Q1.

Students are given the apparatus shown in Figure 12 and a protractor.

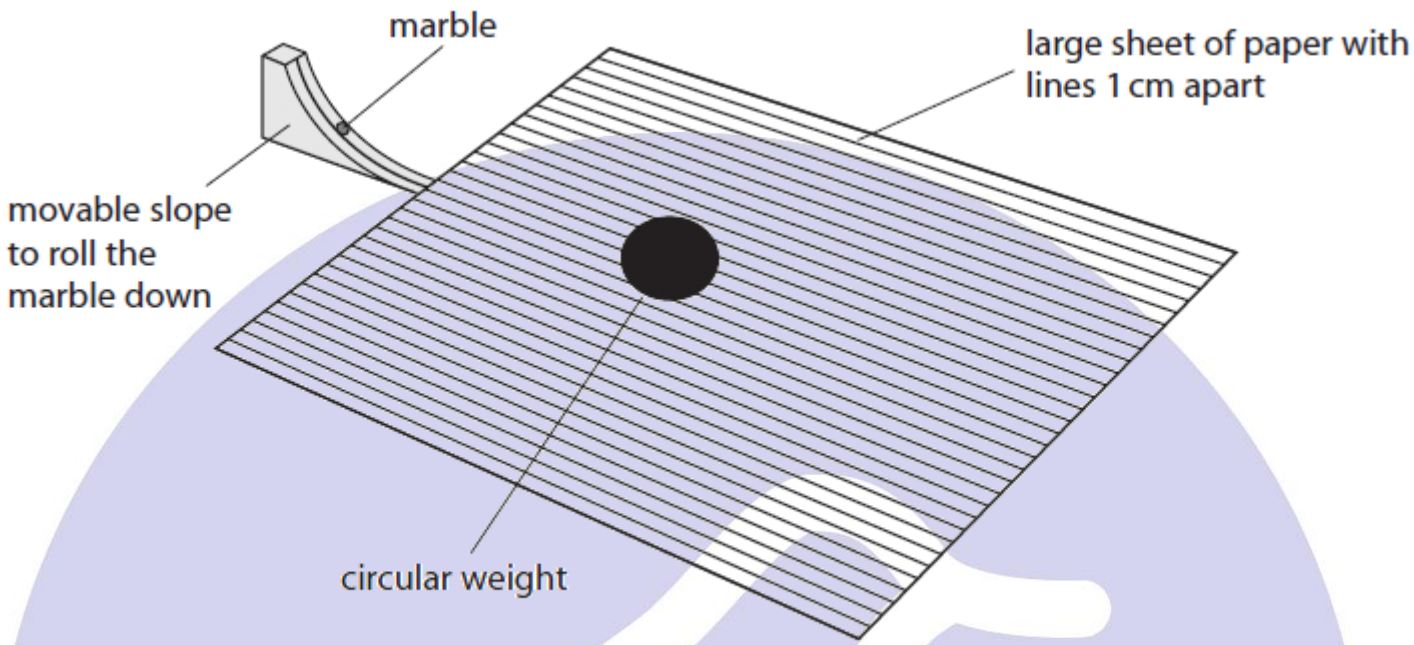

Figure 12

(i) Describe how the students could use the apparatus to model the scattering of alpha particles.

(2)

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(ii) Give **one** limitation of this model.

(1)

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(Total for question = 3 marks)

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Q2.

The apparatus that was used in the experiment is shown in Figure 10.

