



- There are 3 main ways in which businesses can use data to forecast what might happen

- **Time Series Analysis**

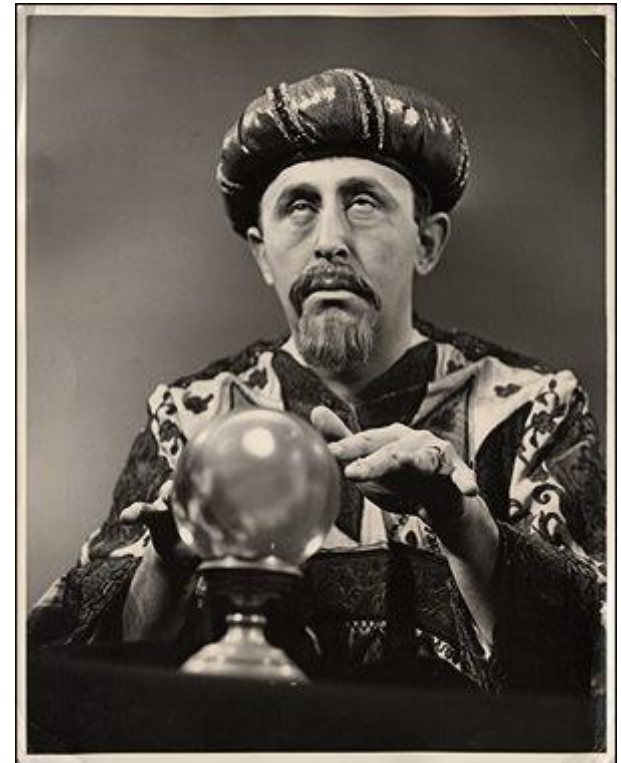
- We have already seen how this utilises:
 - ◆ Moving averages
 - ◆ Line of best fit
 - ◆ Extrapolation

- **Correlation**

- Used to establish causal relationships

- **Probability**

- Used to assess the likelihood of an event happening



Correlation



- Correlation refers to the extent to which there is a **linear relationship** between 2 variables
- Using an example we can see what this actually means:
 - Suppose a business wants to know whether it is worth spending money on advertising
 - It would look to see whether in the past there has been a link between spending on advertising and increases in sales
 - If there is then it may be possible to say that increasing advertising causes an increase in sales
 - Hence the term causal relationships

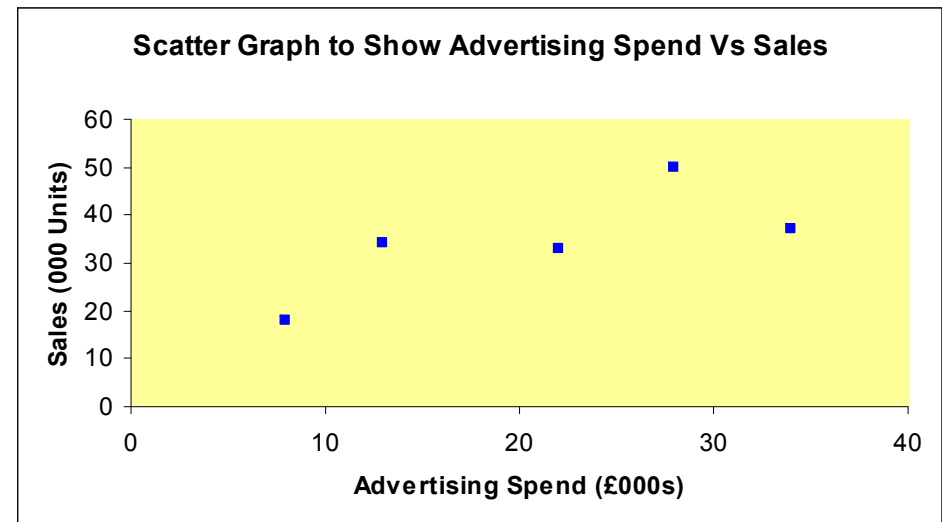


Correlation - An Example

- Suppose a business had collected data about advertising spend and sales over the last 5 years:

Year	Advertising Spend (£000s)	Sales (000s Units)
2000	8	18
2001	22	33
2002	13	34
2003	34	37
2004	28	50

