

Name _____ Block: _____ Date: _____

Chemistry 11
UNIT 2 REVIEW

KEY

1. Complete the following table (try from memory first!)

Prefix	Abbreviation	Exponent
giga	G	10^9
micro	μ	10^{-6}
mega	M	10^6
pico	P	10^{-12}
deci	d	10^{-1}
nano	n	10^{-9}
milli	m	10^{-3}
kilo	k	10^3
centi	c	10^{-2}

2. Convert the following:

- a. 0.00085L into microliters $\mu\text{L} = (0.00085\text{L}) \left(\frac{1\mu\text{L}}{10^{-6}\text{L}} \right) = 8.5 \times 10^2 \mu\text{L}$
- b. 432 ng into grams $\text{g} = (432\text{ng}) \left(\frac{10^{-9}\text{g}}{1\text{ng}} \right) = 4.32 \times 10^{-7}\text{g}$
- c. 50 ks into Ms $\text{MS} = (50\text{ks}) \left(\frac{10^3\text{s}}{1\text{ks}} \right) \left(\frac{1\text{MS}}{10^6\text{s}} \right) = 5.0 \times 10^{-2}\text{MS}$
- d. 2 cg into μg $\mu\text{g} = (2\text{cg}) \left(\frac{10^{-2}\text{g}}{1\text{cg}} \right) \left(\frac{1\mu\text{g}}{10^{-6}\text{g}} \right) = 2 \times 10^4 \mu\text{g}$
- e. 12 pL into cL $\text{cL} = (12\text{pL}) \left(\frac{10^{-12}\text{L}}{1\text{pL}} \right) \left(\frac{1\text{cL}}{10^{-2}\text{L}} \right) = 1.2 \times 10^{-9}\text{cL}$
- f. 0.35 g/s into g/min $\frac{\text{g}}{\text{min}} = \left(\frac{0.35\text{g}}{\text{s}} \right) \left(\frac{60\text{s}}{\text{min}} \right) = 21 \frac{\text{g}}{\text{min}}$
- g. 70 kV into mV $\text{mV} = (70\text{kV}) \left(\frac{10^3\text{V}}{1\text{kV}} \right) \left(\frac{1\text{mV}}{10^{-3}\text{V}} \right) = 7.0 \times 10^7 \text{mV}$
- h. 0.1 dm into millimetres $\text{mm} = (0.1\text{dm}) \left(\frac{10^{-1}\text{m}}{1\text{dm}} \right) \left(\frac{1\text{mm}}{10^{-3}\text{m}} \right) = 10\text{mm}$
or $1 \times 10^1 \text{mm}$
- i. 3.46 mg/s into kg/ms $\frac{\text{kg}}{\text{ms}} = \left(\frac{3.46\text{mg}}{\text{s}} \right) \left(\frac{10^{-3}\text{g}}{1\text{mg}} \right) \left(\frac{1\text{kg}}{10^3\text{g}} \right) \left(\frac{10^{-3}\text{s}}{1\text{ms}} \right) = 3.46 \times 10^{-9} \frac{\text{kg}}{\text{ms}}$
- j. 0.96 kg/L into mg/ μL $\frac{\text{mg}}{\mu\text{L}} = \left(\frac{0.96\text{kg}}{\text{L}} \right) \left(\frac{10^3\text{g}}{1\text{kg}} \right) \left(\frac{1\text{mg}}{10^{-3}\text{g}} \right) \left(\frac{10^{-6}\text{L}}{1\mu\text{L}} \right) = 9.6 \times 10^{-1} \frac{\text{mg}}{\mu\text{L}}$

3. Of the following balances, which is the most precise? Balance C

How do you know? most number of decimal places



4. What is the uncertainty of Balance A? $\pm 0.01\text{g}$ (hint: look at the decimal places)

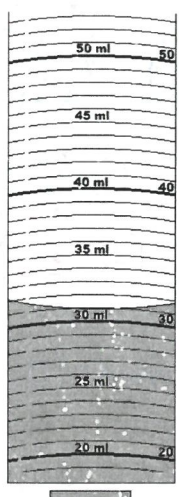
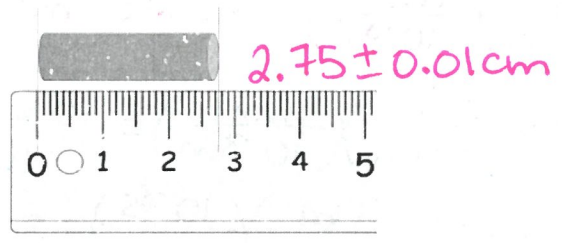
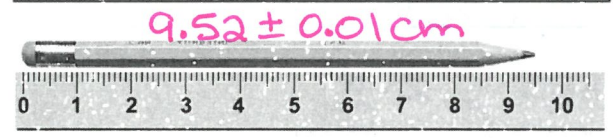
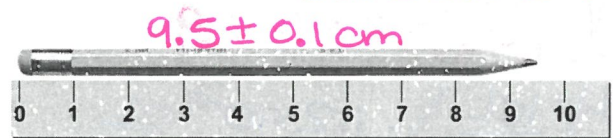
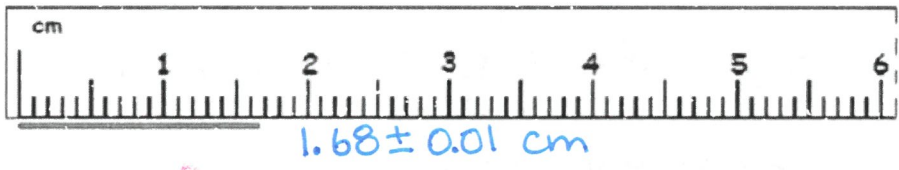
5. What is the uncertainty of Balance C? $\pm 0.00001\text{g}$

