

Excel 2016:

Creating, Using, and Modifying Pivot Tables

Presented by Knack Training, LLC

Topics Addressed:

- Setting up data for successful use of Pivot Tables
- Creating reports using sums, averages, and counts
- Creating custom calculations
- Using external data sources for your Pivot Table
- Communicating relevant information effectively with data visualization
- Using a Pivot Table for internal communications

Module 01: Core Skills

Pivot Tables provide a huge amount of potential value; to get all the value possible from them, make sure that you use the essential framework successfully. In our first two lessons, we'll discuss how to structure the source data of a Pivot Table; then we'll use the next three lessons to build a Pivot Table that solves many problems.

Exercise 01: Clean Data

Open the first sheet of the workbook

Open **M01 Core Skills**, and begin with **L01 Clean Datasets**.



Try to use the dataset as a single unit

Click within the **Engagement Duration** data region, and use the **[CTRL] + [A]** keyboard shortcut.

ENGAGEMENT DURATION		CLIENT	
INITIAL CONTACT	CONTRACT SIGNED	CLIENT	CLIENT
3/21/2017	1/13/2018	Robin Medicines	SMB
4/7/2017	1/7/2018	Credit Aruba	ENTR
4/11/2017	7/28/2017	Reef Group	ENTR
2/19/2017	10/2/2017	Visalia Gas & Electric	SMBU

You should recognize two important things about what happens:

1. The two columns of Engagement Duration are selected, *without* the Client Details region.
2. Engagement Duration – the label *above* the primary labels of Initial Contact and Contract Signed – is selected along with those labels.

Change the connections between data

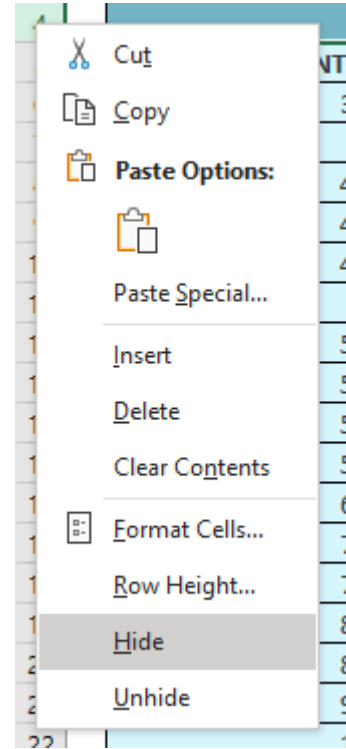
Delete the blank columns – D, H, and K – and **insert** a blank row between 3 and 4.

ENGAGEMENT DURATION		CLIENT	
INITIAL CONTACT	CONTRACT SIGNED	CLIENT	CLIENT
3/21/2017	1/13/2018	Robin Medicines	SMB
4/7/2017	1/7/2018	Credit Aruba	ENTR
4/11/2017	7/28/2017	Reef Group	ENTR
2/19/2017	10/2/2017	Visalia Gas & Electric	SMBU

This created a relationship between the various columns, and focuses the labels on the primary labels above each column.

Reduce the visible spacing

If you'd still like the headings Engagement Duration, Client Details, etc. to still appear connected to the relevant data, **right-click and hide Row 4**.



Reduce inconsistencies

In the **Date** column(s), make sure that all the entries are dates. In columns that are category-based (like **Region**), make sure that the categories are always consistently named. If your column has numbers, make sure all the entries are numbers.

South
South
Central
South
N
E
C
Central
Central

Make data useable

In the **Contract Duration** column, use **Text to Columns** to split the number values from the abbreviation **yrs**.

CONTRACT DURATION
1.5 yrs
4.5 yrs
3.5 yrs
2.5 yrs
2.0 yrs

Before building a report in a Pivot Table, the data you're working with should be consistent, contiguous, and calculable. For example, when we use Text to Columns on the Contract Duration column, we find that we can **average** the number of years each duration is.

Exercise 02: Working with Tables

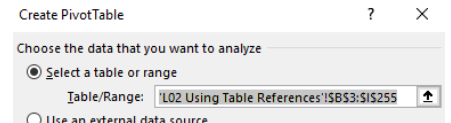
Find the sheet for table ranges.

Select the tab **L02 Using Table References**.

	ITEM ID	ITEM NAME	FACILITY	BL
4	LMC-120	Penguin 120	Hammermill	Build
5	EDE-200	Lark 200	Yellow Cliffs	Build
6	BNG-100	Wingtip 100	Brandeis	Build
7	EDE-150	Lark 150	Brookmoor	Build
8	LMC-100	Penguin 100	Hammermill	Build

Attempt to create a Pivot Table

On **L02 Using Table References**, select cell **B6**, and choose **Insert Tab > Pivot Table**. On the dialog that opens, notice the range reference.

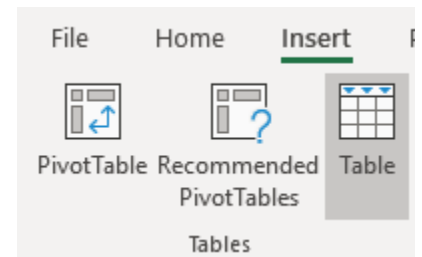


Cancel creating the Pivot Table

Note that these cells are not flexible; if the original data added extra rows and columns, those would not be automatically added to the Pivot Table. Click **Cancel**.

Convert the range into a Table

Select cell **B6**, and click **Insert Tab > Table**. Notice that this, also, references the same set of cells.



Name the Table

You see the immediate formatting changes (color, alternating rows) and the filter drop-down arrows, but the most important element is on the **Table Design Tab** - the **Table Name**.

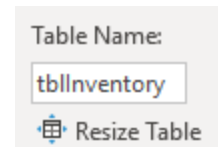
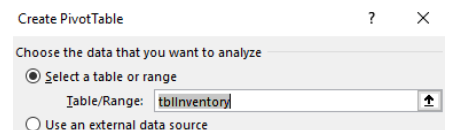


Table names must (1) start with a letter - not a number or special character, and (2) have no spaces. In the near future, we'll see this name in action. Take a moment to name your table something different.

Create a Pivot Table

Select cell **B6**, and choose **Insert Tab > Pivot Table**. On the dialog that opens, notice the range reference.



By using a Table, the range that is used in the Pivot Table is dynamic and named. This is critical for ease of maintenance.

Exercise 03: Creating a Simple Pivot Table

EMPLOYEE ID	FIRST NAME	LAST NAME	DIVISION	LEVEL	LOCATION	DATE OF HIRE	SALARY
2013-2208	Guadalupe	Moon	Research	L4	Hammermill	1/22/2013	\$ 75,800.00
2017-6488	Dean	Weber	Production	L4	Hammermill	5/21/2017	\$ 78,600.00
2005-9977	Krystal	Mayer	Information Services	L4	Brandeis	11/26/2005	\$ 89,600.00
2005-5625	Shelley	Ford	Sales	L3	Brookmoor	8/17/2005	\$ 71,300.00
2016-2000	Guadalupe	Moon	Production	L4	Brookmoor	4/12/2016	\$ 81,600.00

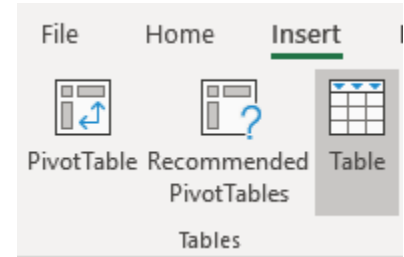
Find the employee dataset Select the tab **L03 Creating a Pivot Table**.

