

Name _____

The Particle Adventure Internet Activity – II

Directions:

- 1) Proceed to: **<http://particleadventure.org>**
- 2) Once at the site, click on ***Start Here***
- 3) On the ***Home Glossary/Table of Contents*** at left, go to the ***What is the World Made Of?*** Section, scroll down to and click on ***Leptons*** to begin this session. When you finish each page, click on the > icon at top right to proceed to the next page.

What is the World Made of? Leptons

1. Write a short profile for each of the different Leptons. Be sure to include a discussion of charge and mass:

Electron - _____

Muon - _____

Tau - _____

Neutrino - _____

2. Are leptons always found combined with other leptons (as quarks are) or do they exist as solitary particles?

3. What is the name given to the antiparticle to the electron?

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What is the World Made of? Lepton Decays

1. Which two leptons decay rapidly into lighter particles?

2. Which leptons are stable? _____

What is the World Made of? Lepton Type Conservation (Skip)

What is the World Made of? Lepton Decay Quiz (Skip)

What is the World Made of? Neutrinos

1. What do neutrinos almost never do with other particles?

2. What is the reason given for this? _____

3. In the example given, what is the law that requires that there be another particle produced on the decay of a radioactive nucleus? _____
4. Do neutrinos have a lot of mass for subatomic particles? _____
5. Are there a lot of them in the universe? _____

What is the World Made of? Quiz on What Particles are Made of

Try the quiz. See how you do.

What is the World Made of? The Generations of Matter

1. How are generations organized?

2. Which generation(s) of matter is the visible matter in the universe made of? _____
3. What are three particles that make up the visible universe?

4. Why aren't other particles included in visible matter?

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What is the World Made of? Matter Summary

1. So what's everything made of?

2. What are particles made up of quarks called? _____

What Holds it Together? The Four Interactions

1. What are the four interactions? _____

2. What's the difference between a force and an interaction?

What Holds it Together? How Does Matter Interact?

1. What is a force at the fundamental level? _____

What Holds it Together? The Unseen Effect

1. Check out the basketball guys on the ice. What do particles exchange when they interact? _____
2. What types of forces aren't explained well by the basketball guys on ice analogy? _____
3. Can any matter particle be affected by any force carrier particle? _____
4. What is the electromagnetic force carrier? _____
5. What particles cannot absorb this force carrier? _____
6. Why can't they? _____

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What Holds it Together? Electromagnetism

1. What two everyday forces are attributed to electromagnetism?

2. What is the mass of a photon? _____
3. How fast do photons travel in:
 - a) meters/second? _____
 - b) miles/second? _____

What Holds it Together? Residual E-M Force

1. What does the residual E-M force allow atoms to do?

What Holds it Together? What about the Nucleus?

1. What's the burning question about the nucleus?

What Holds it Together? Strong

1. What **two** types of charge do quarks have?

2. What is the strong force carrier particle called? _____
3. Why aren't we directly aware of the strong force in everyday life? _____

What Holds it Together? Color Charge

1. What happens to the color force field between quarks as they get further apart? _____

What Holds it Together? Quark Confinement

1. What are baryons? _____
2. What are mesons? _____
3. Why can't quarks exist individually? _____

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What Holds it Together? Quarks Emit Gluons

1. What's always conserved? _____

What Holds it Together? Residual Strong Force

1. So what does the residual strong force do that's so important?

What Holds it Together? Weak

1. What are weak interactions responsible for? _____

2. List the weak force carriers particles and indicate whether they are charged or neutral.

3. What other force has been unified with the weak force, and what is this unified interaction called?

What Holds it Together? Electroweak

1. At what distance does the weak force become comparable to the electromagnetic force? _____

What Holds it Together? Gravity

1. What will scientists call the gravity force carrier particle when it is discovered? _____
2. Why does the Standard Model work fine without explaining gravity? _____

What Holds it Together? Interaction Summary

1. Fill in the chart:

	Gravity	Weak	Electromagnetic	Strong
		(electroweak)		
carried by				
acts on				

2. Which fundamental interaction(s) is(are) responsible for:

a. friction? _____

b. nuclear bonding? _____

c. interactions on neutrinos? _____