

EMPL4005

INFORMATION, DATA AND ANALYSIS

Visual Representations

Reminder: Types of Data

Categorical

- Do you currently own any stocks or shares? ☐ Yes ☐ No

Numerical

- Discrete (whole number : no fractions): e.g., to how many magazines do you currently subscribe? ____ (Number)
- Continuous: e.g. how tall are you? ____ (Inches)

Charts

- Histograms
 - Bar charts
 - Simple
 - Stacked
 - Multiple
 - Pie charts
 - Scatter Diagrams
-

Graphing Numerical Data: The Histogram

- A graph of the data in a frequency distribution is called a **histogram**
- The **class boundaries** (or **class midpoints**) are shown on the **horizontal axis**
- The **vertical axis** is either **frequency**, **relative frequency** or **percentage**
- Bars of the appropriate heights are used to represent the number of observations within each class

Frequency distribution: Using Excel

- Excel will construct a frequency distribution and plot a **histogram** if you have suitable input data.
- You need the “Data Analysis Add-In” facility
- Create a table with 2 columns
- Column 1 all the frequency data
- Column 2 class intervals (upper end)
- Use “Data Analysis> Histograms”
- Input Range : all frequency data
- Bin range : class data



Bar Charts

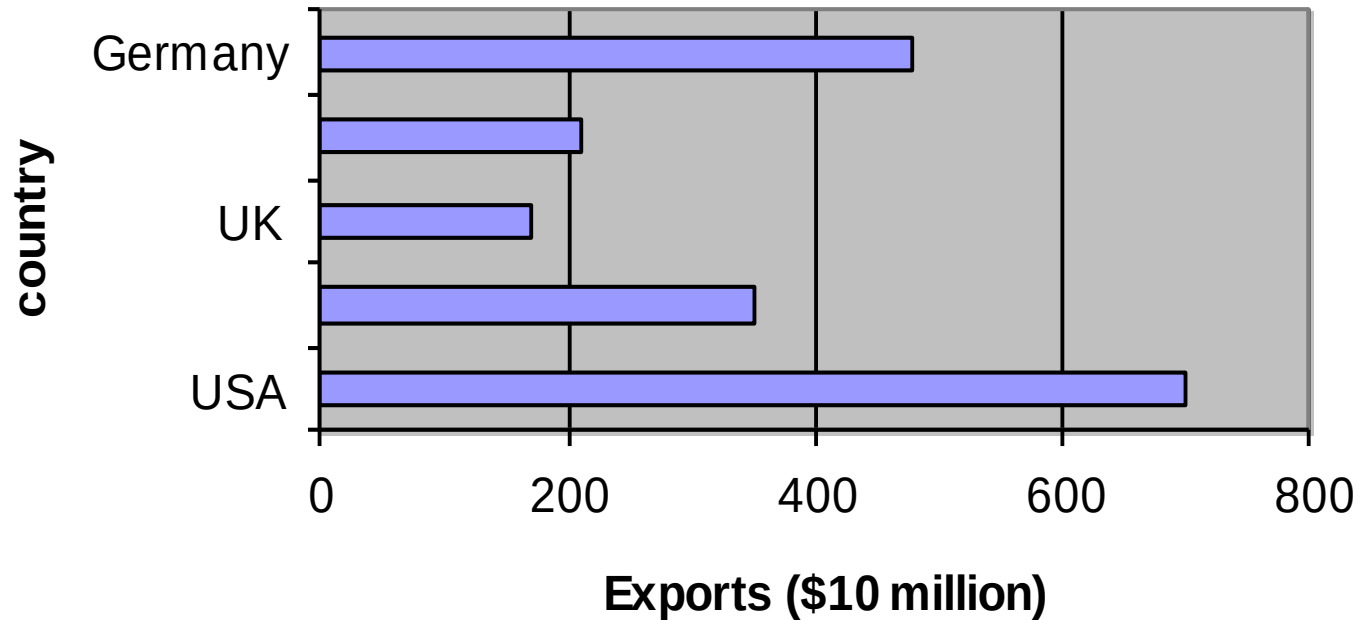
- The y-axis should start at 0 or comparisons can become distorted
- The width of the bars does not matter, but should be similar for each bar
- Gaps between the bars emphasise the trends in the data
- Can be vertical or horizontal
- Bar charts are more useful when you want to highlight the actual data values.

