PASSING LANE

FSK - Foundation Skills Training Package

FSK20119
Certificate II in
Skills for Work and Vocational Pathways

Unit

FSKNUM018

Collect data and construct routine tables and graphs for work

Student/Trainee Manual

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PO Box 975
COWES VICTORIA 3922

MATERIALS PUBLISHED IN AUSTRALIA

STUDENT/TRAINEE DETAILS

Student/Trainee Name

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School / Institution / Training Organisation / Employer

PASSING LANE

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INTRODUCTION

This manual was developed to provide training content that addresses the specific 'Unit of Competency' as outlined in the following pages.

We encourage you the student / trainee to take your time when reviewing this content and seek any assistance from your teacher/trainer should you have difficulty in understanding the information.

LEARNING ACTIVITIES

Also included in this Student / Trainee manual are a series of Learning Activities.

The learning activities in the student and/or trainee manuals are 'Form Enabled' so that if the resources are delivered online, the activities can be entered in using the computer keyboard.

Each learning activity is identified with the following icon.

Learning Activity

Learning activities come in the following forms.

- ☆ Questions
- ☆ Research
- ☆ Tasks
- ☆ Interviews

INTRODUCTION—CONT'D

Questions

Questions generally relate to the information presented on previous pages. Questions will also include multiple choice questions, 'Yes' and 'No' questions and/or 'True' and 'False' questions.

Research

This type of learning activity requires you to locate information by using research methods. The research methods could include:

- ☆ Internet searches
- ☆ Reading textbooks and other reference sources
- ☆ Location visits

Tasks

This learning activity type requires you to actually do something and some examples of tasks may include:

- ☆ Creating reports
- ☆ Visiting locations such as workplaces
- ☆ Performing an activity in a workplace

Interviews

This learning activity type would require you to interview person(s) in an actual workplace environment or a person(s) who are experienced in the industry sector which you currently are undergoing training.

You will be made aware of the type of learning activity by noting the learning activity type displayed under the learning activity icon.

INTRODUCTION—CONT'D

USING THE FORM ENABLED FEATURE

If you are using this manual online, you can fill in some of the answers using your computer keyboard.

Your teacher or trainer will provide you with the information and instructions on how to use the 'Form Enabled' feature in this manual.

SELF ASSESSMENT

At the end of each manual is a series of questions that you should review and answer either Yes or No.

The term 'Self Assessment' means you will ask yourself these questions and therefore is no need to provide the answers to the self assessment questions to your teacher or trainer, unless they require you to do so.

This self assessment is to ensure you have reviewed and understood the information that was presented in this manual.

If you answered 'No' to any of these questions or are unsure of your understanding in any of the topics reviewed, you are encouraged to go back and review the information again and/or seek the assistance of your teacher or trainer.

UNIT OF COMPETENCY OVERVIEW

The following pages are extracts from Training.gov.au website and outlines this specific 'Unit of Competency' including the 'Elements' and the 'Performance Criteria'. The content within this manual has been developed to address this unit.

FSKNUM018 COLLECT DATA AND CONSTRUCT ROUTINE TABLES AND GRAPHS FOR WORK

ELEMENT	PERFORMANCE CRITERIA
1. Identify relevant and familiar workplace data	1.1 Identify basis and specifications of data collection requirements for workplace task including being aware of audience of data and purpose of collection 1.2 Identify source(s) of familiar and routine data in the workplace and possible methods of collection
2. Collect data and develop routine tables and graphs for workplace task	2.1 Select mathematical problem solving process for completing workplace task 2.2 Describe an expected result of the data collection and results 2.3 Select method to collect routine workplace data and collect relevant data sample 2.4 Collect, order and collate data into a table or spreadsheet 2.5 Determine scale and axes and construct routine graph or chart using appropriate tools 2.6 Check and reflect on expected result, data collection and outcomes and appropriateness of outcome to workplace task
3. Communicate results	3.1 Use informal and formal written mathematical representation to document and report on workplace data and problem solving process and results 3.2 Use informal and formal mathematical language to present and discuss workplace information and problem solving process and results

Section One

Identify Relevant and Familiar Workplace Data

COLLECT DATA AND CONSTRUCT ROUTINE TABLES AND GRAPHS FOR WORK

SECTION ONE—IDENTIFY RELEVANT AND FAMILIAR WORKPLACE DATA

Introduction

In many workplaces, information is displayed in tables and graphs.

This is especially true where the information can be difficult to understand unless it is organised in more of an easier format such as a table, or graph.

In this training manual we will be learning what data is and how it is used for constructing tables and graphs in a workplace setting.

Section Learning Objectives

At the completion of this section you will learn information relating to:

- ☆ Identifying basis and specifications of data collection requirements for workplace task including being aware of audience of data and purpose of collection
- ☆ Identifying source(s) of familiar and routine data in the workplace and possible methods of collection

To successfully complete this part of your training, you will be asked to do a number of tasks that will show you have learned and have used what you have learned about 'collecting data and constructing routine tables and graphs at work'.

Generally, you as a student or trainee would be doing those tasks (called assessment tasks) at work.

You could be a full time or part time employee, or even doing work experience.

These 'assessment tasks' are provided to you to do as if you were at work.

However, sometimes we have students or trainees who do not have a job as yet, so your teacher or trainer will take the place of your employer and watch you do your assessment tasks at school or wherever you are taking the training course.

To complete this training unit it is important that you have access to a word processing application such as Microsoft Word and a spreadsheet application, such as Microsoft Excel.

We are assuming that you have basic skills in using a spreadsheet application and a word processing application.

In this manual we do not go into much detail about spreadsheet or word processing applications, except to show you how to use the basic table and graph tools in each application.

IDENTIFY BASIS AND SPECIFICATIONS OF DATA COLLECTION REQUIREMENTS FOR WORKPLACE TASK INCLUDING BEING AWARE OF AUDIENCE OF DATA AND PURPOSE OF COLLECTION

Before we go on with this section of the manual it is important that you understand the meaning of 'data' and the difference between 'data and 'information'.

The common definition of 'data' is:

'A collection of facts or numbers not organised in a meaningful way'

Data becomes 'information' when the facts or numbers called data are organised, structured and presented in a way that is clear and understandable.

In this training manual we will be looking at collecting data and presenting it in tables or graphs as understandable presentation of information.

You will also hear the term 'audience'.

In simple terms, the tables or graphs will be read by certain people who are known as the 'audience'.

An audience can be one person, or a group who are wanting the information and have skills in reading and understanding the information.

It is very important to understand who the audience of your tables or graphs are.

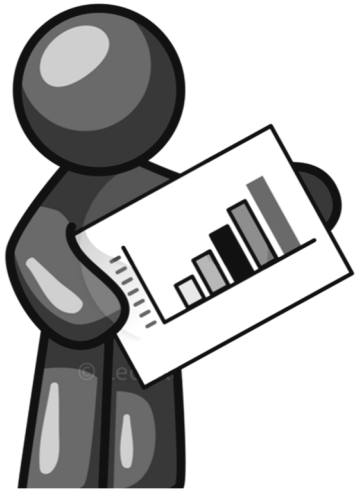
For example, some audiences want certain information presented to them in a simple way.

So giving this audience information in tables or graphs that they have no interest in or is so complicated they cannot understand it would be a waste of time.

As an example, the audience could be the sales manager of an organisation so he or she may want detailed sales volumes and sales expenses of the business.

However, the audience could be sales staff and the information presented could be sales volumes of specific products over a period of time.

The amount of information and detail for the above two types of audiences differ dramatically.



Identifying Basis and Specifications of Data Collection Requirements

A person given the tasks of constructing tables or graphs at work need to first understand the basis of the data that will be used in the tables, or graphs.

The basis of presenting information in tables or graphs can be to:

- ☆ Inform
- ☆ Educate
- ☆ Persuade
- ☆ Motivate

This again is why it is important to know your audience.

The data in the tables or graphs may be showing the financial position of the business to management, shareholders or banks.

Data in tables and graphs are often used to teach sales people about new products, students or trainees about a new topic, or persons in the organisation about new procedures.

Tables and graphs are often used in presentations to new customers, banks for financing, investors and so on.

And presentations with tables or graphs could often include data that will motivate sales people to seek more sales, workers to work safer, staff to be more efficient and so on.

Knowing the basis of the data to be used can then help you to determine what type of data to collect.

This is when you need to know what the specifications of the data are.

Data specifications generally include the following examples:

- ☆ ***Period*** - such as time, days, months and/or years
- ☆ ***Category*** - such as what department, what country, state or city, customer, supplier and so on
- ☆ ***Type*** - could include products, services, processes, sales, expenses, profits and so on
- ☆ ***Detail*** - these are numbers such as sales numbers, part numbers or facts such a type of sale (new/ repeat), product problems (rework/failure/replace) and many more.

The purpose of a graph or a table is to present data that is too numerous or complicated to be described in a understandable way in text and in less space.

Learning Activity

Question

LEARNING ACTIVITY ONE

1) We gave you the definition of 'data' in this Section. What was it?

2) When does data turn into 'information'?

3) Why is it important to know who your audience for your tables or graphs is?

4) What were the four reasons or the basis for presenting data in tables or graphs as we outlined in this Section?

5) Data specifications can generally include four areas as we outlined in this Section. What are they?

6) What is the main purpose of a table, or graph?

Learning Activity

Task

LEARNING ACTIVITY TWO

As we mentioned earlier in this training manual, to successfully complete this 'Unit of Competency' you will be required to demonstrate your ability do a number of assessment tasks.

The main assessment requirements that your teacher or trainer should have explained to you include:

- ☆ identify and collect a set of workplace data on at least one occasion for a workplace purpose and order and collate into an appropriate format, such as a graph, or chart

To start your assessment process we want you to consult with your employer, supervisor or a nominated person where you work and decide on a project that requires you to collect workplace data and collate the data into a table, or graph.

On the next page describe the project and include the basis (or reason for) the project and describe the audience who will be reading the data in the table or graph.

If you are currently not working then your teacher or trainer will develop this activity into one that has you working in a simulated workplace.

What do you do at work? *(a simple job description)*

A brief description of the project you have been given that involves you taking 'data' and constructing a table or graph.

What is the purpose of this project? *(Use the information we outlined in this Section)*

Describe the audience?

IDENTIFY SOURCE(S) OF FAMILIAR AND ROUTINE DATA IN THE WORKPLACE AND POSSIBLE METHODS OF COLLECTION

Once you have learned the 'specifications' of the data required for your task, as well as the audience and purpose of the data presentation, the next step is to locate the data for the task.

Remember that what we are reviewing is the presentation of data in tables, or graphs.

In this training unit we are looking at sourcing 'familiar' and 'routine' data that will be used to construct a table or a graph.

The term 'familiar' refers to data that you already have seen, know about or is considered common data in the workplace.

The term 'routine' means something that is done as a regular procedure.

So this means that the data you would be identifying and collecting would be data that is produced regularly in the workplace and everyone would have seen the data at some point, so it is not new to them.

When collecting data for a particular workplace task, the data collected is known as a 'data set'.

The definition of a 'data set' is:

"A collection of numbers or values that relate to a particular subject."

For example, it could be the sales data of a particular state or territory.

Another example could be the number of 'widgets' being produced per day by a certain production team.

METHODS OF COLLECTION

Methods of collecting data can vary, depending on how the data is created and stored.

There are two basic methods that 'data' could be created and stored.

One is in a 'hardcopy' format; in other words, paper based documents that contain 'data' stored in filing cabinets or storage boxes.

For example these include:

- ☆ Customer orders
- ☆ Shipping or delivery documents
- ☆ Sales receipts
- ☆ Inventory sheets
- ☆ Workplace forms such as accident reports

This means that the person collecting the data from hardcopy documents would need to locate the required documents that had the relevant data.

The second method is accessing electronic, or digital files.

For example these could include:

- ☆ Financial information such as sales, expenses and so on
- ☆ Customer information
- ☆ Inventory data
- ☆ Supplier information
- ☆ Production levels

...and many more.

It is very important that you know the policies and procedures of the workplace as to accessing organisational data.

Some of the data you may need could be private, confidential or sensitive and you would need approval to access and use the data.

Learning Activity

Question

LEARNING ACTIVITY THREE

We are quickly going to review the meaning of some terms mentioned in this training manual.

1) What is the definition of ‘routine’?

2) What is the definition of ‘familiar’ as it relates to data?

3) What is the definition of a ‘data set’?

Learning Activity

Question

LEARNING ACTIVITY FOUR

We are quickly going to review the meaning of some terms mentioned in this training manual.

1) What were the two format types of data in a workplace?

2) When accessing and using workplace data, what do you need to know and follow?

3) What is the definition of a ‘data set’?

Learning Activity

Task

LEARNING ACTIVITY FIVE

In Activity Two we started you off on one of the main assessment requirements in this training unit.

You were to consult with your employer, supervisor or a nominated person where you work and decide on a project that requires you to collect workplace data and collate the data into a table or graph.

As part of the next step in this assessment requirement, on the next page describe the type of data you will be locating for this project and what methods you will be using to collect this data.

If you are currently not working, then your teacher or trainer will develop this activity into one that has you working in a simulated workplace.

The following information needs to relate to the 'project' you described in Activity Two of this Section.

A brief description of the data you will be collecting for your assessment project.

In what format is the data?

Hardcopy YES or NO _____ Digital YES or NO _____ Both YES or NO _____

Section Two

Collect Data and Develop Routine Tables and Graphs for Workplace Task

COLLECT DATA AND CONSTRUCT ROUTINE TABLES AND GRAPHS FOR WORK

SECTION TWO—COLLECT DATA AND DEVELOP ROUTINE TABLES AND GRAPHS FOR WORKPLACE TASK

Introduction

In Section One we looked at the steps that a person would take when given workplace tasks that involve the collection of data to be used in constructing tables or graphs.

These steps included:

- ☆ Understanding the purpose of the tables or graphs using the data
- ☆ Specifications of the data
- ☆ The audience reviewing the data
- ☆ Sources of the data
- ☆ Deciding on data collection methods

In this section we now look in more detail at the construction of the tables or graphs after the data has been collected.

Section Learning Objectives

At the completion of this section you will learn information relating to:

- ☆ Selecting mathematical problem solving process for completing workplace task
- ☆ Describing an expected result of the data collection and results
- ☆ Selecting method to collect routine workplace data and collecting relevant data sample
- ☆ Collecting, ordering and collating data into a table or spreadsheet
- ☆ Determining scale and axes and constructing routine graph or chart using appropriate tools
- ☆ Checking and reflecting on expected result, data collection and outcomes and appropriateness of outcome to workplace task

Select mathematical problem solving process for completing workplace task

AND

Describe an expected result of the data collection and results

(Over the next few pages we cover two 'Performance Criteria' points at the same time to avoid repetition)

When constructing tables or graphs, there is generally an expected 'result' from the data presented in the table or graph.

For example, your supervisor wants to show that customer returns are going down over the last six months by collecting customer returns data and displaying them on a graph.

Or, the manager of the warehouse wants to compare the cost packaging materials with the number of deliveries sent over the last twelve months.

Knowing the expected results will determine whether the data collection efforts and the data collected will achieve those expected results.

It helps those collecting the data to focus on data that will help achieve the expected results.

It will also help the person decide on whether a table or a graph would be more suitable to present the data to the selected audience.

