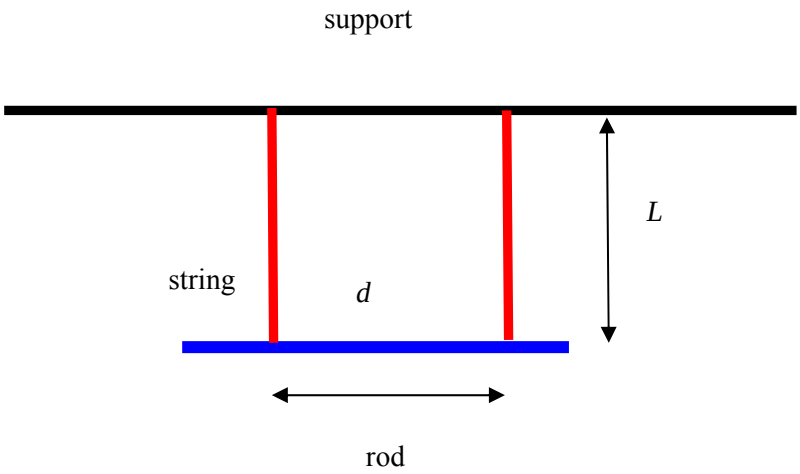
Extension Worksheet – Topic 1, Worksheet 3

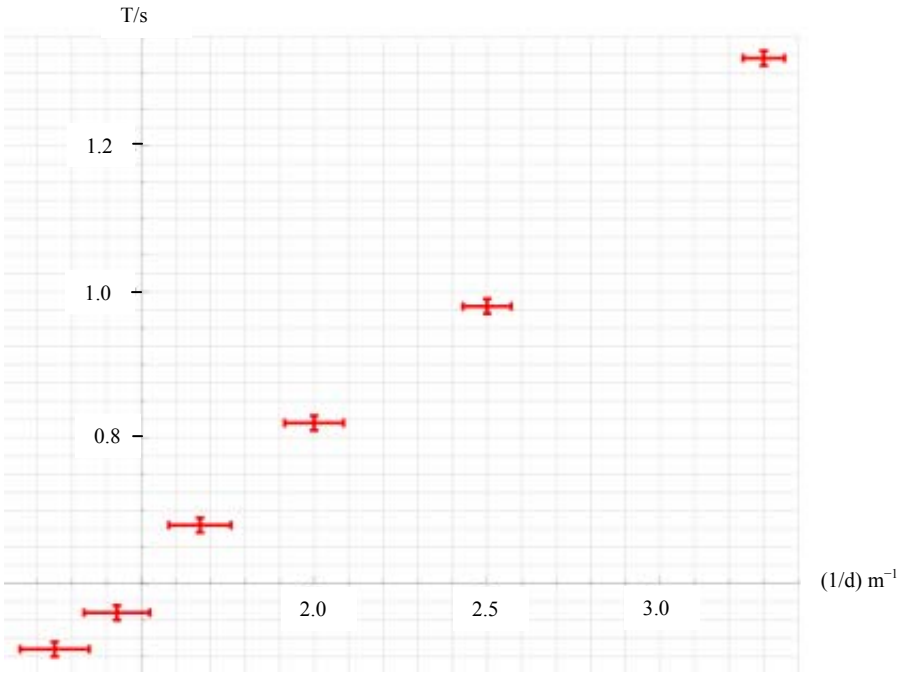
1 A rod is suspended horizontally from two strings of equal length L that are a distance d apart.



When the rod is displaced slightly and then released, it performs oscillations in a horizontal plane. Theory predicts that the period of oscillations T depends on L and d through the formula $T = 2\pi\sqrt{\frac{kL}{d^2}}$ where k is a constant.

a In one experiment, d was kept constant and L was varied. State what variables need to be plotted in order to obtain a straight line and state the gradient of the line. [2]

In another experiment, L was kept constant and d was varied. The graph shows the period of oscillations for a fixed distance L as d is varied.



b Draw the line of best fit for these data. [1]

c Derive the equation of the line of best fit. [3]

d State and explain, using your answer to **b**, whether the data are in agreement with the prediction from theory. [2]

e The measured value of L was $L = 0.30 \pm 0.02$ m. State the value of the constant k including its unit and its absolute uncertainty. [6]