Example:

Country: USA Canada UK France Germany

Export: 700 350 170 210 480

(The figure quoted are given in \$10 million)

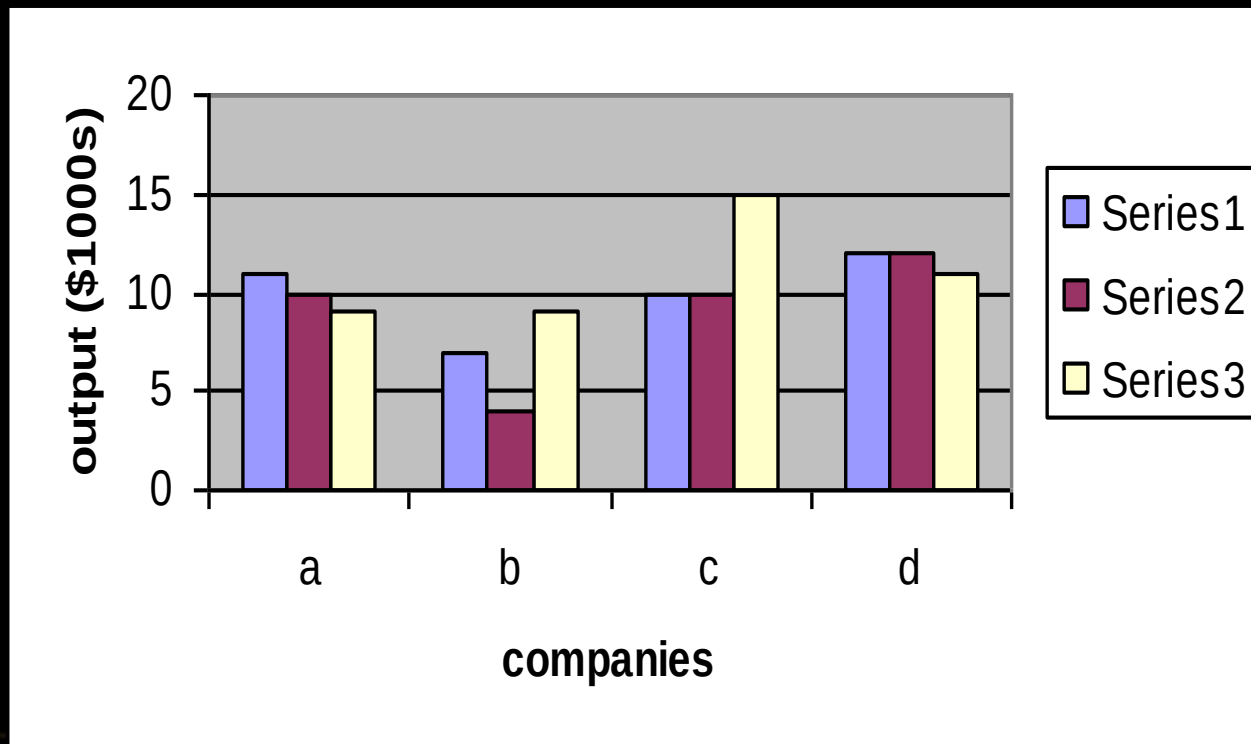


Bar charts and pie charts

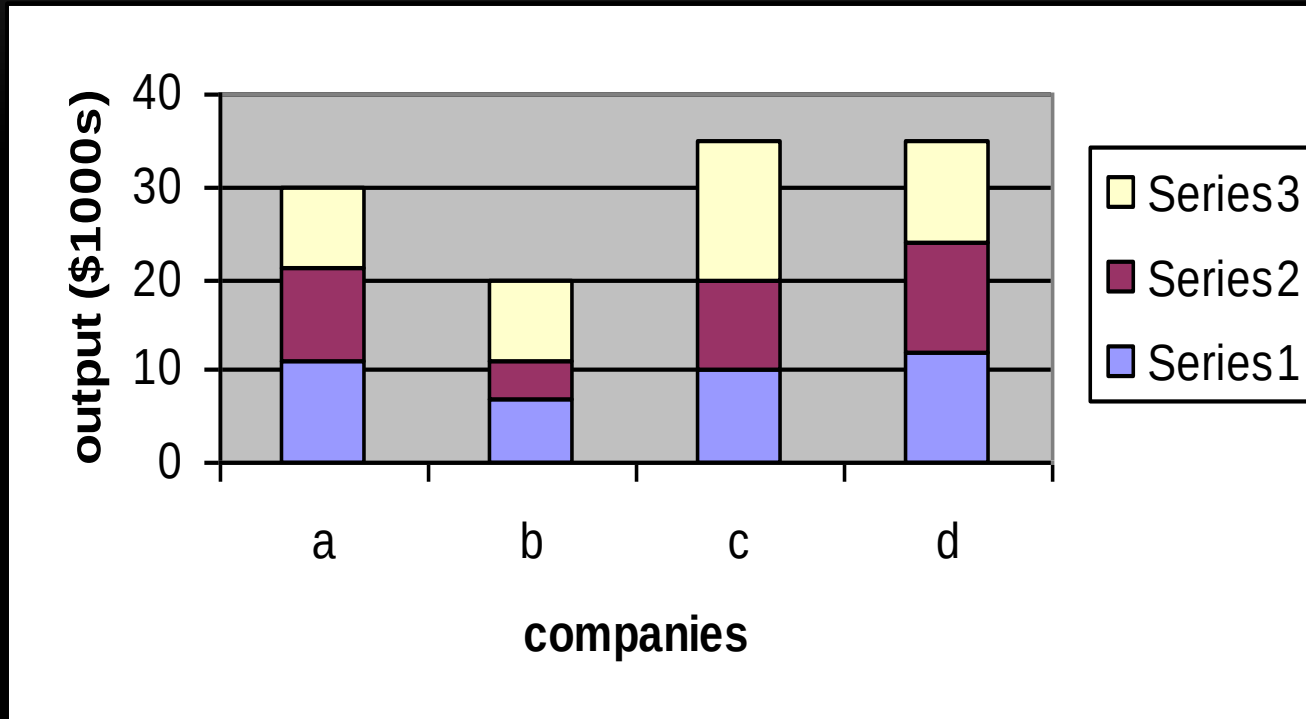
- **Compound** bars allow several sets of data to be presented side-by-side for comparative purposes.
- **Stacked** bars allow two or more sets of related data to be aggregated to show both individual trends and collective trends
- Bar charts and pie charts are often used for categorical data
- Height of bar or size of pie slice shows the frequency or percentage for each category

Multiple Bar Charts

A bar chart has a number of variations such as the stacked bar chart and the multiple bar chart, illustrated as follows, based on the production output of four companies over three successive months.



