5 MORE ON THE USE OF THE SPREADSHEET
Making changes to existing spreadsheets

LEARNING OUTCOMES
In Lesson 4 you created a grade sheet for a class of 4th graders based on a template you had put together at the beginning of the same lesson. You learned that you can easily adapt a template for use with other classes that you might teach. You learned also about the organization of spreadsheets, about rows and columns, and the cells at the intersection of those rows and columns. You learned how to select cells and how to address cells using row and column coordinates. You learned how to enter formulas into certain cells in order to have *Calc* do calculations for you—totals and percentages in particular.

You filled the rows and columns with labels and grades. You had a first introduction to the idea that a spreadsheet can be a powerful tool for handling numeric data that requires mathematical or statistical processing.

In this tutorial you will have the opportunity to reinforce what you learned in Lesson 4. At the same time you will learn how to maintain a spreadsheet. This you will do by making enhancements to the spreadsheet you created in Lesson 4.

You will also learn about some of the logical processing capabilities of spreadsheets, capabilities which enable you to give an "intelligent" flavor to the applications that you build. In particular, you will learn about the following features of *Calc*.

- Updating an existing spreadsheet
- Making changes to the look of a spreadsheet
- Using the LOOKUP function
- Creating charts based on spreadsheet data
- Printing the updated spreadsheet

A caveat before you begin: You'll find it easiest to use the tutorial if you follow the directions carefully. On computers there are always other ways of doing things, but if you wander off on your own be sure you know your way back!

5.1 GETTING STARTED
You're going to work with a Gradebook document very similar to the one you created in Lesson 4. If you completed Lesson 4, for the exercises that follow DO **NOT** USE the Gradebook Template or Grade 4 2016 spreadsheet that you created in that lesson. For the sake of uniformity, and to avoid confusion, you're going to use a Grade Book template and Grade Book spreadsheet specially prepared for use with this lesson.

As an exercise at the end of the tutorial you will have the opportunity to incorporate these changes into your own Gradebook documents (Grade4 2014 and Gradebook Template) which you created when you completed Lesson 4.

You are going to make some improvements to the layout of the Gradebook, after which you will learn about the LOOKUP function as an introduction to the logic capability of *Calc*. At the end of the lesson you will learn how to create and modify charts of various kinds.

> **Open LibreOffice** > ***Calc*** then make sure the storage medium (flash drive or external disk drive or hard drive) on which you have your **Work Files for LibreOffice 5** folder is accessible

You are going to update two documents:

- a grade book template (called *Gradebook Template*, which is stored on your USB drive in the *Work Files for LibreOffice 5* folder > *Miscellaneous Files* folder > *Templates* folder);
- an actual grade book filled with data (this document has the name *Gradebook* and is stored in the *Work Files for LibreOffice 5* folder > *Miscellaneous Files* folder > *Other Documents* folder)

You will work on the Gradebook document first.

> By now you should know the steps to open a document, so go to your **Work Files for LibreOffice 5** > **Miscellaneous Files** > **Other Documents** folder and **Open** the **Gradebook** document

Before proceeding with the tutorial, you need to save this spreadsheet on your USB drive in the *Data Files > Spreadsheet Documents* folder.

> Go to **File** > **Save As**, then navigate to your **USB drive** > **Work Files for LibreOffice 5** > **Data Files** > **Spreadsheet Documents** folder and **Save** the **Gradebook** document there

5.2 RECAPITULATION AND REINFORCEMENT

The following sections give you an opportunity to refresh your memory of the basic spreadsheet skills you learned in Lesson 4.

Moving from cell to cell in the spreadsheet

In Lesson 4, you checked out some of the more useful commands for moving around in the *Calc* spreadsheet (check Lesson 4, page 113). Alternatively, you can use the chart that is included at the end of this text (*LibreOffice Shortcuts*).

In *Calc* spreadsheet terminology, the cell that is selected (surrounded by a heavier border) is called the current (or active) cell. Take a moment now to reacquaint yourself with the methods for changing the position of the currently active cell.

> The **arrow keys** move the **current cell** to the **adjacent cell** left, right, above, or below the current cell—press all four of the arrow keys a few times, and watch how the current cell moves around

> The **TAB key (forward)** and the **Shift-TAB command (back)** also move the cursor to the adjacent cell, but only in a **horizontal** (right or left) direction—try these two commands now.

The **RETURN key (forward)** and the **Shift-RETURN command (back)** also move the cursor to the adjacent cell, but only in a **vertical** (up or down) direction—try these two commands now

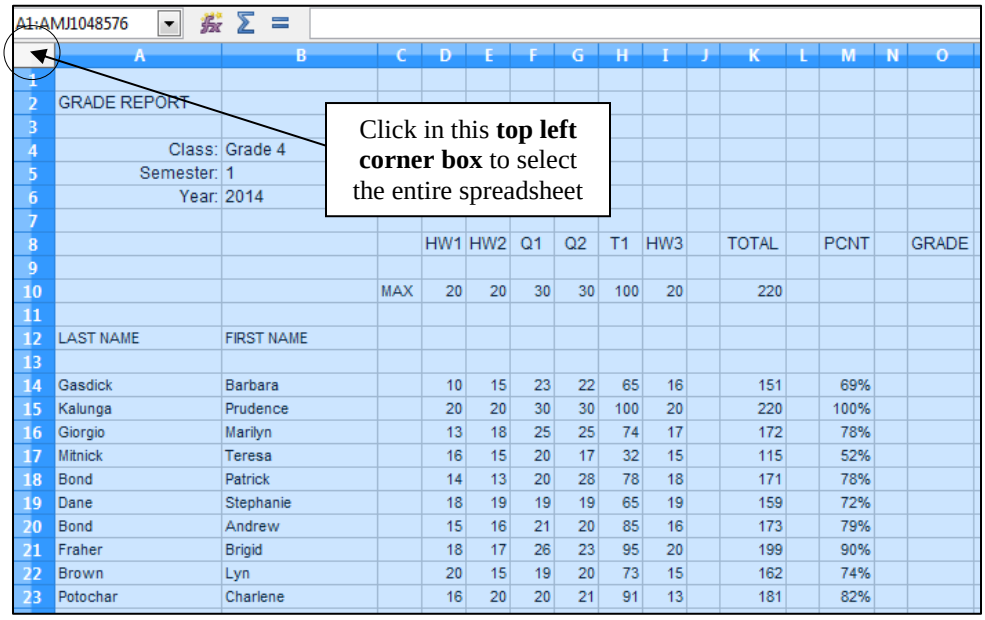
Use the **scroll bars** when you want to move around the spreadsheet without changing the location of the current cell—try this, too

More cell selection commands

Selecting sets of cells in a spreadsheet

You occasionally may want to highlight all the cells in the spreadsheet—in order to change a font, the font size, or the overall cell background, for example. Here's how you do this.

Click in the **small box** right **above** the **Row headings** and to the **left** of the **Column headings** (Fig. 5.1)



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1															
2	GRADE REPORT														
3															
4	Class:	Grade 4													
5	Semester:	1													
6	Year:	2014													
7															
8				HW1	HW2	Q1	Q2	T1	HW3		TOTAL		PCNT		GRADE
9															
10			MAX	20	20	30	30	100	20		220				
11															
12	LAST NAME	FIRST NAME													
13															
14	Gasdick	Barbara		10	15	23	22	65	16		151		69%		
15	Kalunga	Prudence		20	20	30	30	100	20		220		100%		
16	Giorgio	Marilyn		13	18	25	25	74	17		172		78%		
17	Mitnick	Teresa		16	15	20	17	32	15		115		52%		
18	Bond	Patrick		14	13	20	28	78	18		171		78%		
19	Dane	Stephanie		18	19	19	19	65	19		159		72%		
20	Bond	Andrew		15	16	21	20	85	16		173		79%		
21	Fraher	Brigid		18	17	26	23	95	20		199		90%		
22	Brown	Lyn		20	15	19	20	73	15		162		74%		
23	Potochar	Charlene		16	20	20	21	91	13		181		82%		

Fig. 5.1 Selecting an entire spreadsheet

The entire spreadsheet is now highlighted. However, perhaps you want to select only the cells that you're working in. There are a couple of ways to do this.

Click anywhere in the spreadsheet to **de-select** the selected cells

Now, starting at **cell A1**, use the mouse to **drag diagonally down** from cell **A1** to cell **O24**

That's one way. Here's another way of doing the same thing.

Click anywhere to **de-select** the selected cells

Now, click in cell **A1**, hold down the **Shift** key, and click in cell **O24**

The same set of cells is selected. The *Shift key* is very useful for selecting an especially large range of *cells* in *Calc*, or a range of *text* in *Writer*, or even a range of *slides* in *Impress*, which you'll learn about soon enough. Dragging with the mouse can get tedious and error prone when you have to select hundreds or thousands of adjacent cells, dozens of pages, or scores of slides. Remember this *Shift key* trick.

Going to a specific cell anywhere in a spreadsheet
If you are working in a large spreadsheet (consisting of thousands of cells, say) and you know the approximate coordinates of a cell you want to find, it is sometimes quicker to let *Calc* find the cell for you. The following simple steps will show you how to make the cell that intersects *Column AJ and Row 423*—a location quite deep inside the spreadsheet—the current (or selected) cell.

> Click again in the **small box** right **above** the **Row headings** and to the **left** of the **Column headings** (Fig. 5.1 on the previous page), type **AJ423** (you can use either upper case (AJ) or lower case (aj) for the column coordinate), then click on **OK**

There you go! Remember that the first (alphabetic) coordinate (AJ) is always the column; the second (numerical) coordinate is always the Row.

> Click again in the **small box** right **above** the **Row headings** and to the **left** of the **Column headings** (Fig. 5.1 on the previous page), then type **A1**, and click on **OK**

You are now back at the first cell (A1) in the spreadsheet. Some of the options for moving about the spreadsheet are considerably slower than others, which is why you should take the time to familiarize yourself with *all* the different methods for moving around the spreadsheet, especially if you become a regular user of *Calc*.

5.3 UPDATING AN EXISTING SPREADSHEET

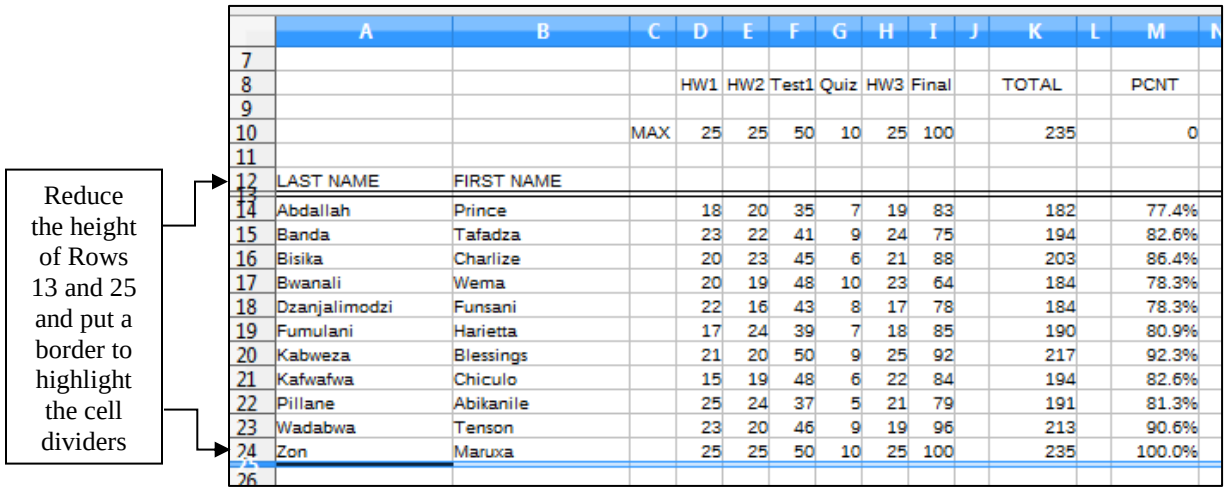
The Gradebook document would benefit from some cosmetic changes, such as the following.

1. There should be *double lines* to set off different parts of the spreadsheet. It is often useful, for example, to include extra space (but not too much space) between the headings above the columns of data and the data itself, and also before summary totals at the bottom of columns of data.
2. It would be useful to include *more formulas* to increase the information content of the spreadsheet. For example, you could add a formula that calculates an *average* for each of the sets of grades so that your students can see where they stand in relation to the rest of the class on any particular assignment or test. A *highest score* and *lowest score* for each set of grades would also be useful.
3. It would be a good idea to *protect cells* containing data that you consider especially important. Protecting cells prevents you or someone else from accidentally losing or changing cell contents. It takes time to put together spreadsheet templates and other documents. Some cells will contain functions that are tricky to figure out. Protecting them will make it difficult to lose your work.
4. Finally, *Calc* can do some of the thinking for you if you include a *LOOKUP Table* to figure out the *Letter grades* for your students based on their percentage score at the end of a reporting period.

Let's deal with these problems one at a time. In this section you'll learn how to handle the first three improvements. Later in the lesson you'll have the opportunity to learn how to create and use the LOOKUP function.

Dividing up the spreadsheet to make it easier to read

After you have fixed change #1, the Gradebook document will look similar to Fig. 5.2.



	A	B	C	D	E	F	G	H	I	J	K	L	M
7													
8				HW1	HW2	Test1	Quiz	HW3	Final		TOTAL		PCNT
9													
10			MAX	25	25	50	10	25	100		235		0
11													
12	LAST NAME	FIRST NAME											
13													
14	Abdallah	Prince		18	20	35	7	19	83		182		77.4%
15	Banda	Tafadza		23	22	41	9	24	75		194		82.6%
16	Bisika	Charlize		20	23	45	6	21	88		203		86.4%
17	Bwanali	Wema		20	19	48	10	23	64		184		78.3%
18	Dzanjalimodzi	Funsani		22	16	43	8	17	78		184		78.3%
19	Fumulani	Harietta		17	24	39	7	18	85		190		80.9%
20	Kabweza	Blessings		21	20	50	9	25	92		217		92.3%
21	Kafwafwa	Chiculo		15	19	48	6	22	84		194		82.6%
22	Pillane	Abikanile		25	24	37	5	21	79		191		81.3%
23	Wadabwa	Tenson		23	20	46	9	19	96		213		90.6%
24	Zon	Maruxa		25	25	50	10	25	100		235		100.0%
25													

Fig. 5.2 Gradebook document after update #1

Breaks between sections of a spreadsheet help the eye locate important data when scanning the page. In *Calc*, the easiest way to do this is to use an extra row or column at the point where you want to create a division between different parts of the spreadsheet, and then put a border along the edges of the empty row and also reduce the width of the inserted row or column so it appears as a double line (Fig. 5.2 above). Follow these steps to update the spreadsheet along these lines.

> On the **left edge** of the screen, in **row 13**, click on the **row number (13)** to select the entire empty row

First you want to put a border around the set of cells in Row 13.

> **Right click** on the **Row number 13** and, in the context menu, select **Format Cells...**, then in the **Format Cells** dialog box click on the **Borders** tab, then click on the tool to **Set Outer Border Only** (Fig. 5.3), and click **OK**

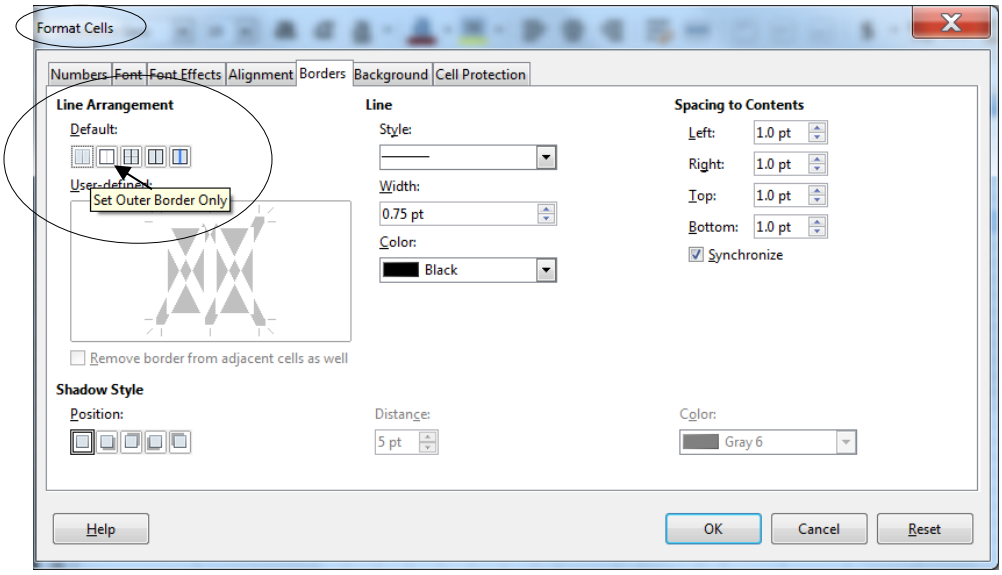


Fig. 5.3 Putting a border around a row of cells

Now you want to reduce the *row height* so the whole row looks like a double line separating Rows 12 and 14.

