VIA AFRIKA DIGITAL EDUCATION ACADEMY

Microsoft 365

SESSION 5

Processing numerical data using Microsoft Excel, Part 2

CLASS NOTES

basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

Via Afrika

In partnership with the Department of Basic Education.

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Course content

Microsoft 365

Session 1: Producing written documents using Microsoft Word, Part 1

Session 2: Producing written documents using Microsoft Word, Part 2

Session 3: Producing written documents using Microsoft Word, Part 3

Session 4: Processing numerical data using Microsoft Excel, Part 1

Session 5: Processing numerical data using Microsoft Excel, Part 2

Session 6: Preparing presentations using Microsoft PowerPoint

Session 7: Keeping things together using Microsoft OneNote

Session 8: Mastering online and mobile Microsoft Apps for classroom success

Microsoft 365

Session 5: Processing numerical data using Microsoft Excel, Part 2

Class Notes

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Contents

Outcomes and content

Outcomes of the session

By the end of the session, the participant will be able to:

- produce a marksheet
- use formulae to perform calculations (addition, subtraction, multiplication and division)
- understand the order of preference
- understand the difference between and among Cell Names, Ranges and References
- use basic functions to solve simple problems (MIN, MAX, SUM, COUNT and AVERAGE)
- identify problems based on error indicators (#VALUE!, #NAME?, #NUM!, #REF! and #DIV/0!)
- troubleshoot basic errors in formulae and functions
- work with sheets in a workbook (insert, delete and rename)
- perform calculations using functions (COUNTA, COUNTBLANK, ROUND and COUNTIF)
- present numerical data
- create graphs/charts from given data and choose appropriate graph types (column, line and pie)
- edit graphs (chart title, axis titles, data labels and legend)
- troubleshoot basic problems in graphs

Content of the session

This session will focus on:

- formulae (addition, subtraction, multiplication and division)
- Cell Names, Ranges and References
- basic functions (MIN, MAX, SUM, COUNT and AVERAGE)
- problems based on error indicators (#VALUE!, #NAME?, #NUM!, #REF! AND #DIV/0!)
- troubleshooting basic errors in formulae and functions
- working with sheets in a workbook (insert, delete and rename)
- functions (COUNTA, COUNTBLANK, ROUND and COUNTIF)

- presenting numerical data
- graphs/charts (column, line and pie)
- editing graphs (chart title, axis titles, data labels and legend)
- troubleshooting basic problems in graphs

Outcomes of Session 4 as a reminder

By the end of the session, the participant will be able to:

- understand the purpose of a spreadsheet
- understand the concepts of a cell, row, column and sheet
- understand the use of Cell References
- format and edit cells (key in data, wrap text, merge and unmerge cells, align text, add borders and shading, adjust text direction)
- use the autofill feature
- use number formats (general, number, currency, text)
- resize rows and columns
- sort data up to two levels
- format and edit spreadsheets (paper size, page margins and page orientation)
- set a print area and print titles (gridlines, repeat rows/ columns)

Overview

Welcome to **Session 5: Processing numerical data using Microsoft Excel, Part 2**.

In Session 4 (**Part 1**) you were introduced to working with spreadsheets, and you created your own class list in spreadsheet format.

In this session (**Part 2**) you will produce a marksheet and learn how to present numerical data in Excel. You will build on your knowledge of how to create, format, edit and save spreadsheets. You will also learn to perform numerical calculations using formulae and functions. Then, to top it all off, you will present your numerical data in visual formats that are easy to analyse and interpret.

By the end of this session, you'll be able to process complex numerical data in spreadsheets.

Producing a marksheet

More about cells

In order to use Excel effectively you need to be able to work well with specific cells, Cell Ranges and Cell References.

Cell Name

The Cell Name identifies a cell by the column the cell is in, and the row it is in. For example, Cell A3 can be found in the Column A and in Row 3.

Cell Range

A Cell Range is a set of individual cells that you wish to work with. A Cell Range is stated in a particular way. They are keyed in as a pair of cells separated by a colon. They can be:

- A number of cells in a column, for example, A2:A15. This refers to all the cells in Column A from Row 2 up to Row 15.
- A number of cells in a row, for example, A2:F2. This refers to all the cells in Row 2 from Column A to Column F.
- A number of cells in more than one column and across rows, for example, A2:B15. This refers to all the cells in Column A from Row 2 up to Row 15 and from Column B Row 2 up to Row 15.

You can enter the Cell Range manually, or you can highlight/select the range using your cursor.

Cell Reference

A Cell Reference refers to a cell or a Cell Range on a worksheet. Cell References are a useful formula because Microsoft Excel can find the values or data that you want that formula to calculate in another part of the worksheet or even another part of the workbook.

You can set one cell to have the same value or content as another cell. (For example, we can set Cell C2 to be the same as Cell A2.)

1. Type =A2 in Cell C2 and then press Enter.
2. Cell C2 will now have the same value as Cell A2.

Task

Familiarise yourself with Cell Names, Cell Ranges and Cell References by exploring on your own in Excel.

Using formulae

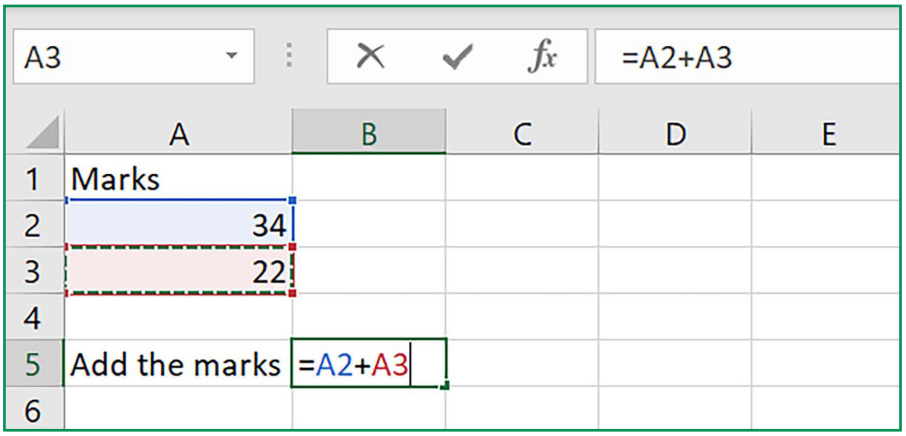
In Excel, once we have put data into our cells, we will use a number of different formulae and functions to work with that data to calculate information that is useful to us. This could include class averages, percentages or numbers of learners who achieved certain marks. We will start off with basic formulae involving the mathematics operations (add, subtract, minus and divide).

A formula in Excel always starts with an = sign and then will use either data or Cell References to complete it.
For example, =A2-3 means Subtract 3 from the data in Cell A2.

Operations

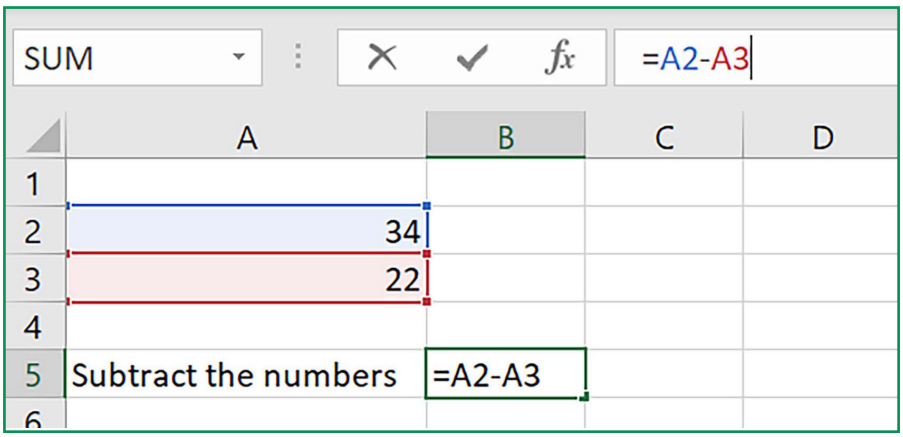
You can add numbers. Here, we want to add the number in Cell A2 to the number in Cell A3.