Stacked bar charts

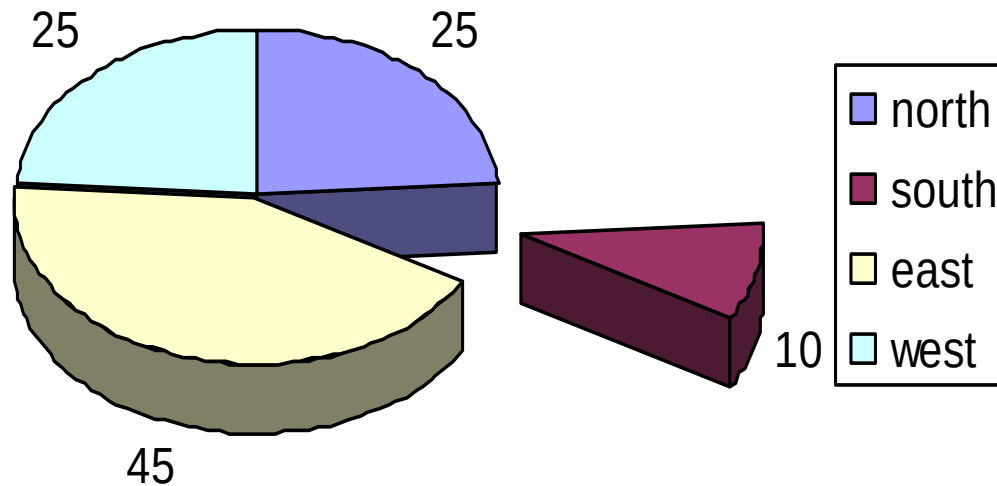


Pie Charts

- Pie charts use simple data to emphasise differences or similarities.
- Six categories of data is the maximum that can realistically be accommodated in a pie-chart.
- Pie charts are commonly used to describe data from relative frequency distributions.
- Data must first be converted to degrees of a full circle.
- Full circle = 360 degrees
- Exploded pie charts allow you to emphasise particular elements