Identify a Pivot Table need In this list of employees, we might want to know the answer to:

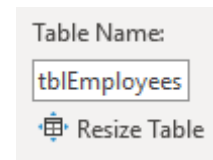
- What is the **total salary by location**?
- What is the **highest average salary by division**?
- What are the **average salaries by level**?

In this situation, let's ask the question: **How much are we paying employees (total) at each level?** This might give us insight into whether we're overstaffed at higher levels, etc.

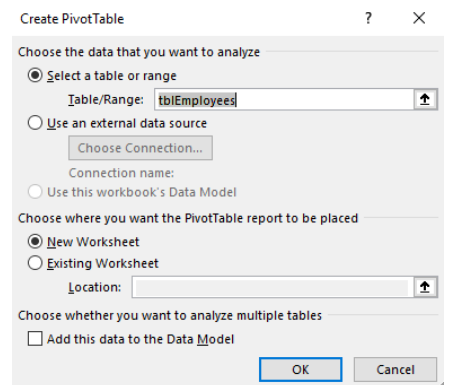
Convert to a Table Once we know the question, it is a best practice to **convert the dataset into a Table**. So, click **C5** and click **Insert Tab > Table**.



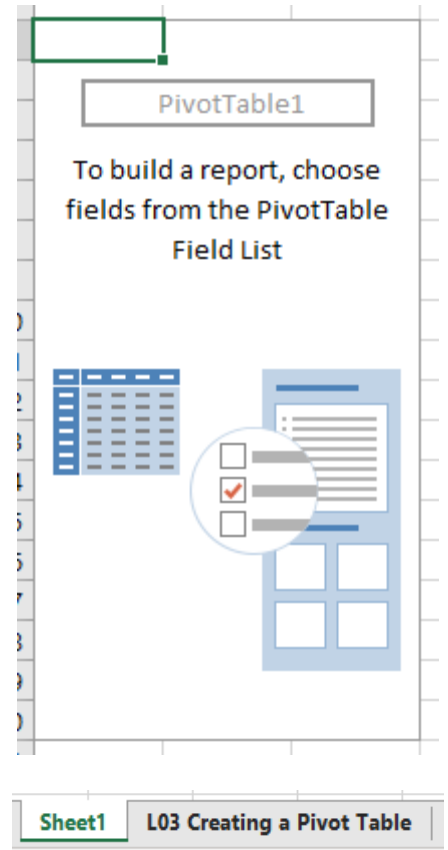
Name the Table Give your Table a good name, like **tblEmployees**.



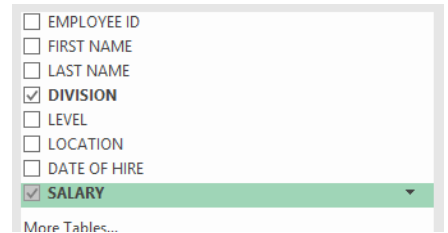
Insert a Pivot Table Now, insert the Pivot Table by clicking cell **C5** and choosing **Insert Tab > Pivot Table**.



Note the effects You have an empty Pivot Table on a new sheet (Sheet1).



Add fields to create a summary report At this point, move into the **Field List** panel, and click the checkboxes for **Division** and **Salary**. Notice that these change the Pivot Table immediately.



Note the effects This action - adding **Categories** like Location or Division to the **Rows** of a Pivot Table, and a **Value** like Salary to the **Values** of a Pivot Table - is the core of using Pivot Tables. You now have a simple report giving you insights about the divisions or locations that require the most salary.

Row Labels	Sum of SALARY
Brandeis	16096000
Brookmoor	7452600
Hammermill	24525800
San Clemente	8830000
Yellow Cliffs	7883800
Yorktown	8214000
Grand Total	73002200

By using the **Field List**, we can create different summaries within a Pivot Table.

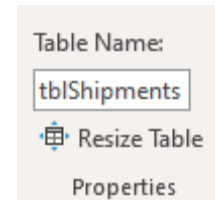
Exercise 04: Understanding Columns, Rows, and Values

Find the next tab Select the **L04 Columns Rows and Values** sheet.



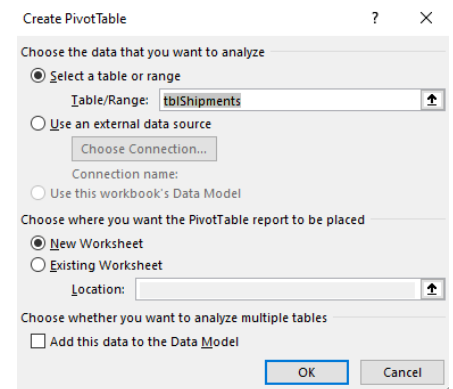
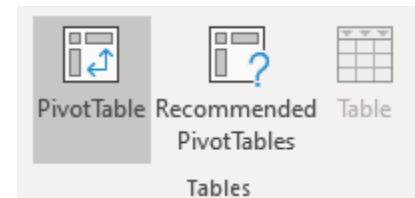
Create a Table Click within the data set, and use **[CTRL] + [T]** to convert the data into a Table.

In the Table Properties, name the Table something specific, like **tblShipments**.



Insert a Pivot Table Click **Insert Tab > Pivot Table**.

Create a Pivot Table on a new worksheet.



Note your working data

In the data, you'll notice that you have the following characteristics:

- Both **DATE SHIPPED** and **DATE ARRIVED** are dates (of course), with the characteristics of having a year, month, and day value;
- **PROJECT SITE**, **PROJECT MANAGER**, **SHIPPING MANAGER**, and **MODE** are all columns that have repeating values - we only have a few sites, a few managers, and a few shipping modes; and
- **SHIPMENT VOLUME**, **SHIPMENT WEIGHT**, and **SHIPPING COST** are all numeric values, suitable to be added, averaged, etc.

Add relevant fields to the appropriate areas

If we want to know the **Total Cost** broken down by **Mode**, we should be able to **drag-and-drop** the **SHIPPING COST** column into the **Values** box, and **MODE** into the **Rows** box.

Row Labels	Sum of SHIPPING COST
Air	18486.4
Truck	55699.41
Grand Total	74185.81

Make the breakdown more complex

We can imagine, however, that air costs might be different, if we send the shipments to different locations. So, we can **drag-and-drop PROJECT SITE** into the **Rows** box, as well.

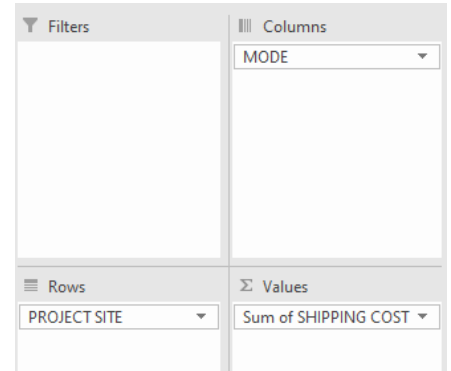
Row Labels	Sum of SHIPPING COST
Air	18486.4
Birmingham	4505.22
Cascadia	3198.92
Grey Coast	879.99
Kano	754.76
Luanda	3415.37
Santiago	1252.39
Snake River	4006.45
Surat	473.3
Truck	55699.41
Birmingham	747.06
Cascadia	9241.26
Grey Coast	8469.42
Hyderabad	7386.42
Kano	2007.78
Luanda	8433.93
San Clemente	9681.15
Santiago	2986.72
Snake River	3435.87
Surat	3309.8
Grand Total	74185.81

Change the order

This gives us Air broken down by Site, but we might **drag-and-drop PROJECT SITE** above **MODE** in the Rows field.

