This handout lists the steps for building an Access Database for a small kiosk business in a mall. The name of the business is Wooden Crafts. Wooden Crafts sell wooden toys. Wooden Crafts has asked you to design a database that stores product data and supplier data that will produce reports such as product list, supplier list and inventory value.

The overriding steps to build Wooden Crafts database are here:

Video #39

1. Create New Database.
2. Import SupplierData Table into Database from an Excel workbook.
3. Add Data Types and Field Properties to each Field in the SupplierData Table
4. In Access create a Product Table and add Data Types and Field Properties
5. Use Data Type Lookup Wizard to connect the Products table to the SupplierData table with a One-To-Many Relationship between the two Supplier Code Fields. We will also use Lookup Wizard to create a Whole Sale Retail Field.
6. Use Relationship Window to add "Referential Integrity" to One-To-Many Relationship between the two Suppliers Code fields
7. Create a Form for the Products Table
8. Add data to Products table using the Products Form
9. Create Queries with various Logical Constructions and Formulas (Expressions) – **Video #40**
10. Create Reports based on Queries – **Video #41**
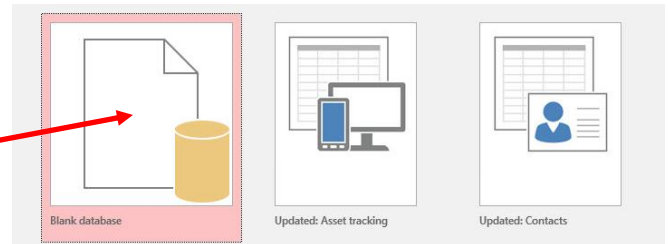11. Export Queries from Access to Excel, Text File and pdf – **Video #42**

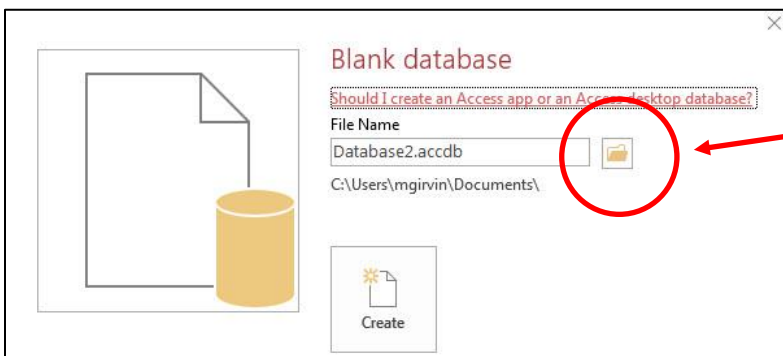The specific steps to build Wooden Crafts database are here:

1. Create New Database.

    i.   After opening Access, click "Blank Desktop Database":
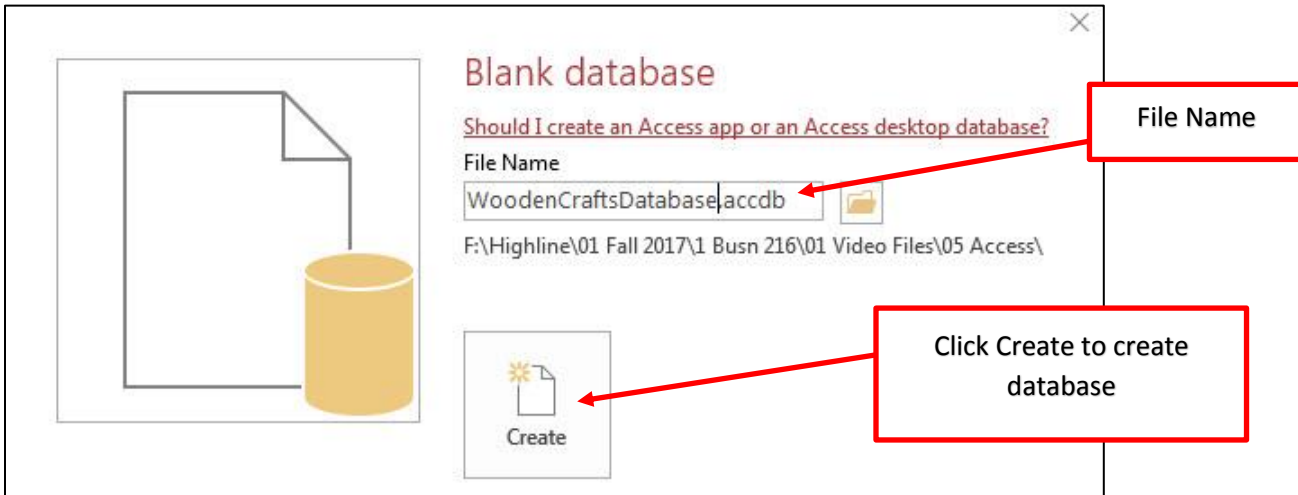
Click Blank database to create a new database.

   ii.   In the next window, click on the Browse button to save the database to the correct folder for Access:

Click the Browse button to choose where the database is saved

iii. In the File Name textbox, type the name of the database: "WoodenCraftsDatabase". Then click the Create button to create the new database file.
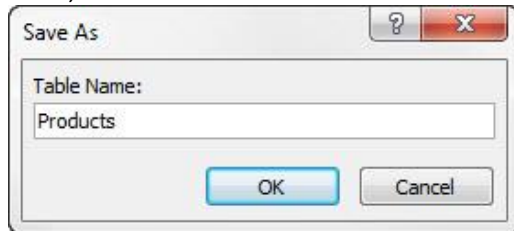

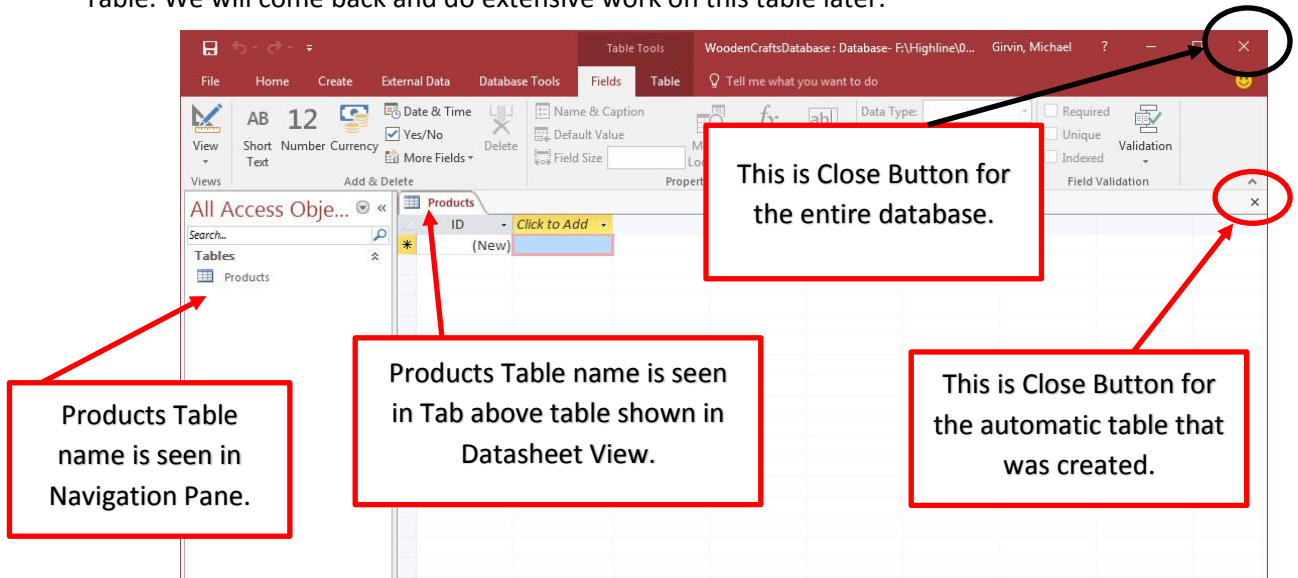## 2. Import SupplierData Table into Database from an Excel workbook.

i. Here is a view of the new database and the automatic table that was created:
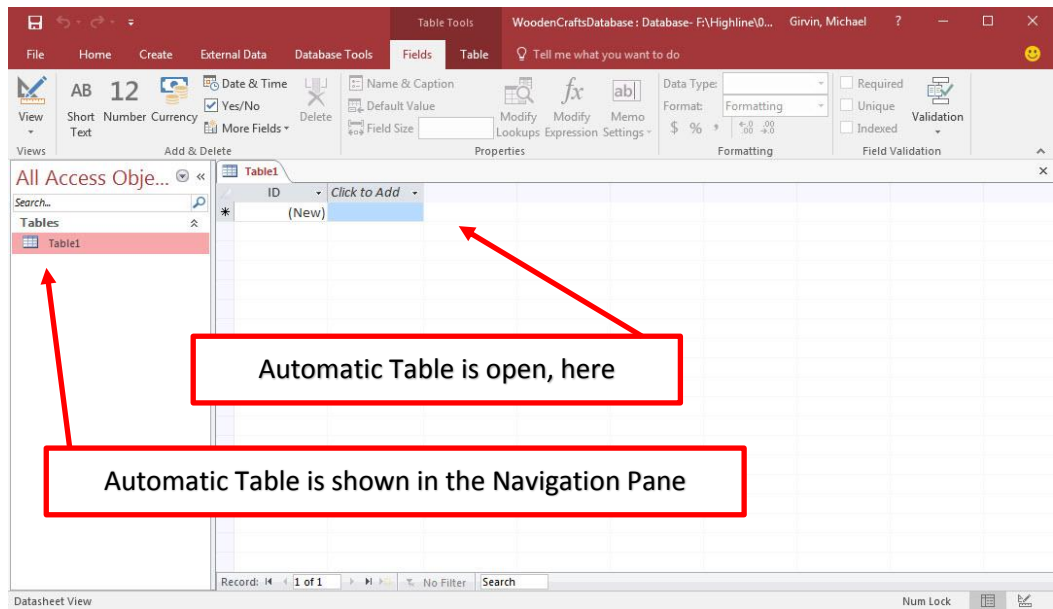

ii. Using Ctrl + S, name the table "Products".

i. Here is a view of the new database and the new Products Table. Use the Close Button for the Products Table. We will come back and do extensive work on this table later.

Products Table name is seen in Navigation Pane.

Products Table name is seen in Tab above table shown in Datasheet View.

This is Close Button for the entire database.

