# Activity 01:
# Video Summary

Name: ..................................................................

01. The model of the atom has changed over the past 150 years as new evidence has been found. Draw labelled diagrams for a helium atom using each of these models.

| Dalton's model of indivisible balls of matter | Thomson's model using electrons in a positive mass | Rutherford's model using electrons and nuclei |
|---|---|---|
| | | |

02. Rutherford fired alpha particles at gold foil and was surprised by the results.
    He developed the nuclear model of the atom because
    (a) most of the alpha particles went through.
    (b) most of the alpha particles bounced back.
    (c) a few of the alpha particles went through.
    (d) a few of the alpha particles bounced back.
    Explain your choice and make a labelled diagram of Rutherford's experiment.

03. The Large Hadron Collider (LHC) accelerates particles to unprecedented energy levels.
    Higher-energy particles are used at the LHC because they can
    (a) get closer to each other and probe smaller distances.
    (b) create massive particles from the energy.
    (c) both of the above.
    Explain your choice.

04. The most famous physics equation is Einstein's $E = mc^2$.
    (a) Explain what each letter in the equation represents, and what the equation means.

    (b) Draw a picture of what happens when an electron and a positron are created in a bubble chamber.
        Where does the mass of the electron and positron come from?

05. Science was much simpler 80 years ago. Everything appeared to be made of just electron, protons, and neutrons.
    Then physicists probed deeper into matter and detected new particles.
    (a) Why was the discovery of new particles a problem?
    (b) How was it solved?

06. The electromagnetic force pulls opposite charges together and pushes like charges apart. The strong force is different from the electromagnetic force in that the strong force is only attractive and it has
  (a) three types of charge and gets weaker with distance.
  (b) three types of charge and gets stronger with distance.
  (c) two types of charge and gets weaker with distance.
  (d) two types of charge and gets stronger with distance.

07. The Standard Model describes what is needed to make matter and the forces that hold it together.
  (a) Fill in the table for the Standard Model.

|  | 1st Generation | | 2nd Generation | | 3rd Generation | | Bosons |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Quarks | | | | | | | |
| Leptons | | | | | | | |

  (b)  What is special about the first column?

  (c) How are the next two columns different from the first?

  (d) How is the last column different from the other three?

  (e) Compare the periodic table of chemistry and the Standard Model of physics.

08. What particle in the Standard Model is the LHC designed to find? Why is it important?

09. What else might the LHC find? Make a list of all the possibilities mentioned.