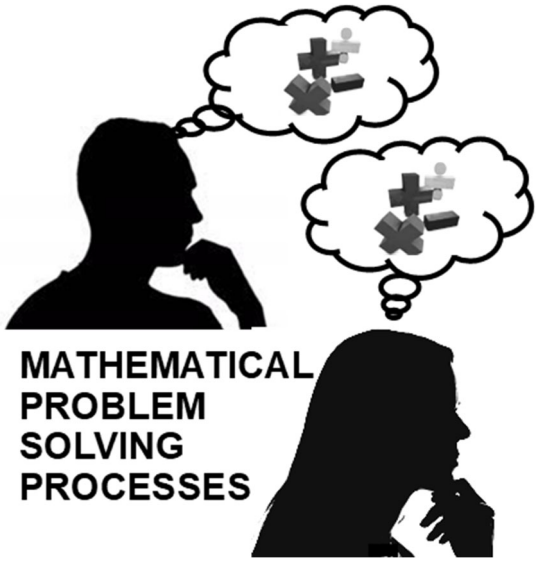
A table would show numbers or facts that are related, but independent of each other.

For example, if you are the sales manager of a company, you may have a table in which five columns represent order dollar amount, order quantity, salesperson and territory, each with totals or summaries.

There are two main types of graphs - a line graph and a bar graph.

A bar graph shows numbers or facts that are related but independent of each other and generally used to show relationships or trends between different data sets.

A line graph would show numbers or facts and are used more frequently to demonstrate trends over a period of time.



Mathematical Processes

In almost all cases, data collected needs to be collated and certain mathematical processes applied to ensure that the data is in a form that will achieve the 'expected results'.

The task is likely to require you to use some 'problem solving' techniques or processes' to ensure that your mathematical calculations have the results expected and needed.

'Mathematical problem solving processes' is a term used by trainers and teachers to describe how a person should solve an mathematical task.

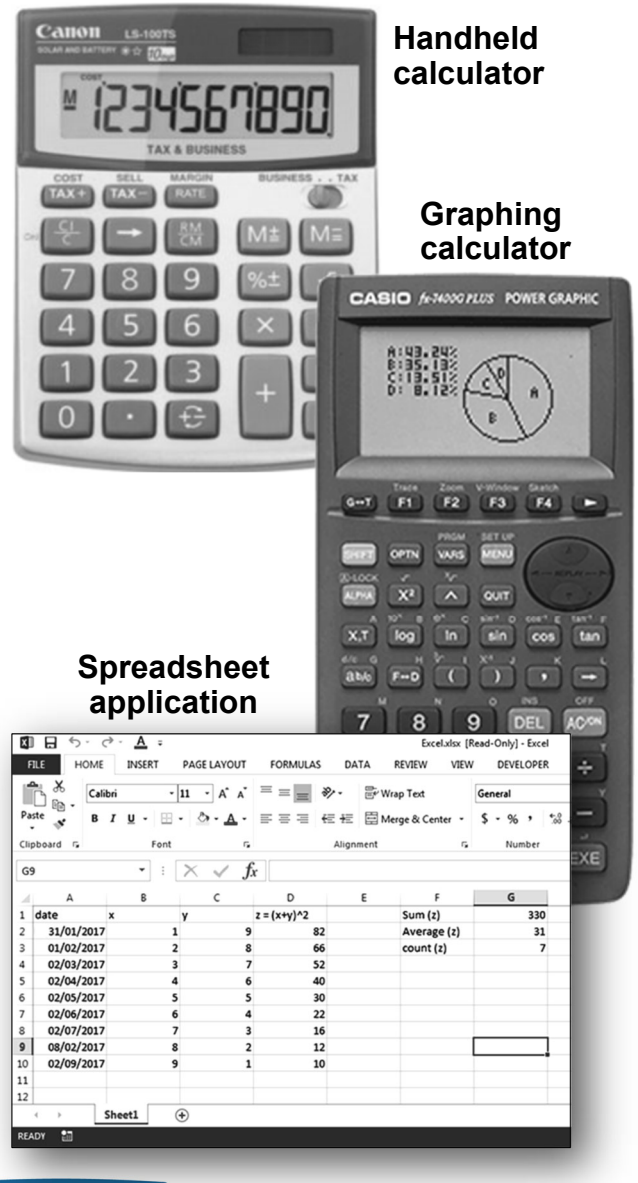
Simply it includes you:

- ***Fully understanding the mathematical problem*** - this would have you fully understand what are the expected results required of you and how these results will be worked out.
- ***Working out what you need to do to solve the mathematical problem*** - this is called coming up with a 'strategy' that usually includes choosing what mathematical operations to use.
- ***Using the chosen strategy*** - this means taking the steps to solve the mathematical problem.
- ***Going back and determine whether the mathematical problem solution is reasonable*** - this is called 'reflection' and simply means you look at the result of your problem solving steps and see if it looks right.

As part of you selecting and using any mathematical problem solving processes, would be the choice of mathematical operations.

The common mathematical operations include:

- Addition
- Subtraction
- Multiplication
- Division
- Percentages (requires multiplication as well as addition and/or subtraction often is used)
- Averaging (requires both addition and division)
- Frequencies (requires addition as well as division)



Mathematical Tools

There are a number of tools that are used by persons who are collating and processing data and then constructing tables or graphs.

The simplest tool is the handheld calculator.

The handheld calculator is capable of all mathematical processes, including percentages.

There is also a ‘graphing calculator’, although not commonly used for routine data processing.

This is a type of scientific calculator that performs calculations and displays outcomes in the form of a graph.

Spreadsheet applications all have calculation tools called ’formulas’ and are also used to construct tables and graphs.

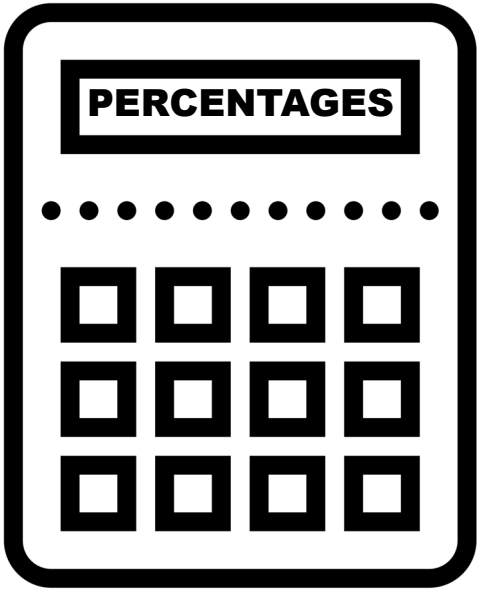
As you know, to successfully complete this part of your training, you will be asked to do a number of tasks that will show you have learned and have used what you have learned about 'collecting data and constructing routine tables and graphs at work'.

This can include using a number of mathematical processes.

In this training manual we do not get into any detail about the basics of mathematics.

We assume that you are able to perform general mathematical calculations and if you struggle with some maths calculation seek some assistance from your teacher or trainer.

We will provide some details on 'averaging', calculating 'percentages' and simple 'frequency' calculations.



Calculating Percentages

Many tables or graphs will be presenting data as ‘percentages’.

Percentages describe a part of 100 whole numbers.

For example, out of 100 whole numbers, you are given 10 whole numbers.

This means you are given 10 percent.

Or, if you have 200 whole numbers and you gave someone 100 whole numbers, they would have received 50 percent of your whole numbers.

All percentages are based on 100 and any part of 100.

The formula used to calculate the percentage of something, goes like this:

20 percent of 200, is calculated as 20 times 200 = 4000.

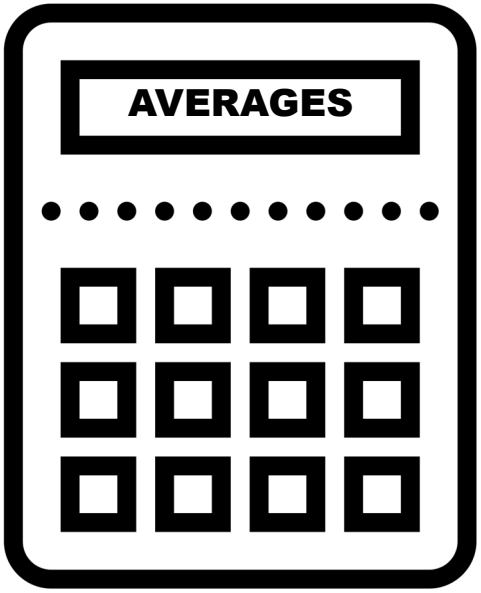
4000 divided by 100, equals 40.

So, 20 percent of 200, is 40%.

All numbers that are percentage numbers are followed by this symbol:

%

So 20 percent would look like 20%.



Calculating Averages

An average is taking a series of amounts over a set period of time or events and then dividing the amounts by the period of time, or events.

An example could look like this.

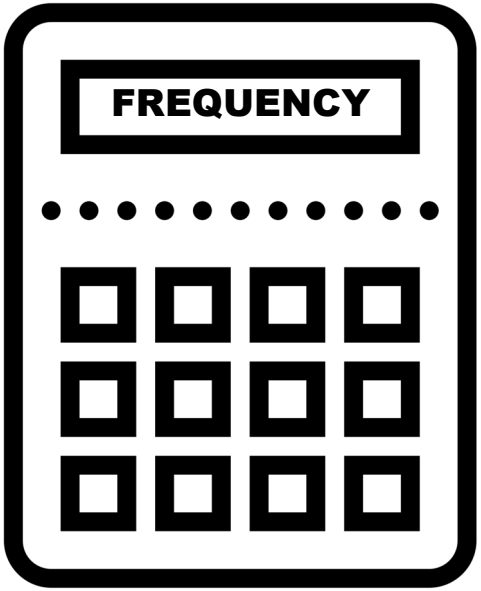
We want to learn the average number of cartons a warehouse sends per day for the week.

The warehouse has shipped out 5 cartons on Monday, 7 cartons on Tuesday, 3 cartons on Wednesday, 6 cartons on Thursday and 9 cartons on Friday.

The amounts are the number of cartons sent out added together being - 30 cartons

There are 5 days in the working week.

To determine the average, 30 is divided by the 5 days and the average is 6 cartons per day.



Calculating Frequency

'Frequency' is similar to 'averages'.

For frequency there is an additional variable involved in the calculation.

An example could look like this.

To calculate we want to determine customer order frequency over 12 months.

You take the number of orders the business has received and divide that number by the number of customers.

Then you divide that by 12 months (or any time period)

Let's say that ABC Pty Ltd has received 1200 orders over twelve months from 20 customers.

That works out to be 60 orders per customer.

Order frequency is 60 divided by 12 months which works out to a frequency of 5 orders per customer per month.

Businesses use 'averages' and 'frequency' for planning purposes such as inventory levels, financing levels and so on.

Learning Activity

Task

LEARNING ACTIVITY ONE

Going back to your assessment project you have settled on in Section One, we want you to tell us what the ‘expected results’ are from the collection of the data for your project.

Also, tell us what types of mathematical processes you will be using to achieve the expected outcome.

We have provided space on the next page for you to complete this activity.

If you are currently not working, then your teacher or trainer will develop this activity into one that has you working in a simulated workplace.

The following information needs to relate to the 'project' you described in Activity Two of Section One.

A brief description of the 'expected results' from your data collection activities for your assessment project.

What mathematical processes you will be using to achieve the 'expected results' for your assessment project?

Select method to collect routine workplace data and collect relevant data sample

and

Collect, order and collate data into a table or spreadsheet

(Over the next few pages we cover two 'Performance Criteria' points at the same time to avoid repetition)

On the previous pages we went through a number of ways or methods to collect routine data.

In most data collection to be used in basic tables or graphs is known as a 'data sample'.

This is a term used for taking a portion of a data source that would achieve the 'expected result' of the data collection task.

In some cases the data source may be very large and cover a wide range of time periods, overwhelming amount of facts, or both.

For example, if the data source has sales data for ten years and your data collection task 'expected result' is to see if the sales increased over the previous twelve months, then the 'data sample' would be for the specific twelve months, not the whole ten years.

As we learned the data could be in a few formats that could include:

- ☆ Hardcopy - handwritten or printed document
- ☆ Electronic versions - spreadsheets, word documents, emails (including emails with attachments), files and so on.

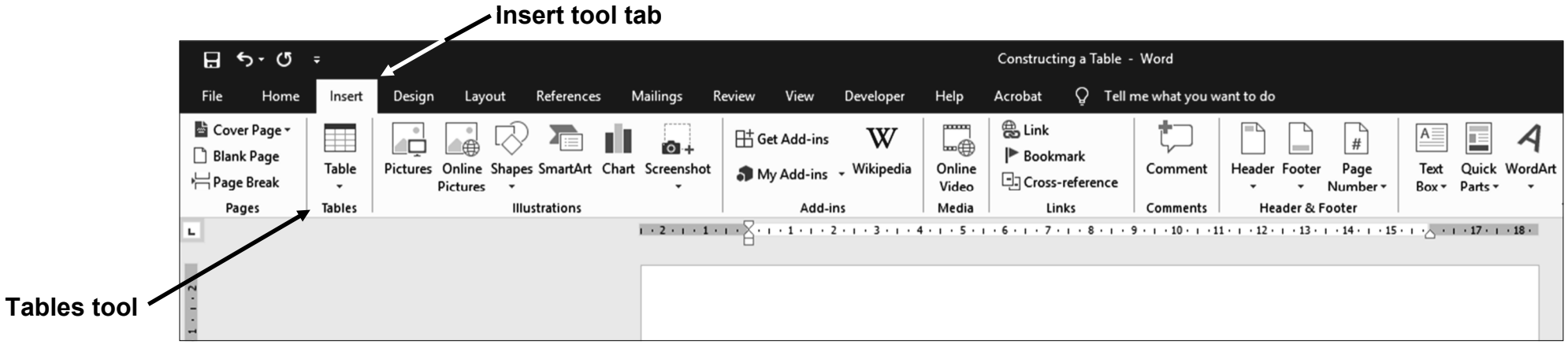
Whatever method you choose to use, it is important that you fully understand what data sample is required for the table or graph you are asked to construct.

Constructing a Table and Enter Data

We first look at constructing a table and then entering some data.

To start off, we want you to launch Microsoft Word and open up a new document.

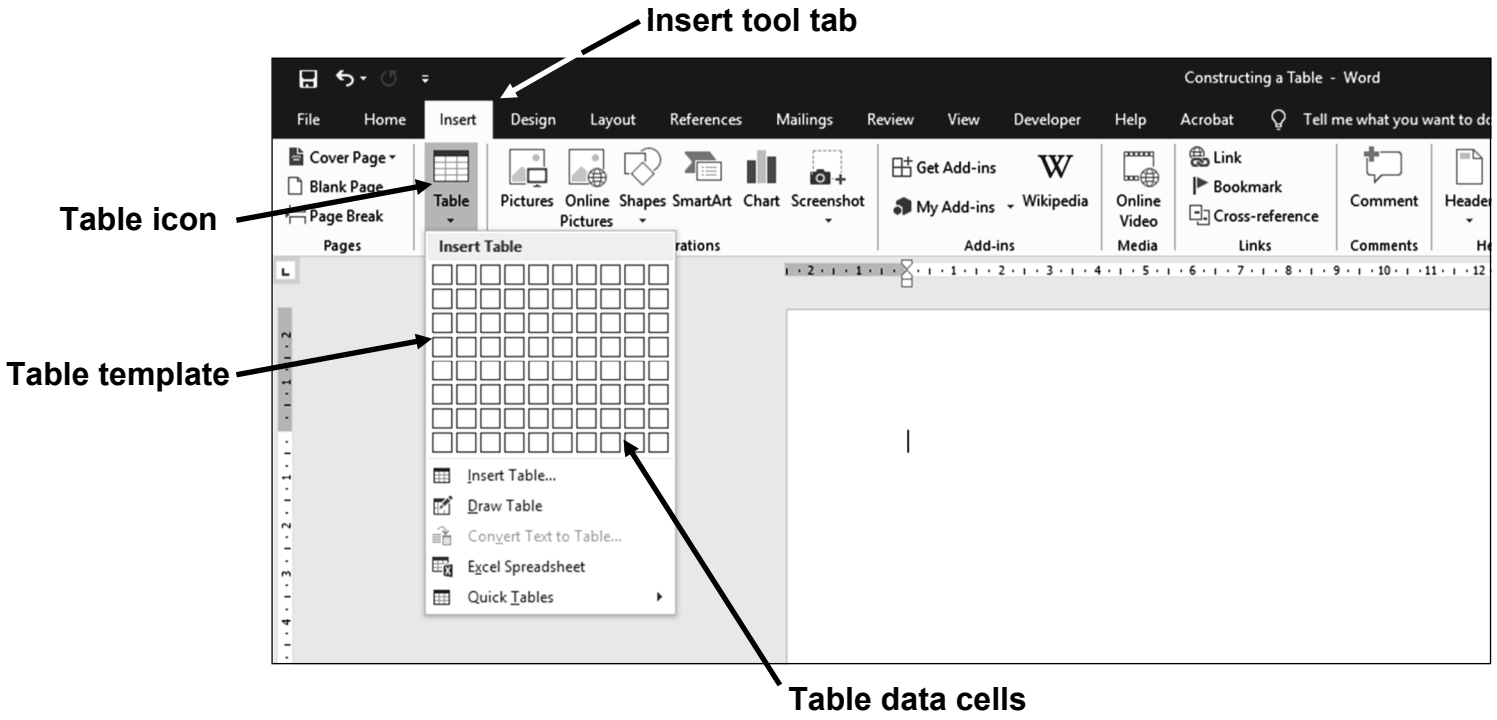
At the top of the blank document is the Word tool ribbon. On this tool ribbon you will see a tool tab called ‘Insert’. When you click on the ‘Insert’ tool tab you will see a series of tools - one being ‘Tables’.