This is Close Button for the automatic table that was created.

ii. Now we need to import the Supplier Table from the Excel File named "V39-SupplierDataFromExcel.xlsx" (you download file from our web page).

iii. If you are using Access 2016 from Office 365, your Ribbon Tab looks like this:

1. On the External Data Tab, click the New Data Source dropdown, then click on Excel.
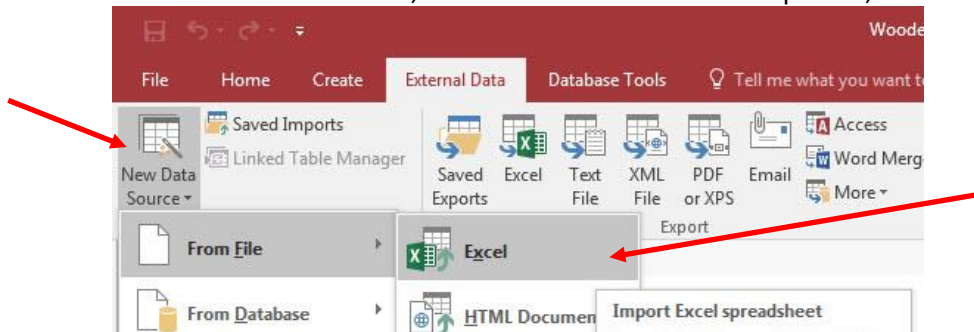

iv. If you are using Access 2016 and you do NOT have Office 365, your Ribbon Tab looks like this:

1. On the External Data Tab, in the Import & Link group click the Excel button:
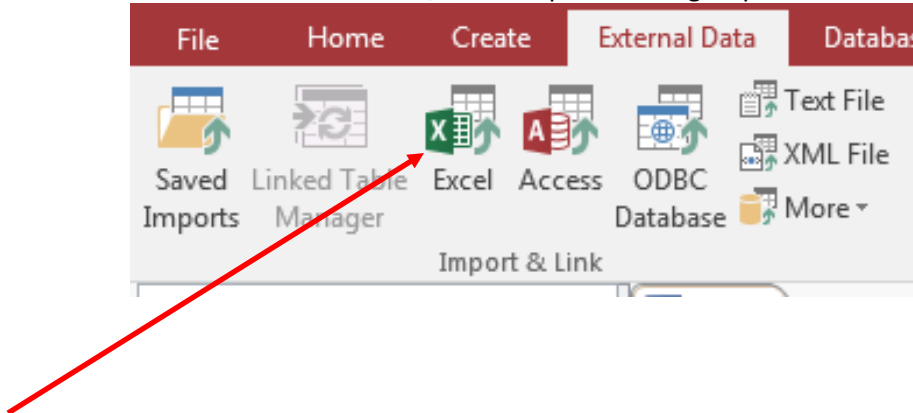
v. "In the Get External Data – Excel Spreadsheet" dialog box:
1. Use the Browse button to navigate to the Excel file named "V39-SupplierDataFromExcel.xlsx".
2. Make sure that the "Import the source data into a new table in the current database" dialog button is selected.
3. Click OK.

Make sure that the "Import the source data into a new table in the current database" dialog button is selected
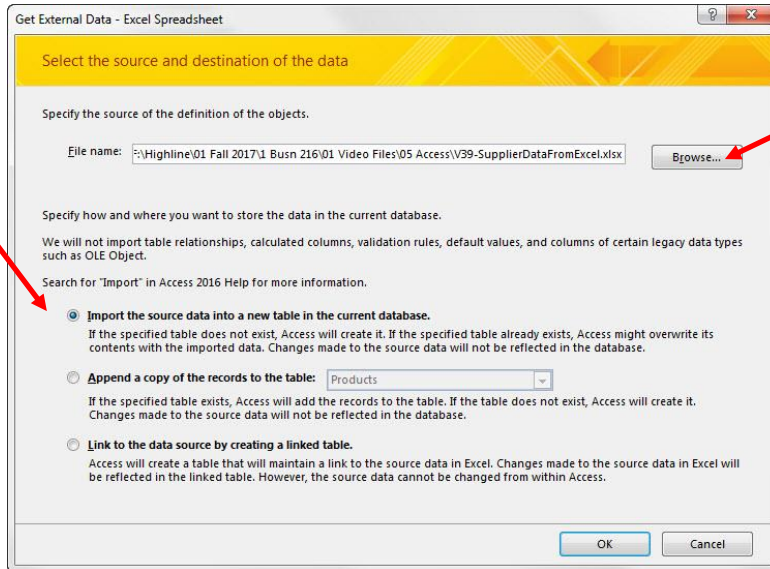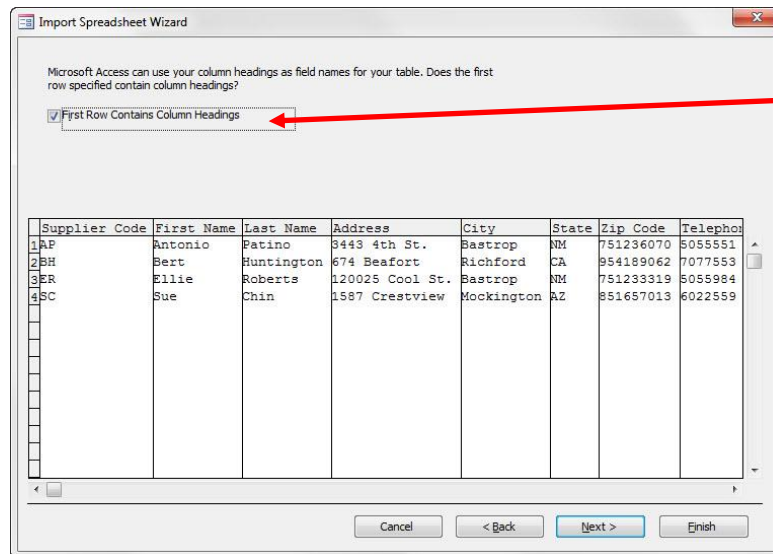
Use the Browse button to navigate to the Excel file named "V39-SupplierDataFromExcel.xlsx"

4.
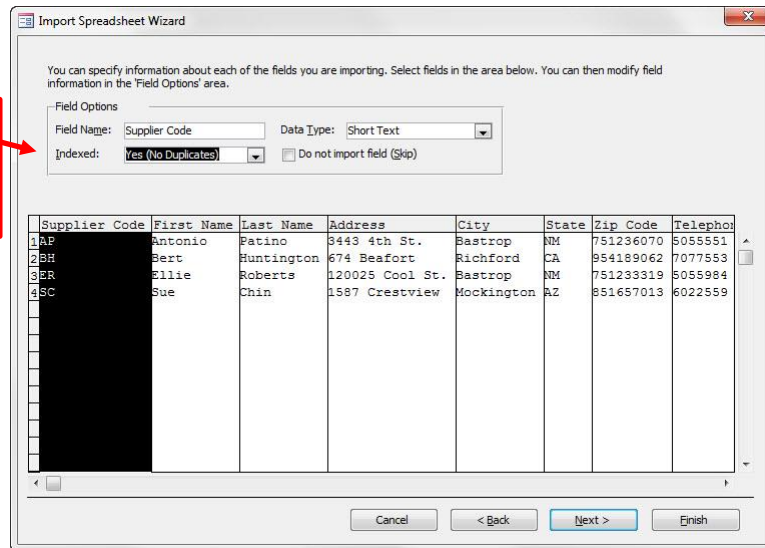vi. In the next window you can accept the default settings:
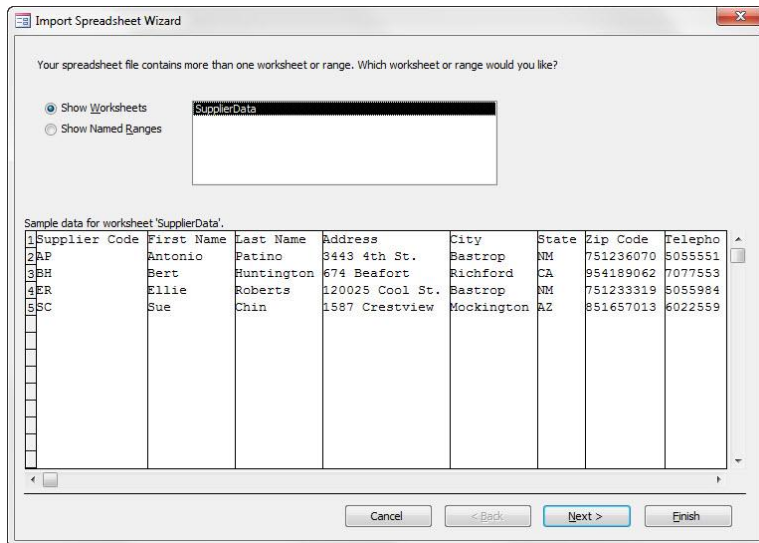
vii. In the next window, check the check box for "First Row Contains Column Headers":

Check the check box for "First Row Contains Column Headers"

viii. In the next window, for the Supplier Code Field Name, select "Yes (No Duplicates)" in the Indexed textbox dropdown:
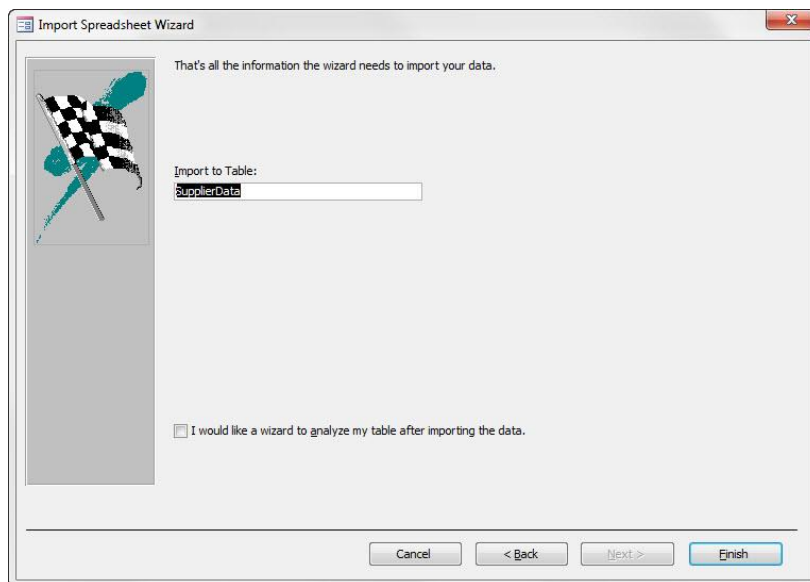

Select
"Yes (No Duplicates)"

ix. In the next window, select "Choose my own primary key" for the Supplier Code Field.

