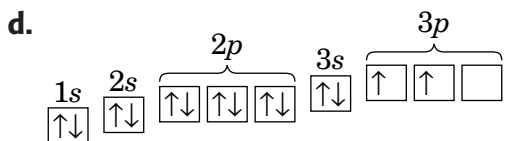
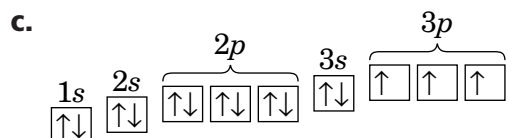
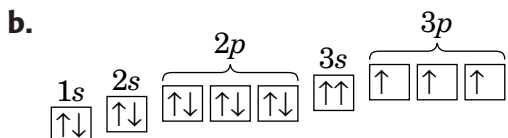
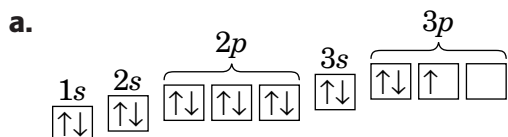


## Assessment

**Chapter Test A****Chapter: Arrangement of Electrons in Atoms**

In the space provided, write the letter of the term that best completes each sentence or best answers each question.

\_\_\_\_\_ 1. Which of the following orbital notations for phosphorus is correct?



\_\_\_\_\_ 2. The diagram  $\boxed{\uparrow\downarrow}$  represents two electrons with

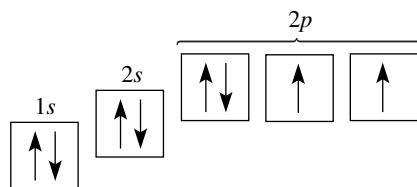
- opposite spin states.
- the same spin state.
- different energies.
- the same energy.

\_\_\_\_\_ 3. Which of the following quantum numbers describes a *p*-orbital in the third energy level?

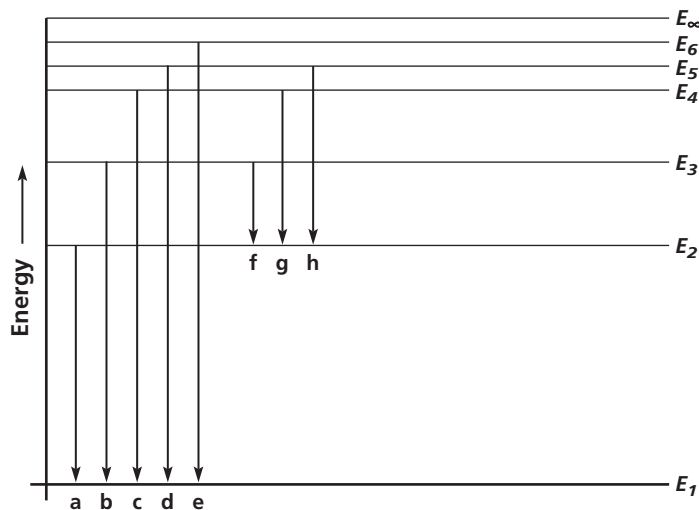
- $n = 3, l = 0, m = 0$
- $n = 3, l = 1, m = 0$
- $n = 3, l = -1, m = 0$
- $n = 4, l = 1, m = 0$

**Chapter Test A, *continued***

\_\_\_\_\_ 4. The electron configuration below violates



- a. the Pauli exclusion principle.
  - b. the Aufbau principle.
  - c. Hund's rule.
  - d. Both (a) and (c)
- \_\_\_\_\_ 5. A photon is emitted from a gaseous atom when an electron moves to its ground state from a(n)
- a. inner shell.
  - b. excited state.
  - c.  $n = 0$  state.
  - d. less energetic state.
- \_\_\_\_\_ 6. How many wavelengths of light are represented in the diagram below?