> **Right click** again on the **Row Number 13** and, in the **context menu**, select **Row Height...**, then in the **Row Height** dialog box type the value **0.05"** to replace the default height, and click **OK**

You need to create a similar dividing line after Row 24, which holds the data for the last student in the roster. This is because you are shortly going to include new formulas in Rows 26 thru 28.

> Right click on the **Row number 26** and, in the context menu, select **Format Cells...**, then in the **Format Cells** dialog box click on the **Borders** tab, then click on the **Set outer border only** tool (Fig. 5.3 previous page), and click **OK**

> Right click again on the **Row Number 26** and, in the context menu, select **Row Height...**, then in the **Row Height** dialog box type the value **0.05"** to replace the default height, in the **Shadow style** section click on the **first (no shadow)** button, and click **OK**, then **save** your work (**Ctrl+s**)

Adding functions to the spreadsheet

As you learned in Lesson 4, *Calc* comes with many built-in functions for the spreadsheet. Let's look at some of the built-in functions so that you know how to find them when you need them.

> Start this exercise by clicking in cell **A1**, right at the top left of the spreadsheet, then, in the **Formula Bar**, click on the **Function Wizard** tool (Fig. 5.4)

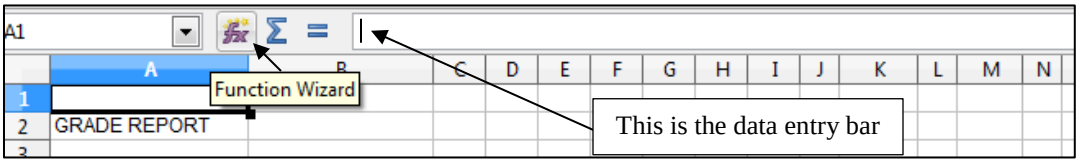


Fig. 5.4 The Function Wizard tool in the Formula Bar

> The **Function Wizard** tool brings up the **Function Wizard dialog box** (Fig. 5.5)

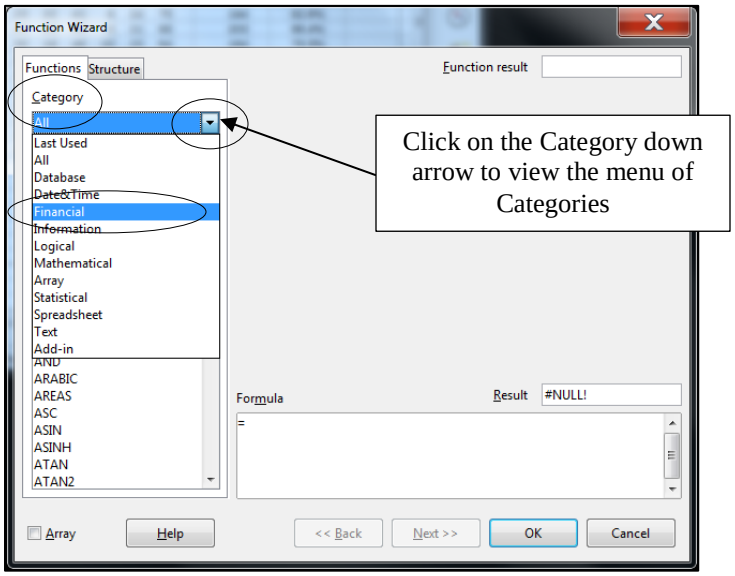


Fig. 5.5 The Function Wizard dialog box

In the **Category section**, click on the **down arrow** to bring up the various **Categories of Functions** available in *LibreOffice* (Fig. 5.5 previous page) and select the **Financial** category, then, in the **Function section** of the dialog box, check out the **several dozen Financial functions** available to you there

Do the same with the *Calc* **Database**, **Date&Time**, **Information**, **Logical**, **Mathematical**, **Statistical**, **Spreadsheet**, and **Text** sets of **built-in Functions**

If you're feeling overwhelmed, relax. Complete the exercises that follow and you'll start to get the hang of using functions such as these.

Click on the **Cancel** button to **close** the **Function Wizard** dialog box

Experience is the best way to learn how some of these functions work. In Lesson 4 you already learned to use the *Sum* function, and also you created your own formula to calculate the *Percentage* for each student.

You are going to add three new functions to the Gradebook document: the *Average*, the *Max*, and the *Min* functions. Let's start with the *Average* function, which will calculate the *average score* for a set of student scores.

Calculating an average for each of the Grade columns

In Row 26 of the Gradebook spreadsheet, at the bottom of each of the columns that contain scores, you are going to put the value representing the *average* of the scores for that column (Fig. 5.6).

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1															
2	GRADE REPORT														
3															
4	Class:	Grade 4													
5	Semester:	1													
6	Year:	2016													
7															
8				HW1	HW2	Test1	Quiz	HW3	Final		TOTAL		PCNT		GRADE
9															
10			MAX	25	25	50	10	25	100		235		0		
11															
12	LAST NAME	FIRST NAME													
14	Abdallah	Prince		18	20	35	7	19	83		182		77.4%		
15	Banda	Tafadza		23	22	41	9	24	75		194		82.6%		
16	Bisika	Charlize		20	23	45	6	21	88		203		86.4%		
17	Bwanali	Wema		20	19	48	10	23	64		184		78.3%		
18	Dzanjalimodzi	Funsani		22	16	43	8	17	78		184		78.3%		
19	Fumulani	Harietta		17	24	39	7	18	85		190		80.9%		
20	Kabweza	Blessings		21	20	50	9	25	92		217		92.3%		
21	Kafwafwa	Chiculo		15	19	48	6	22	84		194		82.6%		
22	Pillane	Abikanile		25	24	37	5	21	79		191		81.3%		
23	Wadabwa	Tenson		23	20	46	9	19	96		213		90.6%		
24	Zon	Maruxa		25	25	50	10	25	100		235		100.0%		
26		Average		20.8	21.1	43.8	7.82	21.3	84						
27															

Fig. 5.6 Average scores for each column

Notice in Fig. 5.6 that cell B27, right under the column of first names, has the row label *Average*. You need to put the same cell entry in your Gradebook document.

Select cell **B26**, type the label **Average**, and press **Tab twice** to move to cell **D26**

A word about automatic calculation

When **Auto**matic **Calc**ulation is switched on, *Calc* immediately carries out any calculations that are necessary when you make any changes to the data in the spreadsheet. With automatic calculation, you don't have to remember to do this yourself. If *Automatic Calculation* is not already on by default, it will be good for you to turn it on, so here's how you do it.

> In the **Data menu** > **Calculate**, check to see, in the **sub menu**, that there is a **check mark** next to **AutoCalculate** (Fig. 5.7)

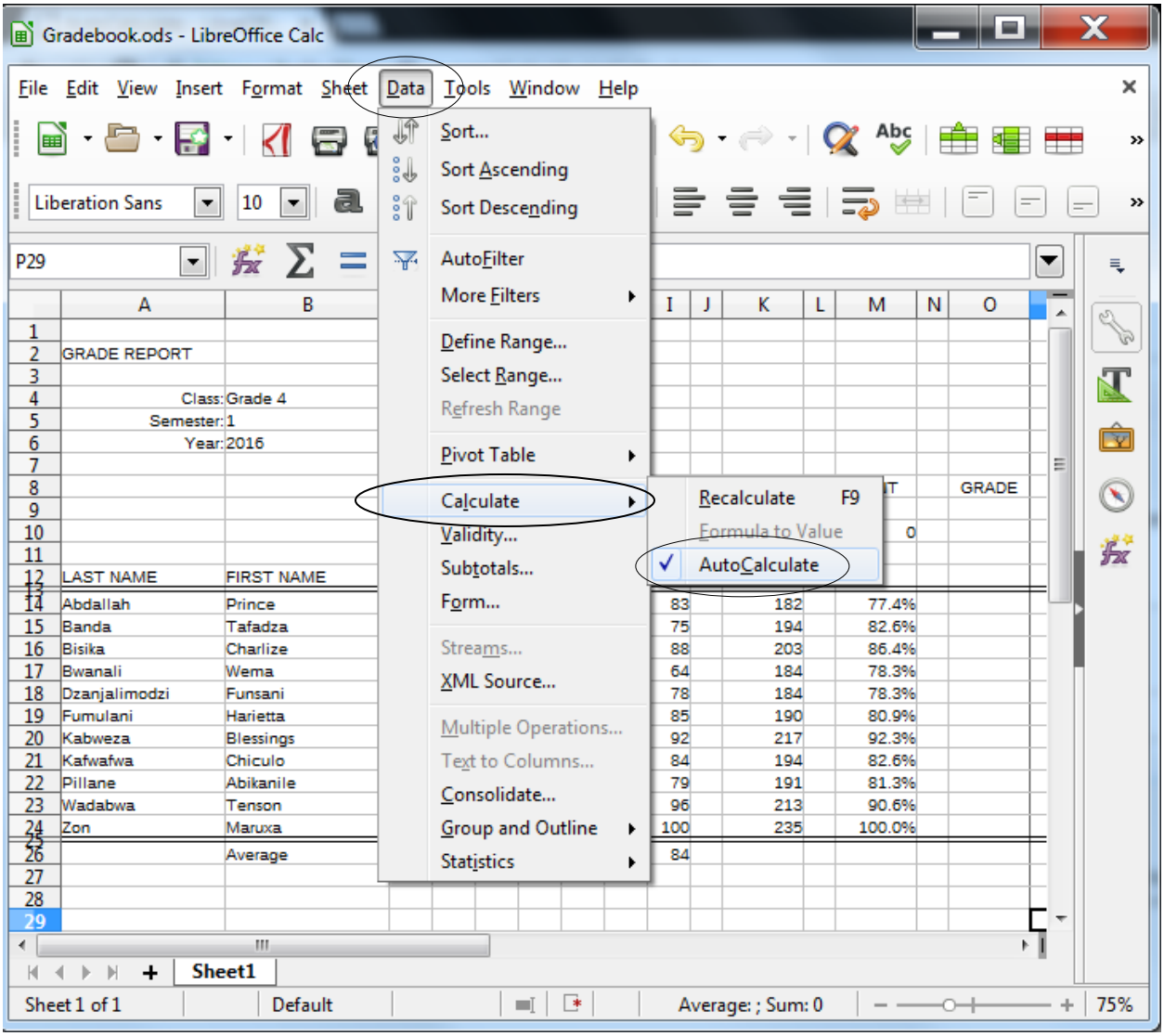


Fig. 5.7 Automatic Calculation

Back to the task at hand

An average is computed by *adding* (SUMming) the set of scores for an assignment or test, and then *dividing the total by the number of scores in the set*. You *could* put together this formula yourself, of course. If you know what the formula would be for the first column of scores, write it in the box below. Remember, a function or formula always begins with the equals (=) sign.

Check the footnote below to see if you got the answer right[1]. Since *Calc* has a built-in Average function, you may as well use it. Here are the steps to include the Average function in your spreadsheet.

Make sure cell **D26** is still selected (the cell under the first column of scores), then click on the **Function Wizard (*fx*)** icon in the **data entry** bar and, in the **Function Wizard dialog box**, from the list of **Categories**, select the **Statistical** category (Fig. 5.8)

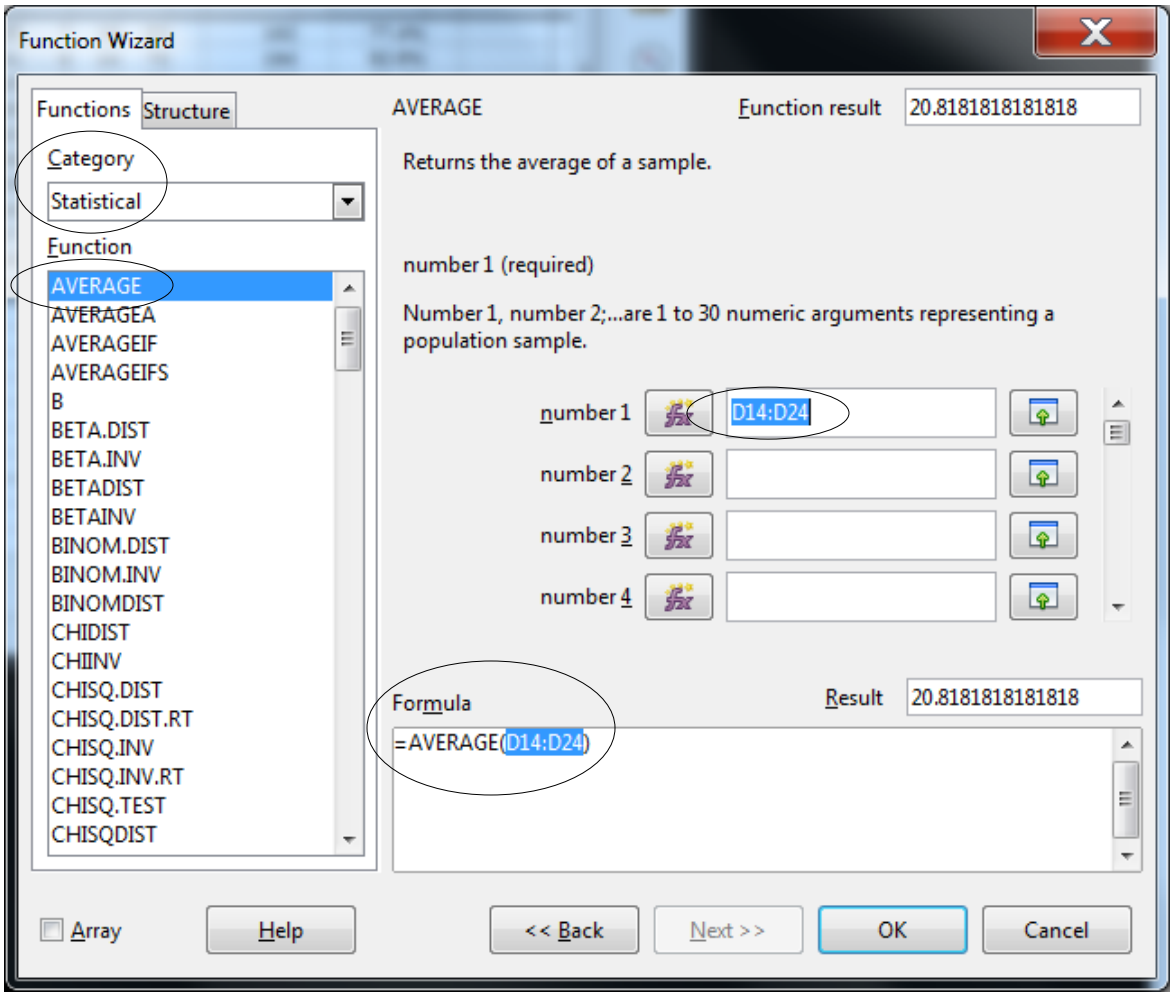


Fig. 5.8 The Insert Function dialog box showing the Statistical category of Functions

From the list of **Statistical functions**, **double click** on the **AVERAGE** function to select it

Calc pastes the function into the Formula area of the dialog box (Fig. 5.8), followed by a set of empty brackets. The brackets are for the set of cells that contain the scores that are to be averaged. Notice that the cursor is waiting between the brackets for you to select that set of cells.

[1] Your formula should look something like this: **=SUM(D14:D24)/11** or **=AVERAGE(D14:D24)**

Type **D14:24** (Fig. 5.8 above) or use the mouse to **drag**, in **column B**, from **cell B14 to cell B24**, then click on **OK**

Look at the data entry bar at the top of the spreadsheet and notice that the formula *=AVERAGE (D14:D24)* is copied there, too.

Now look at cell **D26**. It should contain the average for the scores in Column D. At this stage there are three problems that can occur:

1. If you see a series of pound signs (###), this tells you there's not enough room in the column to show the value, so you might need to *widen* the column a little to make enough space for the average score to appear. If this is the case (where you see ### instead of an average score), make the column wider (Right click on the column header > Column Width…).
2. If a Bad Formula prompt pops up on the screen, check your formula in the entry bar again, compare it to the correct Average formula *=AVERAGE(D14:D24)*, and make any corrections.
3. It is always possible that the values being averaged yield a result that turns out to be a whole number (no fractions). But it would be useful to show at least one decimal place, regardless of the outcome of the Average calculation. Here are the steps to change the precision of the Average value to 1 decimal place.

   Cell **D26** should still be selected (click on it if it is not selected)

   In the **Format menu** select **Cells…** > **Numbers tab** and, in the **Options area**, set the number of **Decimal places** to **1**

Assuming all is well, your next task will be to copy this *Average formula* into the cells immediately to the right of *cell D26*, so that you have an average score under the other columns of scores (cells E26 through I26).

