



Citrus Orchard Foreman Occupational Learning

Work Scenario Guide

A3: Data Gathering and Reporting

Qualification:	110667 – Occupational Certificate: Orchard and Vineyard Foreman
Work Scenario:	A3: Data Gathering and Reporting
Learning Area:	A: Take part in the business management of the farming operation
Scenario Description:	To manage the business operations and production activities on the farm effectively, you need to know exactly what is going on, and for that, you need to gather weekly and daily production data, and create reports for other management personnel.

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Alignment Information

Qualification

The content of this learner guide is aligned to the following occupational qualification:

SAQA QUAL ID	Qualification Title			
110667	Occupational Certificate: Orchard and Vineyard Foreman			
Originator				
Development Quality Partner – AgriSETA				
Primary Or Delegated Quality Assurance Functionary			NQF Sub-Framework	
-			OQSF - Occupational Qualifications Sub-Framework	
QUALIFICATION TYPE		FIELD		SUBFIELD
Occupational Certificate		Field 01 - Agriculture and Nature Conservation		Primary Agriculture
Abet Band	Minimum Credits	Pre-2009 NQF Level	NQF Level	Qual Class
Undefined	147	Not Applicable	NQF Level 04	Regular-ELOAC

Modules

The content of this learner guide is aligned to the following modules of the occupational qualification above.

Module Code	Module Title	Level	Credits
Knowledge Modules			
611202-001-00-KM-01	Plant Structure and Physiology	4	5
611202-001-00-KM-02	Vineyard or Orchard Establishment	3	2
611202-001-00-KM-03	Vineyard or Orchard Manipulation Processes	3	8
611202-001-00-KM-04	Harvesting	3	4
611202-001-00-KM-05	Basic Principles of Plant Nutrition	4	4
611202-001-00-KM-06	Crop Protection	3	3
611202-001-00-KM-07	Assets in Horticultural Production	3	2
611202-001-00-KM-08	Farm Business Management and Farming Process Management	4	8
611202-001-00-KM-09	Human Resource Management and Processes	4	8
611202-001-00-KM-10	Overseeing Farming Resource Utilisation	4	8
Practical Skill Modules			
611202-001-00-PM-01	Organise, Allocate and Monitor Availability and Productive Use of Resources	4	5
611202-001-00-PM-2a	Set Team and Individual Performance Goals to Enhancing Team Performance	4	10
611202-001-00-PM-2b	Control Vineyard or Orchard Practices	4	10

611202-001-00-PM-03	Supply Accurate Daily Orchard or Vineyard and Production Information	4	10
Work Experience Modules			
611202-001-00-WM-01	Vineyard or Orchard Resource Optimisation	4	20
611202-001-00-WM-02	Skilled and Motivated Work Team Output	4	20
611202-001-00-WM-03	Daily Orchard or Vineyard and Production Information Availability	4	20

Learning Outcomes

The content of this learner guide is aligned to the following learning outcomes of the modules above.

Knowledge Topics	
Outcome Code	Module Title
KM-08-KT05	Farm management information systems
IAC0501	Data, information and knowledge management concepts are defined in terms of their role in horticultural production
IAC0502	The importance of documenting data and information is argued
IAC0503	Historical information on orchard production and environmental conditions and the uses thereof are discussed
IAC0504	The purpose of environmental information and the impact thereof on activities and production targets and decision making processes are evaluated
IAC0505	Internal and external records and reporting structures are identified and discussed
IAC0506	The purpose and methods of collection and analysis of agricultural data is justified and applied
IAC0507	The collection and recordkeeping of agricultural data is described and motivated
IAC0508	Methods of report writing and presentations are applied
KM-10-KT07	Administration, record keeping, reporting
IAC0701	The need for administration, record-keeping and reporting is motivated and the underlying principles explained
IAC0702	Effective administration and record-keeping is described and implemented
Practical Skills	
PM-01-PS01	Perform a practical exercise to compile a production plan for an orchard or vineyard for a full growth cycle based on case study information
PA0106	Identify the control mechanisms to ensure output and quality targets are met.
AK0107	Techniques to analyse and summarise farm information
PM-01-PS02	Determine agricultural input to support the production activities of the orchard related to the production stages of the crop
AK0207	Techniques to analyse and summarise farm information
PM-01-PS03	Organise and allocate equipment and agri-chemicals to the work team to perform Vineyard or orchard practices
AK0307	Techniques to analyse and summarise farm information
PM-2b-PS01	Conduct a practical exercise to control and evaluate the agricultural practices in a Vineyard or orchard based on case study information
PA0109	Observe and interpret real data and compare to expected outcome
PA0110	Use a control system for recording productivity