- a. 1
  - b. 6
  - c. 7
  - d. 8
- \_\_\_\_\_ 7. What is the frequency of light whose wavelength is 633 nm?
- a.  $4.74 \times 10^{-4}$  Hz
  - b.  $4.74 \times 10^{-2}$  Hz
  - c.  $4.74 \times 10^{14}$  Hz
  - d.  $4.74 \times 10^{16}$  Hz

**Chapter Test A, *continued***

- \_\_\_\_\_ **8.** What is the frequency of a photon whose energy is  $3.4 \times 10^{-19}$  J?  
( $h = 6.626 \times 10^{-34}$  J·s)  
**a.**  $8.8 \times 10^{26}$  Hz  
**b.**  $5.1 \times 10^{14}$  Hz  
**c.**  $1.9 \times 10^{-15}$  Hz  
**d.**  $2.3 \times 10^{-52}$  Hz
- \_\_\_\_\_ **9.** When electromagnetic radiation strikes the surface of a metal, electrons are ejected from the metal's surface. This is a description of the  
**a.** photoelectric effect.  
**b.** quantum theory.  
**c.** Aufbau principle.  
**d.** effects of diffraction.
- \_\_\_\_\_ **10.** The lowest energy state of an atom is its  
**a.** highest-occupied energy level.  
**b.** principle quantum number.  
**c.** electron configuration.  
**d.** ground state.
- \_\_\_\_\_ **11.** Which of these does the angular momentum quantum number indicate?  
**a.** the shape of an orbital  
**b.** the main energy level of an electron  
**c.** the orientation of an orbital around the nucleus  
**d.** the spin state of an electron in an orbital
- \_\_\_\_\_ **12.** Which are the sublevels in an energy level of  $n = 3$ ?  
**a.**  $s$ ,  $p$ , and  $f$   
**b.**  $s$ ,  $d$ , and  $f$   
**c.**  $s$ ,  $p$ , and  $d$   
**d.**  $p$ ,  $d$ , and  $f$
- \_\_\_\_\_ **13.** What is the highest occupied energy level in an atom of strontium in its ground state?  
**a.**  $n = 3$   
**b.**  $n = 4$   
**c.**  $n = 5$   
**d.**  $n = 6$
- \_\_\_\_\_ **14.** What is the correct electron configuration for a ground-state atom with 7 electrons?  
**a.**  $1s^2 2s^2 2p^3$   
**b.**  $1s^2 2s^2 2p^2 3s^1$   
**c.**  $1s^2 2s^3 2p^2$   
**d.**  $1s^2 2s^5$

**Chapter Test A, *continued***

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- \_\_\_\_\_ 15. What is the correct noble-gas notation for the electron configuration of an atom of chlorine?
- $[\text{Ar}]3s^23p^5$
  - $[\text{Ne}]3s^23p^4$
  - $[\text{Ar}]3s^23p^4$
  - $[\text{Ne}]3s^23p^5$
- \_\_\_\_\_ 16. What is the atomic number of the element with the noble-gas notation  $[\text{Kr}]5s^1$ ?
- 35
  - 36
  - 37
  - 38
- \_\_\_\_\_ 17. In which orbital(s) are all the inner-shell electrons located in an atom of magnesium that is in the ground state?
- 1s
  - 1s, 2s
  - 1s, 2s, 2p
  - 1s, 2s, 2p, 3s
- \_\_\_\_\_ 18. The electron configuration below represents a ground-state atom of which element?
- $$1s^22s^22p^63s^23p^4$$
- sulfur
  - oxygen
  - silicon
  - selenium
- \_\_\_\_\_ 19. Which of the following types of electromagnetic radiation has the lowest frequency?
- X rays
  - infrared light
  - ultraviolet light
  - microwaves
- \_\_\_\_\_ 20. The distance between corresponding points on adjacent waves is the wave's
- energy.
  - wavelength.
  - frequency.
  - speed.

**Chapter Test A, *continued***

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- \_\_\_\_\_ **21.** According to Einstein, which of the following can behave like a wave and also like a stream of particles?
- a.** a noble gas
  - b.** the atomic nucleus
  - c.** electromagnetic radiation
  - d.** a hydrogen atom in the ground state
- \_\_\_\_\_ **22.** When an atom in an excited state emits a photon of radiation, the energy of the photon is equal to the
- a.** energy of the atom's excited state.
  - b.** energy of the atom's final state.
  - c.** total energy of the atom's excited state and its final state.
  - d.** difference in energy between the atom's excited state and its final state.
- \_\_\_\_\_ **23.** The total number of orbitals that can exist at a given main energy level,  $n$ , is equal to
- a.**  $n$ .
  - b.**  $2n^2$ .
  - c.**  $n^2$ .
  - d.**  $n - 1$ .
- \_\_\_\_\_ **24.** How many possible orientations does an  $s$  orbital have?
- a.** 1
  - b.** 2
  - c.** 3
  - d.** 5
- \_\_\_\_\_ **25.** How many possible values are there for the spin quantum number?
- a.** 2
  - b.** 3
  - c.** 4
  - d.** 5