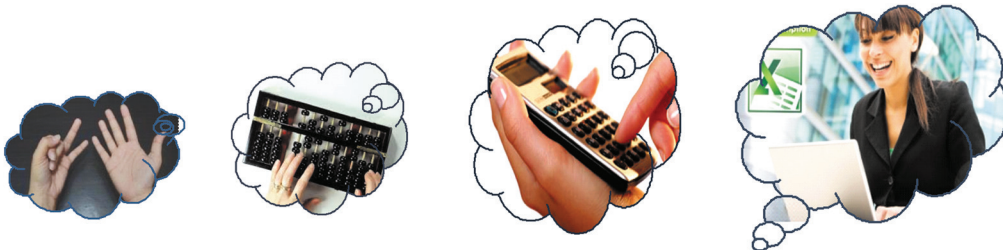


In this chapter you will learn

- fundamental functions and operations of spreadsheets
- identifying the components of a worksheet
- entering and editing data in a worksheet
- simple mathematical operators and building a formula using values
- use of function and cell address for writing formulae
- formatting a worksheet
- use of relative and absolute cell addresses,
- creating charts.

7.1 Introduction

Perhaps in our day-to-day life or at work we need to perform calculations. We use various methods to perform such calculations. Depending on the nature of calculations we use our fingers or mental calculations to perform simple calculations while we use calculators or paper based systems to compute complex calculations. In order to do calculations easily and accurately let us learn how electronic spreadsheets can be used.



We usually use a square ruled book to perform systematic calculations. Every page in this book consists of pages with rows and columns. Electronic Spreadsheets which consist of multiples of rows and columns based on this model of square ruled books.

Using Electronic Spreadsheets we can accurately and efficiently perform the following activities:

- Simple and complex calculations
- Presentation of data in charts
- Show data in ascending and descending order
- Segregate only the required data
- Check the validity of data
- Protection of data using passwords
- Saving for future use

7.1.1 Electronic Spreadsheet Application Software

The table 7.1 below illustrates some of the Electronic Spreadsheet Application Software developed by different companies.

Table 7.1 - Some Spreadsheet Applications and the organizations

Software	Company
Excel	Microsoft Corporation
Numbers	Apple Inc
Libreoffice Calc	The Document Foundation
Openoffice Calc	Apache Foundation

7.1.2 Using Spreadsheet Software

Out of the many spreadsheet software, we discuss only about Microsoft Office Excel 2010 and LibreOffice Calc in this unit. Please note that the method of starting an spreadsheet software may vary according to the operating system and its versions.

For Microsoft Office Excel 2010

Start → Programs → Microsoft
Office → Microsoft Office Excel 2010

For LibreOffice Calc

Start → Programs → LibreOffice
LibreOffice Calc →

7.1.3 The user interface and the components of Microsoft Excel 2010

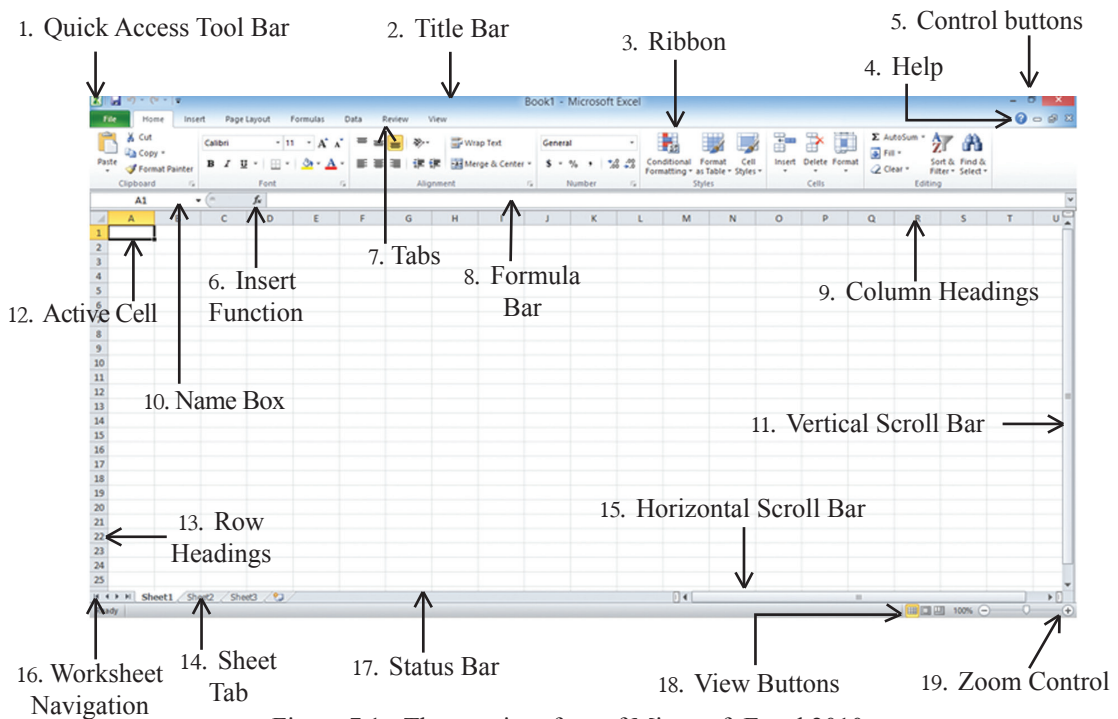


Figure 7.1- The user interface of Microsoft Excel 2010

Table 7.2 - Components of Microsoft Excel 2010

Component	Funtion
1. Quick Access Tool Bar	Contains commonly used commands such as Save , Print Preview, Undo , New etc
2. Title Bar	Shows the name of the Application Software
3. Ribbon	Contains a toolbar with, Home, Insert, Page layout
4. Help	Provides help functions
5. Control Buttons	To minimize, open or to expand the worksheet window
6. Insert Functions	Opens dialog box to create formulae.
7. Tabs	Changes ribbon
8. Formulae Bar	Views the formula and displays the contents of a cell.

9. Column Heading	Shows column name
10. Name Box	Shows active cell address
11. Vertical Scroll Bar	Scrolls the worksheet vertically
12. Active Cell	Displays the cell in which data is entered
13. Row Heading	Shows row number
14. Sheet Tabs	Represents the worksheet
15. Horizontal Scroll Bar	Scrolls the worksheet horizontally
16. Sheet Tab Scroll Button	Changes the worksheet
17. Status Bar	Displays the status of the worksheet
18. View Button	Enables to change the view of the worksheet
19. Zoom Control	Zooms in or zooms out the view of a worksheets

7.1.4 The user interface and the components LibreOffice Calc

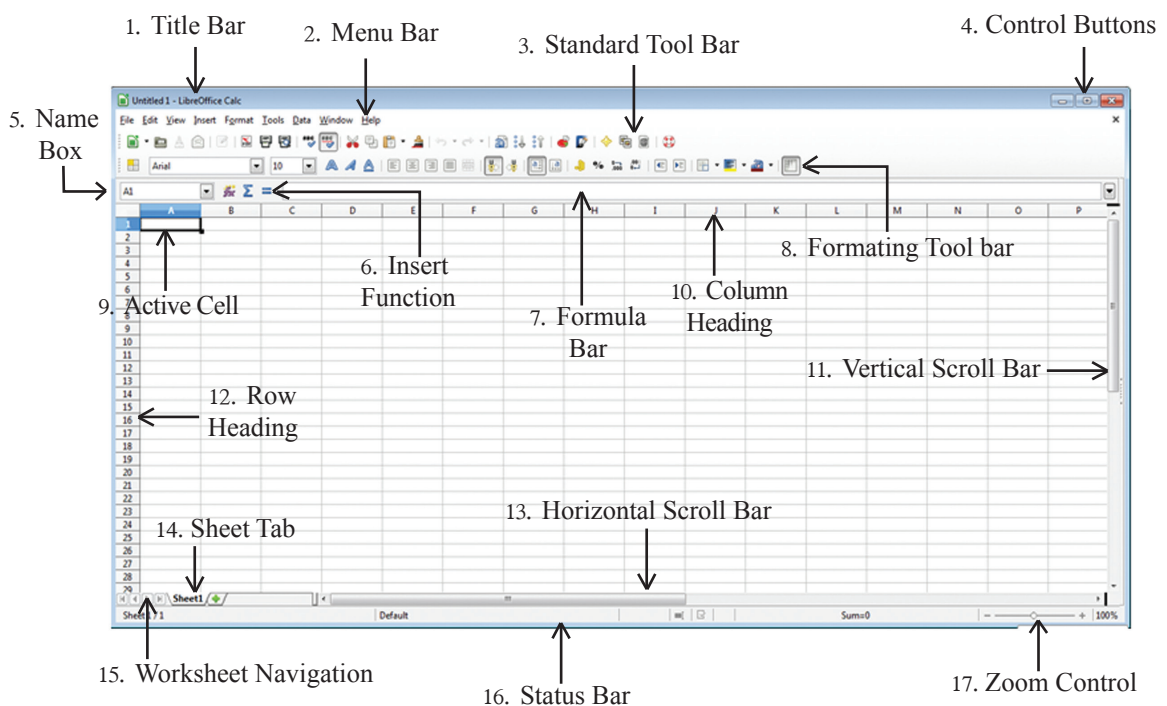


Figure 7.2 - User interface of LibreOffice Calc 4.1

Table 7.3 - Components of LibreOffice Calc 4.1

Component	Funtion
1. Title Bar	Shows the name of the application software
2. Menu bar	Helps to select commands
3. Standard tool bar	Useful to select standard tools
4. Control buttons	Minimizes, opens or to maximize the worksheet window
5. Name box	Shows the address of the active cell
6. Insert Functions	Opens dialog box to make formulae.
7. Formulae bar	To view formula and display the contents of a cell.
8. Formatting tool bar	Helps to format worksheet
9. Active cell	Displays cell in which data is entered
10. Column heading	Shows column name
11. Vertical scroll bar	Scrolls worksheet vertically
12. Row heading	Shows row number
13. Horizontal scroll bar	Scrolls worksheet horizontally
14. Sheet tabs	Represents worksheet.
15. Tab scroll button	Changes worksheet.
16. Status Bar	Displays the status of worksheet.
17. Zoom Control	Zooms in or zooms out view of a worksheet

7.1.5 Worksheet

A worksheet is made up of a multitude of cells made by columns and rows on a two dimensional plane. Each worksheet is denoted by a sheet tab.

