1. (6). The dimensions of a block of pure iron (d = 7.86 g/cm3) are 11.0 cm x 7.3 cm x 243.9 cm.
2. What is the volume of the block?
3. What is the mass of the block?
4. (6). How many protons\_\_\_\_\_, electrons\_\_\_\_\_ and neutrons\_\_\_\_\_ are present in an atom of the mass 58 isotope of nickel (Ni)?
5. (3). Express the following number in scientific notation: 0.0061740.
6. (3). How many significant figures appear in the number, 0.0061740?
7. (5). Write the e-configuration of Mn, using 1s2 etc notation.
8. (6). For each of the following atoms, state the **number** of valence electrons and write the **electron-dot formula** for the atom:

N

Si

1. (3). One of the following is not an ionic compound. Circle it. AlF3 Na2SO4 H2SO4 CaO
2. (3). How many valence electrons are present in the carbonate ion, CO32−?
3. (6). What is the most likely formula of the sulfide of Li? The oxide of Al?
4. (4). Write the e-configuration of the Cr+3 ion using arrow notation.
5. (3). The Al3+ ion has the same e-configuration as which noble gas?
6. (3). Given that 1 in = 2.54 cm, what is the number of feet in one meter? (In other words, calculate *feet/meter*).
7. (6). Using VSEPR theory, predict the geometric shapes of each of the following molecules (start by drawing the Lewis octet structure):
   1. NH3
   2. CO2
8. (8). Draw the Lewis structure - showing all valence electrons – of phosphorus oxychloride, POCl3. (P is the central atom). Start by determining the number of valence electrons.
9. (9). Hydrogen chloride (HCl) is a gas that dissolves in water to give H+ ions (more correctly, H3O+ ions) and Cl− ions, generating considerable heat in the process. Is this a chemical change\_\_\_\_\_ or a physical change\_\_\_\_\_? Is the resulting solution homogeneous\_\_\_\_\_ or heterogeneous\_\_\_\_\_? Is the resulting solution acidic\_\_\_\_\_, basic\_\_\_\_\_ or neutral\_\_\_\_\_?
10. (5). Given that (9/5)C + 32 = F, what is the temperature in degrees F when it is 10.0 degrees Celsius? What is this temperature in Kelvins (K)?
11. (5). Calculate the specific heat of copper if it takes 23 cal to heat a 5.0 g sample from 25 0C to 75 0C. (Caution: significant figures!).
12. (3) Group 1A metals easily gain an electron. True\_\_\_\_ or false\_\_\_\_.
13. (3) In the NaCl crystal lattice, each sodium ion has how many nearest-neighbor choride ions\_\_\_\_?
14. (4) The ‘old’ name for MnO2 was manganese dioxide. An incorrectly written ‘new’ name is manganese(II) oxide. Give the correct ‘new’ name.
15. (3). Given that the electronegativities of H, C and O are 2.1, 2.5, and 3.0, which molecular bond is more polar, C-H \_\_\_\_\_or O-H \_\_\_\_\_?
16. (3). The maximum number of covalent bonds that nitrogen can form is 4. However phosphorus, which is also in Group 5A, can form 5 covalent bonds. What does phosphorus have that are not available to nitrogen?

SCORING

1. (6) \_\_\_\_\_
2. (6) \_\_\_\_\_ PERFECT SCORE = 100
3. (3) \_\_\_\_\_ YOUR TOTAL\_\_\_\_\_\_\_
4. (3) \_\_\_\_\_ CLASS MEDIAN \_\_\_\_\_
5. (5) \_\_\_\_\_ YOUR ADJUSTED SCORE (%) \_\_\_\_\_
6. (6) \_\_\_\_\_ LETTER GRADE \_\_\_\_\_
7. (3) \_\_\_\_\_
8. (3) \_\_\_\_\_
9. (6) \_\_\_\_\_
10. (4) \_\_\_\_\_
11. (3) \_\_\_\_\_
12. (3) \_\_\_\_\_
13. (6) \_\_\_\_\_
14. (8) \_\_\_\_\_
15. (9) \_\_\_\_\_
16. (5) \_\_\_\_\_
17. (5) \_\_\_\_\_
18. (3) \_\_\_\_\_
19. (3) \_\_\_\_\_
20. (4) \_\_\_\_\_
21. (3) \_\_\_\_\_
22. (3) \_\_\_\_\_