1. Select the cell in which you are going to work. In this example, it is Cell B5.
2. Type the equal sign =
3. Select the cell with the data you want (or type its Cell Reference in the selected cell). In this example, it is Cell A2.
4. Enter the + operator for addition.
5. Select the cell that contains the data you wish to add to the data in your selected cell (or type its name in the selected cell). In this example, it is Cell A3.
6. Press Enter. You should now see the sum of 34 + 22 in Cell B5.



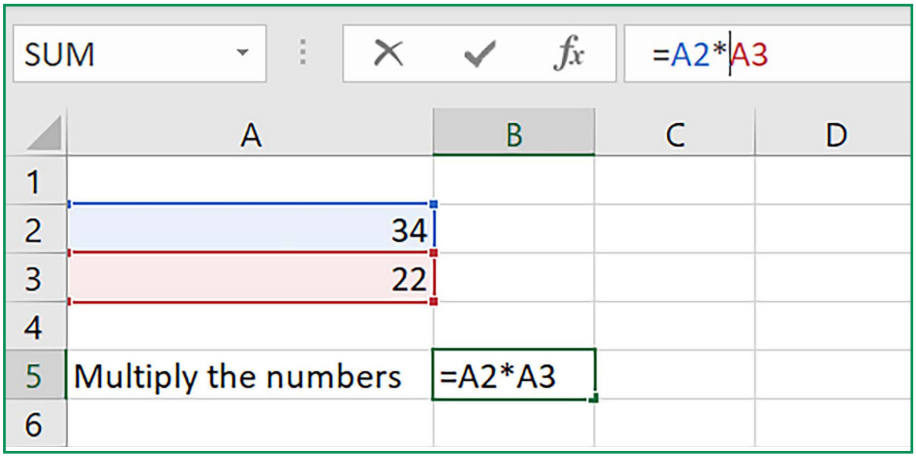
You can subtract one number from another number.

1. Select the cell in which you are going to work.
2. Type the equal sign =
3. Select the cell with the data you want (or type its Cell Reference in the selected cell).
4. Enter the - operator for subtraction.
5. Select the cell that contains the data you wish to subtract from the data in your selected cell (or type its name in the selected cell).
6. Press Enter.



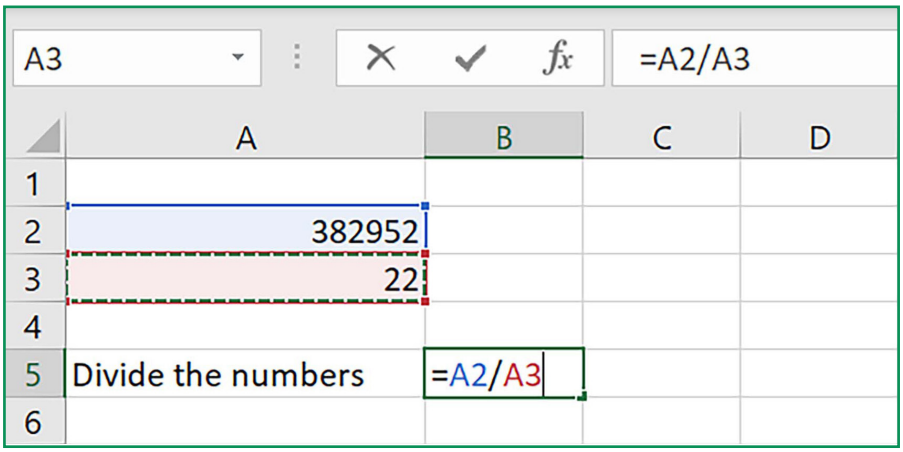
You can multiply one number with another number.

1. Select the cell in which you are going to work.
2. Type the equal sign =
3. Select the cell with the data you want (or type its Cell Reference in the selected cell).
4. Enter the * operator for multiplication (use Shift 8).
5. Select the cell that contains the data with which you wish to multiply the data in your selected cell (or type its name in the selected cell).
6. Press Enter.



You can divide one number by another number.

1. Select the cell in which you are going to work.
2. Type the equal sign =
3. Select the cell with the data you want (or type its Cell Reference in the selected cell).
4. Enter the / operator for division.
5. Select the cell that contains the data with which you wish to divide the data in your selected cell (or type its name in the selected cell).
6. Press Enter.

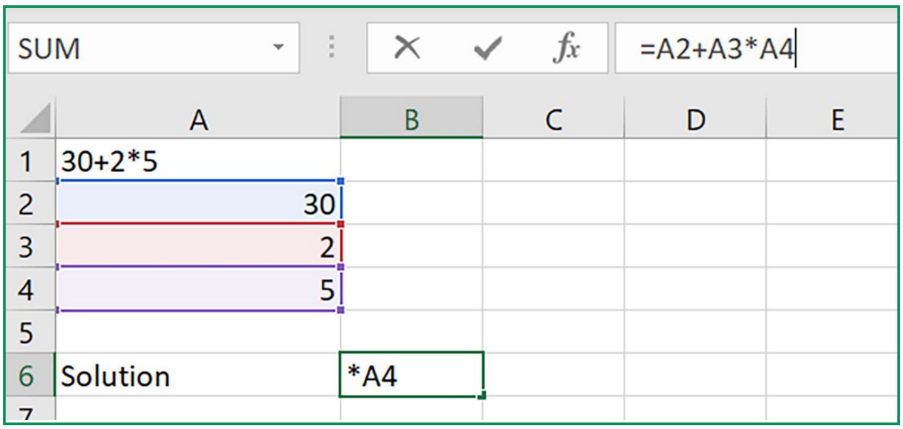


Multiple operations

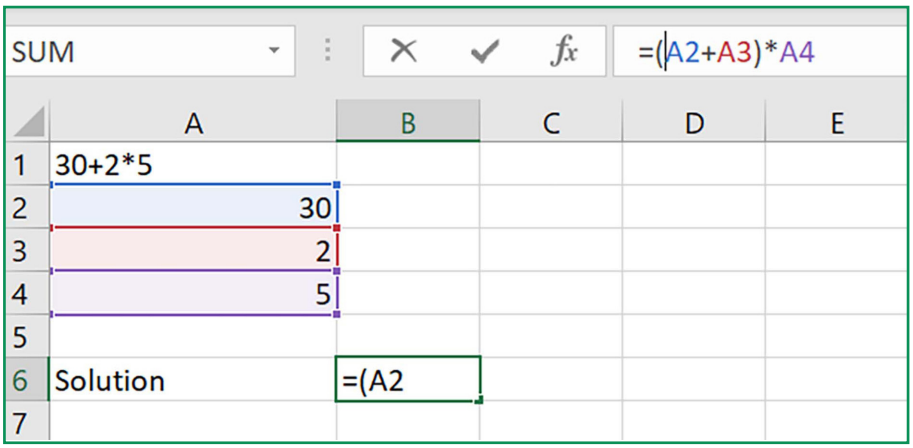
When you need to do different operations in the same calculation, remember that Excel will use the mathematics rules that say that operations happen in a strict order.

You can use brackets to change the order of operation.

For example, 30+2*5 versus (30+2)*5



If you want to add or subtract before you multiply or divide, put that operation in brackets.



Task

- Practice using all four operations (+, -, * and /) in formulae in Excel.
- Find the answers to the calculations above in the explanations on how to add, subtract, divide and multiply.
- You can find the solutions on page 19.

Using basic functions

Structure of a function

A function typically has four basic elements:

1. An equal sign.
2. A function name.
3. A set of brackets ( ).
4. An argument or arguments (the information or inputs that the function uses to do its job) that go into the brackets.

For example, =SUM(A1:A30)

Each function takes a different argument. Some take one argument while others take several.