7.1.6 Naming the columns in a worksheet

Each column of a worksheet is assigned an English letter or a combination of letters as shown below: See Figure 7.3

A,B,C,D,.....upto Z
 AA,AB,AC,AD,AE,.....upto AZ
 BA,BB,BC,BD,BF.....upto BZ

7.1.7 Naming the rows in a worksheet

Each row of a worksheet is assigned a row number as 1,2,3,4,5... etc as shown below: See Figure 7.3

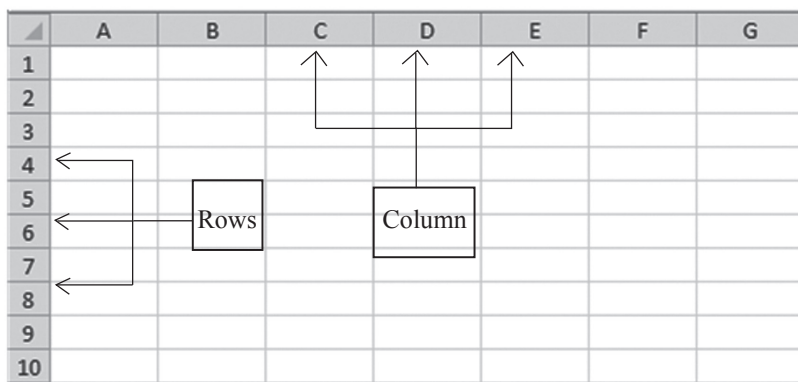


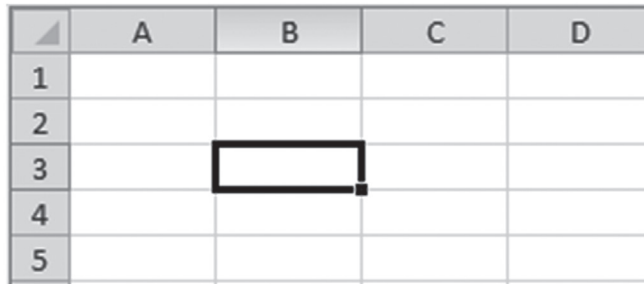
Figure 7.3 - Positions of rows and coumns in a worksheet

Usually the number of rows and columns of a worksheet is a power of two.

Worksheet application	Number of rows	Number of columns
Microsoft 365, Excel 2021, Excel 2019	1,048,576(2^{20})	16,384(2^{14})
LibreOffice Calc 24.2	1,048,576(2^{20})	1,024(2^{10})
Microsoft Excel 2007-2010	1,048,576(2^{20})	16,384(2^{14})

7.1.8 Active Cell

It is needed to select the cell before entering data in it. A currently selected cell is called an active cell. B3 is the active cell in the worksheet below. An active cell always has a thick border. See Figure 7.4



	A	B	C	D
1				
2				
3				
4				
5				

Figure 7.4 - Active cell in a worksheet

7.2 Scrolling in a worksheet

In order to enter data the cell, it should be selected. Active cell in a worksheet can be moved and selected by the keys or a combination of keys.

Key/combination of keys	Result
Arrow keys	Move a single cell in any direction (left, right, up, down)
Ctrl + Arrow Keys	Moves the cell to the end of the data range in a particular direction
Home	Moves to column A along the row where the active cell is
Ctrl + Home	Moves the cell to A1 position
Ctrl + End	Moves to bottom right cell of the data range
Page Up	Moves the worksheet one screen up
Page Down	Moves the worksheet one screen down

7.2.1 Cell Address

A cell address is denoted first by the column letter and secondly by the row number. The address of the active cell is displayed in the name box.

Ex: A cell at D column and 3rd row would be named D3. See Figure 7.5

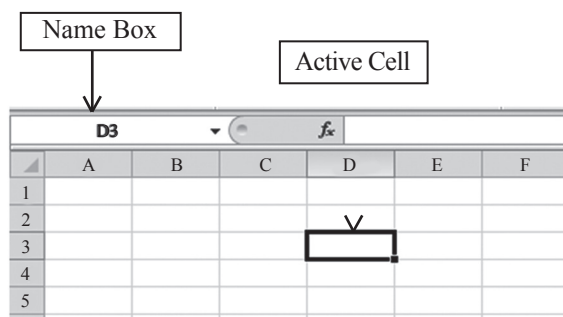


Figure 7.5 - Cell address of a worksheet

Activity



The cell address KD74 is situated in row number and column letter

7.2.2 Range of Cells

A block of adjacent cells in a worksheet which is highlighted or selected is called a range of cells. Observe the worksheets below.

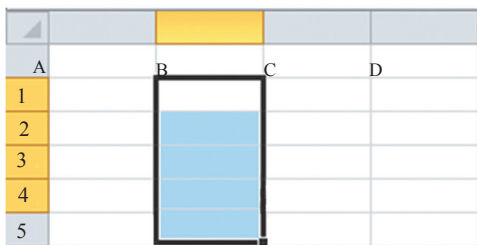


Figure 7.6 - A range of cells in a column (B2:B5)

This range of cells is represented as A3:C3. The range in Figure 7.7 consists of the cells A3, B3, C3.

This range of cells is represented as A3:C3.

Row number is constant in a cell range along a row.

This range of cells consists of the cells namely B2, B3, B4, B5. The range of cells starts in B2 and ending in B5.

Column letter is constant in a cell range along a column.

The cell range in figure 7.6 is represented by B2:B5.

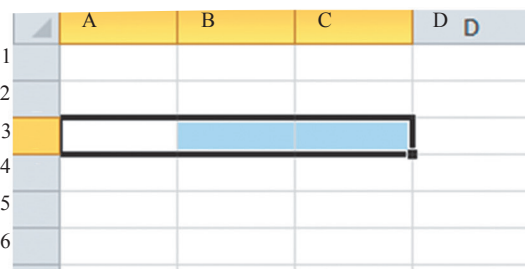


Figure 7.7 - A range of cell in a row

	A	B	C	D
1				
2				
3				
4				
5				
6				
7				

For this cell range in Figure 7.7 cells; B2, B3, B4, C2, C3, and C4 are included.

Figure 7.8 - A range of cells in a worksheet spanning several rows and columns

The cell range in figure 7.8 is represented by B2: C4 The column letter and the row number vary in a range of cells spanning several rows and columns.

Note: The control key is used to select more than one 'range of cells' in a worksheet. The control key is marked 'Ctrl' on the key board.

Activity



Answer the questions based on the worksheet shown on Figure 7.9

	A	B	C	D	E	F	G	H	I
1									
2	A	B	C	D	E	F	G	H	I
3									
4	R1								
5									
6	R3						R2		
7									
8									

Figure 7.9 - Range of cells in a worksheet

- (1) What is the address of the first cell represented by R1 cell range?
- (2) What is the address of the last cell represented by R1 cell range?
- (3) Write the cell range represented by R1.
- (4) Write the cell range represented by R2.
- (5) What is the name of the cell range along a row?
- (6) What is the name of the cell range along a column?
- (7) Write the cell range represented by R3.
- (8) Give the number of cells in the cell range represented by R3.

7.2.3 Entering Data

Before entering data in a worksheet, we need to select the required cell. We can enter the data once it is selected. The contents of a cell would be either a label, value or formula.

1. Label

A combination of letters, numbers, special symbols or the text entered using a keyboard are called labels. By default the labels are left aligned.

Figure 7.10 below shows how labels are left aligned.

Note: The telephone numbers would not be displayed in the same way as shown below. (The first letter '0' is not displayed). You need to specify the range of cells where the telephone numbers to be entered as 'Text'. Formatting cells would be discussed in a later lesson.

	A	B	C	D	E	F
1						
2	Piumi Kaushalya	Kegalle	Sabaragamuwa	03512232438	Piumi@gmail.com	
3	A.Mallikadevi	Kandy	Central	08350632867	maldevi@yahoo.com	
4	Dilisha Gamhewa	Colombo	Western	01278643563	Dilesha@hotmail.com	
5	Hakeem Anver	Matara	Southern	01369589596	anwerhac@live.com	
6						

Figure 7.10 - labels in a worksheet are left aligned

2. Values

The data with numerical figure are called values. By default value is right aligned. Figure 7.11 shows various ways how data are represented as values.

	A	B
1	Integer	23
2	Decimal	5.72
3	Fractional	3 1/4
4	Percentage	65%
5	Scientific	4.37E+04
6	Date	5/12/2007
7	Time	2.45 PM
8	Currency	Rs 400.00

Figure 7.11 - values are right aligned

Note: When entering fraction numbers a space needs to be entered after the whole number.

3. Formulae

The expressions beginning with an equals '=' mark using values, cell address and functions are called a formula. When a formula is entered in a cell in a worksheet the value of the equation is displayed in the cell and the formula is shown in the formula bar.

Example: Getting the total value of cells A1 and B1 into cell C1 (See Figure 7.12)

	A	B	C	D	E	F	G
1	2	3	5				
2							
3							
4							
5							

Figure 7.12 - showing values and formula

7.3 Mathematical operators used in formulae

Operator	Meaning
+	addition
-	subtraction
*	multiplication
/	division
^	exponentiation (power)

Note: The order of evaluation can be changed by using brackets. (The expressions within the brackets are evaluated first).

Operator precedence:

First	()	
Second	^	
Third	*, /	
Fourth	+, -	reduce top to bottom.

