If you are a student that **HAS** access to technology, this is not the packet for you. This packet is for students who pick up and drop off their work at the front office every week. If you have access to technology, please go back to your teacher's website and complete the correct assignment.

Name: _____ Period: _____ Teacher: _____

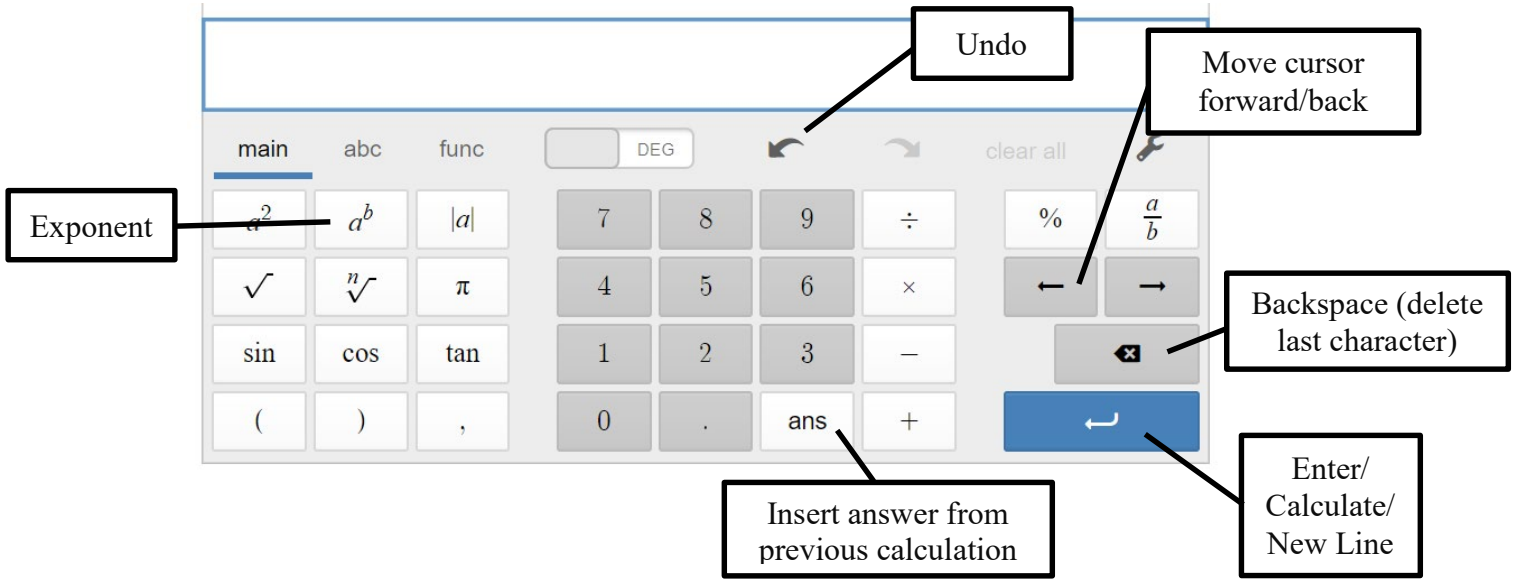
Distance Learning Week 6 Paper Packet
5/11/2020 – 5/17/2020

Assignment 6.1: Online Calculator Tutorial

In this assignment you will learn to use the online Desmos calculator, particularly when calculating numbers in scientific notation. You will need to be able to calculate with Avogadro's number for this week's assignment! **If you have your own calculator that is fine too**—just make sure you are getting the **right answers** by doing the practice problems on page 2. Every calculator is a bit different but if you are entering the computations correctly, you should get the same answer as me.

The Basics:

1. Go to desmos.com/scientific
2. Do a few test calculations to get a feel for the calculator. Here is an overview of some of the specific buttons:



3. Try the following calculations. The answers are given—make sure you get the correct answer!
   a. 468 x 25 = *Answer: 11700*
   b. 0.025 ÷ 13 x 51 = *Answer: 3.77 x 10^{-5}*
   c. $3^4 \div 0.53$ = *Answer: 152.8*

   For c, after entering the exponent, press the → key to get out of the exponent!