We will be using this tool to construct our ‘table’.

Our table will consist of seven columns and two rows.

To construct this size of a table you click on the ‘table icon’ and a template will appear.



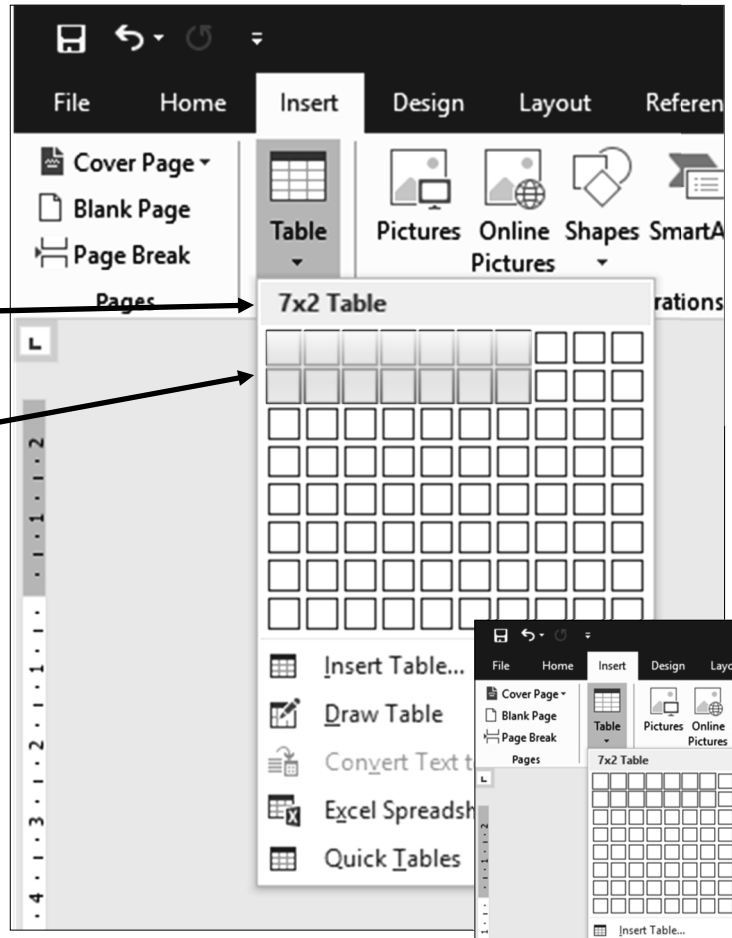
In this template you will see a series of squares.

These are called ‘table data cells’.

The table template is ‘mouse driven’, in other words when you drag the mouse corner over the squares starting in the top left corner of the template, they change colour.

You drag the mouse cursor over the squares until you have the right number of columns and rows you require.

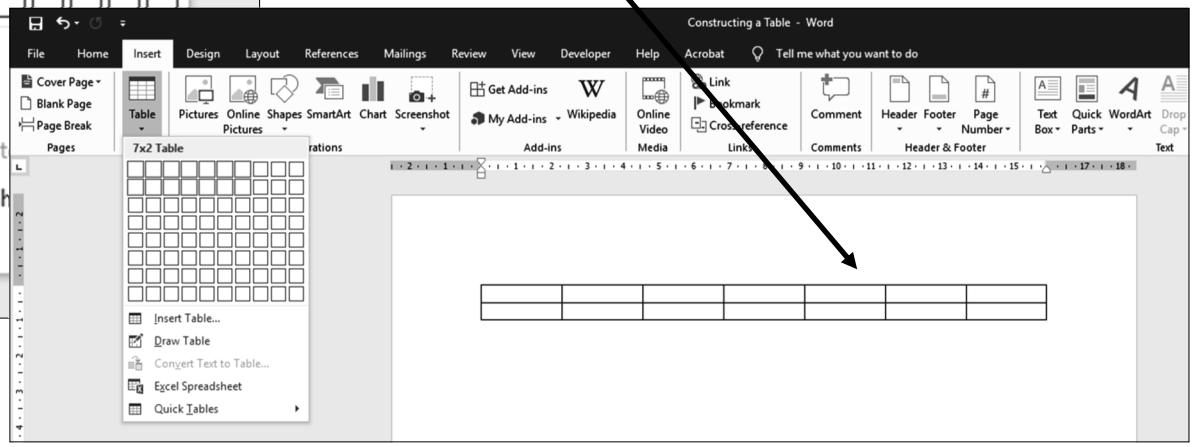
The template also tells you the size of the table you have constructed (in our example 7 columns and 2 rows).



As you construct the table using the template tool, the table appears on the Word document.

It has, however, no data in the cells as yet.

Constructed table

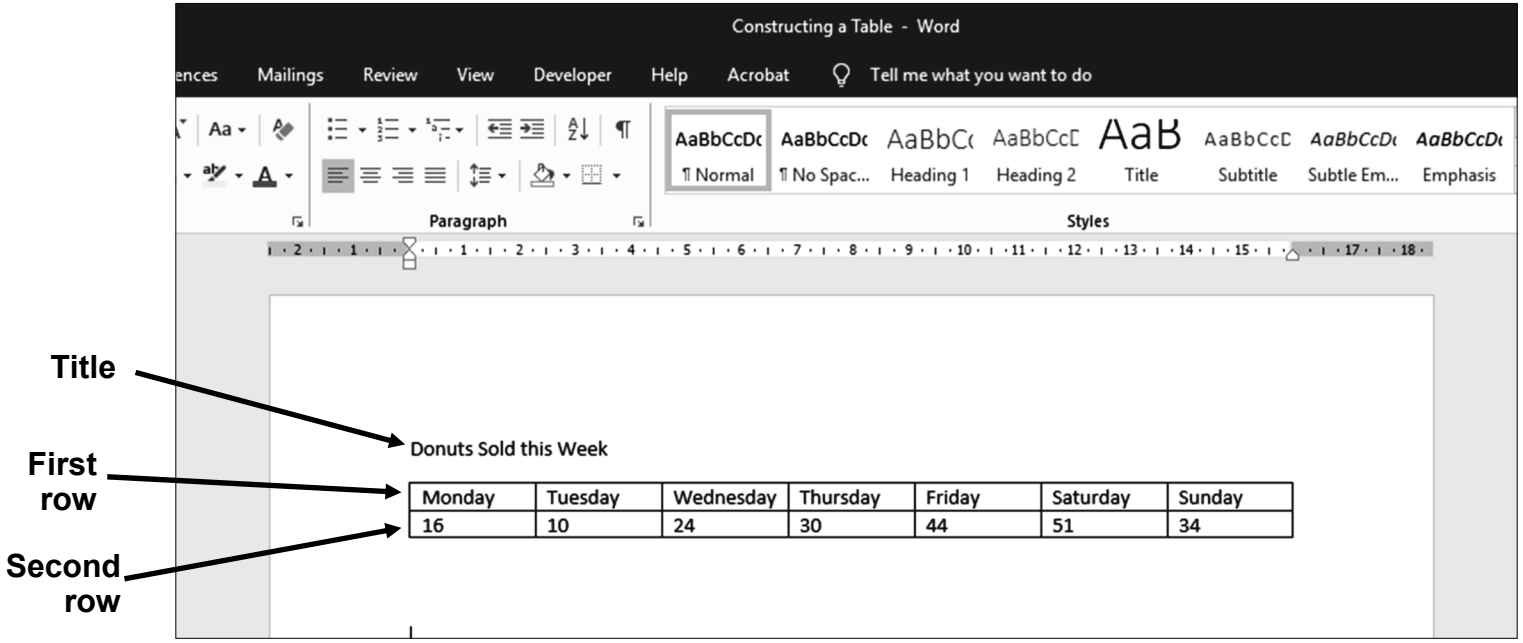


The next step is to enter the data into the table cells.

In this example we first put in a title ‘Donuts Sold this Week’.

Then along the top row we enter each day of the week into each cell and on the second row the amount of donuts sold in each cell.

To move from one cell to the next you can either use the ‘Tab’ button on your keyboard, or use the mouse cursor.



At this point you have constructed a simple table using two variables; being the day of the week and the number of donuts sold each day.

Entering Data into a Spreadsheet

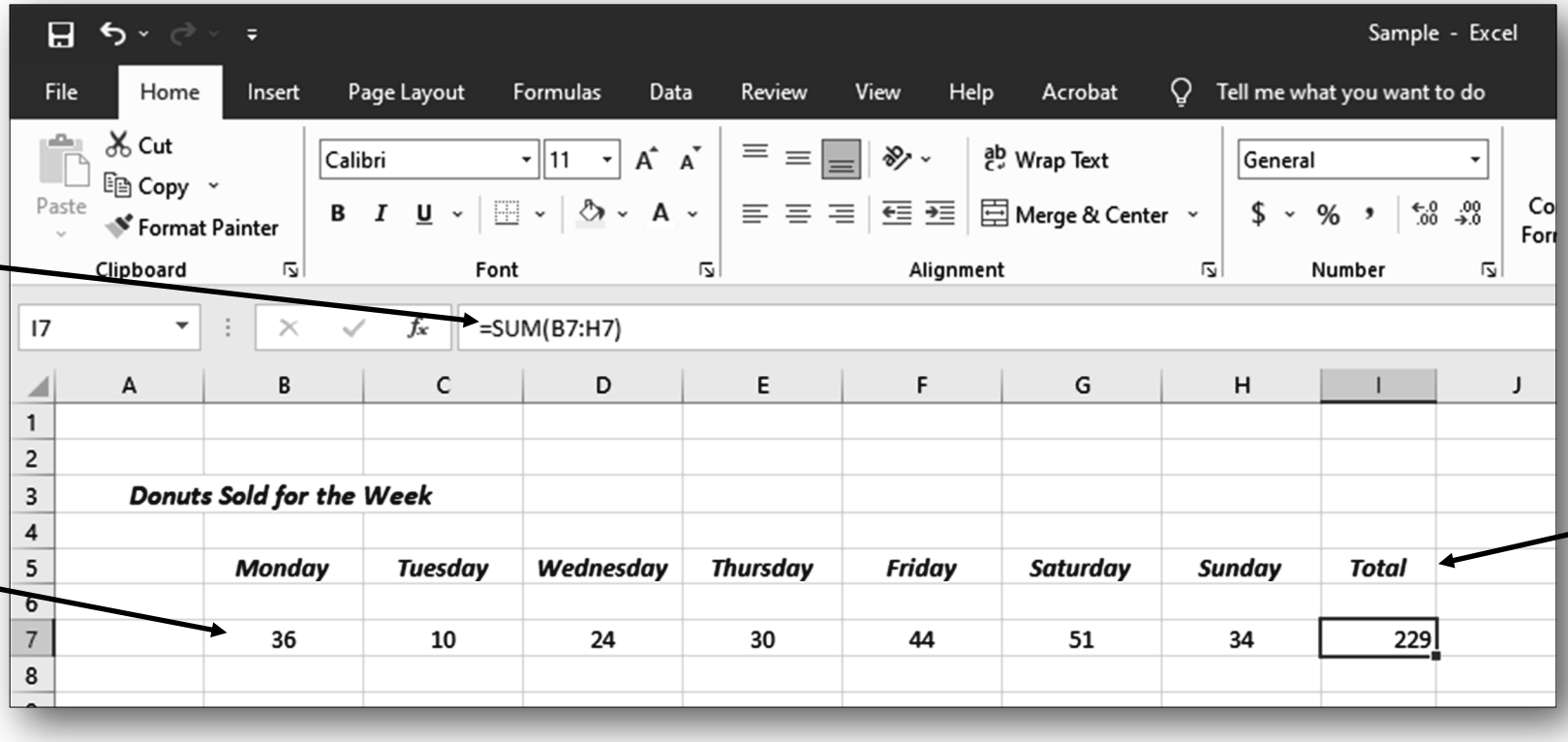
Next we look at entering data into a spreadsheet.

To start off, we want you to launch Microsoft Excel and open up a new document.

We will not go into much detail about how to use Excel and only using this to show how to construct graphs from a spreadsheet.

Using the same simple data from the Word table we enter the data as below but this time we have added a 'Total' column.

To come up with the totals we used the 'addition formula' as highlighted below.



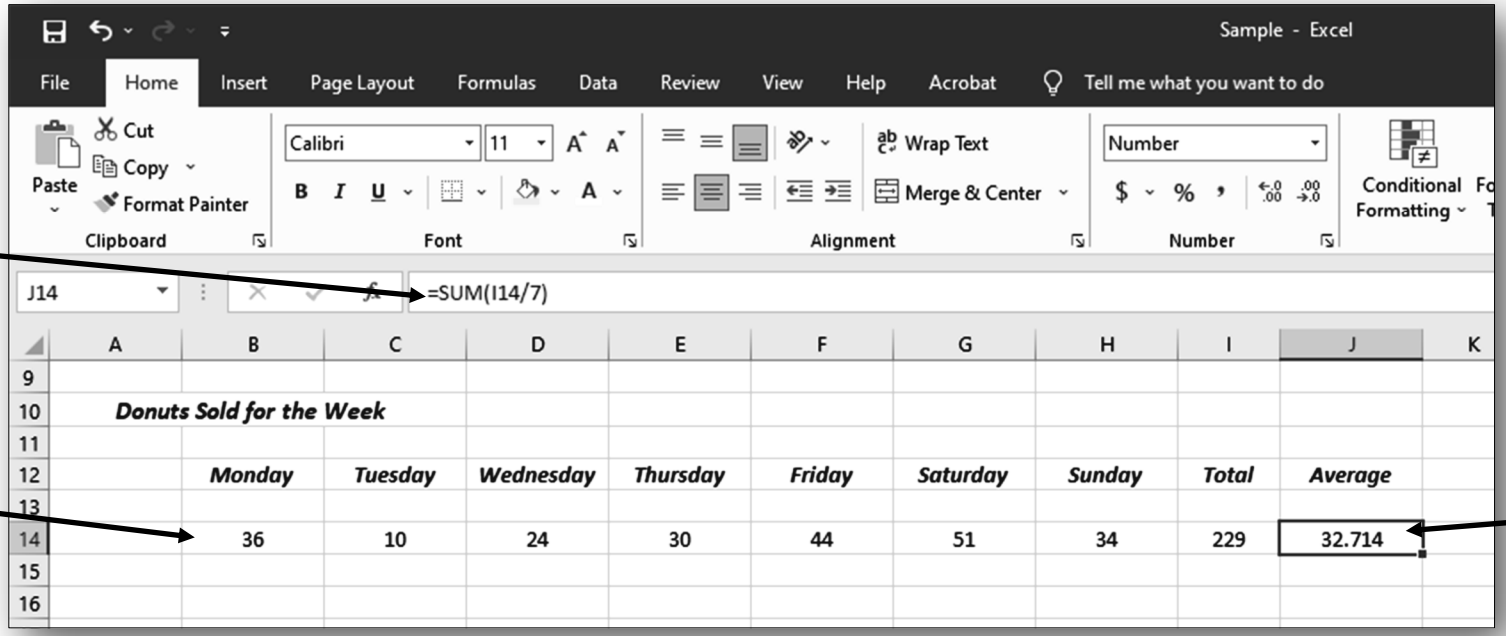
Save this spreadsheet as we will be using this as an example for constructing a graph.

