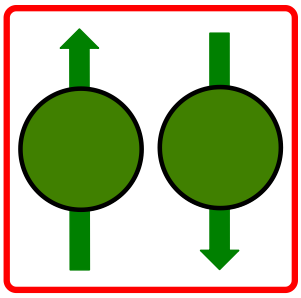
CONCEPT: QUANTUM NUMBERS: SPIN QUANTUM NUMBER

- An orbital can hold a maximum of ____ electrons that have opposite spins according to the *Pauli Exclusion Principle*.
  - □ **Pauli Exclusion Principle:** No two electrons in the same orbital can have the same four quantum numbers.



- **The Spin Quantum Number (m_s):** Deals with the rotational spin of an electron inside an atomic orbital.
  - □ Start out filling an orbital with an electron that points _____ followed by the next one pointing _____.
    - An electron that *points up* has an m_s value of _____.
    - An electron that *points down* has an m_s value of _____.

EXAMPLE: Provide the n, l m_l, and m_s quantum numbers for the two highlighted electrons in a 3rd principal level.

PRACTICE: Select the correct quantum numbers for the highlighted electron in a set of 5d orbitals.

a) n = 5, l = 3, m_l = – 4, m_s = +1/2

b) n = 4, l = 4, m_l = +1, m_s = +1/2

c) n = 5, l = 2, m_l = +1, m_s = +1/2

d) n = 5, l = 5, m_l = – 2, m_s = +1/2

e) n = 5, l = 2, m_l = +5, m_s = +1/2

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PRACTICE: Which of the following set of quantum numbers is possible?

a) $n = 8, l = 3, m_l = 0, m_s = 0$

b) $n = 7, l = 2, m_l = 1, m_s = -1/2$

c) $n = 9, l = 1, m_l = -2, m_s = +1/2$

d) $n = 3, l = 0, m_l = +3, m_s = +1/2$

e) $n = 4, l = 2, m_l = -2, m_s = +1$

PRACTICE: Which of the following set of quantum numbers is possible for an electron in a set of 6f orbitals?

a) $n = 6, l = 3, m_l = 0, m_s = 0$

b) $n = 6, l = 2, m_l = 1, m_s = -1/2$

c) $n = 9, l = 1, m_l = -2, m_s = +1/2$

d) $n = 6, l = 3, m_l = 0, m_s = +1/2$

e) $n = 4, l = 2, m_l = -2, m_s = +1$

PRACTICE: Which of the following statements is false?

a) If an electron has n = 2, it possesses only s and p orbitals.

b) Each orbital within a given atom can hold up to 2 electrons.

c) The second shell of an atom possesses *d* orbitals.

d) A set of *f* orbitals can hold a maximum of 14 electrons.

e) The first energy level contains only *s* orbitals.