4 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 about the organization of Spreadsheets. You learned 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 Excel 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 3. 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 3.

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 the Excel Spreadsheet.

• Updating an existing worksheet
• Using the LOOKUP function
• Creating charts based on the Spreadsheet data
• Printing the updated Spreadsheet file
• Making backup copies of all your work

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!

4.1 GETTING STARTED

Showing the Full menus
Microsoft Office has a silly habit of showing only a few items in the menus when you want to use them. If you want to see the full menus, you have to double click on the menu name, or slide down to the arrows at the bottom of the menu, or, worse still, wait for the full menu to reveal itself, which it will after a few seconds. But for this tutorial, we're going to be using quite a few menu items that do not normally appear when you first click to select a menu. So let's set the Option in Word to Show Full Menus all the time.

In the Tools menu, select Customize..., then in the dialog box that pops up, select the Options tab

Remove the check mark next to the item Menus Show Recently Used Commands First

There, now you'll get the full menus all the time. If you find this tip useful, and you're working a lab where you can't permanently set defaults like this, remember to show full menus when you start work using any of the programs in the Office suite (Word, Excel, PowerPoint, Access, and so forth). If you have your own computer at home, you might like to permanently set this Show Full menus option. It'll save you no end of time and annoyance.

You will be working with a Gradesheet similar to the one you created in Lesson 3. For the sake of uniformity, however, and to avoid confusion, you will use files 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 files (Grade4 2000 and GradeTmp) which you created when you completed Lesson 3.

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

Start by opening Microsoft Excel then put your WorkDisk in the disk drive
Lesson 4: More on the use of the Spreadsheet

Have your Data and DataBkp disks handy, of course, so that you won't forget to make a backup copy of all your work when you are done.

You are going to update two files:
• a gradebook template (called GradeTmp, and stored in the Templates folder on your WorkDisk);
• and an actual gradesheet filled with data (this file has the name Gradebk and is stored in the Other folder also on your WorkDisk).

You will work on the Gradebk file first.

By now you should know the steps to open a file, so go ahead and Open the file Gradebk spreadsheet from the Other folder on your WorkDisk

4.2 RECAPITULATION AND REINFORCEMENT

Lesson 3 has Tables of the most useful Excel Spreadsheet commands. You might like to put a marker at the relevant pages (pp. 68 and 69) for easy reference while you follow along in this tutorial. Alternatively, you can use the chart that is included at the end of this text (inside back cover).

The following sections give you an opportunity to refresh your memory of the basic Spreadsheet skills you learned in Lesson 3.

Moving from cell to cell in the Spreadsheet

In Excel 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 current cell one 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 current cell one 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 all the cells used in the Spreadsheet

You often may want to highlight all the cells in the Spreadsheet—in order to change a font, or copy the data to another document, for example. Here's how you do this.

Click in the empty box above Row 1 and to the left of Column A (Fig. 4.1)
The entire Spreadsheet is now highlighted and ready for any changes you need to make. However, perhaps you want to select only the cells that make up your Gradesheet.

Use the mouse to drag diagonally down from cell A1 to cell N23

**Going to a specific cell anywhere in your Spreadsheet**

If you are working in a large Spreadsheet (consisting of thousands of cells) and you know the approximate coordinates of a cell you want to find, it is sometimes quicker to let Excel find the cell for you. The following steps will make the current cell the one that intersects Column AJ and Row 423, a location deep inside the Spreadsheet and a long way from the first cell, Cell A1.

1. Double click on the **Edit** menu name to see the expanded version of the menu, then select **Go To…**, or press **ctrl-G**
2. Type **AJ423** (you can use upper case (AJ) or lower case (aj) for the column coordinate)--and click on **OK**

Remember that the first coordinate is always the column; the second coordinate is always the Row. Look at the screen. If necessary scroll across until you can see for yourself that the Cell AJ423 is selected. Getting back to Cell A1 is easy enough.

1. Press **ctrl-G** again, type **A1**, and click on **OK**

You are now back at the first cell. You could use the various movement options you read about at the beginning of this Reinforcement section. Some would be 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 the Spreadsheet.

### 4.3 UPDATING AN EXISTING SPREADSHEET

The Gradebk Spreadsheet would benefit from some cosmetic changes. Here are some of the problems that need attention.

1. There should be double lines to set off different parts of the Spreadsheet. It is often useful to include double lines between headers and the data, and before summary totals, as is common practice in accounting.
2. It would be useful to include a few extra formulas to increase the information content of the Spreadsheet. For example, how about an average for each of the sets of grades so that you and 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 lock cells containing data that you consider especially important to prevent you or someone else accidentally destroying the cell contents. It takes time to put together Spreadsheet templates and other documents. Some cells will contain functions that were tricky to figure out. Locking them will make it more difficult to lose the fruits of your labors.

