

**ACCESS 2013**

# Querying a Database

# 4

One of the main goals of a database is to organize data so that information can be located and retrieved quickly. People in all types of businesses retrieve stored data and information daily, often at a moment's notice. When data is stored in tables in a relational database, you can search that information and extract records that meet specific criteria using a query, a database object used to locate records based on the conditions you set.

In this lesson, you will create select and crosstab queries and set query criteria. You will also create and format a calculated field, set a query sort order, and set multiple query conditions. Finally, you will create special queries designed to find unmatched records between tables and find duplicate entries in a database table.

## LEARNING OBJECTIVES

After studying this lesson, you will be able to:

- Create, save, and run select queries
- Set query criteria and sort order
- Create and format a calculated field
- Use functions in query expressions
- Create special types of queries

## LESSON TIMING

- Concepts/Develop Your Skills: 1 hr 30 min
- Concepts Review: 15 min
- Total: 1 hr 45 min

## CASE STUDY: USING QUERIES TO GET ANSWERS

As technology evolves, a smart business person will take advantage of the new opportunities that arise. An example of one such technology is *Quick Response* (QR) code. QR code is a square-shaped barcode that can be scanned by smartphones to quickly provide additional information about a product, open a website, send an email, or transfer contact information.

You have been asked to query the Winchester Web Design database and compile two separate customer lists. The lists will be used to notify all past clients of the QR code upgrade that can be added to their website contact forms. The first list will include only the first and last name of the clients and their email address. The second list will include the first and last name of the clients and their mailing addresses, sorted by ZIP code. Additionally, you have been asked to build queries that instantly calculate the total income from all the Winchester Web Design services, and from specific areas such as blogs or shopping carts.

# Creating Select Queries

Some tables, such as a Customers table, may contain ten or more fields. Once you exceed seven or eight fields, it may be difficult to display the entire record on one line of a printout or screen. However, when you create a select query to display or select only certain fields, such as customer names and addresses, the resulting product will be small enough to attractively display each record on a single line. Consequently, the address list will be easier to look at in Datasheet View or on a printed report. You can create and save a query to use each time you need to print an updated list.

A select query allows you to select records based upon certain criteria that you set. A query asks a question, such as *What are the customer addresses?* Or, *How much money did the company make last month?* The answer to the question is a set of records. A select query is basically a database inquiry that selects only the requested records.

Customers Email List		
Last Name	First Name	Email
Abrams	John	JPAbrams@email.com
Anders	Mark	AndersM@email.com
Blaser	Helen	BlasingHel@email.com
Davis	Peter	DavisAngie@email.com
Fleetwood	Candace	CandyWin@email.com
Hassan	Ahmed	HansAnge@email.com
Jeffries	Daniel	DannyJ@email.com
Klein	Joyce	KleinBri...@email.com

A select query displays only the requested fields from the Customers table.

## Reviewing Query Features

Some important points about queries to keep in mind:

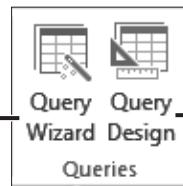
- A query acts as a saved question you ask a database.
- A query is a subset of data from one or more tables.
- Data displayed in query results remain stored in the original table rather than in the query.
- When you edit data in query results, you are actually editing the data stored in the source table.
- Queries are dynamic objects that display up-to-date data stored in database tables.
- Queries can be used to create forms and reports, which may contain fields from multiple tables.

Query results datasheets enable you to filter or selectively organize data using the same techniques you may use to filter and organize table datasheets.

## Identifying Tools for Creating Select Queries

The most common type of query is the select query. A select query retrieves data from one or more tables and displays the results in a datasheet. You can update records that appear in the query results datasheet, group records, and calculate sums, counts, averages, and other types of equations using query results.

The Query Wizard walks you through the query creation process.



Query Design enables you to create a query from scratch.

Access provides two distinct tools for creating queries:

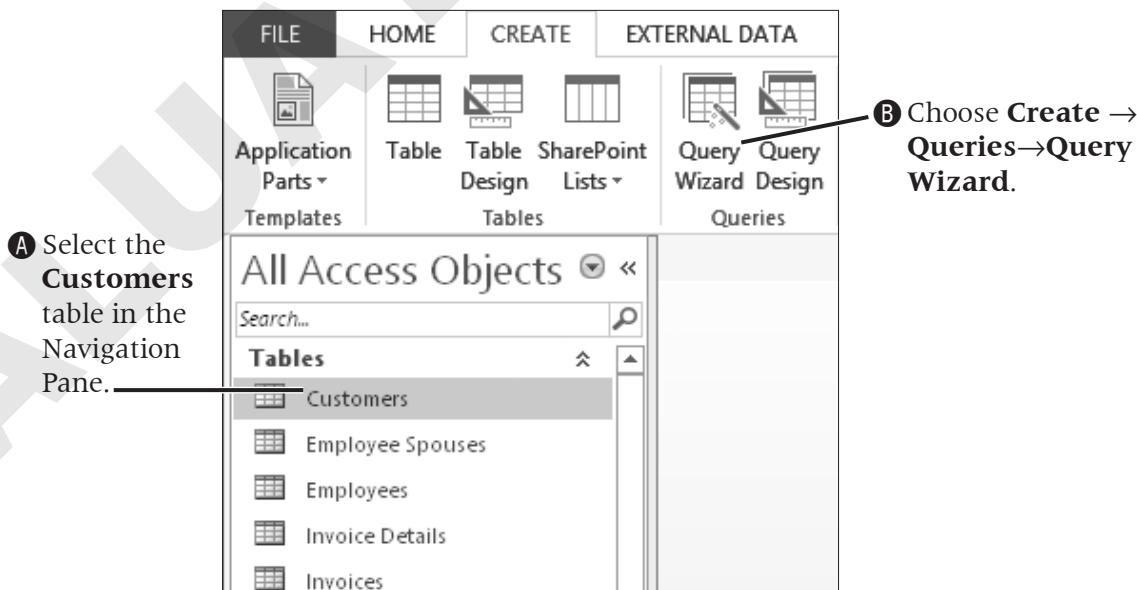
- Query Wizard
- Query Design

Buttons for creating queries are grouped in the Queries group on the Create tab. You will use both tools to create queries.

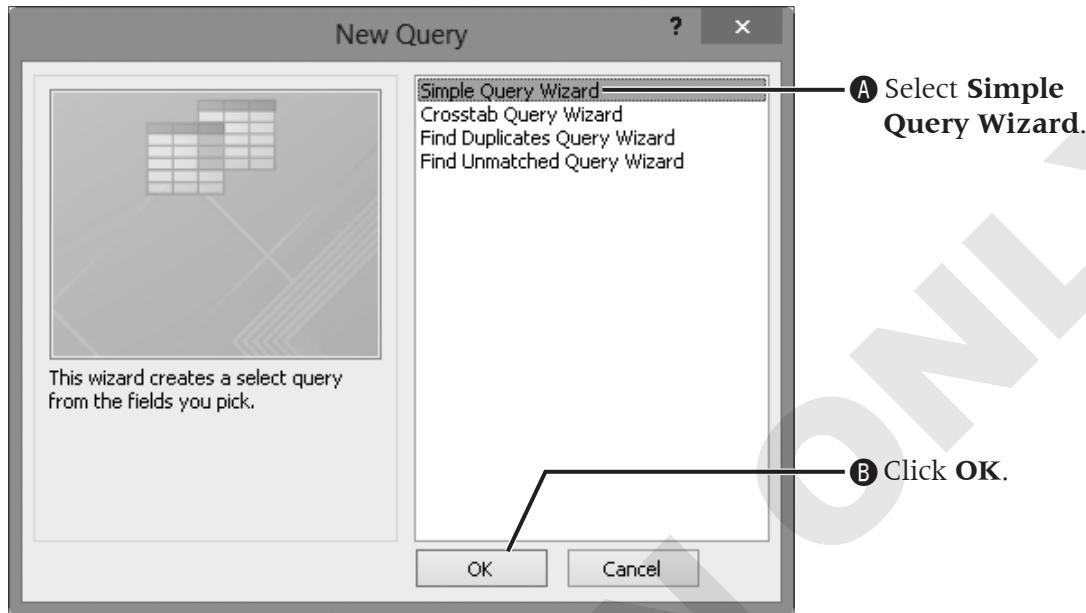
### DEVELOP YOUR SKILLS AC04-D01

## Create a Select Query Using the Query Wizard

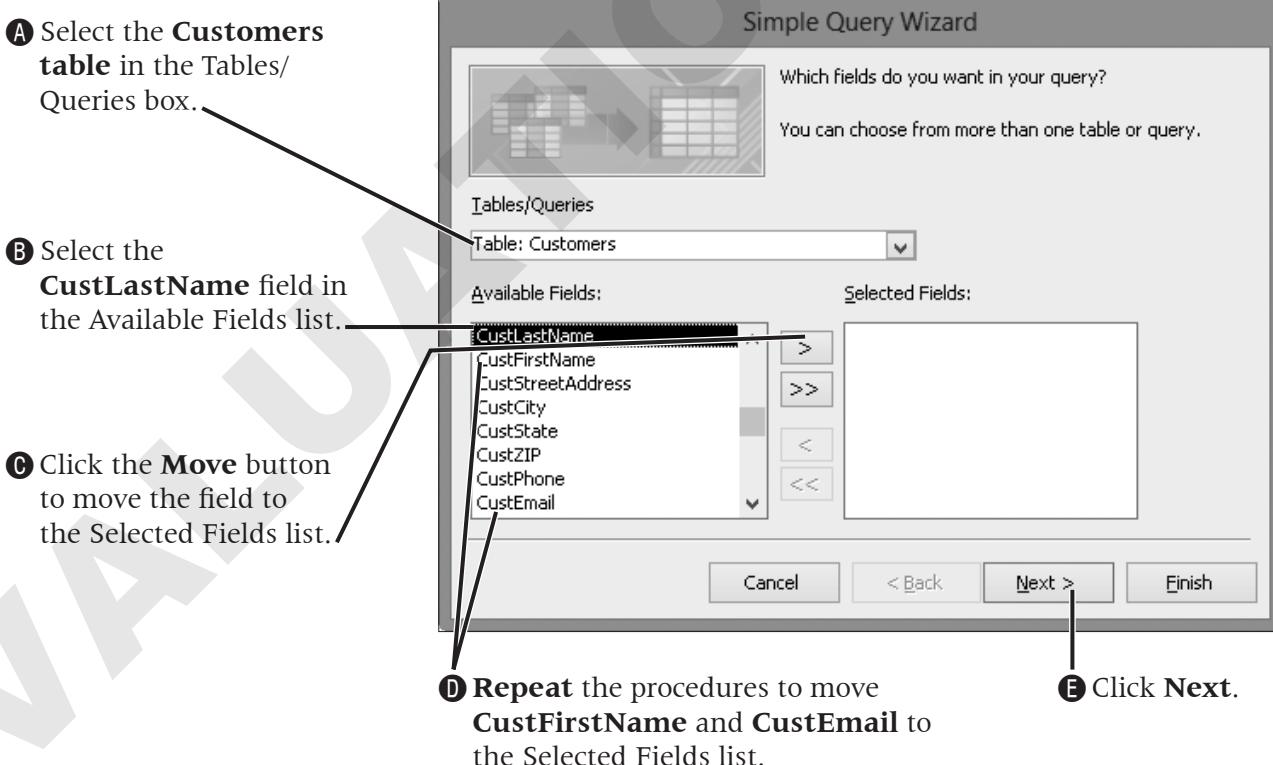
1. Open **AC04-D01-WinWebDesign** from the **AC2013 Lesson 04** folder and save it as **AC04-D01-WinWebDesign-[FirstInitialLastName]**.
2. Follow these steps to activate the Query Wizard:



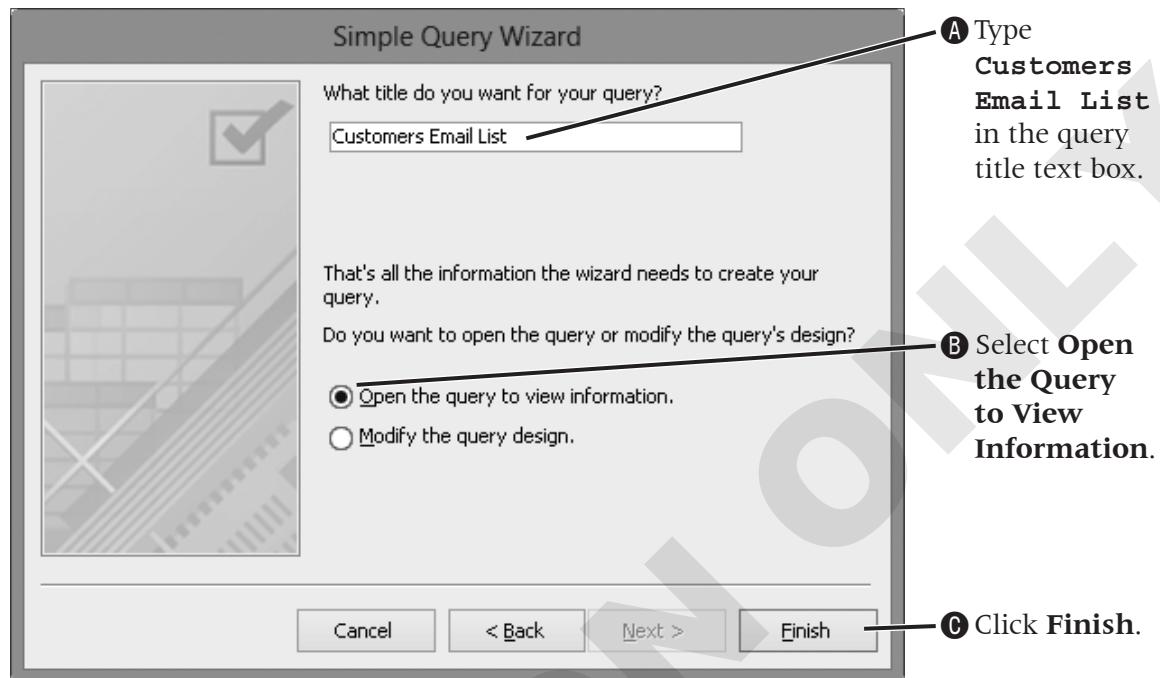
3. Follow these steps to select the query type:



