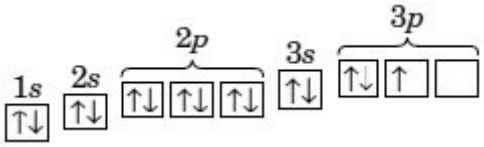
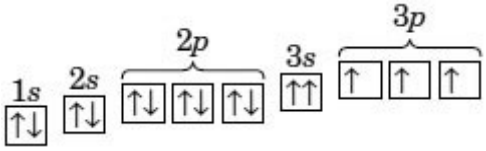
Choose the best answer from the options that follow each question.

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

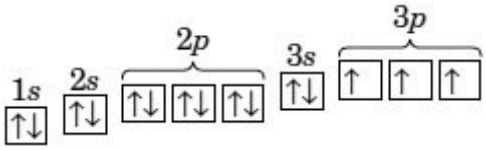
a.



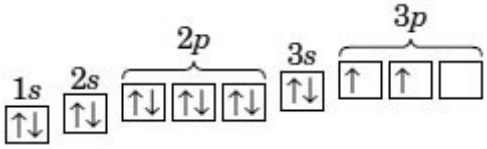
b.



→ c.



d.



Score: 0/1
Correct Answer: c.
Sorry, that's the wrong answer.

2. The diagram ↑↓ represents two electrons with

→ a. opposite spin states.
b. the same spin state.
c. different energies.
d. the same energy.

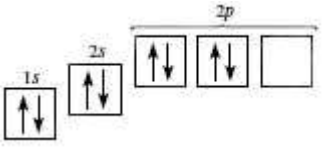
Score: 1/1
Correct Answer: a.
Correct!

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

a. $n = 3$, $l = 0$, $m = 0$
→ b. $n = 3$, $l = 1$, $m = 0$
c. $n = 3$, $l = -1$, $m = 0$
d. $n = 4$, $l = 1$, $m = 0$

Score: 1/1
Correct Answer: b.
Correct!

4. The electron configuration below violates



a. the Pauli exclusion principle.

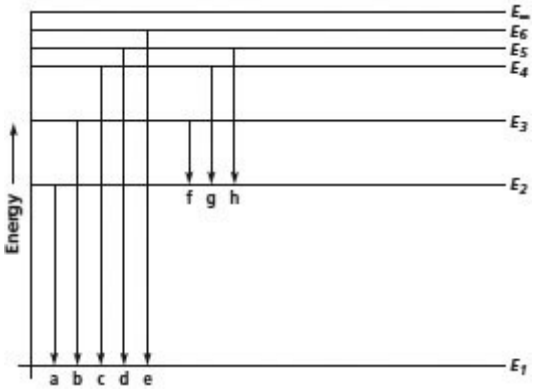
b. the Aufbau principle.
→ c. Hund's rule.
d. Both (a) and (c)

Score: 0/1
Correct Answer: c.
Sorry, that's the wrong answer.

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.

Score: 0/1
Correct Answer: b.
Sorry, that's the wrong answer.

6. How many wavelengths of light are represented in the diagram below?



a. 1
b. 6
c. 7
→ d. 8

Score: 0/1
Correct Answer: d.
Sorry, that's the wrong answer.

7. What is the frequency of light whose wavelength is 633 nm?
a. 4.74×10^{-4} Hz
b. 4.74×10^{-2} Hz
→ c. 4.74×10^{14} Hz
d. 4.74×10^{16} Hz

Score: 0/1
Correct Answer: c.
Sorry, that's the wrong answer.

8. What is the frequency of a photon whose energy is 3.4×10^{-19} J? ($h = 6.626 \times 10^{-34}$ J•s)
a. 8.8×10^{26} Hz
→ b. 5.1×10^{14} Hz
c. 1.9×10^{-15} Hz
d. 2.3×10^{-52} Hz

Score: 1/1
Correct Answer: b.

Correct!

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.

Score: 1/1
Correct Answer: a.
Correct!

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.

Score: 0/1
Correct Answer: d.
Sorry, that's the wrong answer.

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

Score: 0/1
Correct Answer: a.
Sorry, that's the wrong answer.

12. Which are the sublevels in an energy level of $n \times 3$?

- a. *s, p,* and *f*
- b. *s, d,* and *f*
- c. *s, p,* and *d*
- d. *p, d,* and *f*

Score: 0/1
Correct Answer: c.
Sorry, that's the wrong answer.

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. $n = 6$

Score: 0/1
Correct Answer: c.
Sorry, that's the wrong answer.

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. $1s^2 2s^5$

Score: 1/1

Correct Answer: a.
Correct!

15. What is the correct noble-gas notation for the electron configuration of an atom of chlorine?
- a. $[Ar]3s^2 3p^5$
- b. $[Ne]3s^2 3p^4$
- c. $[Ar]3s^2 3p^4$
- → d. $[Ne]3s^2 3p^5$

Score: 0/1
Correct Answer: d.
Sorry, that's the wrong answer.

16. What is the atomic number of the element with the noble-gas notation $[Kr]5s^1$?
- a. 35
- b. 36
- → c. 37
- d. 38

Score: 0/1
Correct Answer: c.
Sorry, that's the wrong answer.

17. In which orbital(s) are all the inner-shell electrons located in an atom of magnesium that is in the ground state?
- a. 1*s*
- b. 1*s*, 2*s*
- → c. 1*s*, 2*s*, 2*p*
- d. 1*s*, 2*s*, 2*p*, 3*s*

Score: 0/1
Correct Answer: c.
Sorry, that's the wrong answer.

18. The electron configuration below represents a ground-state atom of which element?
$1s^2 2s^2 2p^6 3s^2 3p^4$
- → a. sulfur
- b. oxygen
- c. silicon
- d. selenium

Score: 1/1
Correct Answer: a.
Correct!

19. Which of the following types of electromagnetic radiation has the lowest frequency?
- a. X rays
- b. infrared light
- c. ultraviolet light
- → d. microwaves

Score: 0/1
Correct Answer: d.
Sorry, that's the wrong answer.

20. The distance between corresponding points on adjacent waves is the wave's
- a. energy.
- → b. wavelength.

c. frequency.
d. speed.

Score: 1/1
Correct Answer: b.
Correct!

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

Score: 0/1
Correct Answer: c.
Sorry, that's the wrong answer.

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.

Score: 0/1
Correct Answer: d.
Sorry, that's the wrong answer.

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. $n - 1$.

Score: 0/1
Correct Answer: c.
Sorry, that's the wrong answer.

24. How many possible orientations does an *s* orbital have?
a. 1
b. 2
c. 3
d. 5

Score: 0/1
Correct Answer: a.
Sorry, that's the wrong answer.

25. How many possible values are there for the spin quantum number?
a. 2
b. 3
c. 4
d. 5

Score: 1/1
Correct Answer: a.
Correct!