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## Lesson 8      The Lookup Functions

### Lesson Topics

- Vertical Lookup
- Horizontal Lookup
- Looking up Values in a Tax Table
- Looking up Values in a Table of Orders
- The SUMIF Function

### Lesson Objectives

At the end of the lesson, you will be able to:

- Use the horizontal and vertical lookup functions to look up and display information in a list.

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### Student Files Used

You will use the following files from your student folder:

- Tax Table
- Order Summary Lookup 1
- Order Summary Lookup 2

## Vertical Lookup

Two functions, *VLOOKUP* (vertical lookup) and *HLOOKUP* (horizontal lookup), let you type text or a value into a cell, look up information about it, and then copy that information. Vertical lookup is used when the information is in columns. Horizontal lookup is used when the information is in rows.

You are going to create a table of flowers in one column and their prices in the next column.

1. **Open a new workbook.**

2. **Beginning in A1, type the following table in columns A and B.** →

	A	B
1	Daisies	15
2	Irises	12
3	Roses	8
4	Violets	11
5		
6		
7	Flower	
8	Price	

3. Although your table has only four flowers, imagine that it is a very long table that will be used by a florist. The florist will type the name of a flower into B7, and the price will appear in B8.

**Go to B7.**

4. **Type Roses and tap the ENTER key.**

5. **In B8, type: =VLOOKUP(B7**

You have just told Excel to look up whatever is in B7.

6. **Type: ,A1:B4**

You have just told Excel to go to range A1:B4 to find the information. Your formula should look like this:  
=VLOOKUP(B7,A1:B4

**Tip:** Remember that you can always drag through a range instead of typing it. (Do not forget the comma, however.)

7. **Type: ,2**

This 2 is a location, not a value. It instructs Excel to copy the information in the second column of the indicated range and place it in this cell. In this case, it is the price of the flowers. Your formula should look like this: =VLOOKUP(B7,A1:B4,2

8. **Although Excel will add the final parenthesis for you, finish the formula with a right parenthesis: )**

Your formula should look like this:

```
=VLOOKUP(B7,A1:B4,2)
```

There should not be any spaces on either side of the commas.

**To review:** The *lookup* is the cell containing whatever is to be looked up. The *range* is where it will be looked up. The *offset* (also called the *index number*) is the number of the column in the range where the information is located. As you know, these three elements are called *arguments*.

**9. Tap the ENTER key.**

Notice that the price of roses appears in B8. Excel looked up the contents of B7, found it in the range you specified, and displayed the contents of the cell to the right of it.

**10. Type the names of other flowers into B7 and notice the prices displayed in B8.**

**Note:** As you might expect, the flower names are not case sensitive.

**Note:** The data you are referencing does not have to be in alphabetical order.

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You are going to type another column of prices that are charged on Sundays.

**1. Starting in C1, type the following prices:**

14
10
5
9

**2. Go to A9 and type: Sunday**

**3. Go to B9 and type: =VLOOKUP(B7,A1:C4,3)**

Notice that the range is larger and the offset is now 3. This is because you want to look up information in the third column of the range.

**4. Go to B7 and type the names of some flowers.**

Notice how both prices are displayed. Depending on the flower chosen, your screen should look something like the following:

	A	B	C
1	Daisies	15	14
2	Irises	12	10
3	Roses	8	5
4	Violets	11	9
5			
6			
7	Flower	Violets	
8	Price	11	
9	Sunday	9	

## Horizontal Lookup

Horizontal lookup works the same way as vertical lookup except that the offset refers to a row in the range rather than a column.

You are going to lookup the same items in rows rather than in columns.

1. **Open a new workbook.**
2. **Starting in A1, type the following worksheet.**

	A	B	C	D
1	Daisies	Irises	Roses	Violets
2	15	12	8	11
3	14	10	5	9
4				
5				
6	Flower			
7	Price			
8	Sunday			

3. **In B7, type the following:** =HLOOKUP(B6,A1:D3,2)
4. **Tap the ENTER key.**  
#N/A is displayed because you have not entered a flower to look up. Ignore it for now.
5. **In B8, type the following:** =HLOOKUP(B6,A1:D3,3)
6. **Tap the ENTER key.**  
#N/A is displayed. Ignore it for now.
7. **Go to B6 and type the names of some flowers.**

Notice how both prices are displayed. Depending on

the flower chosen, your screen should look like the following:

	A	B	C	D
1	Daisies	Irises	Roses	Violets
2	15	12	8	11
3	14	10	5	9
4				
5				
6	Flower	Irises		
7	Price	12		
8	Sunday	10		

## Exercise: Looking up Values in a Tax Table

So far you have been looking up text, but looking up values is the more common procedure.

You are going to look up values in a workbook named *Tax Table*.

### 1. Open *Tax Table*.

On your screen is a tax table for incomes between \$30,000 and \$31,000. You are going to write two formulas so that when a tax accountant types an income into F4, the tax on that income for a single person will appear in B4, and that for a married head of household will appear in B5.

	A	B	C	D	E	F
1	<b>Tax Table for Incomes Between</b>					
2	<b>\$30,000 and \$31,000</b>					
3						
4	<b>Single:</b>					<b>Income:</b>
5	<b>Married:</b>					
6						
7		<b>Income</b>	<b>Single</b>	<b>Married</b>		
8		30,000	2,162	2,108		
9		30,100	2,171	2,116		
10		30,200	2,180	2,125		
11		30,300	2,188	2,134		
12		30,400	2,197	2,143		
13		30,500	2,202	2,147		
14		30,600	2,215	2,160		
15		30,700	2,223	2,169		
16		30,800	2,232	2,178		
17		30,900	2,241	2,186		
18		31,000	2,250	2,195		

### 2. In B4, type =VLOOKUP(F4,B8:D18,2) and tap the ENTER key.

#N/A appears in the cell because no income has been typed into F4.