4. Follow these steps to move selected fields to the query:



5. Follow these steps to complete the query:



Last Name	First Name	Email
Abrams	John	JPAbrams@email.com
Anders	Mark	AndersM@email.com
Blaser	Helen	BlasingHel@email.com
Davis	Peter	DavisAngie@email.com
Fleetwood	Candace	CandyWin@email.com
Hassan	Ahmed	HansAnge@email.com
Jeffries	Daniel	DannyJ@email.com
Klein	Joyce	KleinBrian@email.com
Mansur	Jo	Mansur@email.com
Roberts	Ilsa	IlsaRoberts@email.com
Roberts	John	JRoberts@email.com
Santos	Emily	SantosE@email.com
Smith	William	SmithBilly@email.com
Thibeaux	Pierre	PierreJT@email.com
Winkler	Samuel	SamWinkler45@email.com

6. Review the query results datasheet then close the query.

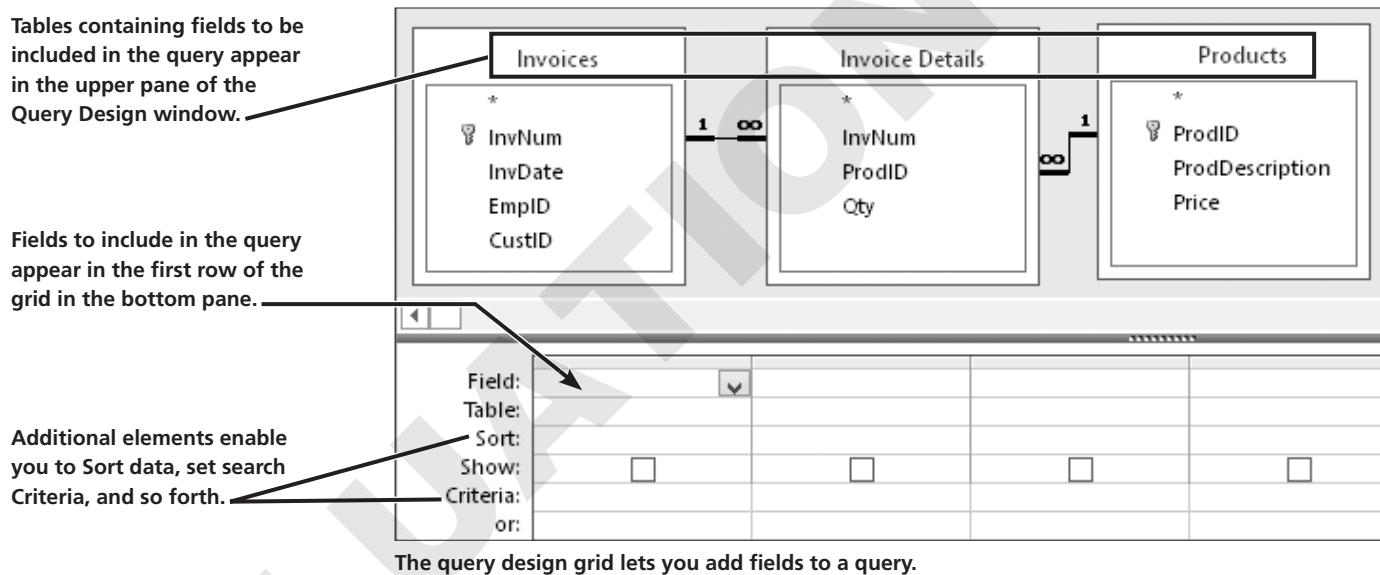
## Creating a Select Query Using Query Design

The query you created in the previous exercise only displayed a few fields, but it reported every single record in the table. That may not be a problem for a small table, but when thousands of records and multiple tables are involved, it is often necessary to select only specific records by setting precise criteria. Using Query Design View, Access allows you to:

- Select fields from multiple tables.
- Set criteria to locate records based on data contained in one or more fields.
- Calculate totals.
- Show or hide fields containing criteria that are in the query results datasheet.

### Identifying Features of the Query Design Grid

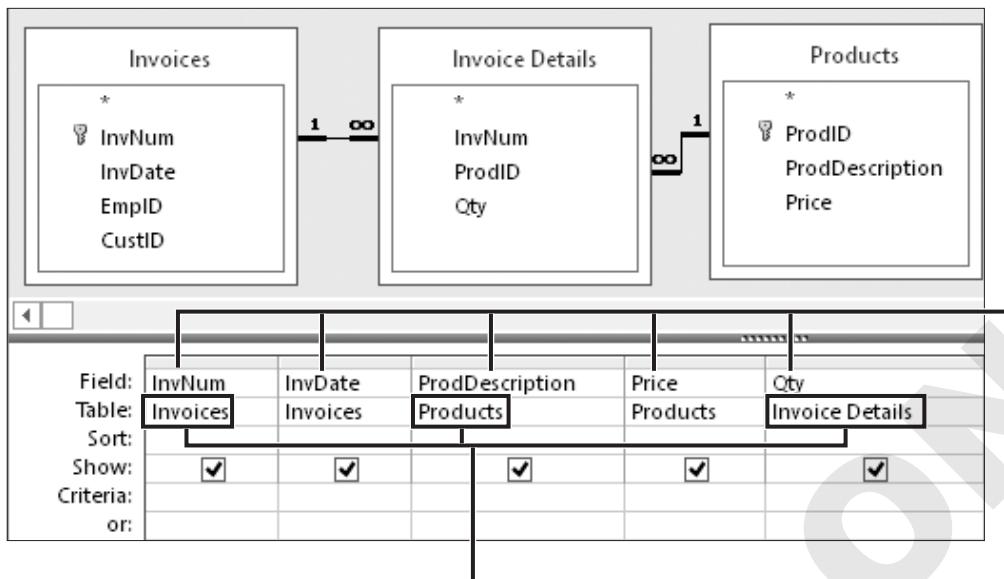
When in Query Design View, you are able to add fields from one or more tables into the display grid. You can place the fields in the order in which you want them to appear in the query results datasheet. In addition, the query design grid contains elements that enable you to set specific search criteria or sort the data.



### Adding Fields to the Query Design Grid

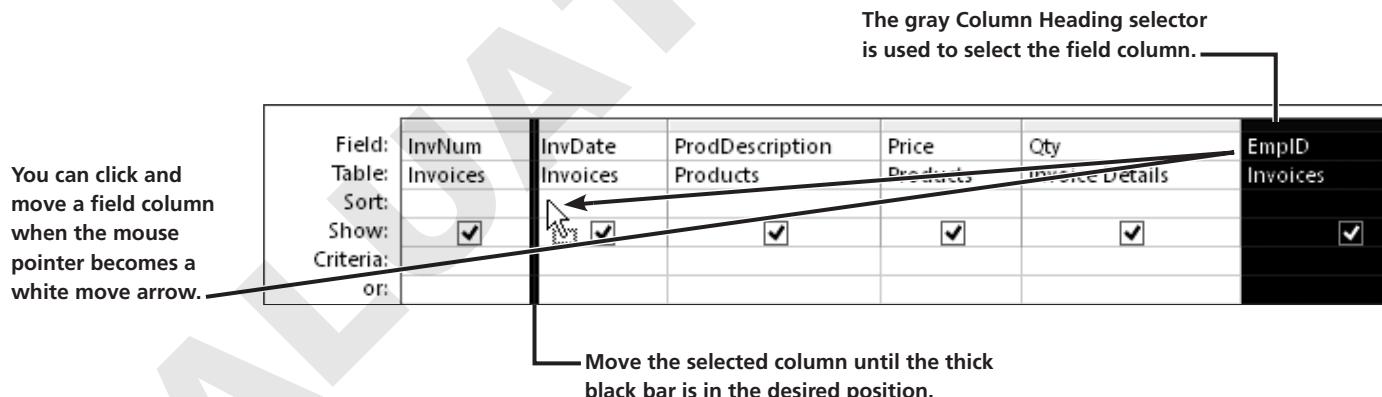
Access offers a variety of techniques for adding fields to the query grid.

- Double-click a field name to add the field to the next available column of the query design grid.
- Drag a field to the next column in the grid.
- Click the Field row of a column in the query grid and select the field from the drop-down list.
- Double-click the asterisk (\*) that appears at the top of the field list to add all fields to the grid.



### Rearranging Fields in the Query Design Grid

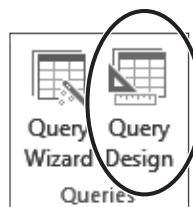
You can rearrange query columns in Design View or Datasheet View by dragging and dropping them into position. Click the gray Column Heading selector that appears above the Field name in the query grid or datasheet to select the field column. Then, hover over the top of the selected column until the mouse pointer becomes a white arrow and drag the field column to a new position.



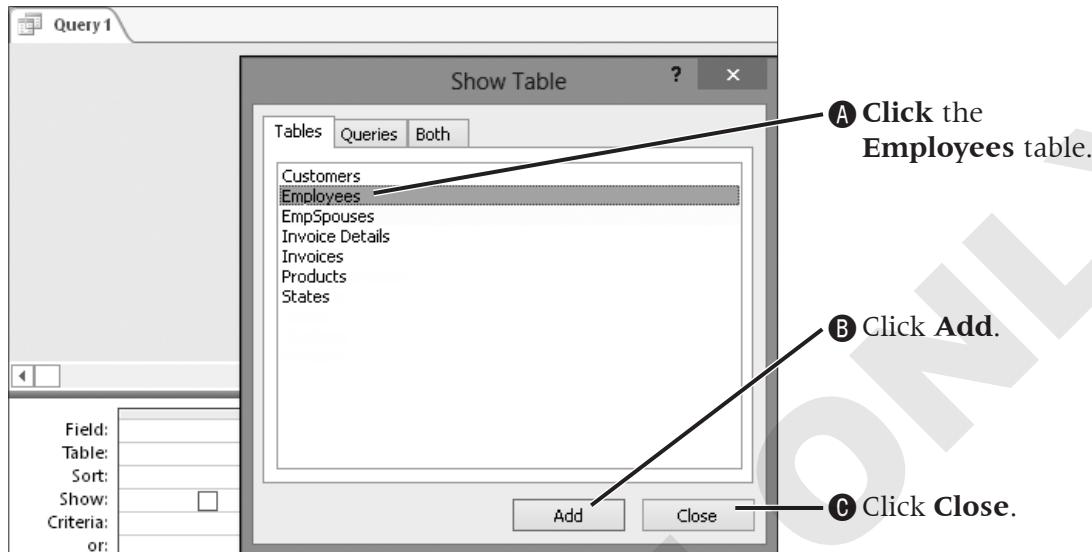
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### Create a Query Using Query Design

1. Choose **Create**→**Queries**→**Query Design** to display the Query Design Grid.



2. Follow these steps to add a table to the query:



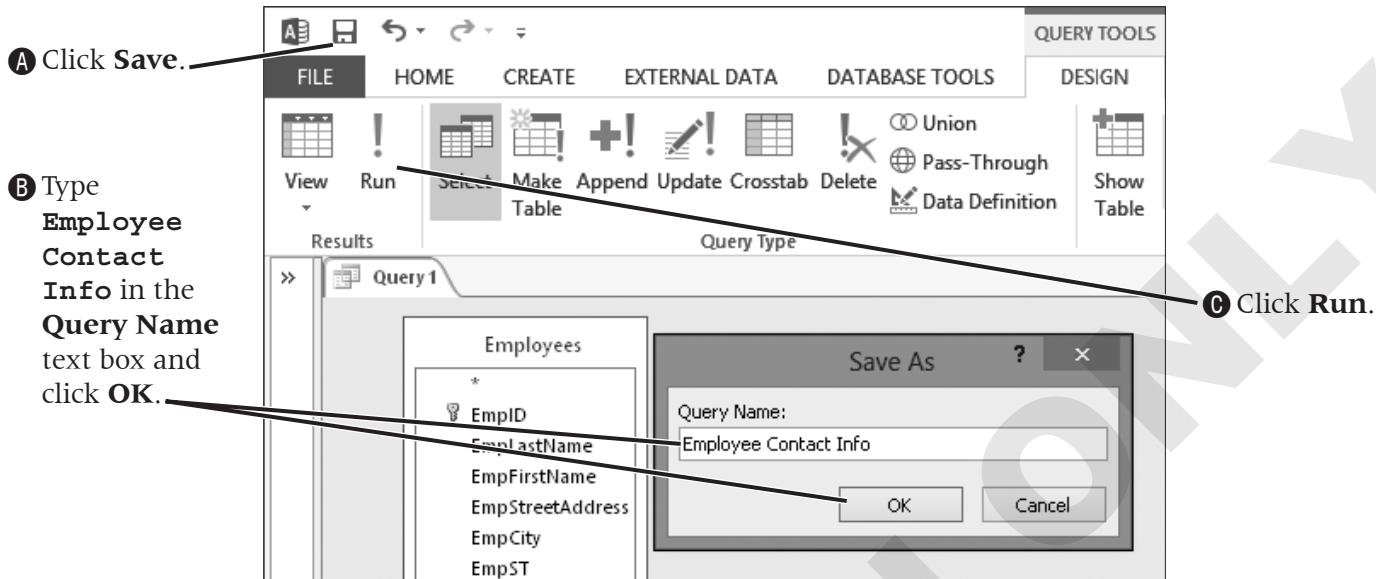
3. Follow these steps to add fields (in a different order than they are in the underlying table) to the query grid:

A Double-click **EmpFirstName** to add it to the query grid's first column.

