

**Support Worksheet – Option J, Worksheet 2**

- 1 New particles may be produced in the collision of an electron and a positron in a synchrotron through the reaction  $e^- + e^+ \rightarrow \text{particle} + \text{antiparticle}$ . Explain why, for this to happen, the electron and the positron must be accelerated to high energies. [2]
- 2 State the function of a photomultiplier. [1]
- 3 State the function of a wire chamber. [2]
- 4 Explain why the magnets in a synchrotron are electromagnets rather than permanent magnets. [2]
- 5 Describe the operation of a cyclotron. [3]
- 6 State the function of the Higgs boson in the standard model. [1]
- 7 State what is meant by **deep inelastic scattering** experiments. [2]
- 8 Define the term **asymptotic freedom**. [1]
- 9 Describe what is meant by a **neutral current**. [1]
- 10 Calculate the temperature at which the average kinetic energy of electrons is 0.50 MeV. [2]
- 11 State two essential differences between theories of elementary particles and theories of strings. [2]