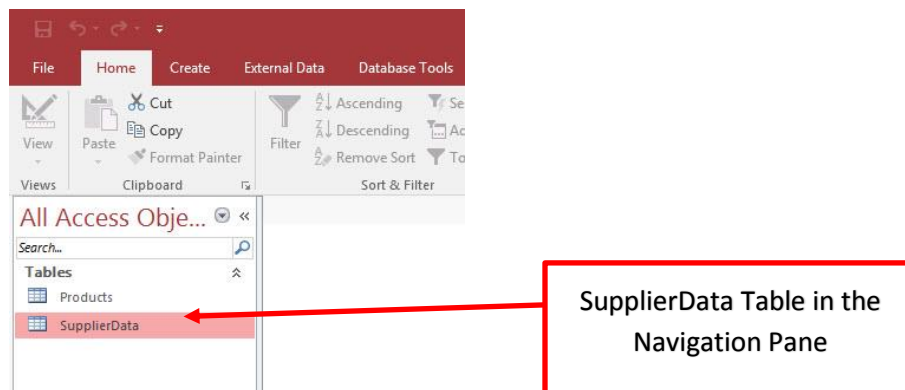Select "Choose my own primary key" for the Supplier Code Field
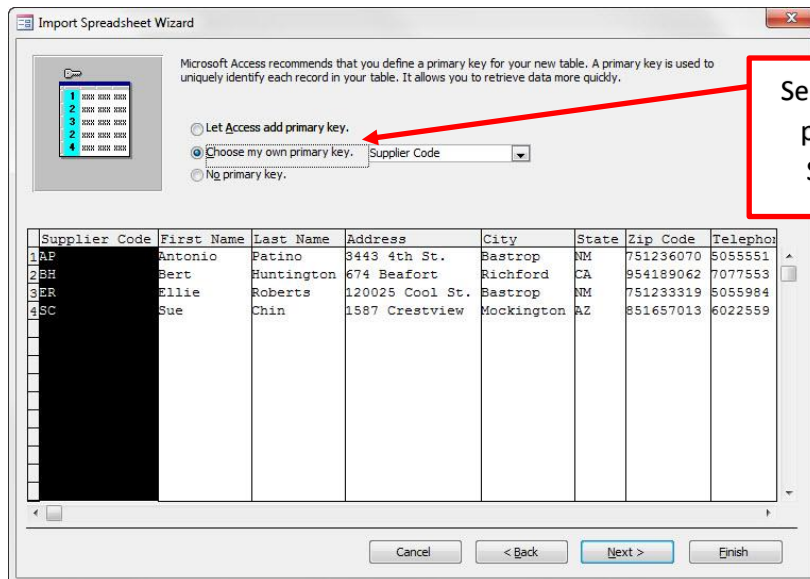
x. In the next window, we can accept the table name "SupplierData". Click Finish.

xi. In the last window click the Close button (window not shown)
xii. Now we can see the imported SupplierData Table in the Navigation Pane.

SupplierData Table in the Navigation Pane

3. Add Data Types and Field Properties to each Field in the SupplierData Table

  i. As we talked about last video Data Types and Field Properties allow us to add Data Validation to our Fields so that "Bad Data" doesn't get into our Field.

  ii. Following are two tables that list the different Data Types and the different Codes for Input Masks:

    1. Different Data Types:

Data Type	Usage	Size
Short Text	Alphanumeric data (names, titles, etc.)	Up to 255 characters.
Long Text	Large amounts of alphanumeric data: sentences and paragraphs.	Up to about 1 gigabyte (GB), display first 64,000 characters.
Number	Numeric data.	1, 2, 4, 8, or 16 bytes.
Large Number	Numeric data.	-2^{63} to 2^{63}
Date/Time	Dates and times.	8 bytes.
Currency	Monetary data, stored with 4 decimal places of precision.	8 bytes.
AutoNumber	Unique value generated by Access for each new record.	4 bytes
Yes/No	Boolean (true/false) data; Access stores the numeric value zero (0) for false, and -1 for true.	1 byte.
OLE Object	Pictures, graphs, or other ActiveX objects from another Windows-based application.	Up to about 2 GB.
Hyperlink	A link address	Up to 8,192 characters
Attachment	You can attach files such as pictures, documents, spreadsheets...	Up to about 2 GB.
Calculated	You can create an expression (formula)	Dependent on the data type
Lookup Wizard	The Lookup Wizard can lookup a value from another column in a different table (Primary Key)	Dependent on the data type of the lookup field.

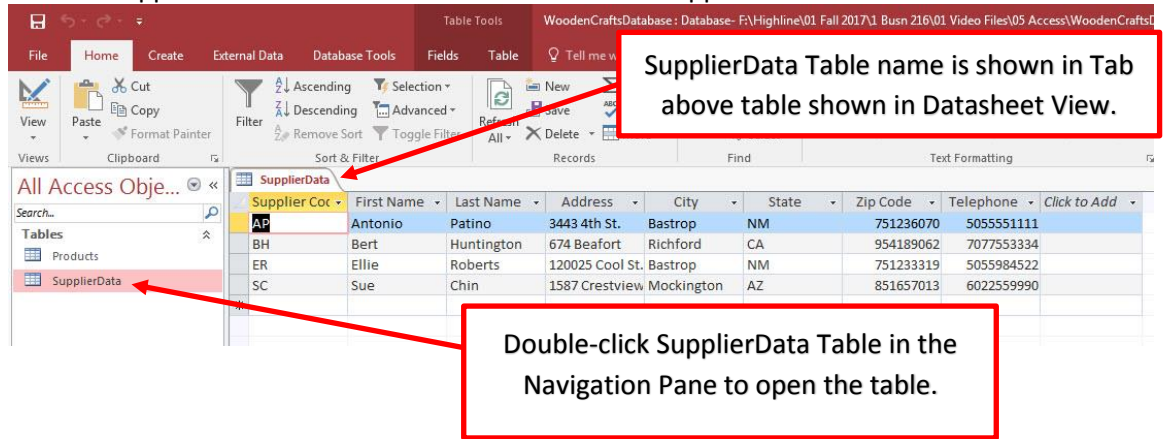2. Code for Input Mask (like Number Formatting in Excel) for Field Properties:

Character	Description
0	Digit (0 to 9, entry required, plus [+] and minus [?] signs not allowed).
9	Digit or space (entry not required, plus and minus signs not allowed).
#	Digit or space (entry not required; spaces are displayed as blanks while in Edit mode, but blanks are removed when data is saved; plus and minus signs allowed).
L	Letter (A to Z, entry required).
?	Letter (A to Z, entry optional).
A	Letter or digit (entry required).
a	Letter or digit (entry optional).
&;	Any character or a space (entry required).
C	Any character or a space (entry optional).
. , : ; - /	Decimal placeholder and thousand, date, and time separators. (The actual character used depends on the settings in the Regional Settings Properties dialog box in Windows Control Panel).
<	Causes all characters to be converted to lowercase.
>	Causes all characters to be converted to uppercase.
!	Causes the input mask to display from right to left, rather than from left to right. Characters typed into the mask always fill it from left to right. You can include the exclamation point anywhere in the input mask.

** |Causes the character that follows to be displayed as the literal character (for example, \A is displayed as just A).

3. Number Field Size Properties:

Field Size	Description		
Byte	Interger:	0 to	255
Integer	Interger:	-32,768 to	32,767
Long Integer	Interger:	-2,147,483,648 to	2,147,483,647
Single	decimals with 7 significant digits:	Requires 4 bytes of storage	
Double	decimals with > 'Single' significant digits:	Requires 8 bytes of storage	
Decimal	decimals with > 'Double' significant digits:	Requires 12 bytes of storage	
Replication ID	Globally unique identifier (GUID)	16 bytes of storage	

iii. First, we want to open our Supplier Table in "Regular View" or Datasheet View. In the Navigation Pane, double-click the Supplier Data Table. We can see we have four suppliers.

SupplierData Table name is shown in Tab above table shown in Datasheet View.

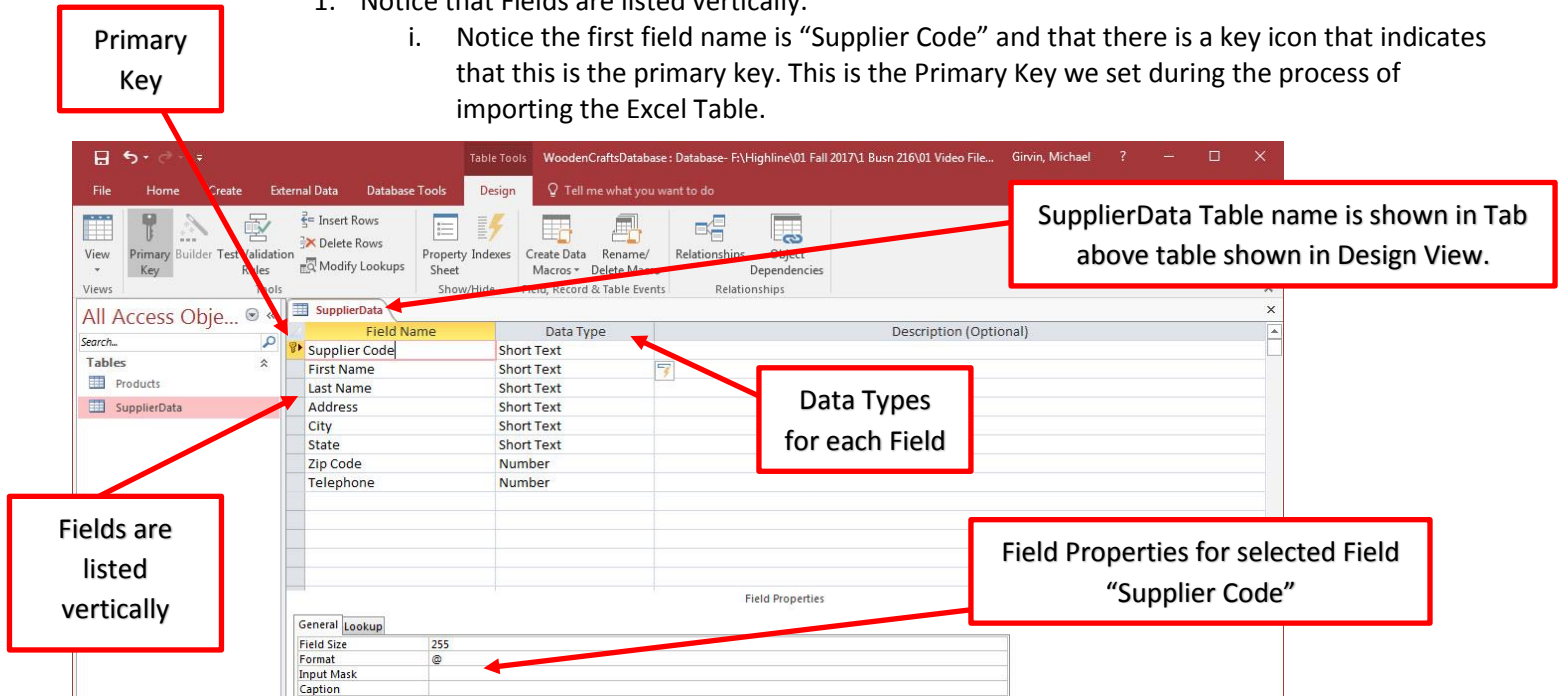Double-click SupplierData Table in the Navigation Pane to open the table.

iv. Now we want to view the table in Design View so that we can add the correct Data Types and Field Properties to each Field. To show the table in Design View click the View Button in the View group in the Home Ribbon Tab.