The screenshot shows the Microsoft Access Query Designer. On the left, the 'Employees' table is open, displaying fields: EmpID, EmpLastName, EmpFirstName, EmpStreetAddress, EmpCity, EmpST, EmpZIP, EmpPhone, EmpEmail, and HireDate. On the right, the query grid is shown with four columns: EmpFirstName, EmpLastName, EmpPhone, and EmpEmail. Each column has a dropdown arrow icon at the top right. The 'Field:' row of the query grid lists 'EmpFirstName', 'EmpLastName', 'Employees', and 'Employees' respectively. The 'Table:' row lists 'Employees', 'Employees', 'Employees', and 'Employees'. The 'Show:' row has checkboxes checked for all four columns. Callout arrows point from the text instructions to specific fields in the table and grid. Arrow A points to 'EmpFirstName' in the table. Arrow B points to 'EmpLastName' in the table. Arrow C points to both 'EmpPhone' and 'EmpEmail' in the table.

Field:	EmpFirstName	EmpLastName	EmpPhone	EmpEmail
Table:	Employees	Employees	Employees	Employees
Show:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Criteria:				

4. Follow these steps to save and then run the query:



First Name	Last Name	Telephone	Email
Jay	Winchester	(941) 555-9382	WinchesterJay@email.com
John	Kramer	(941) 555-3490	KramerJ@email.com
Julie	Mansfield	(941) 555-5218	JulieMansfield@email.com
Mike	Waters	(941) 555-3981	MikeWaters@email.com

5. Switch to **Design View**.

6. Follow these steps to rearrange fields in the query grid:

- B Click the **Column Heading selector** for EmpLastName again and use the new white move arrow to drag the selected field column to the left of the EmpFirstName column.

A Hover the mouse pointer over the **Column Heading selector** for the EmpLastName column until the mouse pointer becomes a solid down-pointing arrow ↓, and click to select the field.

Field:	EmpFirstName	EmpLastName	EmpPhone	EmpEmail
Table:	Employees	Employees	Employees	Employees
Show:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Criteria:				
or:				

C Release the EmpLastName field column when the thick black bar appears.

7. Choose **Design**→**Results**→**Run** to run the query again.

Last Name	First Name	Telephone	Email
Winchester	Jay	(941) 555-9382	WinchesterJay@email.com
Kramer	John	(941) 555-3490	KramerJ@email.com
Mansfield	Julie	(941) 555-5218	JulieMansfield@email.com
Waters	Mike	(941) 555-3981	MikeWaters@email.com

8. Close the query, saving changes when prompted.

## Designing a Query Using Multiple Tables

Until now, the datasheets you have worked with have displayed data from only one table. There will be times when you need to view data contained in different tables within the same database. Queries allow you to do this.

## Choosing Fields to Include in a Query

When you build a query, you select only those tables and fields that you want to display in the query results datasheet and leave out those fields that have no impact on the data you want to view or that are confidential. For example, if you were responsible for maintaining a list of FBI agents, would you want everyone with access to the database to know the addresses and phone numbers of all agents? By specifying only certain tables and fields in a database and displaying only the desired fields in a query, you can create a report or a form that only presents pertinent data.

## Selecting a Field that Appears in Multiple Tables

When you work with table field lists, you may see multiple tables that contain the same ID field names. You may wonder which ID field to add to a query. The best practice is to identify the table for which the ID field is the *primary key*. This table will best allow you to retrieve other related data contained in that table.

Note that when you add fields from multiple tables, these tables must be related in order for the intended results to be displayed.

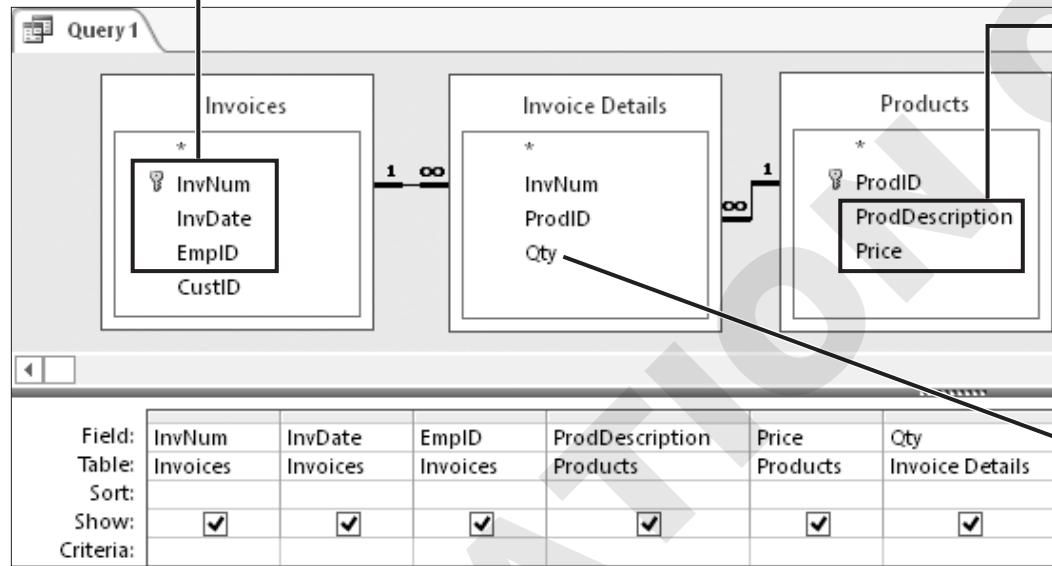


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### Create a Multi-Table Query

1. Choose **Create**→**Queries**→**Query Design** 
2. Double-click the following table names in the Show Table dialog box to add the table field lists to the upper pane of the query: **Invoices**, **Invoice Details**, and **Products**.
3. Close the Show Table dialog box, then follow these steps to add fields to the query grid:

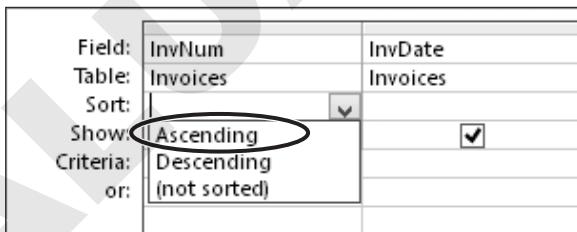
- A** Double-click fields from the **Invoices** table in this order:  
**InvNum**, **InvDate**, **EmpID**.



- B** Double-click fields from the **Products** table in this order:  
**ProdDescription**, **Price**.

- C** Double-click this field from the **Invoice Details** table: **Qty**.

4. Click in the **Sort** row for the InvNum field in the query grid and choose **Ascending**.



5. Save the query as **InvoicesList** and click **OK**.

6. Choose **Design→Results→Run** to display the query results.

InvNum	Invoice Date	Emp ID	Description	Price	Qty
1	3/15/2012	JFW	Secondary Page	\$200.00	6
1	3/15/2012	JFW	Image, Custom Designed	\$40.00	11
1	3/15/2012	JFW	Home Page, Nav, CSS, Design	\$400.00	1
2	4/2/2012	MJW	Image, Custom Designed	\$40.00	14
2	4/2/2012	MJW	Home Page, Nav, CSS, Design	\$400.00	1
2	4/2/2012	MJW	Secondary Page	\$200.00	7
2	4/2/2012	MJW	Hourly Rate for Modifications	\$80.00	5
3	5/11/2012	JMM	Image, Custom Designed	\$40.00	6
3	5/11/2012	JMM	Secondary Page	\$200.00	2
4	5/30/2012	JMM	Blog, Integrated into Site	\$300.00	1
4	5/30/2012	JMM	Hourly Rate for Modifications	\$80.00	2
4	5/30/2012	JMM	Image, Custom Designed	\$40.00	2
5	6/19/2012	JFW	Image, Custom Designed	\$40.00	9
5	6/19/2012	JFW	Secondary Page	\$200.00	11
5	6/19/2012	JFW	Home Page, Nav, CSS, Design	\$400.00	1
6	6/23/2012	MJW	Hourly Rate for Modifications	\$80.00	3
6	6/23/2012	MJW	Blog, Integrated into Site	\$300.00	1
6	6/23/2012	MJW	Home Page, Nav, CSS, Design	\$400.00	1
6	6/23/2012	MJW	Secondary Page	\$200.00	6
7	7/11/2012	JMM	Image, Custom Designed	\$40.00	14

## Setting Query Criteria

As you begin working with large databases that contain thousands or even hundreds of thousands of records, you will experience the power behind queries that enables you to specify criteria, or conditions that data must meet. When you run the query, Access lists only those records containing data that meet the criteria. This is the feature used by sportscasters, live chat specialists working for an online retailer, and others who need data and questions answered right away.

### Adding Criteria to a Query

You can filter and sort records while working in Table Design View, Form Design View, and to a limited degree in Report Design View. However, the best way to sort and filter data is through a query, because you can save each individual query with a meaningful name. Access uses standard comparison operators ( $<$ ,  $>$ ,  $=$ ,  $\geq$ ,  $\leq$ ,  $\neq$ ) to set validation rules to help define a query's criteria. Setting query criteria limits the number of records displayed in query results to only those records with values in the selected field columns that meet the criteria. In addition, the following comparison and logical criteria can be used to limit data returned in queries.

CRITERIA EXPRESSION	CRITERIA DESCRIPTION AND SAMPLE
> 123	<i>Greater than:</i> For a numeric data field; returns records for all values greater than 123
< 100.45	<i>Less than:</i> For a currency data field; returns all values less than 100.45
>= Smith	<i>Greater than or equal:</i> For a text data field—all values from Smith through the end of the alphabet
<> 2	<i>Unequal:</i> For a numeric data field—all values unequal to 2. You could also use Not
Not Smith	For a text data field—all records for values except Smith
Not T*	For text data field—all values that don't start with the letter T
"London" Or "Hedge End"	For a text data field—orders shipped to London or Hedge End
In("Canada", "UK")	For a text data field—records containing the values Canada or UK in the criteria field
Between #1/1/2013# And #12/31/2013#	For date data field—dates from January 1, 2013 through December 31, 2013 (Access inserts the # signs after you type: Between 1/1/2013 and 12/31/2013)
Between Date() And DateAdd ("M", 3, Date())	For a date data field—values required between today's date and three months from today's date
Date()	For a date data field—values for today's date
< Date() – 30	For a date data field—values 30 days prior to the current date

## Hiding Columns in the Query Results Datasheet

Suppose your company determines the price of a product by marking up the cost by 50%. So if your company bought a widget for \$100, they would sell it for \$150. As a salesperson, you need to show your customers the price of your products, but it would not be wise to disclose the amount of markup. Consequently, you include the Cost field in your query, but hide it when you run the query. This is easily accomplished by unchecking the Show checkbox for the Cost field in the query grid.

Uncheck the Show checkbox to hide the Cost field.

Field:	ProdDescription	Cost	Price: [Cost]*1.5
Table:	Product Costs	Product Costs	
Sort:			
Show:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Criteria:			
Or:			

Price is calculated by multiplying [Cost]\*1.5.

