

Nuclear Energy Fundamentals

Physics · Practice Test · 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