Using the same spreadsheet and data this time we are adding an ‘Average’ column.

Put the data below the previous data.

This still has the ‘Total’ column and we use the data in this column to calculate the ‘Average’ of donuts sold each day.

To come up with the ‘Average’ we created an ‘Average’ formula as highlighted below.

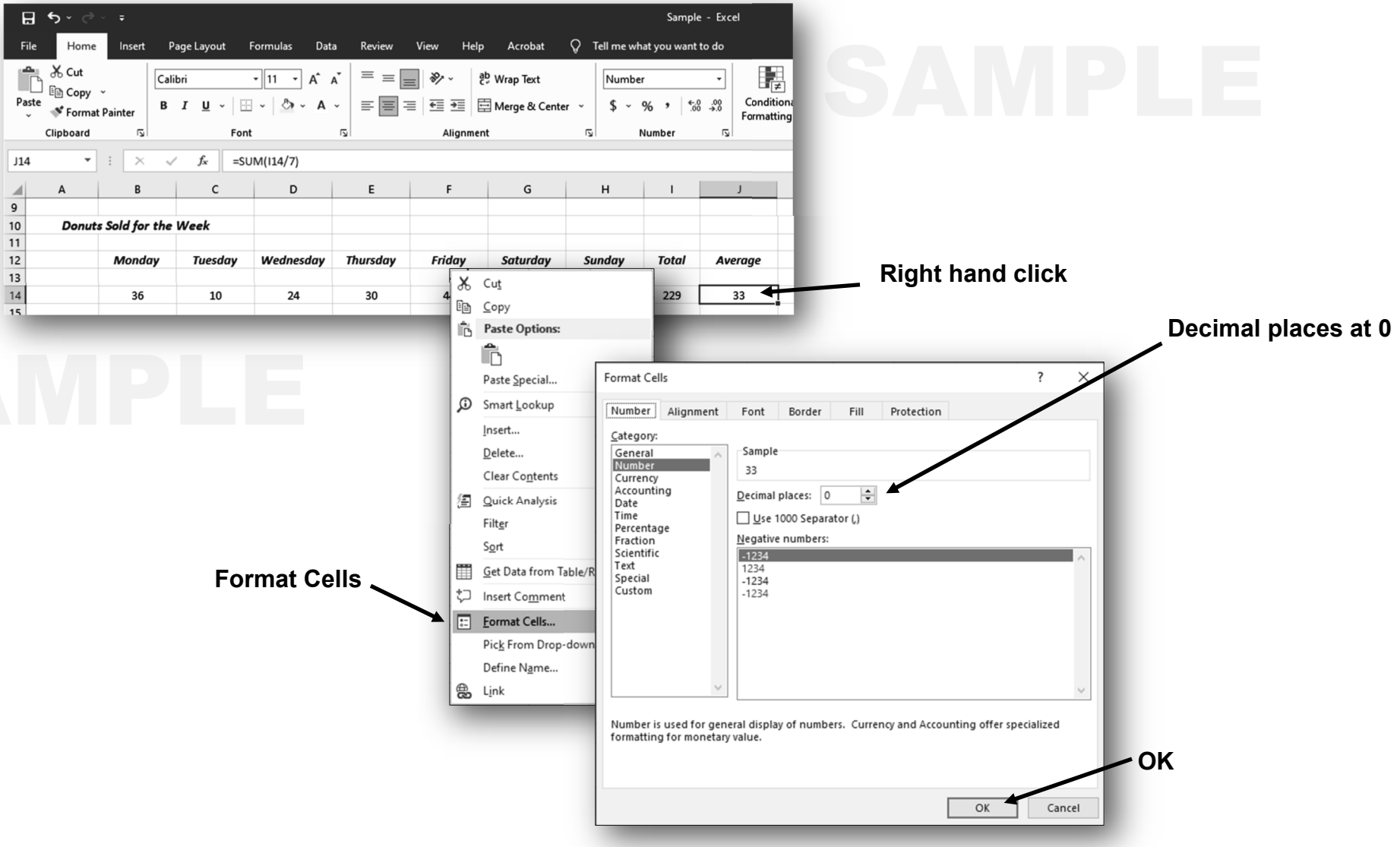


You will have noticed that the 'Average' amount appears as **33.714**

We want this number to have no decimal places for the purposes of the construction of a graph.

To do this, you right hand click on the cell with the average amount.

A new window will appear and you click on 'Format Cells' and on the next window change the 'Decimal places' to 0 and click 'OK'

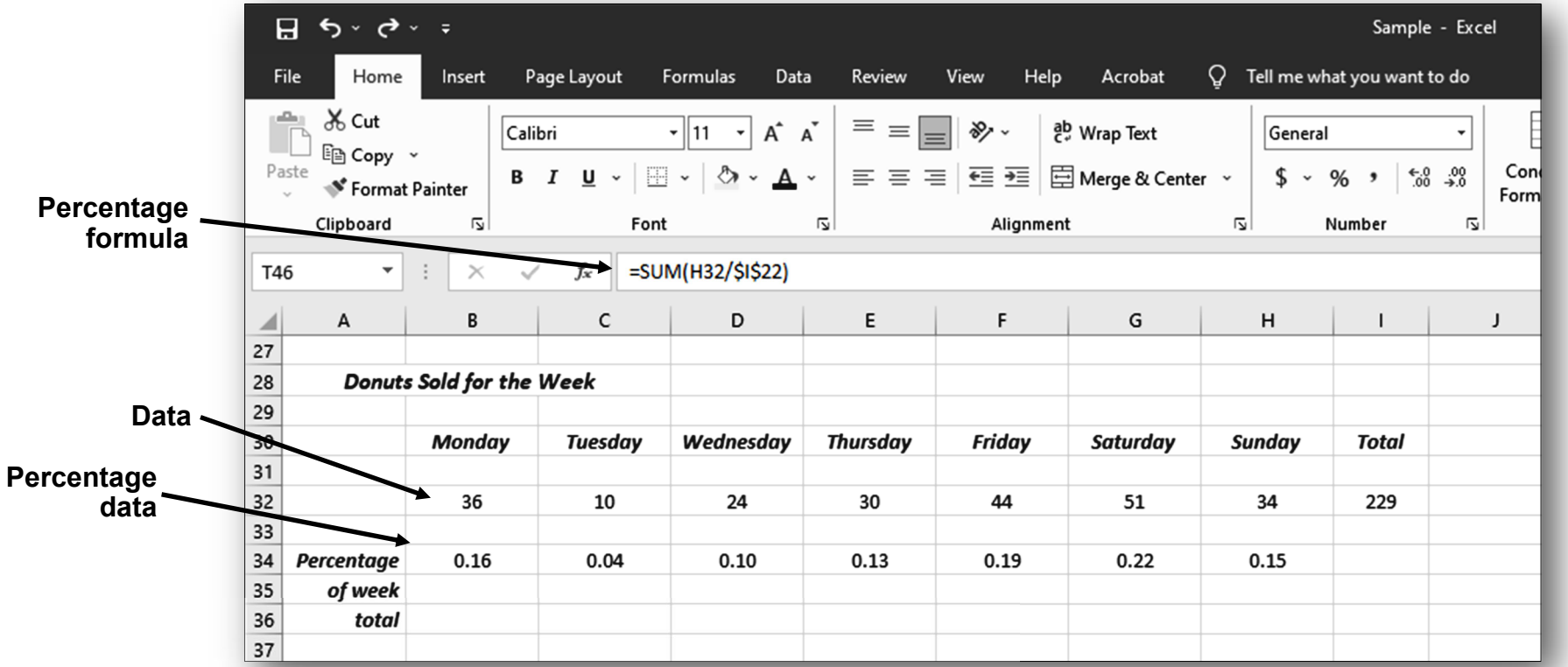


For the purposes of demonstrating how to construct graphs, we again use the same spreadsheet and data, but this time we are adding a ‘Percentage’ row.

Put the data below the previous data.

This still has the ‘Total’ column and we use the data in this column to calculate the ‘Percentage’ of donuts sold each day based on the total for the week.

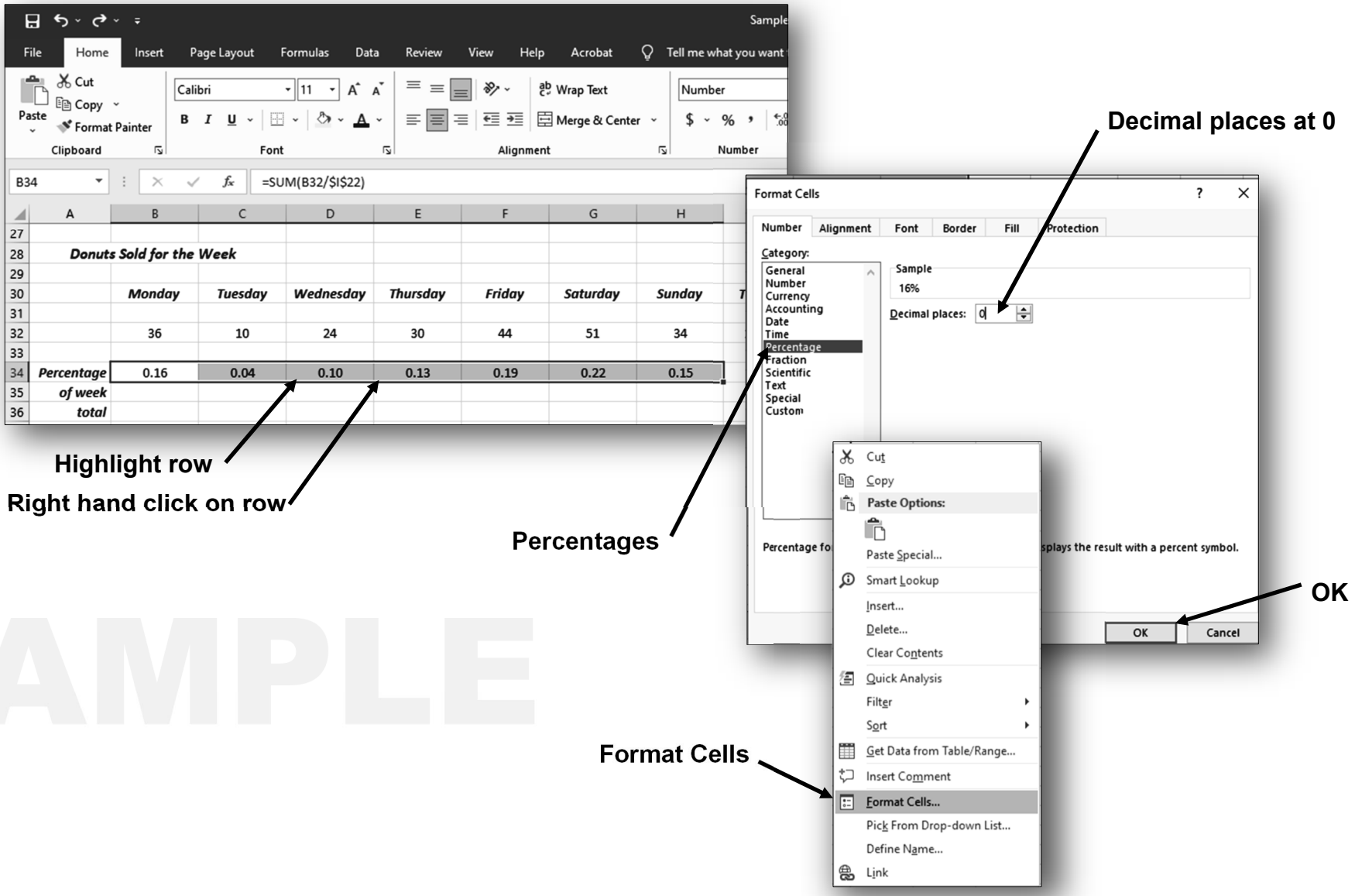
To come up with the ‘Percentage’ we created a formula as highlighted below, however this number we need to convert to a percentage number.



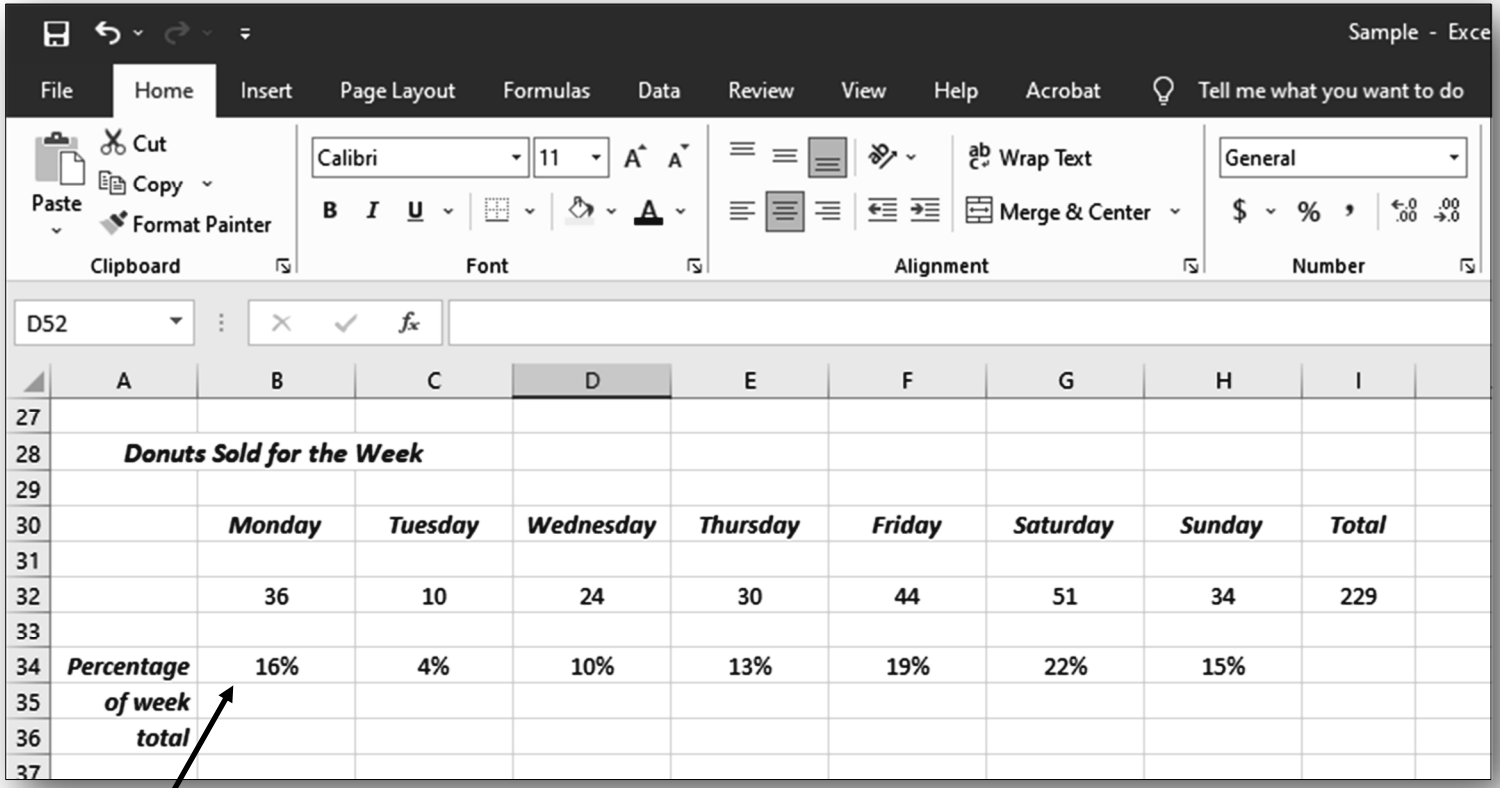
	A	B	C	D	E	F	G	H	I	J
27										
28	***Donuts Sold for the Week***									
29										
30		***Monday***	***Tuesday***	***Wednesday***	***Thursday***	***Friday***	***Saturday***	***Sunday***	***Total***	
31										
32		36	10	24	30	44	51	34	229	
33										
34	***Percentage***	0.16	0.04	0.10	0.13	0.19	0.22	0.15		
35	***of week***									
36	***total***									
37										

To convert the data to display as percentages you first highlight the entire row and the right hand click on the row.