PM-03-PS01	Perform a practical exercise to verify orchard and production information related to occurrence of pests and diseases, crop quantity and size and production tasks based on case study information
IAC0101	The correct records related to chemicals, pest and diseases and crop quality and quantity is presented
IAC0102	Availability is compared against industry standards or the information of the previous year
IAC0103	Actions are taken in compliance with IPM regulations and the provided plan of action
PM-03-PS02	Perform a practical exercise to report on Vineyard or orchard and production progress based on case study information
PA0206	Interpret and understand charts, statistics and graphs
PA0207	Calculate the average

Chapter 1

Data Collection

learning outcomes

In this chapter, you will learn how to:

- Gather useful data.

1. Introduction to Data

definition

Data

Data can be defined a few different ways depending on context, but we will define it as a collection of facts and statistics used for reference or analysis.

Data forms the backbone of citrus production. If you do not know what is going on at your farm, how much fruit you are producing, how well you are producing it, how much of various inputs you are using, and how much everything is costing you; you cannot hope to run a farming business successfully. You must be able to collect, handle, and interpret reliable, accurate data, as well as turn that data into useable information in the form of reports and records.

Data handling refers to this process of collecting, storing, managing, and using data. In our context as citrus farmers, data handling includes various activities that ensure that any data related to our citrus production is accurate, reliable, and accessible. This includes everything from collecting data on soil conditions and weather to recording harvest yields and tracking fruit quality.

Before we continue, it is important to differentiate between data and information, as they are not the same thing. Information is the result of processing, manipulating and organising data in a way that adds knowledge to the receiver. In other words, it is the 'end product', the 'cooked sausage' ready to eat, where data is the 'raw meat' from the animal. Data handling is the process of turning that raw meat into a cooked sausage.

By understanding and effectively managing data, you can make sure that your farm is running efficiently, complying with regulatory and market requirements, while producing high-quality fruit. Data handling does not only help with day-to-day operations, but is also a big part of long-term business management and planning.

2. Data Gathering

The first step to managing data effectively is having data to manage. Data is gathered in a few different ways and there are a few different types of data, each of which we will examine here. Gathering good, reliable data is essential, since if you start with 'poisoned' data, that is incorrect or badly gathered, then you won't be able to handle it and apply it in any useful way.

3. Data Types

First, we should discuss the different types of data that apply to citrus farming. There are different ways to categorise the different types of data, but we will group data into four broad categories. These four categories are:

- Environmental Data
- Production Data
- Financial Data
- Quality Data

Environmental data is data about environmental factors, like weather conditions, soil quality, water availability and quality, and local pest populations. This data helps you to understand the way that environmental factors that influence citrus production, and to adjust production practices accordingly.

Production data is data about the activities we do on the farm, such as planting dates and locations, cultivar and rootstock selections, fertilization schedules, irrigation practices, and all the data relating to harvest. This data is vital for managing the farm day-to-day, and for making sure that everything on-farm is done properly, and according to plan.

Financial data is all the data about the 'business' side of the farm. This includes budgets, costs, sales, and calculations regarding profitability. As you well know, farming is a business, and having a firm grasp of the financial side of things is an important part of farming successfully and profitably.

Quality Data is data about our fruit itself. This would include our fruit's size, colour, sugar content, blemish rates, and all other quality factors that affect our fruits' marketability. These factors must be closely monitored to ensure that your fruit is fit for the target market it is grown for.