Using basic functions

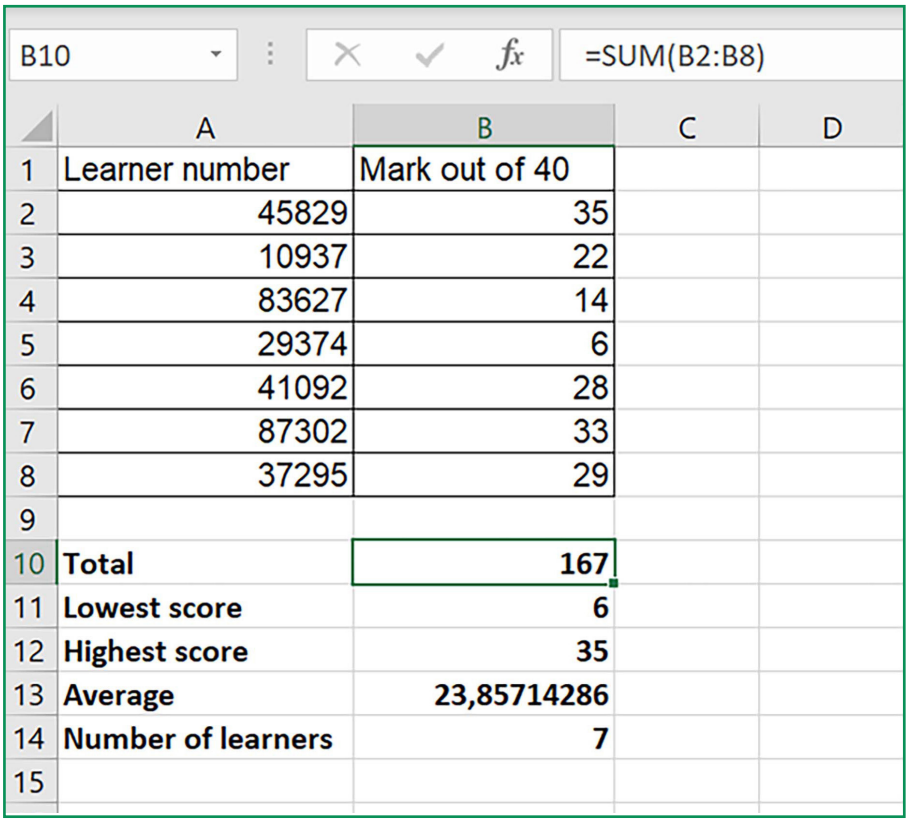
Excel provides us with some useful functions.

Function	What it does
SUM	Adds all the values in a specific Cell Range.
MIN	Returns the smallest value in a specific Cell Range.
MAX	Returns the biggest value in a specific Cell Range.
AVERAGE	Calculates the average for a specific Cell Range.
COUNT	This function counts all cells in a range that contain only numeric values.

There are many more functions that you'll encounter, but here are a few of the basic ones.

You can add up a set of marks using the SUM Function. In this example, we want to calculate the sum of a set of marks in Cell B10.

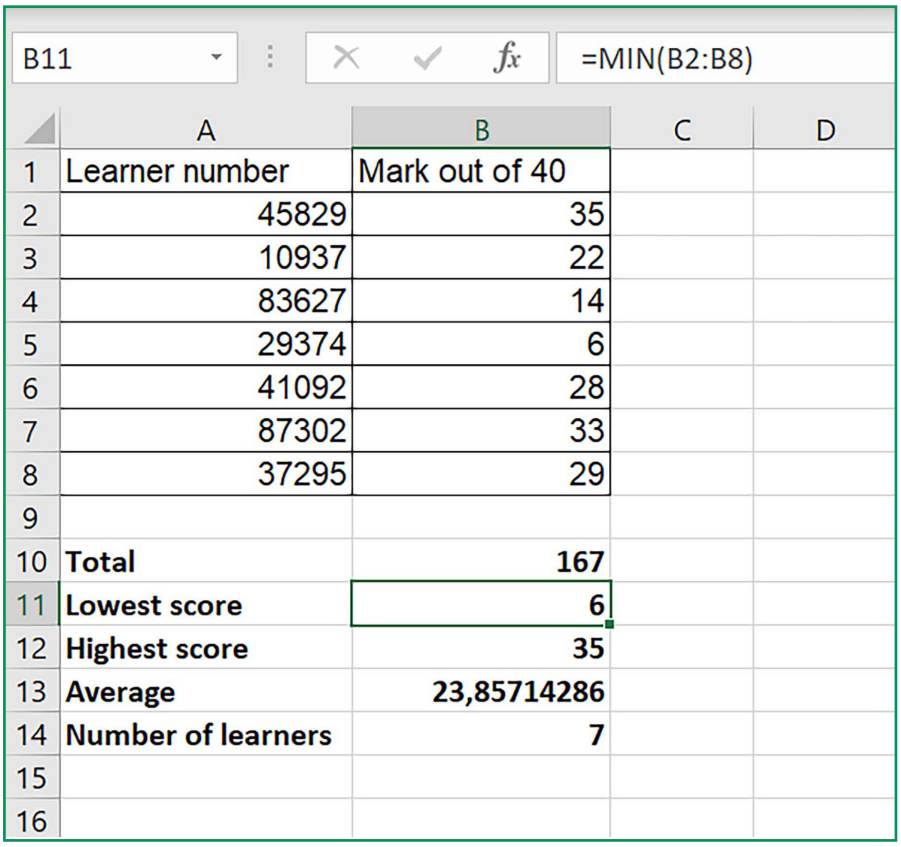
1. Select the cell in which you want to calculate the SUM.
2. Key in =SUM(
3. Select a cell Range.
4. Key in)
5. Press Enter.



	A	B	C	D
1	Learner number	Mark out of 40		
2	45829	35		
3	10937	22		
4	83627	14		
5	29374	6		
6	41092	28		
7	87302	33		
8	37295	29		
9				
10	**Total**	**167**		
11	**Lowest score**	**6**		
12	**Highest score**	**35**		
13	**Average**	**23,85714286**		
14	**Number of learners**	**7**		
15				

You can see who got the lowest mark using the MIN Function.

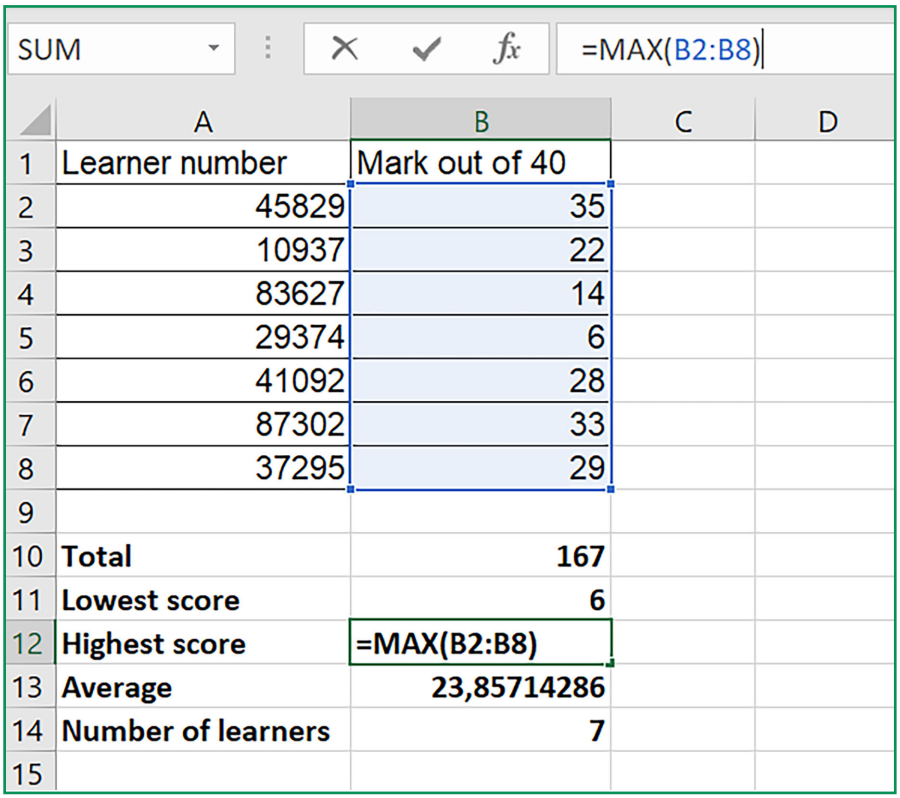
1. Select the cell in which you want to place the information from the MIN Function. In this example, we want to calculate the lowest mark in Cell B11.
2. Key in =MIN(
3. Select a Cell Range.
4. Key in)
5. Press Enter.



