Statistical Data Handling

Statistics, Collection of Data and Organisation of Data

(i) Statistics

It is a science of collecting, organising, interpreting and analysing data.

(ii) Collection of Data

It can be obtained

(a) using a questionnaire,
(b) through observation,
(c) through interview,
(d) by measuring,
(e) using electronic means and the Internet.

(iii) Organisation of Data

The data collected can be organised in the form of a table and then presented in graphical forms such as

(a) pictograms,
(b) bar graphs,
(c) pie charts,
(d) line graphs.

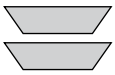
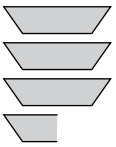
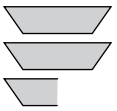
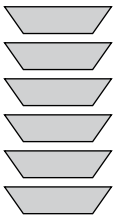
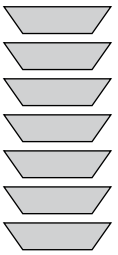
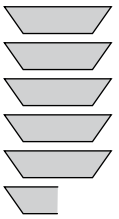
Pictograms

It uses **pictures** to represent statistics.

It is the most suitable when the data needs to be presented in a **lively** and **interesting** manner while the accuracy is not of utmost importance.

Example 1

The table shows the number of cups of drinks sold in a café in a particular week.

Mon	Tue	Wed	Thurs	Fri	Sat	Sun
						

Each  represents 50 cups of drinks.

(a) How many cups of drinks were sold on
  (i) Wednesday,
  (ii) the busiest day?

(b) What percentage of the drinks sold in that week were sold on Friday?

Solution: (a) (i) Number of cups of drinks sold on Wednesday $= 3.5 \times 50$
$= 175$

(ii) Saturday was the busiest day.
Number of cups of drinks sold on Saturday $= 7 \times 50$
$= 350$

(b) Total number of cups of drinks sold in that week $= 27 \times 50$
$= 1350$

Number of cups of drinks sold on Friday $= 6 \times 50$
$= 300$

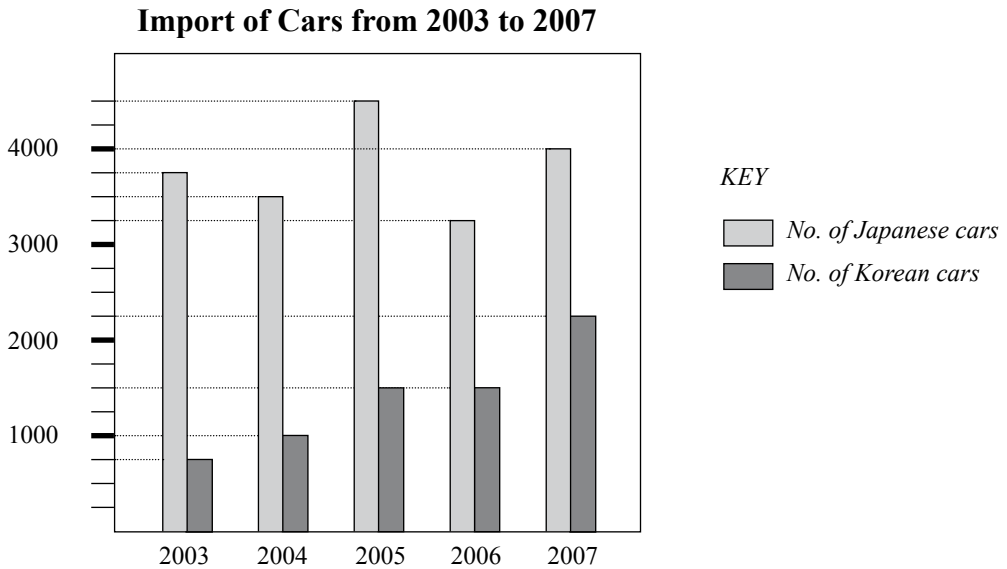
$$\% \text{ of drinks sold on Friday} = \frac{300}{1350} \times 100\%$$
$$= 22.2\% \text{ (3 s.f.)}$$

Bar Graphs

It is useful for **comparing** the data clearly.
A bar is constructed for representing each category.
There is **equal space** between each bar.
The bars are of the **same width**.
The **height** of each bar is proportional to the **size** of a particular category in a set of data.

Example 2

The bar graph shows the number of Japanese and Korean cars imported over a five-year period.



(a) In which year was there the greatest drop in the import of Japanese cars?
(b) Calculate the average number of Korean cars imported over the five-year period.
(c) What would be the total number of cars imported in 2008 if there is an increase of 12% in the total number of cars imported as compared to the previous year?

Solution: (a) Year 2006 showed the greatest drop in the import of Japanese cars.

(b) Total number of Korean cars imported over the 5-year period
$= 750 + 1000 + 1500 + 1500 + 2250$
$= 7000$
Average number of Korean cars imported over the 5-year period
$= \dfrac{\text{Total number of Korean cars imported}}{5}$
$= \dfrac{7000}{5}$
$= 1400$

(c) Total number of cars imported in 2007 $= 4000 + 2250$
$= 6250$
Total number of cars imported in 2008 $= \dfrac{112}{100} \times 6250$
$= 7000$

Tips

$$\text{Percentage change} = \frac{\text{change in value}}{\text{original value}} \times 100\%$$

13.4 Pie Charts and Angle of Sectors

(i) Pie Charts

It is suitable when a **comparison** of the proportion of a whole rather than the actual numerical values are required.

It represents the relative quantities by the areas of sectors of a circle.

