Electron Configurations Worksheet Chemistry

1) What does each letter and number mean in the following notation? $3p^6$
2) Determine the following for the 4th electron shell (n=4) of an atom:
   a) Number of subshells it contains
   b) The designation used to describe each of the first three subshells
   c) The number of orbitals in each of the first three subshells.
   d) The maximum number of electrons that can occupy the 4th shell.
   e) The maximum number of electrons that can occupy each of the first three subshells.
3) Fill in the numerical value(s) that correctly complete(s) each of the following statements.
   a) A 5f subshell holds a maximum of _____ electrons.
   b) A 4s orbital holds a maximum of _____ electrons.
   c) The maximum number of electrons in the third electron shell is _____.
   d) The fourth shell contains _____ subshells, ___ orbitals, and a maximum of _____ electrons.
4) Give the maximum number of electrons that can occupy each of the following units.
   a) 2p subshell
   b) 5d orbital
   c) 3s orbital
   d) 5d subshell
   e) fifth shell
5) Write an orbital-filling diagram for the outer energy level of the following elements by drawing an arrow for each electron:

   a) Argon __ ___ ___ ___ (s; p_x p_y p_z)
   b) Sulfur ___ ___ ___ ___ (s; p_x p_y p_z)
   c) Calcium __ ___ ___ ___ (s; p_x p_y p_z)
   d) Oxygen __ ___ ___ ___ (s; p_x p_y p_z)
6) Write the electronic configuration for germanium.
7) Write the electronic configuration for iron.
8) The electron configuration for a neutral atom ends in $4s^23d^8$.
   a) What is its atomic number?
   b) How many orbitals are NOT completely filled?
   c) Name the atom.
9) The electron configuration for a neutral atom ends in $3s^2$.
   a) What is its atomic number?
   b) How many orbitals are NOT completely filled?
   c) Name the atom.
10) Name the elements whose electron configuration is:
   a) $1s^22s^22p^63s^23p^64s^23d^3$
   b) $1s^22s^22p^63s^23p^64s^23d^{10}4p^65s^24d^9$
   c) $1s^22s^22p^63s^23p^64s^23d^{10}4p^65s^24d^{10}5p^6 6s^2$
   d) [Xe] $6s^24f^{14}5d^6$
   e) [Rn] $7s^25f^{11}$
11) Determine which of the following electron configurations are not valid, and tell what is wrong with them:
   a) $1s^22s^22p^63s^23p^64s^24d^{10}4p^5$
   b) $1s^22s^22p^63s^23d^{10}$
   c) [Ra] $7s^25f^8$
   d) [Kr] $4s^23d^{10}4p^5$

An **ion** is an element that has a positive or negative charge because it has lost or gained one or more electrons. Positively-charged ions are also called cations; negatively charged ions are anions. A polyatomic ion is a bound group of elements that has a positive or negative charge.
Based on this information, answer the following:

12) Name the –1 ion that has an electron configuration of [Kr].
13) Name the –2 ion that has an electron configuration of [Ar].
14) Name the +1 ion that has an electron configuration of [Ar].
15) Name the +1 ion that has an electron configuration of [Ne].
16) Name the +3 ion that has an electron configuration of [Ne].
17) Determine the electron configuration for each of the following ions:
   a) S^{2-}
   b) Se^{2-}
   c) Mg^{2+}
   d) Ca^{2+}