7.3.1 Simple calculations using values and operators

Table 7.4 below shows a few formulae written using values and operators

Table 7.4 - Writing simple formul

Operator	Formula	Result
Addition (+)	$= 2+4$	6
Subtraction (-)	$= 5-2$	3
Multiplication (*)	$= 4*5$	20
Division (/)	$= 12/6$	2
Exponentiation (^)	$= 2^4$	16

There can be more than one operator in a formula. Let us learn how to evaluate the operators in order. See the tables 7.5 and 7.6

Table 7.5 - Use of brackets in simple equations

Formula	Evaluation method	Result
$= 2+4*3$	$= 2+12$	$= 14$
$= (2+4)*3$	$= 6*3$	$= 18$
$= 4*3^2$	$= 4*9$	$= 36$
$= (4*3)^2$	$= 12^2$	$= 144$

Table 7.6 - Methods of evaluation of equations

Examples	$= 5+2*3^2/6-3$	$= 5+2*3^2/(6-3)$	$= 8/2*3-2^3+5$
Steps of evaluation	$= 5+2*3^2/6-3$	$= 5+2*3^2/(6-3)$	$= 8/2*3-2^3+5$
	$= 5+2*9/6-3$	$= 5+2*3^2/3$	$= 8/2*3-8+5$
	$= 5+18/6-3$	$= 5+2*9/3$	$= 4*3-8+5$
	$= 5+3 - 3$	$= 5+18/3$	$= 12-8+5$
	$= 8-3$	$= 5+6$	$= 4+5$
Answer	$= 5$	$= 11$	$= 9$

Note: When brackets are not used operators in the same level such as multiplication (*) and division and addition (+) and subtraction (-) are executed from left to right.

Activity



Evaluate the following equations.

- | | | |
|-------------------|---------------------|----------------------------|
| (1) = $6 - 4/2$ | (6) = $4 + 5 * 2^3$ | (11) = $5/2 + 1^3 * 4$ |
| (2) = $5 * 4 + 3$ | (7) = $8/4 * 2$ | (12) = $3 - 4 * 3/2$ |
| (3) = $3 + 4 * 5$ | (8) = $-4/2 + 2$ | (13) = $6/3 * 2^1 - 3$ |
| (4) = $2^5 + 3$ | (9) = $1 + 2^2 * 3$ | (14) = $3 * (2 + 4)/9 + 1$ |
| (5) = $3 + 5^2$ | (10) = $3 * 4/2$ | (15) = $2^3/(5 - 1^3) * 5$ |

7.3.2 Formulas with cell addresses and operators

The main advantage of entering formulae using cell addresses and operators is when the values of the cells concerned change, the results obtained by the formulae also get updated accordingly.

Example 1

In order to calculate the perimeter and area of a rectangle, let us enter the length and breadth of the rectangle in cells A2 and B2 respectively. The formulae to derive the perimeter are entered in cells C2, C3, C4 and the formula to derive the area is entered in cell D2. See Figure 7.13

	A	B	C	D
1	A Length of the Rectangle	B Breadth of the Rectangle	C Perimeter	D Area
2	45	24	=A2+A2+B2+B2	=A2*B2
3			=A2*2+B2*2	
4			=(A2+B2)*2	
5				

Figure 7.13 - The perimeter and area of a rectangle

Activity



Create a worksheet in your spreadsheet application based on the image 7.13. Observe the changes in values obtained from the formulae in column C and D when you enter different values in cells A2 and B2.

Important: In cell D2 if you write the formula $D2=A2*B2$ it would be taken as a label and hence calculations do not happen. Therefore it is important to remember that nothing should be written on the left side of the equal sign ('='). (See image 7.15).

C	D	E
	D2=A2*B2	

Figure 7.14 - The incorrect way of writing the formula

C	D	E
	=A2*B2	

Figure 7.15 - The correct way of writing the formula

Example 2

See the formulae in the worksheet given in Figure 7.16 when the price of each pencil and book are given.

	A	B	C
1	Price of a Book	48	
2	Price of a Pencil	12	
3	Price of book and pencil	=B1+B2	
4	Difference between the price of a book and a pencil	=B1-B2	
5	Price of 4 books	=B1*3	
6	Price of 4 books and 2 pencils	=B1*4+B2*2	
7			

Figure 7.16 - Price calculation

Activity



Prepare the worksheet shown in Figure 7.16 using a Spreadsheet application. Change the values in cells B1 and B2. Observe the results obtained from the formulae in cells B3, B4, B5 and B6.

Example 3

Calculating the area and volume of a cube when the length of one side is given. (See Figure 7.17)

	A	B	C
1	Side length of the Cube	8	
2	Side area of the Cube	=B1^2	
3	Total area of the Cube	=6*B1^2	
4	Volume of the Cube	=B1^3	
5			

Figure 7.17 - Finding the area and volume of a cube

Activity



Create a the worksheet shown in Figure 7.17 using a Spreadsheet application. Change the values in the cell B1 and observe the results obtained from the formulae in the cells B2, B3 and B4.

Note: The results obtained from a formula (based on cell addresses) always get updated when the values of these cells mentioned in the formula change.

Activity



Study the worksheet (Figure 7.18) and the table 7.7 containing formulae. Now calculate the result of each formula shown in table 7.7 in accordance with the Precedence of Operators and write the results under the 'results' column.

	A	B	C	D	E
1	7	5	4	2	
2	3	1	9	4	
3	6	2	4	8	
4					

Figure 7.18 - Worksheet with data

Formula	Result
=A1+B1	12
=C1+C2+C3	17
=B2+C3+B3	7
=A2*C1	12
=C2/A2*D1	6
=B3^A2+D1	10

Table 7.7

Formula	Result
=A1*B1-D2	
=D1-C2/A2	
=B3^C3-A3	
=A1*C1/C3	
=D2*C4*E1	
=A3/B3+A2*D1	
=A1+(B2*C2)-B3+C2/B2	
=B2-B3+B1*(D1+D2^B1)	
=A2^B3-C2+A3*(B3+C1)	
=A3/C3*(D2*D1)	
=D3/C3/B3*A3+B2	
=(D3/(A1+B2))^C2	

7.4 Use of functions to do calculations

When there is a large quantity of data it becomes a difficult and complex task to write formulae using only the cell addresses. In this kind of situation functions are used. The spreadsheet applications contain different functions to meet the requirements of different fields. Let us learn some of basic functions which are commonly used. (See table 7.8)

Table 7.8

Name of function	Syntax	Use
SUM	=SUM (Number 1,Number2.....)	Adds the values contained in a range of cells.
AVERAGE	=AVERAGE (Number1,Number2.....)	Finds out the average of the values contained in a range of cells.
MAX	=MAX(Number1,Number2.....)	Finds out the largest value contained in a range of cells.
MIN	=MIN(Number1,Number2.....)	Finds out the smallest value contained in a range of cells.
COUNT	=COUNT(Number1,Number2.....)	Within a range of cells, counts the number of cells containing numerical values.
COUNTA	=COUNTA(Number1,Number2.....)	Counts the number of non-empty cells in the selected range.
ROUND	=ROUND(Number, Num_digits)	Rounds a given value to the required number of decimal places.
IF	=IF(Condition, Value_if_true, Value_if_false)	Checks the conditions and returns a value as follows: * If the condition is true → the first value is returned. * If the condition is false → the second value is returned.

For example, look at the methods 1 and 2 given below. In order to find out the sum of the values of cells A1 to A10, method 1 uses cell addresses whereas method 2 uses a function. The same results are obtained from both methods. However, when there is a large range of cells, the formula shown by method 2 is simple and easy compared to both the methods.

=A1+A2+A3+A4+A5+A6+A7+A8+A9+A10

=SUM(A1:A10)

—————→ ①

—————→ ②

=A1+A2+A3+A4+A5+A6+A7+A8+A9+A10

=SUM(A1:A10)

Only the starting cell address and the last cell address in a function need to be included.

Create a function based formulae based on the worksheet given in 7.19.

	A	B	C	D	E	F
1	2	6	4			
2	5	3	7		Student	
3	5	9	12		2	4.5847

Figure 7.19 - Worksheet

Let us identify the various ways in which a function can be used.

SUM function (See table 7.9)

Table 7.9

Formula	Details	Result
= SUM(A1,B1,C1)	The sum of cells A1,B1 and C1	12
= SUM(A1:C1)	The sum of cells in the range of cells from A1 to C1	12
= SUM(A1:C1,B2)	The sum of cells in the range of cells from A1 to C1 and B2	15
= SUM(B1:C2)	The sum of cells in the range of cells from B1 to C2	20
= SUM(A1:A3,C1:C3)	The sum of cells in the range of cells from A1 to A3 and C1 to C3	35

AVERAGE function (See table 7.10)

Table 7.10

Formula	Details	Result
= AVERAGE(A1,B1,C1)	The average of cells A1, B1 and C2	4.00
= AVERAGE(A1:C1)	The average of cells in the range of cells from A1 to C1	4.00
= AVERAGE(A1:C1,B2)	The average of cells in the range of cells from A1 to C1 and B2	3.75
= AVERAGE(B1:C2)	The average of cells in the range of cells from B1 to C2	5.00
= AVERAGE(A1:A3,C1:C3)	The average of cells in the range of cells from A1 to A3 and C1to C3	5.83

Note: When the average is calculated a decimal number with several decimal places may be used. You need the required decimal places in the relevant cell range.