A new window will appear and you click on ‘Format Cells’ and on the next window click on ‘Percentages’ and change decimal places to 0 and click ‘OK’.



This is what the result should look like.



Learning Activity

Task

LEARNING ACTIVITY TWO

In this activity you are now to collect the data for your assessment project, collate the data into a table or a spreadsheet.

This is an ‘observable assessment task’ which means your employer, supervisor or a nominated person where you work will observe you or watch you access the required data, collecting a data sample and collate the data into a table or spreadsheet.

Your teacher or trainer will provide your employer, supervisor or a nominated person where you work the necessary assessment forms to fill in, sign and return.

These documents will be part of your assessment evidence portfolio.

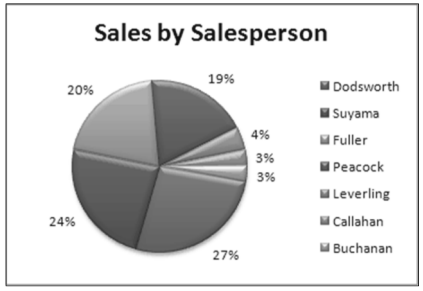
If you are currently not working then your teacher or trainer will be your ‘observers’ and will develop this activity into one that has you working in a simulated workplace.

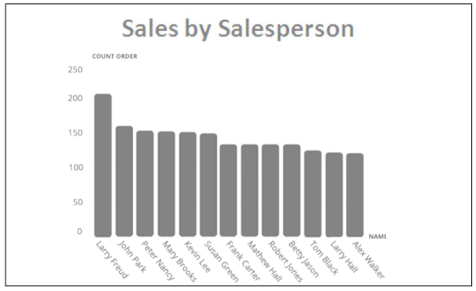
DETERMINE SCALE AND AXES AND CONSTRUCT ROUTINE GRAPH OR CHART USING APPROPRIATE TOOLS

The term ‘graph’ is also known as ‘charts’ and in Microsoft Excel all graphs are known as ‘charts’.

Two of the most common and popular charts are the ‘Pie Chart’ and the ‘Bar Chart’ (also known as a .Bar Graph’)

Pie Chart





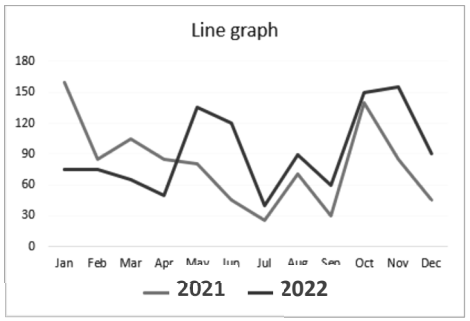
Bar Chart

The most common graph is the ‘line graph’.

Some line graphs will have two or more lines.

These are used to compare two sets of data over a period of time, usually past events as shown in the example below.

Single line graph

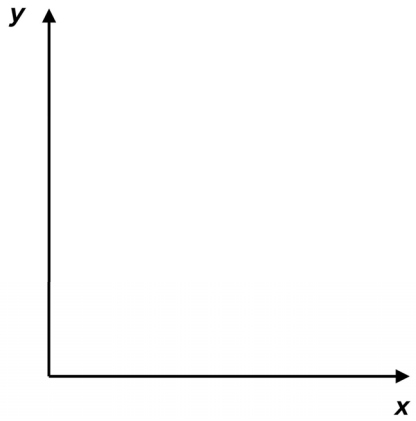


Multi line graph

.

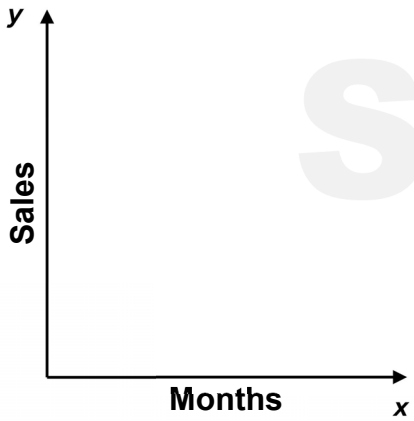
Elements of a Graph

The true definition of a 'graph' refers to a chart that 'plots' data along two dimensions - the 'Y' axis and the 'X' axis, as shown below.



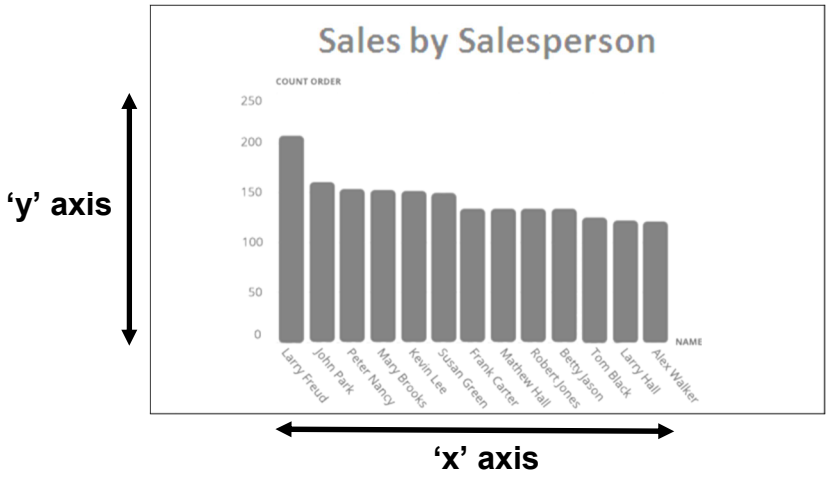
When you 'plot' your data, the 'known' data value goes on the 'X' axis and the 'measured' data value goes on the *'y'* axis.

For example, if you were to plot the measured ***sales*** for a number of ***months***, you'd set up axes as shown below.



As we mentioned earlier, another common graph is known as the ‘Bar Chart’.

A ‘Bar Chart’ also uses the ‘x’ - ‘y’ axis except instead of using a line to chart the data, it uses ‘bars’ or ‘columns’.



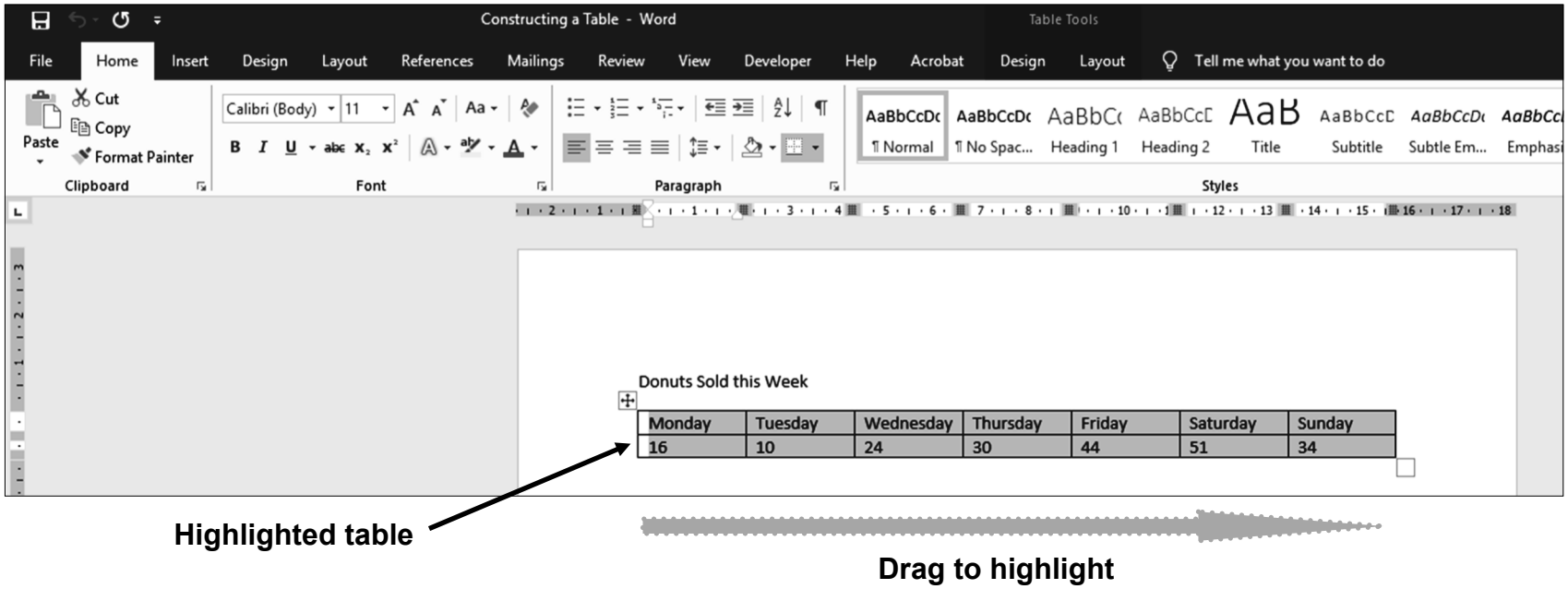
Constructing a Graph using Data from Table

Over the next few pages we will show you how to construct first a line graph and then a bar chart using the same data from the table that we constructed earlier as an example.

On the Word document that has the table you first highlight the table by clicking on the cell with Monday and hold down the mouse button and drag across the table until the whole table is highlighted.

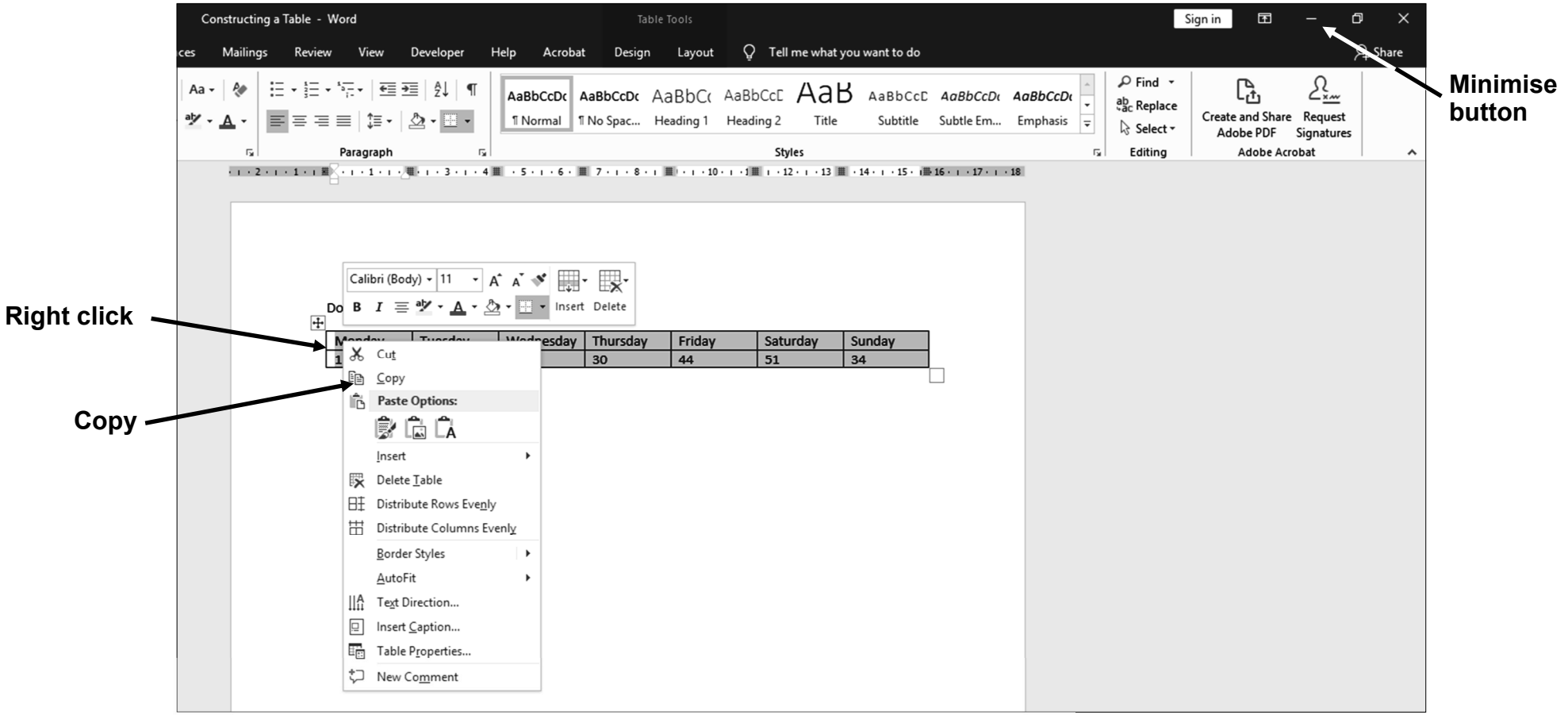
Do not highlight the title.

