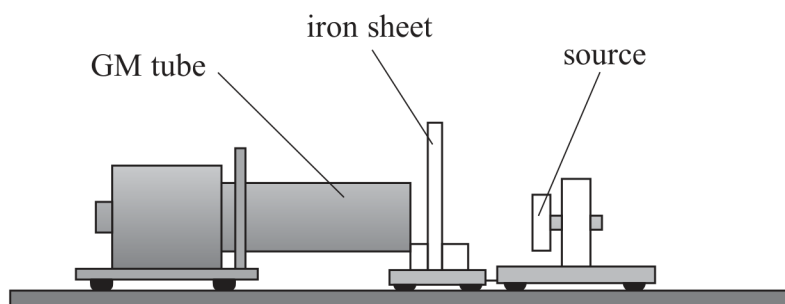15 A student investigated the absorption of gamma radiation by iron. She placed a gamma source in a holder and set up a Geiger-Müller (GM) tube a short distance away. She placed thin sheets of iron between the GM tube and the source as shown.
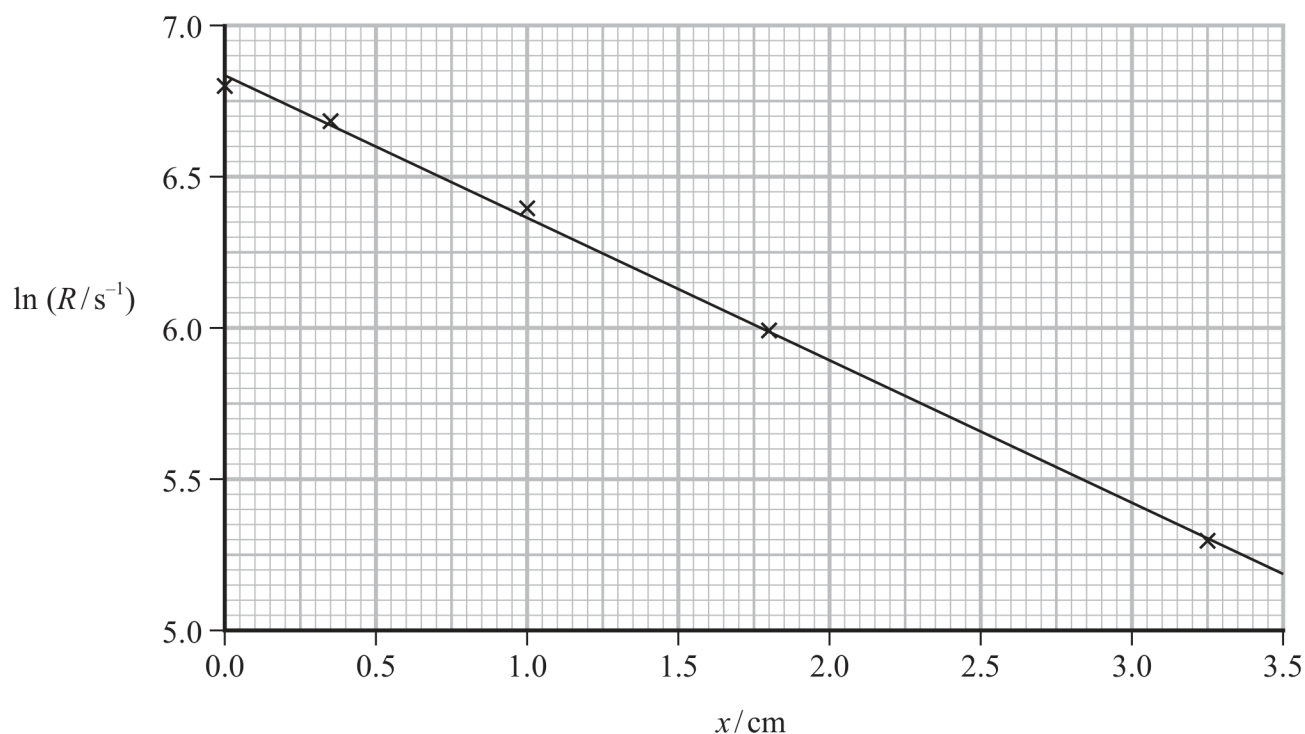

The student used five different thicknesses of iron and determined the count rate for each thickness.

The count rate with no iron sheet in place is R_0. After passing through an iron sheet of thickness x the count rate R is given by the equation

$$R = R_0 e^{-\mu x}$$

where μ is a constant.

The student used her data to plot a graph.

The student used the gradient of the graph to determine a value for μ and used this to estimate the half-value thickness for the iron. This is the thickness of iron that would reduce the count rate to $R_0/2$

The student used a source that emitted gamma rays of energy 1.1 MeV.

Deduce whether the data the student obtained confirms this energy value.

half-value thickness for 1.1 MeV gamma rays in iron = 1.5 cm

(6)

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(Total for Question 15 = 6 marks)