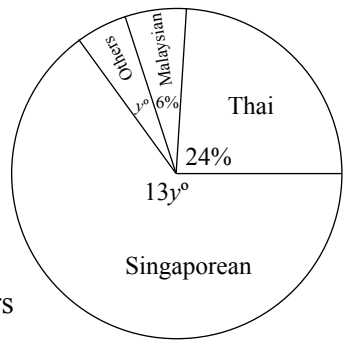
(ii) Angle of Sectors

The **angle** of each sector is proportional to the **size** of each category.

$$\text{Angle of a sector} = \frac{\text{size of the category}}{\text{total size of all categories}} \times 360^\circ$$

Example 3

The pie chart shows the proportions of different nationalities in an aircraft.



(a) Calculate the value of y.

(b) What percentage of the passengers are Singaporeans?

(c) How many passengers are Thais if there are 60 fewer Malaysians than Thais?

Solution: (a) Total percentage of Singaporean and others

$= 100\% - (24 + 6)\%$

$= 70\%$

$$\text{Angle of sectors (Singaporean + others)} = \frac{70}{100} \times 360^\circ$$

$$= 252^\circ$$

$$13y^\circ + y^\circ = 252^\circ$$

$$y = \frac{252}{14}$$

$$= 18$$

(b) $$\text{Percentage of Singaporean passengers} = \frac{13 \times 18^\circ}{360^\circ} \times 100\%$$

$$= 65\%$$

(c) Difference in the percentages of Thai and Malaysian passengers

$= (24 - 6)\%$

$= 18\%$

$$\text{Number of Thai passengers} = \frac{24}{18} \times 60$$

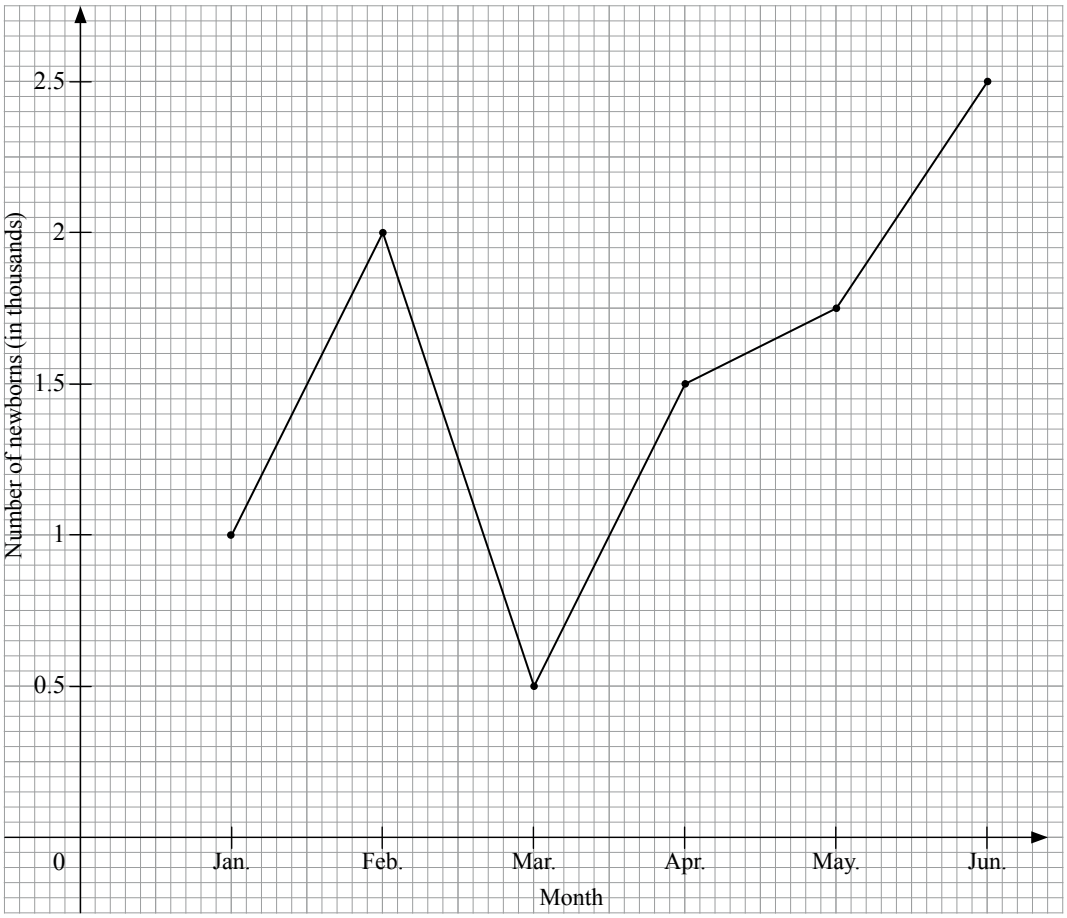
$$= 80$$

Line Graphs

It is the most suitable for representing data that changes over time. The rising and the falling trends in a set of data over a period of time are clearly displayed.

Example 4

The line graph shows the number of newborns of a country in the first half of year 2007.



(a) In which period did the country show a continuous rise in the number of newborns?

(b) Calculate the percentage of the greatest monthly decrease in the number of newborns.

Solution: (a) There was a continuous rise in the number of newborns from April to June.

(b) Greatest monthly decrease in the number of newborns (from Feb. to Mar.)

$= 2000 - 500$

$= 1500$

Percentage of the greatest monthly decrease in the number of newborns

$$= \frac{\text{change in the number of newborns from Feb. to Mar.}}{\text{number of newborns in Feb.}} \times 100\%$$

$$= \frac{1500}{2000} \times 100\%$$

$= 75\%$

Tips Despite the joining of the adjacent points by the line segments, there is no meaning for the intermediate values.