4. Finally, you can tell Excel to do some of the thinking for you by including a LOOKUP Table to figure out the grades for your students based on their percentage score at the end of a reporting period.

Let us deal with these problems one at a time. In this section you will learn how to handle the first three improvements. Using the LOOKUP function is more complex and will be dealt with later in this lesson.

**Dividing up the Spreadsheet to make it easier to read**

After you have fixed change #1, the gradebk document will look like Fig. 4.2.

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#### Fig. 4.2 Gradesheet after update #1

Breaks between sections of a Spreadsheet help the eye locate important data when scanning the page, whether on screen or on paper. In Excel, the easiest way to do this is to insert an extra row or column at the point where you want to create a division between different parts of the Spreadsheet, and reduce the width of the row or column so it appears as a double line. Follow these steps to update the Spreadsheet along the lines of Fig. 4.2.

Click on the Row Number 13 on the left of the screen to highlight the entire empty row.
Now you want to reduce the row height so it looks like a double line dividing Rows 12 and 14.

From the **Format** menu select **Row/Height...**, then in the **Row/Height** dialog box type the number **4.5** to replace the default height, and click **OK**.

You need to create a similar dividing line after Row 23 which holds the data for the last student in the roster. This is because you are shortly going to include new formulas in Rows 25 through 27.

Reduce the height of **Row 24** in the same way as you did Row 13, then **Save** the changes you have made.

Another way to change the height of a row or the width of a column is to position the mouse on the line between the row or column headers at the point where you want to change the height or width. The mouse changes to a cross hair with arrows. Then you just hold down the mouse button and drag to change the height or width of a row or column respectively.

**Adding formulas to the Spreadsheet**

Excel comes with many built-in functions for both the Spreadsheet and the Database. There are nine categories of functions, including Math and Trig functions, Statistical functions, Logical functions, and Financial functions among others. These functions allow the Spreadsheet to be tailored to meet the needs of myriad numerical data applications from Accounting to Zoological research.

From the **Insert** menu select **Function...** or click on the **Paste Function (fx)** icon in the **Standard** tool bar to take a look at the functions you can use. Excel displays a dialog box showing a listing of these functions (Fig. 4.3).
Click on **All** and scan through the list in the **Function name:** scroll box

Depending on your math, computing, statistics, or accounting background, you might recognize many of them.

Experience is the best way to learn how they work. In Lesson 3 you already learned to use the Sum function, and you also created your own formula to calculate the Percentage for each student. You are going to use three new functions right now: the **Average**, the **Max**, and the **Min** functions.

Click on the **Cancel** button to remove the **Paste Function** dialog box

Calculating an average for each of the grade columns

The value representing the average of the scores in a column will appear in the cell in Row 25 at the bottom of the column to which it applies (Fig. 4.4).

<table>
<thead>
<tr>
<th>FIRST NAME</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pamela</td>
<td>12</td>
<td>14</td>
<td>28</td>
<td>43</td>
</tr>
<tr>
<td>Barbara</td>
<td>10</td>
<td>15</td>
<td>23</td>
<td>65</td>
</tr>
<tr>
<td>Marilyn</td>
<td>13</td>
<td>18</td>
<td>25</td>
<td>74</td>
</tr>
<tr>
<td>Teresa</td>
<td>16</td>
<td>15</td>
<td>20</td>
<td>77</td>
</tr>
<tr>
<td>Patrick</td>
<td>14</td>
<td>13</td>
<td>20</td>
<td>78</td>
</tr>
<tr>
<td>Stephanie</td>
<td>18</td>
<td>19</td>
<td>20</td>
<td>82</td>
</tr>
<tr>
<td>Andrew</td>
<td>15</td>
<td>16</td>
<td>21</td>
<td>85</td>
</tr>
<tr>
<td>Brigid</td>
<td>18</td>
<td>17</td>
<td>26</td>
<td>85</td>
</tr>
<tr>
<td>Lyn</td>
<td>20</td>
<td>15</td>
<td>19</td>
<td>88</td>
</tr>
<tr>
<td>Charlene</td>
<td>16</td>
<td>20</td>
<td>20</td>
<td>91</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td>15</td>
<td>16</td>
<td>22</td>
<td>76</td>
</tr>
</tbody>
</table>

![Fig. 4.4 Average scores for each column](image)

Notice in Fig. 4.4 that the last cell in the column of names has the row label **Average** entered in it. Your first task is to do the same in your Gradsheet.

Select Cell **B25**, type the label **Average**, and press Tab twice to move to Cell **D25**

A word about automatic calculation

When **Automatic Calculation** is switched on, Excel immediately carries out any calculations that are necessary when you make any changes to the data in the spreadsheet. So you don't have to remember to do this yourself. Whenever your spreadsheet is small (like the gradebk document) you will hardly be aware that Excel is working for you like this. If your spreadsheet were large, however, you might want to tell Excel to wait till you tell it to recalculate all the formulas, because of the time it can take to carry out this task.