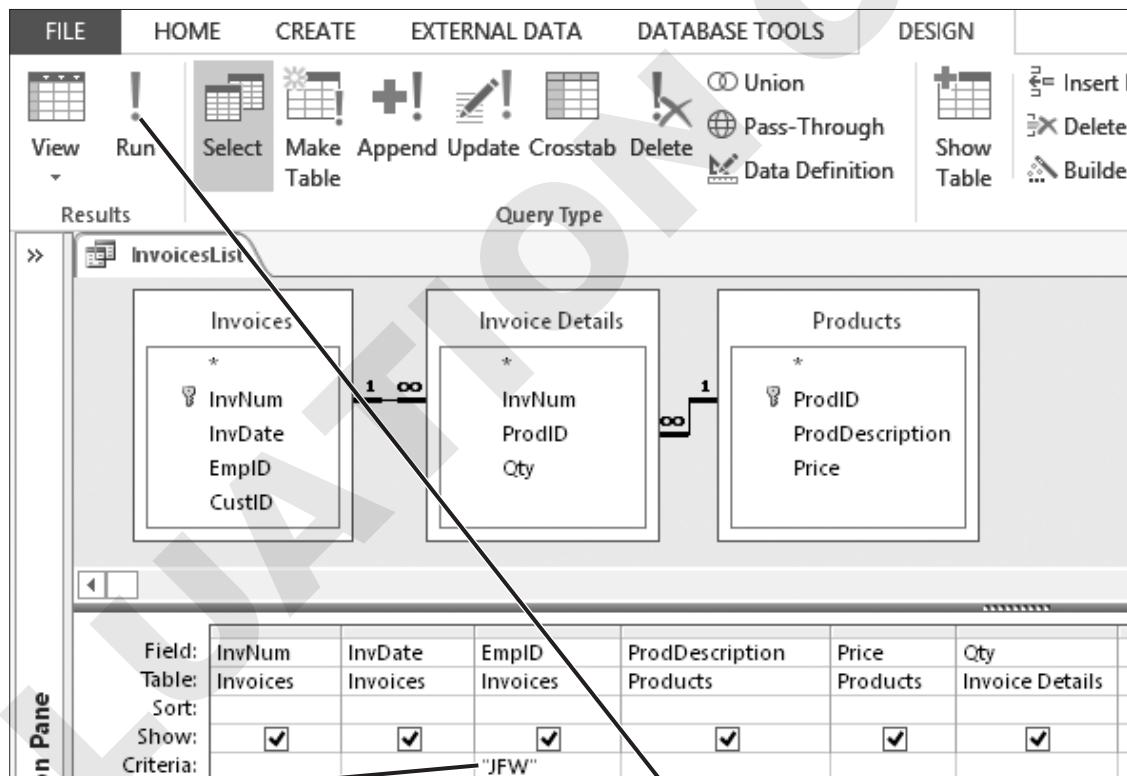
## Building Queries with Criteria

When building a query you often add criteria to locate specific records in the database. Access recognizes any added or modified criteria as a change in the query design. As a result, when you close the query, Access prompts you to save it. Saving the query saves the criteria as part of the query. However, you may be just running what-if scenarios or you want to set different criteria each time you run the query. In those cases, you would choose *No* when Access prompts you to save the file.

### DEVELOP YOUR SKILLS AC04-D04

#### Add Criteria and Run a Query

1. Open the **InvoicesList** query, if necessary, and choose **Home**→**Views**→**View** .
2. Follow these steps to add criteria to the query grid:



The screenshot shows the Microsoft Access ribbon with the 'DESIGN' tab selected. Below the ribbon, the 'Query Type' section includes icons for Union, Pass-Through, Data Definition, Insert, Delete, Show Table, and Builder. The main area displays three tables: 'Invoices', 'Invoice Details', and 'Products', connected by relationships. The 'Invoices' table has fields InvNum, InvDate, EmpID, and CustID. The 'Invoice Details' table has fields InvNum, ProdID, and Qty. The 'Products' table has fields ProdID, ProdDescription, and Price. Below the tables is the query grid. The 'Criteria' row for the 'EmpID' field is highlighted, containing the value 'JFW'. The 'Show' column for this row has a checked checkbox.

Field:	InvNum	InvDate	EmpID	ProdDescription	Price	Qty
Table:	Invoices	Invoices	Invoices	Products	Products	Invoice Details
Sort:						
Show:	<input checked="" type="checkbox"/>					
Criteria:	'JFW'					

A Click in the **Criteria** row of the query grid for the **EmpID** field, type **JFW**, and tap **Enter**. Access adds quotes around the text you type to indicate that it is a literal value.

B Choose **Design**→**Results**→**Run**.

InvNum	Invoice Date	Emp ID	Description	Price	Qty
1	3/15/2012	JFW	Secondary Page	\$200.00	6
1	3/15/2012	JFW	Image, Custom Designed	\$40.00	11
1	3/15/2012	JFW	Home Page, Nav, CSS, Design	\$400.00	1
5	6/19/2012	JFW	Image, Custom Designed	\$40.00	9
5	6/19/2012	JFW	Home Page, Nav, CSS, Design	\$400.00	1
5	6/19/2012	JFW	Secondary Page	\$200.00	11
8	7/11/2012	JFW	Home Page, Nav, CSS, Design	\$400.00	1
8	7/11/2012	JFW	Secondary Page	\$200.00	9
8	7/11/2012	JFW	Shopping Cart, Basic	\$400.00	1
8	7/11/2012	JFW	Image, Custom Designed	\$40.00	21
8	7/11/2012	JFW	Hourly Rate for Modifications	\$80.00	7
10	7/30/2012	JFW	Secondary Page	\$200.00	4
10	7/30/2012	JFW	Image, Custom Designed	\$40.00	9
10	7/30/2012	JFW	Blog, Integrated into Site	\$300.00	1
19	12/10/2012	JFW	Hourly Rate for Modifications	\$80.00	4

3. Close the query. Choose **No** when prompted to save the changes.

## Using Wildcards

The two most frequent wildcards with which you may be familiar are the asterisk (\*) and the question mark (?). There are four additional wildcards. Each wildcard is described in the following table.

WILDCARD SYMBOLS	
Symbol	Description of Use
An asterisk (*)	Substitutes for a group of characters that appear at the position of the asterisk <b>Example:</b> If you type R* in the last name column of a query grid, Access will locate all last names beginning with R regardless of how many characters make up the name. In this case, <i>Rogers</i> , <i>Rich</i> , and <i>Rodriquez</i> would all appear in the results datasheet.
A question mark (?)	Substitutes for a single character that might appear at the position of the question mark <b>Example:</b> If you type m?s in the criteria row for a column, Access will locate records containing values such as <i>mrs</i> , <i>ms</i> , <i>mbs</i> .
Open/close brackets [ ]	Matches text or individual characters placed within the brackets individually <b>Example:</b> If you type ca[rt], Access will find <i>cat</i> and <i>car</i> but not <i>cab</i> or <i>cad</i> .
Exclamation point (!)	Matches any character within the brackets <i>except</i> those characters that follow the ! <b>Example:</b> If you type ca[!rt], Access will find <i>cab</i> , <i>cad</i> , <i>cam</i> , etc., but not <i>cat</i> or <i>car</i> .
Hyphen (-)	Matches characters at the wildcard position that fall within a range of ascending values <b>Example:</b> If you type ca[a-r], Access finds <i>cab</i> , <i>cad</i> , <i>cam</i> , <i>car</i> , etc., but not <i>cat</i> or <i>cay</i> .
Number sign (#)	Locates any numeric digit at the position of the # <b>Example:</b> If you type #10, Access locates 010, 110, 210, etc.

Field:	InvDate	Table:	Invoices	EmpID	Invoices	CustID	Customers	ProdDescription	Products	Price	Products
Criteria: or:	Between #12/31/2012# And #1/1/2014#	Criteria: or:	Like "J??"	Criteria: or:	Like "S*"	Criteria: or:	Like "*Page*"	Criteria: or:	> 50	Criteria: or:	

Display records with InvDate within the specified date range.

Locate EmpIDs beginning with J followed by exactly two characters.

Display all records with CustIDs starting with S.

Display all records with a description that includes the word Page.

Display all records with a Price greater than 50.

## Setting AND and OR Criteria

In some cases, you may need to select records that meet multiple criteria. Access uses two basic criteria conditions that apply to setting multiple criteria for a query: AND and OR. The basic principles for determining whether to use AND criteria or OR criteria in queries are as follows.

AND AND OR CRITERIA	
Criterion Type	Description
AND operator	Use to select records that meet <i>all</i> criteria set in all query grid fields. <b>Example:</b> Set an AND criteria to locate employees who are from Sarasota <i>and</i> who are web-certified by using Sarasota in the City field and Yes in the Web Certification field on the query grid.
OR operator	Use to select records meeting <i>one</i> condition <i>or another</i> condition whether the criteria are set for the same field or different fields. <b>Example:</b> Set OR criteria to locate customers from <i>either</i> Sarasota <i>or</i> Bradenton.

## Positioning Multiple Criteria in the Query Grid

In the query grid, the AND criteria all appear on the same Criteria row even when criteria are set for different fields. When you set OR criteria, the first criterion is entered on the Criteria row in the grid while other criteria appear on the Or row in the grid.

### Example of an AND Criteria

Setting criteria for two different fields on the same Criteria row creates an AND condition. With this type of criterion, Access locates only those records for employees who live in Sarasota *and* are web certified.

Field:	EmpLastName	Table:	Employees	EmpFirstName	Employees	EmpCity	Employees	HireDate	Employees	WebCert	Employees
Criteria: or:		Criteria: or:		Criteria: or:		Criteria: or:		Criteria: or:		Criteria: or:	

The AND criteria are on the same row.

## Example of an OR Criteria

Setting criteria on both the Criteria row and the Or row creates an OR condition. With this type of criterion, Access locates those records for employees who live in Sarasota *or* in Bradenton.

Field:	EmpLastName	EmpFirstName	EmpCity	HireDate	WebCert
Table:	Employees	Employees	Employees	Employees	Employees
Sort:					
Show:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Criteria:			"Sarasota"		Yes
or:			"Bradenton"		

The OR criteria are on different rows.

Setting OR criteria sometimes seems to operate backwards. In this example, you wanted to locate all records for employees from Sarasota *and* Bradenton, yet you use an OR condition. If you consider that there are no records that contain both Sarasota and Bradenton in the City field, it begins to make sense.

## DEVELOP YOUR SKILLS AC04-D05

### Use Wildcards and Multiple Criteria in Queries

1. Right-click **Invoices** Query in the Navigation Pane and choose **Design View**.
2. Follow these steps to set multiple criteria in a query grid:

A Click the **Criteria** row for **ProdDescription**, type **Blog\***, and tap **[Enter]**. *Blog\** converts to *Like "Blog\*"*.

B Click in the **Or** row for **ProdDescription** and type **Image\***.

Field:	InvNum	InvDate	ProdDescription	Price	Qty	LineTotal: [Qty]*[Price]
Table:	Invoices	Invoices	Products	Products	Invoice Details	
Sort:						
Show:	<input checked="" type="checkbox"/>					
Criteria:			Like "Blog*"			
or:			Like "Image*"		> 10	

C Click in the **Or** row for **Qty** and type **>10**. Be sure to type in the same row as *Like "Image\*"*.

**3.** Switch to **Datasheet View**.

Inv Num	Inv Date	Description	Price	Qty	LineTotal
4	5/30/2012	Blog, Integrated into Site	\$300.00	1	\$300.00
6	6/23/2012	Blog, Integrated into Site	\$300.00	1	\$300.00
10	7/30/2012	Blog, Integrated into Site	\$300.00	1	\$300.00
15	10/30/2012	Blog, Integrated into Site	\$300.00	1	\$300.00
34	8/5/2013	Blog, Integrated into Site	\$300.00	1	\$300.00
13	9/3/2012	Blog, Integrated into Site	\$300.00	1	\$300.00
16	11/5/2012	Blog, Integrated into Site	\$300.00	1	\$300.00
24	2/7/2013	Blog, Integrated into Site	\$300.00	1	\$300.00
29	3/12/2013	Blog, Integrated into Site	\$300.00	1	\$300.00
1	3/15/2012	Image, Custom Designed	\$40.00	11	\$440.00
7	7/11/2012	Image, Custom Designed	\$40.00	14	\$560.00
20	1/5/2013	Image, Custom Designed	\$40.00	14	\$560.00
21	1/12/2013	Image, Custom Designed	\$40.00	18	\$720.00
2	4/2/2012	Image, Custom Designed	\$40.00	14	\$560.00
8	7/11/2012	Image, Custom Designed	\$40.00	21	\$840.00
17	11/20/2012	Image, Custom Designed	\$40.00	12	\$480.00
24	2/7/2013	Image, Custom Designed	\$40.00	19	\$760.00
26	2/12/2013	Image, Custom Designed	\$40.00	14	\$560.00

- 4.** Close the query. Choose **No** when prompted to save the changes.

## Entering Date Criteria

You can set date criteria to determine age, hired date, invoice date, and so forth. Access acknowledges the same comparison criteria for performing date comparisons that it does for locating other types of data—regardless of the format used to enter dates.