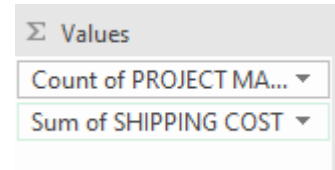
Split the two categorizations into different areas

Drag-and-drop MODE to the **Columns** field.



Calculate a count beside the sum

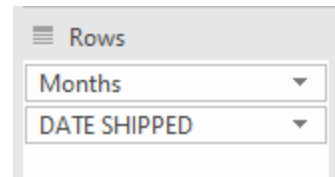
Drag-and-drop a text value (like **PROJECT MANAGER**) into the **Values** field, and note how you can have both a Sum and a Count.



Swap to a date breakdown

Remove the Project Site and Mode entries from their Rows and Columns areas.

Then, **drag-and-drop the DATE SHIPPED** into the **Rows** field.



Note the grouping

In modern versions of Excel, this automatically groups by the most logical segment – in this case, by month.

The builder of a Pivot Table can put various fields into Rows, Columns, and Values. Placing numeric values into Values results in an automatic sum, while text values result in a count. Placing various grouping choices into Rows and Columns gives us a table with interesting breakdowns.

Exercise 05: Calculations

Find the next tab

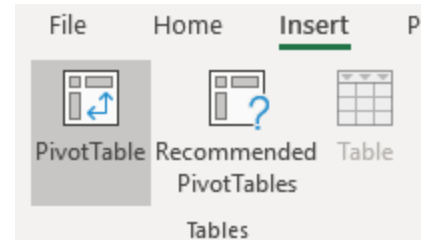
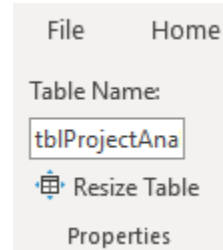
Select the **L05 Calculations** tab.

Add a Table and Pivot Table

Click within the dataset, and choose **Insert Tab > Table**.

Name the new Table **tblProjectAnalysis**.

Click **Insert Tab > Pivot Table**, and place the Pivot Table on a New Worksheet.



Break down the number of team members by Project

Click the checkbox for **PROJECT** to place it in the Rows field.

Click the checkbox for **TEAM MEMBERS**, and notice the value is placed in the Values field.

Row Labels	Sum of TEAM MEMBERS
Acadia	48
Crater Lake	150
Denali	191
Sequoia	93
Yosemite	146
Grand Total	628

Try another numeric column

Click the checkbox for **ACTUAL DURATION (days)**, and notice that it is placed in the Rows field.

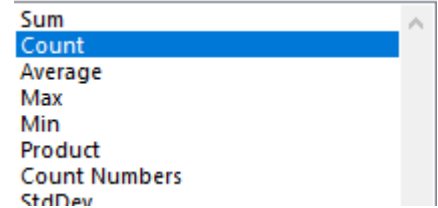
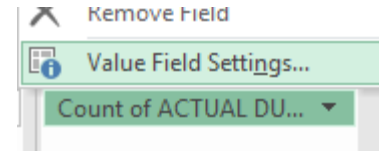
We recognize that due to the existence of **N/A** entries in this column, Excel doesn't see this as a numeric field. Additionally, if you **drag ACTUAL DURATION (days)** into the **Values field**, notice that it *doesn't* get added.

Row Labels
Acadia
7
9
10
12
13
15
17
19



Hard-code the function to be used

Using the drop-down arrow on **Count of ACTUAL DU...** to change the **Value Field Settings...** lets us get access to the **Sum** function, among others.



Try different Count options

At this point, let's look at the possible functionality for **Actual Duration**. The **Count** function is actually the same as **COUNTA** in a standard spreadsheet - it counts all the non-blank entries.

Using **Count Numbers**, however, gives us the values that have been entered for ACTUAL DURATION.

Row Labels	Count of Actual	Count of Entries
Acadia	11	29
Crater Lake	37	87
Denali	40	122
Sequoia	28	53
Yosemite	39	92
Grand Total	155	383

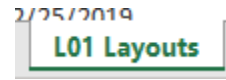
In a standard Pivot Table, non-numeric columns are automatically added to Rows, instead of Values. If we drag-and-drop a non-numeric column to Values, we see a Count function. We can change this to any function we like, but we should recognize there are non-numeric options in this column.

Module 02: Creating Perfect Pivot Tables

Once the core tools in your Pivot Table are in hand, there are dozens of ways to shape the results. In this module, we'll look at formatting, filtering, and otherwise altering the Pivot Table.

Exercise 01: Pivot Table Layouts

Open the Module 2 workbook Open **M02 Perfect Pivots**. Note the first tab, **L01 Layouts**.

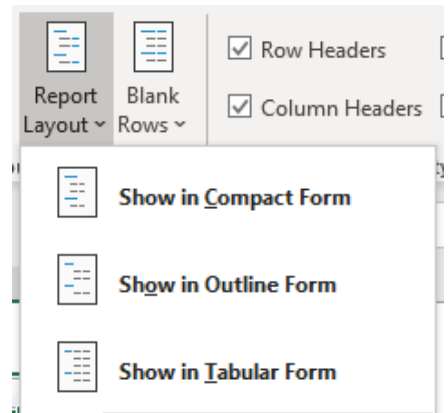


Create a Pivot Table Convert the dataset on this page into a Table called **tblShipments**, and choose **Insert Tab > Pivot Table**.

Finally, put **Project Site** and **Shipping Cost** into the Pivot Table.

Row Labels	Sum of SHIPPING COST
Birmingham	\$ 5,252
Cascadia	\$ 12,440
Grey Coast	\$ 9,349
Hyderabad	\$ 7,386
Kano	\$ 2,763
Luanda	\$ 11,849
San Clemente	\$ 9,681
Santiago	\$ 4,239
Snake River	\$ 7,442
Surat	\$ 3,783
Grand Total	\$ 74,186

Experiment with **Compact, Outline,** and **Tabular** form Click **Design Tab > Report Layout**, and choose between these three options.



Try again with another dimension Click the checkbox **SHIPPING MANAGER**, and notice that when you choose between **Compact, Outline,** and **Tabular Form**, they appear very different.