From the **Tools** menu select **Options...** then, in the **Options** dialog box, click on the **Calculation** tab (Fig. 4.5)
Check to see that the radio button next to **Automatic** is selected (indicating that **Automatic Calculation** is already selected)

If not, click on the radio button next to **Automatic** and click **OK**

Back to the task at hand

The average is computed by adding (SUMming) the set of scores for an assignment or test, and then dividing by the number of scores in the set. You could put together this function yourself, of course. If you know what it would be for the first column of scores, write it in the box below.

It would look something like this: \( \text{=SUM(D14:D23)/10} \). But since Excel has a built in Average function, you may as well use it. Here is the complete set of steps to include the Average function in your Spreadsheet.

Make sure Cell **D25** is still selected (the cell under the first column of scores), then from the **Insert** menu select **Function**...

Select the **Statistical** category, then select the **AVERAGE** function from the list of Statistical functions and click **OK**
Excel pastes the function into the Entry bar at the top of the screen and then makes its own best guess as to which cells you want averaged and presents a new dialog box (Fig. 4.6).

This dialog box selects a set of cells, explains what the Average function does, and asks you to confirm its guess by clicking the OK button, or change any of the cell addresses in the data entry box.

Notice that Excel has included cell D24 (an empty cell) as part of the set of cells to be averaged. This will not affect the result because Excel assumes that an empty cell is not to be included in the calculation of the function’s result.

The formula in the Data Entry bar should read \( \text{AVERAGE(D14:D24)} \). Is this the exact wording of the formula on your screen?

If it is, click OK; if it is not, correct it, then click on OK.

Now look at Cell D25 yourself. It should contain the average for the scores in Column D.

![Fig. 4.6 The function is first pasted into the Entry bar](image)

There are three problems that can occur:

1. If you see a series of pound signs (###) this indicates that you need to widen the column a little so there is enough space for the average score— you should know how to do this by now (if you don’t see the pound signs (###), all well and good). Either use the Format Column/Width... option, or use the mouse to make the column wider.

2. If the set of values being averaged has no decimal places, then the default number of decimal places will be zero (0). But it would be useful to show at least one decimal place here. Here are the steps to change the precision of a decimal number.
From the **Format** menu select **Cells...**, then in the **Format Cells** dialog box (Fig. 4.7) select the **Number** category, and set the number of decimal places (also called precision) to 1 and click on **OK**

3. If a Bad Formula prompt pops up on the screen, check the formula in the entry bar again, compare it to the **Average** formula above, and make any corrections.

Assuming all is well, your next task will be to copy this formula into the adjacent cells to the right under the other columns of scores (cells E25 through H25).

**Cell D25** should still be selected

Use the mouse to point at Cell D25, then hold down the mouse button and drag across to **Column H** (so Cells D25, E25, F25, G25, and H25 will all be selected) then from the **Edit** menu select **Fill/Right...**

That's all there is to it. Adjust the column widths if you see pound signs (#) instead of averages. It's all good practice.

Time to save all that hard work (**ctrl-S**)
Put a heading in cell B26 (Max score) and in cell B27 (Min score)

Put the Max function in cell D26 (listed as Max( ) in the Statistical category in the Paste Function dialog box)—this function is used to find the highest score for each set of scores

Drag down with the mouse to select cells D14 through D23, the cells you want included as arguments in the Max function (D14:D23), and click OK

In cell D27 put the Min function (listed as Min( ) in the Statistical category in the Paste Function dialog box) and drag with the mouse to select cells D14 thru D23 once again

To copy the new Max and Min functions across to the corresponding cells under the other columns of scores (E thru H) use the Fill/Right... option in the Edit menu, as you did when you worked on the Average function just now

When you're done, your spreadsheet should resemble that illustrated in Fig. 4.8.

Fig. 4.8 The Gradebk Spreadsheet after adding the functions
Locking (protecting) important cells
Excel allows you to protect the contents of a cell by locking or protecting it. 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 Gradesheet 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.

From the Tools menu select Protection/Protect sheet..., then click on OK in the dialog box that pops up on the screen.

Now all the cells in the Gradesheet are unable to be changed unless you select Unlock Cells from the Option menu. If you wanted to lock just certain cells you would first select the cell or cells and turn on the Protection tool for just that cell or those cells.

If you try to change a locked cell, you will get an warning dialog box (Fig. 4.9) telling you that you can’t change anything unless you first remove the protection.

![Fig. 4.9 Protection warning dialog box](image)

For this reason, later in this tutorial, when you get this warning message, you will need to remove the protection on cells in order to make updates.

Time to save the changes you have made to the Gradesheet (ctrl-S). This should be becoming instinctive for you by now.
Lesson 4: More on the use of the Spreadsheet

Dividing the Spreadsheet into panes

Often a Spreadsheet, or any type of Excel document for that matter, will be too long or too wide to view all at once on the screen. Excel has a useful feature called panes.