Click the View button to get to Design View.
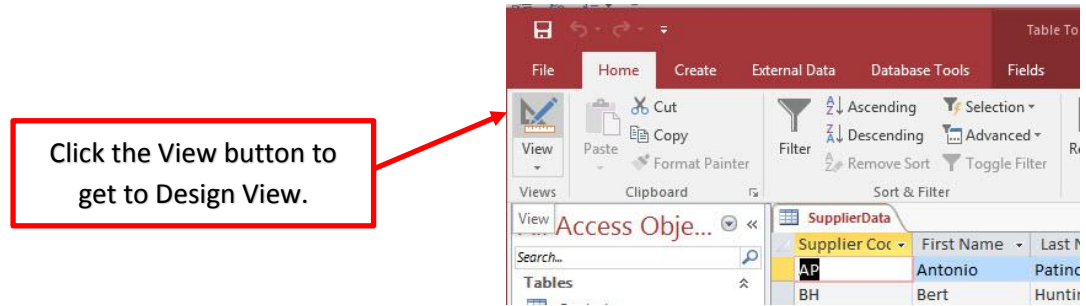
v. Design View for the SupplierData Table is seen below.
1. Notice that Fields are listed vertically.
   i. Notice the first field name is "Supplier Code" and that there is a key icon that indicates that this is the primary key. This is the Primary Key we set during the process of importing the Excel Table.

Primary Key

SupplierData Table name is shown in Tab above table shown in Design View.

Data Types for each Field

Fields are listed vertically

Field Properties for selected Field "Supplier Code"

vi. For the Supplier Code Field our Data Type, Description and Field Properties are:
   1. Data Type = Short Text
   2. Description = "Primary Key - this will be the Foreign Key in the Products Table."
   3. Field Properties are:
      i. Field Size = 2
      ii. Input Mask = >LL (this means letters are always capital and two letters must be entered)

vii. The remaining Data Types, Descriptions and Field Properties are seen in the following pictures, one for each Field:

viii. First Name:

ix. Last Name:

x. Address:

xi. City:

xii. State (State is a two capital letter abbreviation so we use input mask >LL):

xiii. Zip Code (not a Number Data Type because we will never do math operations on this field):

xiv. Telephone (not a Number Data Type because we will never do math operations on this field):

xv. The finished list of Fields, Data Types and Field Properties is seen below. Using Ctrl + S, Save the changes you made to the SupplierData Table Object. Then Close the window.

    i. We already have an automatic table that was created when we created the database, and we named it Products. Now we need to open it in Design View and add Field, Data Types and Field Properties. To open it in Design View, right-click the Products table in the Navigation Pane and point to Design View, like in this picture:
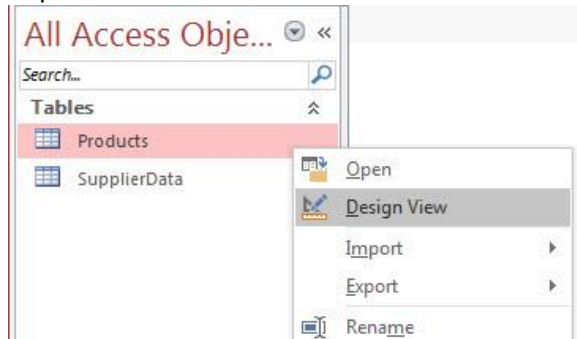
    ii. Below is the Products Table shown in Design View. An automatic Primary Key was added with an AutoNumber Data Type. We do not want this field in our table.
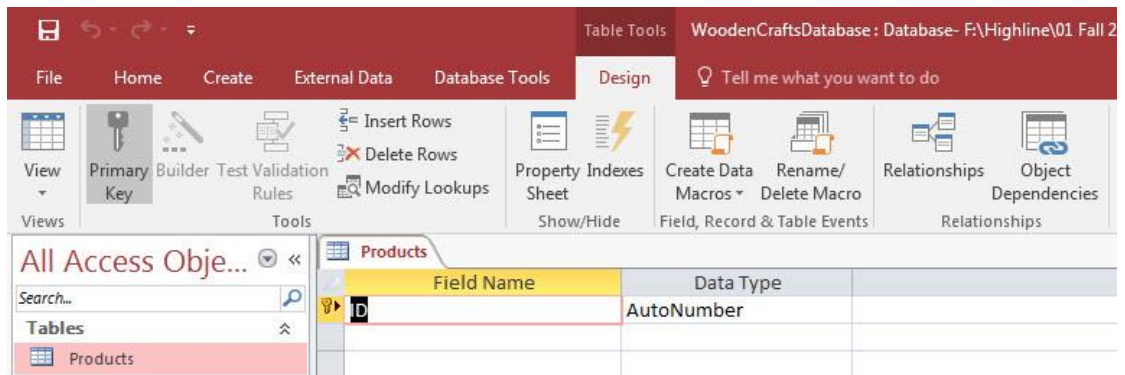
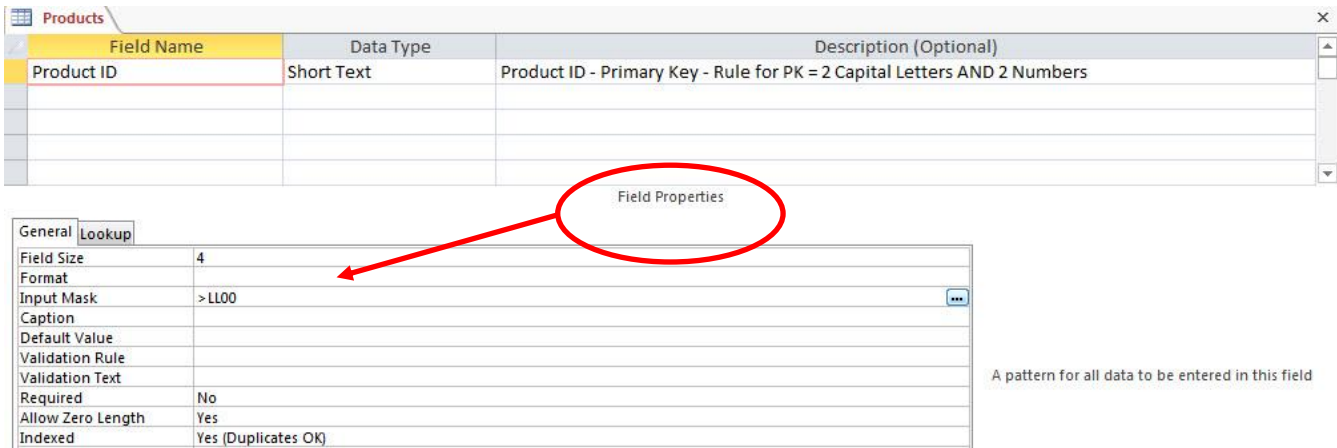   iii. To delete the field, right-click the Field Name and click on Delete Rows.

        1.
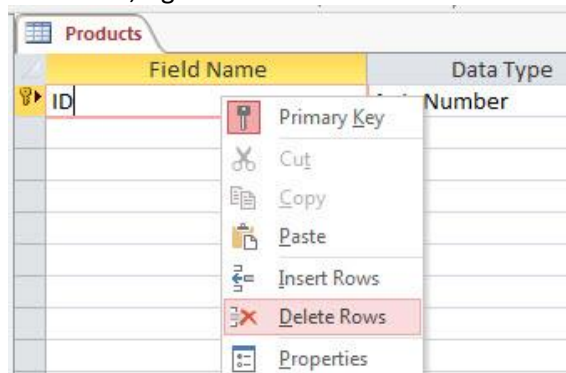
    iv. When the dialog box pops up, click Yes, like in this picture:

   1.

v. We now need to create our own Primary Key (Unique Identifier for each Product). For the first field in the Products Table, our Data Type, Description and Field Properties are:

1. Field Name = Product ID
2. Data Type = Short Text
3. Description = "Product ID - Primary Key - Rule for PK = 2 Capital Letters AND 2 Numbers"
4. Field Properties are:
   i. Field Size = 4
   ii. Input Mask ➔ >LL00 (this means two letters and two numbers must be entered and letters will be capitalized)

vi. To convert the field to a Primary Key, you can right-click the Field Name and click on the Key Icon:
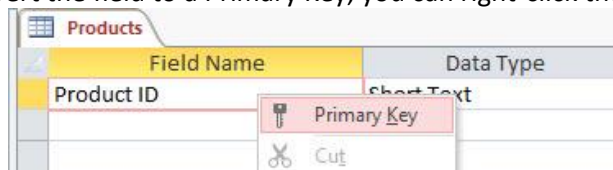
vii. Here is the Completed Primary Key:
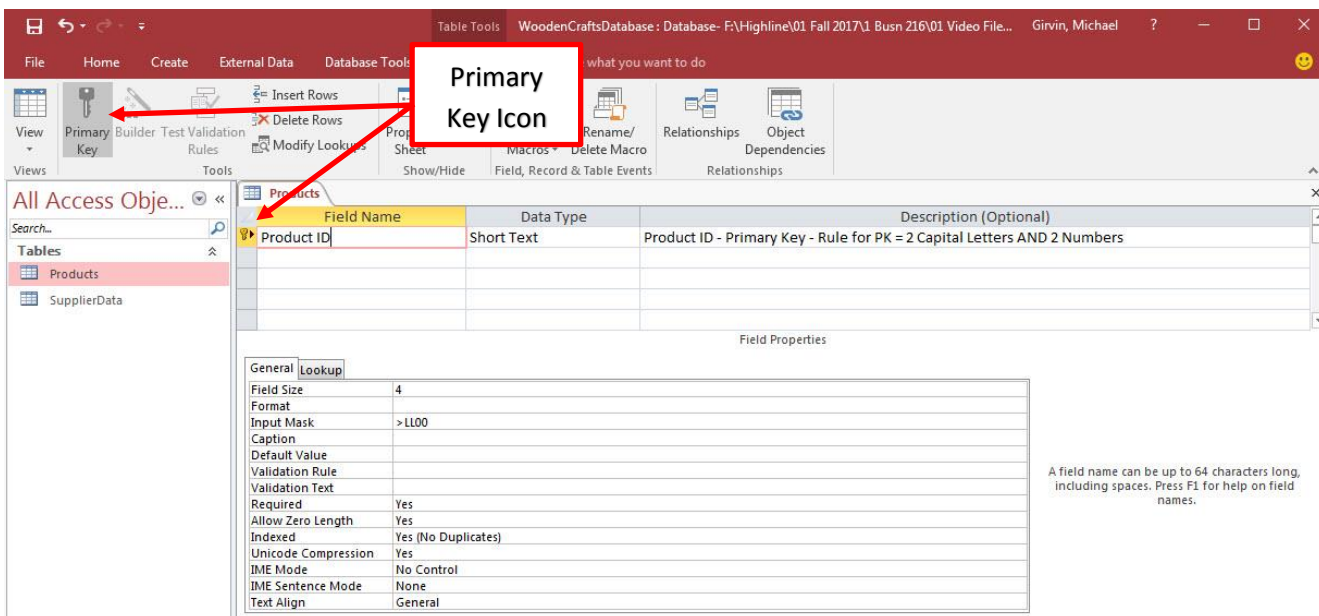
viii. The remaining Data Types, Descriptions and Field Properties are seen on the next page. The Raw Data for the Products Table is also seen on the next page.

ix. You can use the below table to complete the Field Names, Data Types and Field Properties for the Products Table, **however**, for the last two fields, Supplier Code and Wholesale Retail, you want to see instructions on the next few pages.

## Create Table that stores the Raw Data. Table Name = Products

Field Name:	Product ID	Description	On Hand	Cost	Sell Price	Supplier Code	Wholesale Retail
Raw Data	BF01	Barnyard Friends	3	$27.00	$50.00	SC	Retail
	BL23	Blocks In Box	5	$14.50	$27.00	AP	Retail
	CC14	Coal Car	8	$4.50	$8.50	BH	Retail
	FT05	Fire Truck	7	$4.50	$9.00	AP	Retail
	LB34	Lacing Bear	4	$6.00	$11.00	AP	Retail
	MR06	Midget Railroad	3	$15.50	$29.00	BH	Retail
	PJ12	Pets Jigsaw	10	$4.00	$8.00	SC	Retail
	RB02	Railway Bridge	1	$8.50	$16.00	BH	Retail
	SK10	Skyscraper	6	$12.50	$23.00	SC	Retail
	UM09	USA Map	12	$7.00	$13.00	AP	Retail

Field Names, Data Types & Field Properties For Above Fields (Structure Of The Table)

| Field Name:	Product ID	Description	On Hand	Cost	Sell Price	Supplier Code	Wholesale Retail
Data Type:	Short Text	Short Text	Number	Currency	Currency	Lookup Wizard	Lookup Wizard
Description:	Product ID - Primary Key - Rule for PK = 2 Capital Letters AND 2 Numbers	Description Of Product	Number of Units on Hand - Available to sell	Cost Of Product	Selling Price Of Product	Lookup to SupplierData Table to get Primary Key Supplier Code (It is a Foreign Key in this Table)	Wholesale or Retail Lookup (not to another table - just to a list we typed in)
Field Size:	4	25				2	25
Format:							
Input Mask:	>LL00						
Validation Rule:				>=0 and <=500			
Validation Text:				Enter Amount Between $0 and $500			

5. Use Data Type Lookup Wizard to connect the Products table to the SupplierData table with a One-To-Many Relationship between the two Supplier Code Fields. We will also use Lookup Wizard to create a Whole Sale Retail Field.

  x. Here are the instructions for creating the Supplier Code and Wholesale Retail fields:

  xi. Supplier Code Field:

    1. Type Field Name "Supplier Code"

    2. Select the Data Type "Lookup Wizard":
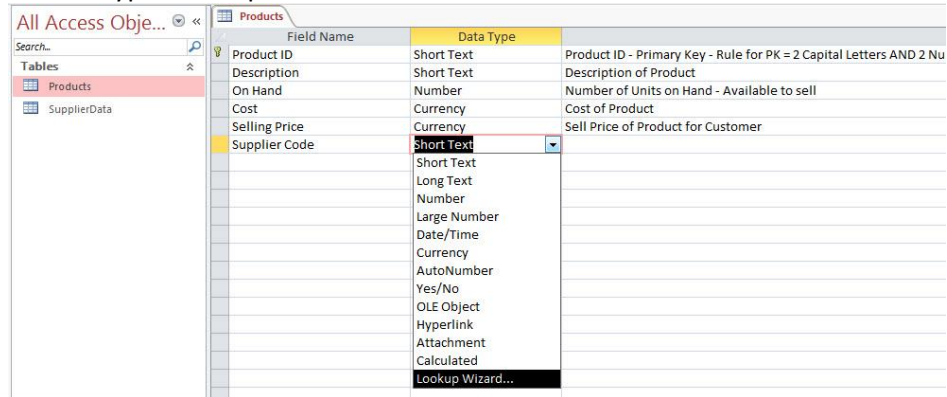
    3. In the first dialog box, select "I want the lookup field to get the values from another table or query". Then click Next.
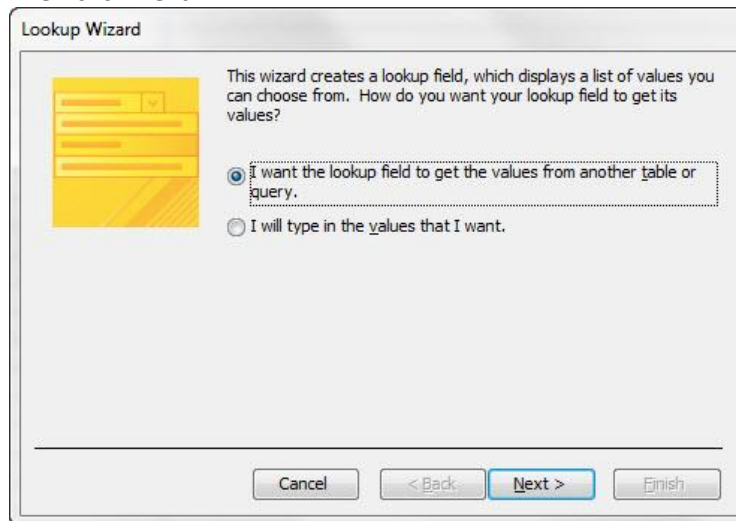

   4. In the second dialog box, select the SupplierData Table. Then click Next.
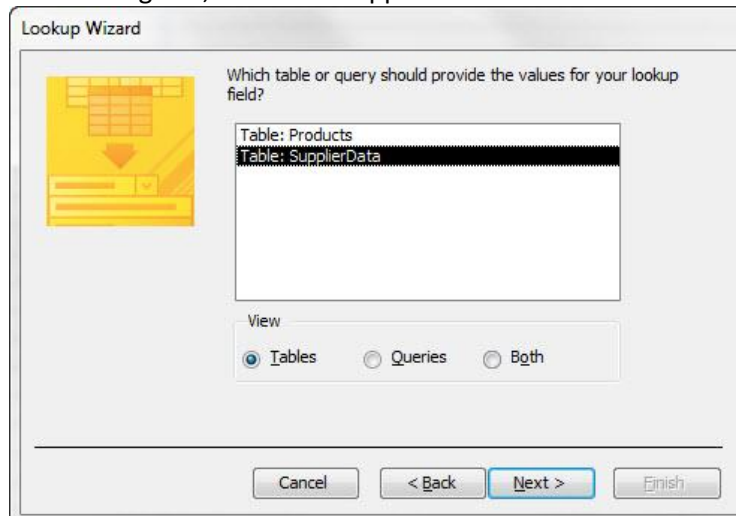
5. In the third dialog box from the Available Fields list on the left, select Supplier Code and then click the Single Arrow Button to move the Field to the Selected Fields on the right.
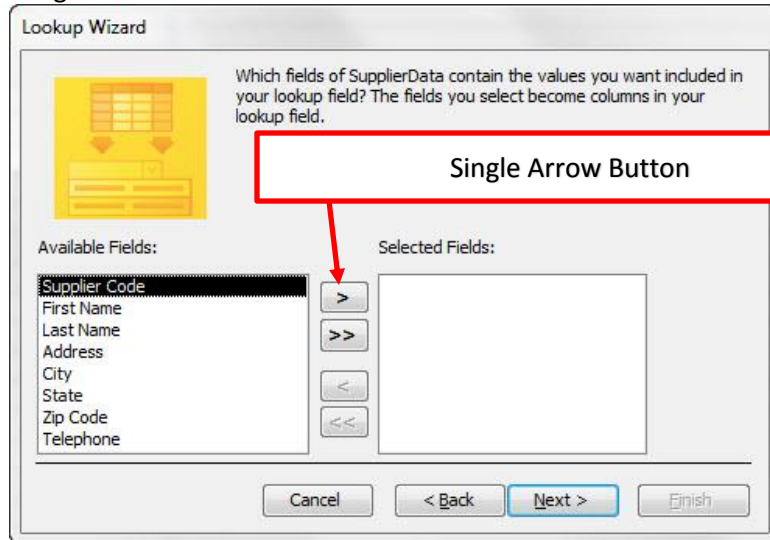
6. After you click the Single Arrow Button to move the Field to the Selected Fields on the right, the dialog box will look like the one below. Then click Next.
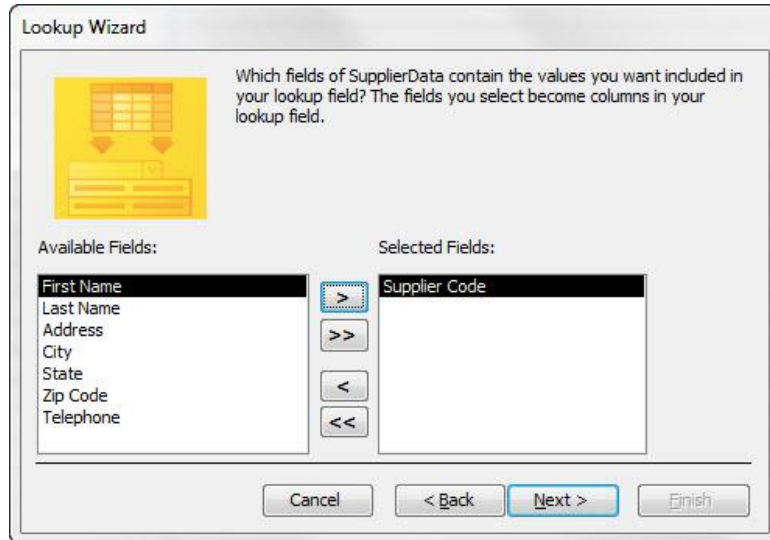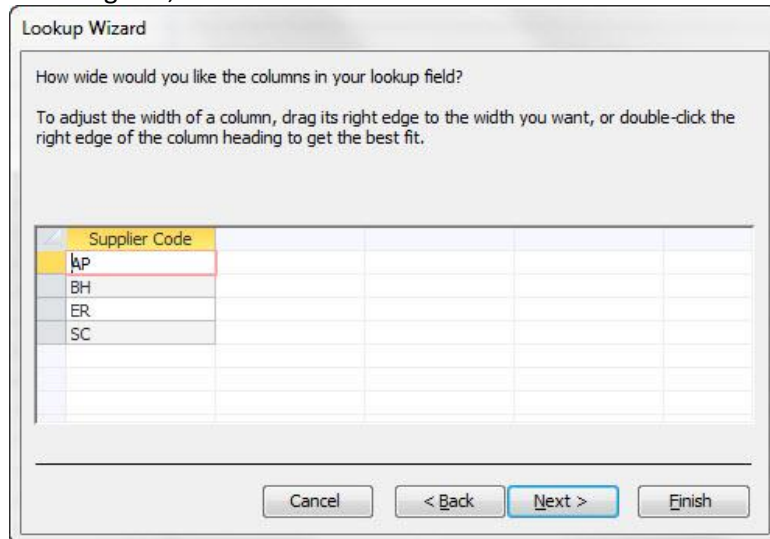

