4 A student takes measurements to determine a value for the acceleration of free fall. Some of the apparatus used is illustrated in Fig. 4.1.

For Examiner's Use

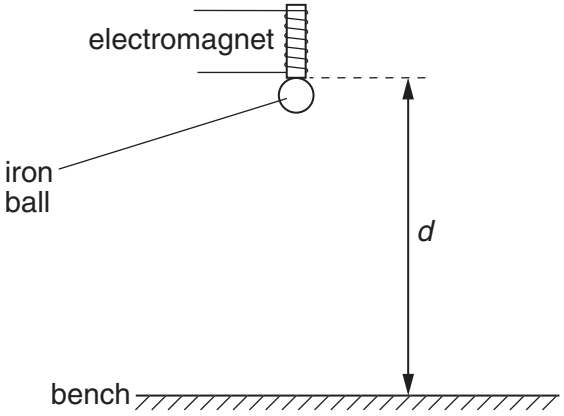

Fig. 4.1

The student measures the vertical distance d between the base of the electromagnet and the bench. The time t for an iron ball to fall from the electromagnet to the bench is also measured.
Corresponding values of t^2 and d are shown in Fig. 4.2.

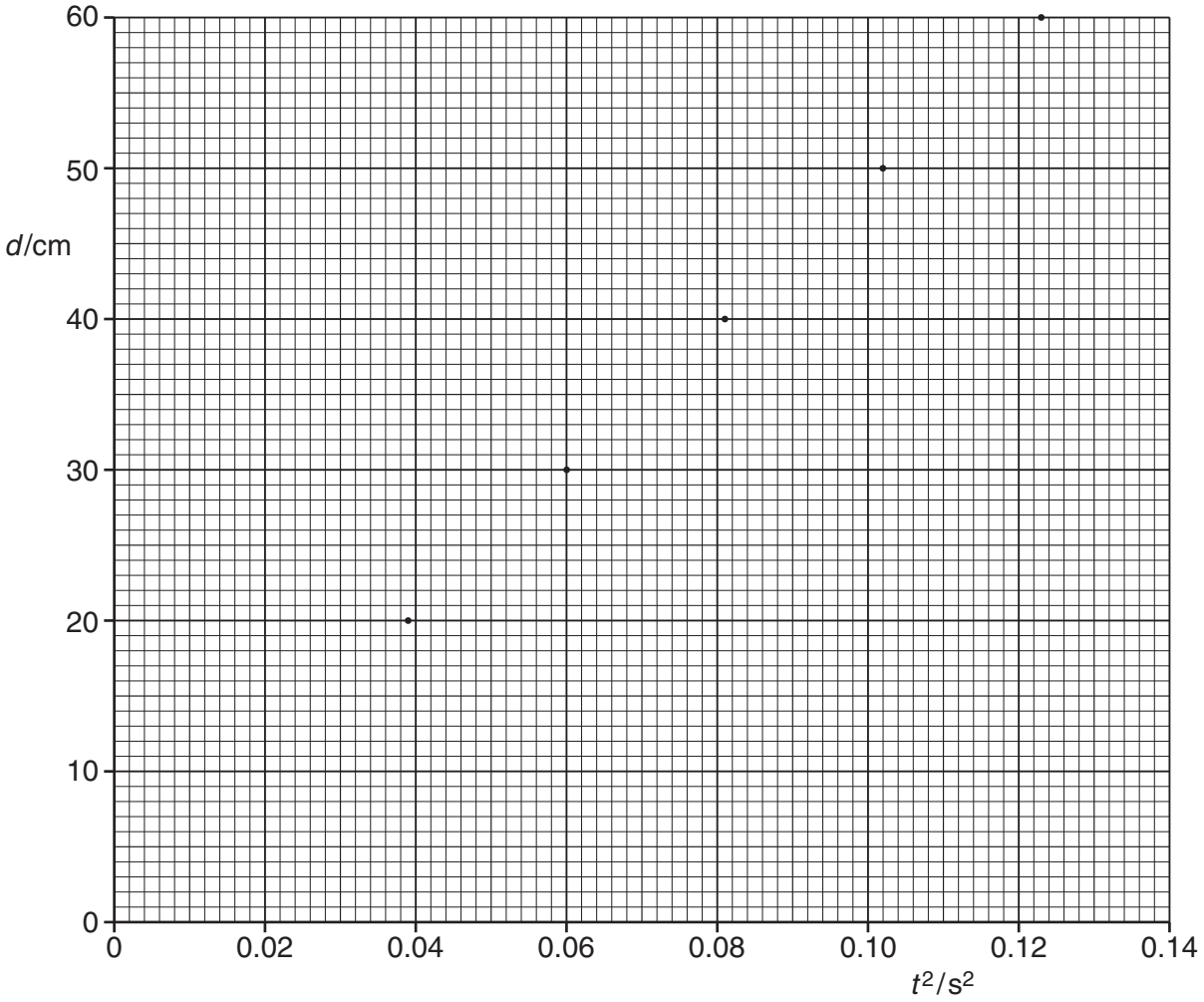

Fig. 4.2

(a) On Fig. 4.2, draw the line of best fit for the points. [1]

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(b) State and explain why there is a non-zero intercept on the graph of Fig. 4.2.

.....

.....

..... [2]

(c) Determine the student's value for

(i) the diameter of the ball,

diameter = ... cm [1]

(ii) the acceleration of free fall.

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