Marks

Question 16 (continued)

(a) Outline TWO changes that could be made to the experimental procedure that would improve its accuracy. **2**

• To get a more accurate measurement of the period (T) the mass should be swung atleast 10-20 times and then this time should be divided by the number of complete oscillations to give a value for T with less errors.

• The lengths of the string should be varied more greatly, i.e from .1m to 1m (with many in between) to improve the results.

(b) Compare Kim's and Ali's methods of calculating g and identify the better approach. **3**

Both Kim's and Ali's methods use the experimental data collected however Kim uses the exact measurements (including any 'one-offs') while Ali uses the line of best fit, eliminating those 'one-off' measurements and hence giving a more accurate answer. In essence they are both finding the 'mean' but Ali's method extends over a greater L thus enabling a better approximation to be calculated than by using the 'mean value' as obtained directly from the experimental results. Ali's is definately the better approach. It managed to produce a result of $\approx 9.67 ms^{-2}$ for g, far closer to the actual $9.8 ms^{-2}$. Kim only managed $9.5 ms^{-2}$.

(c) Calculate the value of g from the line of best fit on Ali's graph.

$$T = 2\pi\sqrt{\frac{L}{g}} \qquad \frac{.98}{.24} = \frac{4\pi^2}{g}$$

$$T^2 = 4\pi^2 \cdot \frac{L}{g} \qquad g = \frac{4\pi^2}{\left(\frac{.98}{.24}\right)}$$

$$\frac{T^2}{L} = \frac{4\pi^2}{g} \qquad = 9.66818\ldots$$

$$= 9.67 ms^{-2} \text{ (2 dp)}$$

[$T^2 \div .98$ when $L = .24$]

End of Question 16