The Periodic Table

IA																	VIIIA
H 1 1.01	IIA											IIIA	IVA	VA	VIA	VIIA	He 2 4.00
Li 3 6.94	Be 4 9.01											B 5 10.81	C 6 12.01	N 7 14.01	O 8 16.00	F 9 19.00	Ne 10 20.18
Na 11 22.99	Mg 12 24.31	IIIB	IVB	VB	VIB	VIIB	VIIIB	VIIIB	VIIIB	IB	IIB	Al 13 26.98	Si 14 28.09	P 15 30.97	S 16 32.07	Cl 17 35.45	Ar 18 39.95
K 19 39.10	Ca 20 40.08	Sc 21 44.96	Ti 22 47.88	V 23 50.94	Cr 24 52.00	Mn 25 54.94	Fe 26 55.85	Co 27 58.93	Ni 28 58.69	Cu 29 63.55	Zn 30 65.39	Ga 31 69.72	Ge 32 72.61	As 33 74.92	Se 34 78.96	Br 35 79.90	Kr 36 83.80
Rb 37 85.47	Sr 38 87.62	Y 39 88.91	Zr 40 91.22	Nb 41 92.91	Mo 42 95.94	Tc 43 (97.9)	Ru 44 101.07	Rh 45 102.91	Pd 46 106.42	Ag 47 107.87	Cd 48 112.41	In 49 114.82	Sn 50 118.71	Sb 51 121.76	Te 52 127.60	I 53 126.90	Xe 54 131.29
Cs 55 132.91	Ba 56 137.33	La 57 138.91	Hf 72 178.49	Ta 73 180.95	W 74 183.85	Re 75 186.21	Os 76 190.2	Ir 77 192.22	Pt 78 195.08	Au 79 197.97	Hg 80 200.59	Tl 81 204.38	Pb 82 207.2	Bi 83 208.98	Po 84 (209)	At 85 (210)	Rn 86 (222)
Fr 87 223.02	Ra 88 226.03	Ac 89 227.03	Rf 104 (261)	Db 105 (262)	Sg 106 263)	Bh 107 (262)	Hs 108 (265)	Mt 109 (266)	Ds 110 (271)	Rg 111 (272)	Uub 112 (285)	Uut 113 (284)	Uuq 114 (289)	Uup 115 (288)			

Ce 58 140.12	Pr 59 140.91	Nd 60 144.24	Pm 61 (145)	Sm 62 150.36	Eu 63 152.97	Gd 64 157.25	Tb 65 158.93	Dy 66 162.50	Ho 67 164.93	Er 68 167.26	Tm 69 168.93	Yb 70 173.04	Lu 71 174.97
Th 90 232.04	Pa 91 231.04	U 92 238.03	Np 93 237.05	Pu 94 (240)	Am 95 243.06	Cm 96 (247)	Bk 97 (248)	Cf 98 (251)	Es 99 252.08	Fm 100 257.10	Md 101 (257)	No 102 259.10	Lr 103 262.11

The Orbital Stairs
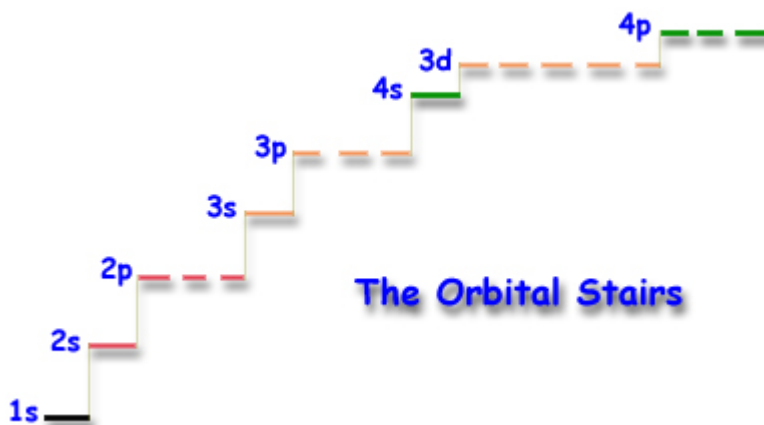
Some Useful (maybe) Constants:

a)   1 amu = 1.661×10^{-24} g

Question 1
4 Points

How many **significant figures** are there in each of the following numbers?

0.09672 ___   0.8280 ___   1000 ___

The number 174.8558... **rounded to 5 significant figures** is: _____

Question 2
6 Points

a) When 15.7 is **subtracted** from 17.809, the result should be reported with **digit(s) after the decimal point**: _____

b) When 35.085 is **divided** by 57.07, the answer should be reported to **significant digit(s)**. _____

c) Reported to the **correct number of significant figures**, how many hours are there in exactly **13 days**? _____

Question 3
4 Points

A piece of **copper** has a mass of **950** grams. What is the volume of the sample in **units of liters**.

1 cm^3 Cu = 8.8 g Cu	1 kg = 1000 g	1 L = 1000 cm^3
9.5 x 10^{21} atoms Cu = 1 g Cu		1 cm^3 = 1 mL

No need to do the calculation – just set up the correct dimensional analysis conversions – **you may not need to fill in all the boxes**.