4. Methods of Data Collection

As we mentioned, data can be collected a few different ways, depending on various factors. The three most common types of collection for citrus farming are:

- Manual Collection
- Digital Collection
- Surveys and Interviews

Manual collection is when data is collected by humans, using traditional methods like paper forms, manual counting, and physical inspections. This is often performed by workers in the field (such as pest scouts) or supervisors. Although manual collection can be time-consuming and carries a risk of human error, it is still very widely used on many farms, especially in smaller operations.

Digital collection is when data is collected using technology, such as sensors, mobile apps, or GPS. These systems allow you to collect real-time data, often faster and more accurately than with manual collection, but can be very expensive to set up and maintain.

Surveys and interviews involve the gathering of what is called "qualitative data", which is data that cannot be easily recorded as specific numbers (called "quantitative data", like the height of a tree). Qualitative data usually has to do with things like "how customers feel about our brand", or "how happy our workers are".

5. Frequency of Data Collection

How often data is collected depends on the type of data and its use. For example, environmental data about weather conditions can be collected multiple times a day, while financial data could be gathered monthly. Whatever the interval between data collection periods, it is important that these intervals are regular, so that any trends or patterns in the data can be analysed accurately.

summary

Chapter 1 – Data Collection

- Data can be defined as a collection of facts and statistics used for reference or analysis.
- You must be able to collect, handle, and interpret reliable, accurate data, as well as turn that data into useable information in the form of reports and records.
- Data handling refers to this process of collecting, storing, managing, and using data.
- Data and information are not the same thing. Information is the result of processing, manipulating and organising data in a way that adds knowledge to the receiver.
- Data can be broadly categorised into environmental data, production data, financial data, and quality data.
- The three most common types of data collection for citrus farming are manual collection, digital collection and surveys and interviews.
- How often data is collected depends on the type of data and its use.

assessment activities

- ✓ **Activity P1:** Complete this activity to test your knowledge of data collection.

Chapter 2

Data Handling and Reporting

learning outcomes

In this chapter, you will learn how to:

- Handle data to turn it into useful information.
- Create reports using data and information.

1. Data Storage

Now that you have gathered your data, you need to enter it into a system where it can be stored safely, while being easily accessible. In the past, farmers (like all other businesses back then) would have kept paper records and files in a records area or a file cabinet. This is not ideal, as paper can get damaged or lost, and it can be difficult to find the exact bit of information you need when it is buried somewhere in thousands of pages of information.

Thankfully, these days, you have a wide range of electronic and digital systems for data storage and management, most of which are fairly easy to get the hang of. These systems are incredibly useful, as they keep the data secure and well-organised, while making it much easier to find the exact bit of information you are searching for.

These systems vary a little, depending on the size and complexity of the farm in question, but whichever form you choose for storage, the data must be stored in a secure and organized manner. Digital storage solutions such as cloud storage, databases, and farm management systems are best, as they are reliable and easy to access.

Proper data storage ensures that information is not lost and can be retrieved quickly when needed for analysis or reporting. Implementing regular backup procedures is also essential to protect against data loss.

2. Data Entry

A good data storage system is useless if the data is not being entered correctly. If the personnel in charge of entering the data into the system are putting in the wrong figures, or putting them in the wrong place, then the quality of the storage system itself becomes meaningless.

You need to train the workers responsible for data entry to do their jobs well, and consistently. Good, reliable data is important for all the factors we have already discussed, and precise, timely data entry is a vital part of having good data to use.

3. Data Processing

Data processing involves organizing and analysing the data you have collected and entered into the database to turn it into meaningful, useful information. This can include sorting, filtering, and applying statistical analyses to understand trends and patterns. Depending on the complexity of the data or the size of the operation, this can be a highly specialised skill. It may be well worth it to hire someone with training in data handling or statistics, or sending your own employees to be trained in these fields.

4. Data Reporting

Now that you have collected, stored, and processed your data into information, it is time to use that information. Often, information is only useful if it is shared around to everyone who needs it (such as all the managers or supervisors at a farm). Data reporting is the act of sharing data or information in a way that is understandable and useful for everyone who needs it for decision-making.

Regular, effective reporting is a big part of effectively running a farm. Reports can take many forms and vary in terms of complexity or length, depending on what information is needed and who it is needed for.