<b>SAMPLES OF DATE CRITERIA</b>	
<b>Criterion</b>	<b>Locates</b>
06/22/2013	Finds records containing a specific date
<22-Oct-2013	Finds records containing dates that occur before a specific date—regardless of how the date is typed
>01/01/13	Finds records containing dates that occur after a specific date
<=#06/01/13#	Finds records containing dates on or before a specific date; the # signs that appear before and after the date help Access identify the data between them as a date
Between 01/01/13 and 06/30/13	Finds records containing dates after the first date and before the second date

## DEVELOP YOUR SKILLS AC04-D06

### Use Date Criteria in Queries

1. Choose **Create**→**Queries**→**Query Design** 

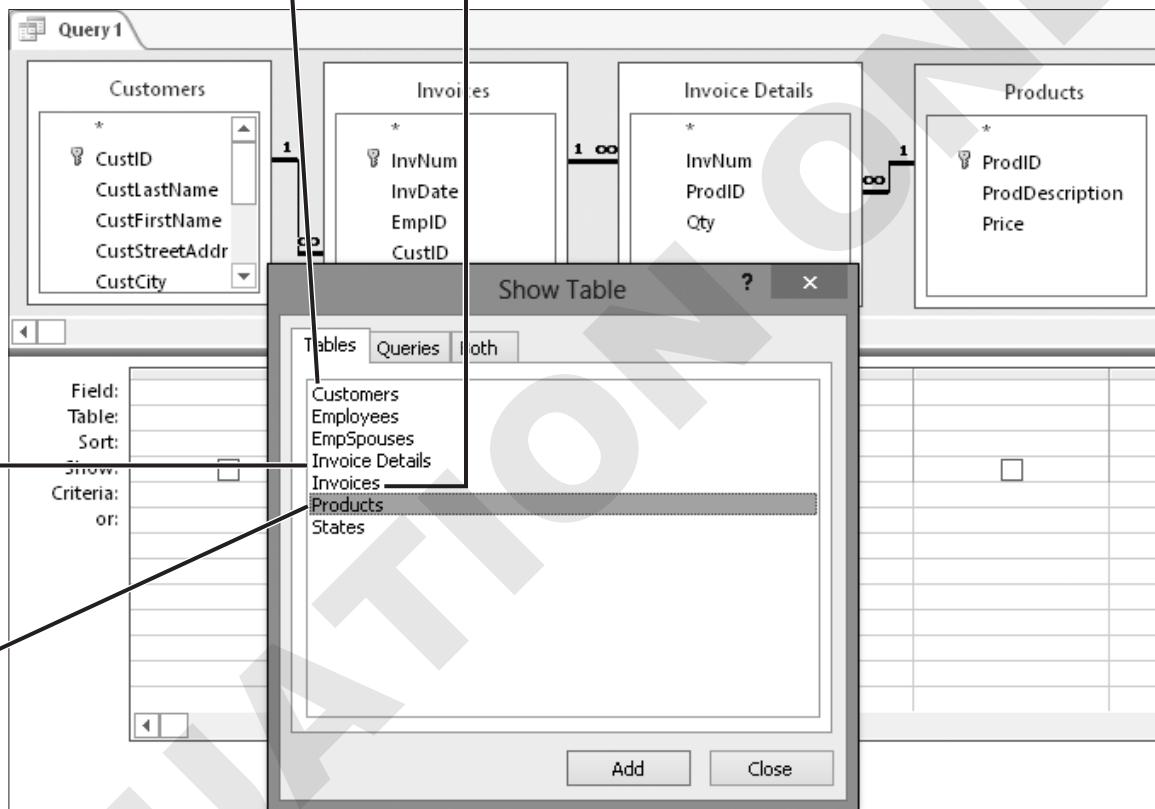
2. Follow these steps to add table field lists to the query:

A Double-click the **Customers** table.

B Double-click the **Invoices** table.

C Double-click the **Invoice Details** table.

D Double-click the **Products** table.

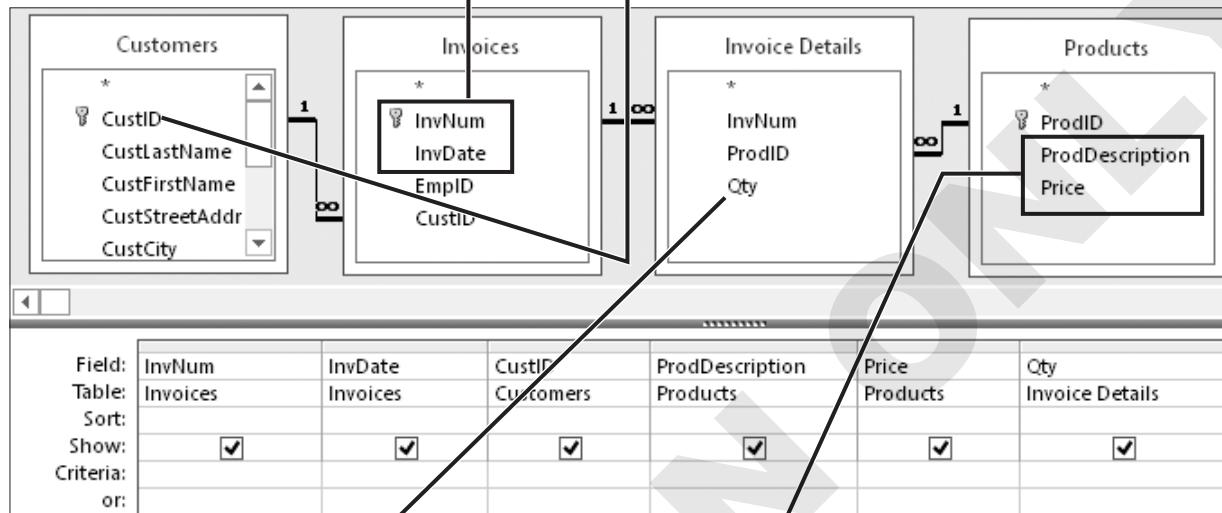


3. Close the **Show Table** dialog box.

4. Follow these steps to add fields to the query grid:

- A Double-click **InvNum** and **InvDate** in the **Invoices** table to add the fields to the query grid.

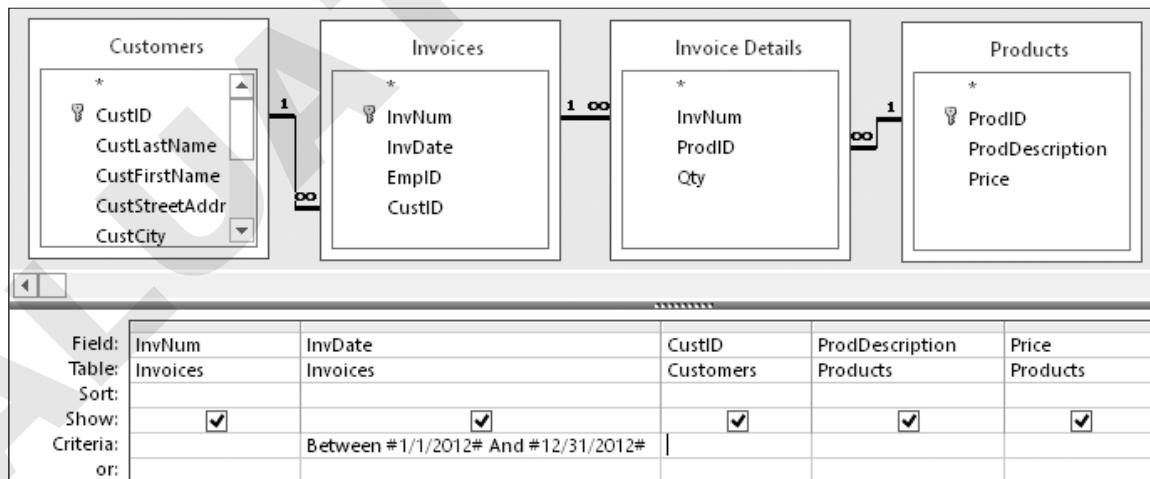
- B Double-click **CustID** in the **Customers** table.



- D Double-click **Qty** in the **Invoice Details** table.

- C Double-click **ProdDescription** and **Price** in the **Products** table.

5. Type **Between January 1, 2012 and December 31, 2012** in the **Criteria** row for the **InvDate** field and tap **Enter**.



**6. Choose Design→Results→Run.**

InvNum	Invoice Date	CustID	Description	Price	Qty
1	3/15/2012	SmithW	Home Page, Nav, CSS, Design	\$400.00	1
1	3/15/2012	SmithW	Secondary Page	\$200.00	6
1	3/15/2012	SmithW	Image, Custom Designed	\$40.00	11
2	4/2/2012	SantosE	Home Page, Nav, CSS, Design	\$400.00	1
2	4/2/2012	SantosE	Secondary Page	\$200.00	7
2	4/2/2012	SantosE	Image, Custom Designed	\$40.00	14
2	4/2/2012	SantosE	Hourly Rate for Modifications	\$80.00	5
3	5/11/2012	SantosE	Secondary Page	\$200.00	2
3	5/11/2012	SantosE	Image, Custom Designed	\$40.00	6
4	5/30/2012	SmithW	Blog, Integrated into Site	\$300.00	1
4	5/30/2012	SmithW	Hourly Rate for Modifications	\$80.00	2
4	5/30/2012	SmithW	Image, Custom Designed	\$40.00	2
5	6/19/2012	AndersM	Home Page, Nav, CSS, Design	\$400.00	1
5	6/19/2012	AndersM	Secondary Page	\$200.00	11
5	6/19/2012	AndersM	Image, Custom Designed	\$40.00	9
6	6/23/2012	JeffriesD	Home Page, Nav, CSS, Design	\$400.00	1
6	6/23/2012	JeffriesD	Secondary Page	\$200.00	6
6	6/23/2012	JeffriesD	Blog, Integrated into Site	\$300.00	1
6	6/23/2012	JeffriesD	Hourly Rate for Modifications	\$80.00	3

**7. Save the query as `Invoices2012` then click **OK**.**

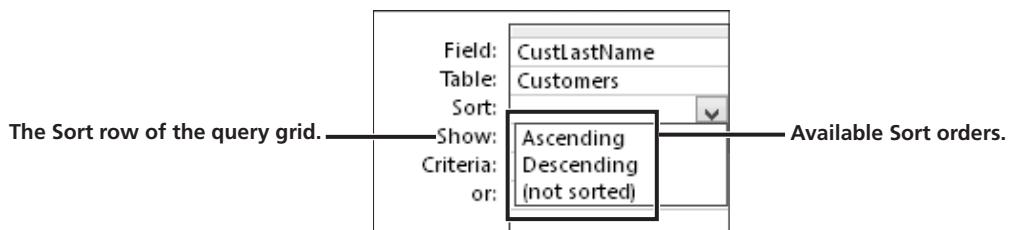
**8. Close the query.**

## Sorting a Query and Limiting Results

The query grid contains a Sort row that you can use to sort data in ascending or descending order. Sorting queried data helps ensure consistency and makes locating data in the query results more efficient.

### Setting a Query Sort Order

There may be times when you need to sort data based upon two fields. For instance, if there are duplicate last names, you have to do a secondary sort on first name. When two fields are set as sort fields, Access sorts the fields left to right as they appear in the query grid. The first sort field is identified as the *primary* sort field; the next sort field is the *secondary* sort field. Multiple sorted fields do not need to be side by side in the query grid.



## Limiting Number of Results Displayed

Running queries on large databases that contain hundreds of thousands of records often return such a large number of results that it can be challenging to find what you are looking for. So limiting the number of records displayed when you run a query can be beneficial, especially when these records are sorted.

For example, if you set up a query to sort in descending order and then limit the number of items displayed to ten, you would, in effect, have a list of the top ten items in the table being queried.

This query datasheet includes all the records in the database.

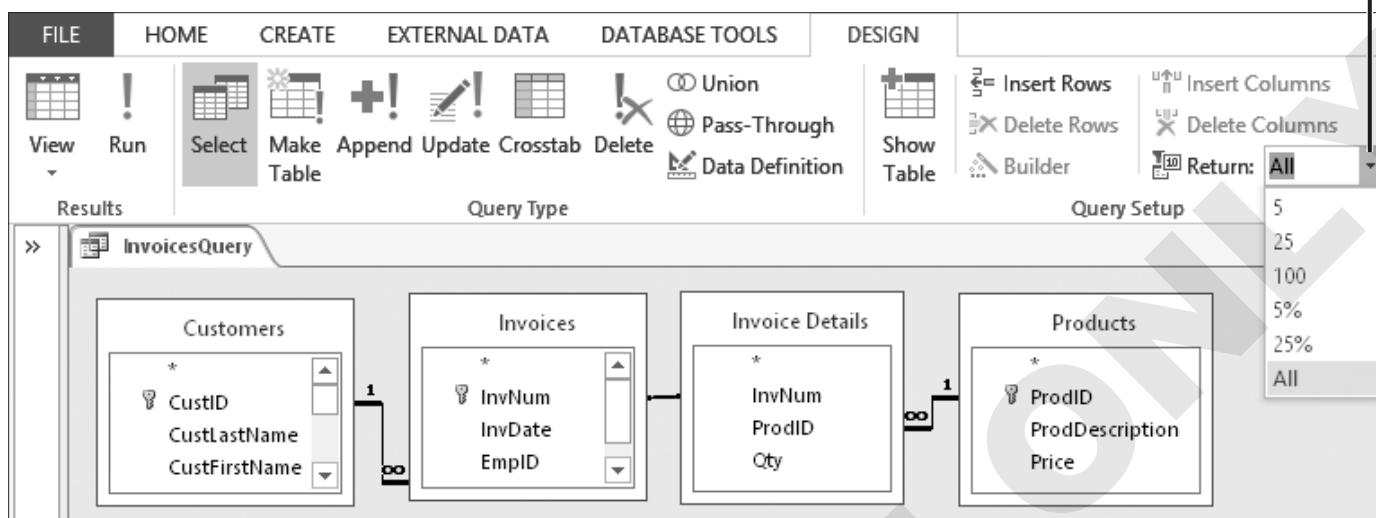
Notice the item totals are in random order.

After sorting with the results limited, only the largest item totals are shown, and in descending order.