PROJECT SITE	SHIPPING MANAGER	Sum of SHIPPING COST
Birmingham	Eric	\$ 5,252
Birmingham	Ericson	\$ 2,812
Birmingham	Kim	\$ 722
Birmingham	Brooks	\$ 4,239
Birmingham	Diaz	\$ 1,632
Birmingham	Ericson	\$ 4,006
Cascadia	Eric	\$ 12,440
Cascadia	Ericson	\$ 6,000
Cascadia	Brooks	\$ 4,239
Cascadia	Diaz	\$ 1,632
Cascadia	Ericson	\$ 4,006
Grey Coast	Eric	\$ 9,349
Grey Coast	Ericson	\$ 5,178
Grey Coast	Kim	\$ 722
Grey Coast	Brooks	\$ 4,239
Grey Coast	Diaz	\$ 1,632
Grey Coast	Ericson	\$ 4,006
Hyderabad	Eric	\$ 7,386
Hyderabad	Ericson	\$ 3,783
Hyderabad	Brooks	\$ 4,239
Hyderabad	Diaz	\$ 1,632
Hyderabad	Ericson	\$ 4,006
Kano	Eric	\$ 2,763
Kano	Ericson	\$ 1,381
Kano	Brooks	\$ 4,239
Kano	Diaz	\$ 1,632
Kano	Ericson	\$ 4,006
Luanda	Eric	\$ 11,849
Luanda	Ericson	\$ 6,000
Luanda	Brooks	\$ 4,239
Luanda	Diaz	\$ 1,632
Luanda	Ericson	\$ 4,006
San Clemente	Eric	\$ 9,681
San Clemente	Ericson	\$ 5,178
San Clemente	Kim	\$ 722
San Clemente	Brooks	\$ 4,239
San Clemente	Diaz	\$ 1,632
San Clemente	Ericson	\$ 4,006
Santiago	Eric	\$ 4,239
Santiago	Ericson	\$ 2,119
Santiago	Brooks	\$ 4,239
Santiago	Diaz	\$ 1,632
Santiago	Ericson	\$ 4,006
Snake River	Eric	\$ 7,442
Snake River	Ericson	\$ 3,721
Snake River	Brooks	\$ 4,239
Snake River	Diaz	\$ 1,632
Snake River	Ericson	\$ 4,006
Surat	Eric	\$ 3,783
Surat	Ericson	\$ 1,891
Surat	Brooks	\$ 4,239
Surat	Diaz	\$ 1,632
Surat	Ericson	\$ 4,006
Grand Total		\$ 74,186

Try repeating the item labels Click **Design Tab > Report Layout**, and try **Repeat All Item Labels** with these three layout choices.

PROJECT SITE	SHIPPING MANAGER	Sum of SHIPPING COST
Birmingham	Eric	\$ 5,252
Birmingham	Ericson	\$ 2,812
Birmingham	Kim	\$ 722
Birmingham	Brooks	\$ 4,239
Birmingham	Diaz	\$ 1,632
Birmingham	Ericson	\$ 4,006
Cascadia	Eric	\$ 12,440
Cascadia	Ericson	\$ 6,000
Cascadia	Brooks	\$ 4,239
Cascadia	Diaz	\$ 1,632
Cascadia	Ericson	\$ 4,006
Grey Coast	Eric	\$ 9,349
Grey Coast	Ericson	\$ 5,178
Grey Coast	Kim	\$ 722
Grey Coast	Brooks	\$ 4,239
Grey Coast	Diaz	\$ 1,632
Grey Coast	Ericson	\$ 4,006
Hyderabad	Eric	\$ 7,386
Hyderabad	Ericson	\$ 3,783
Hyderabad	Brooks	\$ 4,239
Hyderabad	Diaz	\$ 1,632
Hyderabad	Ericson	\$ 4,006
Kano	Eric	\$ 2,763
Kano	Ericson	\$ 1,381
Kano	Brooks	\$ 4,239
Kano	Diaz	\$ 1,632
Kano	Ericson	\$ 4,006
Luanda	Eric	\$ 11,849
Luanda	Ericson	\$ 6,000
Luanda	Brooks	\$ 4,239
Luanda	Diaz	\$ 1,632
Luanda	Ericson	\$ 4,006
San Clemente	Eric	\$ 9,681
San Clemente	Ericson	\$ 5,178
San Clemente	Kim	\$ 722
San Clemente	Brooks	\$ 4,239
San Clemente	Diaz	\$ 1,632
San Clemente	Ericson	\$ 4,006
Santiago	Eric	\$ 4,239
Santiago	Ericson	\$ 2,119
Santiago	Brooks	\$ 4,239
Santiago	Diaz	\$ 1,632
Santiago	Ericson	\$ 4,006
Snake River	Eric	\$ 7,442
Snake River	Ericson	\$ 3,721
Snake River	Brooks	\$ 4,239
Snake River	Diaz	\$ 1,632
Snake River	Ericson	\$ 4,006
Surat	Eric	\$ 3,783
Surat	Ericson	\$ 1,891
Surat	Brooks	\$ 4,239
Surat	Diaz	\$ 1,632
Surat	Ericson	\$ 4,006
Grand Total		\$ 74,186

Try this layout with consistent choices

In this dataset, Project Site and Project Manager have a one-to-one relationship – there is a manager for each site.

PROJECT SITE	PROJECT MANAGER	Sum of SHIPPING COST
Birmingham	Christiansen	\$ 5,252
Birmingham Total		\$ 5,252
Cascadia	Brown	\$ 12,440
Cascadia Total		\$ 12,440
Grey Coast	Billings	\$ 9,349

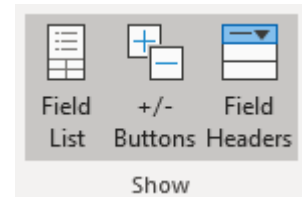
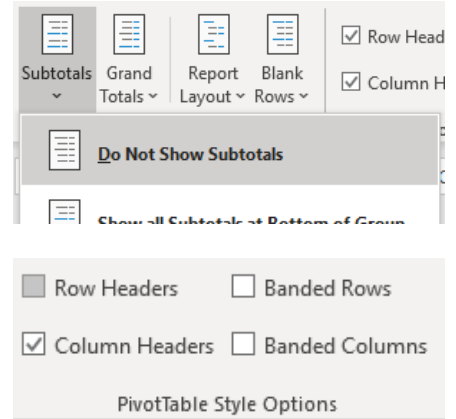
This means that if we put both Site and Manager into the Rows field, we get something like this:

Change the configuration for a one-to-one relationship

Clicking **Design Tab > Subtotals**, we can choose **Do Not Show Subtotals**.

Clicking **Design Tab**, you can disable the **Row Headers** checkbox.

Clicking the **Analyze Tab**, you can turn off the **+/-** button.



Notice the effects of these choices

By changing these values, we've made the table appear as if it treats the Site and Manager as two entries for the same record.

PROJECT SITE	PROJECT MANAGER	Sum of SHIPPING COST
Birmingham	Christiansen	\$ 5,252
Cascadia	Brown	\$ 12,440
Grey Coast	Billings	\$ 9,349
Hyderabad	Gilbert	\$ 7,386
Kano	Keith	\$ 2,763
Luanda	Guerrero	\$ 11,849
San Clemente	Crowe	\$ 9,681
Santiago	Noel	\$ 4,239
Snake River	Harris	\$ 7,442
Surat	Kalal	\$ 3,783
Grand Total		\$ 74,186

In a Pivot Table, the Compact form that is the default is good for showing subordinate relationships. However, it makes the display of additional data less clear. So, changing the Layout configurations can have positive results.

Exercise 02: Aesthetic Formatting Choices

Find the Aesthetics tab.

Select the tab for **L02 Aesthetic Formatting**.

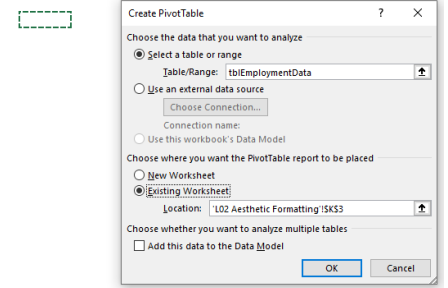
Note that the data has already been made into a Table; the Table has been named **tblEmploymentData**; the Table has been set to a black-and-grey color scheme with banded rows.

