

To Plot a Graph for a Given set of Data, with Proper Choice of Scales and Error Bars

Aim

To plot a graph for a given set of data, with proper choice of scales and error bars.

Apparatus

Graph paper, scale, rubber, pencil.

Data

<i>Load (gf)</i>	50	100	150	200	250	300	350
<i>Extension (cm)</i>	0.08	0.15	0.23	0.31	0.40	0.49	0.57

Procedure

(a) To identify dependent and independent variable

1. The load is taken as independent variable and should be taken on X-axis. The extension is taken as dependent variable and should be taken on Y-axis.

(b) To select proper scale for load and extension

- Find the range of load i.e., $350 - 50 = 300$ gf and extension i.e., $0.57 - 0.08 = 0.49$ cm. Since the range of load is greater than extension, then load-axis is taken parallel to longer side and extension axis is taken to smaller side of graph paper.
- Since, the data have the positive values, then origin is taken at the lower left corner of the graph paper.
- Along the load-axis (X-axis), one small division (1 S.D.) = 5 gf and along the extension axis (Y-axis).
1 S.D. = 0.01 cm.

(c) To plot the data with error bars

- Mark the points 50, 100, 150, 350 gf on the load axis and the points 0.10, 0.20, 0.30 0.60 cm on the extension-axis of the graph paper.
- For the first data point, the value of load is 50 gf and extension is 0.08 cm measured with an accuracy of ± 0.2 cm. Mark the dot on the graph paper against the load 50 gf and extension 0.08 cm and surround it by a small circle as



Corresponding to the load of 50 gf, the error bars are indicated against the upper and lower limiting values of the extension as $0.08 - 0.02$ and $0.08 + 0.02$ i.e., 0.06 and 0.10 cm. The first data point is then completely plotted as



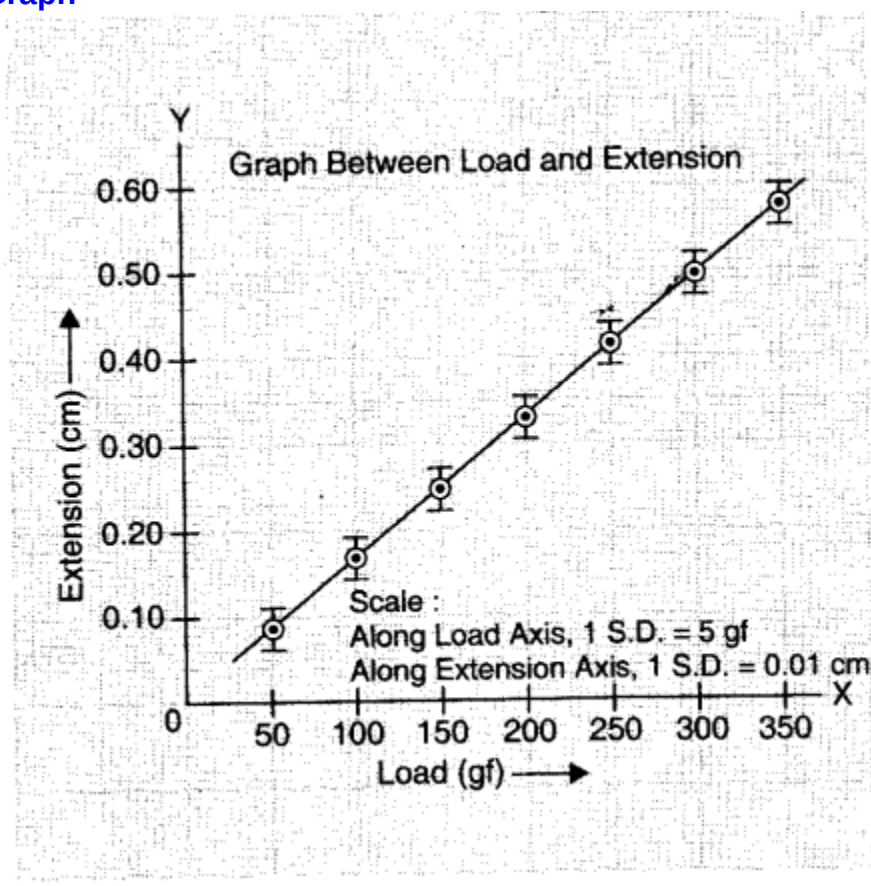
7. Similarly, plot the remaining data points, all the data points should lie in a straight line.

In general, a few data points may be of the expected straight line graph.

8. Draw a straight line joining the data points, taking care that the points, which do not lie on the straight line graph are distributed evenly above and below it.

9. Write down the title of the graph i.e., 'Graph between load and extension' and the scales used along the two axes on the graph-paper.

Graph



Result

The graph between load and extension for the given set of data along with the error bars is as shown in Graph.

Precautions

1. The scale along the two axes should be properly selected.
2. The data points should be joined with a smooth curve or a straight line (as the case may be), so as to pass through the maximum number of points and the

points, which do not lie on the graph, should be distributed evenly above and below it.