MAX function (See table 7.11)

Table 7.11

Formula	Details	Result
= MAX(A1,B2,C1)	Finds out the largest value among cells A1,B2 and C1	4
= MAX(A2:C2,B3)	Finds out the largest value among the range of cells from A2 to C2 and the cell B3	9
= MAX(A1:C1)	Finds out the largest value among the range of cells from A1 to C1	6
= MAX(A1,B1:C2)	Finds out the largest value among the range of cells from A1 to B1 and the cell C2	7

MIN function (See Table 7.12)

Table 7.12

Formula	Details	Result
= MIN(A1,B2,C1)	Finds out the smallest value among cells A1, B2 and C1	2
= MIN(A2:C2,B3)	Finds out the smallest value among the range of cells from A2 to C2 and the cell B3	3
= MIN(A1:C1)	Finds out the smallest value among the range of cells from A1 to C1	2
= MIN(A1,B1:C2)	Finds out the smallest value among the range of cells from B1 to C2 and the cell A1	2

COUNT function (See Table 7.13).

Table 7.13

Formula	Details	Result
= COUNT(A1,B1)	Counts the number of cells that contain numbers among cells A1, B1	2
= COUNT(A1:C1)	Counts the number of cells that contain numbers in the range of cells from A1 to C1	3
= COUNT(A1:A3)	Counts the number of cells that contain numbers in the range of cells from A1 to A3	3
=COUNT(A1:C1,B2)	Counts the number of cells that contain numbers in the range of cells from A1 to C1 and B2	4
= COUNT(B1:C3)	Counts the number of cells that contain numbers in the range of cells from B1 to C3	6
=COUNT(A1:A3,C1:C3)	Counts the number of cells that contain numbers in the range of cells from A1 to A3 and the range of cells from C1 to C3	6

COUNTA function (See Table 7.14)

Table 7.14

Formula	Details	Result
=COUNTA(A1,B1)	Counts the number of non-empty cells among cells A1 and B1.	2
=COUNTA(A1:E3)	Counts the number of non-empty cells in the range of cells from A1 to E3.	11
=COUNTA(A1:A4)	Counts the number of non-empty cells in the range of cells from A1 to A4.	3
=COUNTA(A1:C1,E2)	Counts the number of non-empty cells in the range of cells from A1 to C1 and cell E2.	4
=COUNTA(A2:F2)	Counts the number of non-empty cells in the range of cells from A2 to F2.	4
=COUNTA(A1:A3, E1:E3)	Counts the number of non-empty cells in the range of cells from A1 to A3 and the range of cells from E1 to E3.	5

ROUND function (See Table 7.15).

Table 7.15

Formula	Details	Result
= ROUND (2.15, 1)	Rounds 2.15 to the nearest first decimal place.	2.2
= ROUND (2.149, 1)	Rounds 2.149 to the nearest first decimal place.	2.1
= ROUND (-1.475, 2)	Rounds -1.475 to the nearest second decimal place.	-1.48
= ROUND (21.5, -1)	Rounds 21.5 to the nearest 10.	20
= ROUND (21.5, 0)	Rounds 22 to the nearest whole number.	22
= ROUND (1.5, 0)	Rounds 1.5 to the nearest whole number.	2
= ROUND (2.5, 0)	Rounds 2.5 to the nearest whole number.	3
= ROUND (F3, 1)	Rounds the value in cell F3 to the nearest first decimal place.	4.6

= ROUND (123, -1)	Rounds 123 to the nearest 10.	120
= ROUND (456, -2)	Rounds 456 to the nearest 100.	500
= ROUND(F3, -1)	Rounds the value in cell F3 to the nearest 10.	10

When the second value is negative (–), rounding is done as follows:

- When rounding to the nearest 10, the tens place of the number is identified. If the digit to the right of it is less than 5, the number is rounded down. If it is 5 or greater, the number is rounded up.
- When rounding to the nearest 100, the hundreds place of the number is identified. If the digit to the right of it is less than 5, the number is rounded down. If it is 5 or greater, the number is rounded up.

IF Function

The IF function is used to check a certain condition. It performs one action if the condition is true, or another action if it is false.

Its basic structure is as follows:

=IF(logical_test, “value_if_true”, “value_if_false”)

logical_test : The condition that needs to be checked (EX: A1>10).

value_if_true: The action, if the condition is TRUE

value_if_false: The action, if the condition is FALSE

- These three parts must be separated by commas (,).

	A	B	C	D	E	F
1	6	7				
2		12				
3			yes			
4				30		
5					100	
6						

Figure 7.20 Worksheet

Table 7.16

Formula	Details	Result
=IF(B2>10, "Pass", "Fail")	If the value in B2 is greater than 10, it returns "Pass"; otherwise, it returns "Fail".	"Pass"
=IF(C3="Yes", 50, 0)	If the value in C3 is "Yes", it returns 50; otherwise, it returns 0.	50
=IF(A1="", "Empty", "Not Empty")	If the value in A1 is empty, it returns "Empty"; otherwise, it returns "Not Empty".	" Not Empty"
=IF(D4<=25, "Low", "High")	If the value in D4 is less than or equal to 25, it returns "Low"; otherwise, it returns "High".	"High"
=IF(E5>=100, E5*1.1, E5*1.2)	If the value in E5 is greater than or equal to 100, multiply that value by 1.1; otherwise, multiply by 1.2.	110
=IF(AND(A1>5, B1>5), "Both > 5", "At least one <= 5")	If the both values in A1 and B1 are greater than 5, it returns "Both>5"; otherwise, it returns "At least one<=5".	"Both > 5"
=IF(B2>100, "Bonus", "")	If the value in B2 is greater than 100, it returns "Bonus"; otherwise, it keeps empty.	
=IF(C2="Complete", "", "Pending")	If the value in C2 is "Complete", it keeps empty; otherwise, it returns "Pending".	Pending

When setting what happens if the condition is true or false, double quotation marks (") are used to indicate that the expression is a text. Without quotation marks, the expression represents a number, a cell reference, or another function.

If you want to display a word or phrase such as "Pass", "Fail", or "Correct" as the result, it must be written within double quotation marks (").

If the result should be a numerical value or a calculation such as 50, B2*10, or SUM(D1:D5), double quotation marks should not be used.

Activity



The following chart shows marks obtained by ICT students at different terms.

	A	B	C	D	E
1	Student Name	Term 1	Term 2	Term 3	
2	K.Bhanu Somarathna	57	79	66	
3	Wasantham Jayaraj	45	57	60	
4	Mohammad Niyas	89	ab	76	
5	R.Ganga Kumari	71	62	78	
6	P.Vasuki Devi	60	70	65	
7	M.M.Fawsiya	42	58	67	
8					

Provide answers for the below questions using functions.

- 1) What is the formula to be inserted in E2 to find the total marks scored by K. Bhanu Somarathne?
- 2) What is the formula to be inserted in E3 to find the average marks scored by Wasantham Jayaraj?
- 3) What is the formula to be inserted in cell B8 to find the highest score made in 1st Term.
- 4) What is the formula to be inserted in cell C8 to find the total number of students who appeared for the Term 2?
- 5) What is the formula to be inserted in cell D8 to find the lowest score made in the 3rd Term.

7.5 Formatting the worksheet

In order to format the labels and value in a worksheet formatting tool bar or cell formatting window can be used.

7.5.1 Ribbon with formatting tools in Microsoft Excel 2010

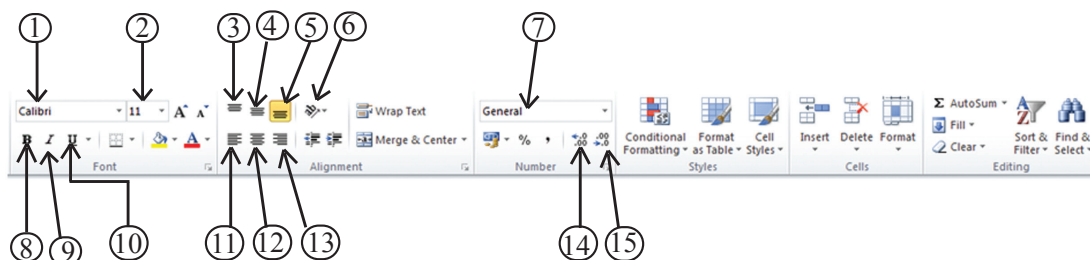


Figure 7.21 - Formatting tools in Microsoft Excel 2010

Table 7.17

No	Tool	Details
1	Font	Apply different font types in a worksheet
2	Font Size	Apply different font sizes in a worksheet
3	Vertical Top Alignment	Align text to the top of a cell
4	Vertical Middle Alignment	Align text to the middle of a cell
5	Vertical Bottom Alignment	Align text to the bottom of a cell
6	Orientation	Rotate the text to diagonal angle or vertical orientation
7	Number Format	Choose how the values in a cell are displayed
8	Bold	Make the selected text bold
9	Italic	Italicize the selected text
10	Underline	Underline the selected text
11	Left Alignment	Align text in a cell to the left
12	Center Alignment	Align text in a cell to the center
13	Right Alignment	Align text in a cell to the right
14	Increase decimal places	Show more precise value by showing more decimal places
15	Decreased decimal places	Show less precise decimal places

7.5.2 Formatting tool bar in LibreOffice Calc

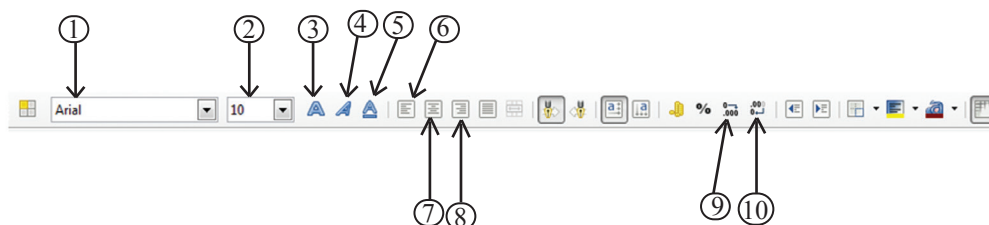


Figure 7.22 - Formatting tool bar in Libre Office Calc 4.1

Table 7-18

No	Tool	Details
1	Font	Apply different font types on a worksheet
2	Font Size	Apply different font sizes on a worksheet
3	Bold	Make the selected text bold
4	Italic	Italicize the selected text
5	Underline	Underline the selected text
6	Left Alignment	Align text in a cell to the left
7	Center Alignment	Align text in a cell to the center
8	Right Alignment	Align text in a cell to the right
9	Increase decimal places	Show more precise value by showing more decimal places
10	Decreased decimal places	Show less precise decimal places

7.5.3 Use of dialog boxes to format values

The Formal Cells dialog box in the tool bar can be used to find more about formatting a cell or range of cell.