EMPLOYEE ID	FIRST NAME	LAST NAME	DIVISION	LEV	LOCATION	DATE OF HIRE	SALARY
2017-2019	David	Waller	Research	L4	Hammermill	5/21/2017	\$ 78,600.00
2017-6488	Dean	Weber	Production	L4	Hammermill	5/21/2017	\$ 78,600.00
2005-2977	Kristal	Meyer	Information Services	L4	Brandeis	11/29/2005	\$ 89,400.00
2007-9453	Shelby	Paul	Sales	L3	Brookmoor	6/17/2007	\$ 72,100.00
2018-4038	Herbert	Murphy	Production	L1	Brandeis	2/23/2018	\$ 42,600.00
2012-2580	Alan	Erickson	Production	L5	Brandeis	6/29/2012	\$ 78,800.00
2006-2344	Collette	Mendoza	Research	L3	Brookmoor	1/9/2006	\$ 89,200.00
2006-1708	Allen	Johnson	Research	L5	Brookmoor	1/11/2006	\$ 103,900.00

Create a Pivot Table alongside the Table

Select cell **C9**, and choose **Insert Tab > Pivot Table**.

Choose for the location **Existing Sheet**, and click cell **K3** on that sheet.



Add the relevant fields to the Pivot Table

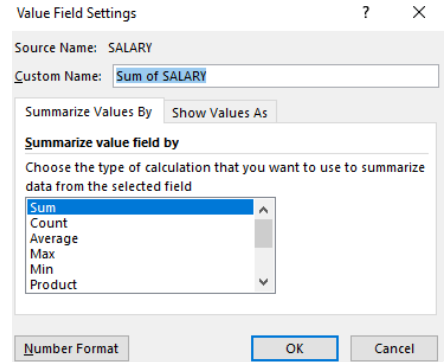
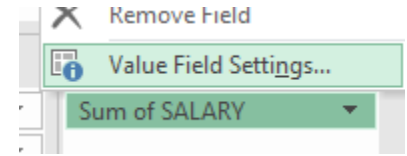
Click the checkboxes for **DIVISION**, **LOCATION**, and **SALARY**. This will create a Pivot Table with a calculation, and a two-level breakdown between Division and Location.

- EMPLOYEE ID
- FIRST NAME
- LAST NAME
- DIVISION
- LEVEL
- LOCATION
- DATE OF HIRE
- SALARY

Row Labels	Sum of SALARY
Administrative	6257400
Brandeis	1187300
Brookmoor	601100
Hammermill	2289700
San Clemente	806600

Change the number formatting

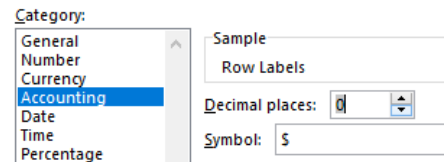
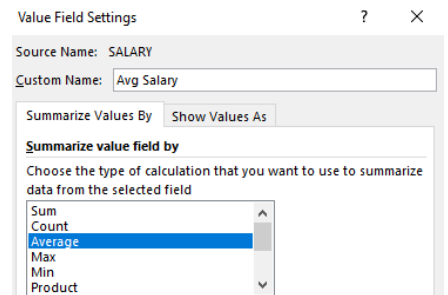
By clicking **Sum of Salary > Value Field Settings**, you can get the dialog to open for the calculation and other options.



Make three changes to Value Field Settings

First, choose **Average** as your calculation. Then, type the Custom Name **Avg Salary**.

Finally, click the **Number Format** button, and choose an **Accounting** format for the numbers that doesn't include decimal places.



Note the simplicity of the display

After you click **OK** twice, notice that the numbers display nicely, and the label is cleaner, as well.

Row Labels	Avg Salary
Administrative	\$ 65,181
Brandeis	\$ 65,961
Brookmoor	\$ 60,110
Hammerville	\$ 67,244

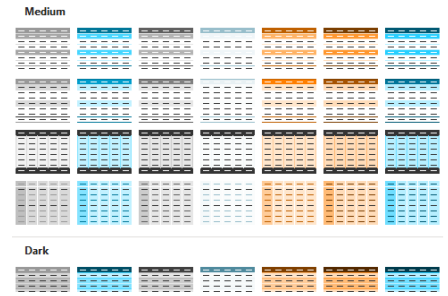
Collapse the categories

Click **Analyze Tab > Collapse Field**, and you will see only the Divisions, with the Locations folded under.



Change the color scheme

On the **Design Tab**, look through the **Pivot Table Styles** and choose a more black-and-white look.



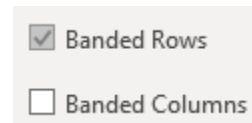
Expand-and-contract the Divisions

As you click the + buttons to expand each Division, note the similarity to the original table.

Row Labels	Avg Salary
Administrative	\$ 65,181
Executive	\$ 152,672
Brandeis	\$ 156,770
Brookmoor	\$ 177,150
Hammermill	\$ 146,661
See Elements	\$ 124,575

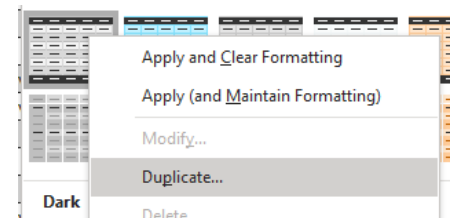
Customize further

On the **Design Tab**, click the checkbox for **Banded Rows**.



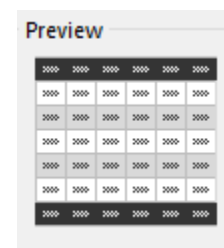
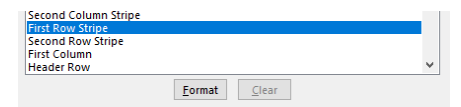
Customize further

Right-click the Style you chose, and select **Duplicate** from the context menu.



Stripe the rows consistently

To match the existing Table, we can choose **First Row Stripe**, and **Format**; then **Second Row Stripe**, and **Format**. We can then match the background colors of the two stripes in our Table.



Choose our new Style

Finally, click the **Pivot Table Styles drop-down**, and choose the new Style.

Row Labels	Avg Salary
Administrative	\$ 65,181
Executive	\$ 152,672
Brandeis	\$ 156,770
Brookmoor	\$ 177,150
Hammermill	\$ 146,661
San Clemente	\$ 184,575
Yellow Cliffs	\$ 165,880

With a combination of layout, Style, and number formatting, we can create a Pivot Table that looks exactly the way we like.

Exercise 03: Sorting

Find the worksheet

Select the **L03 Sorting** tab.



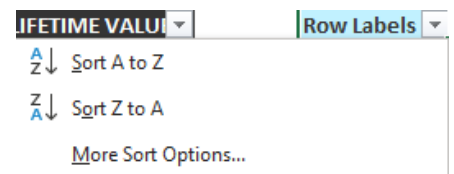
Create a simple Pivot Table

Using the table **tblContracts**, break down the **Total Lifetime Value** by **Region**.

Row Labels	Total Lifetime Value
Asia	\$ 850,960
Central	\$ 750,840
Eastern	\$ 2,126,650
Europe	\$ 623,870
Ex-US NA	\$ 215,520
Mountain	\$ 890,220
Oceania	\$ 367,070
Pacific	\$ 1,006,970
Grand Total	\$ 6,832,100

Sort by Row Labels

Click the **drop-down arrow** at the head of the **Row Labels** area, and choose either **Sort Ascending** or **Sort Descending** (Ascending was already chosen by default).