There are various tools that can generate reports, including farm management software, programs like Microsoft Word or Excel, or even specialized reporting and data management tools. Reports can be presented in many formats, including charts, graphs, tables, and written reports. We will discuss some of these later in this chapter.

5. Types of Reports

Reports can be grouped into a few types depending on their purpose. There are more types than those listed below, but these are the most common types of report that you will create or use. These include:

- Operational Reports
- Financial Reports
- Compliance Reports
- Quality Reports

Operational reports are used to provide insight into the day-to-day activities and worker performance. These reports help in understanding how well the farm is operating and identifying areas for improvement.

Financial reports include profit and loss statements, balance sheets, and budget reports. These reports are vital for management to understand the financial 'health' of the farm business and make informed financial decisions.

Compliance reports are used to track adherence to regulatory and market requirements. As you know, export markets can have very strict requirements to sell your fruit there, and these reports let you ensure that you are meeting those requirements.

Quality reports include data on fruit quality factors, and help to ensure your fruit is at the quality it should be. Any problems in fruit quality can be quickly noticed and corrected before it is too late.

6. Frequency of Reporting

Like data collection, reporting should be done at regular intervals, which will depend on the type of report and its purpose. Regular reporting is an important part of continuous monitoring and improvement. For example, daily operational reports can help in managing daily activities and ensuring that everything is running smoothly, while monthly financial reports can give a broader picture of financial performance to aid in goal setting and budgeting.

7. Visual Report Formats

Using visual formats in your report helps to quickly share key information and can help with making reports and presentations more effective. When faced with pages of raw data in the

form of figures, it can be difficult to 'see the big picture', and this can make reports a lot less effective.

Visual forms of data presentation, such as tables and graphs, are great at presenting the most important trends in data, and getting the report-reader to focus on the important parts of the data. The specific format will depend on the type of information and the people who the report is meant for.

8. Tables

example

Tables

Below is an example of a simple table, showing a production comparison.

Year	Total Production (quad. Btu)	Percent of Production			
		Coal	Petroleum	Natural Gas	Other ¹
1960	41.5	26.1	36.0	34.0	3.9
1970	62.1	23.5	32.9	38.9	4.7
1980	64.8	28.7	28.2	34.2	8.9

1. Includes hydropower, nuclear power, geothermal energy, and others.

Figure 3. Energy Production by Major Source from 1960 to 1980. Source: U.S. Energy Information Administration, *Annual Energy Review*.

In its simplest form, a table is a group of rows and columns of data. At the top of each column is a column heading, which defines or identifies the contents of that column and often it indicates the unit of measurement as well. On the left edge of the table row headings are placed, which define or identify the contents of that row. Tables depict sets of figures in relation to certain parameters.

Tables generally contain more detail than what is normally shown in graph form. When using tables, it is best to keep them as simple as possible, so that they contain only the information that is relevant and are as uncluttered as possible.

Tables are great for accessing and comparing information. For example, if the data is arranged chronologically (in time order), the table can show trends, and patterns of rising or falling activity. However, tables are not necessarily the most effective means of showing trends or relationships between data, which is why charts and graphs are more commonly used for this purpose.

Tables are mainly used for numerical data, but can be used whenever different details of several items must be listed. For example, you can compare the characteristics of various agricultural products. This is ideal information to be captured on a table, and it would include words (agrochemical name) and numbers (dosage).

When creating tables, it is best to refer to the table in the text just preceding the table. Explain the general significance of the data in the table – do not expect readers to figure it out entirely for themselves.

You should also be careful not to overwhelm readers with massive tables with dozens of columns and rows. These will be very hard to understand, and may not get the point across. Simplify the table so that it includes only the data that illustrates your point, without distorting that data.

It is also not necessarily to put the unit of measurement in every cell of a column. For example, in a column of measurements all in millimetres, you do not need to put 'mm' after every number. Put the abbreviation in parentheses in the column or row heading. Finally, when there is something special to note about one or more of the items in the table, use a footnote instead of clogging up the table with the information.