Figure 7.23 - 'Format Cells' dialog box

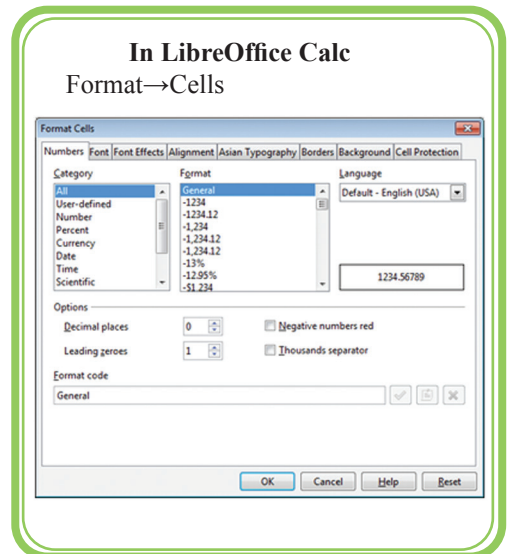


Figure 7.24 - 'Format Cells' dialog box

7.5.4 Formatting a range of cells with decimal places

When division of numbers are performed, different numbers of decimal places are made. In such instances it is necessary to format the number to a fixed number of decimal places.

	A	B	C
	Before Formatting	After Formatting with two decimal places	
1			
2	2.4	2.40	
3	1.857142857	1.86	
4	3	3.00	
5	6.666666667	6.67	
6			

Figure 7.25 - Formatted to two decimal places

Follow the steps below in order to follow a cell to the required number of decimal places.

In Microsoft Office Excel 2010

1. Select the range of cells
2. Open the 'Format Cells dialog' box
3. Click the 'Number' tab
4. Select the 'Number'
5. Change the decimal places as required
6. Click 'OK'

In LibreOffice Calc

1. Select the range of cells.
2. Open the 'Format Cells dialog' box
3. Click the 'Number' tab
4. Select the 'Number'
5. Change the decimal places as required
6. Click 'OK'

7.5.5 Formatting a range of cells to be seen as labels.

A telephone number consists of 10 digits. But in spreadsheets the zero ('0') inserted as the first digit will not be displayed. This is because the telephone number is stored as a numeric value. Therefore, there is need to format the whole range of cells where the phone numbers are to be inserted as 'text'. See figure 7.26 and column D of figure 7.10

	A	B	C
1	Display as values	Inputs after the Formatting	
2	714365759	0714365759	
3	778746853	0778746853	
4			

Figure 7.26 - Formatting a range of cells as Text

Follow the steps below in order to format a range of cells as text.

In Microsoft Office Excel 2010

1. Select the range of cells.
2. Open the 'Format Cells' dialog box
3. Click the 'Number' tab
4. Select 'Text'
5. Click 'OK'
6. Enter numbers

In LibreOffice Calc

1. Select the range of cells
2. Open the 'Format Cells' dialog box
3. Click the 'Number' tab
4. Select 'Text'
5. Click 'OK'
6. Enter numbers

7.5.6 Formatting a range of cells as percentage

When a number is divided, a quotient can be represented as percentage by formatting. The monthly profit earned by a school book shop in the first term is given below in table 7.19

	A	B	C	D
1	Month	Income	As Percentage	
2	January	Rs. 24,500.00	36.62%	
3	February	Rs. 14,000.00	20.93%	
4	March	Rs. 21,600.00	32.29%	
5	April	Rs. 6,800.00	10.16%	
6				

Table 7.19 - Formatting of a range of cell percentage

Follow the steps below in order to format a range of cells as a percentage

In Microsoft Office Excel 2010

1. Select the cell range.
2. Open the 'Format Cells' dialog box
3. Click the 'Number' tab
4. Change the decimal places required
5. Click 'OK'

In LibreOffice Calc

1. Select the range cells.
2. Open the 'Format Cells' dialog box
3. Click the 'Number' tab
4. Select the percentage category
5. Click the 'Ok'

7.5.7 Formatting a range of cells as scientific notations

Spreadsheets can be used to calculate very small to very large numbers. Sometimes it is somewhat difficult to understand or express these numbers. But when these numbers are converted into scientific format, all numbers can be represented by common format which is easy to understand.

	A	B	C
1	Description	Value	Scientific Format
2	One Tera bytes in bits(2^{43})	8796093022208	8.80E+12
3	Floppy disk capacity in Terabytes($1.44/2^{20}$)	0.000001373291015625	1.37E-06
4			

Figure 7.28 - Scientific Format

Follow the steps below in order to format a range of cells as a percentage.

In Microsoft Office Excel 2010

1. Select the cell range.
2. Open the 'Format Cells' dialog box
3. Click the 'Number' tab
4. Select 'Scientific'
5. Change the decimal places as needed
6. Click 'OK'

In Libre Office Calc

1. Select the range of cells
2. Open the 'Format Cells' dialog box
3. Click the 'Number' tab
4. Select 'Scientific'
5. Change the decimal places as needed
6. Click 'OK'

7.5.8 Formatting of a cell range as scientific

In a computer (Date) 5/12/2014 means that it is 12th date of May 2014. This is the American Format; (mm/dd/yyyy) (mm-month, dd-date, yyyy-year). Date can be displayed in many different formats in a spreadsheet. See figure 7.29

	A	B
1	Display Date as different formats	
2	5/12/2014	
3	Friday, September 12, 2014	
4	05/12/14	
5	12-May-14	
6		

Figure 7.29 - various date formats

Follow the below steps in order to format a cell range.

In Microsoft Office Excel 2010

1. Select the range of cells.
2. Open the 'Format Cells' dialog box
3. Click the 'Number' tab
4. Select the 'Date'
5. Select the date format
6. Click 'OK'

In LibreOffice Calc

1. Select the range of cells.
2. Open the 'Format Cells dialog' box
3. Click the 'Number' tab
4. Select the 'Date' category
5. Select the date format
6. Click 'OK'

7.5.9 Formatting a range of cells to display times.

Time is indicated in a computer as 10:35:53 AM. The common format of this is hh:mm:ss AM/PM. See Figure 7.30. Here, hh means hours, mm means minutes and ss means second.

	A	B
1	Display Time as different formats	
2	10:35:53 AM	
3	10:35:53	
4	10:35 AM	
5	10:35	
6		

Figure 7.30 - Various time formats cell range

Follow the below steps in order to format a range of cells to display time.

In Microsoft Office Excel 2010

1. Select the cell range.
2. Open the 'Format' Cells' dialog box
3. Click the 'Number' tab
4. Select the 'Time'
5. Select category time should be displayed
6. Click 'Ok'

In Libre Office Calc

1. Select the cell range
2. Open the 'Format Cells' dialog box
3. Click the 'Number' tab
4. Select the 'Time' category
5. Select category Time should be displayed
6. Click 'Ok'

7.5.10 Formatting a cell range to display currency

When a number denotes a monetary value the currency form such as; Dollar, Rupees should be displayed in front of the number. See column B of figure 7.28

In Microsoft Office Excel 2010

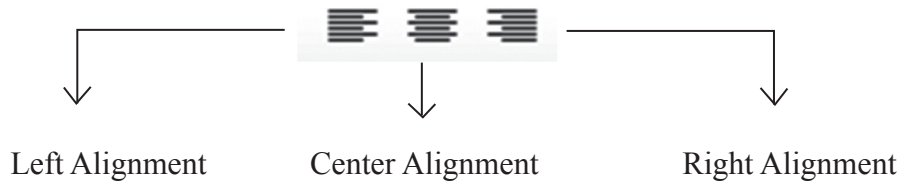
1. Select the cell range.
2. Open the 'Format Cell' dialog box
3. Click the 'Number' tab
4. Select the 'Currency'
5. Click 'Ok'

In Libre Office Calc

1. Select the cell range.
2. Open the 'Format Cells' dialog box
3. Click the 'Number' tab
4. Select the 'Currency'
5. Click 'Ok'

7.5.11 Formatting alignment of a cell range

The labels and values can be aligned to the left, center or right of a cell range.



Follow the steps below in order to format a range of cells for alignment.

In Microsoft Office Excel 2010

1. Select the cell range
2. Open the 'Format Cells' dialog box
3. Click the 'Alignment' tab
4. Select left, right or center
5. Click 'Ok'

In Libre Office Calc

1. Select the range of cells
2. Open the 'Format Cells' dialog box
3. Click the 'Alignment' tab
4. Select left, right or center
5. Click 'Ok'

Activity



Create the worksheet shown in figure 7.31 using formatting tools and formulae.

	A	B	C	D	E	F	G
1		<u>Usage of School Library as Section wise</u>					
2	Section	January	February	March	Total	Average	
3	Art	14	20	16	50	16.67	
4	Commerce	10	13	14	37	12.33	
5	Science	18	20	17	55	18.33	
6	Total	42	53	47			
7	Average	14.00	17.67	15.67			
8							

Figure 7.31 - Worksheet with various formats

1. Center align column A and row 2.
2. Make row 2 Bold.
3. Underline the heading in row. Make the font size 16.
4. Italicize cells A3, A4, A5.
5. Use function SUM and write a formula in B7 to calculate the total for the month of January.
6. Use function AVERAGE and write a formula in B7 to calculate the average for the month of January.
7. Copy the formulae in B6 and B7 and use them to calculate the total and average for other remaining months.
8. Use SUM function to get total of Arts Section in the cell E3.
9. Use AVERAGE function to get average of Arts section in the cell F3.
10. Copy the formulae in E3 and F3 and use them to calculate the total and average for other remaining departments.

