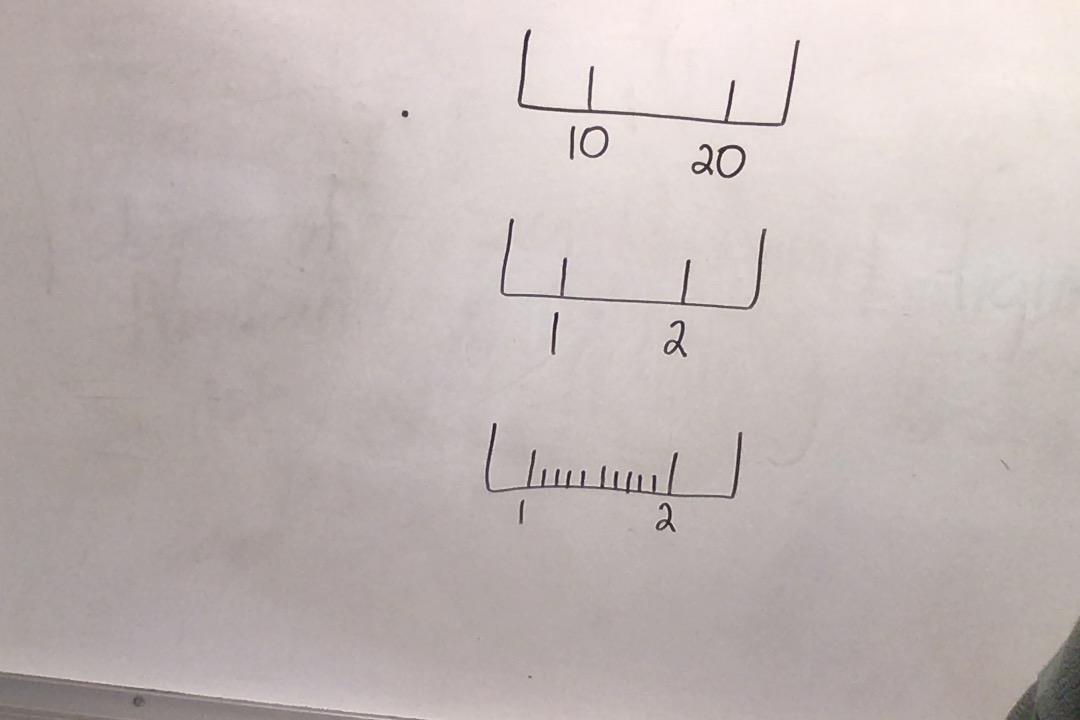
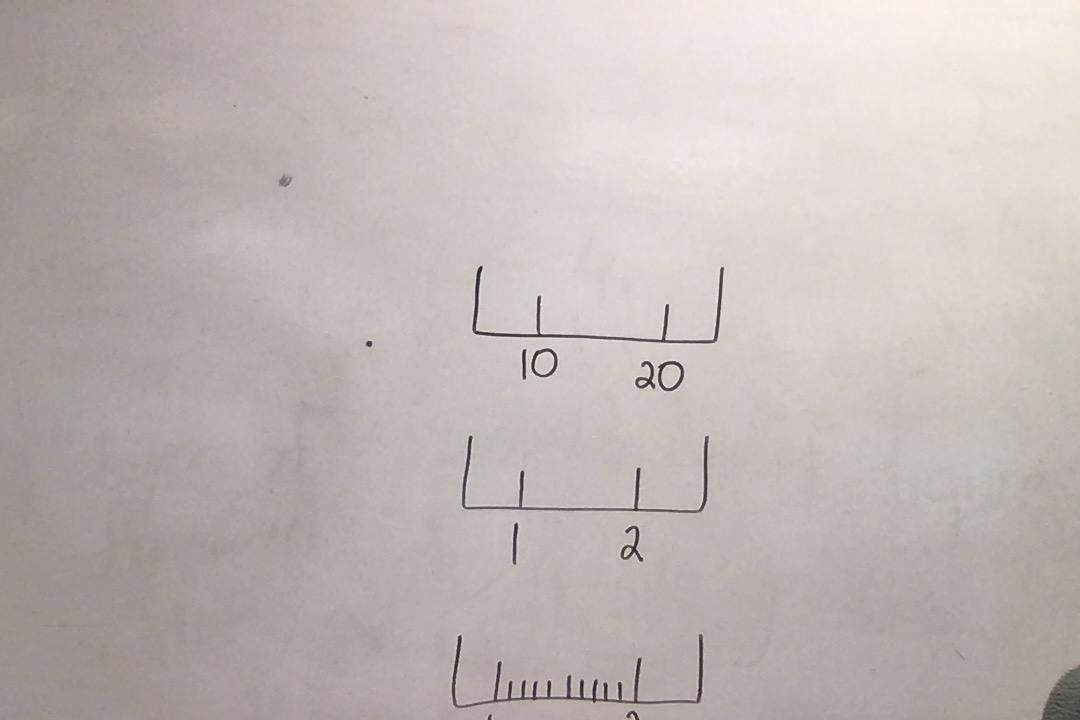
