

Nuclear Energy Fundamentals

Physics · Answer Key · 20 Questions

1. What is the name of the process by which a heavy nucleus splits into two lighter nuclei, releasing energy?

- A) Nuclear fusion
- B) Nuclear fission**
- C) Radioactive decay
- D) Chemical combustion

2. Which subatomic particle is primarily responsible for triggering the fission of a Uranium-235 nucleus?

- A) Proton
- B) Electron
- C) Neutron**
- D) Positron

3. In a nuclear power plant, what is the primary function of the control rods?

- A) To generate electricity directly
- B) To absorb neutrons to regulate the reaction rate**
- C) To provide fuel for the reactor
- D) To cool the reactor core

4. Which element is most commonly used as fuel in commercial nuclear power reactors?

- A) Plutonium-239
- B) Thorium-232
- C) Uranium-235**
- D) Carbon-14

5. What is the main role of the moderator in a nuclear reactor?

- A) To slow down fast neutrons**
- B) To increase the temperature of the core
- C) To prevent radioactive leaks
- D) To convert heat to electricity

6. What form of energy is initially released during the fission of uranium atoms?

- A) Chemical energy
- B) Kinetic energy**
- C) Potential gravitational energy
- D) Sound energy

7. Which famous equation developed by Albert Einstein describes the relationship between mass and energy?

- A) $F = ma$
- B) $E = mc^2$**
- C) $V = IR$
- D) $PV = nRT$

8. Where does the energy produced in the Sun primarily come from?

- A) Nuclear fission
- B) Nuclear fusion**
- C) Combustion
- D) Geothermal heat

9. What is the primary substance used as a coolant in most nuclear reactors to transfer heat away from the core?

- A) Liquid mercury
- B) Liquid nitrogen
- C) Water**
- D) Molten lead

10. Which of the following is a byproduct of nuclear fission that requires long-term management?

- A) High-level radioactive waste**
- B) Pure oxygen
- C) Solid gold
- D) Liquid nitrogen

11. In a nuclear power plant, what is the steam primarily used to drive?

- A) A piston engine
- B) A turbine**
- C) A battery bank
- D) A chemical pump

12. Which term describes a reaction where the products of one fission event cause further fission events?

- A) A thermal equilibrium
- B) A chain reaction**
- C) A chemical synthesis
- D) A radioactive half-life

13. What does the term 'enrichment' refer to in the context of nuclear fuel?

A) Increasing the percentage of U-235 in uranium

B) Removing all radioactivity from the fuel

C) Adding lead to the fuel

D) Increasing the weight of the fuel rods

14. Which of these is a non-renewable energy source?

A) Wind power

B) Solar power

C) Nuclear fission

D) Hydroelectric power

15. What is the primary purpose of a nuclear containment building?

A) To speed up the reaction

B) To generate electricity

C) To prevent the release of radioactive materials

D) To act as a fuel storage unit

16. Which isotope is produced from Uranium-238 by neutron capture and is also used as reactor fuel?

A) Plutonium-239

B) Carbon-12

C) Helium-4

D) Lead-206

17. What does the term 'half-life' represent in radioactive materials?

A) The time it takes for half of the atoms to decay

B) The weight of the material

C) The color of the radiation

D) The amount of electricity produced

18. Which type of radiation consists of high-energy electromagnetic waves?

A) Alpha particles

B) Beta particles

C) Gamma rays

D) Neutron beams

19. What is the main source of heat in a light water reactor?

A) Chemical combustion

B) Fission reactions

C) Friction

D) Geothermal sources

20. Which component of a nuclear reactor is responsible for converting thermal energy into mechanical energy?

A) Control rods

B) Turbine

C) Containment dome

D) Cooling tower