Marks

Question 16 (continued)

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

1. measure the time for 10 periods instead and take the average period. 2. Do several trials for each.

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

In Kim's case, there could be "outliers" - values of g that is relatively higher or lower than the mean value. Hence, the mean value can be affected by this outlier.
In Ali's case, the line of best fit ignores such outliers (the line only satisfies the majority of values that seem to sit on the line), hence Ali's method is better than Kim's.

(c) Calculate the value of g from the line of best fit on Ali's graph. **3**

$T = 2\pi\sqrt{\frac{L}{g}}$; $T^2 = \frac{4\pi^2}{g} L$

The gradient of the graph shows $\frac{dT^2}{dL} = \frac{4\pi^2}{g}$

taking values from the slope:

at $L = 0$, $T^2 = 0$; at $L = 0.12$, $T^2 \approx 0.5$

$\text{gradient} = \frac{\text{rise}}{\text{run}} = \frac{0.5}{0.12} = 4.167$

$\frac{dT^2}{dL} = 4.167 = \frac{4\pi^2}{g}$

End of Question 16

$\therefore g = \frac{4\pi^2}{4.167} \approx 9.48 \text{ ms}^{-2}$