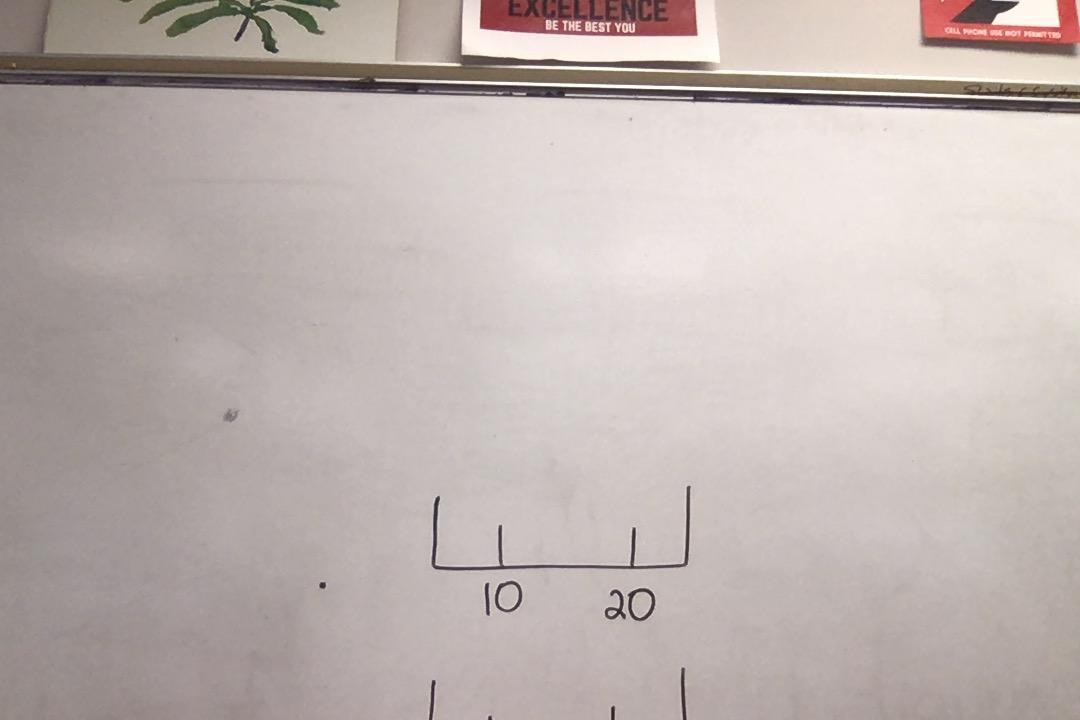
1. Use metric unless otherwise instructed