	A	B	C	D
1	Learner number	Mark out of 40		
2	45829	35		
3	10937	22		
4	83627	14		
5	29374	6		
6	41092	28		
7	87302	33		
8	37295	29		
9				
10	**Total**	**167**		
11	**Lowest score**	**6**		
12	**Highest score**	**35**		
13	**Average**	**23,85714286**		
14	**Number of learners**	**7**		
15				
16				

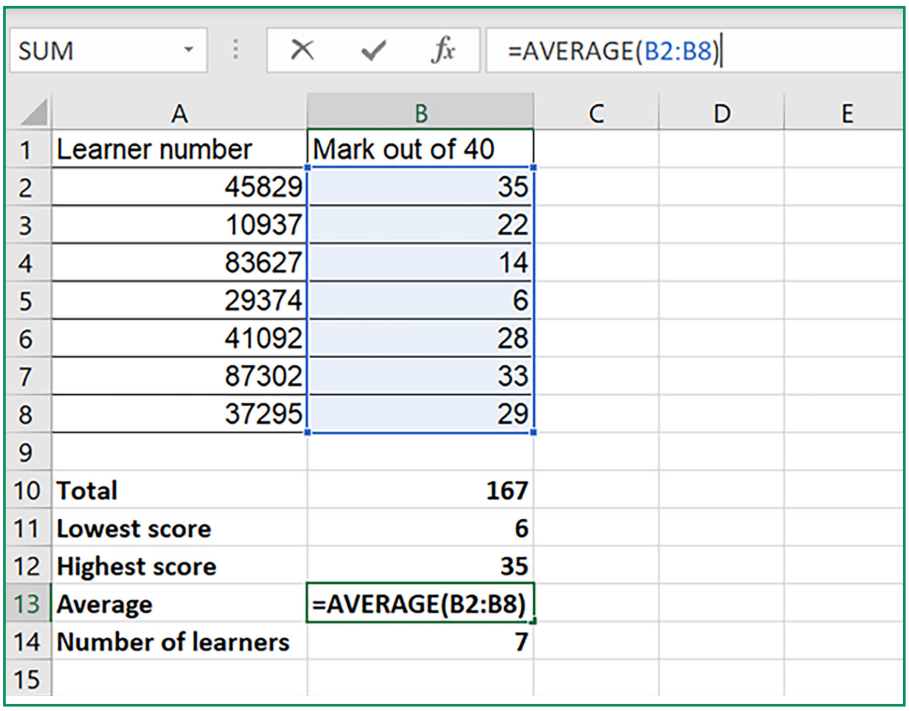
You can see who got the highest mark using the MAX Function.

1. Select the cell in which you want to place the information from the MAX Function. In the example at the top of the next page, we want to calculate the highest mark in Cell B12.
2. Key in =MAX(
3. Select a Cell Range.
4. Key in)
5. Press Enter.



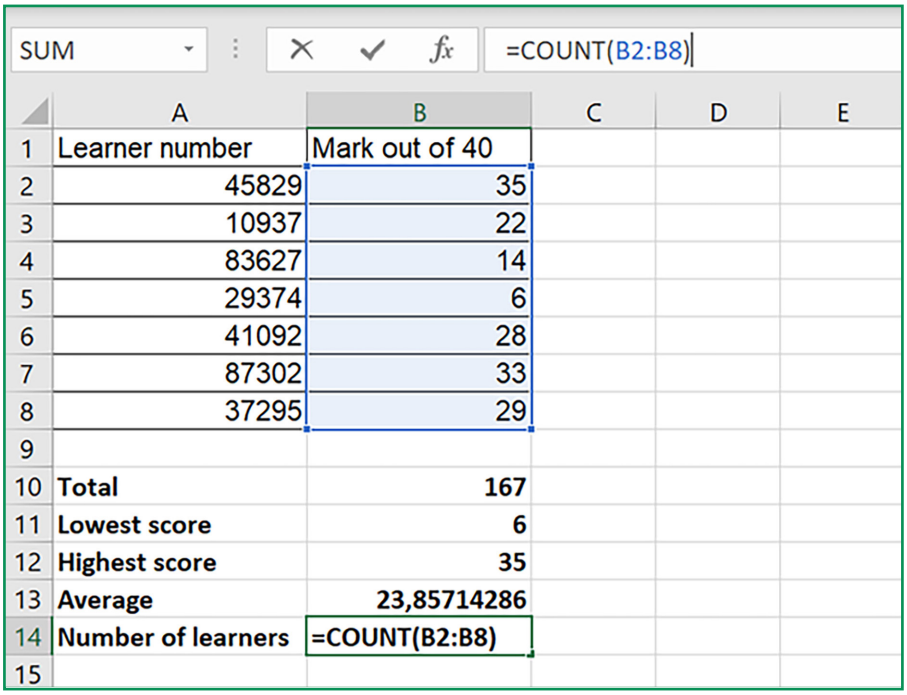
You can calculate a class average using the AVERAGE Function.

1. Select the cell in which you want to calculate the AVERAGE. In this example, we want to calculate the class average in Cell B13.
2. Key in = AVERAGE(
3. Select a Cell Range.
4. Key in)
5. Press Enter.



You can count rows using the COUNT Function.

1. Select the cell in which you want to place the information from the COUNT Function. In this example, we want to look at the number of learners, in Cell B14.
2. Key in =COUNT(
3. Select a Cell Range.
4. Key in)
5. Press Enter.



	A	B	C	D	E
1	Learner number	Mark out of 40			
2	45829	35			
3	10937	22			
4	83627	14			
5	29374	6			
6	41092	28			
7	87302	33			
8	37295	29			
9					
10	**Total**	**167**			
11	**Lowest score**	**6**			
12	**Highest score**	**35**			
13	**Average**	**23,85714286**			
14	**Number of learners**	**=COUNT(B2:B8)**			
15					

Remember, COUNT only counts the number of Cells that contain numerical values.

Task

Enter some random test results on your marksheet and have fun playing with the basic functions: SUM, MIN, MAX, AVERAGE and COUNT.

Identifying and dealing with errors

When you enter data into a spreadsheet and use formulae, you will from time-to-time receive an error message. Do not panic! Simply follow these instructions to fix the error.

Errors and possible fixes

Error	What it means	Possible fixes
#VALUE!	There's something wrong with the way your formula is typed or there's something wrong with the cells you are referencing.	• Check that the formula has been entered correctly. • Check for text or spaces in referenced cells.
#NAME?	There is a typing error in the formula name.	• Check the formula for typing errors.
#NUM!	You've entered a numeric value using a number format that's not supported between the brackets of the formula.	• Check values entered in the brackets of the formula. • Enter values as unformatted numbers (for example, 100 instead of R100,00).
#REF!	Your formula refers to a cell that's not valid. This happens most often when cells that were referenced by formulae have been deleted.	• Adjust the formula so that it uses a Range Reference instead of individual cells.
#DIV/0!	Microsoft Excel shows the #DIV/0! error when a number is divided by zero.	• Make sure the divisor in the function or formula isn't zero or a blank cell (for example, 34/0).

More functions

There are two other functions that are worth learning about to make your teaching administration easier. These functions are the COUNTIF and ROUND Functions.

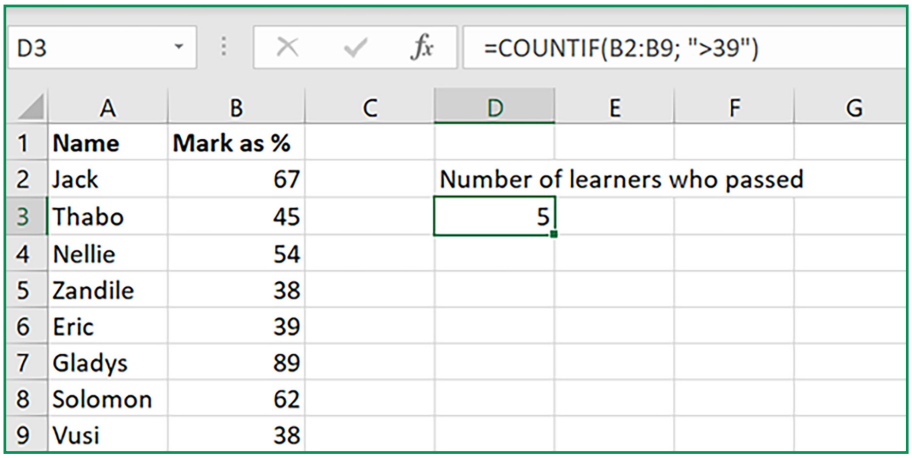
COUNTIF

When you want to calculate how many learners passed a test you could count them all one by one. This is slow. You can, however, use the COUNTIF Function built into Excel to make things easier. COUNTIF takes a number you put into the formula and then looks at all the numbers in the range.

