Here are the answers and work for your summer packet.

NOTE: This is to be used to check your work, and to help you understand things that you are struggling with.

If you are simply copying the answers from this packet, you should consider whether you actually want to take Honors Chemistry and remember that you will be expected to know and thoroughly understand it.

Honors Chemistry

ANSWER BOOKLET – Summer Packet

Answers and work must be recorded in or attached to this packet. NO EXCEPTIONS

SECTION 3 – INTRODUCTION TO CHEMISTRY

1. Which division or divisions of chemistry might be used to examine:
   a) The mechanism by which blood clots – **biochemistry, you are studying the chemistry of a living organism (part of one) and how it works**
   b) The amount of a toxic substance found in a water supply – **analytical chemistry, you are determining how much of a substance is present**
   c) The reason a metal melts at a specific temperature – **physical chemistry, you are studying why does a substance do what it does under specific conditions**
   d) The formation of chemical compounds made up of metals – **inorganic chemistry, you are studying nonliving things, how they interact/react**

Casey noticed that the plants near the river downstream from the local copper mine were withered and dying. She wanted to find out if there was something from the mine that was causing this. She set out to measure levels of water from the river for concentrations of copper, lead, arsenic and sulfates, recorded these levels and compared them to levels of water from the river upstream from the mine. Casey then sought to check the different metal concentrations and their effect on plant growth by measuring the height of plants grown watered with different solutions of copper, lead, arsenic and sulfates. She also included a group of plants that were grown with regular water, untreated with chemicals. She recorded this information over the course of 3 months and also included observations such as plant color, and leaf texture. When she was done, she compiled her data and generated plots and graphs to see if she could determine any relationships between the different toxins and plant growth. Casey noticed that there seemed to be a steep decrease in the height of plants grown with water and lead, along with water and copper. Water with sulfates showed a decline in plant height, but not as steeply. Plants watered with arsenic did not grow at all.
Casey performed an experiment here that was based upon a scientific method. Answer the following questions based on what you know of the scientific method and from the passage above.

2. Although a hypothesis was not overtly stated by Casey, which of the following would be the most appropriate hypothesis? (Circle the appropriate letter)

a. If plants are grown downriver from a copper mine, then they will die.

b. If one checks river water, then one will find traces of lead, copper and other metals.

c. If plants are watered with water containing trace concentrations of certain metals, then there will be a decrease in their plant height.

d. If copper mines are near rivers, then copper will be found in the water.

3. Although not all of the controls were mentioned from Casey's experiment, think about performing this experiment yourself. What are 3 controlled variables that you think were involved in this experiment? **Answers may vary**

a. _____ b. _____ c. _____

4. Identify the independent variable in this experiment and the dependent variable.

Independent – **Concentration of various trace chemical compounds (this is what she was measuring)**

Dependent – **Plant height (what she was using to see if it had an affect on it)**

5. Identify an example of quantitative data in this experiment and an example of qualitative data. **Answers may vary**

Quantitative – **plant height, concentration of trace chemical in water**

Qualitative – **plant color, leaf texture**

6. Write an example of a conclusion to this experiment that addresses both the relationship that was sought (the hypothesis) and the data was collected. This conclusion should not be more than 2 sentences, but should be written in complete sentences. **Answers may vary**

_____

_____

_____

SECTION 4 – METRIC SYSTEM/SI SYSTEM – attach all work clearly and neatly for this section

7. Perform the following conversions:

a. 454 mg to g
b. 5.0 x 10^{-9}m to pm
c. 3.5 x 10^{-2} mm to μm
d. 36.3 km to m
e. 447 kg to g
f. 55.9 dL to L
g. 6251 L to cm^3

Conversion for (b) 1 pm = 1.0 x 10^{-12} m

a. $454\,mg \times \frac{1g}{1000\,mg} = .454\,g$

b. $5.0x10^{-9}\,m \times \frac{1x10^{12}\,pm}{1m} = 5000\,pm$

c. $3.5x10^{-2}\,mm \times \frac{1m}{1000\,mm} \times \frac{1{,}000{,}000\,\mu m}{1m} = 35\,\mu m$

d. $36.3km \times \frac{1000m}{1km} = 36300\,m$

e. $447\,kg \times \frac{1000g}{1kg} = 447000\,g$

f. $55.9\,dl \times \frac{1\,L}{10\,dL} = 5.59\,L$

g. $6251\,L \times \frac{1000\,mL}{1\,L} \times \frac{1\,cm^3}{1\,mL} = 6251000\,cm^3$