You can split any window horizontally or vertically into sections. This will allow you, while working or scrolling in one section, to keep the other section(s) fixed in place.

To see how this works, double click on the Window menu, and select Split...

Excel immediately divides up the worksheet into four sections, using a vertical and a horizontal split bar (Fig. 4.10). You can change the position of the split bars by positioning the mouse arrow on a split bar and hold down the button while you drag across or down the screen. Try this for practice.

Notice how easy it is to compare different parts of a spreadsheet in this way. The pane or splitting screen feature is available in all Excel applications, but you probably will find that you use it most frequently while working with Spreadsheets, especially large ones.

![Fig. 4.10 Excel’s vertical and horizontal split bars](image)

Removing panes
Changing the look of the Spreadsheet

In Lesson 3 you learned how to change the size of columns and rows. Now you are going to remove the grid lines, and put borders around some cells.

Putting a border around a cell or set of cells

You may want to put a box around the Class info in Cells A4 through B6. This will make the information stand out in a report. Try this now.

Drag across **Cells A4 through B6** to select the set of Class info

The cells of the spreadsheet are still protected, and you’ll have to unprotect them before you can make any changes to the cells.

From the **Tools** menu select **Protection/Unprotect sheet**, then from the **Format** menu select **Cells...** to bring up the **Format Cells** dialog box

Click on the **Border** tab in the dialog box (Fig. 4.11)

As you can see, the Border dialog box gives you various options.
Click on the **Outline** preset icon and click on **OK**, then select **Protection/Protect Sheet...** to restore protection to the sheet’s cells. The Class Info now has a border around it, setting it off nicely (Fig. 4.12).

<table>
<thead>
<tr>
<th></th>
<th>GRADE REPORT</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Class: Grade 4</td>
</tr>
<tr>
<td>5</td>
<td>Semester: 1</td>
</tr>
<tr>
<td>6</td>
<td>Year: 2000</td>
</tr>
</tbody>
</table>

Fig. 4.12 Spreadsheet with added features

Removing grid lines and column and row headers.

Grid lines and column and row headers are essential when developing a spreadsheet or when one is updating the data. But for reporting purposes it may look better, perhaps even easier to read, if they are removed. Try this for yourself.

From the **Tools** menu select **Options...** to see the **Options** dialog box (Fig. 4.13) and click on the **View** tab to select the View options.

![Options dialog box](image)

Fig. 4.13 The Options dialog box
In the **Window** options section of the dialog box, remove the **check mark** in the boxes next to **Gridlines**, and **Row & column headers**, then click on **OK**.

The Spreadsheet suddenly looks quite different, as you can see.

**Practice makes perfect**

Open the **Templates** folder on your **WorkDisk** and load the **GradeTmp** file onto the Desktop.

Make the **same changes** to it that you just made to the **Gradebk** file, except that **you won’t transfer any of the actual data** from the Gradebk spreadsheet to the GradeTmp spreadsheet.

What you’re doing is making sure that the GradeTmp spreadsheet has the same design as the Gradebk spreadsheet so that you can use it with other classes in the future.

The following directions will help you in this reinforcement task.

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**Fig. 4.13b Tiling the Spreadsheet windows**

1. Tile the two spreadsheets so you can see them side by side on the screen (Fig. 4.13b above). Here’s how you do this.

   From the **Window** menu select **Arrange**...
The Tiled option is selected by default, so click on OK

2. It will be easier to complete these tasks if you have the gridlines and the column and row headers in the Gradebk spreadsheet.

   Click anywhere on the Gradebk spreadsheet window to make sure the Gradebk spreadsheet is the active window

   From the Tools menu select Options...

   In the Options dialog box click on the View tab

   In the Window options section put the check mark back in the boxes next to Gridlines and Row & column headers, then click on OK

3. Use the Copy and Paste commands to complete many of the tasks.

4. If necessary, step again through the section you have just completed (4.3 UPDATING AN EXISTING SPREADSHEET) doing the work in the GradeTmp file that you just completed for the Gradebk file.

   Be sure to save the GradeTmp when you have finished making the changes.

   When you have finished updating the GradeTmp, select the file Gradebk from the index in the Window menu so as to make this once again the current file on the Desktop

   It might be a good idea to take a break at this point in the tutorial. If you are unable to finish it in one sitting, you should save the Gradebk and the GradeTmp files on your Data and DataBkp disks before shutting down the computer. If you need help with this task, the directions are at the end of the lesson.
TIME FOR A BREAK?

FEEL FREE TO TAKE ONE.

THIS MIGHT BE ENOUGH FOR ONE DAY!
4.4 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, Excel carries out function-based calculations as you make changes in a Spreadsheet. Thus, once you have programmed Excel 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. 4.13 illustrates the LOOKUP Table that will be the outcome of this exercise.