Calculating Using Avogadro's Number: 6.022 x 10^{23}

1. Click "clear all" to reset the screen.

2. Rule of thumb: Always put numbers in scientific notation in PARANTHESIS! ( )

3. Try it: To calculate the dimensional analysis problem to the right, we need to multiply the given (2.5×10^{23}) by 1, then divide by (6.022×10^{23})

2.5×10^{23}	1	=
	6.022×10^{23}	

Type in: $(2.5 \times 10^{23}) \times 1 \div (6.022 \times 10^{23})$ It should look like this: $\left(2.5 \cdot 10^{23}\right) \cdot \frac{1}{\left(6.022 \cdot 10^{23}\right)}$

Then check your answer! *Answer = 0.4151*

If you are having trouble, remember to click the → button to move out of exponents or out of the bottom of a fraction.

4. Try the following **practice problems** to make sure you've got the hang of calculating with Avogadro's number! Check your answer after each calculation.

   a. $4 \times (6.022 \times 10^{23}) =$ *Answer: 2.4088×10^{24}*

   b. $(6.022 \times 10^{23}) \div 45 =$ *Answer: 1.338×10^{22}*

   c. $(7.9 \times 10^{23}) \div (6.022 \times 10^{23}) =$ *Answer: 1.312*

   d. *Answer: 0.6310*

3.8×10^{23}	1	=
	6.022×10^{23}	

   e. *Answer: 4.083×10^{23}*

0.678	6.022×10^{23}	=
	1	

   f.

9.52×10^{23}	1	45.3	=
	6.022×10^{23}	1	

Answer: 71.61

Assignment 6.2 – Dimensional Analysis Review & Practice

We covered dimensional analysis at the beginning of the year (Learning Target 1.1), but we wanted to give you guys a chance to dust off the old notes and do a little more practice before we apply what we learned previously to this new concept of the mole. (Now would be the time to go get those notes out of your notebook if you still have them ☺)

Dimensional Analysis is the process of converting an amount in one unit to different unit using "conversion factors." In a conversion factor, the numerator is equal to the denominator.

For example: $\frac{12\text{ in.}}{1\text{ foot}}$ or $\frac{1\text{ ft}}{12\text{ in.}}$ or $\frac{60\text{ min}}{1\text{ hr}}$ or $\frac{1\text{ hour}}{60\text{ min}}$

So if I wanted to convert 34.5 inches into feet, I would use dimensional analysis. You always start with your given, and then you pick a conversion factor that has the units you want to get rid of on the bottom (to cancel out) and the units you want to convert to on top. Sometimes it takes a one-step conversion, sometimes it takes more!

$$34.5\text{ inches} \times \frac{1\text{ foot}}{12\text{ in}} = 2.88\text{ feet}$$

Another example: How many seconds do you spend in chemistry class in an average week (3.5 hours)? *(Do you see the units cancelling out?)*

$$3.5\text{ hours} \times \frac{60\text{ min}}{1\text{ hr}} \times \frac{60\text{ seconds}}{1\text{ minute}} = 12{,}600\text{ sec } (\textit{13,000 sec for sig figs!})$$

Use the following conversion factor chart to complete the practice problems 1 – 8.

Mass Conversion Factors		Volume Conversion Factors		Length Conversion Factors	
1000 grams (g)	1 kilogram (kg)	1000 mL	1 L	12 in	1 foot
1 g	1000 mg	1 L	0.264 gal	1 in	2.54 cm
1 kg	2.2 lb	1 L	4.227 cups	1.609 km	1 mile
1 lb	16 oz	1 mL	1000 μL	1000 m	1 km
		1 L	1,000,000 μL	100 cm	1 m

1. How many centimeters are in 26.5 inches?

$$26.5\text{ inches} \times \frac{\text{\_\_\_\_cm}}{1\text{ inch}} =$$

2. Convert 2.5 kg to grams.

$$2.5\text{ kg} \times \frac{1000\text{ g}}{\text{Kg}} =$$

3. How many kilometers did you run if you ran a 13.1 mile half-marathon?

4. It takes 16.1 gallons to fill up your gas tank, how many liters is that?

5. A 7-lb baby is how many grams?

$$7\text{ lb} \times \frac{1\text{ kg}}{\text{lb}} \times \frac{\text{\_\_\_\_\_g}}{\text{kg}} =.$$