Inv Num	Invoice Date	Description	Price	Qty	LineTotal
41	12/7/2013	Shopping Cart, Basic	\$400.00	1	\$400.00
41	12/7/2013	Secondary Page	\$200.00	2	\$400.00
41	12/7/2013	Image, Custom Designed	\$40.00	6	\$240.00
40	11/14/2013	Home Page, Nav, CSS, Design	\$400.00	1	\$400.00
40	11/14/2013	Secondary Page	\$200.00	7	\$1,400.00
40	11/14/2013	Image, Custom Designed	\$40.00	3	\$120.00
39	11/4/2013	Secondary Page	\$200.00	3	\$600.00
38	2/7/2013	Secondary Page	\$200.00	13	\$2,600.00
37	9/3/2012	Secondary Page	\$200.00	12	\$2,400.00
37	1/12/2013	Secondary Page	\$200.00	12	\$2,400.00
36	6/19/2012	Secondary Page	\$200.00	11	\$2,200.00
35	3/12/2013	Secondary Page	\$200.00	9	\$1,800.00
35	7/11/2012	Secondary Page	\$200.00	9	\$1,800.00
34	4/2/2012	Secondary Page	\$200.00	7	\$1,400.00
34	11/14/2013	Secondary Page	\$200.00	7	\$1,400.00
34	2/12/2013	Secondary Page	\$200.00	6	\$1,200.00

The Return feature on the Query Design tab enables you to set the number of records to be displayed, or returned, in the query results. The default setting for the Return feature is All.

The Return menu allows you to set the number of records to display in the query results datasheet.



## DEVELOP YOUR SKILLS AC04-D07

### Set a Query Sort Order and Limit Records

1. Choose **Create**→**Queries**→**Query Design**.
2. Double-click the **Customers**, **Invoices**, **Invoice Details**, and **Products** tables in the Show Table dialog box.
3. Close the **Show Table** box.
4. Double-click **CustID** and **CustLastName** in the **Customers** table to add the fields to the query grid.
5. Double-click **InvDate** in the **Invoices** table to add it to the query grid.
6. Double-click **ProdDescription** in the **Products** table and **Qty** in the **Invoice Details** table.
7. Follow these steps to set criteria and a sort order:

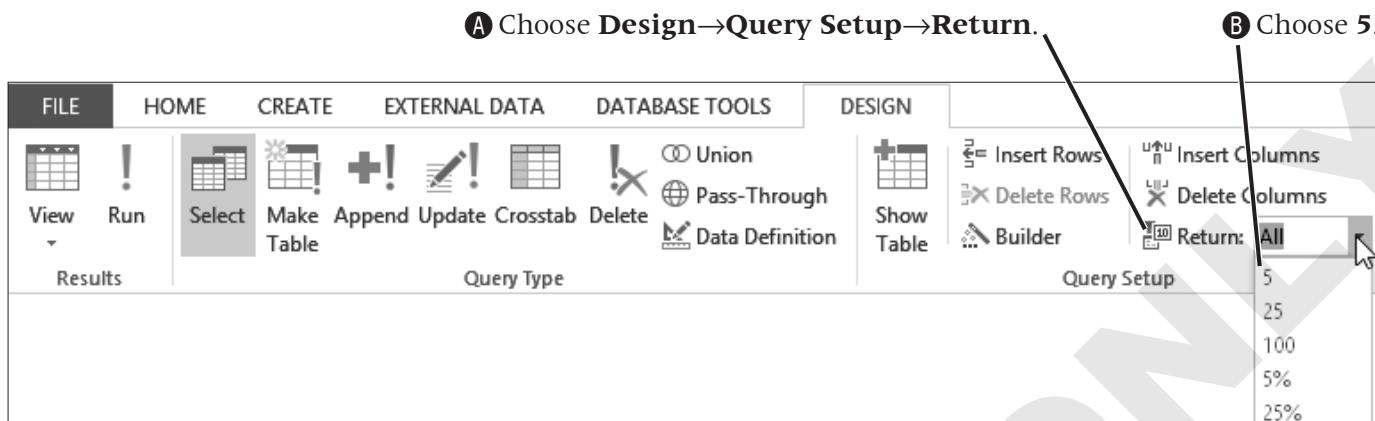
A Type **Image\*** in the Criteria row under **ProdDescription** and tap **Tab**.

B Click the arrow in the **Sort** row for the **Qty** field.

Field:	CustID	CustLastName	InvDate	ProdDescription	Qty
Table:	Customers	Customers	Invoices	Products	Invoice Details
Sort:					
Show:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Like "Image*"
Criteria:					Ascending
or:					Descending
					(not sorted)

C Choose **Descending**.

8. Follow these steps to limit the number of records displayed in the results:



9. Choose Design→Results→Run .

CustID	Last Name	Invoice Date	Description	Qty
DavisP	Davis	7/11/2012	Image, Custom Designed	21
ThibeauxP	Thibeaux	2/7/2013	Image, Custom Designed	19
JeffriesD	Jeffries	1/12/2013	Image, Custom Designed	18
SantosE	Santos	4/2/2012	Image, Custom Designed	15
RobertsJ	Roberts	7/11/2012	Image, Custom Designed	14
BlaserH	Blaser	2/23/2013	Image, Custom Designed	14
DavisP	Davis	2/12/2013	Image, Custom Designed	14

10. Close the query, saving it as **Most Images**.

## Performing Calculations in Queries

So far, the activities in this lesson have introduced the basics of creating, running, sorting, and selecting records based on criteria. As you developed the queries, you used fields already available in database tables. Access also contains features that enable you to use the query grid to create a *calculated field*, which contains no data in a table but uses data in other fields to obtain its value.

A calculated field:

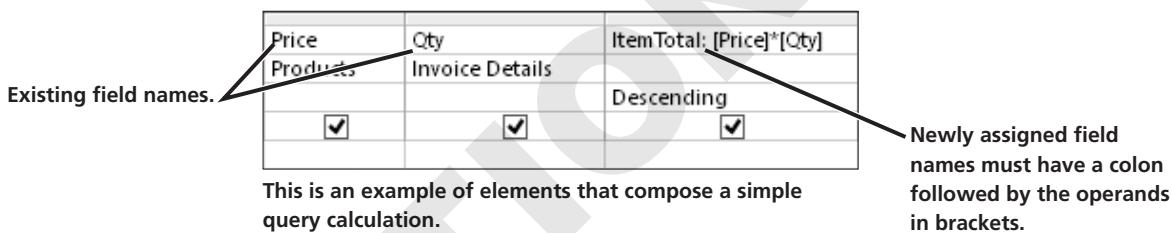
- Creates a new field in the query that can be used in a form or report.
- Can be used to perform mathematical operations such as add, multiply, etc.
- Has a name and can be formatted with properties just like a regular field.
- Enables you to combine values in two text fields into one field, such as LastName and FirstInitial.
- Updates and recalculates each time you run the query.

## Identifying Parts of a Calculated Field

The structure of a calculated field includes a field name and expression elements that tell Access which fields, operators, and punctuation marks to use to create the field. Two examples of calculated fields in an Access query would be Wage: Hours \* Rate and Total: Price \* Quantity.

Each calculated field contains the following elements.

ELEMENTS OF CALCULATED FIELDS	
Element	Description
Calculated field name	■ The unique name you assign to the field, followed by a colon (:) to separate the field name from the expression
Field names from existing tables	■ The field containing the data used in the calculation. Access will add brackets [ ] around field names.
Arithmetic or comparison operators	■ +, -, *, /, ( ), ^, <, =, > to perform mathematical operations or compare values
Concatenation	■ Combining fields and expressions by using the ampersand (&) to join text values from multiple fields For example, FirstName&LastName ■ Required spaces appear within quotation marks (" ") For example, FirstName& " " &LastName



## Identifying Order of Calculations

Time for a little math. What is the answer to  $6 + 6 / 2$ ? Keep your answer in mind as you continue to read. As with Excel, Access calculates mathematical operations in a formula from left to right as it applies the order of calculations rules. The standard order for performing mathematical operations is often abbreviated *PEMDAS* (you may have learned the phrase *Please Excuse My Dear Aunt Sally*, a phrase often taught in middle schools to teach order of operations). The initials represent the order of mathematical operations Excel and Access use, as described in the following table.

ORDER OF MATHEMATICAL CALCULATIONS	
Calculation	Description
Parentheses ( )	Calculations enclosed in parentheses are performed first. In the calculation $(6 + 6) / 2$ , the answer is 6 because what is in parentheses is always performed first. However, in the calculation $6 + 6 / 2$ the answer is 9, because without the parentheses, multiplication and division occur before addition and subtraction.
Exponentials ^	Calculations “raised to the power of,” such as squared or cubed, are performed next. Because superscripts are not on the keyboard, the caret (^) is used to represent exponentials. For example, $5^2$ is 5 squared or $5^3$ and equals 25.
Multiplication * Division /	Multiplication and division are equal in calculation order and are calculated left to right, after calculations on parentheses and exponentials.
Addition + Subtraction -	Addition and subtraction are equal in calculation order and are calculated last, left to right across a formula after calculations on parentheses, exponentials, and multiplication and division.

## Calculating Dates

In addition to performing simple calculations, Access provides alternative ways to use dates in calculated fields. You can use these expressions to calculate age, number of years in business, and so forth.

<b>CALCULATED DATES IN EXPRESSIONS</b>	
<b>Sample Field</b>	<b>Returns</b>
CurrentDate: =Date()	Displays the current date in the <i>mm/dd/yyyy</i> format, where <i>mm</i> is the month, <i>dd</i> is the day, and <i>yyyy</i> is the year. For example: 10/25/2013
CurrentDT: =Now()	Displays the current date and time, for example: 10/25/2013 1:02:41 PM
OrderProcessing: DateDiff("d", [OrderDate], [ShippedDate])	Displays the number of days (d) between the value in the OrderDate field and the ShippedDate field.
(Now()-[DOB])/365	Subtracts the value in the DOB (date of birth) field from the current date and divides the difference by 365 to display the calculated value in years.

## Creating and Formatting a Calculated Field

Each calculated field stored in a query appears in a separate column in the query grid. You can type the calculated field expression directly into the Field row of the column. You can also create a calculated field by using the tools in Query Design View to access the expression builder.

## Setting Calculated Field Properties

When you create tables in Access, you can set field properties, such as field size, format, caption, and default values. With the exception of small whole numbers, calculated fields almost always need to be formatted using field properties to indicate decimal places, commas, and currency formats. To assign field properties to calculated fields, you use the Query Property Sheet.



## DEVELOP YOUR SKILLS AC04-D08

### Create and Format a Calculated Field

1. Right-click the **InvoicesList** query in the Navigation Pane and choose **Design View**.
2. Follow these steps to create a calculated field:

**A** Type **LineTotal: Price \* Qty** in the top of the first blank column and tap **Enter**.

**B** Notice that Access automatically adds brackets [ ] around existing fields.

Field:	InvDate	EmpID	ProdDescription	Price	Qty	LineTotal: [Price]*[Qty]
Table:	Invoices	Invoices	Products	Products	Invoice Details	
Sort:						
Show:	<input checked="" type="checkbox"/>					
Criteria:	"JFW"					
or:						

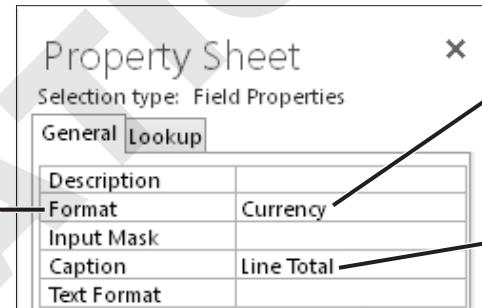
**C** Drag the column border to widen the query grid column so you can view the entire entry.

3. Right-click in the **LineTotal** column and choose **Properties** to open the Property Sheet, if necessary.
4. Follow these steps to format the field:

**A** Select the **Format** property.

**B** Click the drop-down arrow and choose **Currency**.

**C** Type **Line Total** in the **Caption** line.



5. Run the query.

InvNum	Invoice Date	Emp ID	Description	Price	Qty	Line Total
1	3/15/2012	JFW	Secondary Page	\$200.00	6	\$1,200.00
1	3/15/2012	JFW	Image, Custom Designed	\$40.00	11	\$440.00
1	3/15/2012	JFW	Home Page, Nav, CSS, Design	\$400.00	1	\$400.00
2	4/2/2012	MJW	Image, Custom Designed	\$40.00	14	\$560.00
2	4/2/2012	MJW	Home Page, Nav, CSS, Design	\$400.00	1	\$400.00
2	4/2/2012	MJW	Secondary Page	\$200.00	7	\$1,400.00
2	4/2/2012	MJW	Hourly Rate for Modifications	\$80.00	5	\$400.00
3	5/11/2012	JMM	Image, Custom Designed	\$40.00	6	\$240.00
3	5/11/2012	JMM	Secondary Page	\$200.00	2	\$400.00
4	5/30/2012	JMM	Blog, Integrated into Site	\$300.00	1	\$300.00
4	5/30/2012	JMM	Hourly Rate for Modifications	\$80.00	2	\$160.00
4	5/30/2012	JMM	Image, Custom Designed	\$40.00	2	\$80.00
5	6/19/2012	JFW	Image, Custom Designed	\$40.00	9	\$360.00
5	6/19/2012	JFW	Secondary Page	\$200.00	11	\$2,200.00
5	6/19/2012	JFW	Home Page, Nav, CSS, Design	\$400.00	1	\$400.00
6	6/23/2012	MJW	Hourly Rate for Modifications	\$80.00	3	\$240.00
6	6/23/2012	MJW	Blog, Integrated into Site	\$300.00	1	\$300.00
6	6/23/2012	MJW	Home Page, Nav, CSS, Design	\$400.00	1	\$400.00
6	6/23/2012	MJW	Secondary Page	\$200.00	6	\$1,200.00
7	7/11/2012	JMM	Image, Custom Designed	\$40.00	14	\$560.00

6. Save then close the query.

## Using a Function in a Query Expression

If you have worked with Microsoft Excel, you are most likely familiar with the types of functions that provide Excel with its calculating power. In Access, you have many of the same functions for performing specific calculations, such as finding the minimum, maximum, and average values, and counting and summing the entries in a datasheet. These are known as aggregate functions and are built into Access. You can use these functions in queries, forms, and reports to aid in database reporting.