<table>
<thead>
<tr>
<th>O</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range (%)</td>
<td>Grade (A-E)</td>
</tr>
<tr>
<td>0%</td>
<td>E</td>
</tr>
<tr>
<td>60%</td>
<td>D</td>
</tr>
<tr>
<td>70%</td>
<td>C</td>
</tr>
<tr>
<td>80%</td>
<td>B</td>
</tr>
<tr>
<td>90%</td>
<td>A</td>
</tr>
<tr>
<td>100%</td>
<td>A</td>
</tr>
</tbody>
</table>

Fig. 4.14 LOOKUP table

You are going to tell Excel to compare a student's percentage with the range of values in the first column of the table. These are control percentages. Excel 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 Excel
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 gradesheet 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. 4.13, column 1,
what is the highest value less than or equal to 45? ___________
what is the highest value less than or equal to 67? ___________
what is the highest value less than or equal to 59? ___________
what is the highest value less than or equal to 100? ___________
The answers are in the footnote at the bottom of the page.1

There are two parts to incorporating the Excel LOOKUP function into your
Gradesheet. First you must build the LOOKUP Table into the Spreadsheet. Second you
must enter into the appropriate cells the LOOKUP function that will instruct Excel to
carry out the LOOKUP operation.

Building the LOOKUP Table

You'll need both the Gradebk and the GradeTmp spreadsheets open to
complete the remainder of this tutorial, so if these documents are not on the
desktop, open them from the WorkDisk before proceeding

Next, from the Window menu select the Gradebk document if it is not
already the active window on the screen

Since all the cells are protected in the Gradebk spreadsheet you'll need to unlock
them first in order to make changes.

From the Tools menu select Protection/Unprotect sheet...

It will also be a good idea to put back the gridlines and row and column headers for
the next exercise.

If necessary, from the Tools menu select Options..., then in the Options
dialog box click on the Views tab and click to put a check mark in the boxes
next to Gridlines and Row & column headers

1 0%, 60%, 0%, 100%
Now, let's build the Lookup table that's illustrated in Fig. 4.14. The first column of the LOOKUP Table has the values for what Excel calls the lookup_vector. This is the scale of values against which Excel compares the data from a cell in the Gradesheet.

Let's create this column of the LOOKUP table first.

Select cell O1 and type the column header **Range (%)** then press Enter to move down to cell O2.

Type 0 (the number zero (0) that is) in cell O2 and press Enter to move down to cell O3.

Type 0.6 (this is equivalent to 60% in mathematical terms) and press Enter again to select Cell O4.

Type 0.7 and press Enter to make O5 the current cell, then type 0.8 and press Enter once more.

Type 0.9 in Cell O6 and press Enter to make O7 the current cell, then 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 3, so the following is just a reminder of how to do this.

Drag down to highlight all 6 of the scale values from Cell O2 to Cell O7.

In the **Format** tool bar click on the % (Percent) symbol to change the format of the decimals to recognizable percentages.

That completes the first column of the table. Now for the second column with the letter grades—what Excel calls the result_vector. These are the values which Excel returns to the gradesheet cell in which is the formula which calls the LOOKUP function.

Select cell P1 and type the header **Grade (A-E)**, then press Enter to move down to cell P2.

Type the letter E (or whatever you would use for a failing grade) and press Enter to go to Cell P3.

Type a D and move down to Cell P4, then type a C and move down to Cell P5.

Type a B and move on down to Cell P6, then type an A and move down to cell P7.

Finally type an A again in cell P7 and click on the Accept (✓) button.

The table is now almost ready for use. A couple of cosmetic adjustments will improve its appearance.
Select columns O and P by dragging across the letters O and P at the top of the columns.

In the Format toolbar select Center alignment, then in the Format menu select Column/Width and make the width 9.

Your LOOKUP Table should now look like Fig. 4.14 above. When you are done, don't forget to 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 Gradebk file you should update the template file GradeTmp along the same lines. The easiest way to do this is to copy the relevant cells from the Gradebk file into the GradeTmp file using the Excel Copy function and the clipboard.

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

Select Cell O1 at the top left corner of the table and drag down diagonally across the LOOKUP Table to Cell P7.

Press ctrl-C to copy the LOOKUP Table to the clipboard.

Now you must switch to the GradeTmp file.

Select GradeTmp from the index in the Window menu to make it the active file on the Desktop.

Click on Cell O1 to make it the current cell.

Press ctrl-V to paste the LOOKUP Table from the clipboard to the file GradeTmp.

Notice that the width of columns O and P in the GradeTmp is the default width of 13, which is wider than you need for the table.

Change the width of columns O and P to 9, then save your work (ctrl-S) once more.