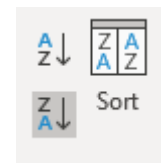


Sort by the numeric values

Click within the calculated range of the Pivot Table (any number under **Total Lifetime Value**).

Then, click **Data Tab > Sort A-Z** or **Sort Z-A**.

Total Lifetime Value	
\$	850,960
\$	750,840
\$	2,126,650
\$	623,870
\$	215,520
\$	890,220
\$	367,070
\$	1,006,970
\$	6,832,100



Row Labels	Total Lifetime Value
Eastern	\$ 2,126,650
Pacific	\$ 1,006,970
Mountain	\$ 890,220
Asia	\$ 850,960
Central	\$ 750,840
Europe	\$ 623,870
Oceania	\$ 367,070
Ex-US NA	\$ 215,520
Grand Total	\$ 6,832,100

Manually sort the regions

Another option is to **click-and-drag** items around. In this example, you may want to always see **Eastern, Pacific, Europe, and Ex-US NA** in that order. Click and drag each of those items to the right place relative to one another.

Row Labels	Total Lifetime Value
Eastern	\$ 2,126,650
Pacific	\$ 1,006,970
Mountain	\$ 890,220
Asia	\$ 850,960
Central	\$ 750,840
Europe	\$ 623,870
Oceania	\$ 367,070
Ex-US NA	\$ 215,520
Grand Total	\$ 6,832,100

Sort within groupings

To make the Pivot Table more complex, click the checkbox for **Client Type**, nesting these under the various regions.

Click onto any of the fields – one of the Regions, one of the Client Types, or one of the number values – and sort by clicking **Data > Sort A-Z** or **Sort Z-A**.

Row Labels	Total Lifetime Value
☑ Asia	\$ 850,960
Government	\$ 327,860
Enterprise	\$ 294,170
Non-Profit	\$ 228,930
☑ Central	\$ 750,840
Government	\$ 323,130
Enterprise	\$ 240,190

Sorting can happen based on alphanumeric order on any of the fields, or it can be a manual process, allowing you to bring a specific value to the top.

Exercise 04: In-Table Filtering

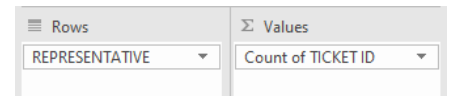
Find the filtering sheet

Select the tab **L04 In-Table Filtering**.



Create a simple Pivot Table

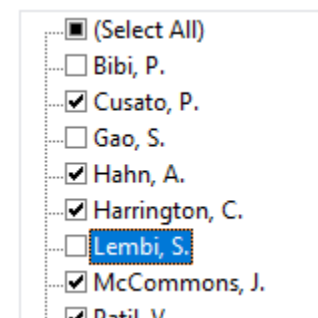
From **tblTickets**, create a Pivot Table that uses **Representative** for the Rows Field, and drag **Ticket ID** to the Values Field. This will create a **Count** of all the tickets.



Row Labels	Count of TICKET ID
Bibi, P.	63
Cusato, P.	95
Gao, S.	53
Hahn, A.	62
Harrington, C.	67
Lembi, S.	42
McCommons, J.	30
Patil, V.	42
Tan, C.	75
Truong, S.	59
Xie, H.	33
Grand Total	621

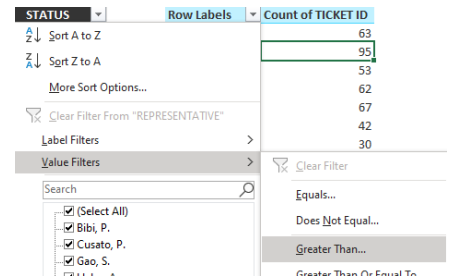
Filter using **Row Labels**

Click the **Row Labels** drop-down, and filter by the Representative.



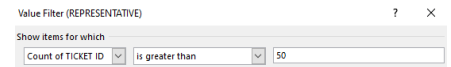
Filter by the **Cell Values**

Click the **Row Labels** drop-down, and choose **Value Filters**. Click the option for **Greater Than...**



Choose a lower limit

Type **50** into the Value Filter, and see that you only see numbers of tickets over 50.



Explore the data more closely

Find any number value in the Pivot Table, and **double-click** the number. You'll find a new data set generated from this request.

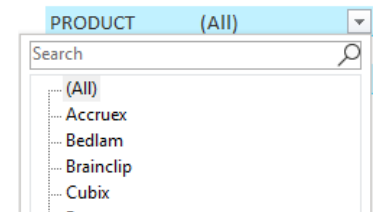
Use the Filter Field

Clear the previous filters on the Pivot Table. Now, **drag Product to the Filters field**.



Filter by a single value

Using the **Product drop-down menu** above the Pivot Table, choose one of the Products.

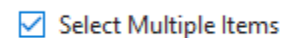


Clear the filter

Return to **All** in this drop-down menu

Filter by multiple items

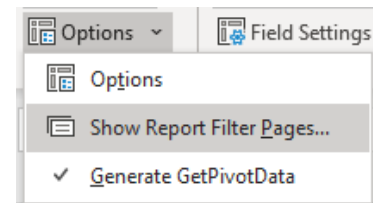
On the **Product drop-down menu**, choose **Select Multiple Items**, and choose which items to show in your Pivot Table.



Create multiple reports

Clear your filter by re-checking the **All** option on your drop-down.

Because **Product** is in the **Filters Field**, you can now click **Analyze Tab > Options Drop-Down > Show Report Filter Pages...**



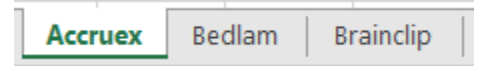
Show Report Filter Pages

Show all report filter pages of:

PRODUCT

Watch the pages generated

Now that you've chosen to show the broken-out report filter pages for each Product, you have tabs named after each item.



On-report filtering can be done through the Rows or Values, and also by using the standard **Filters** field of the Pivot Table. However, modern filters are through Slicers and Timelines.

Exercise 05: Slicers and Timelines

Find the next tab for filtering

Select the tab **L05 Slicers and Timelines**.



Create a Pivot Table from the data

From the table **tblEmployeeList**, create a Pivot Table that calculates **Total Salary by Division**.

Row Labels	Total Salary
Administrative	\$ 6,257,400
Executive	\$ 7,633,600
Finance	\$ 5,862,300
Information Services	\$ 5,704,300
Marketing	\$ 4,975,000
Operations	\$ 8,410,700
Production	\$17,361,400
Research	\$11,258,500
Sales	\$ 5,539,000
Grand Total	\$73,002,200

Add Slicers

Selected on the Pivot Table, click **Analyze Tab > Insert Slicer**. Then, click the checkboxes for **Location** and **Level**.

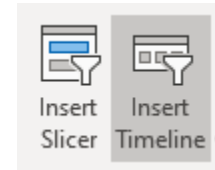


Insert Slicers

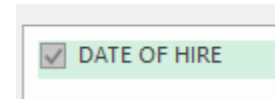
- EMPLOYEE ID
- FIRST NAME
- LAST NAME
- DIVISION
- LEVEL
- LOCATION
- DATE OF HIRE
- SALARY

Add a Timeline

Selected on the Pivot Table, click **Analyze Tab > Insert Timeline**. Then, click the checkbox for **Date of Hire**.