Cell **D26** should still be selected (click on it if it is not selected)

Fig. 5.9 shows you that you're going to use the mouse to grab hold of the handle in the lower right corner of cell **D26** (you practiced doing this in Lesson 4) and drag it across all the way to cell **I26**.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1														
2	GRADE REPORT													
3														
4	Class:	Grade 4												
5	Semester:	1												
6	Year:	2016												
7														
8				HW1	HW2	Test1	Quiz	HW3	Final		TOTAL		PCNT	
9														
10			MAX	25.0	25	50	10	25	100		235		0	
11														
12	LAST NAME	FIRST NAME												
13														
14	Abdallah	Prince		18	20	35	7	19	83		182		77.4%	
15	Banda	Tafadza		23	22	41	9	24	75		194		82.6%	
16	Bisika	Charlize		20	23	45	6	21	88		203		86.4%	
17	Bwanali	Wema		20	19	48	10	23	64		184		78.3%	
18	Dzanjalimodzi	Funsani		22	16	43								
19	Fumulani	Harietta		17	24	39								
20	Kabweza	Blessings		21	20	50								
21	Kafwafwa	Chiculo		15	19	48								
22	Pillane	Abikanile		25	24	37								
23	Wadabwa	Tenson		23	20	46								
24	Zon	Maruxa		25	25	50	10	25	100		235		100.0%	
25														
26		Average		20.8										
27														

Drag this **handle** to the **right** to **copy** the Formula across the row to the other cells that must contain an Average score

Fig. 5.9 Cell copy handle

Use the mouse to point at the **handle** in the **lower right** corner of cell **D26 (**Fig. 5.9), and drag the handle across to **Column I, cell I26**—so that the formula is copied across to cells **E26**, **F26**, **G26**, **H26**, and **I26**, which will all now have the correct Average score for their respective columns

That's all there is to it. If necessary (though it shouldn't be the case with this exercise) adjust the column widths if you see pound signs (###) in any cell instead of averages.

Time to save all your hard work (**Ctrl+s)**

Displaying the Highest (MAX) and Lowest (MIN) scores for each column of scores

Now that you know how to use the Insert Function icon (***fx***) next to the Data Entry bar, and in particular since you just used it to put the Average function in your spreadsheet, you should be able to complete the exercise that follows without much help.

In cell **B27** put the heading **Max score** and in cell **B28** put the heading **Min score**

Make sure cell **D27** is selected (the cell under the first Average calculation), then click on the **Function Wizard (*fx)*** icon in the **data entry** bar and, in the **Function Wizard dialog box**, from the list of **Categories**, select the **Statistical** category (Fig. 5.8 on page 158)

From the list of **Statistical functions**, **double click** on the **MAX** function to select it

Calc again pastes the function into the *Formula area* of the dialog box, followed by a set of empty brackets. The brackets are for the set of cells that contain the scores that are to be averaged. Notice that the cursor is waiting between the brackets for you to select that set of cells.

Type **D14:D24** (Fig. 5.8 again—p. 158) then click on **OK**

Look at the data entry bar at the top of the spreadsheet and notice that the formula *=MAX (D14:D24)* is copied there, too. Now look at cell **D27**. It should contain the maximum score in Column D. Check to confirm that that is indeed the case.

You should be starting to feel comfortable building functions in the spreadsheet.

Now make sure cell **D28** is selected (the cell where you're going to put the MIN formula), then click on the **Function Wizard (*fx)*** icon in the **data entry** bar and, in the **Function Wizard dialog box**, from the list of **Categories**, select the **Statistical** category (Fig. 5.8 on page 148)

From the list of **Statistical functions**, **double click** on the **MIN** function to select it

Calc again pastes the function into the *Formula area* of the dialog box, followed by a set of empty brackets. As you now know, the brackets are for the set of cells that contain the scores that are to be averaged. Notice again that the cursor is waiting between the brackets for you to select that set of cells.

Type **D14:D24** (Fig. 5.8—p. 148) then click on **OK**

Look at the data entry bar at the top of the spreadsheet and notice that the formula *=MIN (D14:D24)* is copied there, too. Now look at cell **D27**. It should contain the maximum score in Column D. Check to confirm that that is indeed the case.

At this stage, the last task is to copy the MIN and MAX Functions across to the other cells in rows 27 and 28. You probably already know how to do this, but here are the steps in case you need help.

> With **cell D26** selected, grab hold of the **handle** in the **lower right corner** of the cell and **drag across** with the mouse to select cells **E26 through I26**—the cells in which you want to include the **Max** function, and click **OK**

Uh oh; cell *I27* may not be wide enough for the highest possible value in the Max score row (100.0%). It's possible a student could have that score, so you'll need to widen Column I so the data can fit in the cell.

> **Right click** on the **Column header (I)** at the **top** of the column and, in the **context menu**, select **Column Width…**, then in the dialog box type **0.50"** and click on **OK**
>
> Now, with **cell D28** selected, grab hold of the **handle** in the **lower right corner** of the cell and **drag across** with the mouse to select cells **E27 through I27**—the cells in which you want to include the **Min** function, and click **OK**
>
> Better **Save** your work (**Ctrl+s**)

When you're done, your spreadsheet should look much the same as Fig. 5.10.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1															
2	GRADE REPORT														
3															
4	Class:	Grade 4													
5	Semester:	1													
6	Year:	2016													
7															
8				HW1	HW2	Test1	Quiz	HW3	Final		TOTAL		PCNT		GRADE
9															
10			MAX	25.0	25	50	10	25	100		235		0		
11															
12	LAST NAME	FIRST NAME													
13															
14	Abdallah	Prince		18	20	35	7	19	83		182		77.4%		
15	Banda	Tafadza		23	22	41	9	24	75		194		82.6%		
16	Bisika	Charlize		20	23	45	6	21	88		203		86.4%		
17	Bwanali	Wema		20	19	48	10	23	64		184		78.3%		
18	Dzanjalimodzi	Funsani		22	16	43	8	17	78		184		78.3%		
19	Fumulani	Harietta		17	24	39	7	18	85		190		80.9%		
20	Kabweza	Blessings		21	20	50	9	25	92		217		92.3%		
21	Kafwafwa	Chiculo		15	19	48	6	22	84		194		82.6%		
22	Pillane	Abikanile		25	24	37	5	21	79		191		81.3%		
23	Wadabwa	Tenson		23	20	46	9	19	96		213		90.6%		
24	Zon	Maruxa		25	25	50	10	25	100		235		100.0%		
25															
26		Average		20.8	21.1	43.8	7.8	21.3	84.0						
27		Max score		25.0	25.0	50.0	10.0	25.0	100.0						
28		Min score		15.0	16.0	35.0	5.0	17.0	64.0						

Fig. 5.10 The Gradebook document after adding the functions (your data will be different)

Protecting (locking) important cells

Calc allows you to protect the contents of a cell or cells. This means that neither you nor anyone else will be able to change the contents unless you remove the protection. This feature is useful to prevent accidental loss of data, and will also help prevent others from interfering with the data you have collected.

Since all the data in a Grade book are important, it would be a good idea to protect everything. The process to do this is the same as if you were protecting a single cell, or a few cells, except that you select every cell.

> Press **Ctrl+a** to **Select All** the cells in the spreadsheet then, from the **Tools menu**, select **Protect Sheet…** (Fig. 5.11)

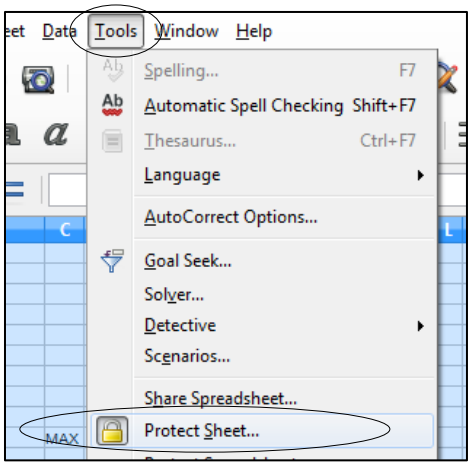


Fig. 5.11 Protecting the spreadsheet data

This brings up the *Protect Sheet* dialog box (Fig. 5.12).

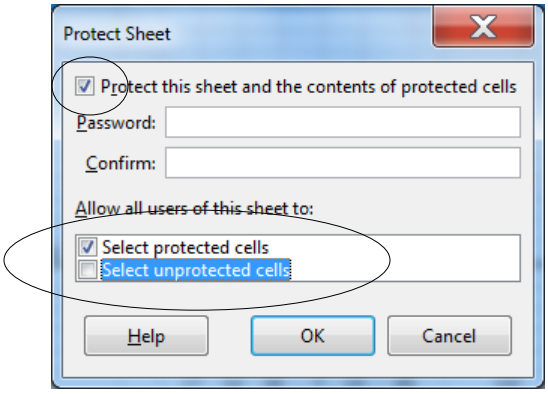


Fig. 5.12 Protect Sheet dialog box

Take a look at this dialog box. Notice that the option to "Protect this sheet and the contents of protected cells" is checked by default, which is fine because that's what you want to do. Notice, too, that you have the option to include a *password* for the protection, which would be important if this were a real world spreadsheet. But for the sake of this exercise, we'll not use a password. We'll return to the subject of password protection when you're done with this exercise.

But you *do* need to remove the check mark next to *Select unprotected cells*. This is because you have opted to protect *every* cell in the spreadsheet (there will be no unprotected cells).

So, click to **remove** the **check mark/tick** next to **Select unprotected cells**, then click on **OK**

Now every cell in the spreadsheet is protected against unwarranted attack. If you try to make a change to a cell you will get this error message (Fig. 5.13):

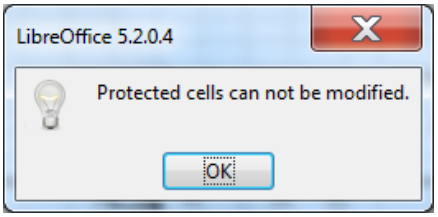


Fig. 5.13 Protected cell alert

Password protection

Of course, someone who knows how to use *Calc* will know how to unlock the protection—unless it's protected by a password, of course. So if you really want to prevent someone else from messing with the data in the spreadsheet, you may need to take advantage of the option to include a password.

This is a necessary feature if you want to lock the cells in your spreadsheet in a way that prevents others from changing data you have stored in the spreadsheet, such as scores or grades. Passwords provide protection against unauthorized access.

Choose a password carefully; one that would be difficult to guess, of course, but also one that you would be sure to remember! The weirder the password the better—it should include upper case letters as well as numbers and special characters such as the @ symbol or whatever. Remember, the weirder your password the better—*as long as you can remember it*. However, there's no need to use a password in this exercise unless you want to, of course.

Now all the cells in the Gradebook spreadsheet are unable to be changed unless, in the *Tools menu* > *Protect Document*, you remove the *check mark* next to *Sheet* in the sub menu.

Time to **Save** the changes to the Gradebook document (**Ctrl+s**)

5.4 MAKING CHANGES TO THE LOOK OF THE SPREADSHEET

In Lesson 4 you learned how to change the width of columns and the height of rows. Now you are going to learn how to put borders around selected cells and how to remove the grid lines and column and row headings.

Putting a border around a cell or set of cells

Before you can make any changes, you need to remove Protection from the worksheet. Let's do that before proceeding with the tutorial.

Press **Ctrl+a** to **Select All** the cells in the spreadsheet then, from the **Tools menu**, select **Protect Sheet…**

Since you didn't use a Password, that's all you need to do. In other words, if you didn't want anyone else to be able to *unprotect* the sheet, you'd definitely want to use a password, right?

Now let's make some more changes to the Gradebook document. For example, you may want to put a box around certain sections of the spreadsheet, such as the *Class info* in cells A4 through B6. This will make the information stand out on the sheet. Try this now.

Drag across the six cells **A4 through B6** to select the set of **Class info** then, in the **Format menu** select **Cells…** to bring up the **Format Cells** dialog box, and in the dialog box click on the **Borders** tab (Fig. 5.15)

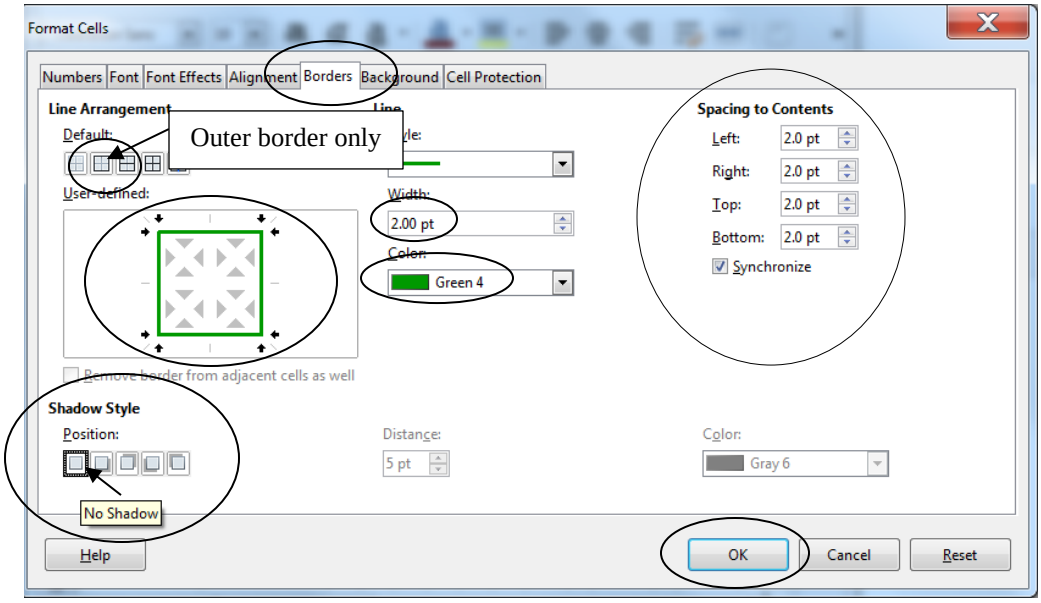


Fig. 5.15 *Calc*'s Borders options for cells or groups of cells

As you can see, the Borders dialog box gives you various options.

In the **Line Arrangement** section, click on the icon to **Set Outer Border Only** and in the **Line** section (see Fig. 5.15 above), increase the **Line Width** to **2.00 pt** and the **Line Color** to **Green**

In the **Shadow Style** section you want **No Shadow** and in the **Spacing to Contents** section, increase the spacing to **2.0 pt** left, right, top, and bottom, then click on **OK**

The Class Info now has a distinctive green border around it, setting it off from the rest of the data in the Gradebook document (Fig. 5.16).

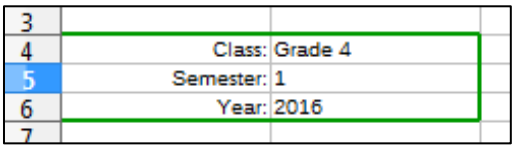


Fig. 5.16 Spreadsheet cell with border

Removing grid lines and column and row headings

Grid lines and column and row headings are essential when developing a spreadsheet or when you are updating the data because you need to easily see and access columns and rows of data, which is what the Grid Lines and column and row headers help you do. But for reporting purposes it may look better, perhaps even easier to read, if they are removed.

You may recall doing this in Lesson 4, specifically in order to print the spreadsheet without column and row headers and Grid Lines. Here, however, you want to remove the column and row headers and Grid Lines in the spreadsheet as it appears on the computer screen.

To remove the headers, in the **View menu** select **Column & Row Headers** and to remove the Grid Lines, in the **View menu** select **Grid Lines for Sheet**

GRADE REPORT

Class: Grade 4
Semester: 1
Year: 2016

		HW1	HW2	Test1	Quiz	HW3	Final	TOTAL	PCNT
	MAX	25	25	50	10	25	100	235	0
LAST NAME	FIRST NAME								
Abdallah	Prince	18	20	35	7	19	83	182	77.4%
Banda	Tafadza	23	22	41	9	24	75	194	82.6%
Bisika	Charlize	20	23	45	6	21	88	203	86.4%
Bwanali	Wema	20	19	48	10	23	64	184	78.3%
Dzanjalimodzi	Funsani	22	16	43	8	17	78	184	78.3%
Fumulani	Harietta	17	24	39	7	18	85	190	80.9%
Kabweza	Blessings	21	20	50	9	25	92	217	92.3%
Kafwafwa	Chiculo	15	19	48	6	22	84	194	82.6%
Pillane	Abikanile	25	24	37	5	21	79	191	81.3%
Wadabwa	Tenson	23	20	46	9	19	96	213	90.6%
Zon	Maruxa	25	25	50	10	25	100	235	100.0%
	Average	20.8	21.1	43.8	7.8	21.3	84.0		
	Max score	25.0	25.0	50.0	10.0	25.0	100.0		
	Min score	15.0	16.0	35.0	5.0	17.0	64.0		

Fig. 5.17 Removing grid lines and column and row headings

No problem. The spreadsheet now looks quite different, as you can see (Fig. 5.17 above). For the next exercise it will be best to have the Grid Lines and Headers in the Gradebook document.

