

PARTICLE ADVENTURE SCAVENGER HUNT



NAME _____

Use the Particle Adventure to research fundamental particles of matter. Click on this link to go to the Particle Adventure or type in this address in your browser: <http://www.particleadventure.org/index.html>.

Go to **The Standard Model**. This is where you will be doing your research. **HINT:** Make sure you click on all of the interactive links on the pages and read the info presented there. You'll be using **The Standard Model**, but the last four questions could be anywhere on the website.

1. Who first classified the fundamental elements as earth, air, fire, and water?

2. What three things would ancient Chinese and Indian philosophers agree on as the fundamental building blocks of everything in the universe?

3. What is the Greek root for the word atom and why is it a misnomer?

4. Physicists have discovered that protons and neutrons are composed of what even smaller particles?

5. What are the only two truly fundamental particles?

6. What percent of an atom's volume is just empty space?

7. To what power of 10 are the size of electrons and quarks in meters?

8. How many particles have scientists found in atoms?

9. How are the new particles found in the atoms named?

10. Who said, "Young man, if I could remember the names of these particles, I would have been a botanist!"

11. What is the name of the theory that that explains what the world is and what holds it together?

12. What are the five components of this model?

- _____ 13. For how many years have physicists known that there were more than just protons, neutrons, electrons, and photons?
- _____ 14. Everything from galaxies to mountains to molecules is made from what two particles?
- _____ 15. For every type of matter particle we've found, there also exists what?
- _____ 16. When a matter particle and antimatter particle meet, what happens?
- _____ 17. What type of instrument gave the evidence for antimatter?
- _____ 18. Draw the track of bubbles that an electron and its antiparticle leave.
- _____ 19. What is the antiparticle of a proton?
- _____ 20. What is the antiparticle of an electron?
- _____ 21. What is the symbol for the antiparticle of a quark?
- _____ 22. List the three pairs of quarks.
- _____ 23. What was the last quark to be discovered?
- _____ 24. What is the charge of an up quark? Of a down quark?
- _____ 25. Where did the word "quark" come from?
- _____ 26. What two flavors of quarks are the lightest?
- _____ 27. What does a top quark look like?
- _____ 28. Groups of quarks are called what?
- _____ 29. What is any hadron which is made of three quarks (qqq) called?
- _____ 30. Hadrons made of one quark and one antiquarks are called what?
- _____ 31. What is a uud?
- _____ 32. What is a udd?
- _____ 33. Why are mesons so short lived?
- _____ 34. What equation explains what happened to most of a hadrons mass?

- _____ 35. An electron is actually what type of particle?

- _____ 36. What are the three types of charged leptons?

- _____ 37. What types of leptons do not have a charge?
- _____ 38. Why is the name for "leptons" a misnomer?
- _____ 39. What is the antiparticle of an electron?
- _____ 40. What are the three lepton families?

- _____ 41. What types of particles are "social", they are found grouped together?
- _____ 42. What types of particles are solitary, they are found alone?
- _____ 43. What three particles does a muon decay into?

- _____ 44. Write the equation for a lepton decay that is actually possible.
- _____ 45. What are protons made of?
- _____ 46. What are electrons made of?
- _____ 47. How many generations of matter are there?
- _____ 48. From lightest to heaviest, list the particles in the 1st generation of matter.

- _____ 49. So why do we have three generations of matter?
- _____ 50. One more time, what are the two most basic, fundamental types of particles?