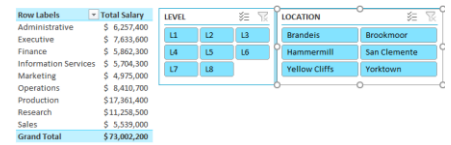


Insert Timelines



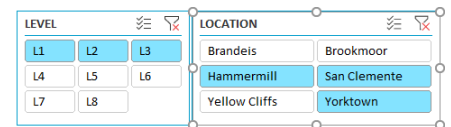
Arrange the filters

Notice that now you can not only **click-and-drag** to move and resize the windows, but you can also click on any Slicer, then choose **Slicer Tab > Columns** to make the Slicer have 2 or 3 (or more) columns.



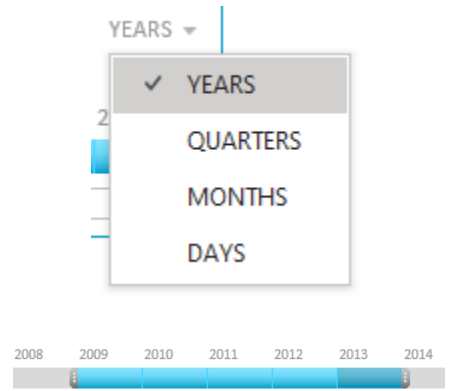
Use the various filters

You can either single-click an entry, **Shift-Click** many entries (for a range of entries), or **Ctrl-Click** many entries (for many disconnected selections).



Adjust the Timeline

On the Timeline, you can choose **Years** as your Period, and filter by Years, rather than Months.



Filtering on the Slicer and/or Timeline for a Pivot Table is a good way to have beautiful, dynamic filtering that is user-friendly.

Exercise 06: Grouping

Find the Grouping tab

Select the tab **L06 Grouping**.



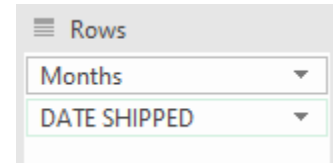
Create a Pivot Table from the Table

Using **tblShipments**, create a Pivot Table that calculates **Total Shipping Costs** with no segmentation.

Total Shipping Costs	
\$	74,186

Segment by date

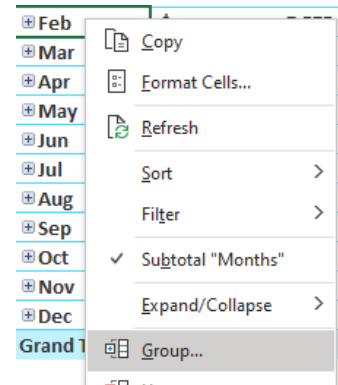
Click-and-drag Date Shipped into the **Rows field**, and notice that those dates are automatically grouped together.



Row Labels
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Grand Total

Change automatic grouping

Right-click the labels (the month abbreviations), and choose **Group...** to change the settings to **Quarter**.



Row Labels	Total Shipping Costs	
Qtr1	\$	23,764
Qtr2	\$	20,992
Qtr3	\$	17,740
Qtr4	\$	11,690
Grand Total	\$	74,186

Change the Row Labels

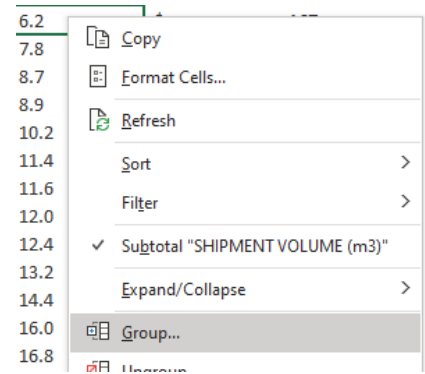
Remove **Date Shipped** from the Rows field. Instead, **drag-and-drop Shipment Volume** to the Rows field.



Row Labels	Total Shipping Costs	
4.5	\$	98
6.2	\$	167
7.8	\$	163
8.7	\$	118
8.9	\$	915

Group these values

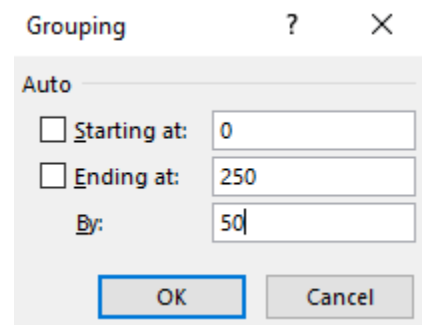
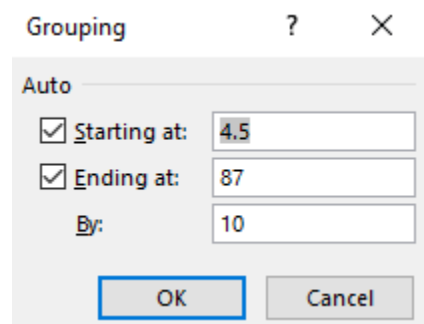
Excel doesn't immediately group these, as it did with dates. So, **right-click the Row Labels and choose Group...**



Change the automatic grouping

Excel decides to set the current maximum and minimum as the Starting at and Ending at values, and provides a simple grouping number. Change these to:

0
250
50



See the impact

Now, your Pivot Table is prepared for Shipping Volumes up to 250 cubic meters, and will only concern itself with the groupings every 50 cubic meters.

Row Labels	Total Shipping Costs	
0-50	\$	37,804
50-100	\$	36,382
Grand Total	\$	74,186

Grouping number values allows you to see relationships where there typically aren't any.

Module 03: Data Handling

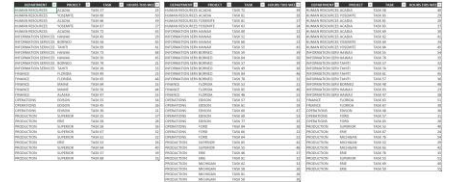
Pivot Tables analyze data, so in this module we'll take a closer look at the data we're bringing into the Pivot.

Exercise 01: Changing and Refreshing Data

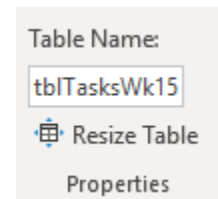
Open the Module 3 workbook Open **M03 Data Handling**, and access **L01 Refreshing Data**.



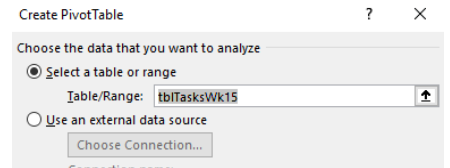
Create three tables Notice that on this tab we have three lists of tasks. Imagine that each list represents the project tracking information for a different week.



Click on the first list, and turn it into a table called **tblTasksWk15**, then create tables called **tblTasksWk16** and **tblTasksWk17**.



Create a Pivot Table from the Week 15 data Click on cell **B5**, and choose **Insert Tab > Pivot Table**.



Break down the data In the Pivot Table, create **Total Hours by Department**.

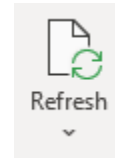
Row Labels	Total Hours
FINANCE	221
HUMAN RESOURCES	182
INFORMATION SERVICES	262
OPERATIONS	111
PRODUCTION	323
Grand Total	1099

Update the current dataset Return to **tblTasksWk15**, and add **Task 22** for **HUMAN RESOURCES**, Project **ACADIA**. This should take **45** hours.



