**Stage 2 Physics**

The following examination-style questions can be used to assess across different topics. They do not constitute a complete test.

Topics 1 and 2

1. Diagram 1 shows the motion of a projectile in the absence of air resistance. Diagram 2 shows the motion of a charged particle before it enters a uniform electric field.

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*E*

**Diagram 1 Diagram 2**

Compare the motion of a projectile in the absence of air resistance with the motion of a charged particle in a uniform electric field.

In your answer, refer only to a projectile that is initially moving horizontally and a charged particle that is initially moving perpendicular to the electric field.

 (4 marks)

Topics 2 and 3

2. The diagram below of an electron microscope shows the electron gun, a magnetic lens, and a beam of electrons. Electrons are accelerated by the potential difference *ΔV* in the electron gun. The electrons are then focused by the magnetic field in the magnetic lens.

 *Δ V* electron gun

 magnetic lens

 beam of electrons

*Source:* Adapted from ‘Light microscope vs. electron microscope: a detailed comparison’, [www.buzzle.com](http://www.buzzle.com/)

An electron travels perpendicular to the magnetic field at a speed of 4.19  107 m s**–**1 and experiences a magnetic force of 2.21  10**–**11 N.

1. Calculate the magnitude of the magnetic field.
2. marks)
3. Calculate the wavelength of the electron.

 (3 marks)