Word document

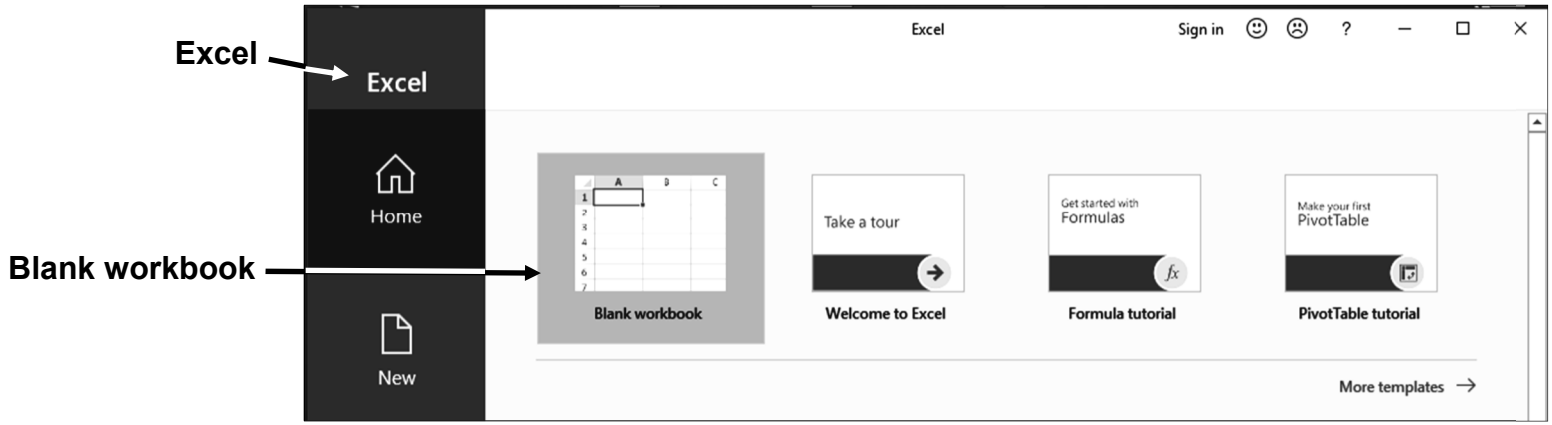


While the table is highlighted, right click on the Monday cell and then click on ‘Copy’.

Then ‘minimise’ the Word document window by clicking on the ‘minimise line’ on the far right of the Word window.

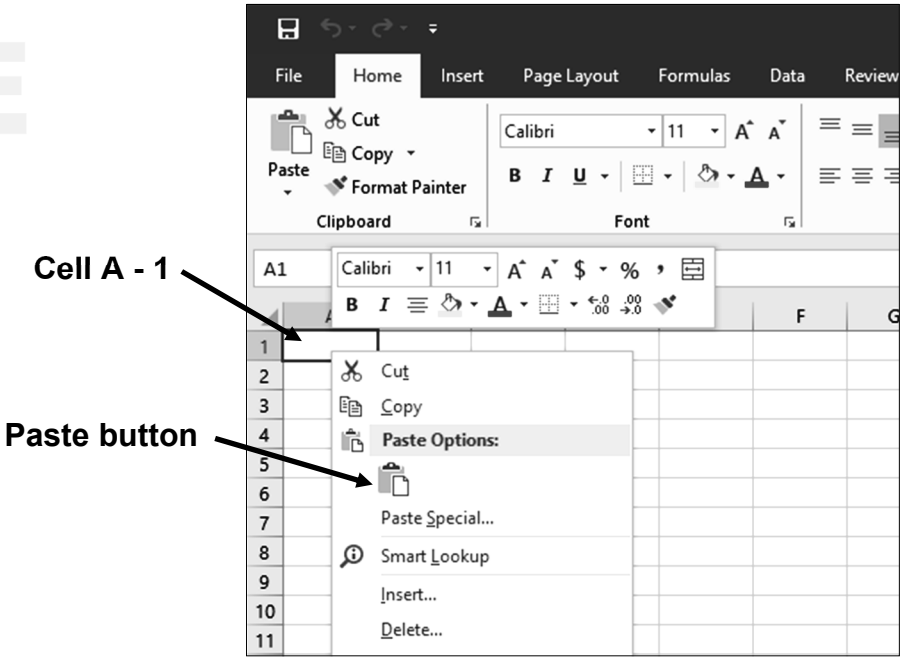


Next, ‘launch’ (open) Microsoft Excel and then open a ‘blank workbook’ by double clicking on the thumbnail.



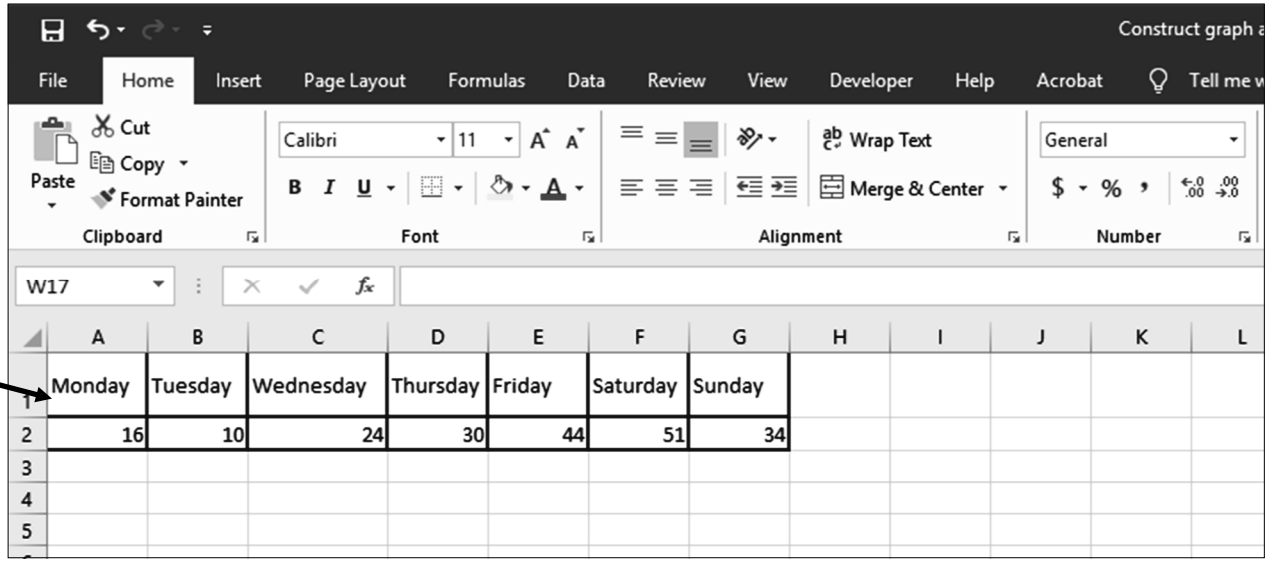
What will appear is a new spreadsheet workbook.

We want you now to right click on the very first cell ‘A’-‘1’ and then click on the ‘Paste’ icon button.



The table that you copied from the Word document now appears on the new Excel spreadsheet workbook.

Copied table



	A	B	C	D	E	F	G
1	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
2	16	10	24	30	44	51	34
3							
4							
5							

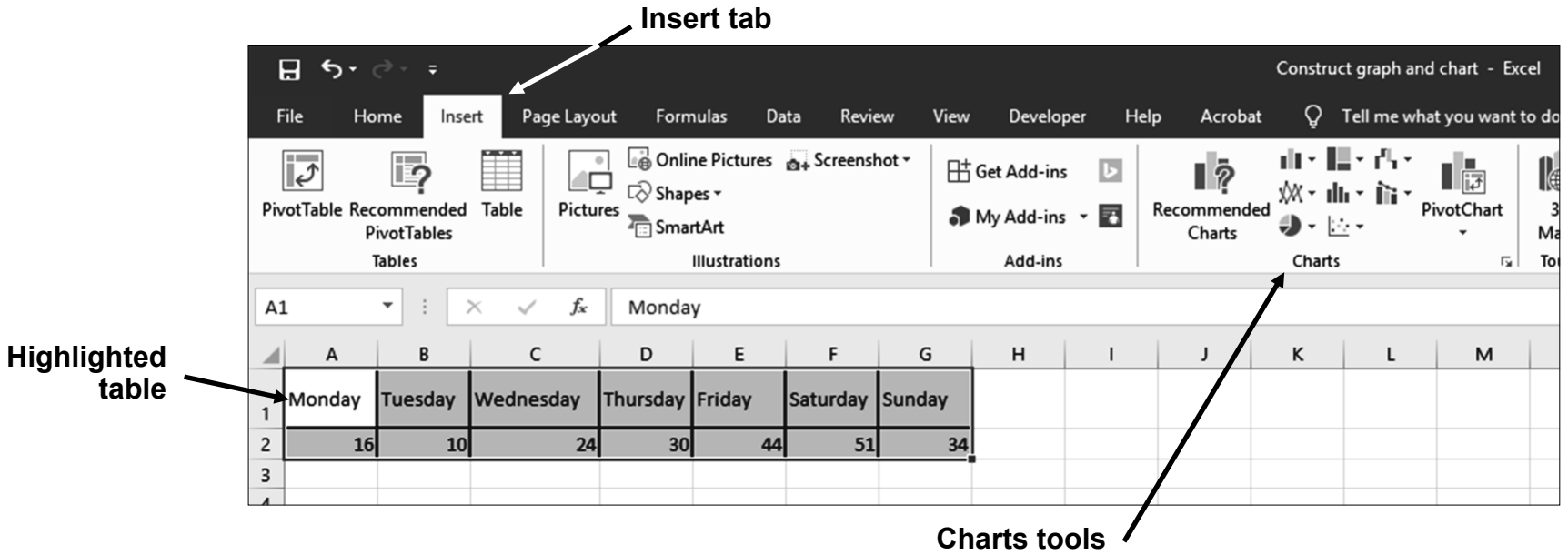
Over the next few pages, using that table, we will first construct a ‘line graph’ and then a ‘bar chart’.

Constructing a Line Graph

We will now show you how to construct a 'line graph' using the tools in Excel.

First you highlight the table on your Excel workbook, using the same method you did when highlighting the table in Word.

Next click on 'Insert' tool tab.

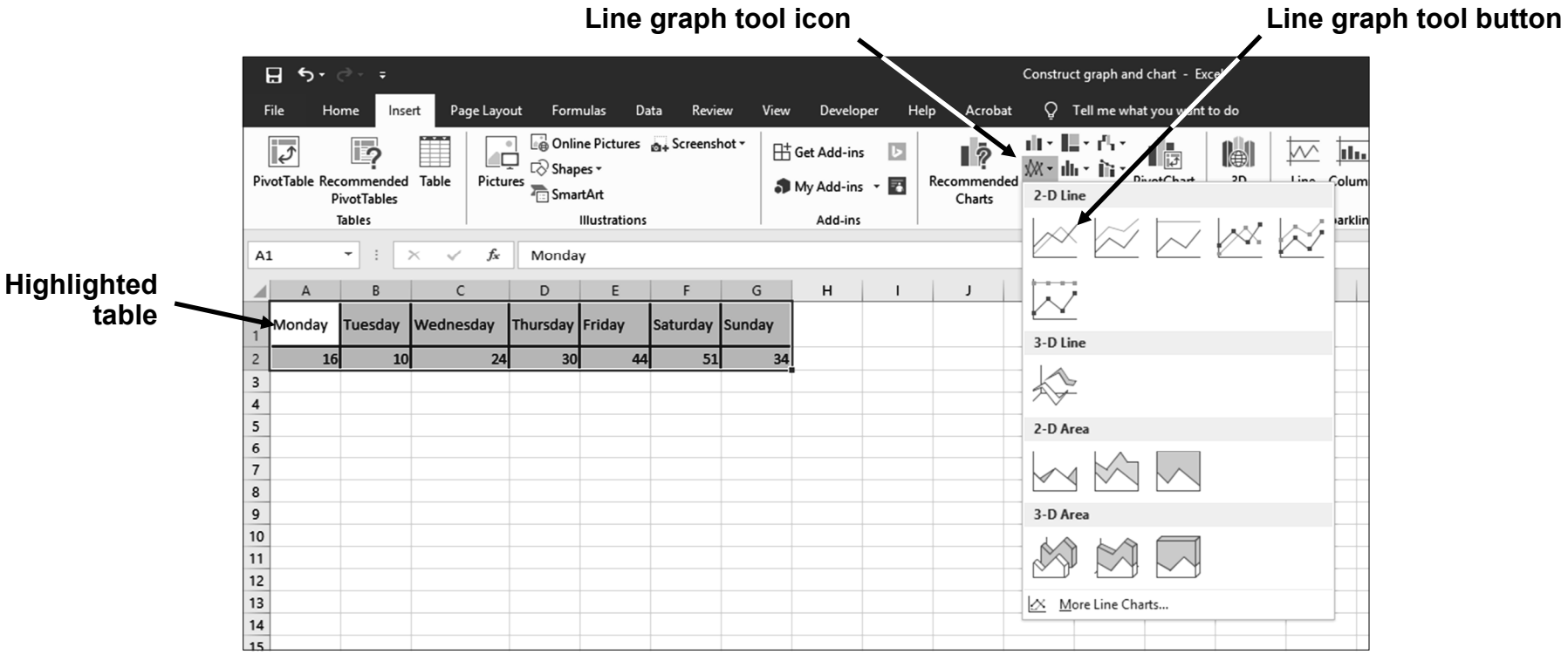


As we mentioned earlier we will first be constructing a simple 'line graph'.

On the 'Insert' tool ribbon there are a collection of 'Charts' tools.

We will be using these over the next few pages.

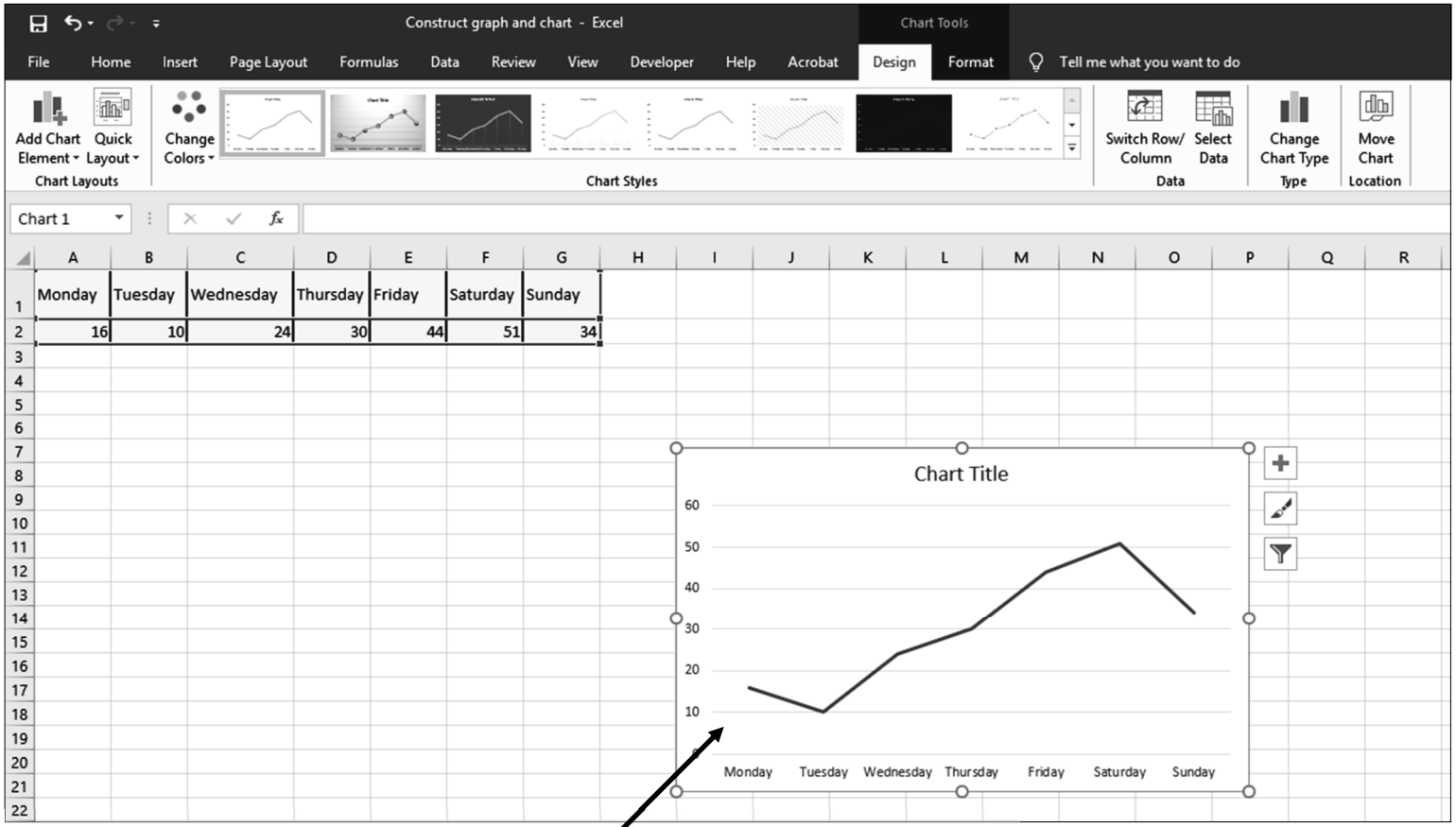
While the table is still highlighted you click on the ‘Line Graph’ tool icon and then click on the first ‘line graph’ tool button.



