

3. (a) For a given value of the principal quantum number n , the orbital quantum number ℓ ranges from 0 to $n - 1$. For $n = 3$, there are three possible values: 0, 1, and 2.
- (b) For a given value of ℓ , the magnetic quantum number m_ℓ ranges from $-\ell$ to $+\ell$. For $\ell = 1$, there are three possible values: -1 , 0, and $+1$.