7. In the fourth dialog box, select Supplier Code from the Ascending textbox dropdown. Then click Next.
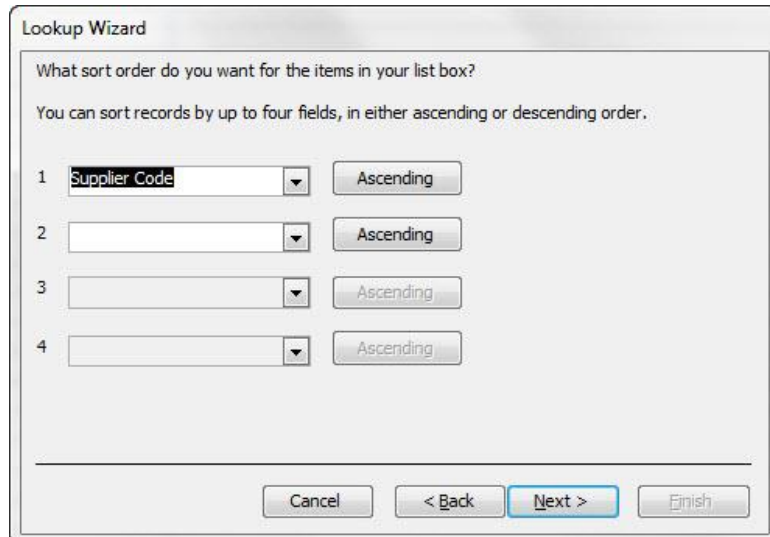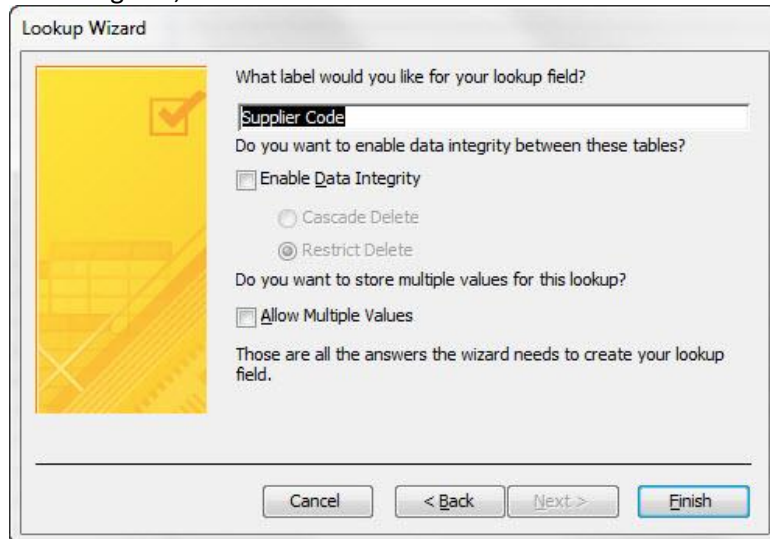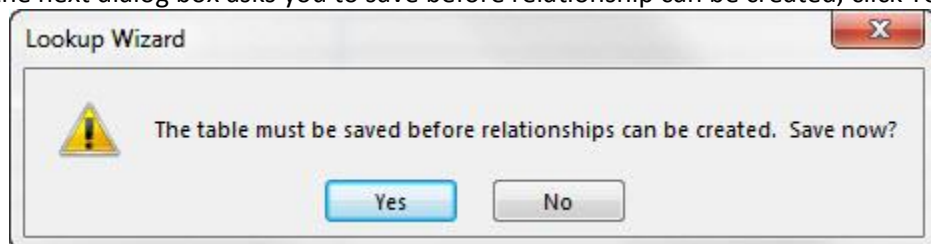

    i.

8. In the fifth dialog box, click Next.

9. In the sixth dialog box, click Finish.

10. When the next dialog box asks you to save before relationship can be created, click Yes.

11. The finished Supplier Code Field is show. Notice how it adopted the Field Size of 2 from the Primary Key Field in the SupplierData Table.

i. Wholesale Retail Field:
1. Type Field Name "Wholesale Retail"
2. Select the Data Type "Lookup Wizard":

3. In the first dialog box, select "I will type the values that I want". Then click Next.

4. In the second dialog box, type the two values as seen below and then click Next.

Lookup Wizard

What values do you want to see in your lookup field? Enter the number of columns you want in the list, and then type the values you want in each cell.

To adjust the width of a column, drag its right edge to the width you want, or double-click the right edge of the column heading to get the best fit.

Number of columns: 1

Col1
Wholesale
Retail

[Cancel] [< Back] [Next >] [Finish]

5. In the third dialog box, check the box for "Limit To List". Then click Finish.

Lookup Wizard

What label would you like for your lookup field?

Wholesale Retail

Do you want to limit entries to the choices?

☑ Limit To List

Do you want to store multiple values for this lookup?

☐ Allow Multiple Values

Those are all the answers the wizard needs to create your lookup field.

[Cancel] [< Back] [Next >] [Finish]

6. The finished Wholesale Retail Field looks like this:

Products

| Field Name	Data Type	Description (Op
Product ID	Short Text	Product ID - Primary Key - Rule for PK = 2 Capital Letters AND 2 Nu
Description	Short Text	Description of Product
On Hand	Number	Number of Units on Hand - Available to sell
Cost	Currency	Cost of Product
Selling Price	Currency	Sell Price of Product for Customer
Supplier Code	Short Text	Lookup to SupplierData Table to get Primary Key Supplier Code (I
Wholesale Retail	Short Text	Wholesale or Retail Lookup (not to another table - just to a list)