In the **View menu** select **Column and Row Headers** to put back the headers, then, in the **View menu** click on **Grid Lines for Sheet**, and **Save** your work

Updating the Grades Template spreadsheet

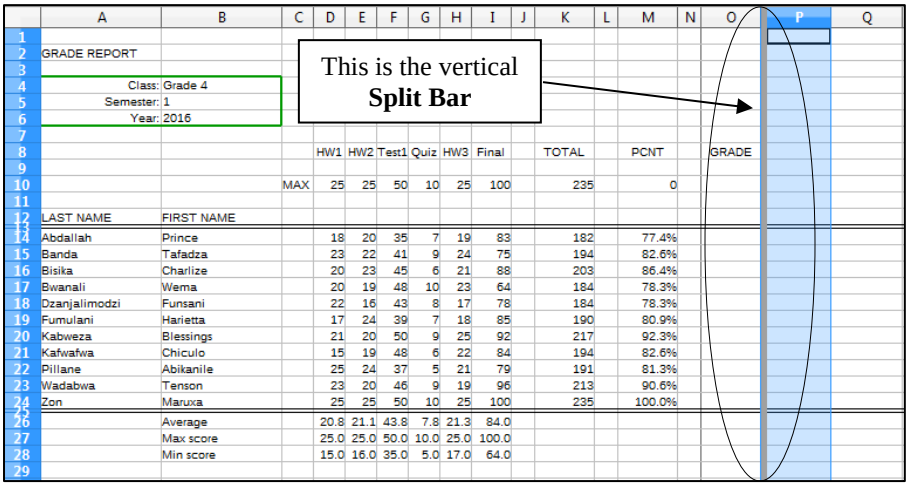
Your next task is tricky, so go slow and follow the directions carefully.

Dividing the spreadsheet into panes

Often a spreadsheet will be too long or too wide to view all the data at once on the screen. For this purpose, *Calc* has a useful feature (*Split*), which allows you to compare separate parts of a sheet side-by-side. You can split any window horizontally and/or vertically into sections (or Panes—like window panes). This allows you, while working or scrolling in one section, to keep other section(s) fixed in place. This applies whether the spreadsheet is protected or not.

To see how this works, you need to start by clicking on the **column header** for **column P**, which will act as the **pivot** for the split screen, then in the **View** menu select **Split window**

Calc divides up the worksheet into two sections side by side, using a vertical split bar (Fig. 5.18).



GRADE REPORT

Class: Grade 4
Semester: 1
Year: 2016

			HW1	HW2	Test1	Quiz	HW3	Final	TOTAL	PCNT	GRADE
		MAX	25	25	50	10	25	100	235	0	
LAST NAME	FIRST NAME										
Abdallah	Prince		18	20	35	7	19	83	182	77.4%	
Banda	Tafadza		23	22	41	9	24	75	194	82.6%	
Bisika	Charlize		20	23	45	6	21	88	203	86.4%	
Bwanali	Wema		20	19	48	10	23	64	184	78.3%	
Dzanjalimodzi	Funsani		22	16	43	8	17	78	184	78.3%	
Fumulani	Harietta		17	24	39	7	18	85	190	80.9%	
Kabweza	Blessings		21	20	50	9	25	92	217	92.3%	
Kafwafwa	Chiculo		15	19	48	6	22	84	194	82.6%	
Pillane	Abikanile		25	24	37	5	21	79	191	81.3%	
Wadabwa	Tenson		23	20	46	9	19	96	213	90.6%	
Zon	Maruxa		25	25	50	10	25	100	235	100.0%	
	Average		20.8	21.1	43.8	7.8	21.3	84.0			
	Max score		25.0	25.0	50.0	10.0	25.0	100.0			
	Min score		15.0	16.0	35.0	5.0	17.0	64.0			

Fig. 5.18 *Calc*'s vertical and horizontal split bars

The split bar is grey so not that obvious, especially with other cell lines all over the place, but look carefully and you'll see it well enough between column O and column P.

The vertical split occurs at the point in the spreadsheet where you selected the column (column P). You can change the position of the split bars by positioning the mouse arrow on a split bar and dragging to the left or right across the screen. Try this for practice

> Position the **tip** of the mouse arrow on the vertical **split bar** (you'll get a **cross-hair cursor**) and **drag the split bar** to the **left** till the **split bar** is next to **Column B**—between **columns B** and **P** (Fig. 5.19)

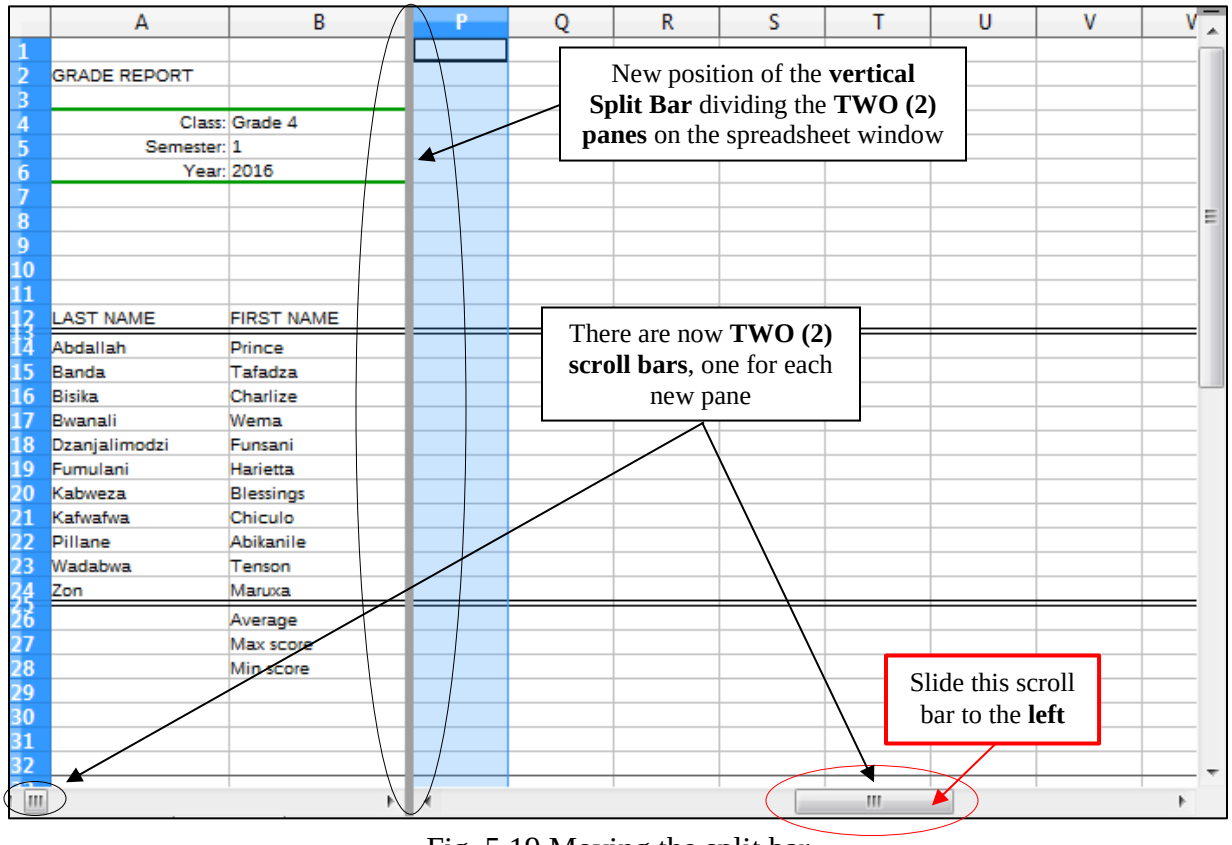


Fig. 5.19 Moving the split bar

> Now grab the **right hand scroll bar** at the **bottom** of the window (circled in **Red**) and slide it to the **left** till **column K** in the **right hand pane** is aligned **side-by-side** with **column B** in the **left hand pane**
>
> Now examine the data in each of the **two side-by-side panes** (Fig. 5.20 on the next page)

Phew! Did you manage to follow all that? If so, congratulations! If not, go over it again—practice makes perfect! Ask your instructor or a friend to help you if you're still confused.

Assuming you were successful, notice how easy it is to compare different parts of a spreadsheet in this way. You can check the TOTAL, PCNT, and GRADE alongside each student's name, which would be very useful if you were doing an assessment, or showing students how they stand with regard to their grade.

> Finally, in the **View menu** select **Split** again to **turn off** the panes option

	A	B	K	L	M	N	O
1							
2	GRADE REPORT						
3							
4	Class:	Grade 4					
5	Semester:	1					
6	Year:	2016					
7							
8			TOTAL		PCNT		GRADE
9							
10			235		0		
11							
12	LAST NAME	FIRST NAME					
14	Abdallah	Prince	182		77.4%		
15	Banda	Tafadza	194		82.6%		
16	Bisika	Charlize	203		86.4%		
17	Bwanali	Wema	184		78.3%		
18	Dzanjalimodzi	Funsani	184		78.3%		
19	Fumulani	Harietta	190		80.9%		
20	Kabweza	Blessings	217		92.3%		
21	Kafwafwa	Chiculo	194		82.6%		
22	Pillane	Abikanile	191		81.3%		
23	Wadabwa	Tenson	213		90.6%		
24	Zon	Maruxa	235		100.0%		

Fig. 5.20 Comparing Student Names with the summary data

Updating the Gradebook Template

You are now going to make the same changes to the **Gradebook Template** that you just made to the **Gradebook** document. To do this, it will be easiest if you have both spreadsheets open side-by-side on your screen.

> Click on **File** > **Open**, then navigate to your **disk drive/USB drive** > **Work Files for LibreOffice 5** > **Miscellaneous Files** > **Templates** folder and open the **Gradebook Template** document

Now you should have both the Gradebook and the Gradebook Template open on your screen.

> If you have a large enough screen, use the mouse to drag each window so they are **side-by-side** (Fig. 5.21)

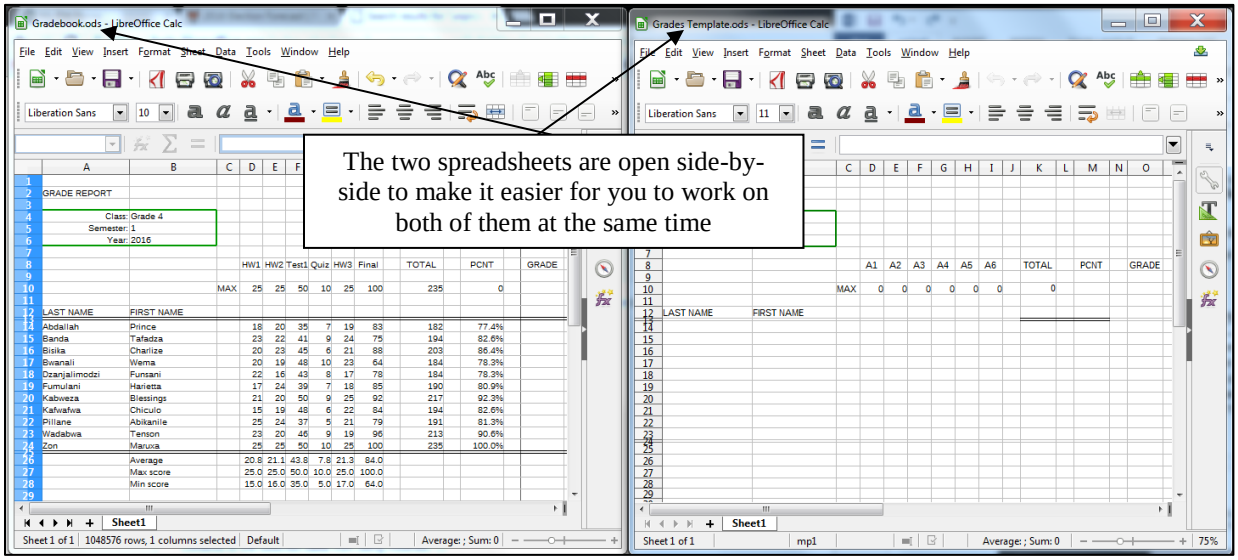


Fig. 5.21 Spreadsheets arranged side-by-side

If you are using a computer with a smaller screen, the two spreadsheets can be layered on top of one another and you can toggle back and forth using the Window menu (Fig. 5.22).

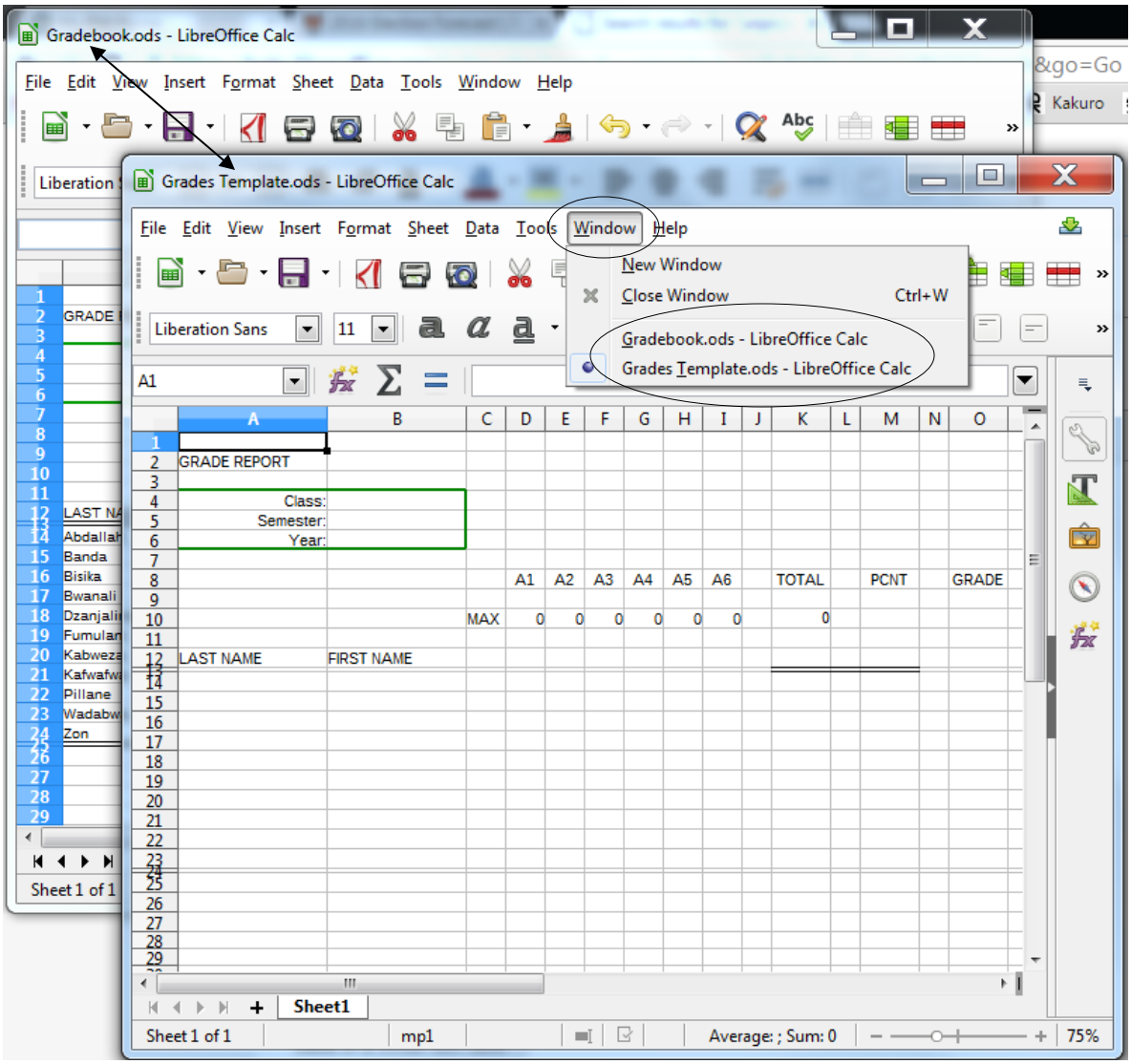


Fig. 5.22 Using the Window menu to toggle back and forth between spreadsheets

You're going to update the Gradebook Template spreadsheet with the same format and functions as the Gradebook spreadsheet so that you can use the template with your future classes.

