Practice – Measurement

Answer the following questions using your notes on "Measurement" given in class. Be sure to include correct units in your answers.

Key 13-14 phys

Part 1: Scientific Notation

Convert the following numbers to scientific notation.

1. 6,000,000,000 people

6×10^{9} people

2. 0.000 000 237 m

2.37×10^{-7} m

3. 30 400 000.00 g

3.04×10^{7} g

4. 0.000 020 9 L

2.09×10^{-5} L

Convert the following number from scientific notation into standard notation.

5. 3.009×10^{10} °C

30 090 000 000 °C

6. 8.09×10^{-3} K

0.008 09 K

7. 5.6×10^{-5} mg

0.000 056 mg

8. 4.7682345×10^{5} km

476 823.45 Km

*Complete the following scientific notation calculations **without** the use of a calculator. Refer to your notes if you are unsure how to do this. Include units!*

9. $(8.46 \times 10^{7}\ \text{N})(2.0 \times 10^{3}\ \text{m})$

1.7×10^{11} Nm

10. $3.0 \times 10^{8}\ \text{m} / 1.5 \times 10^{3}\ \text{s}$

2.0×10^{5} m/s

11. $8.15 \times 10^{3}\ \text{m} + 7.00 \times 10^{4}\ \text{m}$

7.82×10^{4} m

12. $3.23 \times 10^{5}\ \text{kg} - 3.23 \times 10^{3}\ \text{kg}$

3.20×10^{5} kg

*Complete the following scientific notation calculations **with** the use of a calculator. Include units!*

13. $(3.01 \times 10^{3}\ \text{s})(4.02 \times 10^{3}\ \text{s})$

$1.21 \times 10^{7}\ s^{2}$

14. $3.0 \times 10^{3}\ \text{m} / 1.5 \times 10^{3}\ \text{s}$

2.0 m/s

15. $4.602 \times 10^{-2}\ \text{s} + 3.398 \times 10^{-3}\ \text{s}$

4.942×10^{-2} s

16. $2.0 \times 10^{6}\ \text{mL} - 3.0 \times 10^{4}\ \text{mL}$

2.0×10^{6} mL

Part 2: Systems of Measurement

Place an x in the box next to each historic system of measurement if you think it is standardized and/or universal. Leave them blank if you think they are neither.

#	System of measure	Standardized?	Universal?
17.	Egyptian		
18.	Metric		X
19.	English/Imperial	X	
20.	SI	X	X

21. Why is it better to define a meter on the speed of light than on 1/10 000 000th the distance from the North Pole to the equator or a metal rod kept in a vault in France?

This distance is and will remain constant, whereas Earth can change & metal rod can expand/contract/decay.

Part 3: Properties you can Measure

Fill in the empty boxes in the table below:

#	Measurement	Definition	Sense Extender	SI Unit
22.	mass	Amount matter resists Δ motion	balance	Kg
23.	Volume	Amount of space an object takes up	meterstick / Grad Cylinder	m^3
24.	temperature	How fast the particles in a given substance are moving	thermometer	K
25.	length	Distance between 2 points	meterstick	m

Part 4: Using the Metric Prefixes

26. Write the abbreviation for the metric unit that stands for 1/10 of a gram. dg

27. Write the abbreviation for the metric unit that is $1/100^{th}$ of a meter long. cm

28. Write the abbreviation for the metric unit that means 0.001 liters. mL

Fill in the empty boxes in the table below:

#	Metric Unit	Abbreviation	Meaning
29.	kiloliter	kL	10^3 or 1000 Liters
30.	millimeter	mm	10^{-3} or 1/1000 meters
31.	hectogram	hg	10^2 or 100 grams
32.	decimeter	dm	10^{-1} or 1/10 meter
33.	centigram	cg	10^{-2} or 1/100 gram
34.	deca-liter	daL	10^1 or 10 liters

For each object listed in the second table below, choose from the first list which tool and unit of measurement you would use to measure it.

35. Considering that a liter is the volume of ½ a two-liter bottle of beverage, what metric unit would be appropriate for measuring:
    a. The volume of water in your swimming pool? kL
    b. The volume of water in a coffee mug? cL

36. Considering that a gram is approximately the mass of a paperclip, what metric unit would be appropriate for measuring:
    a. The mass of a ladybug? cg -or- dg
    b. The mass of a large dog? Kg

Part 5: Metric Conversions

Fill in the blanks with the correct metric conversions.

37. 1.00 cm = 10.0 mm = 0.00001 km = 0.1 dm = 1.00 cm

38. 437.9 g = 0.4379 kg = 4.379 hg = 437900 mg = 437.9 g

39. 4.138 kL = 4138 L = 413.8 daL = 413800 cL = 4.138 kL