What appears is your simple ‘line graph’ using the data from the table you constructed in Word.

It still needs a ‘main title’ and ‘axis titles’.

On the next page we show you how to add those titles to the line graph.



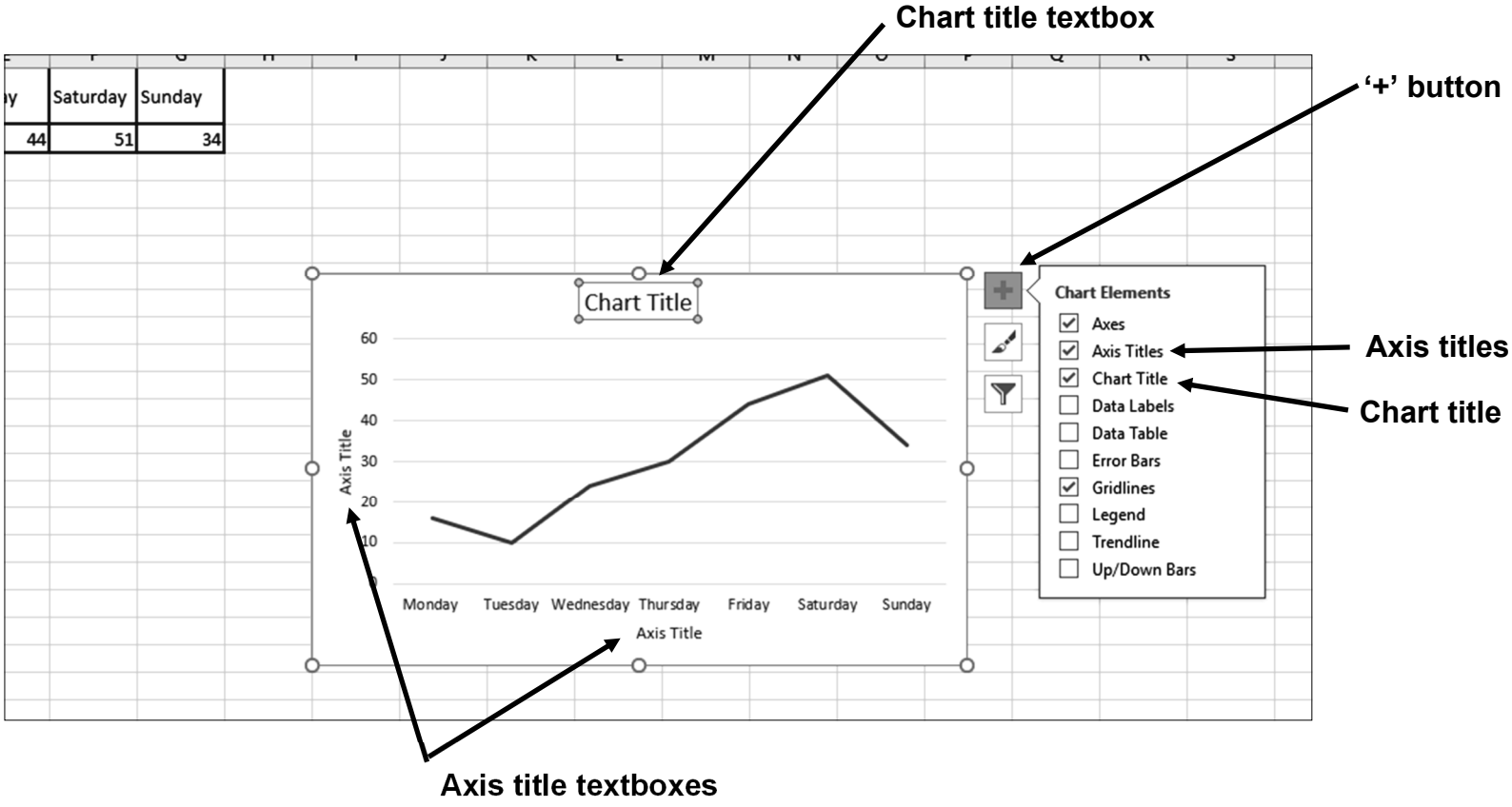
New line graph

To add titles you click on the '+' button next to the line graph.

An 'elements' menu will appear.

Click on the 'Axis titles' and the 'Chart title' boxes.

The title 'textboxes' will appear on the line graph.

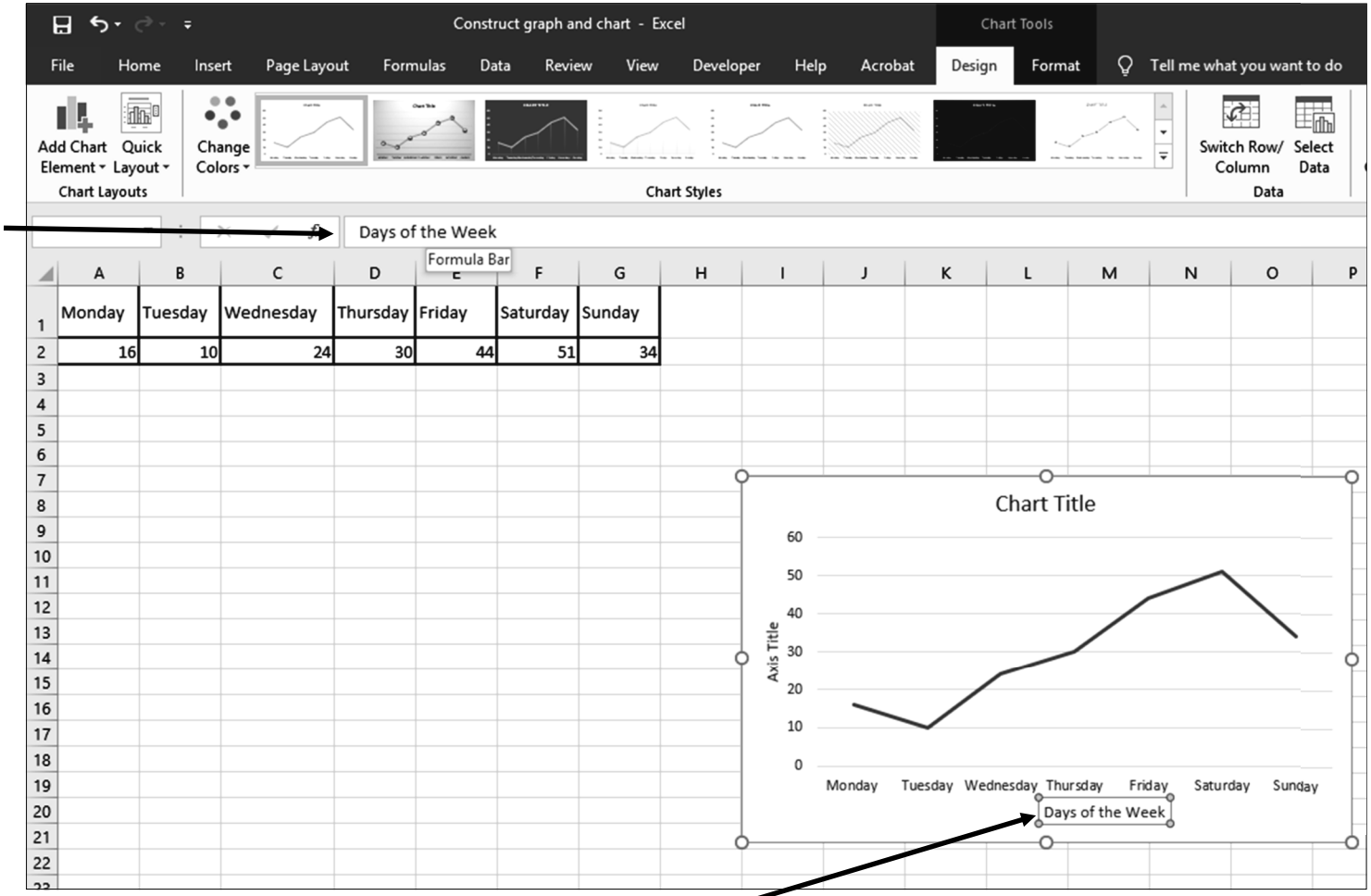


To add the titles click on the textbox and type in the title.

What you type in will appear in the 'formula' field area at the top of the workbook.

We first start by adding the bottom horizontal axis title—'Days of the Week' and then hit 'Enter'.

The title will appear on the line graph.

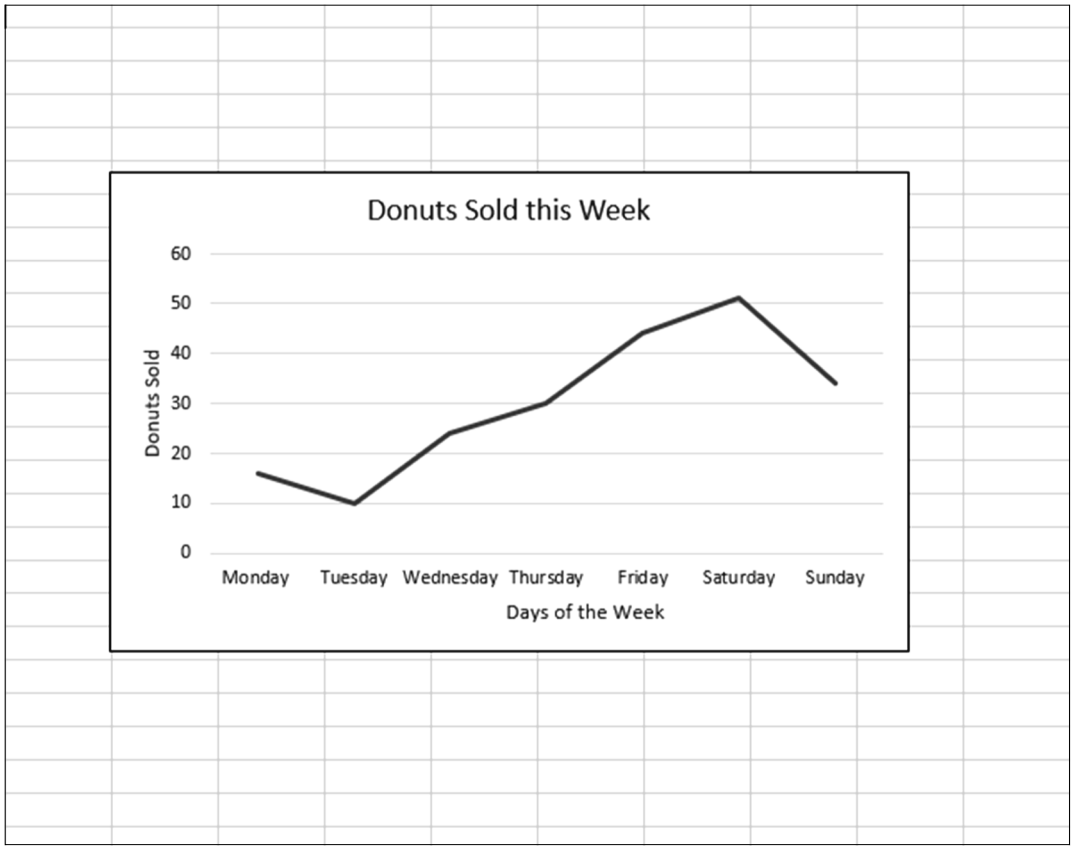


Next we will add the side vertical axis title—'Number of Donuts Sold'.

You simply click on the textbox and type in the title.

And finally, we add the chart title - 'Donuts Sold this Week'.

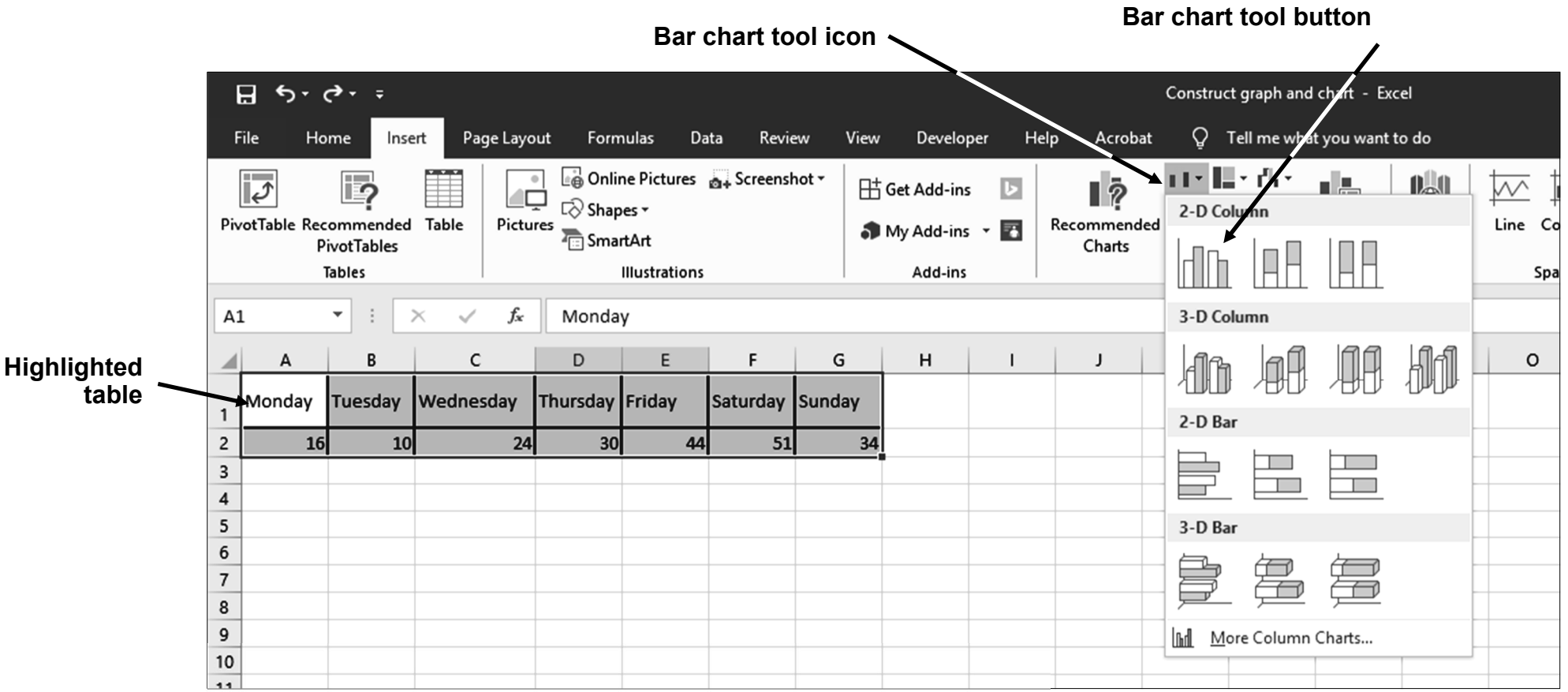
Below is what your completed line graph would look like.