6. The last digit in any measurement has some uncertainty.

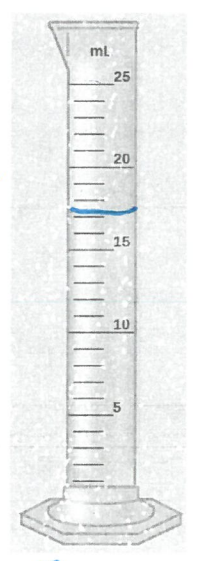
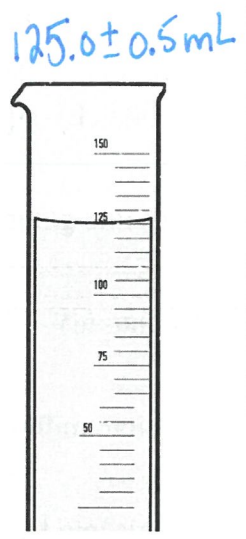
7. The number of certain digits + 1 uncertain digit is called the number of significant digits

8. What is meant by the accuracy of a measurement? how close a reading is to an acceptable standard

9. Determine the correct reading on the following scales, including the uncertainty term. Assume all rulers are in cm and graduated cylinders are in mL.



$31.1 \pm 0.1\text{ mL}$



$17.2 \pm 0.1\text{ mL}$

10. Determine the number of **significant digits** (figures) in each of the following numbers.

- a) 45.002 5 b) 3.400×10^{-4} 4 c) 0.000003 1 d) 3000 1

11. Express each of the following numbers to **2 significant digits** (figures).

- a) 45670 4.6×10^4 b) 0.00003448 3.4×10^{-5} c) 3000000 3.0×10^6
 d) 23.0954 2.3×10^1 e) 4.56219×10^3 4.6×10^3 f) 9 9.0

12. Perform the following calculations and express the answer in the correct number of significant digits or decimal places as justified by the data. Do not forget the rules for multiplication and division and for addition and subtraction.

a) $3.4589 \times 0.0112 = \overset{5sd}{3.4589} \times \overset{3sd}{0.0112} = \underline{3.87 \times 10^{-2}}$ b) $(5.600 \times 10^{-7}) \div 0.700 = \overset{4sd}{5.600} \times 10^{-7} \div \overset{3sd}{0.700} = \underline{8.00 \times 10^{-7}}$

c) $8.6 + 0.473 = \overset{1dp}{8.6} + \overset{4dp}{0.473} = \underline{9.1}$ d) $3.2697 - 0.411 = \overset{4dp}{3.2697} - \overset{3dp}{0.411} = \underline{2.859}$

e) $(2.3 \times 10^{-7}) \times 8.22298 = \overset{2sd}{2.3} \times 10^{-7} \times \overset{6sd}{8.22298} = \underline{1.9 \times 10^{-6}}$

f) $(5.2468 \times 0.923) + (3.00210 \times 1.9999) = \overset{5sd}{5.2468} \times \overset{3sd}{0.923} + \overset{6sd}{3.00210} \times \overset{5sd}{1.9999} = \underline{10.85}$
 $\overset{3sd}{4.8427964} + \overset{5sd}{6.00389979}$
 \uparrow
 $2dp$

g) $(6.210 + 0.92) \times (3.75411 + 1.32410) = \overset{3dp}{6.210} + \overset{2dp}{0.92} \times \overset{5dp}{3.75411} + \overset{5dp}{1.32410} = \underline{36.2}$
 $\overset{2dp}{7.13} \times \overset{5dp}{5.07821}$
 $2dp = 3sf$ $5dp = 6sd$ $3sd$

h) $(222.115 - 4.56892) = \overset{3dp}{222.115} - \overset{5dp}{4.56892} = \underline{217.54608}$ $\overset{3dp}{32.98} - \overset{5dp}{25.22316} = \underline{7.7568}$ $\underline{28.0}$
 $2dp$ $5dp$ $2dp = 3sd$ $3sd$