Thank you Lea for reminding me to post these!

1. If you have 7030. kg, how many Gg do you have?

    *your cheat sheet tells you to bounce the decimal **six** places to the **LEFT***

2. If you have 0.005011. kiloliters, how many microliters do you have?

   *bounce the decimal **nine** places to the **right***

3. We describe three storage "accounts" to understand the changes we see in chemistry. State their names and describe how energy is stored in these three storage modes

    Thermal – is vibrations

    Phase energy – gas > liquid > solid

    Chemical – food and fuel have more energy than feces and ashes

4. A tray of water (20 °C) is placed in the freezer and turns into ice cubes (- 8 °C)
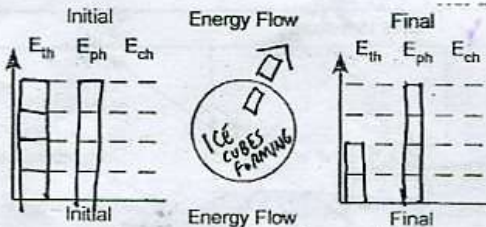
    List one or more **mistakes** in the solution shown above

    *The E_{ph} should be changing a **LOT**! (B/c LIQUID TURNING TO SOLID)*

5. These numbers will NOT be given to you on your final exam. You will only be given a periodic table. **Instructions**: Write down some of these and any numbers like these onto your 'cheat sheet' now

    You will always be given these numbers on tests and quizzes.

    0 degrees C = 273 kelvins = absolute zero
    760. torr = 760. mmHg = 1.00 atm = 101 kPa = 101,300 pascals = 14.7 p.s.i.
    1.00 mole of things is 6.02×10^{23} things. \
    ** you should either memorize your <u>metric units</u> or commit them to your sheet

6. How many mm Hg are in 77.3 kPa?

    77   *answer: 580 mmHg show work!*

7. How many torr are in 1.19 atm?

    answer 904 torr show work!

> This is a before and after problem. Your solution should be a 'lonely number' followed by one or more ratios.

8. A quantity of gas exerts a pressure of 98.6 kPa at a at a temperature of 22.0 °C. If the volume remains unchanged, what pressure will it exert at -8.0°C?

MUST CHANGE TEMPERATURE TO KELVINS FIRST!

answer: 88.6 kPa (show work)

9. If a beachcomber finds a copper coin that contains 8×10^{21} atoms of copper, what is the volume of the coin? Assume that 255 atoms of copper have a mass of 2.69×10^{-20} grams. Also assume that the density of copper is 8.98 grams per mL.

ANSWER: 0.09 mL

show work

mass vs volume

Linear Fit for: metal B | mass

Linear Fit for: metal A | mass
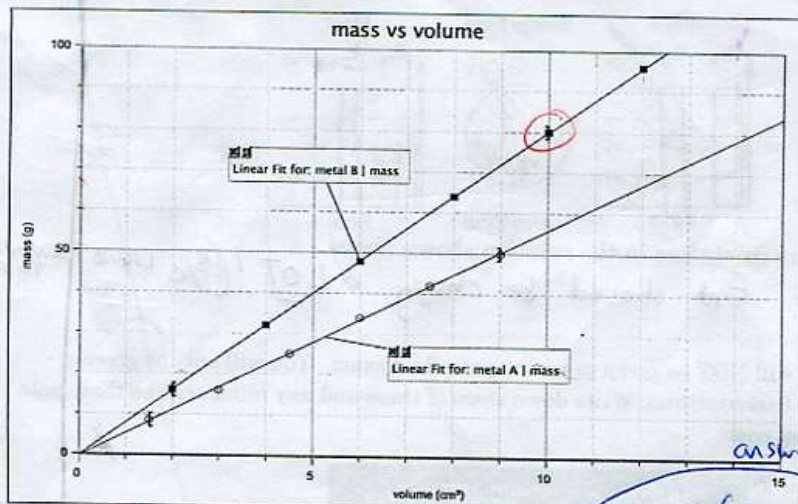
10. Based on this graph, how does metal B differ from metal A?