9. Graphs

Whereas tables provide exact data in a list, graphs are mainly used to convey the general significance of data, such as general trends, relationships and proportions. A well-designed graph is very useful for making clear the specific information you want to show. People also tend to remember the meaning of data presented in graphs better than data presented in tables.

There are a great many types of graphs and variations on the standard types. The type of graph that one uses depends on the sort of data that is being conveyed, and the significance (trend, proportion or relationship) that one wants to show. The major graph types that we will discuss in more detail are:

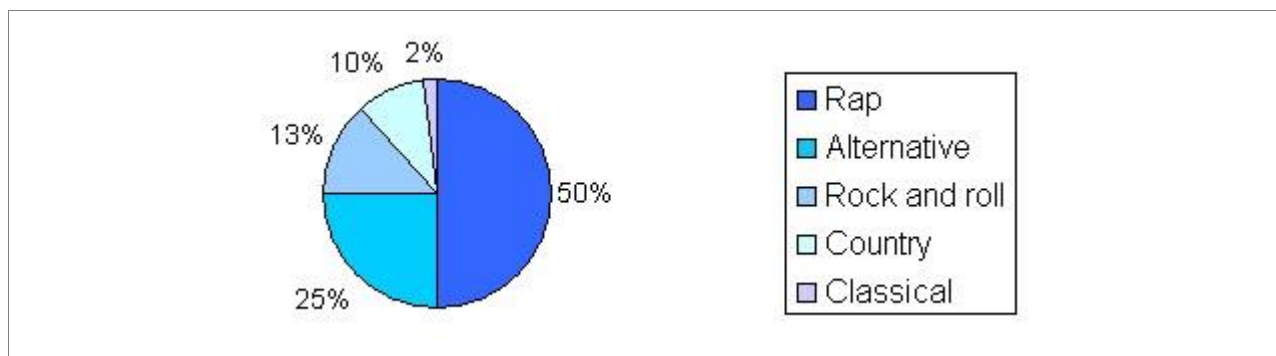
- Pie Charts
- Bar or Column Graphs
- Line Graphs
- Area Graphs

10. Pie Charts

example

Pie Chart

The pie chart below shows the music preferences of young adults, ages 14 to 19.



The pie chart clearly shows that the majority of students like rap best (50%), and the remaining students prefer alternative (25%), rock and roll (13%), country (10%) and classical (2%).

A pie chart is a graph made up of a circle divided into a series of segments with each segment representing a particular category. They are called pie charts because they resemble the top-down view of a pie, with 'slices' cut out of it representing the data.

Pie charts are mainly used as a way of summarising the percentage distribution of each category in a set of data, with the area of each segment being the same proportion of the circle as the category is of the total data set. In other words, the different slices represent different parts of the data set (in the example above, the different music genres listed by the teens), and the size shows you the proportion of the data that that part makes up.

Pie charts are quite popular, because they are simple to use, and are usually very easy to read from even a single glance. Despite this popularity, we generally would not recommend that pie charts should be used too often, for two reasons.