Then it counts any numbers which are above the number you put into the formula, or below the number you put into the formula (depending on what you say in the formula). It gets easier with an example.

You can use the COUNTIF Function to count the number of numbers of a certain value and above that value. (In our example we want to know how many learners achieved 40% or higher on a test.)

1. Select the cell in which you want to display the number of values. In this example, we want to look at the number of learners who passed, in Cell D5.
2. In that cell, key in =COUNTIF(
3. Select the Cell Range that contains the numbers to be counted.
4. Key in a semicolon.
5. Enter the criterion that you are looking for. We are looking for marks above 39, so we will key in '**>39**' (Remember to put your criteria between quotation marks.)
6. Key in)
7. Press Enter.



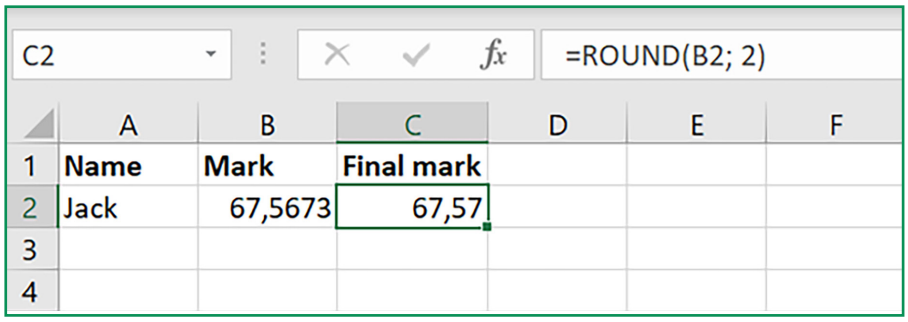
	A	B	C	D	E	F	G
1	**Name**	**Mark as %**					
2	Jack	67		Number of learners who passed			
3	Thabo	45		5			
4	Nellie	54					
5	Zandile	38					
6	Eric	39					
7	Gladys	89					
8	Solomon	62					
9	Vusi	38					

ROUND

Sometimes the learner's average will not be a whole number, so we need to round the number. There are rules to follow, and the Excel Function does it all for you.

You can use the ROUND Function to round numbers to two digits after the decimal comma. (We want two in our example.)

1. Select the cell in which you want to display the rounded off number.
2. In that cell, key in =ROUND(
3. Select the cell that contains the number to be rounded.
4. Key in a semicolon
5. Type the number of digits you want after the decimal comma.
6. Key in)
7. Press Enter.



Task
Practice the COUNTIF and ROUND Functions using this information.

Learner number	Mark out of 40
45829	39
10937	22
83627	14
29374	6
41092	28
87302	33
37295	29

- Pass mark is 40%.
- How many learners did not pass?
- (Note that you will first have to calculate the percentage and Round it off.)
- You can see a solution on page 19.

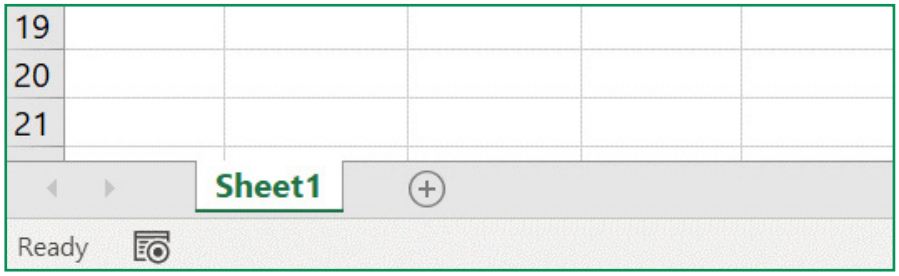
Working with sheets

When we work with Excel, we could create a new workbook (file) for each class, but that means we will have to move from one workbook to another when we work. It is more efficient to put all of our class marksheets (each on its own spreadsheet) into one workbook. You can create a workbook called something like 'Class marks' and then have a worksheet for each class.

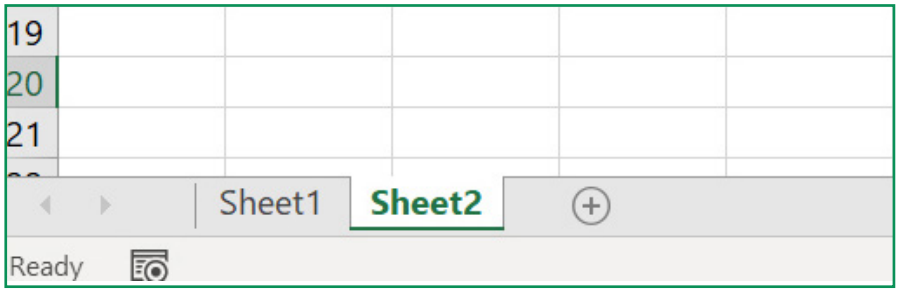
Adding a sheet

You can add a sheet to your workbook.

1. In the bottom left of the screen notice the words Sheet 1 on a tab.
2. Click the plus sign to the right of the tab.



3. Automatically a new sheet is created, Sheet 2.



4. Add more sheets by clicking the plus sign.

Deleting a sheet

You can delete a sheet from your workbook.

1. In the tabs showing the sheets in your workbook on the bottom left of the screen, click your Right Touchpad Button over the tab name you want to delete.
2. Select Delete from the menu.
3. If you have any data on the sheet, you will be warned. You can decide if you are happy for the data to be deleted, or you want to cancel the deletion.

Renaming a sheet

You can rename a sheet in your workbook.

1. In the tabs showing the sheets in your workbook on the bottom left of the screen, click your Right Touchpad Button over the tab that you want to rename.
2. Select Rename from the menu.
3. The existing name of the sheet will be highlighted in grey. Key in the new name into the grey highlight.

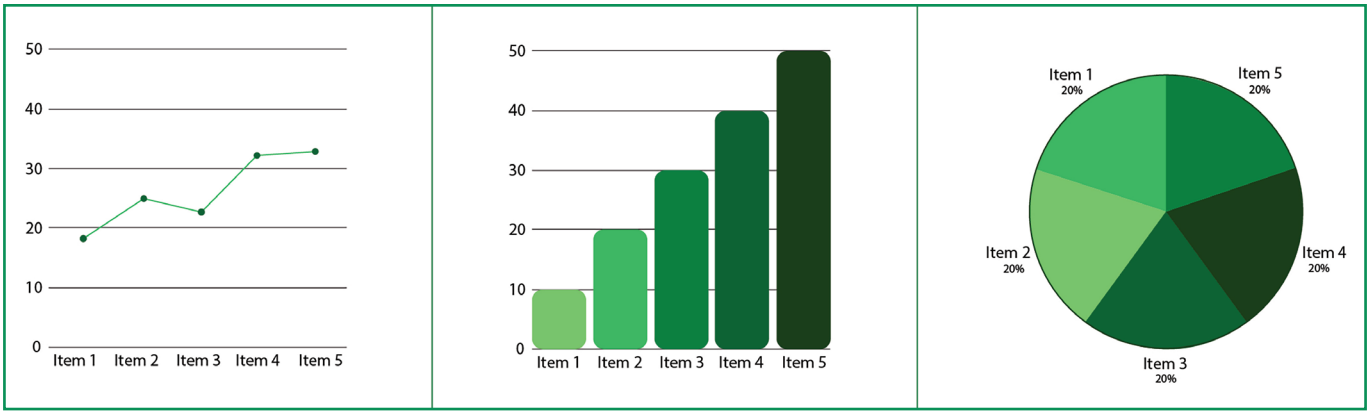
Task

Insert a new sheet into your document and change its name.

Presenting numerical data

Creating charts

Charts (often called graphs) can help us to show and explain complex data in a simple format that is easier to understand quickly. They are particularly useful when we are comparing the performance of learners in a class, or over time. Select the type of chart according to what you want to do.