answer *(The steeper slope has greater density. (so B has greater density))*

$$\frac{80g}{10cm^3} = 8 \frac{g}{cm3}$$

11. Based on this graph, What is the density of metal B? Show all your work and include appropriate units.

12. Based on this graph, What is the mass of 9.0 cm³ of metal B?

$$9.0 \text{ cm}^3 \times \left(\frac{8 \text{ g}}{1 \text{ cm}^3}\right) = 72.0 \text{ g}$$

13. A student filled a graduated cylinder with water and read the meniscus at 25.8 mL. The student then dropped a solid material into the graduated cylinder and the water level rose to 35.9 mL. If the solid material had a density of 2.99 g/mL, determine the mass of the solid object.

$$35.9 \text{ mL} - 25.8 \text{ mL} = 10.1 \text{ mL}$$

$$D = \frac{M}{V} \quad \text{rearrange}$$

$$M = V \cdot D$$
$$M = (10.1 \text{ mL})(2.9$$
$$M = 30.2 \text{ g}$$

Substance	Density (g/mL)
Aluminum	2.70
Titanium	4.54
Zinc	7.13
Tin	7.31
Iron	7.87
Nickel	8.90
Copper	8.96
Silver	10.50
Lead	11.35
Mercury	13.55
Gold	19.30

14. You made some cubes out of each metal in the table that each measures 2.00 cm on every side.

a. What is the volume of each cube in cm³? in mL? Volume is length × width × height

$$V = \underline{8.00} \text{ cm}^3 \qquad V = \underline{8.00} \text{ mL}$$

b. Find the mass of these metal cubes: (Show your work below)

lead cube _____

nickel cube _____

zinc cube _____

$$8 \text{ cm}^3 \text{ Pb} \times \left(\frac{207.2 \text{ gram Pb}}{1 \text{ cm}^3 \text{ Pb}}\right) = 1660 \text{ grams Pb}$$

$$8 \text{ cm}^3 \text{ Ni} \times \left(\frac{58.69 \text{ g Ni}}{1 \text{ cm}^3 \text{ Ni}}\right) = 470. \text{ grams Ni}$$

$$8 \text{ cm}^3 \text{ Zn} \times \left(\frac{65.39 \text{ g Zn}}{1 \text{ cm}^3 \text{ Zn}}\right) = 523 \text{ grams Zn}$$

15. Round each to two significant figures
- 550.9 is ___550___
- 951236 is ___950000___

16. How many significant figures are in each measurement below?
- 75000 miles ___two___
- 903.0 g ___four___
- 800.9520 ___seven___
- 0.0005000050 nm ___seven___

17. Convert the following into scientific notation:

A. 745

$$7.45 \times 10^2$$

B. 0.00852

$$8.52 \times 10^{-3}$$

Convert the following to "normal" numbers (with no exponents anywhere)

C. 7.2×10^{-2}

$$0.072$$

Mark (H) or (T) for each item below indicate whether it applies to HEAT or TEMPERATURE

18. __H__ is measured with a cup of water called a Calorimeter

19. __T__ is just a measure of the average speed of the particle vibrations

20. __H__ one common unit for measuring this is joules

21. A cube of aluminum with a density of 2.70 g/mL has a volume of 52.8 mL, what its mass? (Hint, find the numbers in a relationship, find the lonely number, find the unit for the answer. Set up words before numbers.)

$$52.8 \, mL \times \left(\frac{2.70 \, grams}{1 \, mL} \right) = 143 \, grams$$

22. Is this a substance?

(yes / no)
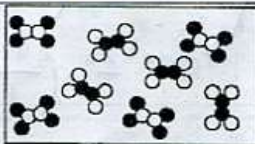
It is a

mixture of two substances. Substance 1:

Substance 2:

23. Using the picture on the right, determine the pressure of the gas if the atmospheric pressure is 735 mm Hg.

$$735 + 0 = 30 + X$$
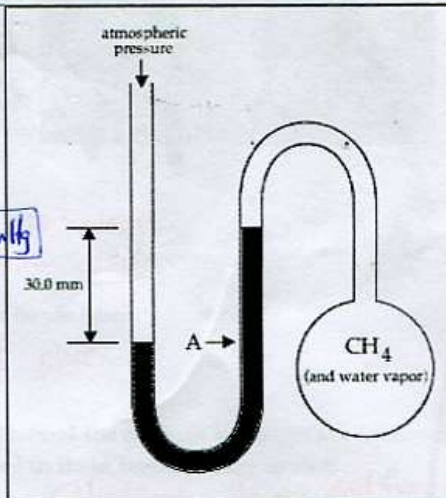$$705 = X \quad \boxed{\text{answer: } 705 \text{ mmHg}}$$

atmospheric pressure

30.0 mm

A →

CH₄ (and water vapor)

24. If the CH₄ gas became colder the height of liquid would
   a. still be 30.0 mm
   b. be greater than 30.0 mm ⟵ (circled)
   c. be less than 30.0 mm

25. If the atmospheric pressure became less (due to bad weather) the height of liquid would
   d. still be 30.0 mm
   e. be greater than 30.0 mm

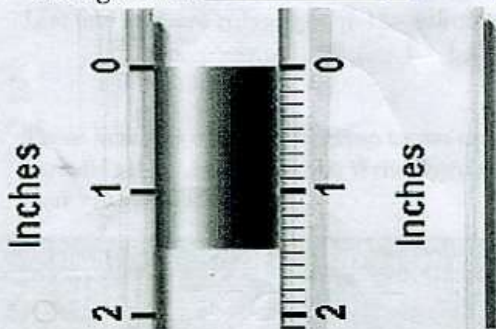   answer to #25 ⟶ be less than 30.0 mm (circled)

26. How many torr is the ambient pressure in this story problem? (use # from #23)

$$735 \text{ mmHg} \times \left(\frac{760 \text{ torr}}{760 \text{ mmHg}} \right) = 735 \text{ torr}$$

☆ A Main point, you must add one estimated digit after the black line digit.

27. Write your best estimate of the length of this object using
   • The left ruler: __1.4 inches__ (two sig figs!)
   • The right ruler: __1.47 inches__ (three sig figs)

Inches 0 1 2

Inches 0 1 2

Math Practice for the January
Final Exam #2

East.H.S. ©ΛЄM|stry

Name _____
Date _____

visit http://genest.weebly.com

The <u>most useful</u> single item to review is the stapled together sheet that looks like this (available at the class website):

Chemistry Semester One Review- 2014-15

1) Be familiar with properties of matter we have studied. Be familiar with their definitions and how they are used. Which ones are always the same for a substance? (See list below.)

2) What units can be used to measure the following quantities?
   i) Volume   vi) Heat   x) Boiling point

However, this sheet you are holding is good for practicing some of the math problems that will be on the test.

1. How many silver atoms are contained in 0.650 grams of silver?

$$0.650g\ Ag \times \left(\frac{1\ moles\ Ag}{107.87\ g\ Ag}\right) \times \left(\frac{6.02 \times 10^{23} atoms}{1\ mole}\right) = \_\_\_ moles$$

Answer
3.63×10^{21} atoms

↑ from periodic table

2. How many moles are in a 12.0 g sample of FeO?

$1 \times Fe = 55.85$
$1 \times O = 16.00$
$\overline{71.85\ grams/mole}$

$$12.0\ grams\ FeO \times \left(\frac{1\ mole}{71.85\ g\ FeO}\right) = 0.167\ moles\ FeO$$

↑ this means it's two numbers in a relationship.