Bar Chart

Next we will show you how to construct a 'Bar Chart' using the same data from the table in the same Excel workbook.

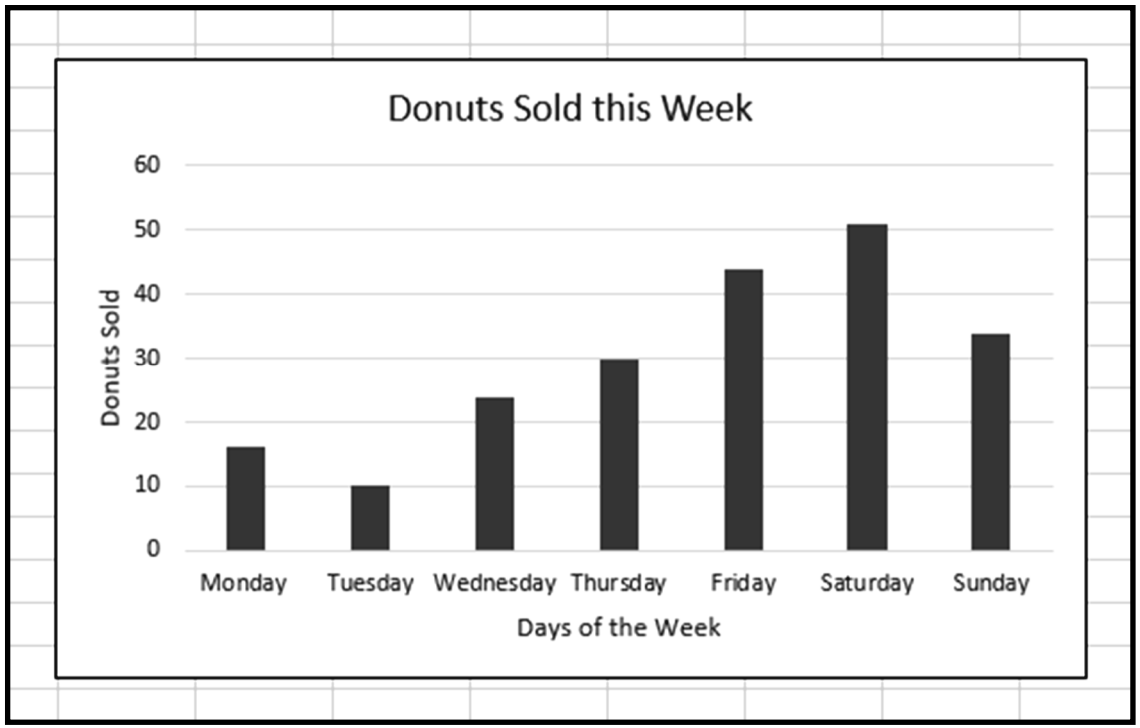
Again highlight the table and this time we will be using the 'Bar Chart' tools.



The bar chart appears on the screen.

The same methods of adding the titles are used as you did when constructing the line graph.

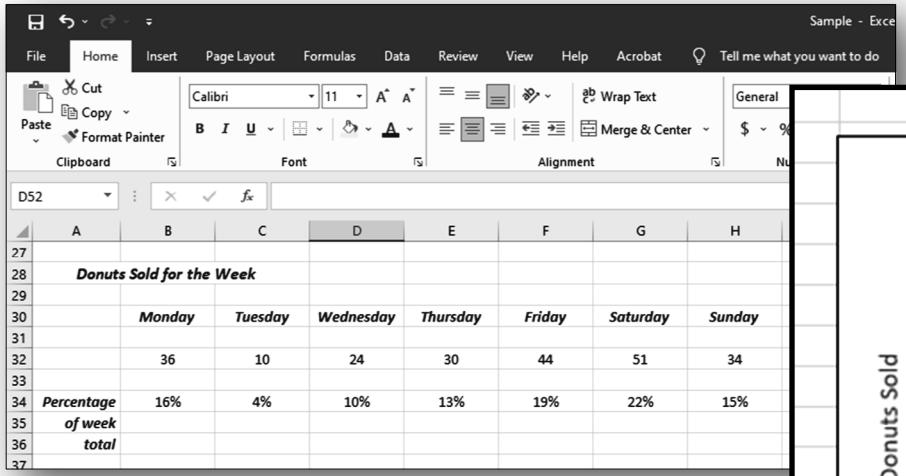
Below is what the new bar chart would look like with the titles added.



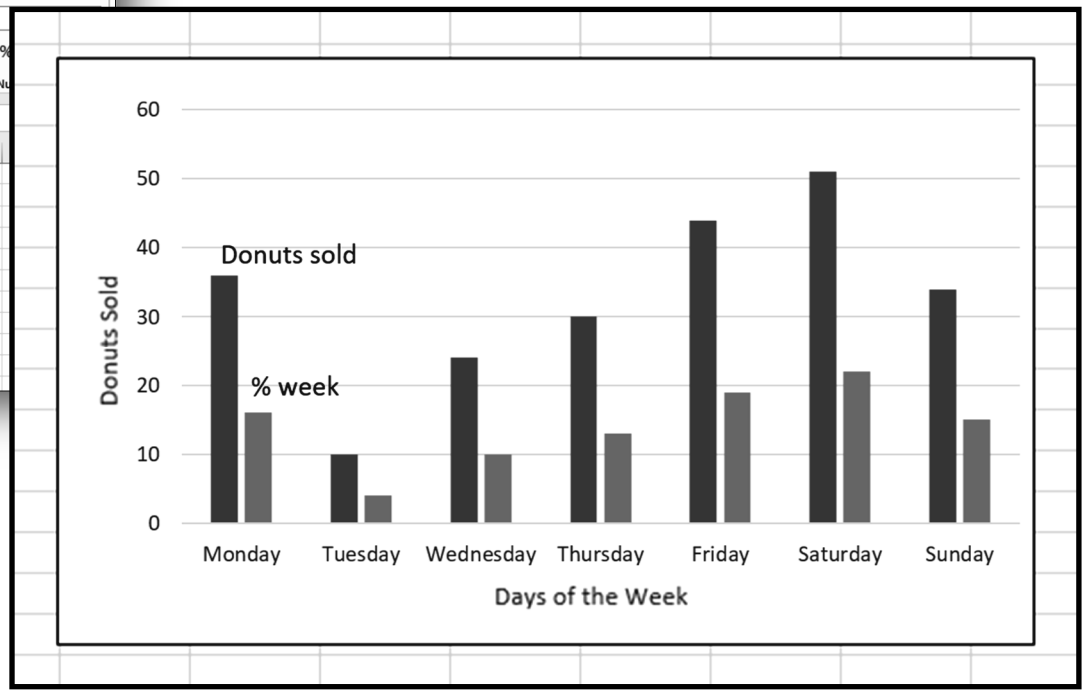
A bar can show two columns for comparison purposes.

Earlier we gave an example of showing ‘percentages’ in a spreadsheet.

When this was used to construct a bar chart, two columns appeared - one showing the donuts sold for the day and what the percentage of the week that amount equalled.



	Donuts Sold for the Week						
		Monday	***Tuesday***	***Wednesday***	***Thursday***	***Friday***	***Saturday***	***Sunday***
		36	10	24	30	44	51	34
	Percentage of week total	16%	4%	10%	13%	19%	22%	15%



The tools in Excel for creating graphs and charts are very flexible and can be used for any type of presentation of data.

Over the pervious pages we gave some basic examples of entering data into a Word document table and entering data in various formats into an Excel spreadsheet.

Those examples may or may not align with what your assessment project is, so it is important that you use the tools available to you that you have the most skills with.

With regards the chart tools in Excel, there a wide range of styles and types of charts (graphs) and each type has a multitude of formatting options, so we encourage you to experiment with the tools to get the best result for your assessment project.

We also suggest that you seek some assistance from someone with experience using those tools as they can often provide you hints and tips that you may have not been aware of, or used before.

Learning Activity

Task

LEARNING ACTIVITY THREE

In this activity you are now to use the data in your table or a spreadsheet and construct a graph (or chart) as agreed to with your employer, supervisor or a nominated person where you work as part of your assessment project.

This is an ‘observable assessment task’ which means your employer, supervisor or a nominated person where you work will observe you, or watch you taking the data from a table or spreadsheet and construct a graph or chart.

Your teacher or trainer will provide your employer, supervisor or a nominated person where you work the necessary assessment forms to fill in, sign and return.

These documents will be part of your assessment evidence portfolio.

If you are currently not working then your teacher or trainer will be your ‘observers’ and will develop this activity into one that has you working in a simulated workplace.

Check and reflect on expected result, data collection and outcomes and appropriateness of outcome to workplace task

After a workplace task that involves collecting data samples, collating into spreadsheets and constructing graphs or charts, it is always important to check the outcome of the completed task.

We learned that such workplace tasks would have needed a clear understanding of the purpose of the data collection task, what the data specifications were and the audience who would be presented the data in the form of a graph or chart.

Earlier, we reviewed the need to determine the ‘expected results’ of a data collection task and the final graph or chart.

Reflecting back on the ‘expected results’ and then checking the outcome of the data collection task and final graphs or charts would determine whether you were able to achieve the outcomes expected from such a workplace task.

Also, it is generally a good idea and sometimes required that tables, charts or graphs, as well as the data contained in them are checked by someone else for reasonableness and correctness.

This could be done with your supervisor or an experienced fellow worker.

When checking for reasonableness, an experienced person can look at the original ‘data sample’ and compare it to the table, chart or graph.

Often another person is able to see that it does not look quite right just by experience.

Learning Activity

Question

LEARNING ACTIVITY FOUR

1) What does it mean to 'reflect on expected result', when reviewing the outcome of a data collection and graph/chart construction tasks?

2) Why would you have someone else check the data collected and the graph or chart constructed before it was finalised?

Section Three

Communicate Results

COLLECT DATA AND CONSTRUCT ROUTINE TABLES AND GRAPHS FOR WORK

SECTION THREE—COMMUNICATE RESULTS

Introduction

Once you have completed the workplace task that involved data collection, collating into a table or spreadsheet and the construction of graphs or charts, you would need to explain how you collected and 'worked' the data so as to achieve the 'expected results'.

This could be through a written report, through a verbal presentation to the most appropriate person in the organisation, or to the intended audience.

In this final section we look at these topics.

Section Learning Objectives

At the completion of this section you will learn information relating to:

- ☆ Using informal and formal written mathematical representation to document and report on workplace data and problem solving process and results
- ☆ Using informal and formal mathematical language to present and discuss workplace information and problem solving process and results

Use informal and formal written mathematical representation to document and report on workplace data and problem solving process and results

AND

Use informal and formal mathematical language to present and discuss workplace information and problem solving process and results

(Over the next few pages we cover two 'Performance Criteria' points at the same time to avoid repetition)

When you have been given the task of collecting data and then presenting that data in the form of a chart or graph, you will likely be asked on how this data was gathered and the calculation process undertaken to show the results as presented in the graph or chart.

These questions could be asked by those requesting the data and subsequent graphs or charts.

Or, the questions could be asked by the intended audience being presented the graphs or charts and want to know the background on the data and processes used to reach the presented outcome.

Who those questions are being asked by and what setting those question are being asked in will determine how you should answer those questions.

The setting could be formal such as a meeting with management or shareholders as an example, or the setting could be informal such as a discussion with co-workers.

This means that the responses to the questions would be either formal or informal verbally.

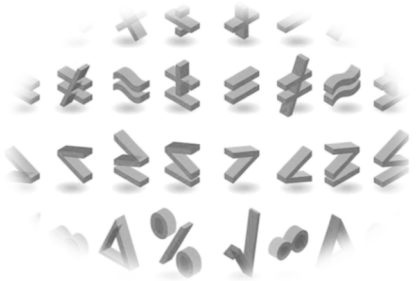
The responses could also be in writing, both formal and informal.

You could receive a formal request in writing for explanations as to the background on the data and processes used to reach the presented outcome such as a request from an external account or a manager.

Or, you could receive an informal request in writing for explanations as to the background on the data and processes used to reach the presented outcome such as a casual email from your supervisor or a co-worker.

In all cases (formal or informal) you need to know your audience.

In both formal and informal situations, the audience may have different levels of data collection and mathematical knowledge so that any verbal discussions or written response must be in a way that the audience can understand.



Responding Appropriately

As we now know there is always some 'expected results' for any data collection workplace task and when it is to be used to construct graphs or charts, then some type of mathematical problem solving process would be required to achieve those expected results.

Explaining some of those mathematical problem solving processes and how they achieved the expected results can be at times complicated, especially when either explaining those processes in writing, or in a discussion.

In mathematics there are symbols used to represent mathematical outcomes that are not commonly used in a workplace.

For example in a graph or chart it may be showing sales numbers or amounts that are 'less than' the monthly average.

The mathematical symbol for 'less than' is <

Some people would not know this if it were shown in a written document or used on a whiteboard presentation.

Instead of using the symbol, it could be simply written out as 'less than' or verbally expressed as 'less than'.

Some more examples of mathematical symbols that could be used to describe sums in a graph or chart can include:

The mathematical symbol for 'more than' is >

The mathematical symbol for 'equal to' is == and the symbol for 'not equal to' is |=

The mathematical symbol for 'grater than or equal to' is >=

The mathematical symbol for 'less than or equal to' is <=

These are just a few examples of the many mathematical symbols that are used to describe mathematical problem solving processes.

If unsure it is always safer to describe the mathematical problem solving outcomes in 'layperson terms' so that all can understand.

Learning Activity

Task

LEARNING ACTIVITY ONE

In this final activity, you will undertake another ‘observable assessment task’ which means your employer, supervisor or a nominated person where you work will observe you explaining in simple and understandable terms, the data collection activities you performed.

Then you will be observed explaining in simple and understandable terms, the ‘expected results’ that was the basis of your choice of mathematical problem solving processes and what those processes were as well as explaining in simple and understandable terms the outcome of the overall assessable workplace task.

Your teacher or trainer will provide your employer, supervisor or a nominated person where you work the necessary assessment forms to fill in, sign and return.

These documents will be part of your assessment evidence portfolio.

If you are currently not working then your teacher or trainer will be your ‘observers’ and will develop this activity into one that has you working in a simulated workplace.

SELF ASSESSMENT

Self assessment is where you ask yourself certain questions to ensure you have understood what you have learned while reading this manual and completing the learning activities.

This unit requires you the student or trainee at the completion of your training to have a certain level of 'Required Knowledge' in which you would need to have acquired and in which you will be assessed on.

This self assessment section reviews this required knowledge by way of questions and if you are able to say YES to all of them you can be confident your assessment will be satisfactory.

- ☆ This training unit had three sections each having information on how to construct routine tables and graphs:
  1) Identify basis and specifications of data collection requirements for workplace task including being aware of audience of data and purpose of collection?
  2) Identify source(s) of familiar and routine data in the workplace and possible methods of collection?
- ☆ After reviewing the information in Section Two, are you confident that you understand and could:
  1) Select mathematical problem solving process for completing workplace task?
  2) Describe an expected result of the data collection and results?
  3) Select method to collect routine workplace data and collect relevant data sample?
  4) Collect, order and collate data into a table or spreadsheet?
  5) Determine scale and axes and construct routine graph or chart using appropriate tools?
  6) Check and reflect on expected result, data collection and outcomes and appropriateness of outcome to workplace task?
- ☆ After reviewing the information in Section Three, are you confident that you understand and could:
  1) Use informal and formal written mathematical representation to document and report on workplace data and problem solving process and results?
  2) Use informal and formal mathematical language to present and discuss workplace information and problem solving process and results?

If there were any questions that you were unable to confidently say YES to, we encourage you to review the information again in this manual and if needed seek the assistance of your teacher or trainer.

NOTES