- This information could be shown on a scatter graph as follows:

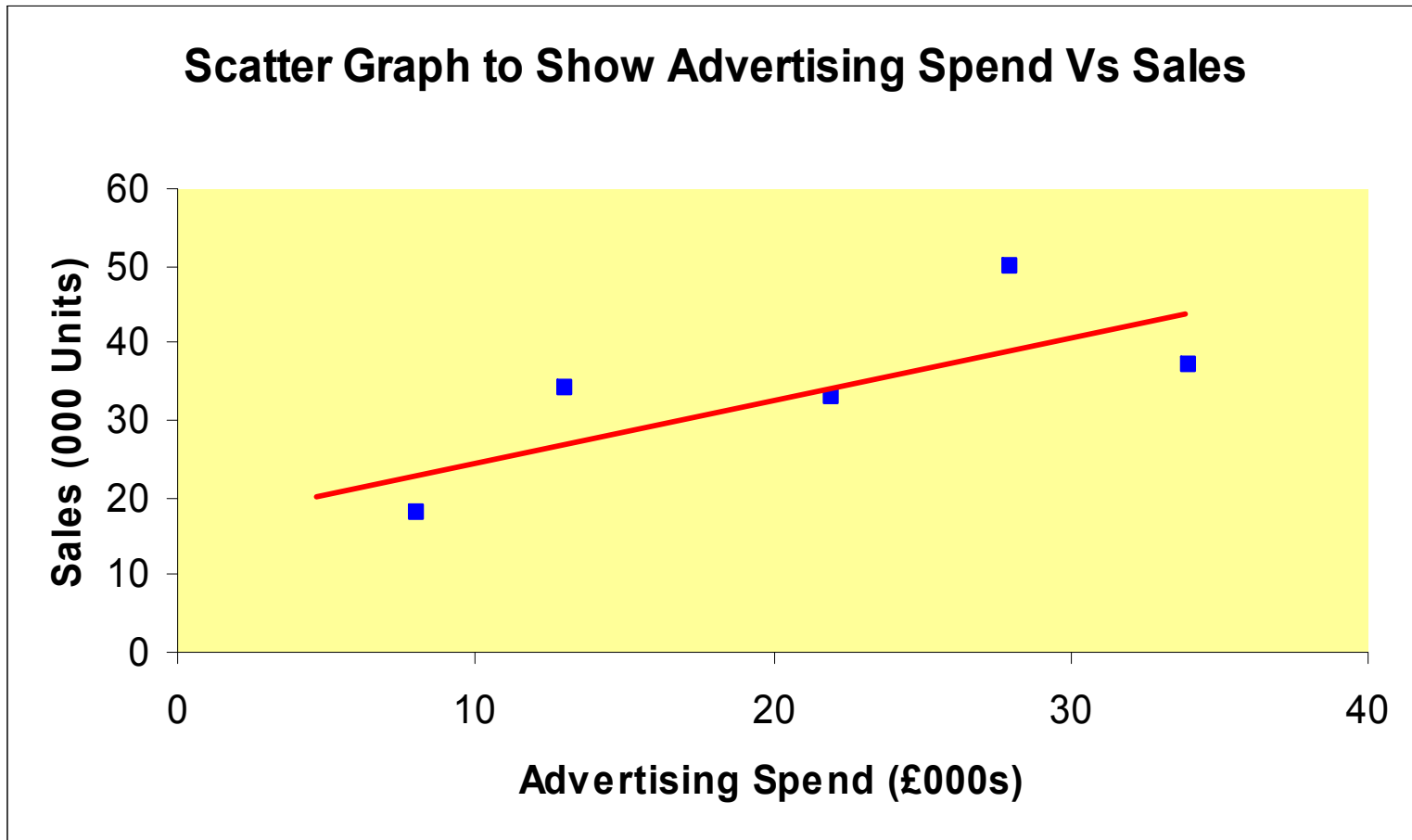


- This clearly shows a **positive** relationship between the 2 variables

Correlation - The Line of Best Fit



- It is then possible to plot a line of best fit to show the relationship more closely in order to forecast:



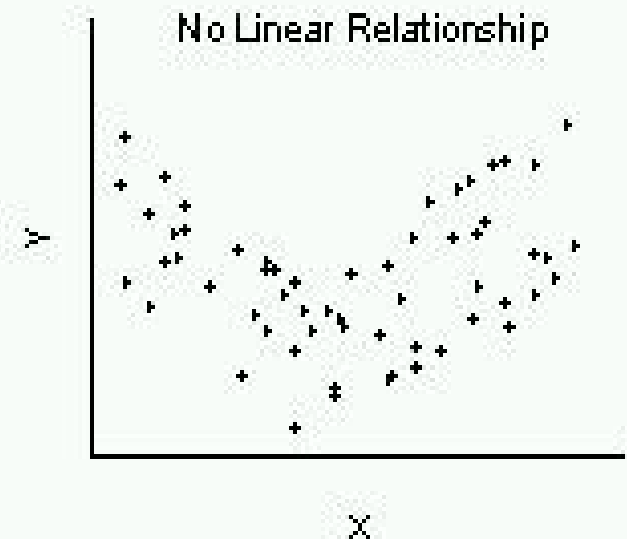
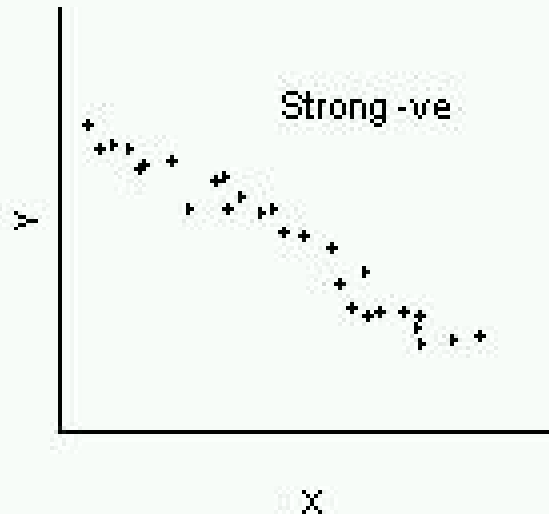
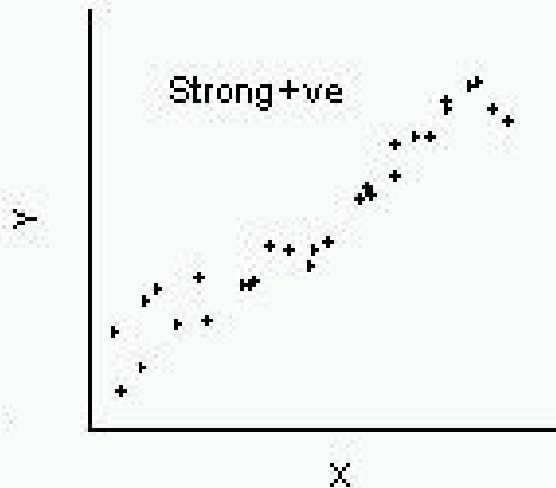


Types of Correlation

- In our example the correlation was positive:
 - This means as advertising spend increased so did sales

- Correlation may also be negative:
 - For example as price increases, sales will fall

- It is not always possible to identify a clear correlation between 2 variables:





Probability

- Probability is used to help businesses assess risk
- We have seen how this is used when using decision trees
- Probability is defined as:

The ratio between the number of desired outcomes compared to the total number of possible outcomes”

- E.g. the probability of rolling a “6” when rolling a dice is:

$$\frac{1}{6}$$





The Laws of Probability

- There are 3 main laws of probability:

1

The sum of the probabilities of all possible outcomes for an event **MUST** equal 1

- E.g. the probability of rolling a number between 1 and 6 when rolling a dice is 1

2

To find the probability of one event **OR** another event we must **ADD** the probabilities together

- E.g. the probability of rolling a “1” OR a “2” when rolling a dice is $\frac{1}{6} + \frac{1}{6} = \frac{2}{6}$

3

To find the probability of one event **AND** another event we must **MULTIPLY** the probabilities together

- E.g. the probability of rolling a “1” AND a “2” when rolling a dice is $\frac{1}{6} \times \frac{1}{6} = \frac{1}{36}$