Exploded pie chart

Region:	North	South	East	West
Sales:	25	10	45	25

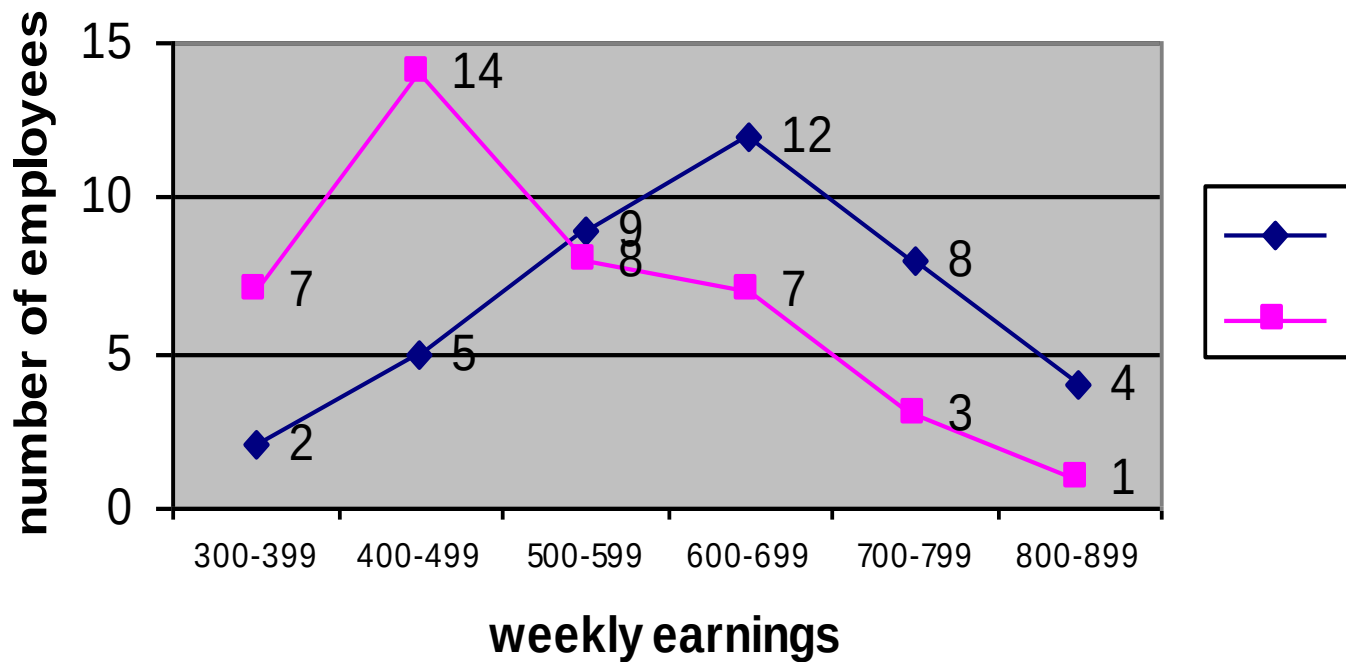


Line Graphs

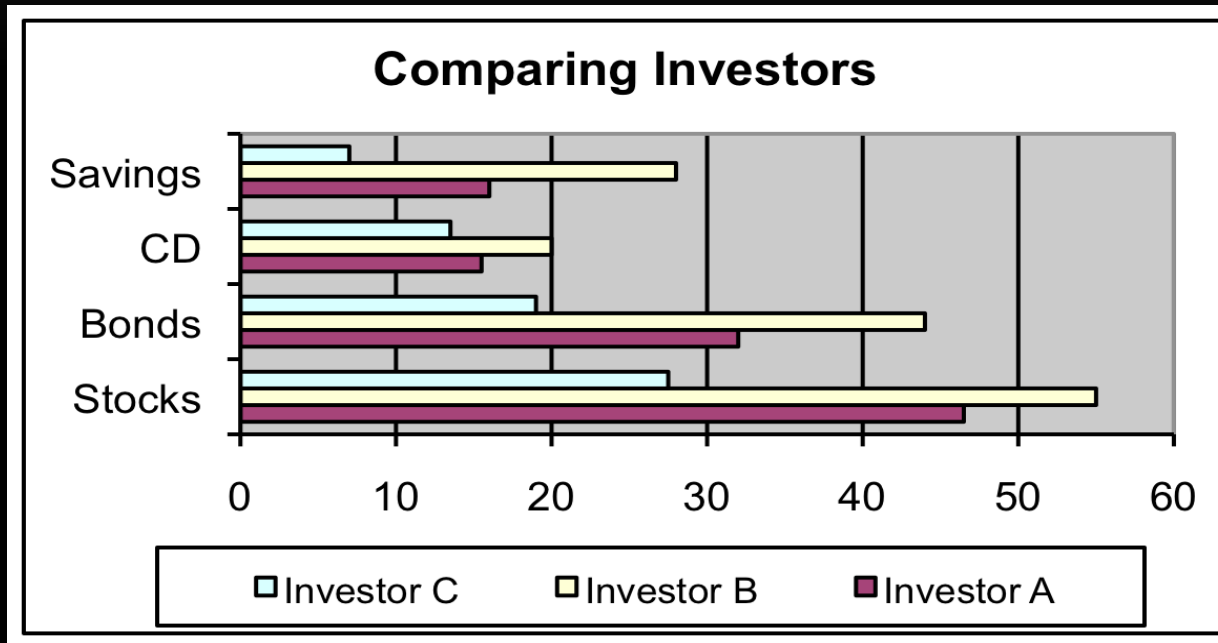
- The line graph can be used to illustrate data in two situations.
 - Firstly, the line graph is often used to illustrate data that is given over a certain time period.
 - Line charts also prove very useful when you are interested in exploring patterns between two different types of data.
 - They are also helpful when you have many data points and want to show all of them on one graph.

