Chapter 18 Review Answer Key

(Note: Solutions to Problems 30 - 59 & 64 - 70 can be found in the Book Answer Key)

Assignments:

- Chapter Review questions 1 - 71 on pages 669-672
- Written Assessment questions 72 - 76 on page 672
- Focus on Graphing questions 82 - 86 on pages 673

Chapter Review Assignment

1. nuclear
2. A nucleon is a proton or neutron.
3. gamma ray
4. nuclear fusion
5. Fission is splitting, while fusion is joining.
6. radioactivity
7. Critical mass is the minimum mass of a fissionable isotope that provides the number of neutrons needed to sustain a chain reaction.
8. A half-life is the time required for half of a sample of a radioactive substance to disintegrate by radioactive decay or natural processes.
9. nuclide
10. nuclear fission and nuclear fusion
11. The strong force binds together nucleons in a nucleus, but only over short distances.
12. atom breaks apart
13.
    a. In a smaller nucleus, the nucleons are all close enough together for each nucleon to attract all others by the strong force.
    b. In a larger nucleus, some of the nucleons are so far apart that they have no attraction due to the strong force, the nucleus holds as long as the repulsion is not greater.
14. Binding energy is the energy released when nucleons come together.
15. The energy (binding energy) is directly proportional to the mass defect.
16. Different isotopes mean different nucleons - different masses.
17. A quark is smaller particle that makes up protons and neutrons.
18. An alpha particle is just the nucleus, whereas a helium atom has electrons.
19. alpha particle - skin or one sheet of paper, beta particle - few sheets of aluminum foil, gamma ray - several centimeters of lead
20. Not necessarily as it depends on the isotopes
21.
    a. neutron gets the material to critical mass and as emitted keep it going

b. in order to sustain the reaction and to maintain a constant rate
c. without neutrons, the chain reaction would end

22. The new nucleus has a higher binding energy per nucleon than each of the smaller nuclei.
23. The atom changes in both - one less proton and one more neutron.
24. The alpha particles in a smoke detector cannot penetrate the plastic covering.
25. acute exposure is a single or a few large dose(s), while chronic radiation exposure occurs as a result of many low doses of radiation over a longer period of time.
26. As a result of eating plants or eating the animals that eat the plants.
27. one with a short half-life
28. a small sample of the art work is taken and bombarded with neutrons - revealing the elements used. This is then used as "fingerprint" for the materials used and can be checked for when these were available
29. A *rem* describes the biological effect of the absorbed dose of radiation in humans.
30. Answers can be found in the textbook answer key.
31. Answers can be found in the textbook answer key.
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71. Answers can be found in the textbook answer key.
72. Answers will vary, but must include that a greater deal of energy is needed.
73. Answers will vary, but must include that fission reactions need far less energy.
74. Without a constant rate, there would be no way to accurately calculate a date using half-lives.
75. The detector would tell them when they have reached the limits of safe exposure and they would stop as result.
76. The charge feels the "pull" of atoms as it moves past them.

82. small

83. large

84. 1.4

85. 1.5

86. B