8. Make the following temperature conversions:

   a. 233 C to K
   b. The melting point of potassium iodide is 681 C. What is this temperature in Kelvins?

a. $233C + 273.15 = 506.15K$ **notice that you do not round with significant figures here as this is an equation.**

b. $681C + 273.15 = 954.15K$

9. Perform the following conversions:
   a. 8.60 miles to m
   b. 3.00 days to s
   c. 16.2 ft to m

a. $8.60\,miles \times \frac{5280\,ft}{1\,mile} \times \frac{12\,in}{1\,ft} \times \frac{2.54\,cm}{1\,in} \times \frac{1\,m}{100\,cm} = 13840.3584 = 13800\,m$

b. $3.00\,days \times \frac{24\,hours}{1\,day} \times \frac{60\,\text{min}}{1\,hour} \times \frac{60\,\text{sec}}{1\,\text{min}} = 259200 = 259000\,s$

c. $16.2\,ft \times \frac{12\,in}{1\,ft} \times \frac{2.54\,cm}{1\,in} \times \frac{1\,m}{100\,cm} = 4.93776 = 4.94\,m$

SECTION 5 – DIMENSIONAL ANALYSIS – attach all work clearly and neatly for this section
Show, using dimensional analysis, how to convert from the given unit to the sought unit. [Answers] are provided. This assignment is checked to see if work can be done properly. Remember, every number MUST have a unit.

10. How many feet are in 10.0 meters? (2.54 cm = 1 inch) [32.8]
11. How many dozens of doughnuts are 144 doughnuts? [12]
12. How many seconds are in 1.000 year? (1 year = 365 days) [31 536 000]
13. How many quarters are in $43.75? [175]
14. How many nickels are in that same amount? [875]
15. How many dollars are in 98 quarters? [24.50]
16. How many months are in 17 500 000 seconds? (1 month = 30 days) [6.75]

10. $10.0\,m \times \frac{100\,cm}{1\,m} \times \frac{1\,in}{2.54\,cm} \times \frac{1\,ft}{12\,in} = 32.8\,ft$

11. $144\,doughnuts \times \frac{1\,dozen}{12\,donuts} = 12.0\,dozen$

12. $1.000\,years \times \frac{365\,days}{1\,year} \times \frac{24\,hours}{1\,day} \times \frac{60\,\text{min}}{1\,hour} \times \frac{60\,\text{sec}}{1\,\text{min}} = 31536000\,\text{sec}$

13. $\$43.75 \times \frac{4\,quarters}{1\,dollar} = 175\,quarters$ **, notice that significant figures are not included in this**

answer because you cannot realistically have a partial quarter. This is an example of where significant figures are not necessary.

14. $\$43.75 \times \frac{20\,nickels}{1\,dollar} = 875\,nickels$ **, note the same situation as number 13**

15. $98\,quarters \times \frac{1\,dollar}{4\,quarters} = 24.5\,dollars$ **, if you consider 98 quarters a measurement then the correct answer would be 25 dollars with significant figures**

16. $17500000\,\text{sec}\,onds \times \frac{1\,\text{min}}{60\,\text{sec}} \times \frac{1\,hour}{60\,\text{min}} \times \frac{1\,day}{24\,hours} \times \frac{1\,month}{30\,days} = 6.75154321 = 6.75\,months$

SECTION 6 – SCIENTIFIC NOTATION

17. Perform the following calculations.
    a. $4.0 \times 10^{15} - 3.0 \times 10^{14}$
    b. $15 \times 10^{-5} + 6 \times 10^{-6}$
    c. $9 \times 10^{7} - 20 \times 10^{6} + 10 \times 10^{7}$
    d. $4 \times 10^{13} \times 3 \times 10^{17}$
    e. $8 \times 10^{54} / 2 \times 10^{32}$
    f. $6 \times 10^{79} \times 6 \times 10^{1}$
    g. $42 \times 10^{100} / 7 \times 10^{65}$
    h. square root of 144×10^{16}

a. $3.7x10^{15}$	**b. $1.56x10^{-4}$**	**c. $1.7x10^{8}$**	**d. $1.2x10^{31}$**	**e. $4x10^{22}$**
f. $3.6x10^{81}$	**g. $6x10^{35}$**	**h. $1.2x10^{9}$**		

18. Complete the following chart.

Standard Notation	Scientific Notation
104 000 m	$1.04x10^{5}$ m
0.000 543 g	$5.43x10^{-4}$ g
0.004 5 mol 60 200 000 s	**$4.5x10^{-3}$ mol** **$6.02x10^{7}$ s**
34 030 000 L	$3.403x10^{7}$ L
.001 22 J	$1.22x10^{-3}$ J
16 700 kPa	**$1.67x10^{4}$ kPa**
150 W	**1.5×10^{2} W**
1 000.30 m^3	**1.00030×10^{3} m^3**
602 000 000 000 000 000 000 000 particles	**6.02×10^{23} particles**