Field Properties

General | Lookup

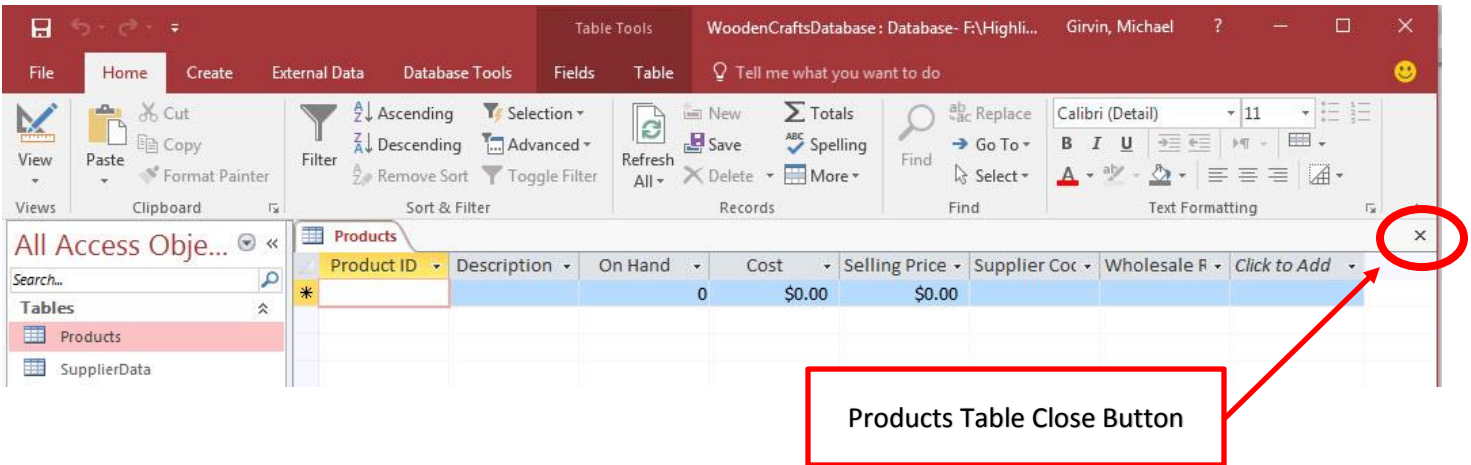| Field Size	25
Format	
Input Mask	

ii. To Save the completed Products Table, use Ctrl + S.
iii. The Finished Products Table with Field Names, Data Types and Field Properties is seen in Design View is seen here:
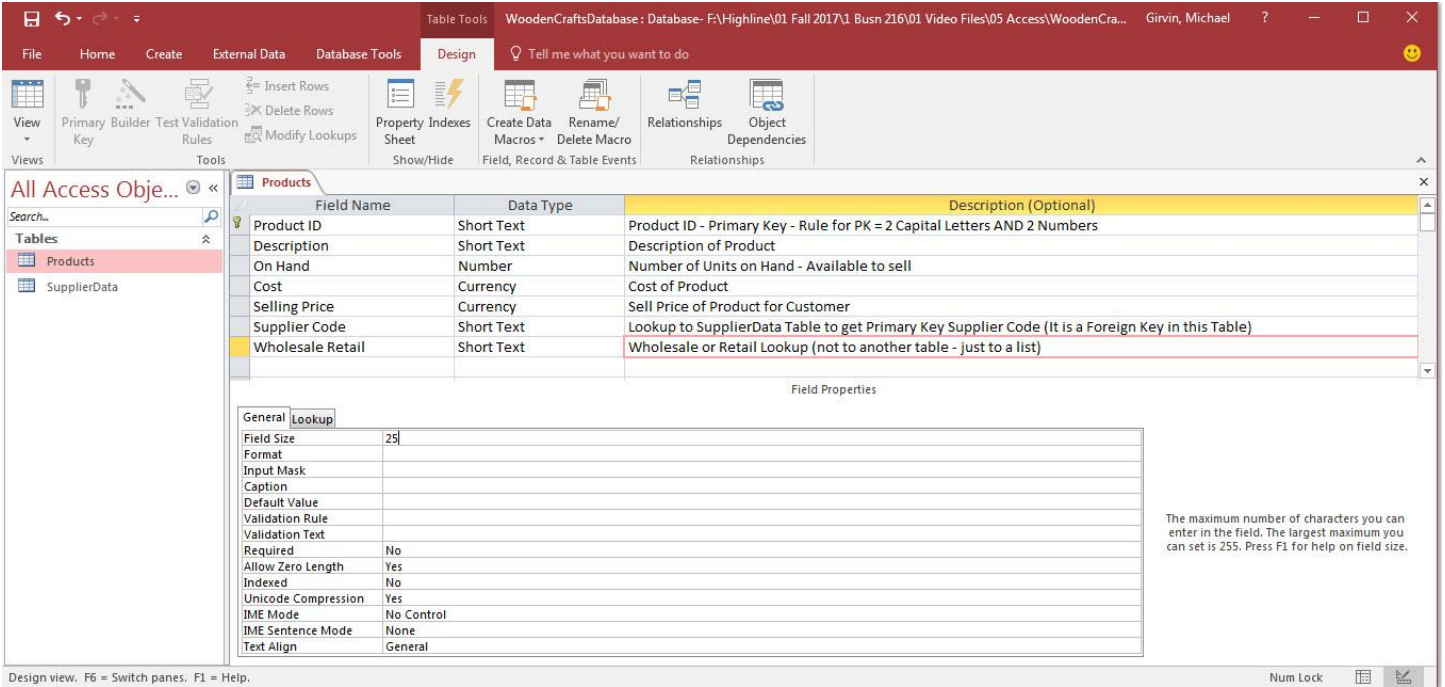
iv. Click the Datasheet View button to view the Datasheet view:
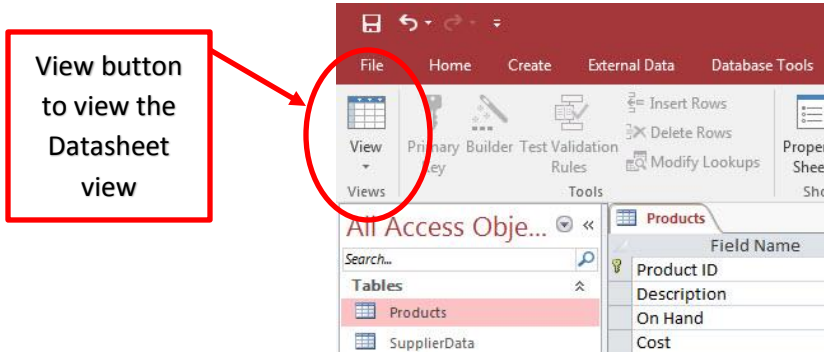
v. The table has no raw data and shows no records. Click the Close Button to close the Products Table.

vi. We need to edit the relationship that was created when we used the Lookup Wizard for the Supplier Code in the Products Table. To edit a relationship, click the Relationships button in the Relationship group in the Database Tools Ribbon Tab.
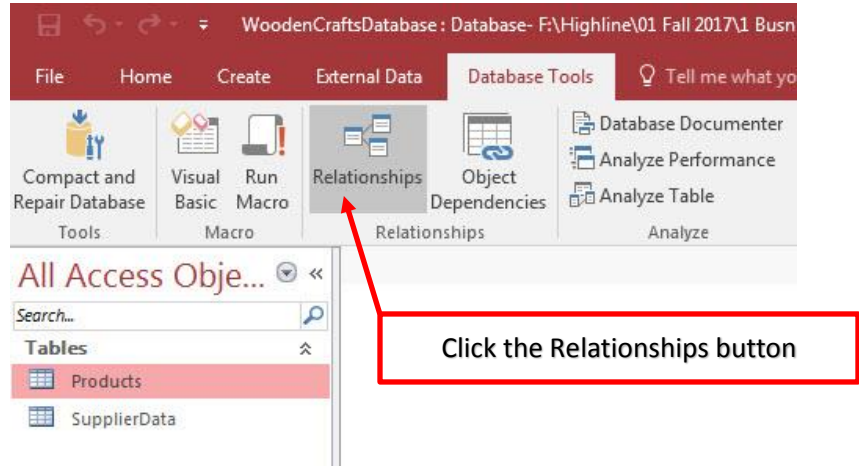

vii. In the Relationships Window, we can see that there is a Relationship Line between the Supplier Code Fields in both the SupplierData Table Field List and the Products Table Field List.
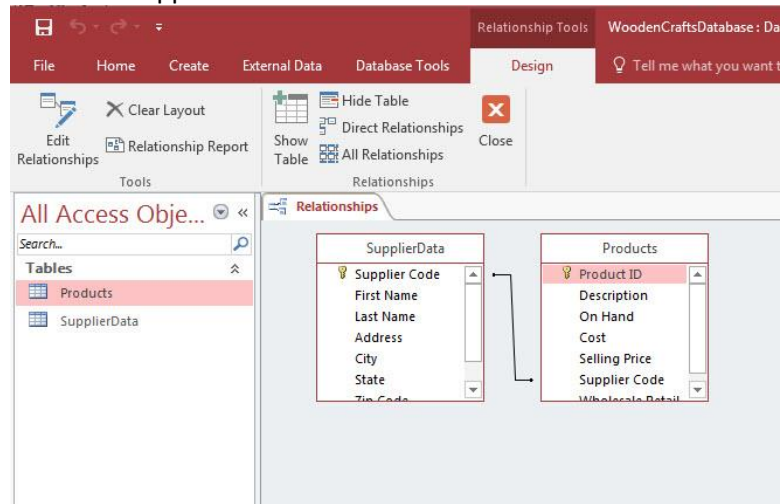

viii. Using your cursor resize the Field Lists so that appear as they are in this picture:
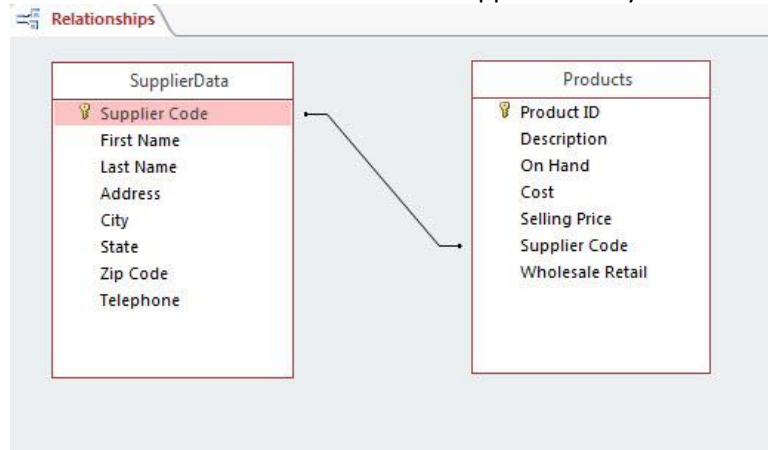
ix. Very carefully, hover your cursor over the Relationship Line and then Right-click and click on Edit Relationship.
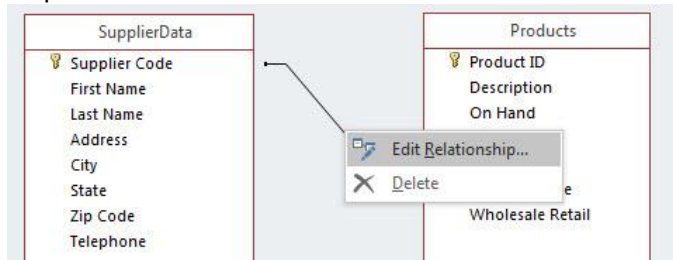
x. In the Edit Relationships dialog box, check the "Enforce Referential Integrity" check box to make sure that you are ONLY allowed to enter a Supplier Code in the Products Table if it is already in the SupplierData Table. This insures a One-To-Many Relationship.
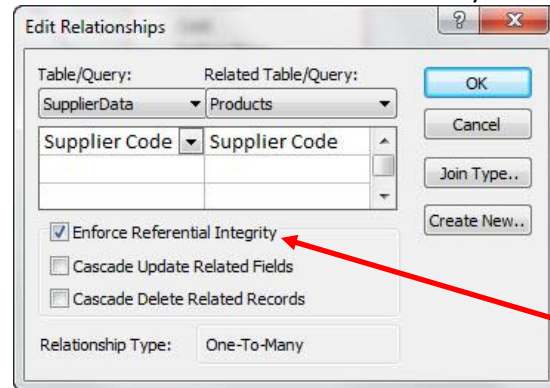