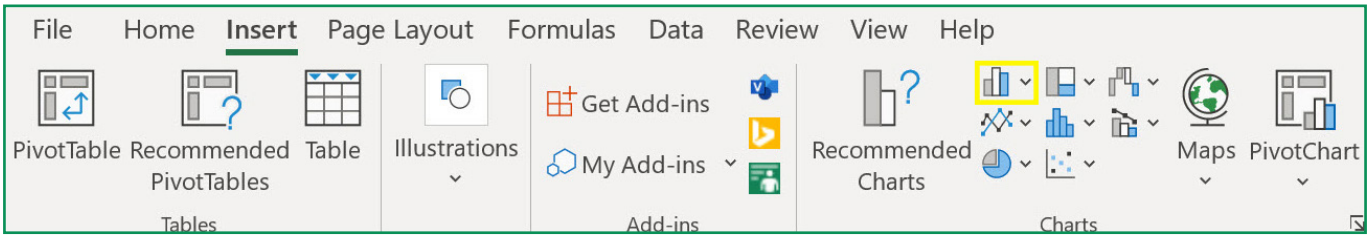
Line Chart | Column Chart | Pie Chart

Column (Bar) Chart

A column or bar chart is used to compare values across a few categories. You could use this, for example, to show a comparison of term averages among the different classes you teach.

You can create a Column or Bar Chart.

1. Select the data for the chart.
2. Work in the Charts Group on the Insert Tab Ribbon.
3. Click on the Column Chart Button.
4. Select your preferred Column Chart.

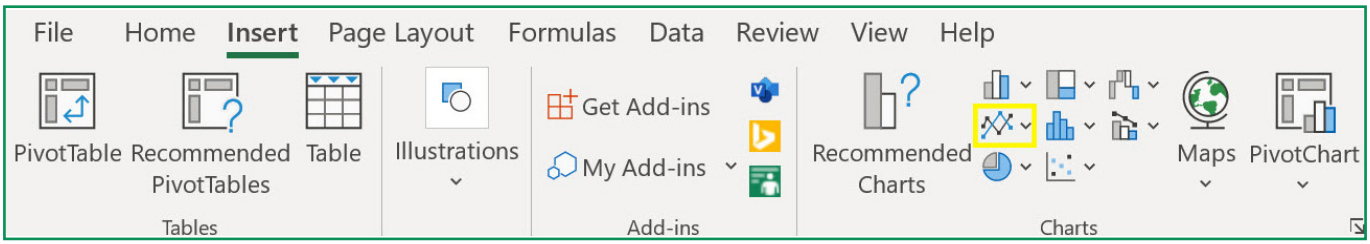


Line Chart

A Line Chart is used to show trends across time or categories. You could use this, for example, to show a comparison of year averages among the different classes you have taught in the last three years.

You can create a Line Chart.

1. Select the data for the chart.
2. Work in the Charts Group on the Insert Tab Ribbon.
3. Click on the Line Chart Button.
4. Select your preferred Line Chart.

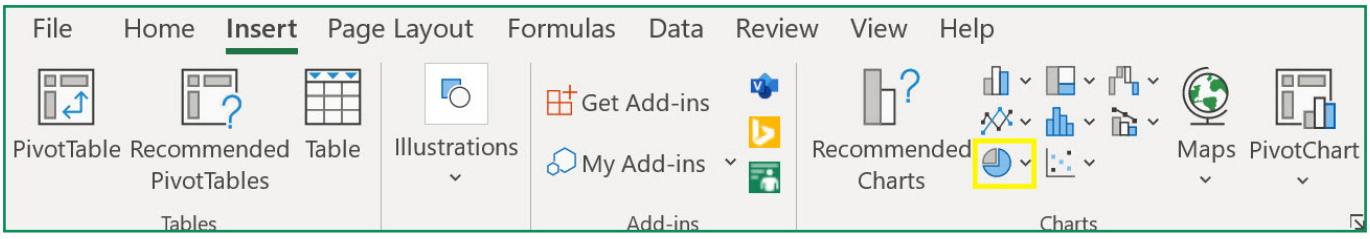


Pie Chart

A Pie Chart is a graph in which a circle is divided up into slices (like a pie) that each represent a proportion of the whole or, in other words, the size of each slice of the pie). Use a pie chart when the total of your number is 100%. You could use this, for example, to show the portion of learners who achieved different grades (0 to 39%, 40% to 49%, 50 to 59% etc.).

You can create a Pie Chart.

1. Select the data for the chart.
2. Work in the Charts Group on the Insert Tab Ribbon.
3. Click on the Pie Chart Button.
4. Select your preferred Pie Chart.



Task

Play around with your marksheet to create different types of charts.

Editing charts

Once you have prepared your chart you may wish to make some changes to what it looks like and the information it contains.

Chart Title

You can change the Chart Title.

1. Click in the chart.
2. Click on the Chart Title.
3. Double-click in the Text Box.
4. Delete the placeholder text and change the title to what you need.
5. Click anywhere on the sheet to save the change.

Axis Titles

You can change the Axis Title of the chart.

1. Click in the chart.
2. Click Plus.
3. Check the box next to Axis Titles.
4. Double-click on the text Vertical Axis and change the label.
5. Double-click on the text Horizontal Axis and change the label.
6. Click anywhere on the sheet to save the change.

Data Labels

You can change the Data Labels of the chart.

1. Click in the chart.
2. Click Plus.
3. Check the box next to Data Labels.
4. Use the arrow on the right to place the data labels in various places (for example, in the centre, in the inside end and so on).
5. Click anywhere on the sheet to save the change.

Legend

You can change the legend of the chart.

1. Click in the chart.
2. Click Plus.
3. Check the box next to Legend.
4. Right-click in the box that is called Series 1.
5. Click Select Data.
6. Click Edit in the section called Legend Entries.
7. Change the name to your preferred name.
8. Click OK.

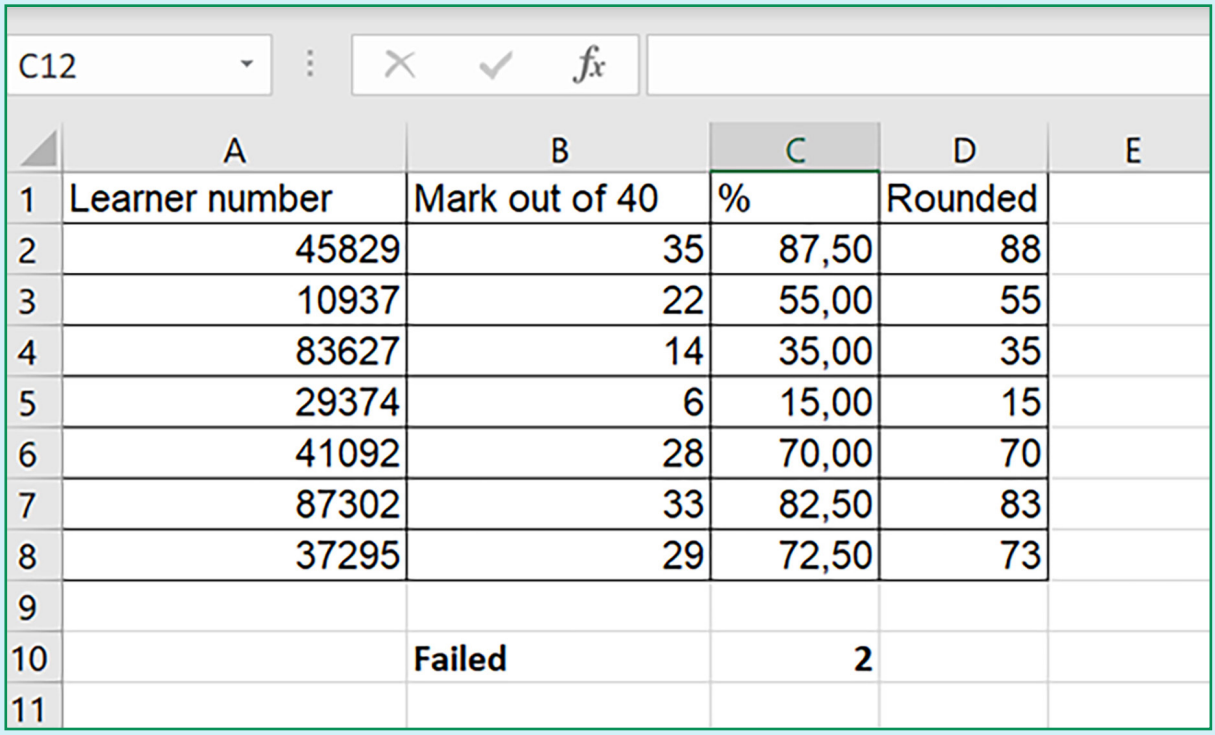
Reflection

Make notes in your PD Journal. What changes will you make to your way of working now that you know how to use Excel?