SECTION 8 – SIGNIFICANT FIGURES/READING EQUIPMENT PROPERLY

19. How many significant figures are in each of the following numbers (assume that each number is a measured quantity):

a. 4.003 = **4**
b. 6.023×10^{23} = **4**
c. 5000 = **1**
d. 1282 kg = **4**
e. 0.00296 s = **3**
f. 8.070 mm = **4**
g. 0.0105 L = **3**
h. 9.7750×10^{-4} =cm =**5**
i. 0.0234 m^2 = **3**
j. 7,194,300 cm = **5**
k. 435.983 K = **6**
l. 204.080 g = **6**

20. Carry out the following operations, and express the answers with the appropriate number of significant figures.

a. 1.24056 + 75.80 = **77.04**
b. 23.67 – 75 = **-51**
c. 890.00 x 112.3 = **99950**
d. 78,132/2.50 = **31300**
e. 37.24 mL + 10.3 mL = **47.5 mL**
f. 21.2342 g – 27.87 g = **-6.64 g**
g. 1.23 cm x 12.34 cm = **$15.2cm^2$**
h. 906.34 – (8903.2/5.7) = **-694**
i. $(356.2 \times 10^{4} - 2.4 \times 10^{3}) \times 3.97$ = **14000000 or 1.4×10^{7}**
j. 482 x [2537 – (3.76 x 90)] = **1080000 or 1.08×10^{6}**

21. **18.25 cm**

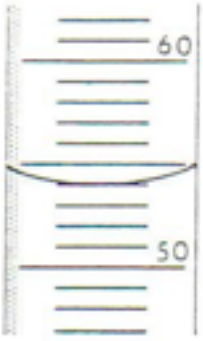
22. **10.20 cm**

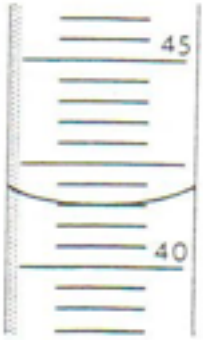
23. **8.00 cm**

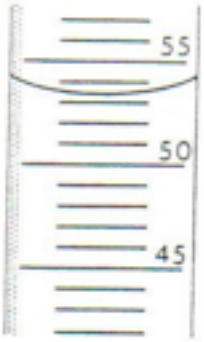
24. **12.60 cm**

25. **28.5 C** **13.0 C** **63.5 C**

26. **54.0 mL** **43.0 mL** **53.5 mL**







SECTION 7 – ALGEBRAIC TRANSFORMATIONS

Density Equation	Light Equation	Energy of Light Equation	Combined Gas Law	Ideal Gas law	Molar Mass Determination	Graham's Law of Effusion
$\rho = \frac{m}{V}$	$c = \lambda\nu$	$E = h\nu$	$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$	$PV = nRT$	$M = \frac{m}{n}$	$\frac{R_A}{R_B} = \frac{\sqrt{M_B}}{\sqrt{M_A}}$
$\rho =$	$c =$	$E =$	$P_1 = \frac{P_2V_2T_1}{T_2V_1}$	$P = \frac{nRT}{V}$	$M =$	$R_A = \frac{\sqrt{M_B}}{\sqrt{M_A}} \times R_B$
$m =$	$\lambda = \frac{c}{\upsilon}$	$h = \frac{E}{\upsilon}$	$P_2 = \frac{P_1V_1T_2}{T_1V_2}$	$V = \frac{nRT}{P}$	$n = \frac{m}{M}$	$R_B = \frac{\sqrt{M_A}}{\sqrt{M_B}} \times R_A$
$V = \frac{M}{D}$	$\nu = \frac{c}{\lambda}$	$\nu = \frac{E}{h}$	$T_1 = \frac{P_1V_1T_2}{P_2V_2}$	$n = \frac{PV}{RT}$	$m =$	$M_A = \left(\frac{R_B}{R_A}\right)^2 \times M_B$
			$T_2 = \frac{P_2V_2T_1}{P_1V_1}$	$R = \frac{PV}{nT}$		$M_B = \left(\frac{R_A}{R_B}\right)^2 \times M_A$
			$V_1 = \frac{P_2V_2T_1}{P_1T_2}$	$T = \frac{PV}{nR}$		
			$\frac{P_1V_1T_2}{}$			