- Use *Copy* and *Paste* to complete many of the tasks.
- DON'T transfer any of the *actual student data* from the Gradebook to the Gradebook Template—only transfer the functions and other formatting features from the Gradebook document (Fig. 5.23 illustrates what you need to do)

Go ahead now and, as illustrated in Fig. 5.23 on the next page, update the **Gradebook Template** by putting a **box** around the **6 Class info** cells (**A4 thru B6**), then **Copy** and **Paste** the **TOTAL** and **PERCENT** data, and the **Average**, **Max score**, and **Min score** data, from the **Gradebook** to the **Gradebook Template**

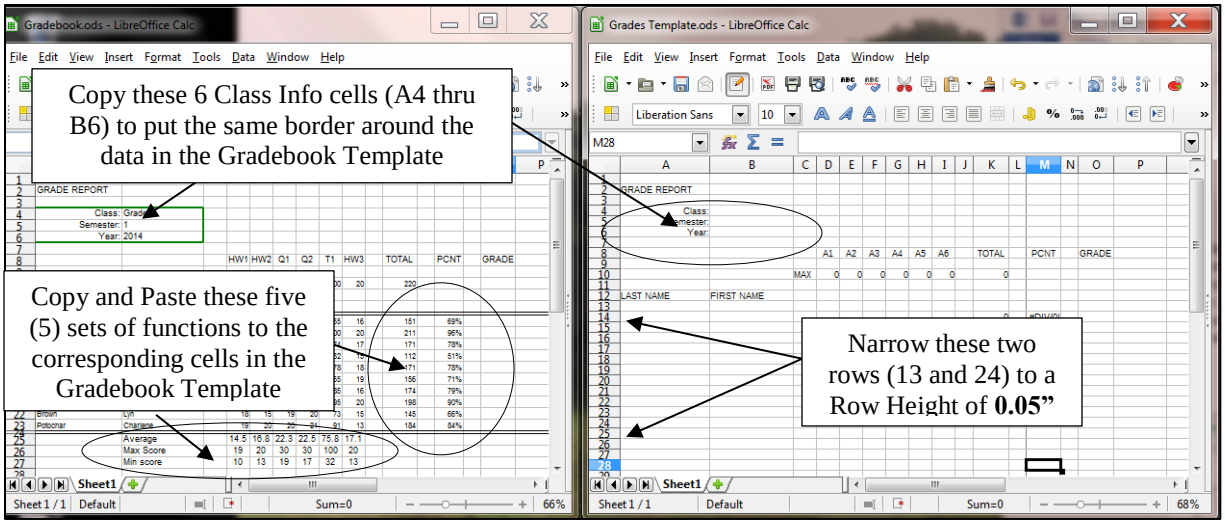


Fig. 5.23 Making updates to the Template

When you are done, your Gradebook Template spreadsheet will look like Fig. 5.24.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1															
2	GRADE REPORT														
3															
4	Class:														
5	Semester:														
6	Year:														
7															
8				A1	A2	A3	A4	A5	A6		TOTAL		PCNT		GRADE
9															
10			MAX	0	0	0	0	0	0		0				
11															
12	LAST NAME	FIRST NAME													
13															
14											0		#DIV/0!		
15											0		#DIV/0!		
16											0		#DIV/0!		
17											0		#DIV/0!		
18											0		#DIV/0!		
19											0		#DIV/0!		
20											0		#DIV/0!		
21											0		#DIV/0!		
22											0		#DIV/0!		
23											0		#DIV/0!		
24											0		#DIV/0!		
25															
26		Average		###	###	###	###	###	###						
27		Max score		0.0	0.0	0.0	0.0	0.0	0.0						
28		Min score		0.0	0.0	0.0	0.0	0.0	0.0						
29															

Fig. 5.24 Gradebook Template spreadsheet after updates

Save the **Gradebook Template** when you have finished making the changes and **close** the **Gradebook Template**

Your next task is to once again protect the cells in the Gradebook spreadsheet and also reset the protection on the worksheet.

In the **Window menu**, click on the **Gradebook** so as to make it the active spreadsheet on the Desktop

Now you can go ahead and protect the Gradebook spreadsheet.

Press **Ctrl+a** to **Select All** the cells in the spreadsheet (this is the quickest way to select all the cells in the spreadsheet, but you may recall that you can also click in the small box in the top left corner of the row and column headings)

From the **Tools menu** select **Protect Sheet…**

In the **Protect Sheet dialog box** that pops up, click to **remove** the **check mark/tick** next to **Select unprotected cells** (see Fig. 5.12 on page 162) then click on **OK**, and **Save** your work

It might be a good idea to take a break at this point in the tutorial. But if you feel up to it, feel free to proceed directly to the next section, Section 5.5 on the next page.

TIME FOR A BREAK?

FEEL FREE TO TAKE ONE…

THIS MIGHT BE ENOUGH FOR ONE DAY!

5.5 USING THE LOOKUP FUNCTION

The concept of the LOOKUP function

The spreadsheet LOOKUP function is a little tricky to understand, so stand up, step back from the keyboard for a while and stretch some of those muscles that are stiff from sitting through the first part of this tutorial. When you are ready, read quietly through this section to understand how the LOOKUP function works.

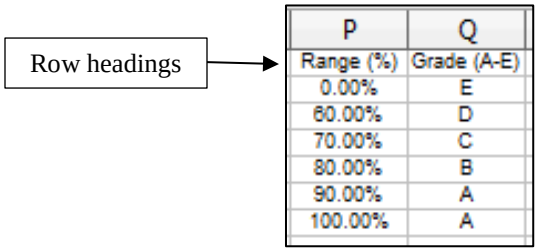
The LOOKUP function is a simple logic tool that you can use to automatically assign grades to your students based on the numbers in the Percentage column of your spreadsheet (column **L**).

You are probably aware by now that if you have the automatic calculation option selected, *Calc* carries out function-based calculations as you make changes in a spreadsheet. Thus, once you have programmed *Calc* to LOOKUP the grades, the system will automatically update each student's Letter Grade, along with Totals and Percentages, even as you enter new scores for assignments, homework, tests, and so forth.

Thus, with no effort on your part, you will be able to keep students informed at any time during the semester as to exactly what grade they currently carry for the class.

Such information is invaluable. *Knowledge is power*. When a student is aware of an inadequate grade early on, extra effort can be applied to improve the situation before it is too late. It is surprising how often students are unaware of how they stand with regard to their progress through a course. The teacher who fails to provide adequate feedback when directing students in their pursuit of academic objectives deserves at least some of the blame if students do not progress as well as they should. When students are kept apprised at all times of where they stand they tend to take more responsibility for the outcomes of their efforts—or lack of them.

Fig. 5.25 illustrates the LOOKUP Table that will be the outcome of this exercise.



P	Q
Range (%)	Grade (A-E)
0.00%	E
60.00%	D
70.00%	C
80.00%	B
90.00%	A
100.00%	A

Fig. 5.25 LOOKUP table

You are going to tell *Calc* to compare a student's percentage with the range of values in the first column of the table. These are control percentages. *Calc* will search through this first column, looking for the highest value (percentage) that is *less than or equal to* the student's percentage. Once that value is located in the first column, the function will assign the student the letter grade that is adjacent to it in the second column.

Does that make sense? An example will help. Suppose the student's percentage is 87%. Well, in the table above, the *highest* value in the first column that is still *less than or equal to* 87% is 80%, is it not? 70%, 60%, and 0% are less than or equal to 87%, but they are not the *highest* value that is less than or equal to 87%. So 80% is the value that *Calc* will select from the Range column in its LOOKUP of the table. The letter grade from the corresponding cell in the second column—in this case a "B"—will then be posted to the **GRADE** column of the Gradebook document proper.

Once you understand the concept of "the highest value less than or equal to another number", the rest is easy. Here are a few student percentages to try for yourself. Complete the exercise that follows.

From Fig. 5.25, column 1,

What is the highest value less than or equal to 45%, and what is the resulting letter grade?_____

What is the highest value less than or equal to 67%, and what is the resulting letter grade?_____

What is the highest value less than or equal to 59%, and what is the resulting letter grade?_____

What is the highest value less than or equal to 100%, and what's the resulting letter grade?_____

The answers are in the footnote at the bottom of the page.[1]

There are two parts to incorporating the *Calc* LOOKUP function into your Gradebook document. First you must build the LOOKUP Table into the spreadsheet. Second you must enter into the appropriate cells the LOOKUP function that will instruct *Calc* to carry out the LOOKUP operation.

Building the LOOKUP Table

You'll need both the **Gradebook document** (which you saved in the **Data Files** folder in the **Spreadsheet Documents** folder) and the **Gradebook Template** (which you also saved in the **Data Files** folder in the **Spreadsheet Documents** folder) to complete the remainder of this tutorial, so if these documents are not already open, open them both from your **Work Files for LibreOffice 5** folder before proceeding

Next, in the **Window menu** select the **Gradebook** document, if it is not already the active window on the screen

Since all the cells are protected in the Gradebook document, you'll need to unlock them first in order to make changes.

From the **Tools menu** select **Protect Sheet…** to toggle the protection **off**

Now you'll be able to work with the data in the spreadsheet. Let's build the Lookup table that's illustrated in Fig. 5.25 above (page 171). The first column of the LOOKUP Table (the lookup vector) has a set of numbers which *Calc* calls the *Search vector*.

A vector is just another name for a single column of numbers. The *Search vector* contains the set of values against which *Calc* compares the data from a selected cell in the Gradebook document.

Let's create this column (vector) of the LOOKUP table first. As you work your way through this exercise, be sure to hit the *number* 0, NOT the *letter* O; they are so close together on the keyboard that some students hit the wrong character by mistake.

Select cell **P1** and type the column header **Range (%)** then press **Enter** to move down to cell **P2**

Type **0** (the number zero (0) that is) in cell **P2** and press **Enter** to move down to cell **P3**

Type **0.6** (this is equivalent to 60% in mathematical terms) and press **Enter** again to select cell **P4**

[1] 0% (E); 60% (D); 0% (E); 100% (A)

Type **0.7** and press **Enter** to make **P5** the current cell

Type **0.8** and press **Enter** once more

Type **0.9** in cell **P6** and press **Enter** again to make **PrANGE (%)7** the current cell

Finally type **1** (this is equivalent to 100% in mathematical terms) and click on the **Accept** ( ) button

Now you must change the cell attributes of this first column of the table so as to display the numbers in percent form (with the percent (%) symbol). You did this before in Lesson 4, so the following is just a reminder of how to do this.

Drag down to highlight **all 6** of the scale values from cell **P2** to cell **P7**

In the **Formatting toolbar** click on the **% (Percent)** symbol to change the format of the **decimal numbers** to **percentages**

If the **percentages** have **decimal places**, **right click** on the **column of selected percentages**

In the **context menu** that pops up, select **Format Cells…** to bring up the **Format Cells dialog box**, click on the **Numbers tab** and then, in the **Options section**, make sure the **Decimal places** option is set to **0 (zero)**

That completes the first column of the table. Now for the second column with the letter grades—what *Calc* calls the *result vector*. The *result vector* contains the values which *Calc* returns to the Gradebook cell which contains the formula which calls on the LOOKUP function.

Select cell **Q1** and type the header **Grade (A-E)**, then press **Enter** to move down to cell **Q2**

Type the letter **E** (or whatever you would use for a failing grade) and press **Enter** to go to cell **Q3**

Type a **D** and move down to cell **Q4**, then type a **C** and move down to cell **Q5**

Type a **B** and move on down to cell **Q6**, then type an **A** and move down to cell **Q7**

Finally type an **A** again in cell **Q7** and click on the **Accept** ( ) **button**

The table is now almost ready for use. A simple cosmetic adjustment will improve its appearance.

Select columns **P** and **Q** by dragging across the **column headers P** and **Q** at the top of the columns and, in the **formatting toolbar**, click on the **center alignment tool**

Your LOOKUP Table should now look like Fig. 5.25 on page 171.

Save all your hard work before proceeding with the tutorial

Using the clipboard to copy cells from one document to another

Now that you have completed the task of building the LOOKUP Table in the Gradebook document you should update the Gradebook Template along the same lines. The easiest way to do this is to

copy the relevant cells from the Gradebook document into the Gradebook Template document using Copy and Paste.

First you must copy the relevant cells (those used for the LOOKUP Table) from the Gradebook document to the clipboard. Here are the steps.

Select cell **P1** and drag down diagonally across the **LOOKUP Table** to cell **Q7**

Press **Ctrl+c** to copy the **LOOKUP Table** to the clipboard

Now switch to the **Gradebook Template** document by **switching windows** in the **Window** menu

In the **Gradebook Template**, click on cell **P1** to make it the current cell

Press **Ctrl+v** to paste the **LOOKUP Table** from the clipboard to the **Gradebook Template**, then **Save** your work (**Ctrl+s**) once more

Entering the LOOKUP function into the Grade column

Take a moment to read carefully through the next several paragraphs to help you understand the next step in using the LOOKUP table.

Recall that the LOOKUP function instructs *Calc* to look up a table that you have built and return with a corresponding result to store in the spreadsheet proper. Still confused? Maybe the following will help you figure it out.

The LOOKUP function has the following parts to it:

=LOOKUP(Search criterion,Search vector,result_vector)

Let's examine each part of this function in order to understand how it works.

- As you know by now, the "=" symbol at the start of the function simply tells *Calc* that a function or formula is in the cell, as opposed to ordinary data such as numbers or labels.
- The word **LOOKUP** tells *Calc* what task it has to carry out (**look** something **up** in a list).
- **Search criterion**, **Search vector**, and **result_vector** are variables (control values) that *Calc* uses when it is looking up the table in columns P and Q:
  - the **Search criterion** is either a number or text (such as a person's name); this **value** will be the "key" that *Calc* will use as it searches through the cells in the **Search vector** or column;
  - the **Search vector** is the column of cells that *Calc* has to check in its lookup of the table (column P in Fig. 5.25 on page 171);
  - the **result_vector** is the column of cells in which *Calc* will find the result of the LOOKUP operation (Column P in Fig. 5.25 on page 171).

Still confused? Don't feel bad; this is definitely tricky stuff. Maybe by working an example you will better understand how the Lookup function works. It will be easiest for you to follow the next exercise if you have an actual grade book to work with.

The **Gradebook Template** and **Gradebook** spreadsheets should still be open on your screen, so begin by switching back to the **Gradebook document** (use the **Window menu** to **Switch Windows**)

As you follow along, make sure you have at least the LOOKUP Table (columns **P** and **Q**) showing on the screen, as well as columns **M** thru **O** of the Gradebook document containing the PCNT and eventual GRADE data.

Make sure you have columns **M thru Q** showing on the screen, with the **LOOKUP Table** at the top of the screen, then select cell **O14** (Fig. 5.26)

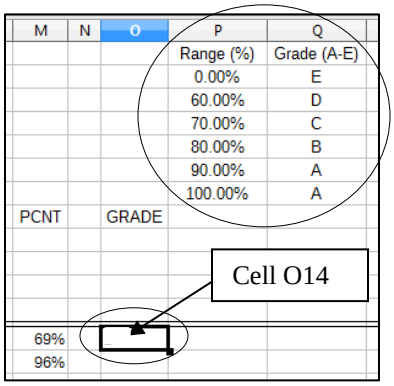


Fig. 5.26 Spreadsheet showing the Lookup Table

This is the cell in the GRADE column for the first student. You want *Calc* to use the LOOKUP function to figure out the letter grade for each student and display it in this column (Column O). So the LOOKUP function must be used in each cell of Column O.

Click on the **Function Wizard** icon (***fx***) in the **data entry** bar towards the top of the spreadsheet window, then in the **Function Wizard** dialog box select the **Spreadsheet category** and locate and **double click** on the **Lookup function** to select it (Fig. 5.27)

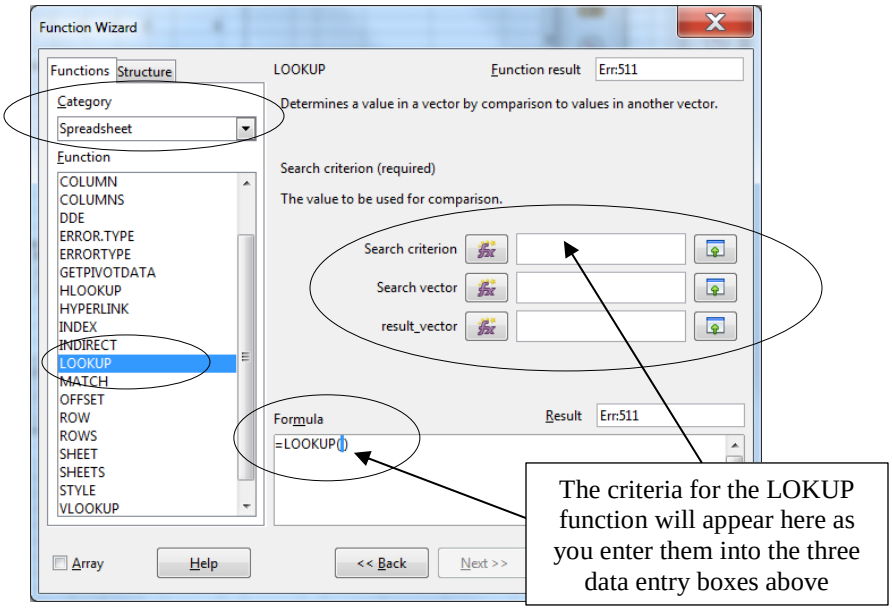


Fig. 5.27 Function Wizard dialog box before defining Lookup function criteria

Notice in Fig. 5.27 above that the cursor is positioned between the brackets after the word =LOOKUP (|) in the formula area of the dialog box. The three sets of data for the LOOKUP function will appear there as you complete the steps that follow.

