

Oxford Resources for IB

Physics – 2023 Edition

Answers

Tools for Physics

Mathematical tools for physics

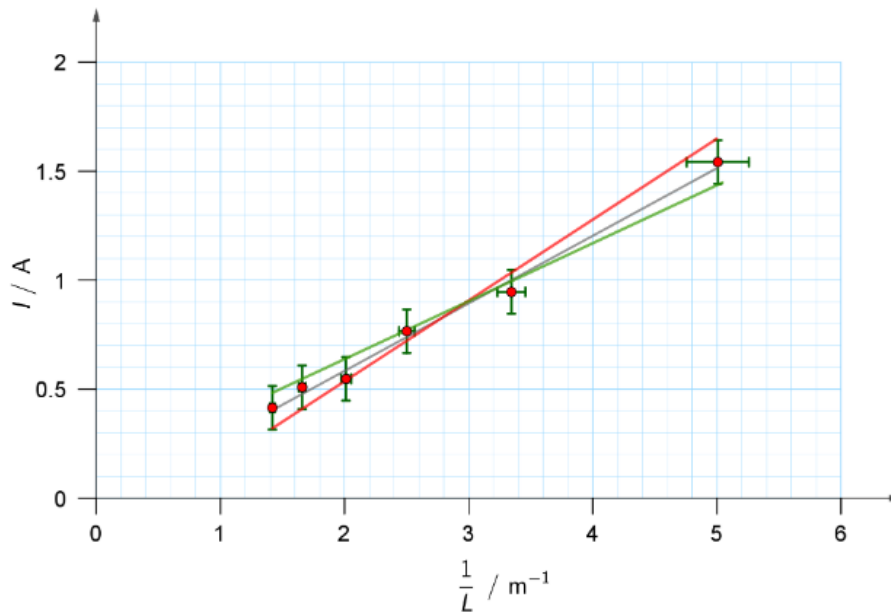
Practice questions – Page 338

- 1 12 m s^{-1}
- 2 109 cm^3
- 3 0.116 A
- 4 The force acting on the girl from the ground is equal to change in pressure over change in time. Estimate both the time the girl takes to land and her mass. Her landing speed comes from a *suvat* equation and your guess at a safe height for a wall.
- 5 The density of common construction materials is roughly about 2000 kg m^{-3} . Either estimate the dimensions of the walls, floors and so on or estimate the number of bricks or blocks used in the construction and the weight of each block. Do you have to consider the weight of any steel used in the construction? Are the internal furnishings important in the estimate?
- 6 Estimate the number of characters on the average page. Count a few lines to estimate the number of characters on the average line. Multiply the number of pages by your estimate of characters/page. Some characters (capitals etc) require two depressions. Decide whether it is important to include this.
- 7 Review the dimensions of each building in your school and estimate the area of each building. Do not forget to allow for buildings with more than one floor. Will stairs make a difference to your estimate?
- 8 Open the lid of a grand piano or look at a photograph of the interior of the instrument. Divide the strings into three groups: the lowest frequencies with one string, the middle frequencies with two and the high frequencies with three. Estimate an average string length for each group. Estimate the number of strings per group. Hence the total estimate length of string. You could go on to suggest whether the mass of the metal of the strings is significant in estimating the mass of the instrument.

Handling data and modelling physics

Practice questions – Page 360

- 1 a The model predicts that I is directly proportional to $1/L$. The line of best fit is straight and passes through the origin when extrapolated (within experimental uncertainties), so the data are consistent with the model.
- b $k = \text{gradient} = \frac{1.5 - 0.40}{5.0 - 1.4} = 0.31 \text{ A m}$
- c One possibility is shown below.



- d Max gradient = 0.37 A m, min gradient = 0.27 A m

$$\Delta k = \frac{0.37 - 0.27}{2} = 0.05 \text{ A m}$$

$$k = (0.31 \pm 0.05) \text{ A m}$$