6. How many centimeters are in 5 feet? *(Hint: this is a two-step problem like #5).*

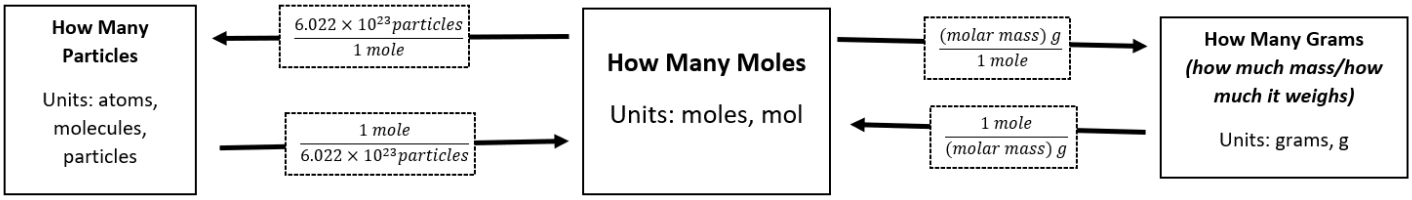
7. 8.5 x 10^9 µL is the same as ____ L.

8. A gallon of milk has ____ cups in it. *(Hint: this is a two-step problem like #5).*

Assignment 6.3: Practicing Mole Conversions

Instructions: Copy mole island (shown below) into your notebook. Then complete the practice problems below. When you are done, take a picture or scan your work and upload it to assignment 6.3 in Turnitin.com.

Mole Island: How to convert between grams, moles, and particles of an element or compound



Practice Problems: For each of the following problems, use mole island to complete the calculation. SHOW ALL WORK. For the first few problems, we started the problem for you.

Moles and Mass Conversions

1. How many grams would 3.25 moles of CH_4 weigh? (Molar Mass CH_4 = 16.04 g/mol)

3.25 moles CH_4		grams	= grams
(remember: nothing goes here!)		moles	*(remember: nothing goes here!)*

2. How many moles are in 47.6 grams of CO_2? (Molar Mass CO_2 = _____)(calculate molar mass first!)

47.6 grams CO_2		=
(remember: nothing goes here!)		*(remember: nothing goes here!)*

3. How much would 0.55 moles of NaBr weigh in grams?
(Molar Mass NaBr = _____)

		=
(remember: nothing goes here!)		*(remember: nothing goes here!)*

4. If I have 245.5 grams of KNO_3, how many moles do I have? (Molar Mass KNO_3 = _____)

5. How many grams would 5.3 moles of Ne weigh? (Molar Mass Ne = _____)

6. How many moles of CF_4 are in 100.5 grams? (Molar Mass CF_4 = _____)

Moles and Particles Conversions

7. If I have 2.5 moles of oxygen, how many oxygen atoms do I have?

2.5 moles Oxygen	atoms	= atoms
(remember: nothing goes here!)	moles	*(remember: nothing goes here!)*

8. If I have 1.82×10^{23} molecules of PCl_3, how many moles do I have?

1.82×10^{23} molecules PCl_3		=
(remember: nothing goes here!)		*(remember: nothing goes here!)*

9. How many particles are in 0.78 moles of a substance?

		=
(remember: nothing goes here!)		*(remember: nothing goes here!)*

10. How many moles are in 4.7×10^{23} atoms of Nitrogen?

11. If I have 6.5 moles of gold, how many gold particles do I have?

12. If I have 9.1×10^{23} molecules of SO_2, how many moles do I have?

Challenge: These problems are optional unless you plan on taking AP Chem next year. If you are planning on taking AP chem, you should definitely do these! Even if you aren't, we encourage you to give them a shot! These are *two step conversions*—so you will take two steps to convert the given to the answer!