7.6 Relative and absolute cell reference

7.6.1 Copying a formula

A class teacher calculates the total and average of each student after the examinations of a term. However, using an electronic spreadsheet would make this task efficient. This is because one can copy the formulae once and apply it to many other instances. Hence let us look at the steps on how to copy formulae along rows and columns.

7.6.2 Fill handle of a cell

The small black square in the bottom – right corner of the selected cell or range is called a fill handle. See figure 7.32

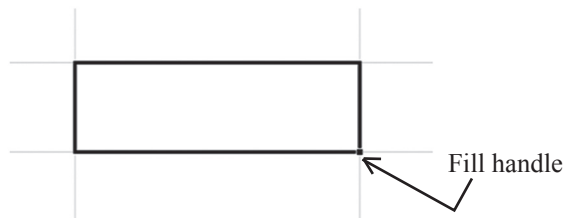


Figure 7. 32 - fill handle

7.6.3 Use of fill handle for copying formulae

Follow the steps below to copy formulae using the fill handle.

1. Select the cell which contains the formula.
2. Click the small black square in the bottom-right corner of the selected cell.
3. Drag the fill handle up to the required cell.

7.6.4 Use of copy and paste commands for copying formulae

Follow the following steps to copy formulae using the copy – paste commands which contains the formula.

- (1) Select the cell.
- (2) Copy the contents of the selected cell (Ctrl+C).
- (3) Select the cell to which the formula is to be pasted.
- (4) Paste the contents on the selected cell (Ctrl+V).

7.6.5 Relative and absolute cell reference

A cell address (reference) consists of a column letter and a row number. In a formula such a cell address is always called as a relative reference. The dollar sign (\$) when sign is placed before a row number absolute row is obtained, when (\$) mark is placed before a column name an absolute column is obtained, when (\$) is placed before column name and row number absolute column and row absolute can be obtained.

Example

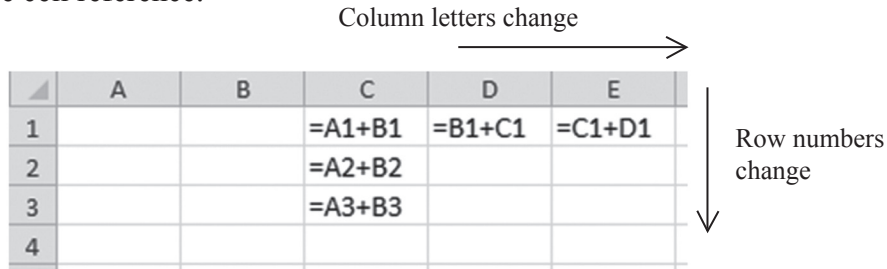
- H2 - Relative cell reference
- H\$2 - Row absolute cell reference
- \$H2 - Column absolute cell reference
- \$H\$2 - Row and column absolute cell reference

7.6.6 Relative cell reference

If the row number and the column letter of the adjacent cells change accordingly when a formula is copied, such cell addresses are called relative cell reference.

Example

When the formula A1+B1 entered in C1 is dragged down along column C and dragged sideways along row 1, the cell references change accordingly as shown in image 7.33 below. Hence the cell references A1 and B1 could be considered relative cell reference.



Column letters change →

	A	B	C	D	E
1			=A1+B1	=B1+C1	=C1+D1
2			=A2+B2		
3			=A3+B3		
4					

↓ Row numbers change

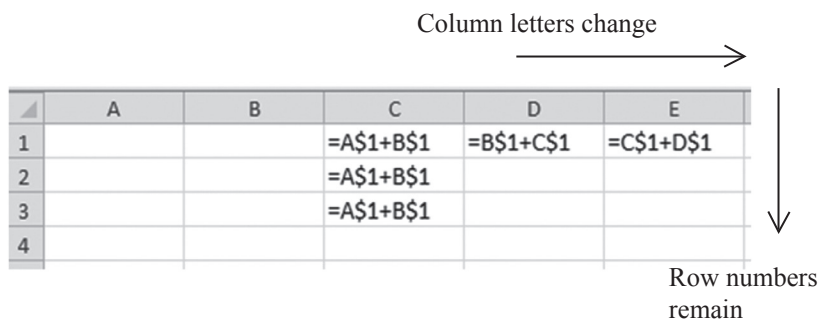
Figure 7.33 - worksheet with relative cell reference

7.6.7 Row absolute cell reference

If the row number of the cells remain unchanged when a formulae is dragged sideways along a row, it is called row absolute cell reference.

Example

When the formula=A\$1+ B\$1 entered in C1, and is dragged down along column C and dragged sideways along row 1, as shown 7.34 only the column letters change relatively while the row numbers remain unchanged. Hence the cell reference A\$1 and B\$1 can be called row absolute cell reference.



Column letters change →

	A	B	C	D	E
1			=A\$1+B\$1	=B\$1+C\$1	=C\$1+D\$1
2			=A\$1+B\$1		
3			=A\$1+B\$1		
4					

↓ Row numbers remain

Figure 7.34 - Work sheet with absolute row cell reference

Example 2

See worksheet 7.35 where the price of many pencils are derived when we know the price of the pencil.

	A	B	C
1	Pencil	Price of a Pencil	Amount(Rs)
2	1	10.00	10.00
3	2		20.00
4	3		30.00
5	4		40.00
6	5		50.00
7	6		60.00

Figure 7.35 - Relative and absolute cell reference

=A2*B2 is the formula we need to enter in C2 to calculate the price of pencils along the column C relative to the number of pencils. Note that we cannot calculate the price of pencils by copying along column C. When the formula is being copied A2 should relatively change into A3,A4,A5 etc. But the cell B2 should always remain constant within the formula. Hence the correct formula to be written in cell C2 is =A2*B\$2.

7.6.8 Column absolute cell reference

If the column letter of the cells remain unchanged when a formula is dragged down along a column, it is called column absolute cell reference.

Example 1

When the formula = \$A1+\$B1 entered in C1 is dragged down along column C and dragged sideways along row 1, as shown in figure 7.36 only the row numbers change relatively while the column letters remain unchanged. Hence the cell reference \$A1 and \$B1 can be called column absolute cell reference.

Column letters remain →

	A	B	C	D	E
1			= \$A1+\$B1	= \$A1+\$B1	= \$A1+\$B1
2			= \$A2+\$B2		
3			= \$A3+\$B3		
4					

↓
Row numbers change

Figure 7.36 - Worksheet with column absolute cell reference.

Example 2

= SUM (\$B2:B2) is the formula to be entered along row 3 at the end each Over, to calculate the total runs. This is shown in figure 7.37 below.

	A	B	C	D	E	F	G	H
1	No. of Overs	1	2	3	4	5	6	
2	Runs per Over	13	14	10	7	15	11	
3	Total	=SUM(\$B2:B2)	27	37	44	59	70	
4								

Figure 7.37 - Worksheet with absolute cell reference and function column

When the formula is copied along row 3 it would appear as shown in figure 7.38 below.

	A	B	C	D	E	F	G
1	No. of Overs	1	2	3	4	5	6
2	Runs per Over	13	14	10	7	15	11
3	Total	=SUM(\$B2:B2)	=SUM(\$B2:C2)	=SUM(\$B2:D2)	=SUM(\$B2:E2)	=SUM(\$B2:F2)	=SUM(\$B2:G2)
4							

Figure 7.38 - Worksheet with column absolute cell reference including formulae

7.6.9 Row and column absolute cell reference

If the row numbers and column letters of the cells remain unchanged when a formula is dragged sideways along a row, such cell addresses are known as row and column absolute cell reference.

Example 1

When the formula =A\$1+\$B\$1 in C1 is copied along column A and row 1, the cell references do not change as shown in worksheet figure 7.39

Column letters remain unchanged →

	A	B	C	D	E
1			=A\$1+\$B\$1	=A\$1+\$B\$1	=A\$1+\$B\$1
2			=A\$1+\$B\$1		
3			=A\$1+\$B\$1		
4					

↓
Row numbers remain unchanged.

Figure 7.39 - Worksheet with row and column absolute cell reference

Hence when a formula with row and column absolute cell reference is copied along a row or column, the references within the cell remain unchanged.

Example 2

As per worksheet in figure 7.40, the prices of books as per quantity are to be calculated from D4 to I4 and prices of books as per the number of dozens are to be calculated from C5 to C10. Let us write all the formulas so that the relevant prices are displayed at once when we enter the unit price of a book in cell C1. We have C1 has to remain unchanged when the formula is copied along row 4 and along C. Hence we have to enter \$C\$1, within the relevant formula.

	A	B	C	D	E	F	G	H	I
1		Price of a book							
2				No of books					
3				1	2	3	4	5	6
4			Price	=D3*\$C\$1	=E3*\$C\$1	=F3*\$C\$1	=G3*\$C\$1	=H3*\$C\$1	=I3*\$C\$1
5	No of Dozens	1	=12*B5*\$C\$1						
6		2	=12*B6*\$C\$1						
7		3	=12*B7*\$C\$1						
8		4	=12*B8*\$C\$1						
9		5	=12*B9*\$C\$1						
10		6	=12*B10*\$C\$1						
11									

Figure 7.40 - Row and Column absolute cell reference

Activity



1. How would the formula appears when formulae are copied.

	A	B	C	D
1	=D2*\$E2+G\$2	=E2*\$E2+H\$2	=F2*\$E2+I\$2	=G2*\$E2+J\$2
2	=D3*\$E3+G\$2			
3	=D4*\$E4+G\$2			
4	=D5*\$E5+G\$2			
5	=D6*\$E6+G\$2			

	A	B	C	D
1	=K3-M2+N4			
2				
3				
4				
5				

	A	B	C	D
1	=E2*F\$2+\$G2			
2				
3				
4				
5				

	A	B	C	D
1	=G\$2*\$F2+G\$2-H2			
2				
3				
4				
5				

2. Write the difference between absolute and relative cell addresses.

RANK Function

The RANK function is used to find the position (rank) of a number within a given list of numbers. It is useful for identifying the first, second, third, etc., highest values in a data set such as a marks list or a sales report. It can also be used to determine a student's position in a class based on their total marks.