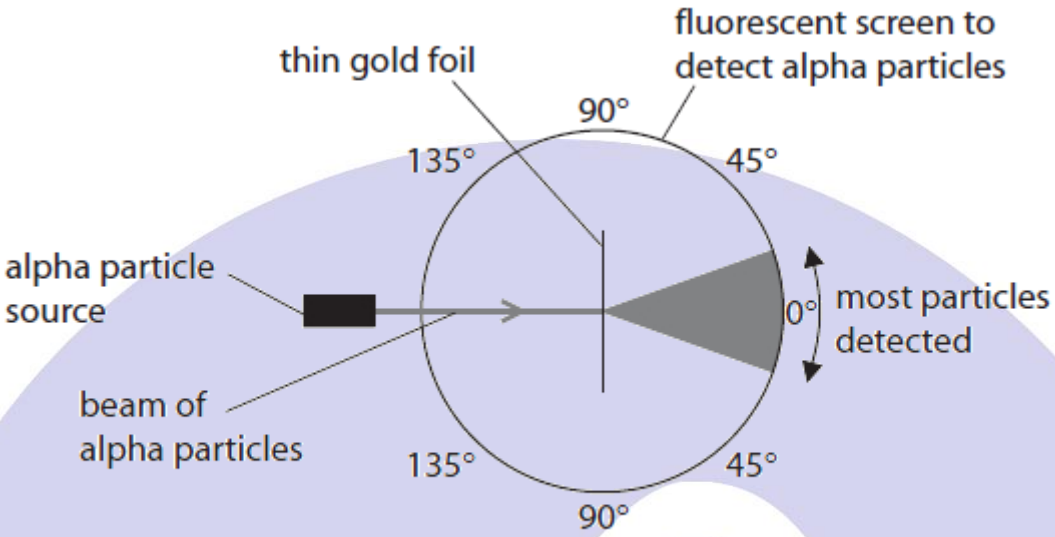

Figure 10

(i) The number of particles detected at each angle in a given time is shown on the graph in Figure 11.

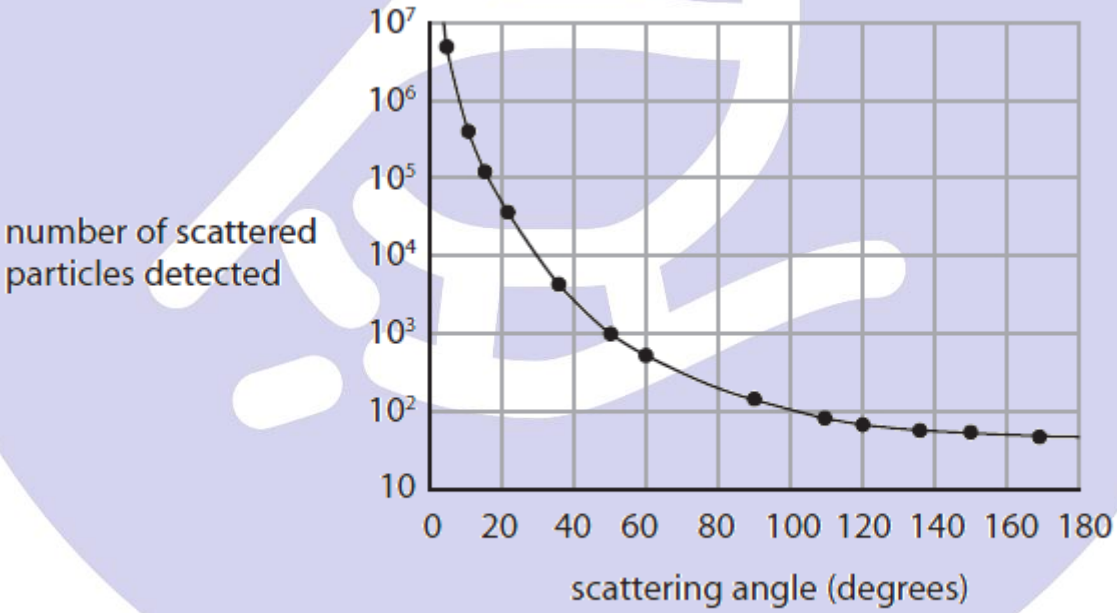

Figure 11

Use information from the graph.
Estimate the ratio of the number of particles scattered through 5° to the number of particles scattered through 100°.

(2)

ratio = ...

(ii) Explain how the difference in the number of particles scattered at different angles gives evidence for the current model of the structure of the atom.

(4)

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(Total for question = 6 marks)

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Q3.

Early in the twentieth century, scientists fired a beam of alpha particles at thin gold foil.

Figure 2 shows the main parts of their experiment with some results.