Task memos

Task Operations
Addition = 56
Subtraction = 12
Multiplication = 748
Division = 17406,91
32+2*3 = 38
(32+2)*3 = 102

Task ROUNDING and COUNTIF



	A	B	C	D	E
1	Learner number	Mark out of 40	%	Rounded	
2	45829	35	87,50	88	
3	10937	22	55,00	55	
4	83627	14	35,00	35	
5	29374	6	15,00	15	
6	41092	28	70,00	70	
7	87302	33	82,50	83	
8	37295	29	72,50	73	
9					
10		**Failed**	**2**		
11					

About the Final Assessment

At the end of this training session, you will be asked to complete the Final Assessment.

If you complete the Final Assessment successfully, you will qualify for your virtual badge and certificate (refer to the sample certificate and sample badge on this page).

Final Assessment

Indicate the ONE correct response for each question.	
1	Select the best option to complete these sentences. The Cell Name _____ a cell by the _____ the cell is in, and the _____ it is in. For example, Cell A3 can be found in the Column A and in Row 3.
a	(1) references (2) angle (3) row
b	(1) identifies (2) column (3) row
c	(1) column (2) identifies (3) row
2	Select the best option to complete these sentences. A Cell Range is a set of _____ that you wish to work with. A Cell Range is stated in a particular way. They are keyed in as a _____ separated by a _____.
a	(1) individual cells (2) pair of cells (3) colon
b	(1) pair of cells (2) individual cells (3) semicolon
c	(1) individual cells (2) pair of cells (3) semicolon
3	Select the best option to complete these sentences. A _____ refers to a cell or a Cell Range on a _____. Cell References are a useful formula because Microsoft Excel can find the _____ that you want that formula to calculate in another part of the worksheet or even another part of the workbook.
a	(1) Cell Range (2) worksheet (3) values or data
b	(1) Cell Reference (2) formula (3) values or data
c	(1) Cell Reference (2) worksheet (3) values or data
4	A formula in Excel always starts with an = sign and then will use either data or Cell References to complete it. For example, =A2-3 means Subtract 3 from the data in Cell A2. Which formula is correctly structured to work in Excel?
a	=A3+4
b	+3+4
c	/A4+A5

Final Assessment (continued)

Indicate the ONE correct response for each question.

5	You can multiply one number with another number by following these steps in order.
a	(1) Select the cell in which you are going to work. (2) Select the cell with the data you want (or type its Cell Reference in the selected cell). (3) Type the equal sign. (4) Enter the * operator for multiplication.
b	(1) Select the cell in which you are going to work. (2) Type the equal sign. (3) Select the cell with the data you want (or type its Cell Reference in the selected cell). (4) Enter the operator for multiplication.
c	(1) Select the cell in which you are going to work. (2) Type the plus sign. (3) Select the cell with the data you want (or type its Cell Reference in the selected cell). (4) Enter the / operator for multiplication.
6	A function typically has four basic elements:
a	(1) a divide sign. (2) a function name. (3) a set of brackets. (4) the information or inputs that the function uses to do its job that go into the brackets.
b	(1) an equal sign. (2) a function name. (3) a set of brackets. (4) the information or inputs that the function uses to do its job that go into the brackets.
c	(1) a plus sign. (2) a function name. (3) a set of brackets. (4) the information or inputs that the function uses to do its job that go into the brackets.

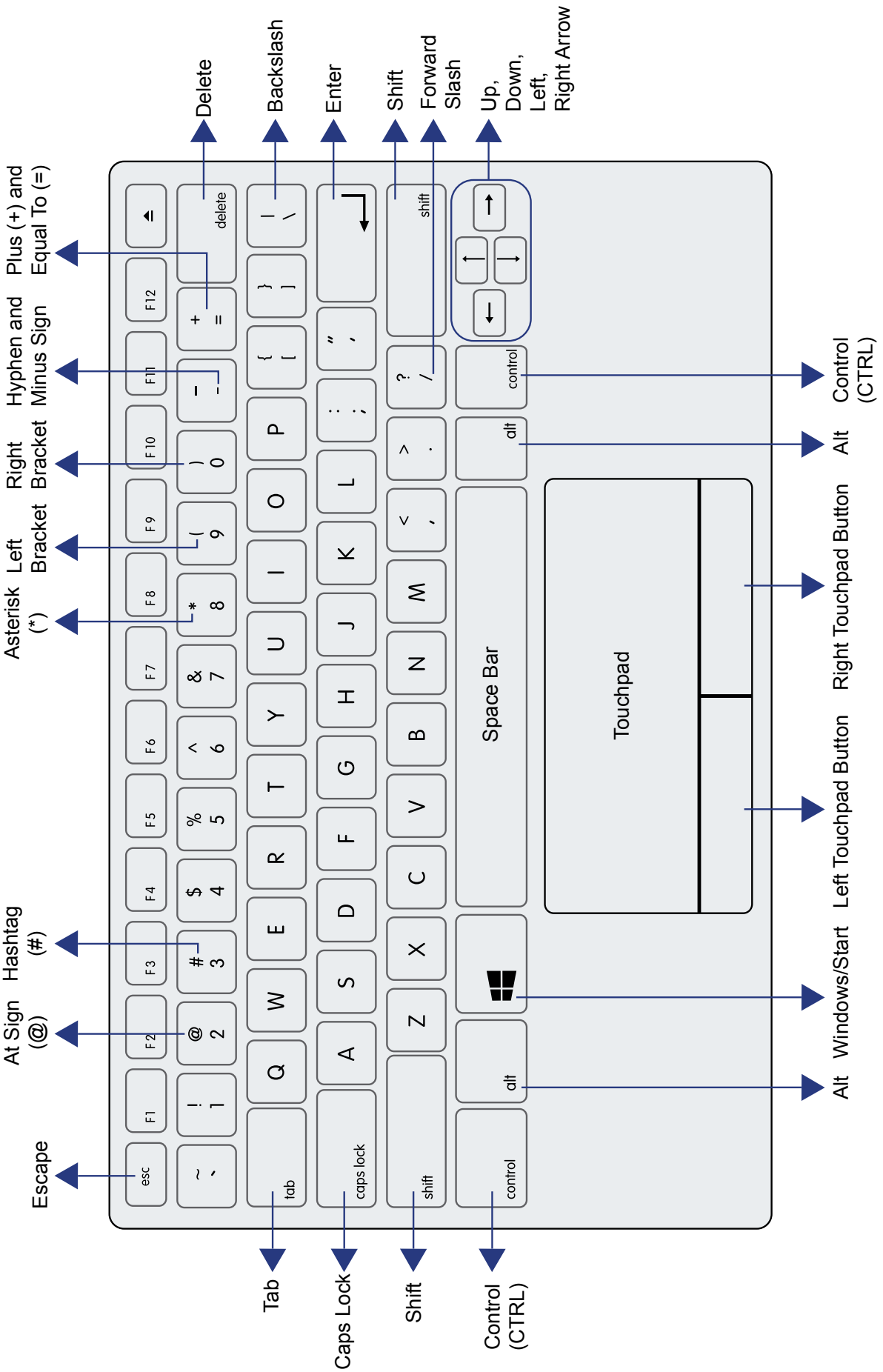
Final Assessment (continued)	
Indicate the ONE correct response for each question.	
7	The Function SUM:
a	adds all the values in a specific Cell Range.
b	calculates the average for a specific Cell Range.
c	this function counts all cells in a range that contain only numeric values.
8	The Function COUNT:
a	calculates the average for a specific Cell Range.
b	counts all cells in a range that contain only numeric values.
c	adds all the values in a specific Cell Range.
9	You can see who got the lowest mark using the MIN Function by following these steps in order.
a	(1) Select the cell in which you want to place the information from the MIN Function. (2) Key in =MIN((3) Select a Cell Range. (4) Key in) (5) Press Enter.
b	(1) Select the cell in which you want to place the information from the MIN Function. (2) Key in =MIN[(3) Select a Cell Range. (4) Key in] (5) Press Enter.
c	(1) Select the cell in which you want to place the information from the MIN Function. (2) Select a Cell Range. (3) Key in =MIN((4) Key in) (5) Press Enter.

