

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) ,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) muon (mu meson)
 - B) pion (pi meson)
 - C) quark
 - D) boson
 - E) none of the preceding

- 2) Two force-mediating particles, designated W^+ and W^- , are members of what particle class?
 - A) leptons
 - B) mesons
 - C) quarks
 - D) bosons
 - E) none of the preceding.

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

- 4) 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 color theory
 - B) quantum hadrodynamics
 - C) quantum fermiodynamics
 - D) quantum chromodynamics
 - E) none of the preceding

- 5) 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) up/down/charm
 - C) strange/antistrange
 - D) top/antitop
 - E) charm/anticharm
- 6) The last quark to be discovered, was found by Leon Lederman in 1995, after 18 years of searching. This was the elusive
- A) charm quark
 - B) bottom quark
 - C) top quark
 - D) strange quark
 - E) none of the preceding
- 7) The only boson predicted to not have a spin of 0 or 1 is the
- A) gluon
 - B) graviton.
 - C) muon
 - D) axion
 - E) all bosons are predicted to have a spin of 0 or 1
- 8) The total number of lepton types is
- A) 1
 - B) 2
 - C) 4
 - D) 8
 - E) none of the preceding.
- 9) Another name for a non-electron-like lepton is a(n)
- A) tauon
 - B) muon
 - C) neutrino
 - D) axion
 - E) boson
- 10) The particle mediating the weak nuclear force is the
- A) Z boson
 - B) W boson
 - C) majoron
 - D) axion
 - E) gluon
- 11) The force involved in mediating all fermion interactions is the
- A) weak force
 - B) strong force
 - C) electromagnetic force
 - D) gravitational force
 - E) all of the preceding forces are involved in mediating fermionic interactions
- 12) Composite particles composed of quarks are known as
- A) bosons
 - B) leptons
 - C) hadrons
 - D) neutrinos
 - E) fermions

- 13) All nucleons are composed of a combination of which of the following quark types?
- A) charm and strange
 - B) up and down
 - C) top and bottom
 - D) all of the preceding
 - E) none of the preceding.
- 14) Mesons are a combination of which of the following?
- A) a quark and an antiquark
 - B) two quarks
 - C) three quarks
 - D) four quarks
 - E) two quarks and an antiquark
- 15) 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 axion
 - B) the graviton
 - C) the tachyon
 - D) the Higg's boson
 - E) none of the preceding.
- 16) The charge of an up quark is
- A) 0
 - B) $1/2$
 - C) $2/3$
 - D) $-1/3$
 - E) none of the preceding
- 17) A hyperon is a
- A) type of meson
 - B) combination of up and/or down quarks and a top quark
 - C) type of nucleon
 - D) combination of strange and charm quarks
 - E) none of the preceding
- 18) A baryon is a
- A) fermionic hadron
 - B) bosonic hadron
 - C) meson
 - D) type of neutrino
 - E) none of the preceding
- 19) Which of the following is the only lepton which has a mass large enough for it to decay into a hadron?
- A) muon
 - B) tauon
 - C) electron
 - D) gluon
 - E) none of the preceding

- 20) The particle postulated to be a major constituent of the dark matter of the universe is the
- A) tauon
 - B) Higg's boson
 - C) majoron
 - D) axion
 - E) none of the preceding