**AS90935**

**Carry out a practical physics investigation that leads to a linear mathematical relationship, with direction**

Aim: on task – copy it!

Method: a well labelled diagram plus brief step by step method is enough

Variables:

- state independent variable (one you change).
- give a range (of ≥ 4) for M/E (We suggest 5).
- state dependent variable (one you measure to get data to plot).
- state controlled variable(s) (the ones to keep the same to make a valid experiment).

Collecting Data

- well-designed results table with headings with quantity, label and units e.g. Distance, D (cm), Time, T (s).
- make space for repeat trials and calculation of averages.

Use techniques to improve the accuracy of the measured values AND justify them.

- repeat and average three measurements for ……[name what you are measuring] to reduce … [timing / measuring / "weighing" ] errors.
- correct for parallax by lining up eye with … [name what] to accurately measure …[name what] - parallax only occurs with scales with divisions and NOT stopwatches ☺.
- account for zero end error if you include the additional length at the end(s) of a ruler i.e. add on the 'extra length' to all your measurements.
- adjust the … [name what] to produce a more measurable range of …[name what] ; if measured times are too short then our reaction times will have a BIG effect on accuracy.
- ignore identified outliers and ……. [say what you do about them].

Plot a linear graph showing the relationship between the independent and the dependent variables.

- good use of graph paper – numbers evenly spaced on axes. Start at (0,0) if you can for level 1).
- axes labelled properly with quantities, labels and units e.g. distance, D (cm), volume, v (mL), time, T (s) – take the letters from task – and watch out for upper or lowercase letters.
- draw line of best fit (don't go past your range) – aim for as many points above as below line.
- calculate the gradient of the linear graph (rise/run) – with correct units – showing how you worked it out (points e.g. 100-55 / 35-20) or draw lines on graph and show 45 & 15).
- value of gradient must be consistent your data.

Conclusion

- state what graph shows… as [what is on x-axis] increases, then [what is on y-axis] increases / decreases.
- give mathematical equation $y$ = gradient $x$ with labels of quantities used instead of x and y.

Discussion - good attempt to do two (or a reasonable attempt to do three) of the following:

- justify choice of the range for the independent variable (upper or lower limit).
- describe the difficulties encountered when measuring and link them to techniques used to improve the accuracy of the measured values.
- discuss why a variable needs to be controlled.
- comment on unexpected results & what might have caused them or what effect they might have on the validity of the conclusion.
- explain the relationship between experimental findings and physics ideas (if known**).**