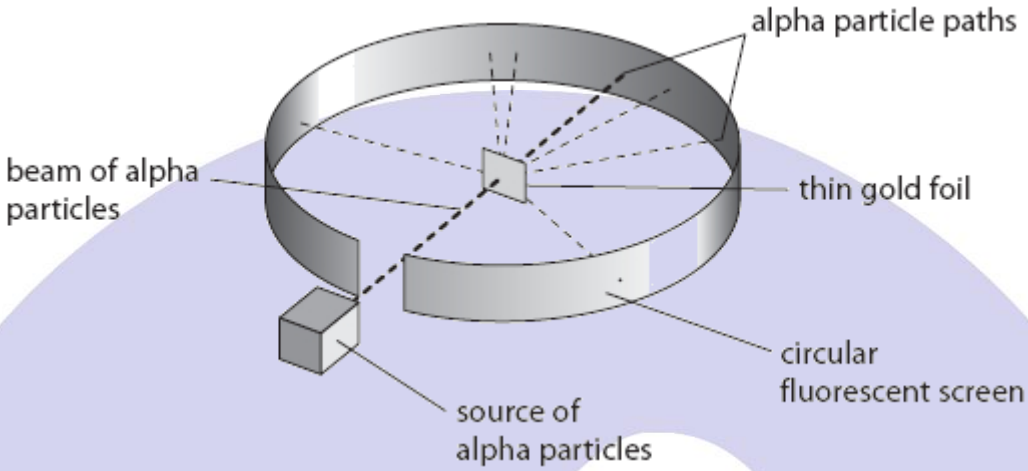

Figure 2

Explain how the results of the experiment shown in Figure 2 support the nuclear model of an atom.

(3)

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(Total for question = 3 marks)

Q4.

In 1908 a scientist called Rutherford was investigating ideas about atoms.

His students fired a beam of alpha particles at a thin piece of gold foil.

Figure 10 shows the arrangement of the experiment.

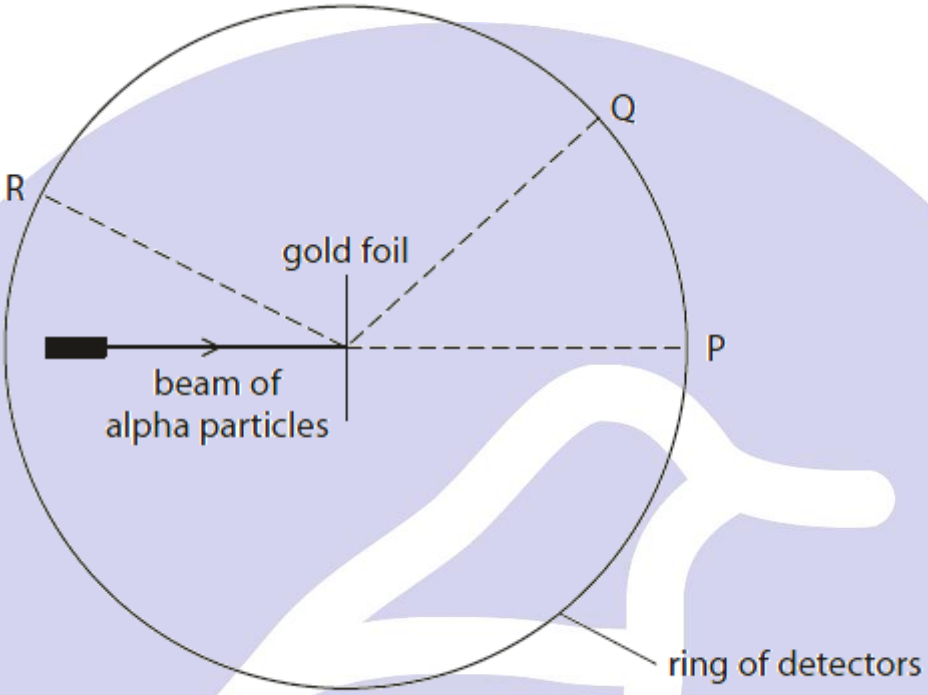

Figure 10

Some alpha particles were found at all parts of the ring of detectors.

The table in Figure 11 shows how many alpha particles were detected at P, at Q and at R, in one experiment.

position	number of alpha particles detected
P	72340
Q	25
R	2

Figure 11

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Explain what the information in Figure 10 and Figure 11 shows about the structure of an atom.

(6)

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(Total for question = 6 marks)