



Elementary Particles Lesson Plan

Time: 40 minutes

Goals: To gain an understanding of elementary particles. This includes an introduction to the Standard Model of Particle Physics.

Objectives: Students will:

- Watch the “Elementary Particles” segment of the “How small is it” video book
- Take a short quiz

Materials:

- Internet connection with a computer for viewing the [“Elementary Particles” segment on YouTube](#). Use the settings to view in 1080p.

Directions:

- Introduce the “Elementary Particles” segment where we’ll cover all the known particles. We start with cosmic rays and cloud chambers and work our way to particle accelerators and bubble chambers. We’ll probe the proton to find quarks like we probed the atom in our last segment to find the nucleus.
- Show the video.
- Review what they saw:
 - How cosmic rays created positrons – the antimatter partner of the electron.
 - How particle decay signatures can identify the originating particle.
 - How cross section analysis was the key to discovering quarks.
 - How quarks combine to create protons, neutrons, and a number of other hadrons.

Assessment:

Take a simple quiz. Print and distribute the quiz on page 2. Here are the answers:

- What is the name of the almost invisible particle that carries away mass and energy in beta radiation decay?
Answer: d) The neutrino
- What do calorimeters measure?
Answer: a) Energy
- How many quarks are there in a proton?
Answer: c) 3



Elementary Particles Quiz

- What is the name of the almost invisible particle that carries away mass and energy in beta radiation decay?
 - a) The Pion
 - b) The Kaon
 - c) The Neutron
 - d) The Neutrino

- What do calorimeters measure?
 - a) Energy
 - b) Spin
 - c) Charge
 - d) Strangeness

- How many quarks are there in a proton?
 - a) 1
 - b) 2
 - c) 3
 - d) 4