### Adding Functions to the Query Grid

When you want to add aggregate functions to total, average, or find minimum and maximum values you must first display the Total row on the query grid. From the Total row, you choose the function(s) you want to use for the specified field. You use a separate column for each additional function. For example, if you want to find the minimum, maximum, and average of the same field, you would add three new fields to the query grid—one for each function.

**Invoices**

- \* Inv Num
- Invoice Date
- EmpID
- CustID

**Invoice Details**

- \* InvNum
- ProdID
- Qty

**Products**

- \* ProdID
- ProdDescription
- Price

Field:	GrandTotal: [Price]*[Qty]	MinSale: [Price]*[Qty]	MaxSale: [Price]*[Qty]	AvgSale: [Price]*[Qty]
Table:				
Total:	Sum	Min	Max	Avg
Show:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

**Which results in:**

	GrandTotal	MinSale	MaxSale	AvgSale
	\$61,380.00	\$80.00	\$2,600.00	\$529.14

Total row in the query grid. Results are for grand total of invoice sales.

When you first display the Total row in the query grid, Access places the Group By command in the Total row of every occupied column. The Group By function allows you to calculate, among other things, the running total, minimum, maximum, and average for each group. This is handy if you need totals and averages for each employee, customer, or product.

Group By appears in the Total row by default, until replaced by other functions such as Sum or Avg.

Field:	EmpID	GrandTotal: [Price]*[Qty]	MinSale: [Price]*[Qty]	MaxSale: [Price]*[Qty]	AvgSale: [Price]*[Qty]
Table:	Invoices				
Total:	Group By	Sum	Min	Max	Avg
Show:	<input checked="" type="checkbox"/>				
Criteria:	or:				

**Which results in:**

	Emp ID	GrandTotal	MinSale	MaxSale	AvgSale
	JFW	\$17,100.00	\$120.00	\$2,200.00	\$570.00
	JK	\$13,680.00	\$160.00	\$2,600.00	\$651.43
	JMM	\$10,520.00	\$80.00	\$1,200.00	\$420.80
	MJW	\$20,080.00	\$80.00	\$2,400.00	\$502.00

The Group By results are broken down by EmpID.

## Creating Aliases in Query Fields

Aggregate functions are designed to summarize data. As a result, these values are not stored in database tables. Suppose you want to find the lowest price, highest price, and average price of the products in your inventory. Although all three columns are derived from the same Price field, you need a unique name for each calculated column. When the same expression or field is assigned to several different field names, each additional field name is referred to as an alias.

Price is the original field name.

Field:	MinPrice: Price	MaxPrice: Price	AvgPrice: Price
Table:	Products	Products	Products
Total:	Min	Max	Avg
Sort:			

MinPrice, MaxPrice, and AvgPrice are the calculated field name aliases.

## Identifying Function Types

Simple aggregate functions allow you to count the number of entries in a field, locate the maximum or minimum values in a field, total the values of a group of records, and find the average value from a group of values. Access contains numerous additional functions that enable you to calculate the standard deviation and variance of values, and so forth. It is also important to know that Access limits or restricts the use of these functions to specific data field types. Some of the more commonly used aggregate functions are identified here.

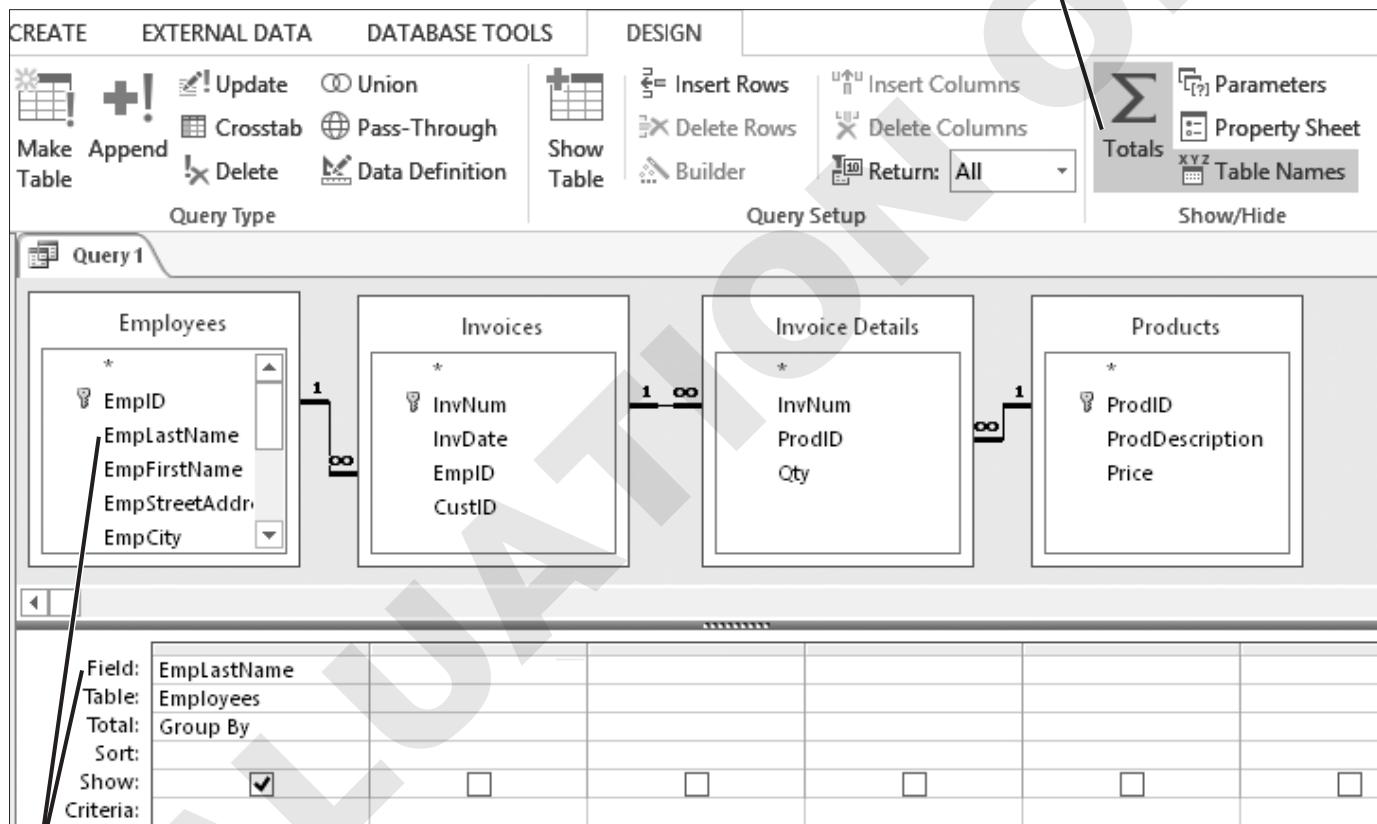
AGGREGATE FUNCTION TYPES		
Function	Description	Valid Field Data Types
Sum	Totals values in a field.	Number, Currency
Avg	Averages values in a field.	Number, Date/Time, Currency
Min	Identifies lowest value in a field.	Text, Number, Date/Time, Currency
Max	Identifies highest value in a field.	Text, Number, Date/Time, Currency
Count	Counts the number of values in a field, not counting blank values.	All types except multi-value lists
StDev	Calculates standard deviation of the values in a field.	Number, Currency
Var	Calculates variance of the values in a field.	Number, Currency
First	Locates the first record in the group on which you are performing calculations in chronological order without sorting.	All data types
Last	Locates the last record in the group on which you are performing calculations in chronological order without sorting.	All data types

## DEVELOP YOUR SKILLS AC04-D09

### Use Functions in Queries

1. Choose **Create**→**Queries**→**Query Design**.
2. Double-click the **Employees**, **Invoices**, **Invoice Details**, and **Products** tables in the Show Table dialog box.
3. Close the **Show Table** dialog box.
4. Follow these steps to add the Group By field to the query:

**A** Choose **Design**→**Show/Hide**→**Totals** to display the Totals row.



- B** Double-click **EmpLastName** in the **Employees** table to add it to the grid.

5. Follow these steps to add functions to the query:

- A Type **MinTotal:Price\*Qty** for the second column field name and expression.

- B Click in the **Total** row, click the drop-down arrow, and choose **Min**.

Field:	EmpLastName	MinTotal: [Price]*[Qty]	MaxTotal: [Price]*[Qty]	AvgTotal: [Price]*[Qty]
Table:	Employees			
Total:	Group By	Min	Max	Group By
Show:		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Criteria:	or:			Group By Sum Avg Min Max Count

- C Type **MaxTotal:Price\*Qty** for the next field name and expression, and choose **Max**.

- D Type **AvgTotal:Price\*Qty** for the next field name and expression, and choose **Avg**.

6. Choose **Design→Results→Run**. Adjust the datasheet column widths to display all data and field names.

Last Name	MinTotal	MaxTotal	AvgTotal
Kramer	\$160.00	\$2,600.00	\$651.43
Mansfield	\$80.00	\$1,200.00	\$420.80
Waters	\$80.00	\$2,400.00	\$502.00
Winchester	\$120.00	\$2,200.00	\$570.00

7. Save the query as **InvoiceFunctions** and close it.

## Creating Special Types of Queries

The queries you have created so far are select queries where Access selects records according to the fields you add to the query grid and the criteria you set. Access also contains tools for creating special types of queries. In this lesson, you will explore three of these special queries:

- Crosstab query
- Find Unmatched query
- Find Duplicates query

### Creating a Crosstab Query

Crosstab queries allow you to easily analyze data. A crosstab query lists the fields to be grouped on the left side of the datasheet. It arranges the fields to be summarized across the top so you can calculate sums, averages, counts, or totals by group and subgroup. For example, if you have a database that contains sales records for your employees, the description of each product they sell, and their total sales for each product, you could create a crosstab query to display the total

sales by product for each employee. Such a grouping and summarization might appear as shown in the following illustrations.

<b>Original Data</b>		
<b>Employee</b>	<b>Product Description</b>	<b>Line Total</b>
JFW	Secondary Page	\$1,200.00
JFW	Image, Custom Designed	\$440.00
JFW	Home Page, Nav, CSS, Design	\$400.00
MJW	Image, Custom Designed	\$560.00
MJW	Home Page, Nav, CSS, Design	\$400.00
MJW	Secondary Page	\$1,400.00
MJW	Hourly Rate for Modifications	\$400.00
JMM	Image, Custom Designed	\$240.00
JMM	Secondary Page	\$400.00
JMM	Blog, Integrated into Site	\$300.00
JMM	Hourly Rate for Modifications	\$160.00
JMM	Image, Custom Designed	\$80.00
JFW	Image, Custom Designed	\$360.00
JFW	Secondary Page	\$2,200.00
JFW	Home Page, Nav, CSS, Design	\$400.00
MJW	Hourly Rate for Modifications	\$240.00
MJW	Blog, Integrated into Site	\$300.00

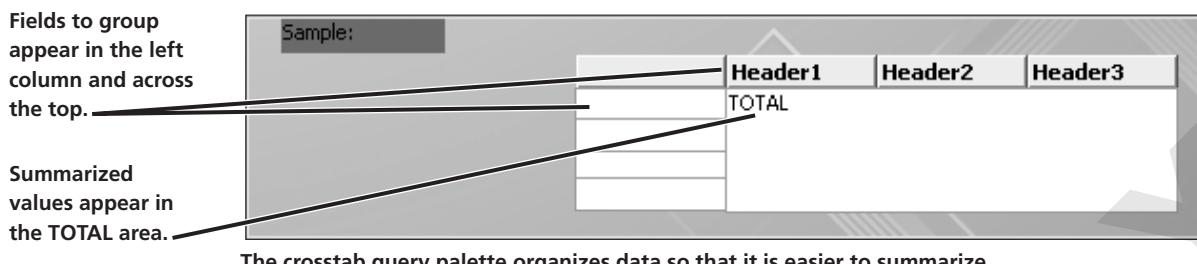
Original data format is arranged by record.

<b>Reorganized by Crosstab Query</b>							
<b>Emp Name</b>	<b>Tot Sales</b>	<b>Home Pg</b>	<b>2nd Page</b>	<b>Blogs</b>	<b>Carts</b>	<b>Images</b>	<b>Hourly</b>
Kramer	\$13,680.00	\$800.00	\$7,600.00	\$600.00		\$2,520.00	\$2,160.00
Mansfield	\$10,520.00	\$400.00	\$4,800.00	\$600.00	\$1,200.00	\$1,680.00	\$1,840.00
Waters	\$20,080.00	\$1,600.00	\$10,000.00	\$1,200.00	\$1,200.00	\$2,080.00	\$4,000.00
Winchester	\$17,100.00	\$2,000.00	\$8,800.00	\$300.00	\$800.00	\$3,040.00	\$2,160.00

Using a crosstab query, you can display the data grouped by employee and product.

