CHAPTER 2 Relations
2.4 Trends, Interpolation, and Extrapolation
Finding patterns and trends, interpolating data, and extrapolating data

Example:

a) Indira decided to test a new fertilizer as a science project. She divided her garden into plots of 1 m^2 and mixed a different dosage of fertilizer into the soil in each plot, as shown in the table. She planted beans in all of the plots and measured the average plant growth over a two-week period. Sketch a graph of these data.

Dosage (g)	Growth (cm)
0	12.2
10	14.5
20	16.1
30	18.3
40	19.2
50	20.1
60	20.8
70	20.4
80	19.5
90	18.7
100	17.5

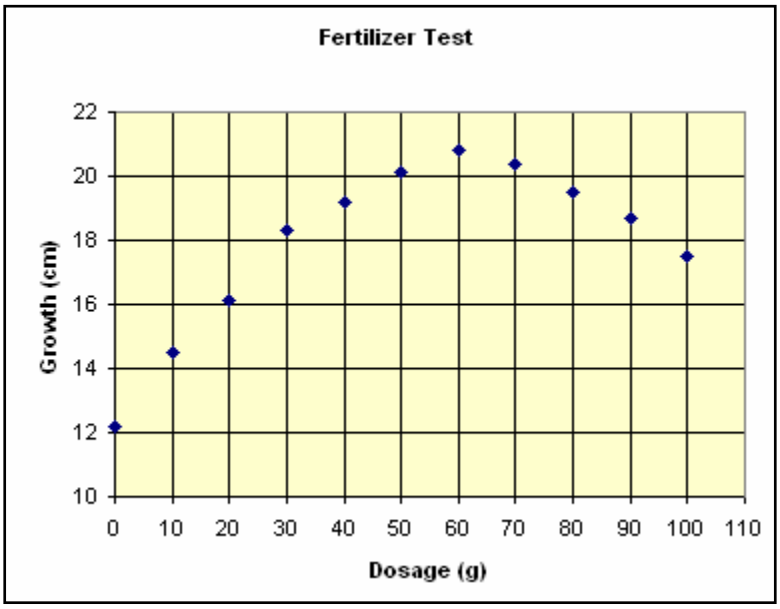
b) Describe any trends in the graph.

c) Estimate the average growth for a dosage of 25 g.

d) Estimate the average growth for a dosage of 110 g.

Solution:

a) The graph is shown.



b) The average bean growth increases for dosages from 0 g to 60 g. After 60 g, the average growth decreases.

c) Interpolate between 20 g and 30 g by finding the mean:

$$\frac{18.3 + 16.1}{2} = 17.2 \text{ cm}$$

d) Extend the graph to estimate a growth of about 16.5 cm for a dosage of 110 g. Answers may vary.

Practice:

1. Duncan suspended an elastic band from a hook and attached various masses. He measured the extension of the elastic, as shown in the table.

Mass (g)	Extension (cm)
0	0
100	1.1
200	3.5
300	7.3
400	10.7
500	13.5
600	16.6
700	19.7
800	22.5
900	24.3
1000	25.4

a) Sketch a graph of these data.

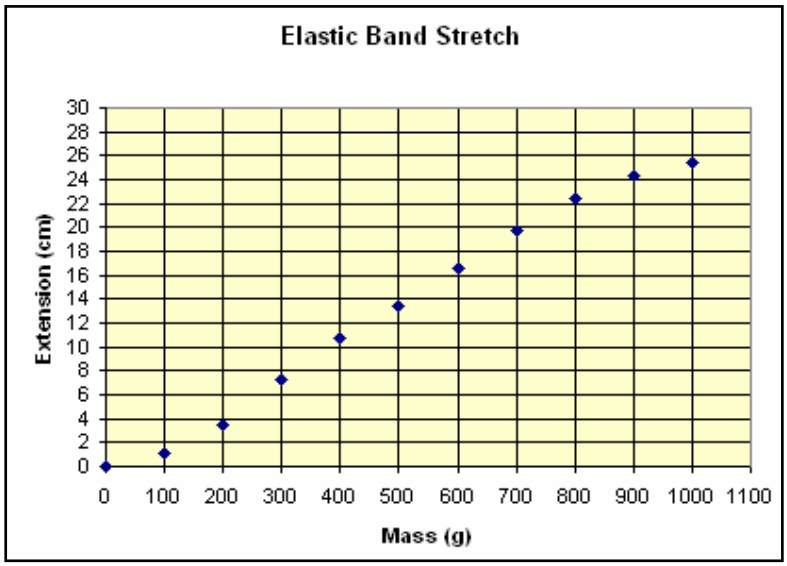
b) Describe any trends in the graph.

c) Estimate the extension for a mass of 450 g.

d) Estimate the extension for a mass of 1100 g.

Answers:

1. a) The graph is shown.



b) The graph rises slowly up to 200 g, then at a fairly even rate to 800 g. After 800 g, the rise rate decreases.

c)
$$\frac{13.5 + 10.7}{2} = 12.1 \text{ cm}$$

d) 26.1 cm. Answers may vary.