

תידון המדע הירושלמי תשס"ח - 2008-2009 Jerusalem Science Contest
Electromagnetic and Ionizing radiation
Exam 12 — Supplementary Handout -Subatomic Particles

Name: _____

Date: _____

Raw Score: _____

Percentage Score: _____ %

Proctor for this Examinaton: _____ Form: _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 1) Mesons are a combination of which of the following?
 - A) three quarks
 - B) four quarks
 - C) a quark and an antiquark
 - D) two quarks and an antiquark
 - E) two quarks

- 2) Another name for a non-electron-like lepton is a(n)
 - A) axion
 - B) tauon
 - C) muon
 - D) boson
 - E) neutrino

- 3) The first quark "flavors" to be described were
 - A) up, strange and bottom
 - B) up, down and top
 - C) up, down and strange
 - D) down, top and bottom
 - E) up, down and charm

- 4) A hyperon is a
 - A) type of meson
 - B) combination of up and/or down quarks and a top quark
 - C) combination of strange and charm quarks
 - D) type of nucleon
 - E) none of the preceding

- 5) The total number of lepton types is
 - A) 1
 - B) 4
 - C) 8
 - D) 2
 - E) none of the preceding.

- 6) A meson independently discovered in 1974 by Richter at Brookhaven and Ting at Stanford known as the J/ψ particle, has which of the following compositions?
- A) up/down/strange
 - B) strange/antistrange
 - C) charm/anticharm
 - D) top/antitop
 - E) up/down/charm
- 7) The last quark to be discovered, was found by Leon Lederman in 1995, after 18 years of searching. This was the elusive
- A) none of the preceding
 - B) bottom quark
 - C) charm quark
 - D) top quark
 - E) strange quark
- 8) All nucleons are composed of a combination of which of the following quark types?
- A) top and bottom
 - B) all of the preceding
 - C) up and down
 - D) charm and strange
 - E) none of the preceding.
- 9) The particle postulated to be a major constituent of the dark matter of the universe is the
- A) Higg's boson
 - B) axion
 - C) tauon
 - D) majoron
 - E) none of the preceding
- 10) An elusive, as yet undiscovered particle that would explain how massless particles can cause matter to have mass, is being searched for in experiments conducted at CERN's Large Hadron Collider. What is this particle?
- A) the Higg's boson
 - B) the graviton
 - C) the axion
 - D) the tachyon
 - E) none of the preceding.
- 11) The force involved in mediating all fermion interactions is the
- A) weak force
 - B) strong force
 - C) gravitational force
 - D) electromagnetic force
 - E) all of the preceding forces are involved in mediating fermionic interactions
- 12) The charge of an up quark is
- A) $2/3$
 - B) 0
 - C) $-1/3$
 - D) $1/2$
 - E) none of the preceding

- 13) The first "second generation" (after proton, neutron and electron) particle to be discovered, fourteen years after it was postulated by Hideki Yukawa in 1933, was the
- A) quark
 - B) muon (mu meson)
 - C) boson
 - D) pion (pi meson)
 - E) none of the preceding
- 14) A baryon is a
- A) fermionic hadron
 - B) meson
 - C) bosonic hadron
 - D) type of neutrino
 - E) none of the preceding
- 15) Composite particles composed of quarks are known as
- A) leptons
 - B) hadrons
 - C) fermions
 - D) neutrinos
 - E) bosons
- 16) Two force-mediating particles, designated W^+ and W^- , are members of what particle class?
- A) leptons
 - B) quarks
 - C) bosons
 - D) mesons
 - E) none of the preceding.
- 17) The only boson predicted to not have a spin of 0 or 1 is the
- A) muon
 - B) axion
 - C) gluon
 - D) graviton.
 - E) all bosons are predicted to have a spin of 0 or 1
- 18) Which of the following is the only lepton which has a mass large enough for it to decay into a hadron?
- A) gluon
 - B) muon
 - C) tauon
 - D) electron
 - E) none of the preceding
- 19) The particle mediating the weak nuclear force is the
- A) axion
 - B) majoron
 - C) Z boson
 - D) gluon
 - E) W boson
- 20) Quantum electrodynamic theory could not explain the strong nuclear force. A new quantum property, "color", was introduced giving rise to a new branch of physics known as
- A) quantum fermiodynamics
 - B) quantum color theory
 - C) quantum chromodynamics
 - D) quantum hadrodynamics
 - E) none of the preceding