Line Graphs

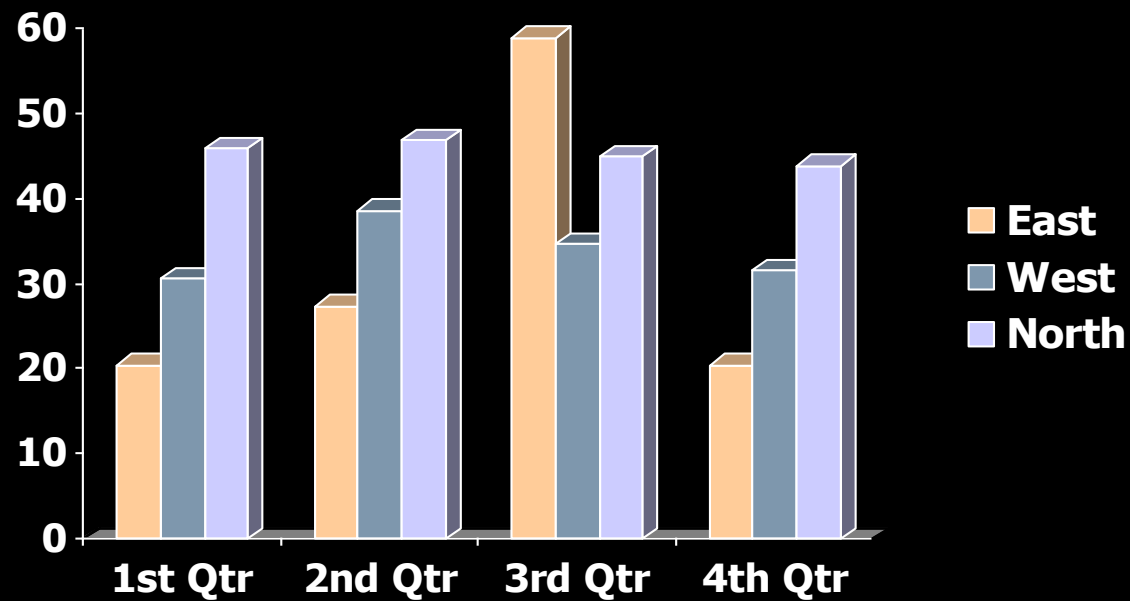
	<u>Number of employees</u>					
Weekly earnings (£)	300	400	500	600	700	800
Company a	2	5	9	12	8	4
Company b	7	14	8	7	3	1



Side-by-side Bar Charts



Sales by quarter for Three Sales Territories:



Scatter Diagrams

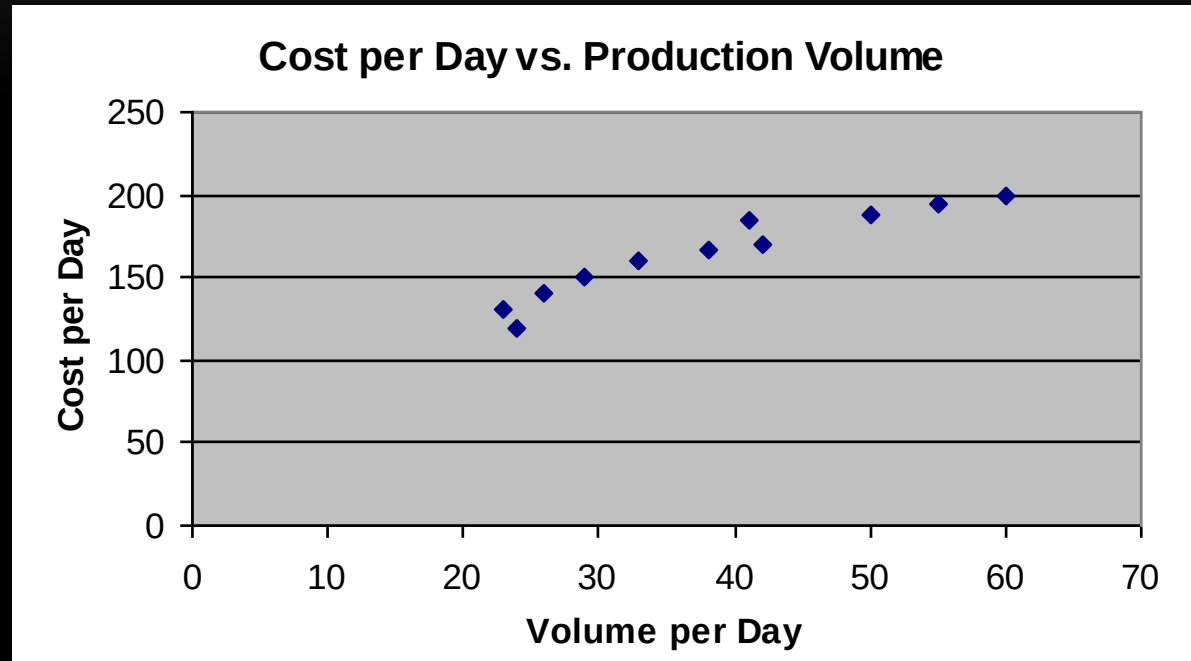
Scatter Diagrams are used to examine possible relationships between two numerical variables