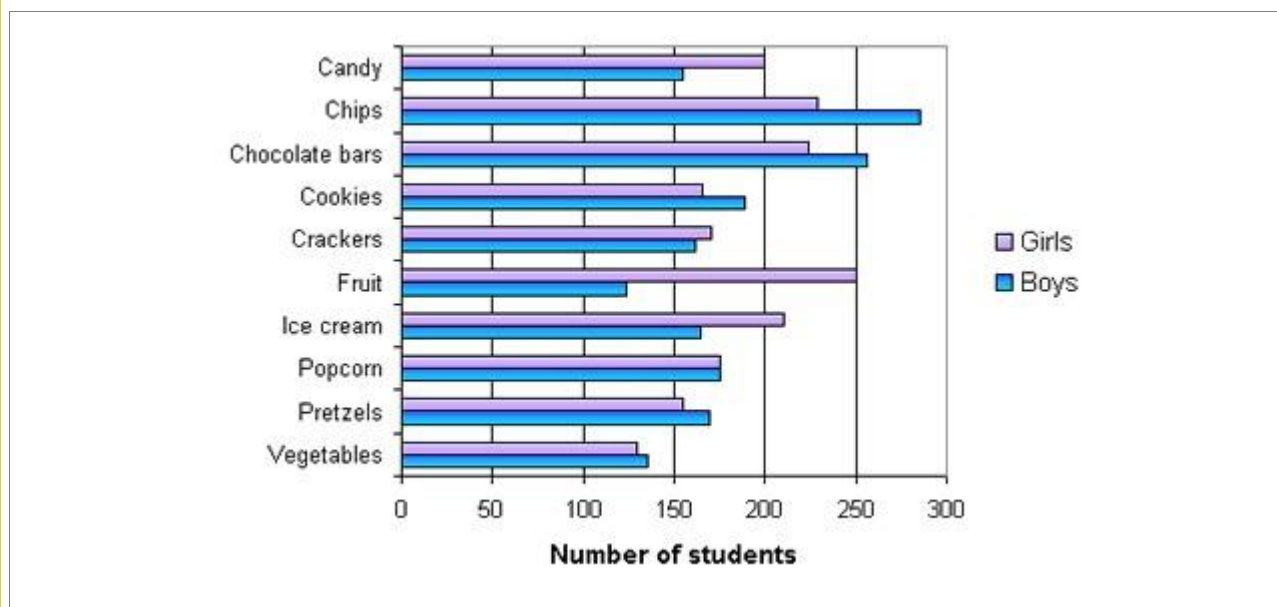
Firstly, pie charts are not effective for displaying large, varied data sets. For example, if there were 12 categories represented on a pie chart, the chart will most likely be too complex to understand. Secondly, pie charts are not useful when the values of one or more of the categories are too similar, because the differences between slice sizes are not significant enough.

11. Bar and Column Graphs

example

Bar Graph

Below is a bar graph that shows the preferred snack choices of student at Hillary High School, also indicating the difference in snacks preferred by girls compared to boys.



Bar, or column, graphs usually present categorical and numeric variables grouped in class intervals. Column graphs are bar graphs that are turned 'upward', so that the 'columns' come out of the x-axis. They consist of an axis and a series or labelled horizontal or vertical bars.

The bars depict amounts of different values of a variable or simply the different values themselves. The numbers on the x-axis of a bar graph or the y-axis of a column graph are called the scale. The important point to note about bar graphs is their bar length or height – the greater their length or height, the greater their value.

When developing bar graphs, a vertical or horizontal bar for each category or value is drawn. The height or length of the bar will represent the number of units or observations in that category (frequency) or simply the value of the variable. The bars can be any width, but this must be consistent between all the bars.

In general, data comparisons are best represented vertically, in column graphs. One disadvantage of column or bar graphs is that they lack space for text labelling at the foot of each bar. When category labels in the graph are too long, you might find a horizontal bar graph better for displaying information.

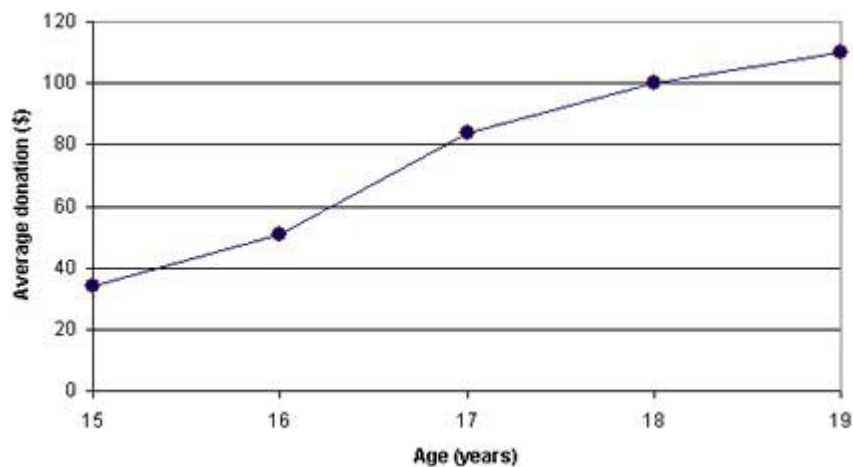
12. Line Graphs

A line graph is a visual comparison of how two variables, shown on the x- and y-axes, are related to each other. Line graphs show related information by drawing a continuous line between all the points on a grid. Line graphs can take different shapes and be used to convey a wide array of information.