### 3. In B5, type =VLOOKUP(F4,B8:D18,3) and tap the ENTER key.

Again, #N/A appears in the cell because no income has been typed into F4.

**4. In F4, type 30150 and tap the ENTER key.**

Excel searches the first column for the highest value that is equal to or less than the income in F4. When it finds the income, it enters the value in the first cell to the right as the single tax, and the value in the second cell to the right as the married tax.

Your screen should look like the following:

	A	B	C	D	E	F
1	<b>Tax Table for Incomes Between</b>					
2	<b>\$30,000 and \$31,000</b>					
3						
4	<b>Single:</b>	2,171			<b>Income:</b>	30,150
5	<b>Married:</b>	2,116				
6						
7		<b>Income</b>	<b>Single</b>	<b>Married</b>		
8		30,000	2,162	2,108		
9		30,100	2,171	2,116		
10		30,200	2,180	2,125		
11		30,300	2,188	2,134		
12		30,400	2,197	2,143		
13		30,500	2,202	2,147		
14		30,600	2,215	2,160		
15		30,700	2,223	2,169		
16		30,800	2,232	2,178		
17		30,900	2,241	2,186		
18		31,000	2,250	2,195		

**5. Go to F4 and try different values between 30,000 and 31,000.**

## Exercise: Looking up Values in a Table of Orders

In this exercise, you will use the VLOOKUP function to get data from a table of orders.

**1. Open Order Summary Lookup 1.**

This workbook has three worksheets — *VLOOKUP*, *ORDERS*, and *CUSTOMERS*.

**2. If necessary, click the ORDERS sheet tab.**

The *ORDERS* sheet has a table of orders received over a period of time, and includes information about each order.

**3. Click the CUSTOMERS sheet tab.**

The *CUSTOMERS* sheet is a table of customer numbers and the customers' names. You will not be

using it in this exercise, but a sheet of this nature is often needed in this kind of workbook.

**4. Click the *VLOOKUP* sheet.**

This sheet is empty at the moment.

- 5.** On the *VLOOKUP* sheet, you are going to create a *VLOOKUP* function to find the order amount for any given order number.

**On the *VLOOKUP* sheet, change the width of all columns to 13.**

- 6. Go to A1 and type:** Order Number

- 7. In B1, type:** Total

- 8. Select A1:B1 and click the Bold button on the Formatting toolbar.**

- 9. On the Formatting toolbar, click the arrow next to the Borders button and choose a thick bottom border.**

- 10. In A2, type:** 111

- 11. In B2, type:** =*VLOOKUP*(

- 12.** You are going to indicate the cell that contains the value you are looking up.

**Click in A2 and then type a comma.**

- 13.** Next, you are going to indicate the table in which the data will be looked up.

**Click the *ORDERS* sheet tab.**

- 14. Drag through column headers A through E to select the entire table.**

Notice the marquee around the range. *ORDERS!A:E* is entered as the second argument. This means that Excel will look on the *ORDERS* sheet in columns A:E.

- 15. Type a comma.**

- 16.** To indicate the data you want, you must type a number which indicates the column in the table that contains the data.

**Type:** 3)

Excel will return a value in the *Price* column.

**17. Tap the ENTER key.**

You are returned to the *VLOOKUP* sheet. Notice the value of the formula, *20*, which is the total paid on order 111.

**18. In A3:A10, type the following order numbers: 115, 119, 120, 122, 123, 129, 132, 134****19. Click in B2 and use the Fill handle to copy the formula down to B10.**

Notice the order totals for the order numbers you entered.

**20. To have a consistent format, format B2:B10 with two decimal places.**

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## The SUMIF Function

Another function that is useful to quickly scan a table for data is the SUMIF function. SUMIF will scan a table and add values together that match a condition.

For the Order Summary Lookup table, you are going to perform a SUMIF to get totals on orders for designated customers.

**1. Open Order Summary Lookup 2.**

This is similar to *Order Summary Lookup 1* but with a fourth sheet, *Customer Totals*.

**2. Click the VLOOKUP sheet tab.****3. You are going to write the SUMIF function.**

**In B2, type: =SUMIF(**

**4. The first argument is the Range of cells in which Excel should look for the customer number. It is going to look in the ORDERS sheet.**

**Click the ORDERS sheet tab.**

**5. Select B2:B41 and then type a comma.**

You have entered the *Range* of cells in which Excel will look for the customer number.

**6. The second argument is the condition – the value you are going to find in the Range.**

**Click the Customer Totals tab.**

**7. Click cell A2 and then type a comma.**

You have entered the condition, which is whatever is in A2.

8. The last argument is the *Sum range*. This is a range of cells that correspond to the first *Range* argument you entered – the cells in the *Total* column in the *Orders* table.

**Click the *ORDERS* sheet tab.**

9. **Select E2:E41 and then type a right parenthesis: )**

10. **Tap the ENTER key.**

You are returned to the Customer Totals sheet. The formula is complete. Notice the order total for the first customer: 32.42.

11. **Make B2 the active cell.**

12. **Use the Fill handle to copy the formula down to B41.**

Notice the totals. The customers who ordered nothing have a zero. (If they have a dash, it is because the cells are formatted with the Accounting number format.)