The Scatter Diagram:

- one variable is measured on the vertical axis and the other variable is measured on the horizontal axis

Scatter Diagram - Example

Volume per day	Cost per day
23	131
24	120
26	140
29	151
33	160
38	167
41	185
42	170
50	188
55	195
60	200

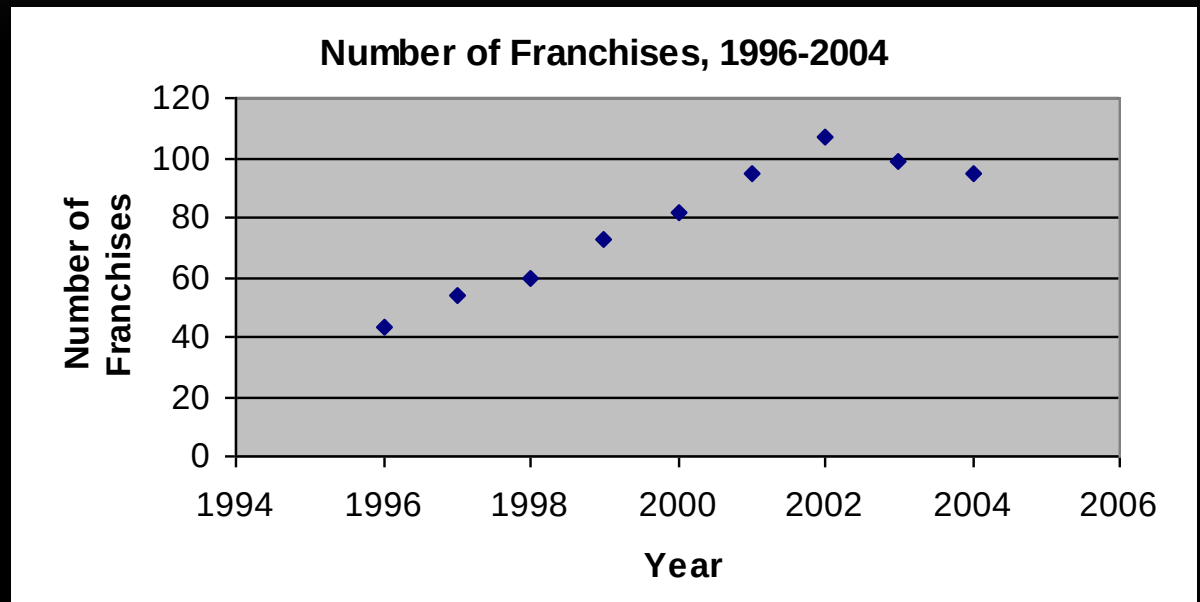


Time Series Plot

- A **Time Series Plot** is used to study patterns in the values of a variable over time
- The Time Series Plot:
 - one variable is measured on the vertical axis and the time period is measured on the horizontal axis

Time Series Plot - Example

Year	Number of Franchises
1996	43
1997	54
1998	60
1999	73
2000	82
2001	95
2002	107
2003	99
2004	95



Graphs

All graphs have a common structure:

- A framework
- Content
- Labels (title, axis labels, legend)

All are equally important

Graphs

Framework:

The framework sets the stage – it indicates the kind of measurements being used. The framework consists of the **axes**.

The **y-axis** is vertical and represents measurements (the dependent variable)

The **x-axis** is horizontal and represents the things being measured (the independent variable).

Graphs

Sometimes grid-lines are used to enhance the framework.

The **content** is the quantitative data that is presented on the graph.

The **labels** explain fully what is contained within the graphs:

Axis labels and measurement details

Titles and sub-titles