Year 12 Science: Atomic and nuclear physics: the nucleus, radiation and $E = mc^2$

Name: _____ Date: _____

Try these without your notes first, then check the answer key.

Practice

1. How many protons and how many neutrons are in $^{239}_{94}\text{Pu}$?

2. Complete the alpha decay: $^{241}_{95}\text{Am} \rightarrow ? + {}^{4}_{2}\text{He}$.

3. Iodine-131 ($Z = 53$) is a beta emitter. Write the product.

4. What fraction of a radioactive sample is left after 4 half-lives?

5. Which radiation is stopped by a sheet of paper, and why does it travel so short a distance?

Task: answering like an Excellence report

Write a short answer to each question, then compare it with the model answers.

6. A uranium-235 nucleus absorbs a neutron and splits into barium-141 ($Z = 56$), krypton-92 and some neutrons. How many neutrons are released?

7. Explain where the energy released in this fission comes from, and how a reactor keeps the rate of fission steady.

Fix the mistake

8. Correct this statement: "In beta decay, one of the atom's orbiting electrons is thrown out."

9. Correct this statement: "After two half-lives, all of the sample has decayed."

10. Correct this statement: "Gamma rays are the most ionising because they go through everything."

11. Correct this statement: "In fission the mass number is lost and turned into energy."