Standardized Test Prep

Answer the following items on a separate piece of paper.

MULTIPLE CHOICE

1. Which of the following relationships is true?
- **A.** Higher-energy light has a higher frequency than lower-energy light does.
- **B.** Higher-energy light has a longer wavelength than lower-energy light does.
- **C.** Higher-energy light travels at a faster speed than lower-energy light does.
- **D.** Higher-frequency light travels at a slower speed than lower-energy light does.

2. The energy of a photon is greatest for
- **A.** visible light.
- **B.** ultraviolet light.
- **C.** infrared light.
- **D.** X-ray radiation.

3. What is the wavelength of radio waves that have a frequency of 88.5 MHz?
- **A.** 3.4 m
- **B.** 8.9 nm
- **C.** 0.30 m
- **D.** 300 nm

4. Which transition in an excited hydrogen atom will emit the longest wavelength of light?
- **A.** E_5 to E_1
- **B.** E_4 to E_1
- **C.** E_3 to E_1
- **D.** E_2 to E_1

5. Which of the following quantum numbers is often designated by the letters *s, p, d,* and *f* instead of by numbers?
- **A.** n
- **B.** l
- **C.** m
- **D.** s

6. Which quantum number is related to the shape of an orbital?
- **A.** n
- **B.** l
- **C.** m
- **D.** s

7. What is the maximum number of unpaired electrons that can be placed in a 3*p* sublevel?
- **A.** 1
- **B.** 2
- **C.** 3
- **D.** 4

8. What is the maximum number of electrons that can occupy a 3*s* orbital?
- **A.** 1
- **B.** 2
- **C.** 6
- **D.** 10

9. Which element has the noble-gas notation $[Kr]5s^24d^2$?
- **A.** Se
- **B.** Sr
- **C.** Zr
- **D.** Mo

SHORT ANSWER

10. When a calcium salt is heated in a flame, a photon of light with an energy of 3.2×10^{-19} J is emitted. On the basis of this fact and the table below, what color would be expected for the calcium flame?

Frequency, s^{-1}	7.1×10^{14}	6.4×10^{14}	5.7×10^{14}
Wavelength, nm	422	469	526
Color	violet	blue	green
Frequency, s^{-1}	5.2×10^{14}	4.8×10^{14}	4.3×10^{14}
Wavelength, nm	577	625	698
Color	yellow	orange	red

11. The electron configuration of sulfur is $1s^22s^22p^63s^23p^4$. Write the orbital notation for sulfur.

EXTENDED RESPONSE

12. Explain the reason for the hydrogen line-emission spectrum.

13. When blue light shines on potassium metal in a photocell, electrons are emitted. But when yellow light shines on the metal, no current is observed. Explain.

Test TIP If time permits, take short mental breaks during the test to improve your concentration.