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Chapter 11 Standardized Test Practice

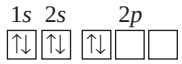
1. In an atom that has an electron configuration of $1s^2 2s^2 2p^3$, what is the total number of electrons in its sublevel of highest energy?

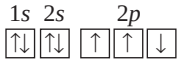
A. 1 **B.** 2 **C.** 3 **D.** 4

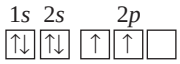
2. The characteristic bright-line spectrum of sodium is produced when its electrons:

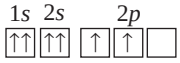
F. return to lower energy levels.
G. jump to higher energy levels.
H. are lost by neutral atoms.
J. are gained by neutral atoms.

3. Which of the following electron box diagrams correctly represents an atom of carbon?

A. 

B. 

C. 

D. 

4. What is the total number of occupied sublevels in an atom of chlorine in the ground state?

F. 1 **G.** 3 **H.** 5 **J.** 9

5. Which element has a completely filled second energy level as its valence shell?

A. Lithium (Li) **B.** Neon (Ne) **C.** Radium (Ra) **D.** Fluorine (F)

6. Which of the following phrases best describes electromagnetic radiation?

F. Wave properties only
G. Particle properties only
H. Both wave and particle properties
J. Photon properties only

7. Electrons that occupy an atom's outermost (highest) principal energy level are known as:

A. core electrons.
B. excited state electrons.
C. ground state electrons.
D. valence electrons.

8. Energy is absorbed when an electron moves from a 3*d* sublevel to a:

F. 1*s* sublevel. **G.** 2*s* sublevel. **H.** 3*p* sublevel. **J.** 4*p* sublevel.

9. In a hydrogen atom an electron undergoing which of the following transitions would emit light of the shortest wavelength?

A. From $n = 5$ to $n = 1$
B. From $n = 5$ to $n = 2$
C. From $n = 4$ to $n = 1$
D. From $n = 1$ to $n = 5$

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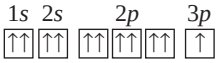
10. A student drew the following electron box diagram for an atom of sodium in the ground state.



Which of the following statements is true?

F. The student's diagram is correct.

G. The student's diagram shows an incorrect number of electrons.

H. The student's diagram violates the Pauli exclusion principle.

J. The student's diagram violates the law of conservation of mass.

Passage I

Use the following passage and table to answer questions 11–14.

A student studying electron configurations in atoms created Table 1 in order to summarize the various facts she learned about principal energy levels, energy sublevels, and orbitals.

Table 1

Facts About Principal Energy Levels, Sublevels, and Orbitals

Principal Energy Level	Number of Sublevels	Description of Sublevel
$n = 1$	1	One sublevel (1*s* orbital)
$n = 2$	2	Two sublevels (one 2*s* orbital and three 2*p* orbitals)
$n = 3$	3	Three sublevels (one 3*s* orbital, three 3*p* orbitals, and five 3*d* orbitals)
$n = 4$	4	Four sublevels (one 4*s* orbital, three 4*p* orbitals, five 4*d* orbitals, and seven 4*f* orbitals)

11. Based on Table 1 what is the relationship between the principal energy level number (n) and the number of energy sublevels that the principal energy level contains?

A. There is no clear relationship.

B. They are the same.

C. The number of orbitals is greater than the principal energy level number (n).

D. The maximum number of electrons equals $2n^2 - 1$.

12. What is the maximum number of electrons that can be contained in the third energy level?

F. 4 **G.** 8 **H.** 12 **J.** 18

13. Which of the following statements is false?

A. The 1*s* orbital can contain up to two electrons.

B. The maximum number of electrons that can be contained in an energy level is equal to $2n^2$.

C. The three 2*p* orbitals can hold a total of six electrons.

D. none of the above

14. What is the total number of *p* orbitals contained by an atom that has completely filled *p* orbitals in the fourth principal energy level?

F. 3 **G.** 4 **H.** 6 **J.** 9

15. Which of the following groups of atoms have the same outermost electron configurations but with different *n* values?

A. N, O, F, Ne **B.** S, Cl, Ar, K **C.** Ca, Ge, Sr, In **D.** O, S, Se, Te

16. As the wavelength of light increases, its frequency:

F. increases. **G.** decreases. **H.** does not change. **J.** oscillates.

17. As the atoms of the elements from atomic number 3 to atomic number 9 are considered in sequence from left to right on the periodic table, the covalent atomic radius of each successive atom is:

A. smaller, and nuclear charge is less.

B. smaller, and nuclear charge is greater.

C. larger, and nuclear charge is less.

D. larger, and nuclear charge is greater.