The basic structure is as follows;
 =RANK(number, ref, [order])

- **number:** the value whose rank you want to find
- **ref** The cell range that contains the numbers (ex: \$A\$2:\$A\$10). A more accurate rank can be obtained by giving this range as absolute cell references.
- **[order]**(optional) Indicates the order. Entering 0 in order (or leaving it blank) gives the Descending Order. This means the largest value is ranked as 1st. Entering 1 in order, gives the Ascending Order. This means the smallest value is ranked as 1st.

	A
1	marks
2	85
3	74
4	95
5	14
6	56
7	96
8	32
9	17
10	84
11	41
12	

Formula	Description	Result
=RANK(A2, \$A\$2:\$A\$11)	The value in A2 is ranked in descending order among the numbers in the fixed range from \$A\$2 to \$A\$11.	3
=RANK(A2, \$A\$2:\$A\$11, 0)	The value in A2 is ranked in descending order among the numbers in the fixed range from \$A\$2 to \$A\$11.	3
=RANK(A2, \$A\$2:\$A\$11, 1)	The value in A2 is ranked in ascending order among the numbers in the fixed range from \$A\$2 to \$A\$11.	8

Using absolute cell references like \$A\$2:\$A\$11 is essential to prevent the ref range from changing when you copy the formula to other cells.

Data Sorting

In spreadsheet software, Data Sorting is a useful tool that allows you to rearrange the order of your data.

It lets you sort values or text in ascending order (from smallest to largest) or descending order (from largest to smallest). By sorting data, you can analyze data and identify patterns more easily.

How the data is sorted

Steps to Sort Data

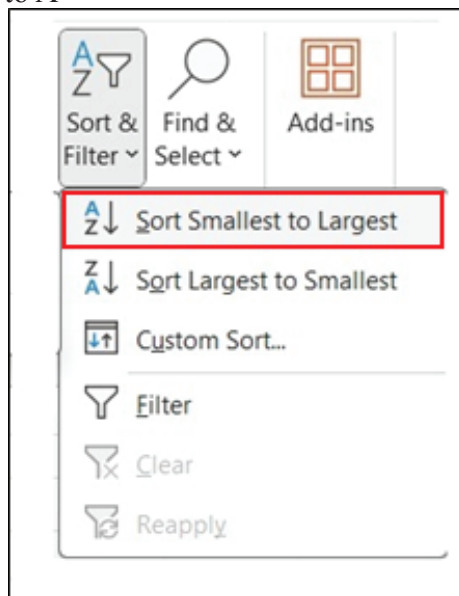
- * Select any cell within your data range.
- * Go to the Home tab, click the Sort & Filter button in the Editing group.
- * Choose either Sort A to Z (Ascending) or Sort Z to A (Descending).

Alternatively, go to the Data tab and click the Sort button. This opens a dialog box that allows you to sort data based on multiple columns.

1. Select any cell in your data range

	A	B	C
1	Student	Subject	Marks
2	Pasindu	Sinhala	98
3	Kumar	Maths	92
4	Anas	Science	85
5	Sandasi	History	78

2. Go to home tab and click sort and filter in editing section and select "sort A to Z" or "sort Z to A"



3. Sorted from the lowest mark to the highest mark.

	A	B	C
1	Student	Subject	Marks
2	Sandasi	History	78
3	Anas	Science	85
4	Kumar	Maths	92
5	Pasindu	Sinhala	98

Filtering

In spreadsheets, Filtering is used to manage and analyze large data sets. It temporarily hides rows that are not needed. Instead of deleting data permanently, filtering allows you to easily view only the information that meets the criteria you specify.

How to Use Filter

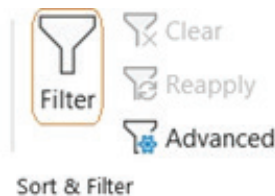
Follow these simple steps to use the filter tool

- Select any cell within your data range. It is important to have a header row for your data.
- Go to the Data tab on the ribbon. Click the Filter button in the Sort & Filter group. Then drop-down arrows will appear on each header cell.
- Click the arrow on the column you want to filter. A menu will appear showing the list of values in that column. For more specific conditions, you can also use Search, Text Filters, or Number Filters (Ex: “Greater Than”, “Begins With”).
- Click OK to apply the filter. All rows that do not match your condition will be immediately hidden.
- To remove the filter, click the arrow again and select Clear Filters.

01. Click the header row that you want to filter in the entire data table.

	A	B	C	D
1	Employee	Region	Product	Sales (LKR)
2	Ashen	North Central	Laptop	120,000
3	Pahan	Sabaragamuwa	Monitor	25000
4	Methuli	Central	Keyboard	8000
5	Daham	Uva	Mouse	5000
6	Amir	Eastern	Laptop	150,000
7	Rajah	Northern	Mouse	6500
8	Nawfa	Eastern	Keyboard	9500
9	Inshira	Western	Printer	80000
10	Wihanga	North Western	Scanner	30000

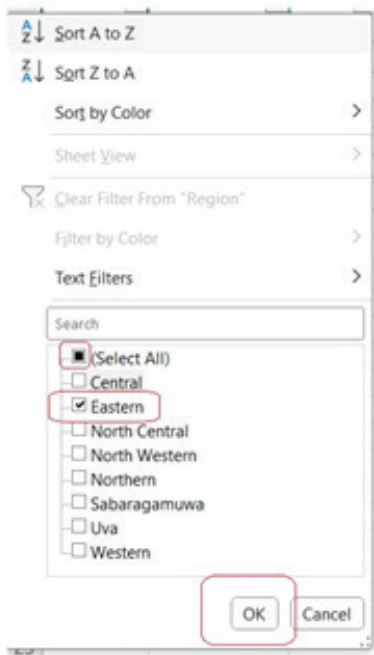
02. Go to the Data tab on the ribbon. Click the Filter button in the Sort & Filter group.



03. Then drop-down arrows will appear on each header cell.

	A	B	C	D
1	Employee ▼	Region ▼	Product ▼	Sales (LKR) ▼
2	Ashen	North Central	Laptop	120,000
3	Pahan	Sabaragamuwa	Monitor	25000
4	Methuli	Central	Keyboard	8000

4. Click the arrow on the column you want to filter. A menu will appear showing the list of values in that column. For more specific conditions, you can also use Search, Text Filters, or Number Filters (Ex: “Greater Than”, “Begins With”).



- In this case, Select All is unchecked and Eastern is selected. Then click OK.

5. Only the data related to Eastern is displayed.

	A	B	C	D
1	Employee	Region	Product	Sales (LK)
6	Amir	Eastern	Laptop	150,000
8	Nawfa	Eastern	Keyboard	9500
11				

7.7 Creation of charts using spreadsheets

It is not easy to comprehend, compare, analyze or present data when they are represented as numbers. But when data are presented in the form of charts they become an effective tool to communicate. Let us learn how spreadsheet applications are used for this purpose.

Given below are the various types of charts.

Table 7.20 - Types of charts

Type of chart	basic form	Purpose of chart
Column Chart		Comparing classes of data items in group. Group comparison
Bar Chart		Comparing classes of data items in group. Group comparison
Line Chart		Comparing classes of data items in group. Group comparison
Pie Chart		Comparing classes of data items as percentage.
XY Scatter Chart		Comparing data in pairs

Activity



Write down two examples use for the chart types in Figure 7.15.

Let us use the worksheet below to create a column chart and a pie chart.

	A	B	C	D	E	F	G	H
1	Name	Maths	Science	English	History	Sinhala	Total	
2	Ravidu	54	68	51	91	74	338	
3	Nadeshean	67	42	47	65	51	272	
4	Dinithi	78	56	72	52	53	311	
5	Ashwar	54	63	43	67	29	256	
6	Dilki	60	76	89	87	63	375	
7	Jayani	62	54	68	82	51	317	
8								

Figure 7.41- Worksheet with chart

Follow the steps below to create charts.

In Microsoft Office Excel 2010

1. Select the range of data (A1:F7)
2. Insert → Chart
3. Select the type of chart
4. Select the chart

In LibreOffice Calc

1. Select the range of data (A1:F7)
2. Insert → Chart
3. Select the type of chart
4. Select the chart
5. Click finish.

Follow the steps below to give a title to the chart.

In Microsoft Office Excel 2010

1. Select the type of chart
2. Layout → Chart Title → Above chart
3. Type a title

In LibreOffice Calc

1. Select the type of chart
2. Insert → Title
3. Type a title
4. Click OK

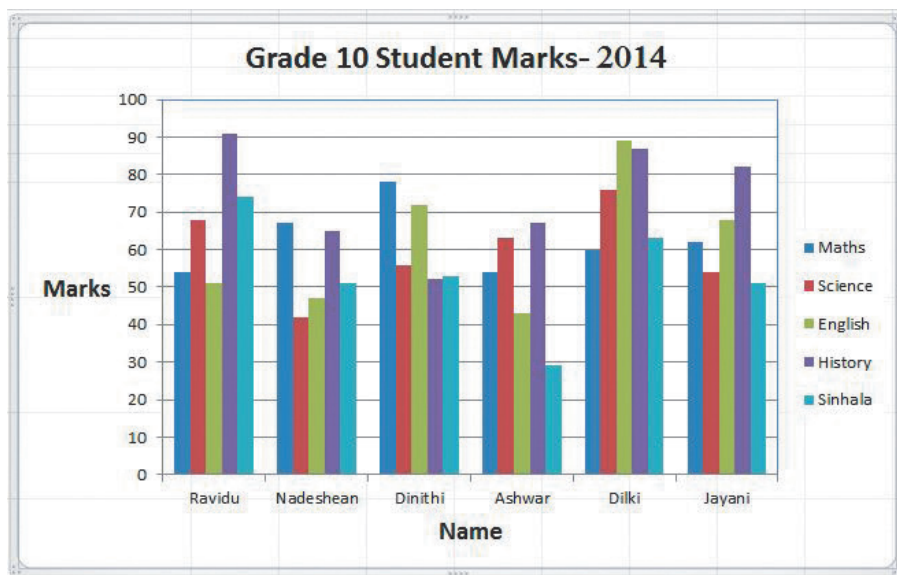
Follow the steps below to name the axis of the graph.