13. If I have 35.12 grams of magnesium, how many magnesium atoms do I have? (Molar Mass Mg = _____)

35.12 grams of Mg			=
(remember: nothing goes here!)			*(remember: nothing goes here!)*

14. If I have 5.04×10^{23} molecules of CoF_2, how much will it weigh in grams? (Molar Mas CoF_2 = _____)

When you are done, take a pictures or scan and upload this to assignment 6.3 on Turnitin.com

Periodic Table of the Elements

Main groups 1 1A	2 2A	Transition metals 3 3B	4 4B	5 5B	6 6B	7 7B	8	9 8B	10	11 1B	12 2B	Main groups 13 3A	14 4A	15 5A	16 6A	17 7A	18 8A
1 H 1.00794																	2 He 4.00260
3 Li 6.941	4 Be 9.01218											5 B 10.81	6 C 12.011	7 N 14.0067	8 O 15.9994	9 F 18.998403	10 Ne 20.1797
11 Na 22.98977	12 Mg 24.305											13 Al 26.98154	14 Si 28.0855	15 P 30.97376	16 S 32.066	17 Cl 35.453	18 Ar 39.948
19 K 39.0983	20 Ca 40.078	21 Sc 44.9559	22 Ti 47.88	23 V 50.9415	24 Cr 51.996	25 Mn 54.9380	26 Fe 55.847	27 Co 58.9332	28 Ni 58.69	29 Cu 63.546	30 Zn 65.38	31 Ga 69.72	32 Ge 72.61	33 As 74.9216	34 Se 78.96	35 Br 79.904	36 Kr 83.80
37 Rb 85.4678	38 Sr 87.62	39 Y 88.9059	40 Zr 91.224	41 Nb 92.9064	42 Mo 95.94	43 Tc (98)	44 Ru 101.07	45 Rh 102.9055	46 Pd 106.42	47 Ag 107.8682	48 Cd 112.41	49 In 114.82	50 Sn 118.710	51 Sb 121.757	52 Te 127.60	53 I 126.9045	54 Xe 131.29
55 Cs 132.9054	56 Ba 137.33	57 *La 138.9055	72 Hf 178.49	73 Ta 180.9479	74 W 183.85	75 Re 186.207	76 Os 190.2	77 Ir 192.22	78 Pt 195.08	79 Au 196.9665	80 Hg 200.59	81 Tl 204.383	82 Pb 207.2	83 Bi 208.9804	84 Po (209)	85 At (210)	86 Rn (222)
87 Fr (223)	88 Ra 226.0254	89 †Ac 227.0278	104 Rf (267)	105 Db (268)	106 Sg (271)	107 Bh (272)	108 Hs (270)	109 Mt (276)	110 Ds (281)	111 Rg (280)	112 Cn (285)	113 Nh (284)	114 Fl (289)	115 Mc (288)	116 Lv (298)	117 Ts (294)	118 Og (294)

*Lanthanide series	58 Ce 140.12	59 Pr 140.9077	60 Nd 144.24	61 Pm (145)	62 Sm 150.36	63 Eu 151.96	64 Gd 157.25	65 Tb 158.9254	66 Dy 162.50	67 Ho 164.9304	68 Er 167.26	69 Tm 168.9342	70 Yb 173.04	71 Lu 174.967
†Actinide series	90 Th 232.0381	91 Pa 231.0359	92 U 238.0289	93 Np 237.048	94 Pu (244)	95 Am (243)	96 Cm (247)	97 Bk (247)	98 Cf (251)	99 Es (252)	100 Fm (257)	101 Md (258)	102 No (259)	103 Lr (262)

Assignment 6.2—Dimensional Analysis Review KEY

★ Remember: Everything in this table is a definition ★ Definitions have an infinite number of sigfigs

1. How many centimeters are in 26.5 inches?

$$26.5 \text{ inches} \times \frac{2.54 \text{ cm}}{1 \text{ inch}} = 67.31 \text{ cm}$$

Don't forget sigfigs!

