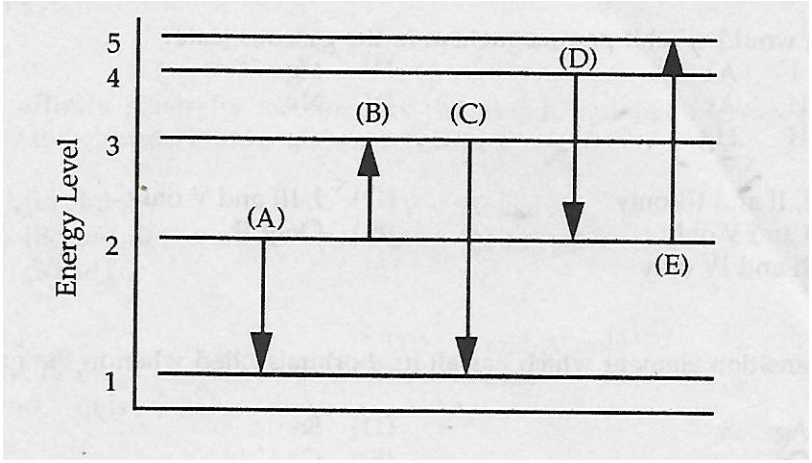
Chemistry 101 Name:_____

QUANTUM MECHANICAL MODEL
Exit Ticket 17

1. Does a photon of visible light (λ= 400 to 700 nm) have sufficient energy to excite an electron in a hydrogen atom from n=1 to the n=5 energy state? From the n=2 to the n=6 energy state? Support your answer with calculations.

2. Consider the transitions indicated in the diagram below:



Which arrow in the figure represents:

a) emission of light with the shortest wavelength? _____

b) a transition requiring absorption of the most energy? _____

3. How many orbitals in an atom have the designation n=3 and l=2? _____

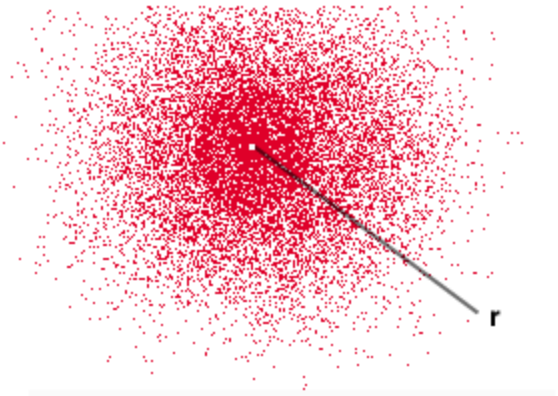
4. Identify the possible quantum numbers associated with each of the following orbitals:

   a) 2p n= l = m_l =

   b) 5f n= l = m_l =

   c) 4d n= l = m_l =

5. Shown on the right is an electron density diagram. Explain in your own words what this diagram represents and how it is used to determine the position of an electron in an atom.



6. Molybdenum metal has a threshold frequency of 1.09×10^{15} s–1 before it can emit an electron from its surface by photoelectric effect. If Mo is radiated by a light with a wavelength of 120. nm, would it emit an electron? If so, what would be the maximum velocity of the electron emitted? (For helpful hints on this problem, see video at this link)