1 An experimental setup used to measure the acceleration of free fall is shown in Fig. 1.1.

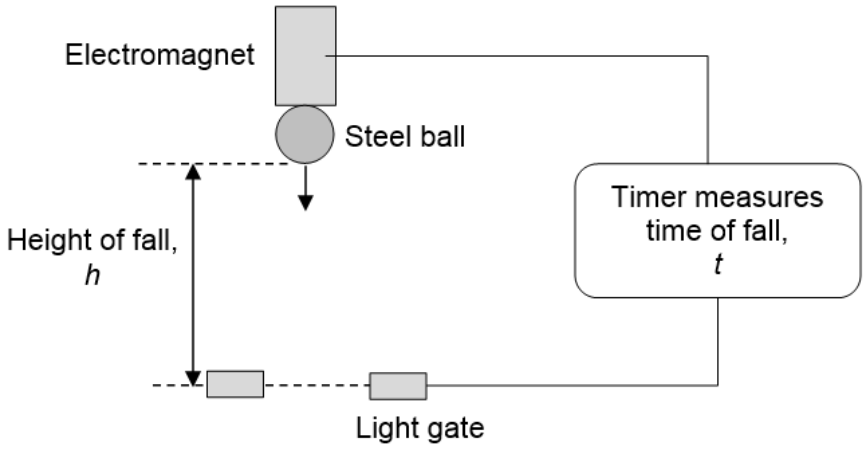

Fig. 1.1

The steel ball is suspended at the top by an electromagnet. The electronic timer starts when the electromagnet is turned off. As the steel ball falls by height h and goes through the light gate, the timer stops and displays the time of fall, t.

Only one set of data was collected:

$$h = (0.600 \pm 0.001)\ \text{m}$$

$$t = (354 \pm 1)\ \text{ms}$$

(a) Determine the acceleration of free fall with its associated uncertainty.

acceleration = ... ± ..... m s^{-2} [3]

(b) It was later found out that when the electromagnet was turned off, there is a constant delay before the steel ball starts falling.

(i) Suggest a cause for this delay.

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..... [1]

(ii) State and explain the type of error caused by this delay.

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..... [2]

(iii) Suggest how this delay can be determined.

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..... [2]

[Total: 8]