### **Using the Crosstab Query Wizard**

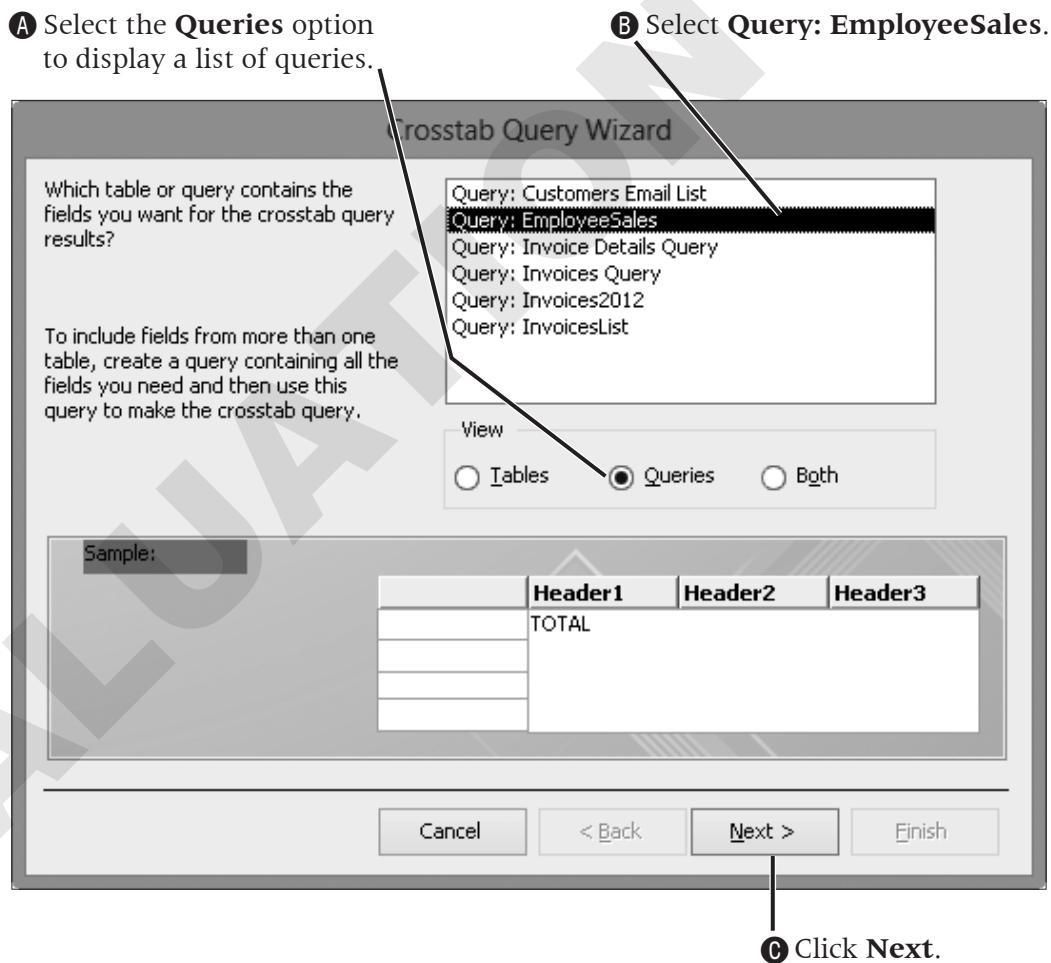
As you work with crosstab queries, you will discover a vast difference between the query grid you have used to create select queries and the crosstab query palette. You can, of course, use the palette to manually construct a crosstab query. Until you become better acquainted with the queries, using the Crosstab Query Wizard is more helpful. Crosstab queries can use both tables and queries as the basis of the query.



## DEVELOP YOUR SKILLS AC04-D10

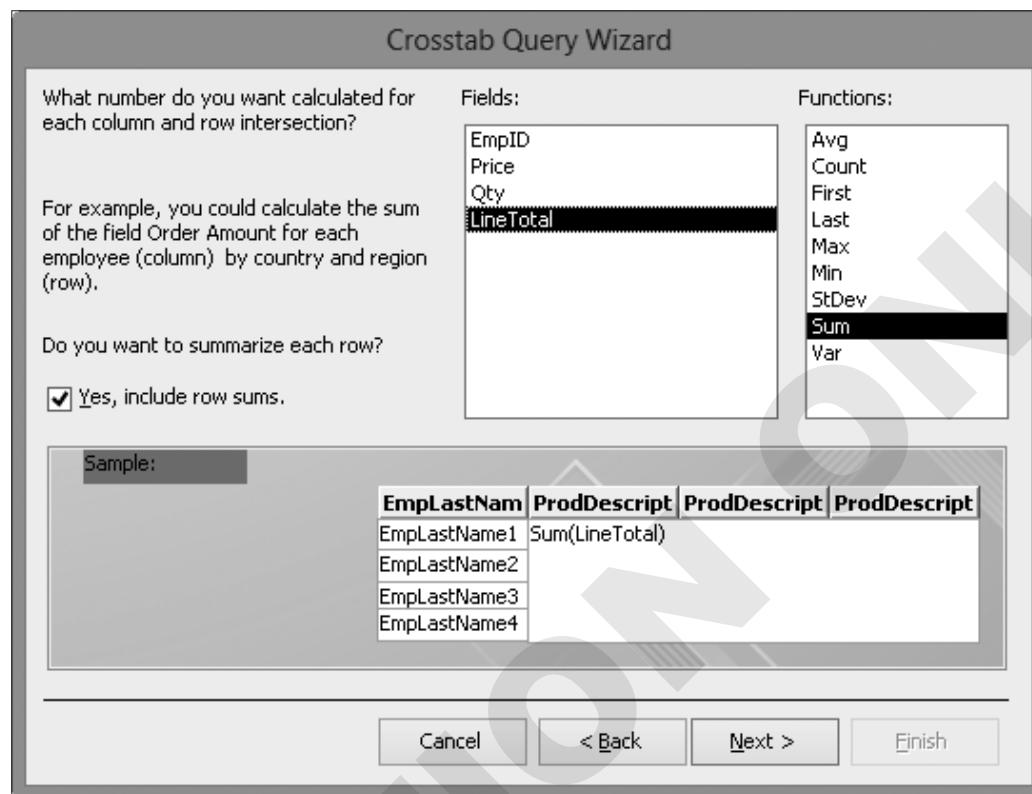
### Create a Crosstab Query

1. Choose **Create**→**Queries**→**Query Wizard** to open the New Query dialog box.
2. Double-click the **Crosstab Query Wizard** to launch the Crosstab Query Wizard.
3. Follow these steps to select the query to use for the crosstab query:



4. Double-click **EmpLastName** in the Available Fields list to move it to the **Selected Fields** list.
5. Click **Next**, and then double-click **ProdDescription** as the field to appear in the column headings, and advance to the next wizard screen.

6. Select **LineTotal** in the Fields list and **Sum** in the Functions list to identify the field that contains values and the function you want to calculate.



7. Click **Next** to display the final page of the Crosstab Query Wizard.

8. Name the query **EmployeeCrosstab** and click **Finish**.

Last Name	Total Of LineTotal	Blog, Integrated	Home Page	Hourly Rate	Image, Custom	Secondary Page	Shopping Cart
Kramer	\$13,680.00	\$600.00	\$800.00	\$2,160.00	\$2,520.00	\$7,600.00	
Mansfield	\$10,520.00	\$600.00	\$400.00	\$1,840.00	\$1,680.00	\$4,800.00	\$1,200.00
Waters	\$20,120.00	\$1,200.00	\$1,600.00	\$4,000.00	\$2,120.00	\$10,000.00	\$1,200.00
Winchester	\$16,940.00	\$300.00	\$2,000.00	\$2,160.00	\$2,880.00	\$8,800.00	\$800.00

9. Save and close the query.

## Creating Unmatched and Duplicates Queries

Data contained in database tables often shares key fields so that you can include data from multiple tables in queries. As a result, it is important that records entered in one table have a matching record in the related table. For instance, you cannot have an invoice without a matching record in the products table.

Access contains two additional query wizards that enable you to create specialized queries for comparing such data—the Find Unmatched Query Wizard and the Find Duplicates Query Wizard.

- **Find Unmatched Query:** Locates records in one table that have no related records in another table. For example, you could create an Unmatched Query to ensure that each record in an Invoice table has a corresponding record in the Customers table or in the Products table.
- **Find Duplicates Query:** Locates records containing duplicate field values in a single table or query. For example, you could create a Duplicates Query to locate any records in the Customers table that were unintentionally entered twice, or to find customers from the same city.

### ***Creating Queries to Find Unmatched and Duplicate Records***

Creating and running the Find Unmatched Query Wizard and the Find Duplicates Query Wizard help maintain the integrity of the database.

#### **DEVELOP YOUR SKILLS AC04-D11**

### **Find Unmatched and Duplicate Records**

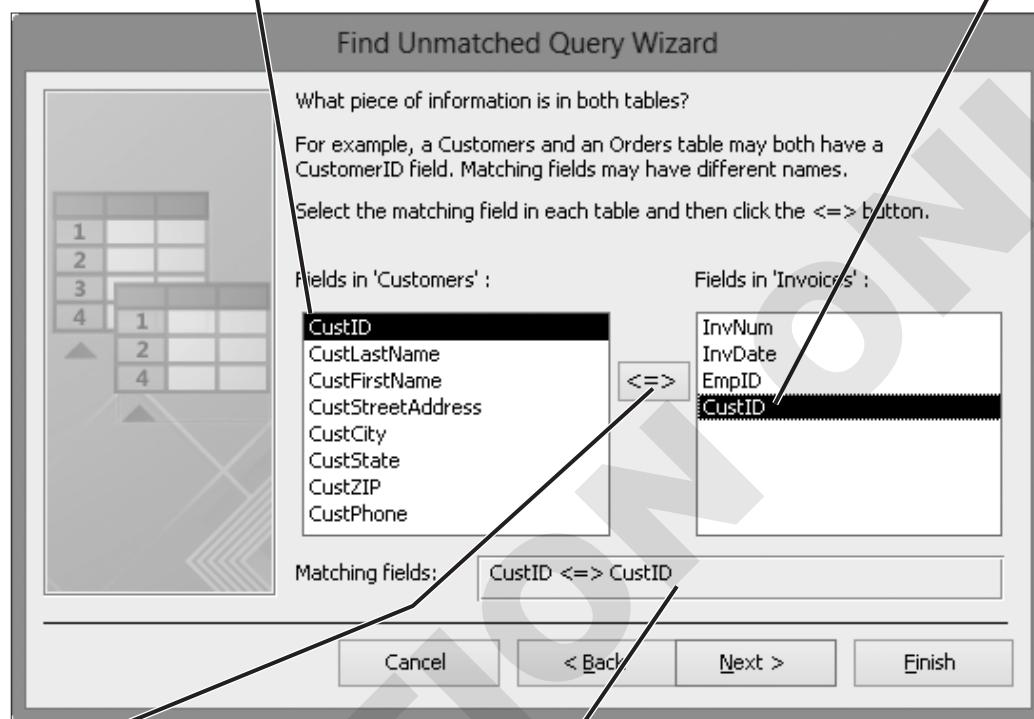
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1. Choose **Create**→**Queries**→**Query Wizard**  and double-click **Find Unmatched Query Wizard**.
2. Double-click **Table: Customers** to identify the table and automatically advance to the next screen.
3. Double-click **Table: Invoices** to identify the table to compare to the **Customers** table entries and automatically advance to the next screen.

4. Follow these steps to identify the fields that should match:

A Ensure that the **CustID** field is selected in the Fields in 'Customers' list.

B Ensure that the matching **CustID** is the selected field in the Fields in 'Invoices' list.



C Click the **equate** button to indicate that these fields should match.

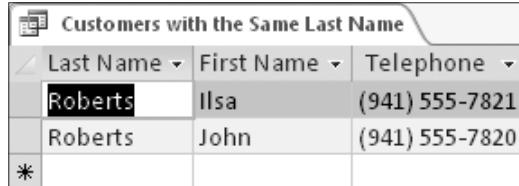
D Note that the fields selected appear in the Matching Fields box and click **Next**.

5. Click **Move** to add the following fields to the Selected Fields list: **CustLastName**, **CustFirstName**, **CustPhone**, and **CustEmail**.
6. Click **Next**, and then click **Finish** to accept the default query name Access assigns.

Customers Without Matching Invoices			
Last Name	First Name	Telephone	Email
Abrams	John	(941) 555-9902	JPAbrams@email.com
Fleetwood	Candace	(941) 555-9256	CandyWin@email.com
Winkler	Samuel	(941) 555-2054	SamWinkler45@email.com

7. Close the query.
8. Choose **Create**→**Queries**→**Query Wizard** and double-click **Find Duplicates Query Wizard**.
9. Double-click **Table: Customers** as the table you want to check for duplicates and to automatically advance to the next screen.
10. Select the **CustLastName** field, click **Move** to move the field to the Duplicate-Value Fields box, and click **Next**.

11. Click **CustFirstName** and click **Move**  to move it to the Additional Query Fields box.
12. Click **CustPhone** and click **Move**  to move it to the Additional Query Fields box, and click **Next**.
13. Name the query **Customers with the Same Last Name** and click **Finish**.



Last Name	First Name	Telephone
Roberts	Ilsa	(941) 555-7821
Roberts	John	(941) 555-7820
*		

14. Save then close the query, close the database, and exit **Access**.

## Concepts Review

To check your knowledge of the key concepts introduced in this lesson, complete the Concepts Review quiz on the student resource center.