In Microsoft Office Excel 2010

1. Select the type of chart
2. Layout→ Axis Title
3. Name Axis Type (Vertical or Horizontal)

In LibreOffice Calc

1. Select the type of chart
2. Insert → Title
3. Name Axis
4. Click OK



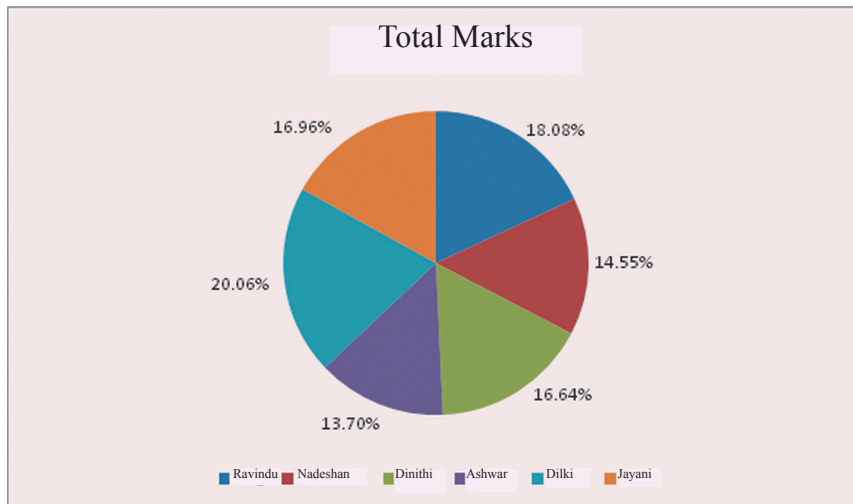
Let us display the marks of the students in a pie chart

In Microsoft Office Excel 2010

1. Select the data ranges A1:A7 and G1:G7
2. Insert→ Chart → Pie chart

In LibreOffice Calc

1. Select the data ranges A1:A7 and G1:G7
2. Insert→ Chart → Pie chart



Example: Drawing $Y=X^2-5X-3$ quadratic function chart

	A	B	C	D	E	F	G	H	I	J	K	L
1	X	-2	-1	0	1	2	3	4	5	6	7	
2	Y	11	3	-3	-7	-9	-9	-7	-3	3	11	
3												

1 Step: Enter the values 2 to 7 in axis as shown in worksheets.

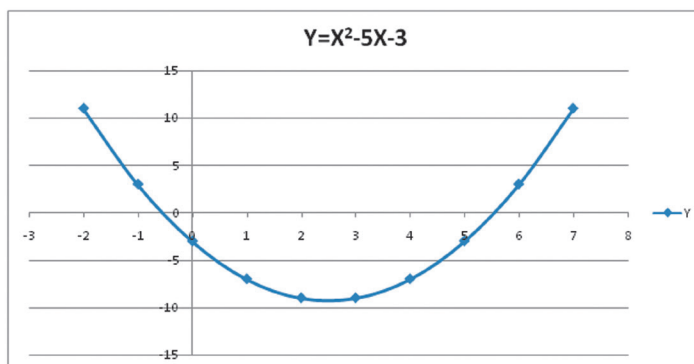
2 Step: Enter the formula below in cell B2.

$$= B1^2 - 5 * B1 - 3$$

3 Step: Copy the formula entered in B2 upto K2

4 Step: Mark A1:A2 a data range

5 Step: Insert → Chart → XY Scatter



Exercise

- 1) Provide answers based on the worksheet below.

	A	B	C	D	E
1	1	2	3	4	
2	5	6	7	8	
3	9	10	11	12	
4	13	14	15	16	
5					

- Name the cell range where 2,6,10,14 are present.
- Name the cell range where 9,10,11,12 are present.
- Name the cell range where 6,7,8,10,11,12 are present.
- Write the formula in A5 using only cell addresses to calculate the total of the values from A1 to A4.
- Write the formula in A3 using function to calculate the total of the values from A3 to D3.
- Write how you would copy the formula in E3 to E4
- Write the formula in A5 using function to calculate the average of the values from A3 to D3.

Activity



Create the below worksheet using a spreadsheet. Those who were absent are marked 'ab'.

	A	B	C	D	E	F	G	H
1	Name	Maths	Science	English	History	Sinhala	Total	Average
2	M.Saman Kumara	54	68	51	91	74		
3	K.Rajarithnam	67	81	47	65	ab		
4	A.Dinithi Udeshika	78	56	72	52	53		
5	M.U.Mifraj	ab	63	69	67	89		
6	A.Dilki Ridmika	60	76	89	87	ab		
7	T.Jayani Saranga	62	54	68	82	51		
8								
9	Maximum Marks							
10	Minimum Marks							
11	No. of Present Students							
12	Average Marks of a Subject							
13								

Use a single function and create the formulae

- (1) Enter the formula in G2 to calculate the total marks scored by Saman Kumara
- (2) Enter the formula in H2 to calculate the average scored by Saman Kumara.
- (3) Enter the formula in B9 to find out the highest score obtained for Mathematics.
- (4) Enter the formula in B10 to find out the lowest score obtained by students in each subject.
- (5) Enter the formula in B11 to find out the number of students present for each subject.
- (6) Enter the formula in B12 to find out the average score of each subject

Activity



The following spreadsheet shows some statistics related to the number (in millions) of electric vehicles (EV) registered from 2010–2021 for 12 selected countries.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	Electric vehicles (EVs) registered during the period 2010–2021 in 12 selected countries														
2	Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Increase in 12 years (N)	Increase in 2021 relative to 2020
3	Australia	0.5	0.8	1.1	1.9	2.8	4.2	6	7.5	10.4	15.2	18.9	25.4		
4	Bangladesh	0.1	0.2	0.3	0.5	0.7	1.2	1.9	2.6	3.2	4.8	5.6	7.9		
5	China	2	4.3	7.5	12.6	20.4	32.5	45	61.3	88.7	123.4	160	210		
6	Finland	0.2	0.3	0.5	0.7	1.1	1.5	2.3	3	4.6	5.5	6.4	8.3		
7	Greece	0.1	0.1	0.2	0.4	0.5	0.8	1.2	1.8	2.3	3	3.6	4.4		
8	India	0.3	0.4	0.7	1.3	2.4	4	6.8	9.3	14	20.5	28	38.5		
9	Malaysia	0.2	0.2	0.4	0.6	0.9	1.4	2.2	3.1	4.3	6	8.2	10.1		
10	Pakistan	0.1	0.1	0.1	0.3	0.4	0.6	1.1	1.5	2	2.8	3.5	4.2		
11	Singapore	0.1	0.1	0.2	0.3	0.6	0.9	1.3	1.9	2.5	3.7	4.9	6.8		
12	Sri Lanka	0	0.1	0.2	0.3	0.5	0.8	1.1	1.7	2.4	3.2	4.1	5		
13	United Kingdom	1.1	1.9	2.8	4.5	6.3	10.1	15.8	22.4	31	41.5	54	70		
14	Vietnam	0	0.1	0.2	0.4	0.6	1	1.5	2.2						

- 1) The column N is used to show the electric vehicle registration increase in 12 years. This is calculated by deducting the 2010 value from the 2021 value. Write down a suitable formula for cell N3 to get the 12 year increase for Australia.
- 2) Assume the formula written in cell N3 is copied to the cell range N4:N14 to get the increased values of other countries. Write down the formula which shows the increased value for Sri Lanka. (cell N12).
- 3) Column O is used to display the increase in electric vehicle registration in 2021 relative to 2020.
 - (a) What is the formula to be written in cell O15 to display the lowest increase value?
 - (b) What is the formula to be written in cell O16 to display the highest increase value?

Note: These formulae must be written in the =function(cell1:cell2) form.

- 4) Assume that in cell P3 the formula =(O3/O16)*100 is entered to display the ratio between Australia's increase and the highest increase. However, this formula is not suitable to be copied to the cell range P4:P14 to display the ratios for the other countries. Write down the correct formula that needs to be entered to cell P3 to fulfill the above purpose.
- 5) From line and pie charts, what is the most suitable to compare the changes of electric vehicle registration of these countries over the period 2010-2020? Briefly justify your answer.
- 6) Write a formula to round the value in cell K3 (registrations of Australia in 2019) to the nearest whole number.
- 7) Suppose you want to check whether a country had more than 50 electric vehicle registrations in 2021. Write the formula that should be entered in cell Q3 (for Australia) to display "HIGH" if it is greater than 50, otherwise to display "LOW".
- 8) Suppose you want to rank the countries based on the total increase over 12 years (column N). If the highest increase receives rank 1, write the function that should be used to rank Australia's increase.

Summary

- A worksheet is composed of vertical columns and horizontal rows in two dimensional plane.
- Columns in a worksheet are named with English letters or combination of English letters.
- Rows in a worksheet are named with numbers.
- Cells are named firstly by column letter and secondly by row number.
- Cell content is either a label, value or a formulae.
- A formulae is initiated with equals sign (=).
- There is a precedence of operators.
- Formulas are made with cell addresses, operators and functions.
- Formatting tools are used to format labels and values.
- The fill handle is used to copy formulae.
- Dollar sign (\$) is used to make absolute cell reference.
- Several chart types are available in spreadsheet applications.