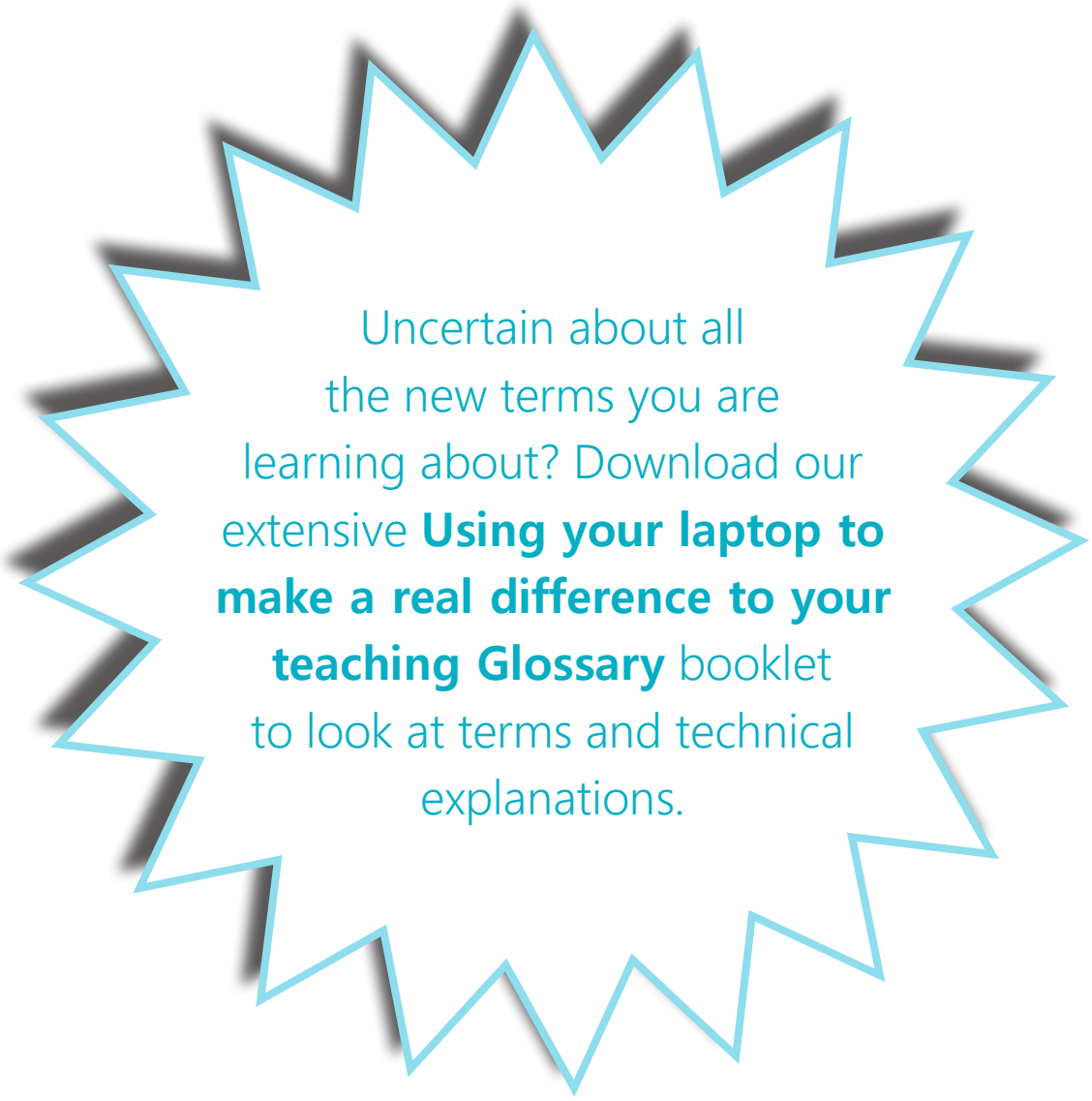
Final Assessment (continued)	
Indicate the ONE correct response for each question.	
10	The error #VALUE! means:
a	there is something wrong with the way your formula is typed or there is something wrong with the cells you are referencing.
b	there is a typing error in the formula name.
c	you have entered a numeric value using a number format that's not supported between the brackets of the formula.
11	The error #NAME? means:
a	there is something wrong with the way your formula is typed or there is something wrong with the cells you are referencing.
b	there is a typing error in the formula name.
c	you have entered a numeric value using a number format that is not supported between the brackets of the formula.
12	You can use the COUNTIF Function to:
a	calculate the average of a set of values.
b	add a set of values.
c	count the number of numbers of a certain value and above that value.
13	Select the best option to complete the sentence. A _____ or bar chart is used to _____ values _____ a few categories.
a	(1) pie (2) compare (3) across
b	(1) column (2) compare (3) across
c	(1) tower (2) compare (3) across
14	Select the best option to complete these sentences. Charts can help us to _____ complex data in a simple format that is easier to understand quickly. Select the _____ according to what you want to do.
a	(1) show and explain (2) type of chart
b	(1) type of chart (2) show and explain
c	(1) calculate (2) type of chart

Final Assessment (continued)	
Indicate the ONE correct response for each question.	
15	Select the best option to complete the sentence. A Line Chart is used to show _____ across _____ or _____.
a	(1) concepts (2) time (3) categories
b	(1) trends (2) time (3) place
c	(1) trends (2) time (3) categories

Additional Resources

The keyboard of a laptop





Acknowledgements

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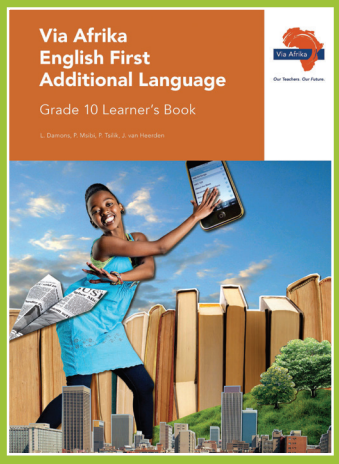
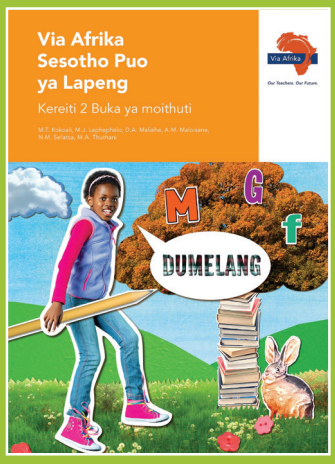
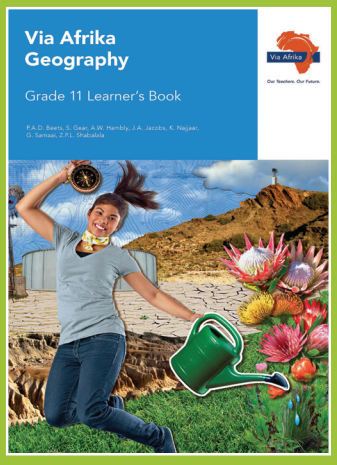
Notes

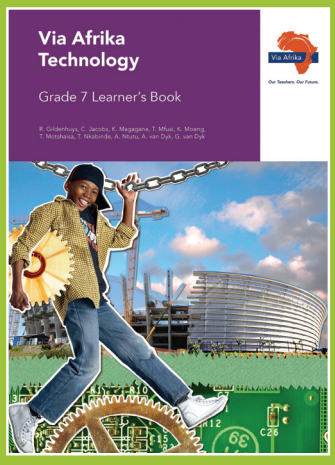
WHAT ELSE WE DO

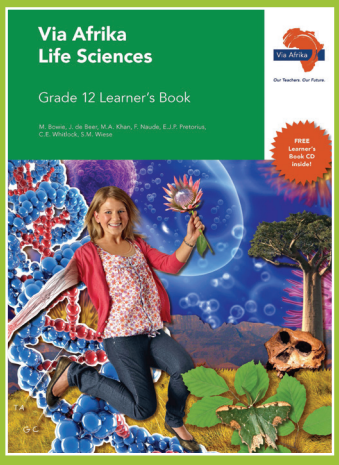
CAPS approved printed books











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