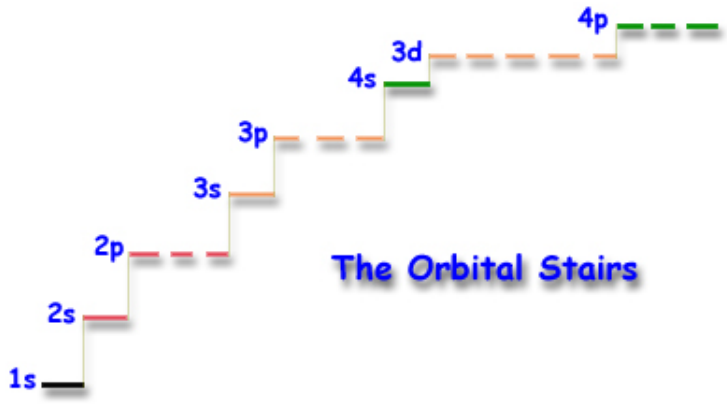
The Periodic Table

IA	IIA	IIIB	IVB	VB	VIB	VIIB	VIIIB	VIIIB	VIIIB	IB	IIB	IIIA	IVA	VA	VIA	VIIA	VIIIA
H 1 1.01																	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											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



Some Useful (maybe) Constants:

1 amu = 1.661×10^{-24} g

SID | | | | | | | | | Last _____ First _____

Question 1 (7 Points)

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

0.927790 _____ 0.060464 _____ 1.00×10^3 _____

b) There are **12 eggs in a dozen**. A farm produces **747 dozen** eggs a month, how should the **number of eggs** per month be reported? _____

c) The number **447.496** rounded to **4 significant figures** is: _____

Question 2 (4 Points)

a) When **17.2** is **subtracted** from **45.58**, the result should be reported with **digit(s)** _____ after the decimal point.

b) When **85.49** is divided by **59.6**, the answer should be reported to significant _____ digit(s).

Question 3 (3 Points)

A copy of your chemistry textbook is found to have a volume of **2.81×10^3 mL**. Using unit analysis, show what the **volume** of this copy of your chemistry textbook is in **L**.

1 g = 1000 mg	1000 mL = 1 L	100 cm = 1 m
1000 mg = 1 g	1 mL = 1 cm^3	1000 mm = 1 m

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

2.81×10^3 mL ____/____ × ____/____

Question 4 (6 Points)

Decide if the following statements are true (**T**) or false (**F**):

a) **Protons** and **neutrons** are **equal in mass**, but **opposite in charge**. _____

b) The **mass of a proton** is **about the same** as the **mass of a neutron**. _____

c) The **electron** acts as a **buffer zone** in the **nucleus** _____

Question 5 (6 Points)

a) What is the **mass number** of an atom that contains **31 protons**, **36 neutrons**, and **31 electrons**? _____

b) How **many protons** and **neutrons** are in an atom that has an **atomic number of 39** and a **mass number of 90**? _____ **Neutrons** _____ **Protons**

c) What is the **symbol** of an atom that contains **27 protons**, **32 neutrons**, and **27 electrons**? _____

Question 6 (3 Points)

Lithium has two stable isotopes, **lithium-7**, atomic mass of **7.016 amu** and **lithium-6**, atomic mass of **6.015** amu. From the **atomic weight** of Li = **6.94** one can conclude that:

- ☐ **lithium-7** has the **highest percent natural abundance**
- ☐ **both isotopes** have the **same percent natural abundance**
- ☐ **lithium-6** has the **highest percent natural abundance**

Question 7
10 Points

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

a. The **atomic number** for the element that is in **group 4A** and **period 2**? _____

b. The **atomic weight** for the element in **group 3A** and **period 4**? _____

c. **Check** the **elements** that would be expected to have **similar properties**?

❒ Pb ❒ Cl ❒ Be ❒ I ❒ Rn

d. What is the **symbol** of the **alkali metal** that is in **period 5**? _____

e. **Check** any of the following that are **metals**? (Z = atomic number)

❒ Fe (Z=26) ❒ N (Z=7) ❒ Br (Z=35) ❒ Ba (Z=56) ❒ None of these

Question 8
8 Points

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

a) **Phosphide** _____

b) **Phosphate** _____

c) **Dihydrogen phosphate** _____

d) **Ammonium** _____

Question 9
8 Points

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

b. **Name** the compound with the formula **$Fe(NO_2)_2$**? _____

c. What is the **formula** for **sodium hydrogen carbonate**? _____

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

Question 10
4 Points

If a grain of sand weighs **46 mg**, what is the weight (**in grams**) of **610 grains**?

For full credit you must show work.

_____ grams

Question 11
3 Points

How many **moles** of **nitrite ions** are present in a sample that contains **1.88 moles** of $Mg(NO_2)_2$?

For full credit you must show work.

_____ moles

Question 12
4 Points

How many **grams** of **chromium(III) hydroxide** are present in **1.67 moles** of this compound?

For full credit you must show work.

_____ grams

Question 13
6 Points

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

a. ___ Mg_3N_2 (s) + ___ H_2O (l) → ___ $Mg(OH)_2$ (aq) + ___ NH_3(aq)

b. Write a **balanced equation** for the **complete oxidation** reaction that occurs when **acetylene** (C_2H_2) burns in air..

___ C_2H_2 + ___ _____ → ___ _____ + ___ _____

c. When aqueous solutions of barium hydroxide, **$Ba(OH)_2$**, and nitric acid, **HNO_3** are combined, **barium nitrate** and **water** are formed.

___ $Ba(OH)_2$ (aq) + ___ HNO_3 (aq) → ___ _____ + ___ _____

Question 14
10 Points

a) Write the **electron configuration** for the **sodium** atom: _____

b) Write the **electronic configuration** for the **argon** atom: _____

c) Write the **noble gas configuration** for **vanadium** atom: _____

d) The following Lewis diagram represents the **valence electron configuration** of a main-group element. X:. If this element is in **period 2**, its **valence electron configuration** is: _____

e) The element with an **electron configuration** of **$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^2$** is in **group** _____ and **period** _____ .

Question 15
6 Points

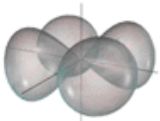
a) What is the **maximum number of electrons** possible in the shell with **n = 4** in an atom? _____

b) How many **types of orbitals** are there in the shell with **n = 2** in an atom? _____

c) How many **4d orbitals** are there in an atom? _____

Question 16
4 Points

Each of the orbitals depicted is from **the lowest energy shell possible** for its type. Which one has the **lowest shell number (n)**?



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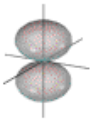

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Question 17 4 Points	Using only the periodic table **arrange** the following elements in order of **increasing atomic** radius: **S, Po, Te, O** _____ _____ _____ _____ Smallest Largest
Question 18 4 Points	Using only the periodic table **arrange** the following elements in order of **decreasing ionization energy**: **Ca, As, K, Ge** _____ _____ _____ _____ Highest Smallest

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Exam I Score [ ]