3. What is the mass of 0.015 moles of Ca(OH)₂?

$1 \times Ca = 40.08\ g/mole$
$2 \times H = 2.02\ g/mole$
$2 \times O = 32.00\ g/mole$
$\overline{74.10\ g/mole}$

$$0.015\ moles\ Ca(OH)_2 \times \left(\frac{74.10\ grams}{1\ mole\ Ca(OH)_2}\right) = 1.1\ grams$$

4. What is the percent by mass of Ca in calcium chloride, CaCl₂?

$$\frac{40.08\ grams\ Ca}{110.98\ grams} \times 100 = 36.11\%$$

5. If you have 505 μL, how many L do you have?

bounce 6 places left

$0.000505\ L$

6. If you have 0.34 μm, how many picometers do you have?

bounce 6 places right

$340\ 000,\ picometers$

7. Given info: You buy a used car and in the trunk find an Tupperware tub with a substance. When analyzed it has 6.93g of oxygen and 0.43 g of hydrogen. If the molar mass of the compound is 34.0 g/mole, what is the molecular formula?

Find the empirical formula

$$6.93 \text{ grams } O \times \left(\frac{1 \text{ mol } O}{16.00 \text{ g } O} \right) = 0.433 \text{ mol}$$

$$0.43 \text{ grams } H \times \left(\frac{1 \text{ mol } H}{1.01 \text{ g } H} \right) = 0.426 \text{ mol}$$

$O_{1.02} H_{1.00}$ that's about $O_1 H_1$

ANSWER: $O_1 H_1$

Find what the mass would be for a mole of this empirical formula.

$O_1 H_1$ would have a molecular mass of

$1 \times 16.00 = 16.00$

$1 \times 1.01 = \underline{1.01}$

17.01 g/mol

Now randomly choose a few integers and multiply your empirical mass by them.

times one gives 17.01

times two gives 34.02 ← the story problem says to look for something that has a mass of 34 g/m

times three gives 51.03

Write the molecular formula here _____

So the formula is "two times 17.01" or, "two times $O_1 H_1$"

Answer, Molecular formula: $O_2 H_2$

8. Is your cheat sheet up to date? You can bring an 8.5" x 11" sheet, *handwritten*, not photocopied, not computer-printed. Include formulas, a metric conversion table, 6.02×10^{23}...

9. How many torr are in 99.3 kPa?

$$99.3 \text{ kPa} \times \left(\frac{760 \text{ torr}}{101.3 \text{ kPa}} \right) = 0.980 \text{ torr}$$

| Substance	Density (g/mL)
Aluminum	2.70
Titanium	4.54
Zinc	7.13
Tin	7.31
Iron	7.87
Nickel	8.90
Copper	8.96
Silver	10.50
Lead	11.35
Mercury	13.55
Gold	19.30

you **don't** need to put numbers like this on your cheat sheet

10. What would be the mass of a 44.8 mL piece of tin?

$$44.8 \text{ mL} \times \left(\frac{7.31 \text{ grams}}{1 \text{ mL}} \right) = 327 \text{ grams}$$

NOTICE the arrows floated a bit lower than they were originally!

11. If 13.6. grams of metal were dropped into 28.5 grams of water calculate the following

BEFORE

16°C water

METAL

AFTER

92°C metal

35°C water

35°C metal
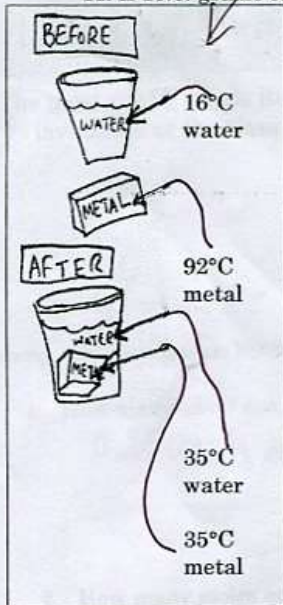
a) Find ΔT for the water.

$$\Delta T = T_{final} - T_{initial} = 35°c - 16°c = 19°c$$

b) How many joules of heat entered the water?

$$Q = m\, C\, \Delta T$$

$$Q = (28.5g)\left(4.184 \frac{J}{g°c}\right)(19°c)$$

$$Q = 2265.6 \approx 2300 \text{ joules}$$

c) Find ΔT for the metal

$$\Delta T = 35°c - 92°c = -57°c$$