Entering the LOOKUP function into the Spreadsheet

Recall that the LOOKUP function instructs Excel to go look up the table you have built and return with a result to store in the Spreadsheet proper. The LOOKUP function has the following parts to it:

=LOOKUP(lookup_value,lookup_vector,result_vector)

Let us examine each part of this function in order to understand how it works.
Lesson 4: More on the use of the Spreadsheet

- As you know, the "=" symbol simply tells Excel that a function is in the cell, as opposed to regular data such as numbers or labels.
- The word LOOKUP tells Excel the task it has to perform.
- lookup_value, lookup_vector, and result_vector are variables (control values) that guide Excel when it is looking up the table:
  - lookup_value is either a number or text (such as a name); this value will be the "key" that Excel will use to guide it as it searches through the range of cells specified in the lookup_vector variable;
  - lookup_vector specifies the series of cells that Excel has to search in its lookup of the table;
  - result_vector specifies the series of cells the same number of cells as in the lookup_vector) from which Excel will get the result of the LOOKUP operation;

An example is the best way to understand what is involved.
It will be easiest for you to follow the next exercise if you have an actual gradesheet to work with. So begin by switching back to the Gradebk Spreadsheet on the Desktop (use the Window menu for this). As you follow along, make sure you have the LOOKUP Table showing on the screen, as well as the last two columns of the gradesheet (columns L and N) containing the PCNT and GRADE data.

Scroll over as far as necessary until you have columns L through P showing on the screen with the top of the LOOKUP Table (Row 1) at the top of the screen

Select Cell N14

This is the first cell in the GRADE column. You want Excel to figure out the letter grades for this column (Column N), so this is where the LOOKUP function must go.

From the Insert menu select Function... or click on the Paste Function icon (fx) in the Standard tool bar at the top of the screen

In the Paste Function dialog box select the Function category titled Lookup & Reference, then click on LOOKUP in the Function name: scroll box, and click on OK

This brings up the Select Arguments dialog box.

The first set of arguments is what we want, and it's already selected by default, so click on OK

The entry bar now contains the basic LOOKUP function, ready for you to add the lookup_value and ranges. Excel also presents a dialog box for you to enter the three (3) arguments for the LOOKUP function—the lookup_value, the lookup_vector, and the result_vector.
Entering in the lookup_value
Notice that the cursor is positioned for you to enter the first parameter of the LOOKUP function (the lookup_value). You must select the cell which contains this lookup_value. Cell L14 contains the Percentage for the first student, which is the "lookup_value" required as the first variable in the LOOKUP function.

Click on Cell L14
Excel fills in the first of the LOOKUP parameters, the lookup_value. You are telling Excel that it must use this first student's percentage as the value to check against the first column of the LOOKUP Table (O2 through O7).

Entering in the lookup_vector
Cells O2 through O7 are the lookup_vector for the LOOKUP Table.

Click in the second data entry box in the LOOKUP dialog box so you can enter the cells which contain the lookup_vector

Use the mouse to drag down from Cell O2 to Cell O7 in the Spreadsheet
Excel fills in the second of the LOOKUP parameters, the lookup_vector. Check this in the Data entry bar.

Entering the result_vector
Cells P2 through P7 are the result_vector for the LOOKUP Table.

Click in the third box in the LOOKUP dialog box so you can enter the cells that contain the result_vector in the LOOKUP function in the Data entry bar at the top of the spreadsheet

Now drag down from Cell P2 to Cell P7 in the Spreadsheet
Notice, once again, that Excel fills in the third of the LOOKUP parameters, the result_vector.

Finally, click on OK

Applying the function
Excel will look for "the highest value in Cells O2 through O7 that is less than or equal to the student's percentage".

Take a look at Cell N14 now and see if it contains the correct grade according to the value in cell L14 (the percentage for this first student)

Once the LOOKUP function has located the correct cell in column 1 (the Range column) of the table, all that remains is for Excel to make a note of the value that is in the corresponding cell in column 2 (the Grade column) of the table, and make a copy of that grade in cell N14.
Copying the LOOKUP function into the rest of the GRADE column

The first student's grade is taken care of. Now you must copy this function from Cell N14 down to all the other cells in the GRADE column (column N).

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

First you must make a small change to the function itself.

You may recall learning about Relative and Absolute cell references in Lesson 3. The function =LOOKUP(L14,O2:O7,P2:P7) will work fine for the first student, but if you copy it to the other cells as is, Excel will assume that all the cell references in the function are relative to the cell into which they are being copied, and will therefore adjust them accordingly.

But the references to the LOOKUP Table (O2:O7 and P2:P7) are absolute references—they must not change) because the LOOKUP Table will always be found in these particular cells.

So you must tell Excel to leave these LOOKUP Table references unchanged when copying the LOOKUP function into the other cells in column N. The reference to the lookup_value (Cell L14 for the first student), however, is relative, and should change for each student (the reference for the second student will be L15, and so on).

Here is a reminder of the steps to tell Excel to treat certain cell references as Absolute References.

Click on Cell N14

The LOOKUP function is spelled out in full in the Data Entry bar at the top of the screen.

