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| Year 12 Worksheet 3 – Formative Assessment 3  **Quantum and Particle Physics** | | |
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| **Name: ANSWER** | **Teacher: MAX PLANK** | **Score /20** |
| **Comment:** | | **Time allowed:**  **20 minutes** |

1. X-rays are created when:
2. protons strike a metal target .
3. neutrons strike a metal target.
4. photons are incident on a surface.
5. electrons strike a metal target.
6. photons strike electrons.
7. Which of the following photons has the greatest energy?
8. Infrared
9. Blue light
10. X-ray
11. Gamma ray
12. Ultraviolet
13. Which of the following colours is associated with the lowest **temperature** of a black body radiator?
14. Violet
15. Blue
16. Green
17. Yellow
18. Red
19. How does the energy of a photon change if the wavelength is doubled?
20. Doubles
21. Quadruples
22. Stays the same
23. Is cut to one-half
24. Is cut to one-fourth
25. The photoelectric effect was explained by Albert Einstein by assuming that:
26. light is a wave.
27. light is a particle.
28. an electron behaves as a wave.
29. an electron behaves as a particle.
30. light does not interact with matter.
31. When an electron falls from an orbit where n = 2 to n = 1:
32. A photon is emitted
33. A photon is absorbed.
34. No change in atomic energy.
35. The atomic energy decreases to zero
36. The atomic energy increases.
37. Emission spectra and absorption spectra
38. for a single element complement one another.
39. can be used to identify elements in unknown samples, but only if the element is already known by classical chemical means.
40. when combined together form a series of bright lines.
41. certain pairs of closely-related elements are identical.
42. When an atom absorbs a photon, one of its orbital electrons
43. jumps from a higher to a lower energy level.
44. gains energy.
45. is absorbed by the nucleus.
46. turns into gamma radiation.
47. **This is a question directly from WACE 2014 Exam**
48. Use the formula to complete the TWO missing values in the energy level diagram below. The diagram is not drawn to scale. **(2 marks)**



1. On the diagram above, draw in all the possible transitions when an electron undergoes relaxation from n = 4 to the ground state.  **(3 marks)**



1. Calculate the wavelength of the photon emitted from the E3 to E2 transition. Show all workings.

 **(4 marks)**

**(e)** The transitions of **E4 to E2** and **E3 to E2** produce red and green photons. Which transition produces each colour? Justify your answer. (No calculation is necessary)

Red photon **E** \_\_\_ 🡪 **E**\_\_\_\_\_ Green photon **E** \_\_\_ 🡪 **E\_**\_\_\_\_

 **[3 Marks]**