61.3 cm

3 sigfigs

2. Convert 2.5 kg to grams.

$$2.5 \text{ kg} \times \frac{1000 \text{ g}}{1 \text{ kg}} = 2500 \text{ g}$$

2 sigfigs

3. How many kilometers did you run if you ran a 13.1 mile half-marathon?

1 mile = 1.609 km

$$13.1 \text{ miles} \times \frac{1.609 \text{ km}}{1 \text{ miles}} = 21.0779 \text{ km}$$

21.1 km

3 sigfigs

4. It takes 16.1 gallons to fill up your gas tank, how many liters is that?

1 L = 0.264 gal

$$16.1 \text{ gal} \times \frac{1 \text{ L}}{0.264 \text{ gal}} = 60.984848 \text{ L}$$

61.0 L

3 sigfigs

5. A 7-lb baby is how many grams?

$$7 \text{ lb} \times \frac{1 \text{ kg}}{2.2 \text{ lb}} \times \frac{1000 \text{ g}}{1 \text{ kg}} = 3181.81818 2 \text{ g}$$

★ 2 step problem!

3000 g

1 sig fig

6. How many centimeters are in 5 feet? *(Hint: this is a two-step problem like #5).*

1 ft = 12 inches

1 in = 2.54 cm

$$5 \text{ ft} \times \frac{12 \text{ in}}{1 \text{ ft}} \times \frac{2.54 \text{ cm}}{1 \text{ inch}} = 152.4 \text{ cm}$$

200 cm

1 sig fig

7. 8.5×10^9 µL is the same as _____ L.

1 L = 1000000 µL

$$8.5 \times 10^9 \text{ µL} \times \frac{1 \text{ L}}{1000000 \text{ µL}} = 8500 \text{ L}$$

2 sigfigs

8. A gallon of milk has _____ cups in it. *(Hint: this is a two-step problem like #5).*

1 L = 0.264 gal

1 L = 4.277 cups

$$1 \text{ gal} \times \frac{1 \text{ L}}{0.264 \text{ gal}} \times \frac{4.277 \text{ cups}}{1 \text{ L}} = 16.20075\ldots \text{ cups}$$

20 cups

1 sig fig

Assignment 6.3—Practicing Mole Conversions KEY

Moles and Mass Conversions

1. How many grams would 3.25 moles of CH_4 weigh? (Molar Mass CH_4 = 16.04 g/mol)

3.25 moles CH_4	16.04 grams	52.1 grams
(remember: nothing goes here!)	moles	*(remember: nothing goes here!)*

2. How many moles are in 47.6 grams of CO_2? (Molar Mass CO_2 = 44.01)(calculate molar mass first!)

47.6 grams CO_2	1 mol CO_2	1.08 mol CO_2
(remember: nothing goes here!)	44.01 g CO_2	*(remember: nothing goes here!)*

3. 56.5895 g → 57 g
4. 2.428288 mol → 2.428 mol
5. 106.954 g → 110 g
6. 1.142045 mol → 1.142 mol

Moles and Particles Conversions

7. If I have 2.5 moles of oxygen, how many oxygen atoms do I have?

2.5 moles Oxygen	6.02×10^{23} atoms	= atoms 1.5×10^{24} atoms
(remember: nothing goes here!)	1 moles	*(remember: nothing goes here!)*

8. If I have 1.82×10^{23} molecules of PCl_3, how many moles do I have?

1.82×10^{23} molecules PCl_3	1 mol	= 0.302325581 mol
(remember: nothing goes here!)	6.02×10^{23}	*(remember: nothing goes here!)*

0.302 mol

9. 4.7×10^{23} particles
10. 0.78 mol N
11. 3.9×10^{24} particles Gold
12. 3.5 mol SO_2

Challenge: These problems are optional unless you plan on taking AP Chem next year. If you are planning on taking AP chem, you should definitely do these! Even if you aren't, we encourage you to give them a shot! These are *two step conversions*—so you will take two steps to convert the given to the answer!

13. If I have 35.12 grams of magnesium, how many magnesium atoms do I have? (Molar Mass Mg = 24.305 g/mol)

35.12 grams of Mg	1 mol Mg	6.02×10^{23}	= 8.699×10^{23} atoms
(remember: nothing goes here!)	24.305 g Mg	1 mol Mg	*(remember: nothing goes here!)*

8.69872×10^{23}

14. 87 g CoF_2