Click immediately before the reference to Cell O2 in the function in the Data entry bar at the top of the spreadsheet

Now put a dollar ($) sign in front of every reference (rows and columns) to the LOOKUP Table (8 $ signs in all) as illustrated in Fig. 4.15

Fig. 4.15 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 N.

Click the Accept button (✓) to accept the LOOKUP function into Cell N14

Here now are the steps to copy the function from Cell N14 by Filling Down into the remaining cells of the GRADE column (Column N).

Make sure the current cell is still Cell N14
Drag down column N from Cell N14 to the last cell in the column that contains a percentage (Cell N23).

From the **Edit** menu select **Fill/Down...**

Excel now takes a moment to complete the copy operation, which includes figuring out the grade for each student based on the function that is now embedded in each cell of the GRADE column. And you should see the correct letter grade for each student in column N.

While you have the cells in **column N** highlighted, **center** the grades in the column.

**Protect** all the cells in your spreadsheet (**Tools** menu) since you don't want to lose all your hard work.

Save the **Gradebk** file once again (**ctrl-S**).

If you need to think about this 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 GradeTmp file again, and add the LOOKUP function there, too. Since you do not have any data in the template (or at least you shouldn’t have!), 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 template file when you were working on Lesson 3. This is no problem, because the data will be relevant when you use the Spreadsheet with an actual class and enter meaningful sets of scores.

You either can add the functions to the GradeTmp file the long way, by repeating all the steps you just carried out for the Gradebk file, or you can use the Copy (**ctrl-C**) function as you did a short while ago to copy the LOOKUP Table from the one document to the other.

Don’t forget to save the changes you have made to the **GradeTmp** spreadsheet.

4.5 **CREATING CHARTS BASED ON THE SPREADSHEET DATA**

**The concept of using charts**

A Spreadsheet user can benefit from charts based on the numbers stored in its rows and columns of cells. Charts enable the user to visualize the data. "A picture," as you know, "is worth a thousand words." By the same token, a well-designed chart can help you
make sense of a thousand numbers. Charts are also useful to increase the impact of any oral or written presentation.

For this exercise you’ll open a new Spreadsheet file so you can practice creating charts.

Open the file **Charts** which is in the **Other** folder on your **WorkDisk**

Your Spreadsheet should look like Fig. 4.16.

![Fig. 4.16 Data for Charts file](image)

**The Excel charting capability**
Charts are very easy to create using the Excel Spreadsheet. You may create a chart from information gathered from most any Spreadsheet. There are dozens of different types of charts that you can create.

**Creating a bar chart**
The values represented in a chart are called a data series. In the chart you are about to create, the number of students in the various grade ranges will be represented by bars. The chart may have a title and a legend which has the names related to the data series.

Most charts, except pie charts, have axes which are the perpendicular lines along which the data is plotted or displayed. The Y axis is the vertical axis, which shows the number of students in each grade range. The X axis is the horizontal axis, which shows the grade range. First you have to designate the part of the Spreadsheet that you want included in the chart. This is called the chart range.

Select by dragging and highlighting from Cell **A1** through **F2**, then click in the **Standard** tool bar bar on the **Chart Wizard** button (Fig. 4.17)

![Fig. 4.17 The Chart Wizard button in the Standard tool bar](image)

The Chart Wizard dialog box is displayed (Fig. 4.18).
Fig. 4.18 The Chart Wizard dialog box

Take a few moments to look over the variety of charts and options that Excel offers. To see how each chart will eventually look, click on the button that tells you to "Press and hold to view sample".

The Chart type called a Column chart is selected by default. This is what you want.

For the Chart sub-type click on the fourth of the seven samples (the clustered column with a 3-D effect—see Fig. 4.18 above), then click on the Next> button

Step 2 in the Chart Wizard prompts you for the Data Range which you have already selected by dragging across the set of cells containing the data you want included in the chart.

Click on the Next> button

Step 3 allows you to enter a title for the chart, as well as descriptions for each axis of the chart. These are your next tasks.
For the **chart title** enter: Grades for Semester 1, Grade 4

In the **X axis** box enter: Grades

In the **Z axis** box (it’s a 3D chart) enter: Number of Students

Click on **Next >** to proceed to Step 4 of the Chart Wizard

Finally, click on the **Finish** button to accept the default of saving the chart as part of the **Charts** worksheet

Immediately Excel creates the chart (Fig. 4.19) and displays it on the screen. It also displays the Chart toolbar so you can easily make changes to the chart if you so wish. Try this now.