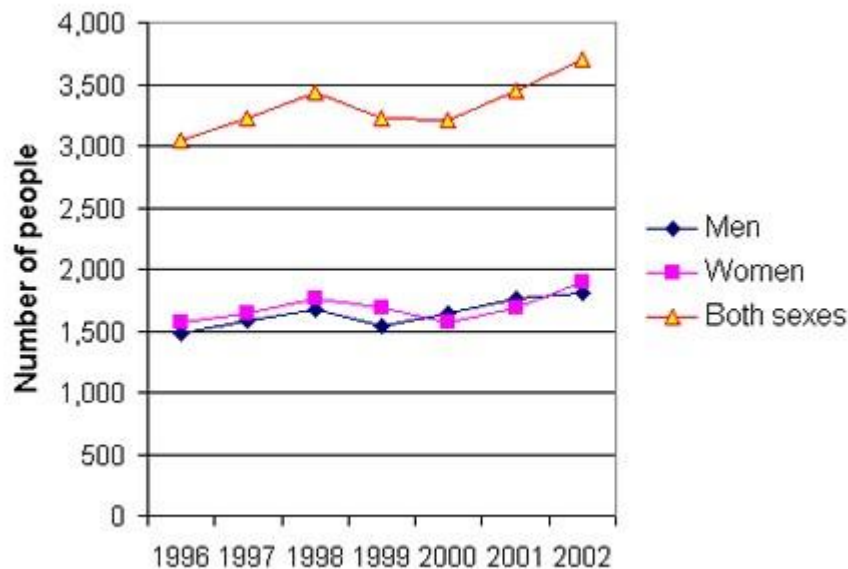
example

Line Graphs

Below is a single line graph comparing the number of dollars donated by the age of the donors. According to the trend in the graph, the older the donor, the more money he or she donates.



Below is an example of a very good multiple line graph. It is easy to see from this graph that the total cell phone usage has been rising steadily since 1996, except for a two-year period between 1999 and 2000, when the numbers drop slightly. The pattern of use for women and men seems to be quite similar, with small discrepancies between them.



Line graphs are the most popular type of graph, because they are easy to create, and easy to read, making them great for showing data trends clearly. Line graphs are especially useful in the fields of statistics and science, and are one of the most common tools used to present data.

Although they do not present specific data as well as tables do, line graphs are able to show relationships more clearly than tables. Line graphs can also depict multiple data series. Time series data and frequency distribution are most commonly depicted using line graphs.

Bar, column graphs and line graphs share a similar purpose. The column graph, however, reveals a change in magnitude (amount), whereas the line graph is used to show a change in direction. A multiple line graph can effectively compare similar items over the same period of time.

