Chemistry 11 - UNIT 3

Name: _____

Measurement Unit Review Package

1. Give the *standard base unit* name and symbol to complete the chart below

Quantity	Length	Mass	Time	Temperature	Amount
Unit	meters	grams	seconds	celcius	moles
Symbol	m	g	s	c	mol

2. Fill in the blanks below to complete the *metric prefix* table

Prefix Name	Prefix Symbol	Exponential Equivalent	Prefix Name	Prefix Symbol	Exponential Equivalent
giga	G	10^9	deci	d	10^{-1}
mega	M	10^6	centi	c	10^{-2}
kilo	k	10^3	milli	m	10^{-3}
hecta	h	10^2	micro	μ	10^{-6}
deka	da	10^1	nano	n	10^{-9}

3. Common conversion factors in chemistry: (.5 mark each)

How many kilograms equal 1 ton? 10^3 kg

How many milliliters equal 1 cubic centimeter? 1 mL

How many liters equal 1 cubic meter? 10^3 L

4. Write *chemistry's* general formula for density: d = m / v

5. Density is independant of amount

6. Label the... written prefix, written unit, exponential equivalent, prefix symbol, unit symbol(s)
(WP) (WU) (EE) (PS) (US)

13 gigatons = 13 Gt = 13×10^{-6} t

WP WU PS US EE US

7. Re-write the following using *prefix* and ***unit symbols***

a. 2.5 centigrams	2.5 cg
b. 5.17 deciseconds	5.17 ds
c. 6.5 millimoles	6.5 mmol

8. Re-write the following using ***written*** *prefixes* and *units*

a. 4.3×10^{-9} g	4.3 nanograms
b. 8.68×10^{1} L	8.68 dekalitres
c. 1.94×10^{2} m	1.94 hectometers

9. Re-write the following using ***exponential*** *equivalents*

a. 3.2 Mt	3.2×10^{6} t
b. 7.68 µL	7.68×10^{-6} L
c. 8.7 Gs	8.7×10^{9} s

10. Convert to base units using proper conversion factors

a. 3.271 Gt	$3.271\ \text{Gt}\left(\frac{10^{9}\ \text{t}}{1\ \text{Gt}}\right) = 3.271 \times 10^{9}\ \text{t}$
b. 9.64 µm	$9.64\ \mu\text{m}\left(\frac{10^{-6}\ \text{m}}{1\ \mu\text{m}}\right) = 9.64 \times 10^{-6}\ \text{m}$
c. 8.05 das	$8.05\ \text{das}\left(\frac{10^{1}\ \text{s}}{1\ \text{das}}\right) = 80.5\ \text{s}$

11. Explain the following terms. Use diagrams if needed (1 mark each)

- **Accuracy**: how close a measurement is to the true (or accepted) value
- **Precision**: how close repeated measurements can agree with each other

12. A "calibration weight" has a mass of exactly 1.000 000 g. A student uses 4 different balances to check the mass of the weight. The results of weighings are shown below.

Mass using balance A = 0.901 453 g Mass using balance B = 1.00 g

Mass using balance C = 0.999 999 g Mass using balance D = 2.0 g

a. Which of the balances give precise weighings? A, C

b. Which of the balances give accurate weighings? B, C

c. Which balance is both accurate and precise? C

13. For each value below, decide if it was most likely obtained by measurement (**M**) or counting (**C**)

a. 0.50 grams M b. 6 atoms C

c. 24 students C d. 400 cm M

e. 2.60 liters M f. 20km/hr M

14. How many significant figures are in each of the following (1 mark each)

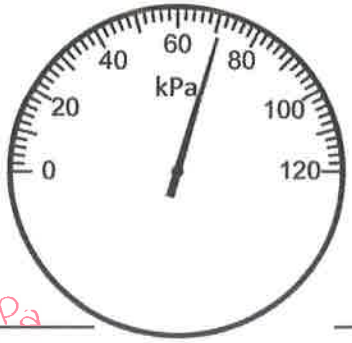
a. 123.456 g 6 sf b. 12.0001 µmol 6 sf

c. 12 000 m 2 sf d. 1.345×10^{-4} cL 4 sf

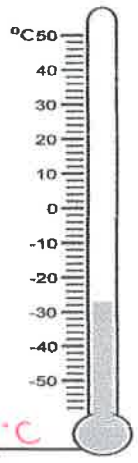
e. 0.000234 s 3 sf f. 123.45600 kt 8 sf

15. Determine the precise measurement for the following scales.
Answer must have correct sig figs (including uncertainty) and include units

1.00 cm
3 sf



705 kPa
3sf



-27.0°C
3sf

Answers must have correct sig figs, be in scientific notation and circled! Ex. 1.00×10^{1} units

16. Perform the operation and report the answer with the correct number of sig figs.

a. (11.4) x (0.0218) = 0.249 3sf

b. (11.4) + (0.0218) = 11.4 1dp

c. $\frac{[(11.4) + (0.0218)]}{[(11.4) \times (0.0218)]}$ = 46.0 3sf

17. A halite (rock slat) crystal has a mass of 43.814 g and a density of 2.56 g/cm^3. Determine the volume of the sample.

$d = m/V$

$V = m/d$

$V = 43.814\,g \div \left(\frac{1\,cm^3}{2.56\,g}\right)$

$= 17.115\,cm^3$

$= 1.71 \times 10^{1}\,cm^3$ (3sf)

18. There were 62.0 g of a substance dissolved in 300 mL of a solution. What is the solubility of that substance. Hint: derived quantity = g/mL

$\text{solubility} = \frac{62.0\,g}{300\,mL} = 2 \times 10^{-1}\,g/mL$ (1sf)

19. If 1 L of granite has a mass of 5.50kg, what is the mass, in grams of 5.00mL?

U = mass

I = 5.00 mL

CF: 1L = 5.50kg

1mL = 10^{-3} L

1kg = 10^{3} g

$\text{mass} = 5.00\,mL \left(\frac{10^{-3}\,L}{1\,mL}\right)\left(\frac{5.50\,kg}{1\,L}\right)\left(\frac{10^{3}\,g}{1\,kg}\right)$

$= 5.00 \times 10^{3} \times 5.50 \times 10^{3}\,g$

$= 2.75 \times 10^{1}\,g$

20. A weather satellite orbits Earth at an altitude of 1,350,000 meters. What is that altitude in kilometers?

$\text{altitude} = 1\,350\,000\,m \left(\frac{1\,km}{10^{3}\,m}\right)$ (3sf)

$= 1350\,km \rightarrow 1.35 \times 10^{3}\,km$

21. One cereal bar has a mass of 37g. What is the mass of 6 cereal bars? (1) Is that mass of 6 cereal bars, more than or less than 1kg? (2) Do you like cereal bars? (3)

(1) $\text{mass} = 37\,g \times 6\,\text{bars} = 222\,g$

(2) $\text{mass} = 222\,g \left(\frac{1\,kg}{10^{3}\,g}\right) = 0.222\,kg = 2.22 \times 10^{-1}\,kg < 1\,kg$

(3) No