> If the **Function Wizard dialog box** is covering the cells you need to work with (**column M** and the **Lookup Table** in **columns P and Q**), slide the **Function Wizard dialog box** down and off to the right or left on the screen so that the dialog box is out of the way

On the *right side* of the *Function Wizard dialog box* in Fig. 5.27, you see three data entry boxes for the set of arguments (*Search criterion, Search vector, result_vector*) which you need to fill out. In Fig. 5.28 below you see the end result of this task, with the set of arguments (*Search criterion, Search vector, result_vector*) filled out relative to cell M14. Your task now is to reproduce this yourself.

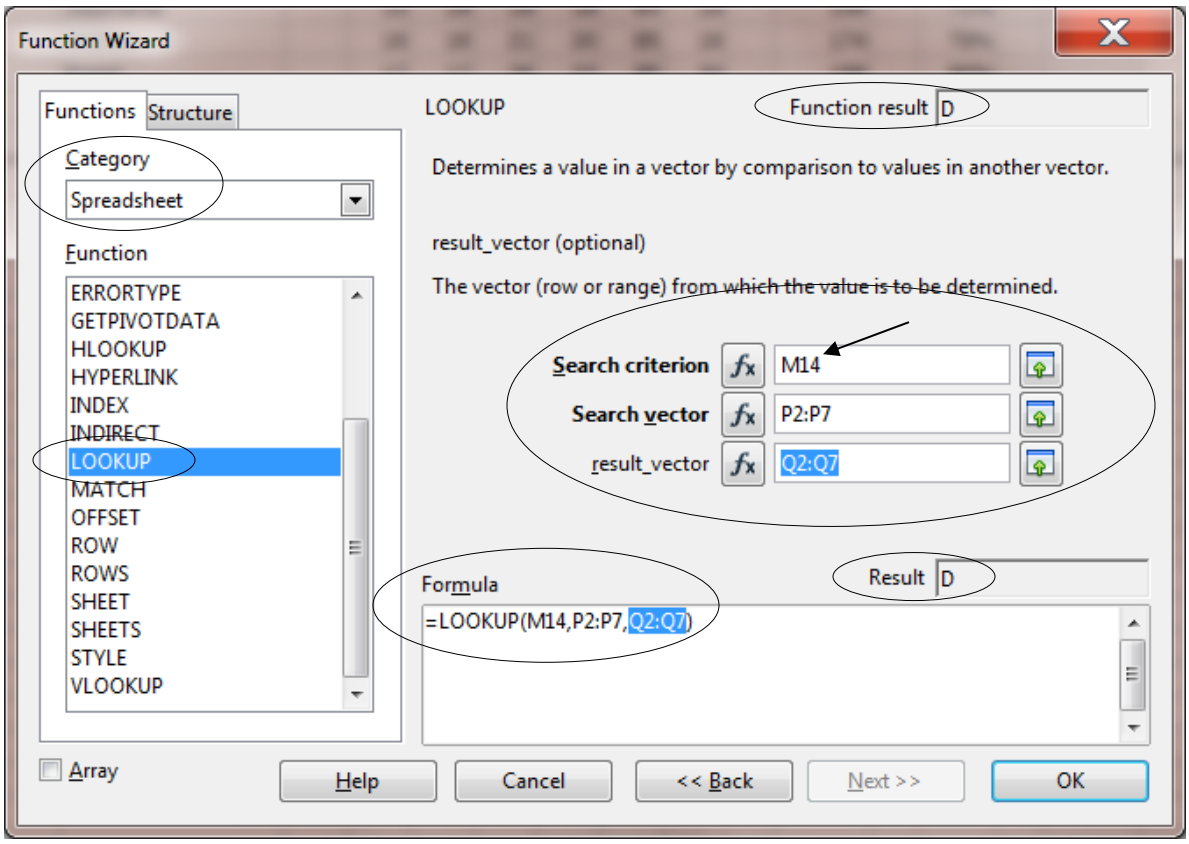


Fig. 5.28 Function Wizard dialog box showing Spreadsheet > Lookup function

Entering the Search criterion in the dialog box

Each student's Percentage will determine the Letter Grade, so the percentage is what we want *Calc* to use as the *Search criterion* to find the letter grade from the Lookup Table.

> In the **Gradebook** spreadsheet, click on cell **M14** and notice that **M14** is immediately entered into the **Search criterion data entry box** *and* also **between the brackets** after **=LOOKUP (|)**—you should now see **=LOOKUP (M14)** there

So *Calc* enters this cell's coordinates as the first of the LOOKUP parameters, the *Search criterion*. You are telling *Calc* that it must use this first student's percentage as the value to check against the first column of the LOOKUP Table (cells P2 through P7).

Entering in the Search vector
Cells P2 through P7 are the *Search vector* for the LOOKUP Table.

> In the **Function wizard dialog box**, click to position the cursor in the **second** data entry box—the **Search vector** entry area (see Fig. 5.28 above)—so you can enter the cells which contain the **Search vector**
>
> Now, in the **Gradebook** spreadsheet, use the mouse to drag down **from cell P2 to cell P7**

Notice that in the data entry bar *Calc* fills in the second of the LOOKUP parameters for the LOOKUP function, namely the *Search vector*. It also appears between the brackets after =LOOKUP (M14,P2:P7). Check that it also appears in the Gradebook spreadsheet in the Data entry bar, too. You are almost done with building the LOOKUP function.

Entering the result_vector
Cells Q2 through Q7 are the *result_vector* for the LOOKUP Table.

> Click to put the cursor in the **third** data entry box so you can specify the cells that contain the **result_vector**, then, in the **Gradebook** spreadsheet, drag down **from cell Q2 to cell Q7**

Notice, once again, that *Calc* fills in the third of the =LOOKUP (M14,P2:P7,Q2:Q7) parameters, the result_vector.

> In the **Gradebook spreadsheet** itself, check the **data entry bar** to see that the LOOKUP function is now complete—at this stage it should read **=LOOKUP(M14,P2:P7,Q2:Q7)**
>
> Finally, click on **OK** and **Save** your work

Applying the function
Calc will look for "the highest value in cells P2 through P7 that is less than or equal to the student's percentage".

> Take a look at cell **O14** now and **verify** that it contains the correct **letter grade** according to the value in cell **M14** (the percentage for this first student)

As you see, once the LOOKUP function has located the correct cell in column 1 of the Lookup Table (the Range column), all that remains is for *Calc* to make a note of the letter grade that is in the corresponding cell in column 2 of the table (the Grade column), and the LOOKUP function copies that grade into cell O14.

Don’t feel bad if your eyes are starting to glaze over; this is kinda nerdy stuff. But hang in there, we’re nearly done.

Copying the LOOKUP function into the rest of the GRADE column
The first student's grade is taken care of. The next task is to copy this function from cell O14 down to the other cells in the GRADE column (column O), but this is not as simple as it seems because we have to consider the problem of *Absolute* and *Relative* cell references.

If you want to try and do this on your own (you will need to understand the concept of Absolute and Relative references!), go ahead. If you are successful you can skip the rest of this sub-section and go to the *Practice makes perfect* section on the next page.

If you need help completing the LOOKUP function, read on to follow the steps to *correctly* Fill down the LOOKUP function to the remaining cells in column O.

First you must make a small change to the function itself. You also need to put your thinking cap on, because if this is the first time you've used a LOOKUP function, it can get mighty confusing.

You may recall learning about Relative and Absolute cell references in Lesson 4. The function *=LOOKUP(L14,P2:P7,Q2:Q7)* will work fine for the first student, but if you copy it to the other cells as is, *Calc* will assume that *all* the cell references in the function are relative to the cell into which they are being copied, and will adjust them accordingly, resulting in the WRONG letter grades. If you enjoy math or logic, you'll be enjoying this; but if not, bear with us, OK?

What you have to bear in mind is that the references to the LOOKUP Table (cells P2:P7 and Q2:Q7) must be *absolute* references—which means any references to those cells *must not* change—because the data for the LOOKUP Table will *absolutely always* be found in these specific cells.

So you need to tell *Calc* to leave these LOOKUP Table references unchanged when copying the LOOKUP function into the other cells in column N. You do this by surrounding the LOOKUP Table's cell coordinates with $ (dollar) signs. Like this:

=LOOKUP(M14,**$P$2:$P$7,$Q$2:$Q$7**)

You did this in Lesson 4 when you were creating the formula for the cells in the Percentage column (Column M).

The reference to the lookup value (cell M14 for the first student) is *relative*, and will be different for each student (M15, M16, and so on), so it doesn't need to have dollar signs around it. But the references to the Search vector and to the result_vector are *absolute*—fixed because they refer to the LOOKUP table in columns P and Q.

Here is a reminder of the steps to tell *Calc* to treat references as Absolute References when referring to the LOOKUP Table.

Click on cell **O14**

Take a look at the Data Entry bar at the top of the screen and you'll see that the LOOKUP function is spelled out in full (Fig. 5.29). It just needs all those $ signs around the references to the cells that make up the LOOKUP table.

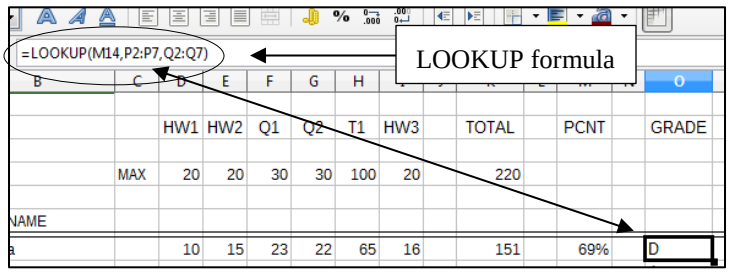


Fig. 5.29 LOOKUP function for cell N14

In the **Data entry bar** (Fig. 5.29), in the **LOOKUP formula**, click to put the cursor immediately before the reference to **cell P2**

Now put a dollar (**$)** sign in front of **every coordinate** (rows *and* columns) for the LOOKUP Table (**8 $ signs** in all) as illustrated in Fig. 5.30

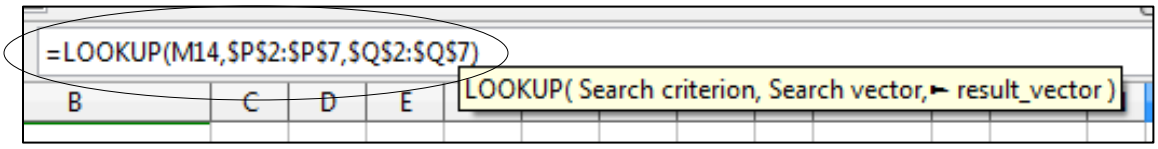


Fig. 5.30 Absolute references are preceded by dollar ($) signs

This will ensure that this part of the function will remain unchanged ("absolute") when you copy it shortly into the other cells in column O.

Click the **Accept button** ( ) to accept the LOOKUP function into cell **O14**

Here now are the steps to copy the function from cell O14 into the remaining cells of the GRADE column (Column N).

Make sure the current cell is still cell **O14**

Grab hold of the small **Fill handle** in the **lower right** corner of **cell O14**, drag down to **cell O24** and let go of the mouse button (or take your finger tip off the screen if you're using a touch screen)

You now should see the correct letter grade for each student in column O.

While you have the cells in **column O** highlighted, **center** the grades in the column (**Formatting toolbar** > **Center icon**)

Save the changes you have made to the **Gradebook** spreadsheet

If you need to think about the LOOKUP function a little more, go carefully back over what you have just done. Once you have a clear idea of how the LOOKUP function works, you and your students will be able to apply it in myriad situations when you build spreadsheets of your own.

Practice makes perfect

Your task now is to switch to the Gradebook Template document again, and add the LOOKUP function there, too. You do not have any data in the template (or at least you shouldn't have!), so your LOOKUP function will produce a column of meaningless grades (all E's!) in the GRADE column, just as was the case when you built a function into the PCNT column of the Gradebook Template document when you were working on Lesson 4. This is no problem, because the data will be relevant and correct when you use the spreadsheet with an *actual class of your own* and enter *meaningful* sets of scores, as is the case in the Gradebook document itself.

You either can add the functions to the Gradebook Template document the long way, by repeating all the steps you just carried out for the Gradebook document cell by cell, or you can use the Copy (*Ctrl+c*) and Paste (*Ctrl+v*) functions as you did a short while ago to copy the LOOKUP Table from the one document to the other.

Go ahead and **copy the grades formulas in column O** from the **Gradebook** to the **Gradebook Template**; don't forget, when you're done, to **Save** the changes you have made to the **Gradebook Template** spreadsheet, then close the **Gradebook Template** document

Finally in this exercise you must *protect* the Gradebook worksheet so that no one can make unauthorized changes to the data in the cells.

Select all the cells in the **Gradebook** worksheet (**Ctrl+a**), then, in the **Tools menu** > **Protect Sheet…** and in the **Protect Sheet** dialog box click to remove the **check mark/tick** in front of **Select Unprotected Cells**

Do the same for the **Gradebook Template** worksheet

Save your work and **close just** the **Gradebook Template** document

You should now have only the *Gradebook* document open on your screen.

5.6 PRINTING THE UPDATED SPREADSHEET

If you are able to do so, you're going to print out the Gradebook document twice. Here are the steps for the first printout.

It is usually best to print a spreadsheet in landscape (sideways) orientation.

In the **Format menu** > **Page…** dialog box, click on the **Page tab** and, in the **Orientation section**, click on the **radio button** next to **Landscape** Orientation

You need to take care of a couple of other details before clicking on the Print button. The printed spreadsheet will look better if you remove *column and row headings* as well as the *cell Grid Lines*.

In the **View menu** click on **Column & Row Headers** to remove the **check mark** there, thus removing column and row headers from the spreadsheet

Next remove the **Grid Lines** by clicking, in the **View menu**, on **Grid Lines for Sheet** (Fig. 5.31)

GRADE REPORT

Class: Grade 4
Semester: 1
Year: 2016

Range (%)	Grade (A-E)
0%	E
60%	D
70%	C
80%	B
90%	A
100%	A

		HW1	HW2	Test1	Quiz	HW3	Final	TOTAL	PCNT	GRADE
	MAX	25	25	50	10	25	100	235	0	
LAST NAME	FIRST NAME									
Abdallah	Prince	18	20	35	7	19	83	182	77.4%	C
Banda	Tafadza	23	22	41	9	24	75	194	82.6%	B
Bisika	Charlize	20	23	45	6	21	88	203	86.4%	B
Bwanali	Wema	20	19	48	10	23	64	184	78.3%	C
Dzanjalimodzi	Funsani	22	16	43	8	17	78	184	78.3%	C
Fumulani	Harietta	17	24	39	7	18	85	190	80.9%	B
Kabweza	Blessings	21	20	50	9	25	92	217	92.3%	A
Kafwafwa	Chiculo	15	19	48	6	22	84	194	82.6%	B
Pillane	Abikanile	25	24	37	5	21	79	191	81.3%	B
Wadabwa	Tenson	23	20	46	9	19	96	213	90.6%	A
Zon	Maruxa	25	25	50	10	25	100	235	100.0%	A
	Average	20.8	21.1	43.8	7.8	21.3	84.0			
	Max score	25.0	25.0	50.0	10.0	25.0	100.0			
	Min score	15.0	16.0	35.0	5.0	17.0	64.0			

Fig. 5.31 Removing Row & Column Headers and Grid Lines

Selecting a section of the spreadsheet for printing

When you first print out your Gradebook document, you do not want the LOOKUP Table to appear on the printed report. You want to print only that block of cells that contains the data pertaining to student grades for the semester. This includes columns A through O and Rows 1 through 27.

The steps that follow will show you how to select just this block of cells for printing. First you must select (highlight) the range of cells that you want to print.