2. Common SI units: meter, liter, kilogram, Kelvin, second

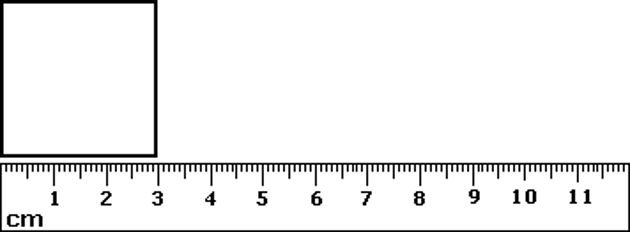
EX: 15.4 ± .5 cm

1. Write the letter of the measurement tool that could produce the following measurements. Assume all tools are in centimeters.

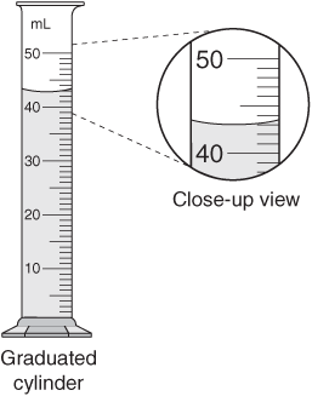
15.4 ± .5 cm \_\_B\_\_\_\_\_ 15 ± 5 cm \_\_\_A\_\_\_\_ 15.47 ± .05 cm \_\_C\_\_\_\_\_

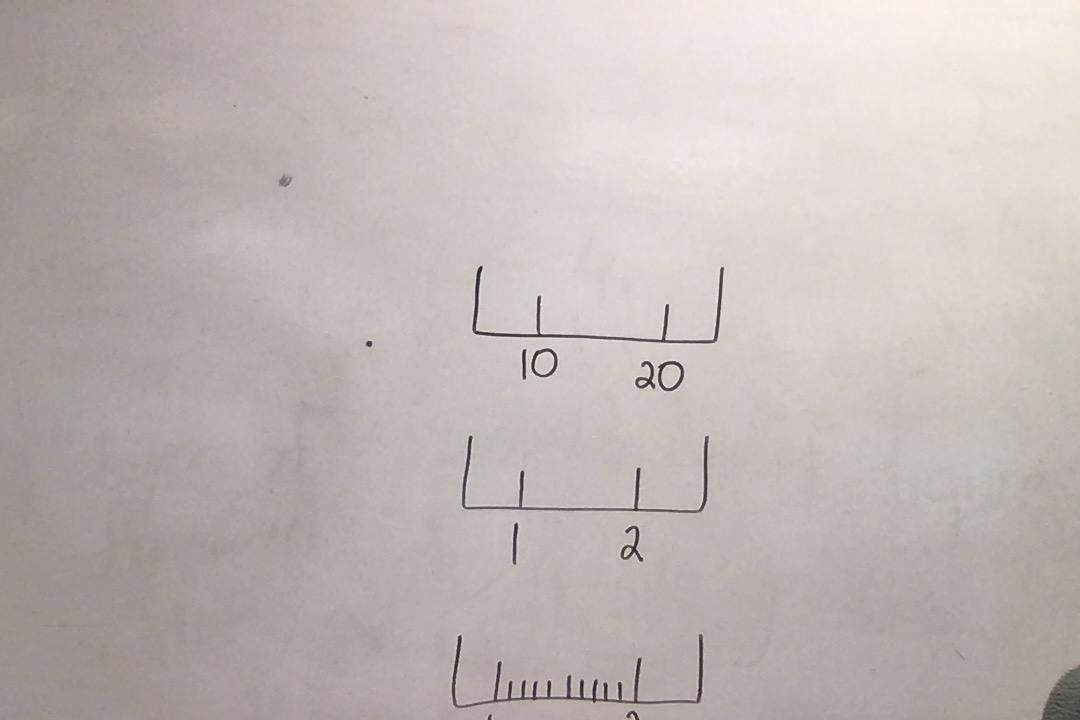
A. B. C.   


1. Which measurement/device is the most precise? Explain.  
   C is most precise. It has the smallest divisions, which allow the scientist to measure to the hundredths place.
2. Measure the length of the square. Report all parts of the measurement. \_2.98 ± .05 cm\_\_\_\_



1. Measure the mystery liquid. Report all parts of the measurement. \_\_\_43.0 ± .5 mL



1. Draw a measuring device that would give 7.3 ± .5 cm as a measurement.  
   
2. Why do we need a standardized system of measurement?  
   An international “language” of measurement allows scientists to share, interpret, and compare experimental findings with other scientists, regardless of nationality or language barriers.
3. Complete the table with the SI units and symbols.

|  |  |  |
| --- | --- | --- |
| **Physical Quantity** | **SI Unit** | **Symbol** |
| length | meter | m |
| mass | kilogram | kg |
| volume | Liter, meter cubed | L, m3 |
| temperature | Kelvin | K |
| time | second | s |