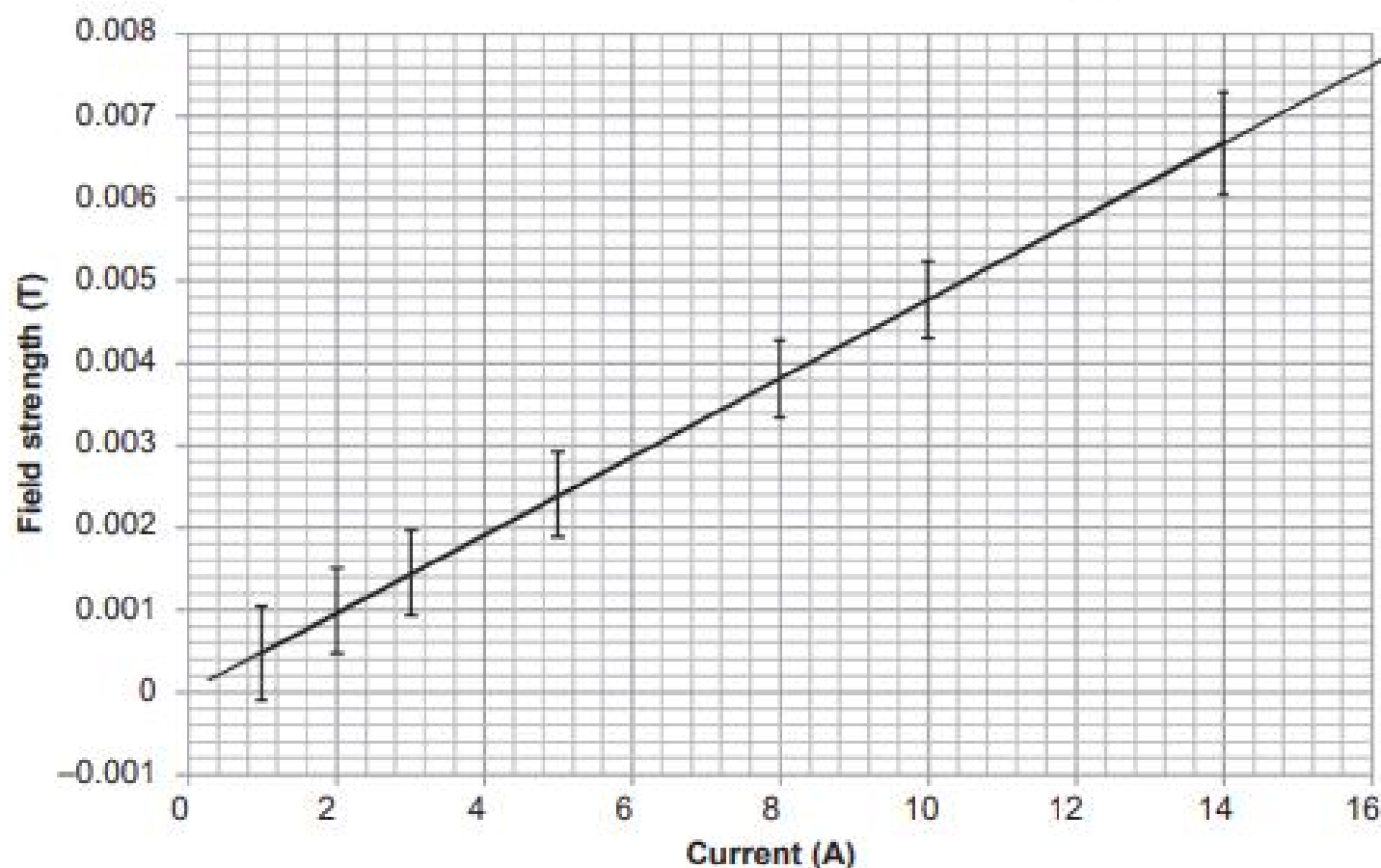


Question 13

(7 marks)

The magnetic constant μ_0 is the magnetic permeability of a vacuum. An iron alloy would have a different permeability μ_a . To determine its permeability, a large block of the iron alloy had an insulated current-carrying wire pass through its middle. A measure of the magnetic field strength 1.00 m from the wire was made as the current was varied as shown on the graph below.



- (a) Use $B = \frac{\mu}{2\pi} \frac{I}{r}$ to determine a gradient for the graph above and hence the magnetic constant μ (where $\mu = \mu_0 \mu_a$). (3 marks)

- (b) Use the gradient and the vertical error bars in the graph on page 14 to comment on the uncertainty of your answer to part (a). Express your answer in the appropriate significant figures. (4 marks)