Fig. 4.19 Completed Bar Chart

Slide the **Chart toolbar** out of the way if it’s sitting on top of your chart

**Right click** on any piece of the chart (title, any other text, the bars, the chart background, the gridlines, the chart area as a whole, the legend, the axis numbers or letters), then **select an option** from the **menu** that pops up and interact with the dialog box to change fonts, colors and so forth

When you’re done having fun, **save** a copy of the bar chart (use **Save As**) with the name **BarChart**

**Creating a pie chart**

Click on the **Bar chart** to select it, then from the **Edit** menu select **Cut (ctrl-X)**

Creating a pie chart will be straightforward if you just successfully completed the bar chart. You will use the same set of data for the next exercise.
Drag from Cell A1 through F2

In the **Standard** tool bar click on the **Chart Wizard** button again

Select **Pie** for the **Chart type**: in the Chart Wizard dialog box

Now select the **Second** of the Pie chart sub-types (Fig. 4.20), and click on **Next>**

![Chart Wizard - Step 1 of 4 - Chart Type](image)

*Fig. 4.20 Pie Chart sub-types*

You already selected the **chart source data** so click on **Next>** again

Enter the chart title: **Class Grades** and click on **Next>**

There’s nothing to change in Step 4 since you want the chart to be saved with the spreadsheet.

Click on **Finish** and click in cell A1 to clean up the screen
If all went well, your pie chart is completed and should like the one in Fig. 4.21.

Right click on any part of the chart and try some different fonts or colors and so forth.

When you’re ready, save a copy of the pie chart with the name **PieChart**, then close the Spreadsheet by selecting **Close** from the **File** menu.

### 4.6 PRINTING THE UPDATED SPREADSHEET

**Selecting a section (block) of the Spreadsheet for printing**

Select the Spreadsheet file **Gradebk** from the **Window** menu.

When you print out your Gradesheet, 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 N and Rows 1 through 27. The steps that follow will show you how to select just this block of cells for printing.

Make sure the printer is turned on, and the paper set up correctly.

Next you must select (highlight) the range of cells that you want to print.

Drag down diagonally from cell **A1** to Cell **N27** (this will include the Average, Max Score, and Min Score summary lines at the bottom of the Gradesheet).

You already selected **Landscape** orientation for the spreadsheet, so from the **File** menu select **Print**.

Your Spreadsheet has just one page.
In the **Print** dialog box, in the **Print range** section, type **1** in both the **From:** and **To:** boxes.

In the **Print what** section, click on the radio button next to **Selection**.

If you wanted to check on how many pages there are in a Spreadsheet before printing, you would select **Page View** from the Window menu, and zoom out as you did earlier in this tutorial by clicking the zoom tool in the Standard toolbar. This will enable you to figure how many pages you need to select in the Print dialog box.

Notice also that in the Print dialog box you can opt to **Preview** the worksheet before printing.

Click on **Preview** now.

The printed spreadsheet will look better if you remove column and row headings as well as the cell gridlines.

Click on **Setup...** at the top of the **Preview** window, then click on the **Sheet** tab.

Click to remove the **check mark** from the boxes next to **gridlines** and **Row and column headings**, then click on **OK**.

Notice how different the spreadsheet looks without the gridlines.

Finally, **Save** your gradebook once more, then click on the **Print** button at the top of the **Preview** window to print out a hardcopy of your gradebook.

### 4.7 MAKING A BACKUP COPY OF YOUR FILES

Your last task before completing this session at the computer is to make a backup of your files on your **WorkDiskBkp** disk. The Gradebk and GradeTmp spreadsheet files are saved on your **WorkDisk** disk, which is in the disk drive.

Close the **Excel** spreadsheet program.

**Close** or **minimize** any other windows that may be open on your desktop to make it easier for you to see what you’re doing.

Double click to open the **My Computer** icon, then double click on **3 1/2 floppy A:**

Now drag the **Other** folder from your **WorkDisk** disk to the Desktop and drop it there, then drag the **Templates** folder to the desktop and drop it there.

Watch while Windows makes a copy of your folders on to the desktop, then close the Window on your **WorkDisk** disk.

Remove your **WorkDisk** disk from the disk drive, replace it with your **WorkDiskBkp** disk and double click on **3 1/2 floppy A:**
Now drag the Other folder and the Templates folder from the desktop to your WorkDiskBkp disk.

**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 Excel than most Excel 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, taking advantage of the features you have learned so that you don't forget them. You also might study the User's Guide that Microsoft provides along with the Excel software.

Expertise is ephemeral. "Use it, or lose it," as they say.

**LOOKING FORWARD**

An exhortation

Lessons 6 and 7 will help you learn to use the Access Database application. 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 only takes place 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 4.

1. List at least 5 applications, other than those presented in these tutorials, for which you think you would use the Excel 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 Gradebk file to the Desktop.
   • Add the function to calculate the average score for each of the tests, quizzes,
     homeworks, 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 file
   • 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 file!)

4. Load the Gradebk file 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 file

5. Create a line chart based on a set of values for populations in several cities in the
   U.S. Generate a Bar chart from the data. Research the populations on the web at

6. Create a pie chart based on a set of values for the amount of rainfall for each of any
ten cities world wide. Research the rainfall data at the following web address:
   http://www.worldclimate.com/