Drag down diagonally from cell **A1** to cell **O28** (this will include the **Average**, **Max Score**, and **Min Score** summary lines at the bottom of the Gradebook document, but **not** the cells with the LOOKUP table)

Now, from the **File menu** select **Print** to bring up the **Print dialog box** (Fig. 5.32)

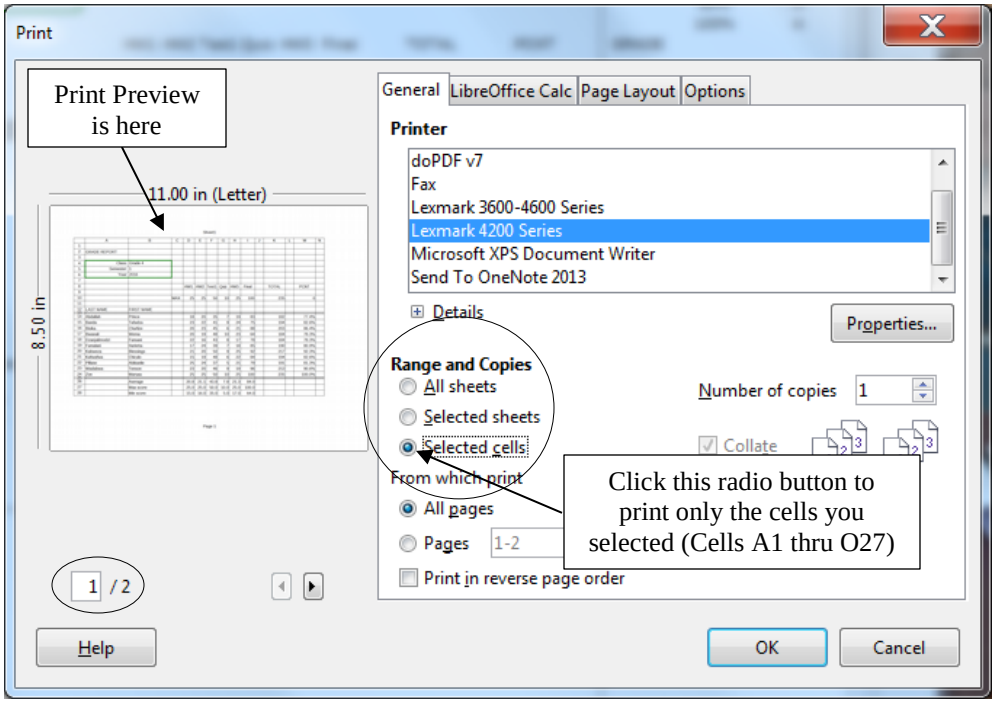


Fig. 5.32 Setting the Print area in the Print dialog box

Notice that in the Print dialog box you have a Preview of the worksheet before printing. Your spreadsheet has just one page. If you wanted to check how many pages there are in your spreadsheet before printing, you would find the answer *underneath* the Print Preview window (it reads 1 of 1 for this spreadsheet).

Check out how the spreadsheet looks in the **Preview window**, then click on **OK** to print out the first hardcopy of the **Gradebook document**

Now you are going to print a second copy of the Gradebook document, but this time you will include the LOOKUP table, the Column and row headers and the Grid Lines.

In the **Gradebook document**, drag down diagonally from cell **A1** to cell **Q27** (this will include the **LOOKUP table** in columns P and Q)

In the **View menu** select **Column & Row Headers**, then **bring back** the **Grid Lines** by clicking, in the **View menu**, on **Grid Lines for Sheet**

Now, from the **File menu** select **Print** and, in the **Print dialog box** make sure the **radio button** next to **Selected cells** is **on** (check the **Print Preview window** to make sure the **LOOKUP table** is included in this **second** printout), then click on **OK** to print this **second copy** of the **Gradebook** spreadsheet

Finally, **close** the Gradebook and, if you are completing the lesson for a class at school, hand in **both hardcopies** of the spreadsheet to your instructor

5.7 CREATING CHARTS BASED ON SPREADSHEET DATA

The *Calc* charting capability

Today we are in danger of being overwhelmed by too much data, the raw material of information. We even have an acronym for it—TMI—too much information. It is a genuine problem.

One of many solutions to TMI is charts—graphic, colorful, eye-catching. Charts—quality charts that don't mess with the data—try to reduce the masses of data on any particular subject to a meaningful analysis of what's going on. This applies as much to the meaning of world events as it does to the progress of an individual student in your class. Charts, in other words, are a powerful way to convey what would otherwise be complex information.

Calc makes it easy to create dozens of different types of charts. You can create a chart from information gathered in most any spreadsheet. It is not an exaggeration to say that your ability to use *Calc*'s charting capability will make you a more effective teacher.

A spreadsheet user can take advantage of charts based on the numbers stored in its rows and columns of cells. The numbers on their own may not provide much information. Charts based on those numbers, on the oth35er hand, may enable the user to *visualize* the data. "A picture," as they say, "is worth a thousand words."

A well-designed chart can help you (and your students) make sense of a thousand numbers. Charts are also useful when you need to increase the impact of any oral or written presentation. Think of the many charts that you now see presented on TV and in other media; their purpose is to help you make sense of all the data out there, whether it's business data, weather data, data related to politics, and so on.

We must be wary of charts, of course, because, like statistics, they can be guilty of purveying, well, lies. But charts that are well-designed and *honestly*-designed will help your students understand what they need to know. More to the point, if you teach your students how to create charts, they will be able to include them in assignments related to every subject area under the sun.

Creating a Column chart

For this exercise, we'll set aside the work we've been doing with the Gradebook documents. You are going to open a new spreadsheet document with data related to Grades so that you can practice creating charts.

> The *LibreOffice* startup window should still be open on your screen after you closed the Gradebook, so click on **Open File** and navigate to your **Removable Disk** > **Work Files for LibreOffice 5** > **Miscellaneous Files** > **Other Documents** folder and open the **Charts** document

Your Charts spreadsheet should look like Fig. 5.33.

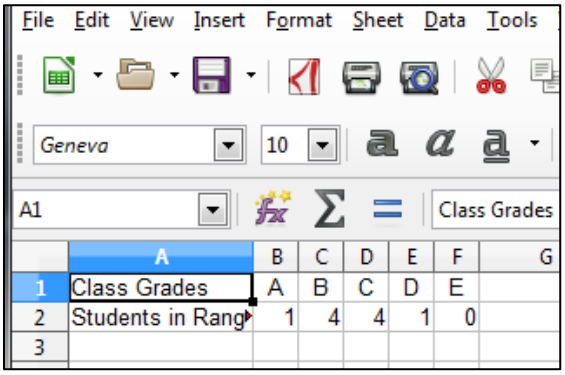


Fig. 5.33 Data for Charts document

The values represented in a chart are called a *data series* or *data set*. In the chart you are about to create, the number of students in the various grade ranges (A, B, C, etc.) will be represented by bars. The chart will have a *title* and a *legend* with names descriptive of the *data series*.

Most two-dimensional charts, except pie charts, pyramid charts and so forth, have two *axes*, which are the vertical and horizontal lines along which the data are plotted or displayed. As illustrated in Fig. 5.34, the Y axis is the *vertical* axis (running from top to bottom); the X axis is the *horizontal* axis (running from left to right).

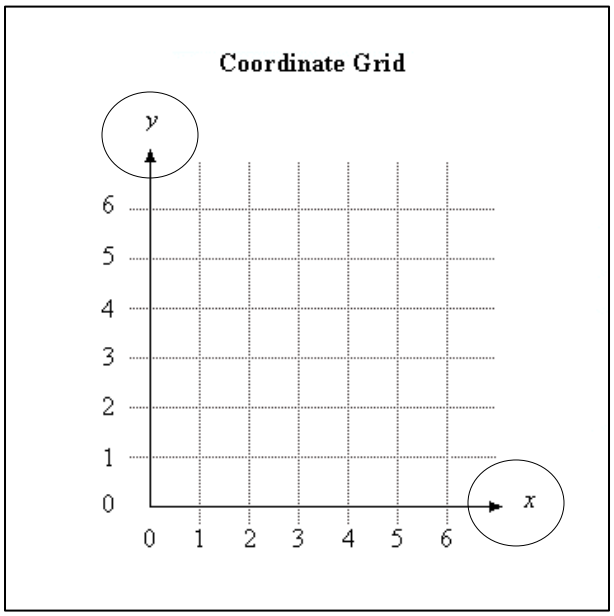


Fig. 5.34 The axes for a chart

To create a chart in *Calc*, you must first designate the set of cells in the spreadsheet that you want included in the chart. This is called the *chart range*. Let's select the Chart Range now.

Drag across cells **A1** through **F2** in order to **highlight** the set of cells

Now, let's check out each of the various categories of *LibreOffice* charts.

In the **Standard toolbar**, click on the **Chart** tool (Fig. 5.35)

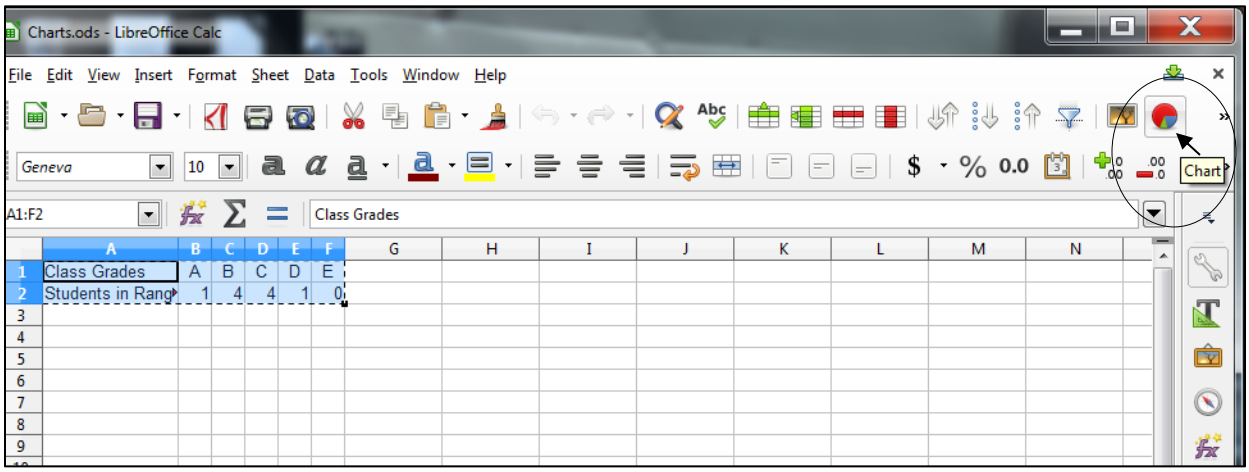


Fig. 5.35 The Chart tool in the Standard toolbar

This immediately brings up a basic chart (a bar chart) based on the data highlighted in the spreadsheet, and also offers the *Chart Wizard dialog box* (Fig. 5.36).

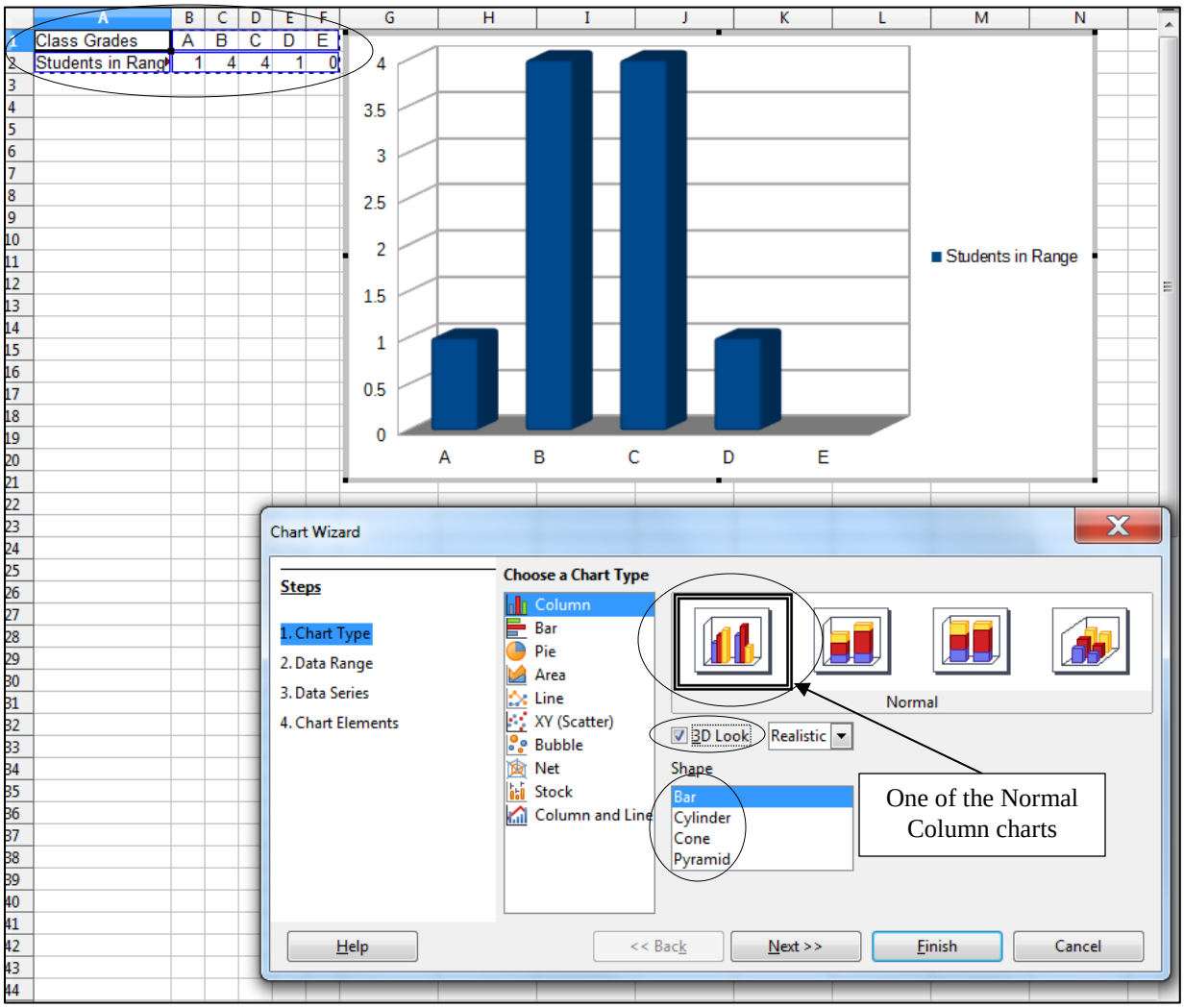


Fig. 5.36 The *LibreOffice* Chart Wizard dialog box

The Chart Wizard dialog box opens up a world of opportunities to create other eye-catching and, more importantly, *effective* chart styles—effective, that is, in the sense of getting the *true* meaning of the data across.

> In the **Chart Wizard dialog box** > **Choose a Chart Type** menu, click on **Column** (Fig. 5.36 above), and look at the different types of **Plain** and **3D Column Charts** you can work with, including **Box**, **Cylinder**, **Cone**, and **Pyramid** charts

Check out the other Chart Types.

> Click on the **Bar chart type** and look at the different types of **Bar Charts**
>
> Click on the **Pie chart type** and look at the different types of **Pie Charts**
>
> Click on the **Area chart type** and look at the different types of **Area Charts**

Click on the **Line chart type** and look at the different types of **Line Charts**

Click on the **XY (Scatter) chart type** and look at the different types of **Scatter Charts**

Click on the **Bubble chart type** and look at the different types of **Bubble Charts**

Click on the **Net chart type** and look at the different types of **Net Charts**

Click on the **Stock chart type** and look at the different types of **Stock Charts**

Finally, click on the **Column and Line chart type** and look at the different types of **Column and Line Charts**

Quite a selection—dozens of different kinds of charts. But let's focus for now on the Column charts.

Click on the **Column charts type**

In the **Column Charts** options, click to put a **check mark** in the box next to **3D Look** (Fig. 5.36 on previous page) then, in the **Shape menu**, click on **Box** (Fig. 5.36 again), and then click on the first **Normal** type of Column chart (Fig. 5.36)

As you see, *Calc* immediately creates the chart and displays it on the screen (Fig. 5.36 previous page).

Notice that Calc has automatically put the *grades* along the (horizontal) X axis and the scale indicating the *number of students "in Range"*—i.e. the number of students with each grade—along the (vertical) Y axis.

One change you need to make right now is to the chart title. It should say something like "Class Grades." While we're doing that we can make a couple of other changes as well.

