Multiple Choice

23.1 The Four Fundamental Forces 33.

Which of the following is not one of the four fundamental forces?

a. gravity
b. friction
c. strong nuclear
d. electromagnetic

34.

What type of carrier particle has not yet been found?

a. gravitons
b. \text{W} bosons
c. \text{Z} bosons
d. pions

35.

What effect does an increase in electric potential have on the accelerating capacity of a Van de Graaff generator?

a. It increases accelerating capacity.
b. It decreases accelerating capacity.
c. The accelerating capacity of a Van de Graaff generator is constant regardless of electric potential.
d. Van de Graaff generators do not have the capacity to accelerate particles.

36.

What force or forces exist between a proton and a second proton?

a. The weak electrostatic force and strong magnetic force
b. The weak electrostatic and strong gravitational force
c. The weak frictional force and strong gravitational force
d. The weak nuclear force, the strong nuclear force, and the electromagnetic force

23.2 Quarks 37.

To what color must quarks combine for a particle to be constructed?

a. black
b. green
c. red
d. white

38.

What type of hadron is always constructed partially of an antiquark?

a. baryon
b. lepton
c. meson
d. photno

39.

What particle is typically released when two particles annihilate?

a. graviton
b. antimatter
c. pion
d. photno

40.

Which of the following categories is not one of the three main categories of the Standard Model?

a. gauge bosons
b. hadrons
c. leptons
d. quarks

41.

Analysis of what particles began the search for the Higgs boson?

a. W and Z bosons
b. up and down quarks
c. mesons and baryons
d. neutrinos and photons

42.

What similarities exist between the discovery of the quark and the discovery of the neutron?

a. Both the quark and the neutron were discovered by launching charged particles through an unknown structure and observing the particle recoil.
b. Both the quark and the neutron were discovered by launching electrically neutral particles through an unknown structure and observing the particle recoil.
c. Both quarks and neutrons were discovered by studying their deflection under an electric field.

23.3 The Unification of Forces 43.

Which two forces were first combined, signifying the eventual desire for a Grand Unified Theory?

a. electric force and magnetic forces

b. electric force and weak nuclear force
c. gravitational force and the weak nuclear force
d. electroweak force and strong nuclear force

44.

After the Big Bang, what was the first force to separate from the others?

a. electromagnetic force
b. gravity
c. strong nuclear force
d. weak nuclear force

45.

What is the name of the device used by scientists to check for proton decay?

a. the cyclotron
b. the Large Hadron Collider
c. the Super-Kamiokande
d. the synchrotron

46.

How do Feynman diagrams suggest the Grand Unified Theory?

a. The electromagnetic, weak, and strong nuclear forces all have similar Feynman diagrams.
b. The electromagnetic, weak, and gravitational forces all have similar Feynman diagrams.
c. The electromagnetic, weak, and strong forces all have different Feynman diagrams.