

9. All the following statements about the quantum numbers are correct **EXCEPT** (Correct the false statement.)

- a. n has integral values from 1 to ∞ . **True**
- b. ℓ has values from 1 to ∞ . **False – ℓ values are 0, 1... $\ell-1$ for each value of ℓ**
- c. m_ℓ has values from $-\ell$ to $+\ell$. **True**
- d. m_s has values from $+1/2$ to $-1/2$. **False? $+1/2$ OR $-1/2$**

10. Which of the following sets of quantum numbers is NOT permissible?

- a. $n = 1, \ell = 0, m_\ell = 0, m_s = +1/2$ **Possible**
- b. $n = 4, \ell = 0, m_\ell = 0, m_s = +1/2$ **Possible**
- c. $n = 3, \ell = 3, m_\ell = -3, m_s = -1/2$ **Not Possible**
- d. $n = 2, \ell = 1, m_\ell = 1, m_s = -1/2$ **Possible**
- e. $n = 2, \ell = 1, m_\ell = 2, m_s = +1/2$ **Not Possible**

11. Which of the following statements is (are) true?

- a. An excited atom can return to a lower energy level by emitting light energy. **True**
- b. An atom can be excited to a higher energy level by absorption of light energy. **True**
- c. The frequency and wavelength of light are inversely proportional. **True**

12. Indicate whether the following statements are true or false.

- True** The $n=3$ energy level has no f orbitals.
- True** The 2p orbitals can have a maximum of 6 electrons.
- True** The s orbital has a spherical shape.
- False** The $n=4$ energy level has three sublevels.

13. Circle the orbital designations shown below that does NOT make sense?



- 14. a. What is the value of ℓ for a 4 f electron? **3**
- b. What is the orbital designation for an electron in the 3rd shell and p sublevel? **3p**
- c. What are the possible values of m_ℓ for a 5d electron? **2, 1, 0, -1, -2**
- d. What is the maximum number of electrons in the 3rd energy level? **18**
- e. How many orbitals have the following quantum numbers: $n=4, \ell=2, m_\ell=-2$? **1**
- f. How many electrons have the following quantum numbers: $n=4, \ell=2, m_\ell=-2$? **2**

15. Fill in the following table by assigning the possible sets of four quantum numbers to each of the electrons in the aluminum atom.

	n	ℓ	m_ℓ	m_s
1	1	0	0	+1/2
2	1	0	0	-1/2
3	2	0	0	+1/2
4	2	0	0	-1/2
5	2	1	1	+1/2
6	2	1	0	-1/2
7	2	1	-1	+1/2
8	2	1	1	-1/2
9	2	1	0	+1/2
10	2	1	-1	-1/2
11	3	0	0	+1/2
12	3	0	0	-1/2
13	3	1	1	+1/2