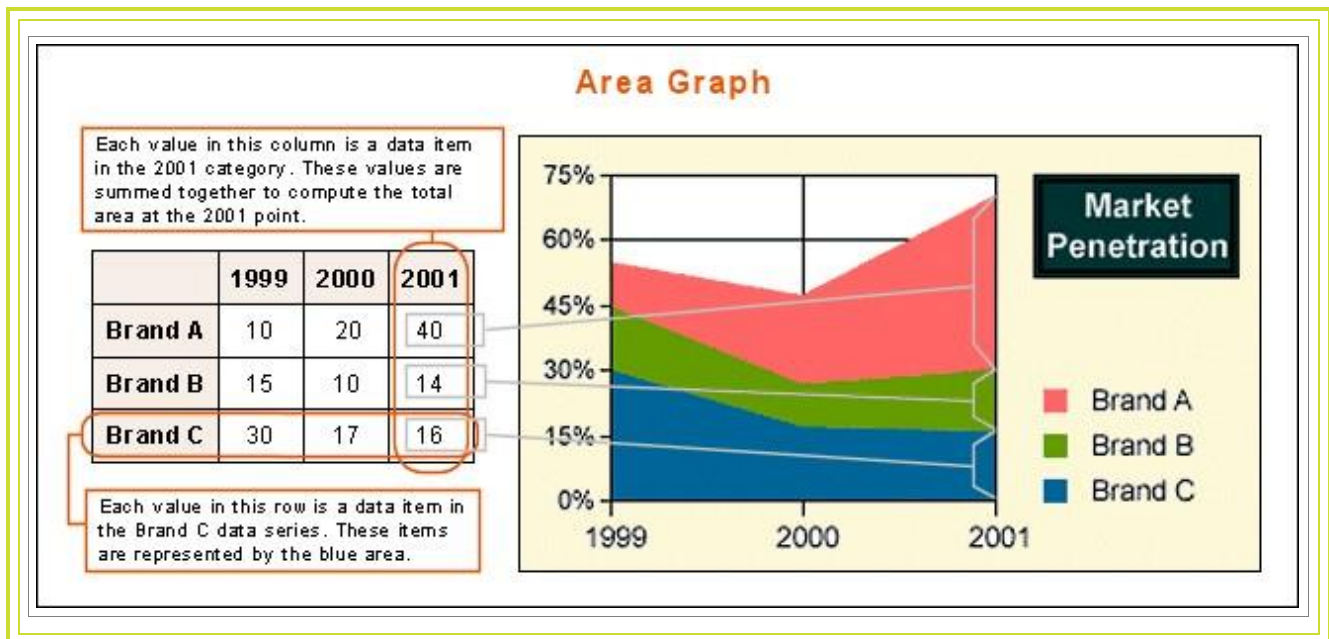
Be careful when selecting the scales for the x- and y-axes when creating a line graph, because this can give a distorted image of the data. If inconsistent scales on the axes of a line graph force data to appear in a certain way, then a graph can even reveal a trend that is entirely different from the one intended.

13. Area Graph

example

Area Graph

This graph compares markets penetration between different brands.



Area graphs combine the features of line graphs and stacked bar graphs by colouring the areas underneath each line. These area segments are stacked on top of each other, as in a stacked bar graph, so that the total size of the area at each category reflects the cumulative value of all data items in that category. Each data series in the graph corresponds to a coloured segment of the total area. The first series is always the top area segment.

summary

Chapter 2 – Data Handling and Reporting

- Proper data storage ensures that information is not lost and can be retrieved quickly when needed for analysis or reporting.
- There are a wide range of electronic and digital systems for data storage and management, which keep your data secure and well-organised.
- Digital storage solutions such as cloud storage, databases, and farm management systems are best, as they are reliable and easy to access.
- You need to train the workers responsible for data entry to do their jobs well, and consistently.
- Data processing involves organizing and analysing the data you have collected and entered into the database to turn it into meaningful, useful information.
- Data reporting is the act of sharing data or information in a way that is understandable and useful for everyone who needs it for decision-making.
- There are various tools that can generate reports, and reports can be presented in many formats.
- Reports can be grouped into operational reports, financial reports, compliance reports, and quality reports.
- Reporting should be done at regular intervals, which will depend on the type of report and its purpose.
- Using visual formats in your report helps to quickly share key information and can help with making reports and presentations more effective.

- A table is a group of rows and columns of data that depicts sets of figures in relation to certain parameters.
- A pie chart is a graph made up of a circle divided into a series of segments, and are mainly used as a way of summarising the percentage distribution of each category in a set of data.
- Bar, or column, graphs usually present categorical and numeric variables grouped in class intervals, and consist of an axis and a series of labelled horizontal or vertical bars.
- Column graphs are bar graphs that are turned 'upward', so that the 'columns' come out of the x-axis.
- A line graph is a visual comparison of the relationship between two variables shown as a continuous line connecting different data points.
- Area graphs combine the features of line graphs and stacked bar graphs by colouring the areas underneath each line.

assessment activities

- ✓ **Activity P2:** Complete this activity to test your knowledge of data handling and reporting.
- ✓ **Activity F1:** Complete this activity to test your knowledge of the entire module.