950 g × _____ × _____ × _____

Question 4
8 Points

Give the correct **formula** for the following **polyatomic ions**:

a) **Nitride**   _____

b) **Nitrate**   _____

c) **Nitrite**   _____

d) **Carbonate**   _____

Question 5
4 Points

Which of the following apply to the **proton?**

☐ mass ~ 9.109x10^{-28} g   ☐ charge = -1

☐ charge = 0   ☐ charge = +1

☐ mass ~ 1.673x10^{-24} g

Question 6
6 Points

a) How many protons and neutrons are in the nucleus of an atom that has an **atomic number** of **27** and a **mass number** of **59**?

_____ protons   _____ neutrons

b) What is the **symbol** for the element?   _____

Question 7
8 Points

The following questions pertain to the **periodic table** given at the **front of this exam**:

a. The **atomic weight** for the element that is in group **5B** and period **4**? _____

b. What is the **name** of the **alkali metal** that is in **period 2**? _____

c. How many **diatomic elements** are there in **period 3**?   _____

d. **Circle** any of the following that are **nonmetals**? (Z = atomic number)

   Cr (Z=24)   **Br** (Z=35)   **Ne** (Z=10)   **Ga** (Z=31)

Question 8
10 Points

a. **Name** the compound with the formula **AlP**?   _____

b. **Name** the compound with the formula **$Fe_2(CrO_4)_3$**?   _____

c. What is the **formula** for **sodium sulfite**?   _____

d. What is the **formula** for **copper(II) phosphate**?   _____

e. What is the **formula** for **lithium hydride**?   _____

Question 9
4 Points

A certain element consists of two stable isotopes:

	Exact Mass (amu)	Abundance (%)
#1	112.9043	4.28
#2	114.9041	95.72

What is the atomic weight of this element?   **Give answer to 5 significant figures.**

Show Work

_____ amu

Question 10
4 Points

How many **moles** of **phosphorus atoms** are present in a sample that contains **4.83** moles of tetraphosphorus decaoxide, **P_4O_{10}**?
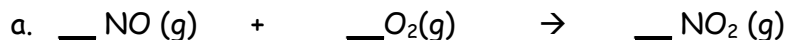
Show Work

_____ moles

Question 11 How many **grams** of **magnesium carbonate** are present in **3.74 moles** of this compound??

                                                                          Show Work

[_____] **grams**

**Question 12** Balance the following chemical equations using the **smallest possible integer coefficients**.

6 Points

    a. __ NO (g)   +   __ O_2(g)   →   __ NO_2 (g)

    b. Write a **balanced equation** for the **complete oxidation** reaction that occurs when butane (C_4H_{10}) burns in air..

    __ C_4H_{10} +   __ _____ → __ _____ + __ _____
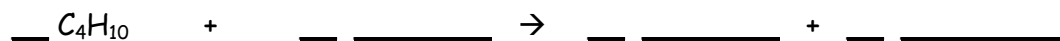
    c. Write a **balanced equation** for the reaction of **phosphorus (P_4)** with **chlorine gas** to produce **phosphorus trichloride (PCl_3)**

    __ P_4 (g)   +   __ __(g) →   __ PCl_3(g)

Question 13

4 Points

    a   b   c
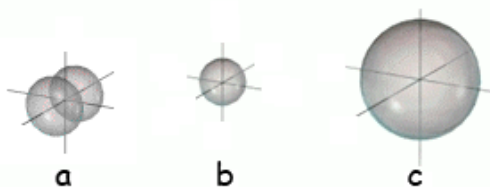
    a) The **orbitals b** and **c** depicted above are **what type**?   _____

    b) Which orbital would likely have the **highest ionization energy**?   _____

Question 14

4 Points

    a) How many **types** of **orbitals** are there in the shell with **n=3** in an atom? _____

    b) What is the **maximum** number of electrons in a set of **5d** orbitals?   _____

Question 15

12 Points

    a) Write the electron configuration for the **silicon** atom. _____

    b) Write the **noble gas** configuration for **nickel, (Ni)**?   _____

    c) The **element** with an **electron configuration** of $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1 3d^5$ _____

    d) **Te, [Kr]$5s^2 4d^{10} 5p^4$**, has how many **valence electrons**?   _____

    e) The Lewis diagram represents the **valence configuration** of a **main-group element** in

    period 3, $\cdot\ddot{X}\colon$, give its **electronic configuration**.   _____

    f) **X** is a **Main Group** element in **period 4** with **5** valence electrons. X is: __

Question 16   Using only the periodic table **arrange** the following elements in order of **increasing**
5 Points   **atomic** radius: P, Ca, Ga, Sr, Al

_____   _____   _____   _____   _____
Smallest   Largest

Question 17   Using only the periodic table **arrange** the following elements in order of **decreasing**
5 Points   **ionization energy**:   Si, O, In, Al, S

_____   _____   _____   _____   _____
Highest   Lowest

Exam I Score