Assessment: Let it Glow

Matching
Choose the letter of the term that best matches each description. Write the letter to the left of the number. Some choices may not be used and other choices may be used more than once.

<table>
<thead>
<tr>
<th>Letter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>measured in Hertz</td>
</tr>
<tr>
<td>2.</td>
<td>represented by Greek letter nu (ν)</td>
</tr>
<tr>
<td>3.</td>
<td>measured in nanometers</td>
</tr>
<tr>
<td>4.</td>
<td>measured in Joules</td>
</tr>
<tr>
<td>5.</td>
<td>represented by Greek letter lambda (λ)</td>
</tr>
<tr>
<td>6.</td>
<td>number of times a wave passes a given point in 1 second</td>
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Terms:
A. Frequency
B. Wavelength
C. Energy
D. Speed of light
E. Planck’s constant

Multiple Choice
Choose the best answer for each question.

7. Fireworks that appear red in color often contain lithium or strontium salts. The emitted visible light occurs when the electrons of the atoms
a. absorb energy and move from their ground state to excited state energy levels.
b. absorb energy and move from their excited state to ground state energy levels.
c. give off absorbed energy and move from their excited state to even higher energy levels.
d. give off absorbed energy and move from their excited state to ground state energy levels.
e. give off absorbed energy and move from their ground state to excited state energy levels.

8. How would you describe the frequency and wavelength of high-energy gamma rays as compared to lower energy visible light rays?
a. Gamma rays have similar wavelengths and frequencies to visible light.
b. Gamma rays have longer wavelengths and higher frequencies than visible light.
c. Gamma rays have longer wavelengths and lower frequencies than visible light.
d. Gamma rays have shorter wavelengths and lower frequencies than visible light.
e. Gamma rays have shorter wavelengths and higher frequencies than visible light.
Calculations
Show all of your work below the problem. Include formulas used and do not forget to include units in all steps.

9. X-rays are used in medical imaging to show the shadow of bones. Radiation near 0.100 nm is directed at a body part placed in front of a detector. Bones contain calcium, which absorbs X-rays efficiently, and the X-rays pass through tissue, hitting the detector and becoming visible on the radiograph. Determine the energy of these X-rays.

Short Answer
Answer each question based on what you have learned in this lesson and lab activity. Make sure to address each part of the question, writing your answers in complete sentences.

10. Imagine that you are invited to a Black Light party. You will want to wear clothes that glow brightly. You purchase a white cotton t-shirt and some highlighters and draw groovy pictures on the white t-shirt. Then you donned your swanky white leather pants. Once you were in the black light you noticed that your white shirt was glowing a bright purple but your white pants were not glowing. Also, the yellow parts of your drawings on the shirt were glowing brightly, but the blue parts were not glowing. Based on what you learned in the lab, how would you explain this? Make sure to also discuss what is happening on the atomic level.

11. At the Black Light party, your friend wore a Batman glow-in-the-dark t-shirt. After a stop in the brightly lit restrooms, you and your friend left the party. It was dark outside, but your friend’s shirt glowed while your white shirt with highlighter drawings was no longer glowing. Based on what you learned in your research on the Extension portion of this lab, give an explanation to your friend including references to what is happening on the atomic level.