In the **Chart Wizard** > **Steps section**, click on **4. Chart Elements** (Fig. 5.37)

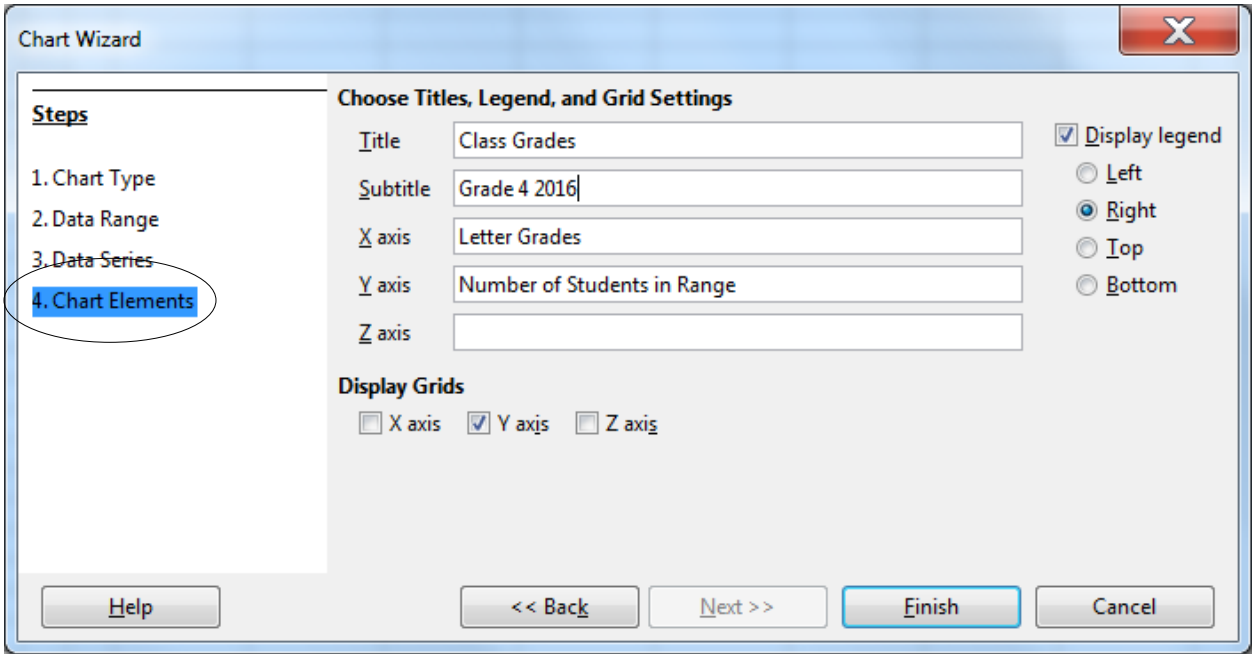


Fig. 5.37 Chart Wizard > Chart Elements dialog box

In the **Chart Elements dialog box**, fill out the **Title**, **Subtitle**, **X axis**, and **Y axis** as per the data in Fig. 5.37 on the previous page—leave the **check mark/tick** in the box next to **Display legend** and leave the **radio button** next to **Right** selected, then click on **Finish**

The end result will look like Fig. 5.38.

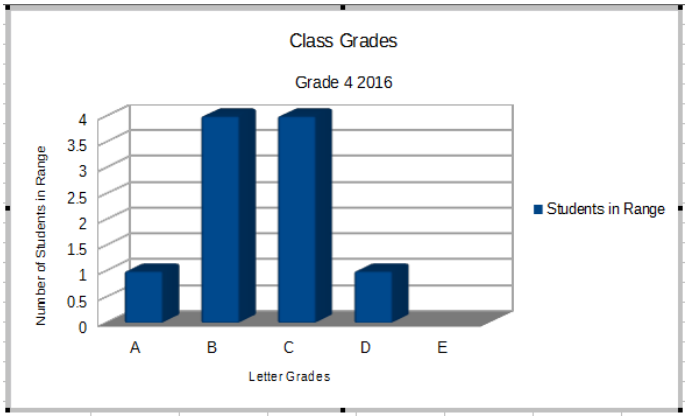


Fig. 5.38 The final version of the 3D Column chart

Go to **File** > **Save As…** and, in your **Work Files for LibreOffice 5** > **Data Files** > **Spreadsheet Documents** folder, **save** the chart with the name **Column Chart**

Before the next exercise, you need to remove the chart from the spreadsheet window.

Click **anywhere off** the chart to **deselect** it, then click **once** on the chart to put the **handles** around it and hit the **Delete** key on the keyboard to **remove** the chart from the *Calc* spreadsheet window before the next exercise

Creating a Pie chart

Creating a pie chart is straightforward if you just successfully completed the Column chart exercise. You will use the same set of data for the exercise that follows.

Drag to select cells **A1** through **F2**, then, in the **Standard toolbar**, click on the **Chart tool** to bring up the **Chart Wizard** (Fig. 5.39) and then, in the **Choose a Chart Type** menu, click on **Pie**

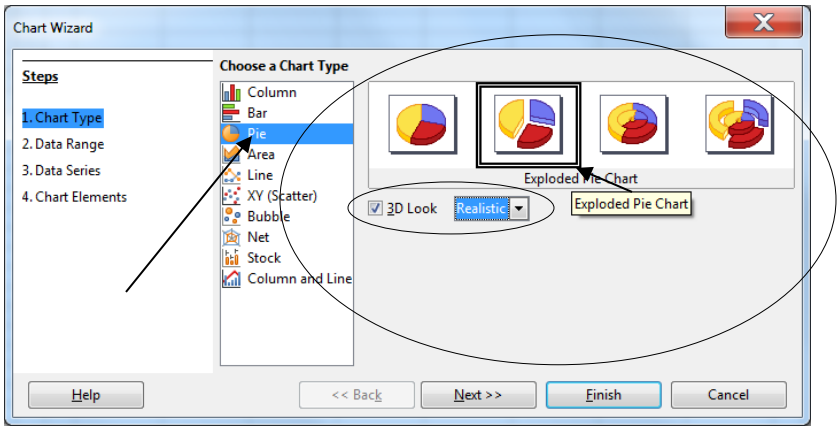


Fig. 5.39 Exploded Pie Chart Style

In the **Pie Charts** dialog, click to put a **check mark** next to **3D Look** and, in the **3D Look menu** make sure the **Realistic** option is selected

In the **Chart Wizard**, click on each of the **four Pie Chart styles** and check them out before proceeding with the exercise

The style of Pie Chart you are going to work with is the *Exploded Pie Chart* (Fig. 5.39 above).

In the **Steps section** on the **left** of the **Chart Wizard dialog box**, click on **4. Chart Elements** and change the **Title** to **Class Grades Distribution** as you did for the Column Chart, type **Grade 4 2016** for the **Subtitle**

Leave the **check mark/tick** in the box next to **Display legend** and leave the **radio button** next to **Right** selected, then click on **Finish**

Now, **right click** on any of the **slices** in the **Pie chart** and, in the **context menu** that pops up, select the option to **Insert Data Labels**

This puts a label on each of the slices indicating how many students got that particular grade, thus adding information to the chart. It would be helpful if the Font size were bigger on each of those slices and maybe the color white would stand out more against the colors of the various slices. This is easy enough to do.

Right click again on the **number label** on any one of the slices in the **Pie chart** and, in the **context menu** that pops up, select the option to **Format Data Labels…**

This brings up the dialog box titled *Data Labels for Data Series "Students in Range"* (Fig. 5.40).

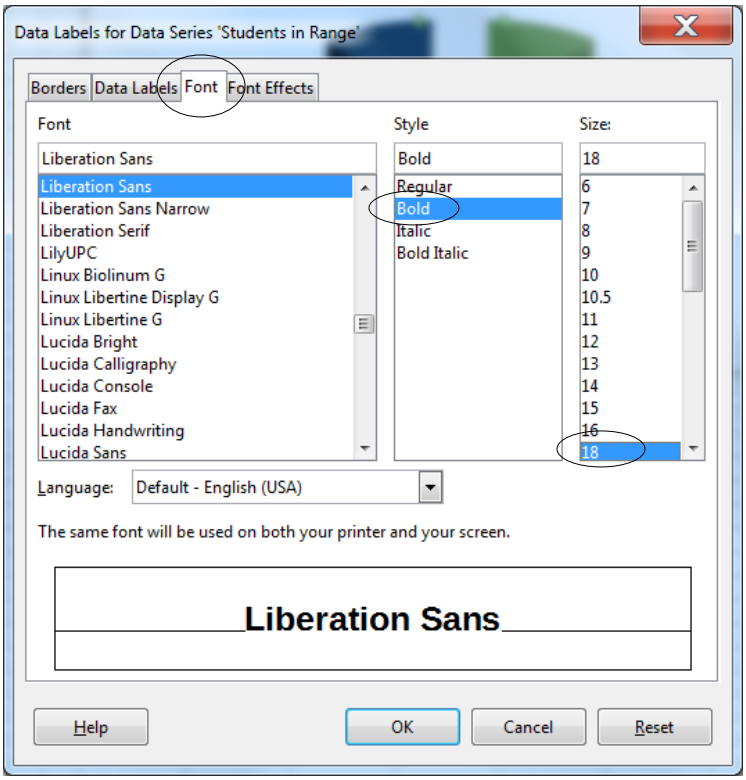


Fig. 5.40 Changing the Font and Size of the Data labels in a Pie chart

Click on the **Font tab** and change the **Style** to **Bold** and the **font size** to **18**

Next click on the **Font Effects tab** and change the **Font Color** to **White**

Last, click on the **Data Labels tab** and change the **Placement** to **Center**, then click on **OK**

There, that's better (Fig. 5.41).

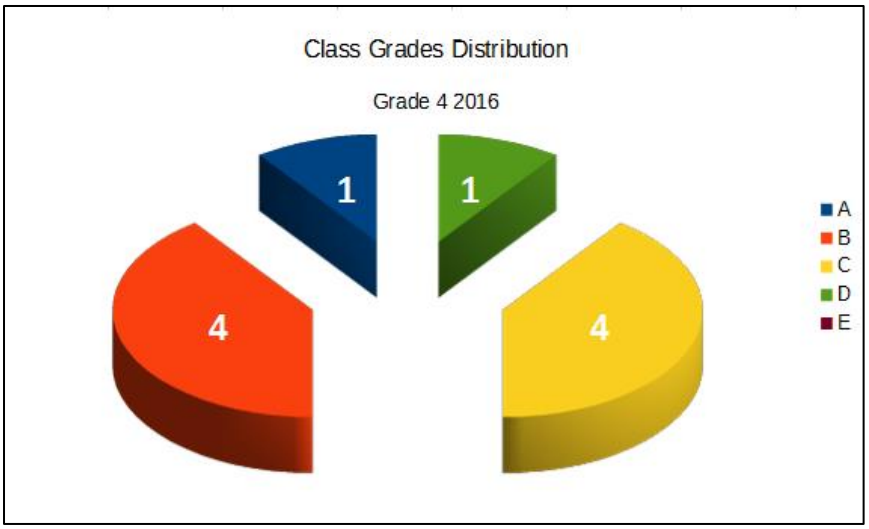


Fig. 5.41 Final version of the Pie Chart

Save the chart with the name **Pie Chart** in your **Data Files** > **Spreadsheet Documents** folder

Before the next exercise, you need to remove the chart from the spreadsheet window.

Click **anywhere off** the chart to **deselect** it, then click **once** on the chart to put the **handles** around it and hit the **Delete** key on the keyboard to **remove** the chart from the *Calc* spreadsheet window before the next exercise

Creating a Bar chart

One last Chart type will suffice for you to get the hang of creating charts using spreadsheet data. This time you'll create a 3D Bar chart.

Drag to select cells **A1** through **F2**, then, in the **Standard toolbar**, click on the **Chart tool** to bring up the **Chart Wizard** (Fig. 5.37 on page 185), and then, in the **Choose a Chart Type** menu, click on **Bar**

In the **Bar Charts** dialog, click to put a **check mark** next to **3D Look**, then in the **3D Look menu** select the **Simple** option, and in the **Shape section** select **Cylinder**

Of the four **Styles of Cylinder Bar Charts**, select the first (**Normal**) style, then, in the **Steps** section of the Chart Wizard, click on **Chart Elements** and type the Title **Class Grades Distribution**, with the Subtitle **Grade 4 2016**

Click the **Finish** button, then **right click** on any of the **Bars** in the **Bar chart** and, in the **context menu** that pops up, select the option to **Format Data Labels**

In the **Data Labels** dialog box, click on the **Font tab** and change the **Style** to **Bold** and the **font size** to **18**, then click on the **Font Effects tab** and change the **Font Color** to **a color of your choice**

Finally, click on the **Data Labels tab** and change the **Placement** to **Center**

The end result should look something like Fig. 5.42.

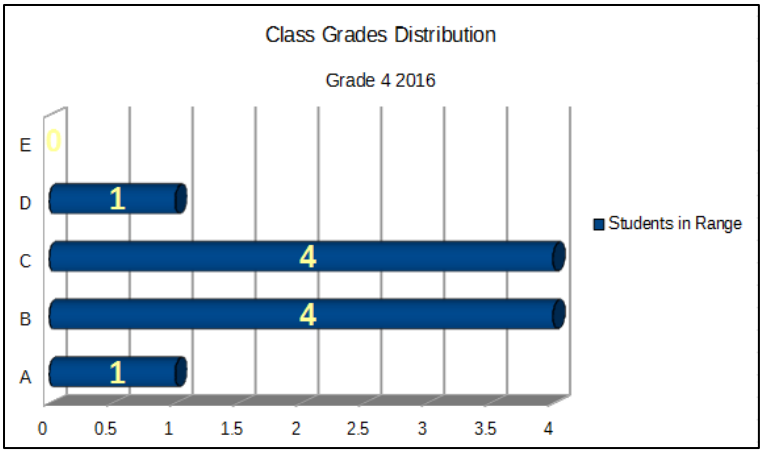


Fig. 5.42 Final version of the Bar Chart

Save the chart in your **Data Files** > **Spreadsheet Documents** folder with the name **Bar Chart**, then **close** the spreadsheet

LOOKING BACK

Most people take advantage of only a fraction of the functionality of computer software. This tutorial, and the others that you have worked your way through thus far, have introduced you to a wider range of features of *Calc* than most *Calc* users are aware of. However, you still cannot consider yourself an expert, even though you are becoming a sophisticated user.

To become an expert you must first of all *use* the software a great deal, taking advantage of the features you have learned so that you don't forget them. You also might study the User's Guide that *LibreOffice* provides along with the *Calc* software.

Having said that, you should always bear in mind that expertise like this is ephemeral. "Use it, or lose it," as they say. It’s not like riding a bike, where once you’ve learned how you can do it forever. You have to practice; you have to *use* the software so that you become more and more proficient.

LOOKING FORWARD

Lessons 7 and 8 will help you learn to use the *Base* database application. But before learning this new *LibreOffice* program, it will be good to return to *Writer* in order to learn how to use the mail merge feature of the word processor. This will be the subject of Lesson 6.

If you have completed all the tutorials in this book up to this point, you have spent a considerable amount of time at the computer. This is the only way to master the machine. Yet it is not enough. You must be prepared to strike out on your own, creating documents using the

productivity tools you are learning in these tutorials to meet your needs both in and out of the classroom.

Deep, assimilated learning takes place only once you are working independently, because to do this you have to show that you have *understood* everything you have learned. Understanding leads to transference and acquisition of skills. Tutorials will open the doors to knowledge, and hold your hand while you make those first steps toward the acquisition of specific skills.

But you must have the desire to let go of the hand that guides you. *Without* this desire, the exercises that you are following will be wasted and yield no fruit. *With* this desire, you will be motivated to *understand* what you are learning so that you can apply it to new situations in your own professional experience.

SKILL CONSOLIDATION

Complete these exercises to reinforce what you have learned in Lesson 5.

1. List at least 5 applications, other than those presented in these tutorials, for which you think you would use the *Calc* spreadsheet in a classroom environment.
2. Either alone, or with a group, develop templates for each of the five spreadsheets identified in exercise 1. This could be an excellent class project. Each team would develop a different set of templates. Then all groups would present their results for review by everyone else in the class, and the complete set of templates could be made available on disk for everyone to take away from the course.
3. Load the *Gradebook* document to the Desktop.
    - Add the function to calculate the average score for each of the tests, quizzes, homework, etc. The system will add up all the scores and divide by the number of cells that contain scores to arrive at the average. You should use the copy function to duplicate the functions across the spreadsheet.
    - Save the updated document
    - Print out only the columns that contain the student names and the final totals and percentages (so you will need to temporarily delete the columns in between—don't save this document!)
4. Load the *Gradebook* document onto the Desktop.
    - Add a new column for another set of scores
    - Add a new row for another student
    - Update the functions where necessary
    - Sort the student records based on the First and Last Name columns
    - Save the updated document
5. Create a line chart based on a set of values for populations in several cities in Malawi. Generate a Column chart, Bar chart, and Pie chart from the data. Research the population data on the web at http://countrymeters.info/en/Malawi
6. Create a Column chart, Bar chart, and Pie chart based on a set of values for the amount of rainfall for each of a selection of cities in Malawi. Research the Malawi rainfall data at this web address: http://www.worldclimate.com/cgi-bin/grid.pl?gr=S13E033