Check the "Enforce Referential Integrity" check box

xi. Note:
1. Cascade Delete Related Records check box
   i. You cannot delete a record from a primary table if matching records exist in a related table. For example, you can't delete an employee record from the Employees table if there are orders assigned to that employee in the Orders table. You can choose to delete a primary record and all related records in one operation by selecting the **Cascade Delete Related Records** check box.
2. Cascade Update Related Fields check box
   i. You cannot change a primary key value in the primary table if doing so would create orphan records. For example, you cannot change an order number in the Orders table if there are line items assigned to that Order in the Order Details table. You can choose to update a primary record and all related records in one operation by selecting the **Cascade Update Related Fields** check box.

xii. We can see the One-To-Many Relationship. Next click the Close Relationship Window Button.
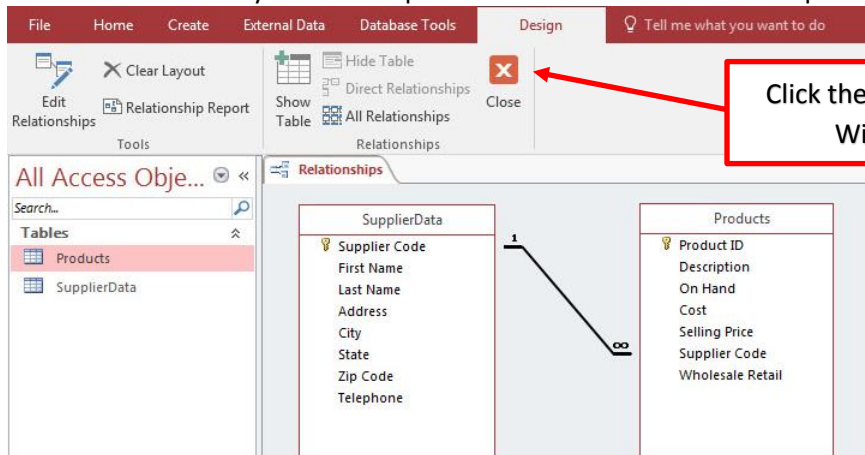
Click the Close Relationship Window Button

xiii. We need a Form For each of the Tables so that we can enter, edit and delete data in each table. To create a Form for the Products Table , select the Products Table in the Navigation Pane and then click the Form button in the Forms group in the Create Ribbon Tab.


Click the Form Button

Select the Products Table in the Navigation Pane
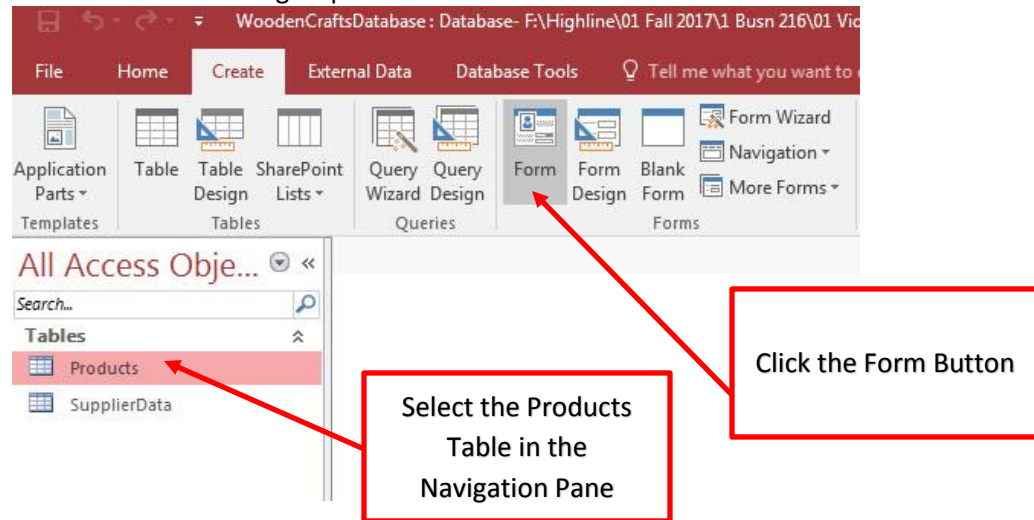
xiv. When the Form for the Products Table appears, click the View dropdown and then click on Form View.

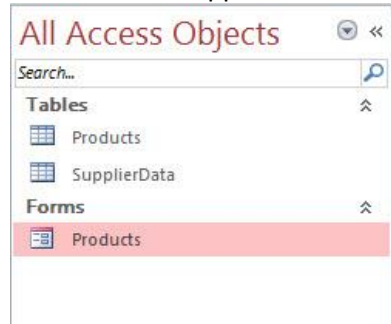Click the View dropdown and then click on Form View
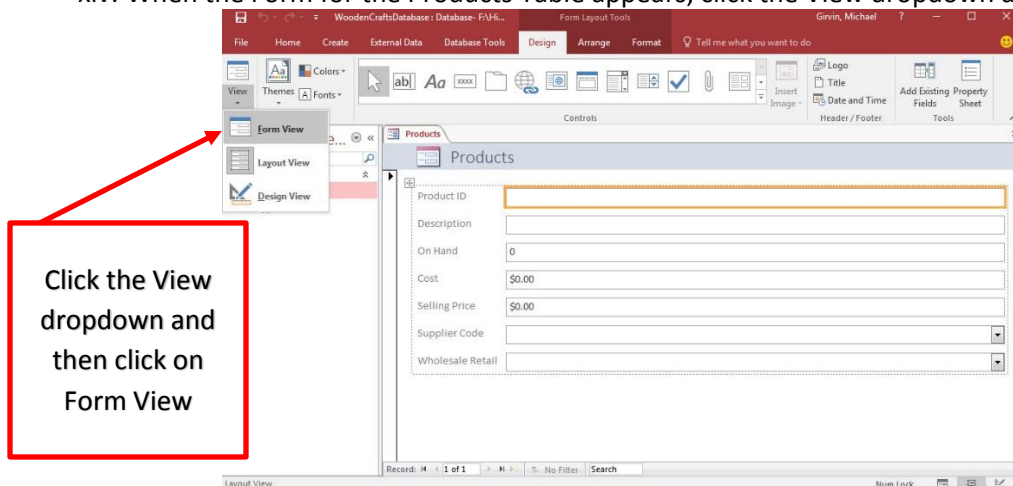
xv. Save the Products Form by using the keyboard Ctrl + S. When the Save As dialog box appears, click OK.

xvi. Using the Close Button for the Products Form, close the Products Form:
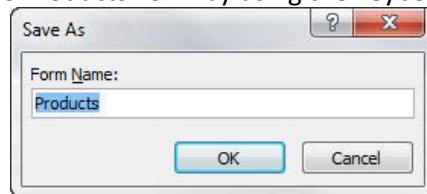
Using the Close Button for the Products Form, close the Products Form
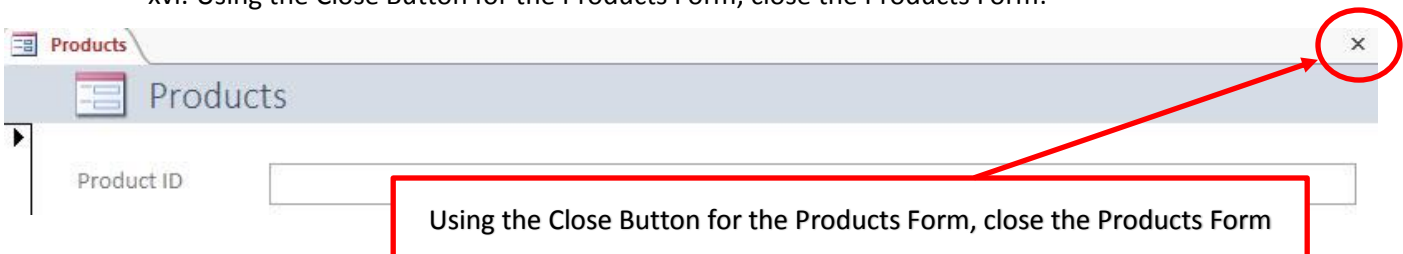
xvii. The Product Form now appears in the Navigation Pane:

xviii. Repeating the steps for creating a Products Table Form, create a Form for the Supplier Data Table. After you complete the SupplierData Form and close it, the Navigation Pane will contain two tables and two formulas, like in this picture:
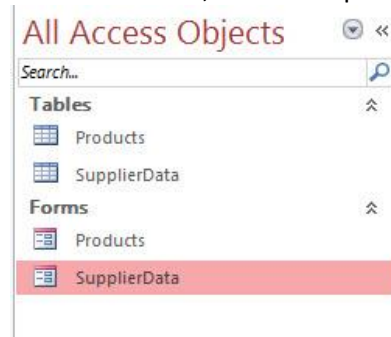
8. Add data to Products table using the Products Form

i. Double-click the Products Form to open it and then enter the raw data for each record. The raw data for each record is listed below.

1. Be sure to use the Tab Key to move to the next field. When you get to the end of the last field for each record, hitting the Tab Key will move you to the first field in the next record.
2. Also, be sure to check each one of the Data Validation "Data Types" and "Field Properties" that you created for this table. For example, see what happened if you type more than 4 characters into the Product ID Field or see what happens if you type a cost of 1000 into the Cost Field.

Product ID	Description	On Hand	Cost	Sell Price	Supplier Code	Wholesale Retail
BF01	Barnyard Friends	3	$27.00	$50.00	SC	Retail
BL23	Blocks In Box	5	$14.50	$27.00	AP	Retail
CC14	Coal Car	8	$4.50	$8.50	BH	Retail
FT05	Fire Truck	7	$4.50	$9.00	AP	Retail
LB34	Lacing Bear	4	$6.00	$11.00	AP	Retail
MR06	Midget Railroad	3	$15.50	$29.00	BH	Retail
PJ12	Pets Jigsaw	10	$4.00	$8.00	SC	Retail
RB02	Railway Bridge	1	$8.50	$16.00	BH	Retail
SK10	Skyscraper	6	$12.50	$23.00	SC	Retail
UM09	USA Map	12	$7.00	$13.00	AP	Retail

i. The next Page shows the Products Table after all the Raw Data is Entered.
ii. This is the end of Video #39.
iii. Next Video we will learn how to create Queries in Access.

New Keyboards in Video

1. F6 = Jump from Field Name area to Field Properties area in Table Design View