Refresh the Pivot Table

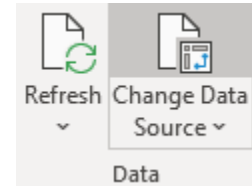
Prior to refreshing, note that your Pivot Table says Human Resources had **182 hours** spent on these projects. Click **Analyze Tab > Refresh**, and watch the value climb to **227**.



Row Labels	Total Hours
FINANCE	221
HUMAN RESOURCES	227
INFORMATION SERVICES	262

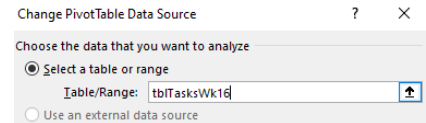
Update the report

Selected on the Pivot Table (cell **A4**, for example), click **Analyze Tab > Change Data Source**.



Change to Week 16

Change the table name to **tblTasksWk16**, and watch your report update to match this new data set.



A Pivot Table can always be updated as the data changes; doing this with Tables makes the update easier to maintain.

Exercise 02: External Data

Find the report page and external data

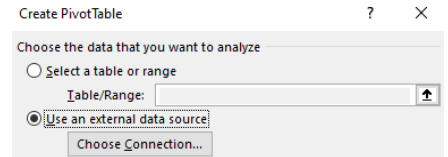
Select the tab for **L02 External Data**, and also open **M03 External Data**.



SALE ID	SALE DATE	RAND	CLIENT	CLIENT TYPE	REGION	COGS	SALE PRICE
2331-7081	43169	111	DYNE-4180	GOVT	US	\$ 1,038,700.00	\$ 2,310,000.00
2789-7078	43590	229	DFHS-5757	GOVT	EX-US	\$ 1,270,100.00	\$ 1,638,000.00
1930-7055	43653	484	GDKB-5343	GOVT	EX-US	\$ 121,300.00	\$ 180,000.00
1138-5681	43545	35	AGEC-2683	GOVT	EX-US	\$ 390,400.00	\$ 1,010,000.00
TOTAL SALES			300	GOVT	US	\$ 1,840,400.00	\$ 5,228,000.00

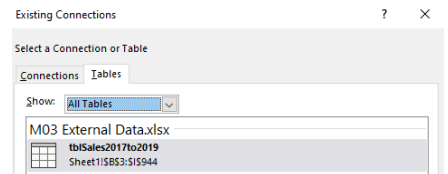
Create a Pivot Table from External Data

In **M03 Data Handling**, click **Insert Tab > Pivot Table**. Choose **Use an external data source**.



Find the external table

Click **Choose Connection...**, and find the **Table** from our second spreadsheet.



Complete your Pivot Table

Click **OK**, and create a Pivot Table that pulls data from another spreadsheet.



The tool we used in this exercise has been around a very long time, and simply pulls the data from a table outside the current spreadsheet, if it is open to be pulled. Power Query, however, is a more sophisticated tool for solving the same problem.

Exercise 03: Introduction to Power Query

Find the Power Query tab

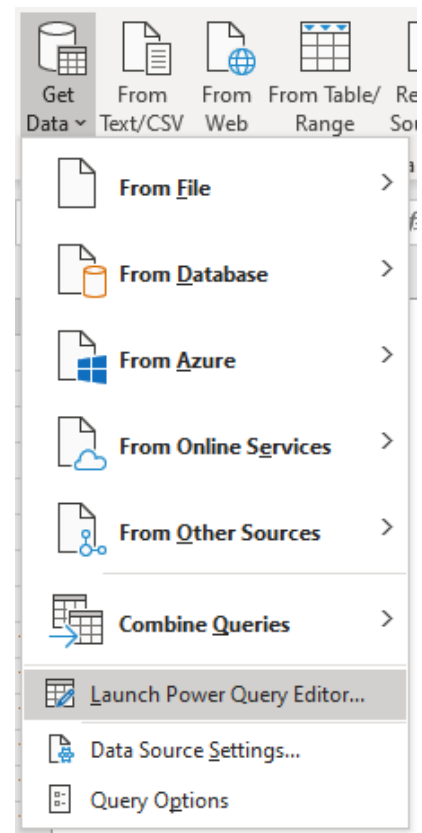
Select the tab **L03 Power Query Intro**.



Query the outside data source

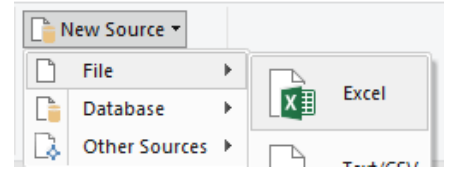
Rather than our previous example, where the table was available on an open file, we can click **Data Tab > Get Data > Launch Power Query Editor** to access data across dozens of sources.

Launch the Power Query Editor to query an Excel spreadsheet, CSV file, database, or even website (we'll be using the same **M03 External Data** spreadsheet from the previous example).



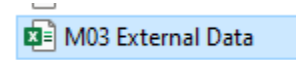
Get data from a Source

Click **Home Tab > New Source > File > Excel.**



Identify the spreadsheet

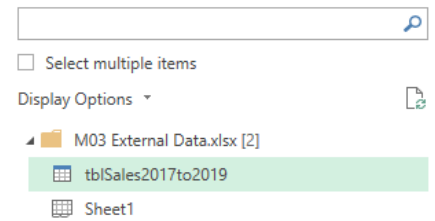
Navigate to the **M03 External Data file.**



Identify the data set

Choose the table **tblSales2017to2019.**

Navigator

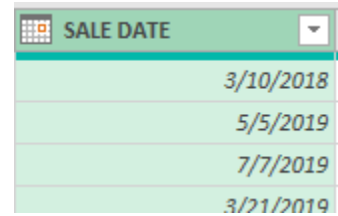
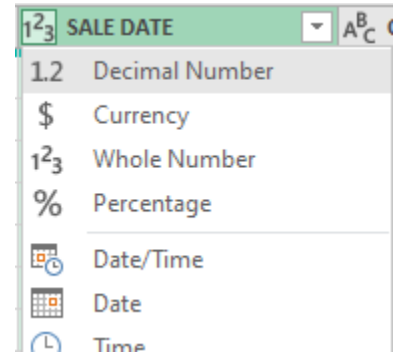


Modify the query

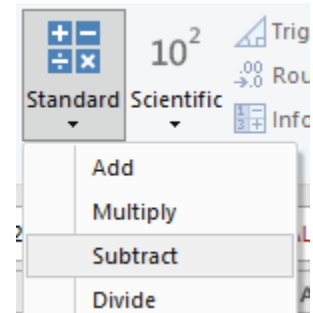
Click the **123** button for **SALE DATE**, and convert the column to a Date.

Click the **Sale Price Column**, hold **[SHIFT]** and click the **COGS Column**. Now, click **Add Column > Standard > Subtract**.

Notice that a new column that can be called **Profit** is created.

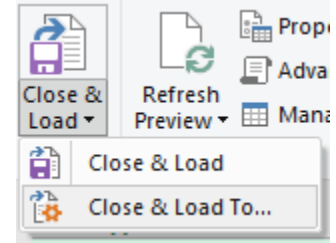


COGS	SALE PRICE
1083700	2330000
1270100	1626000
121300	180000
590400	1010000
2440200	5076000
813700	1107000

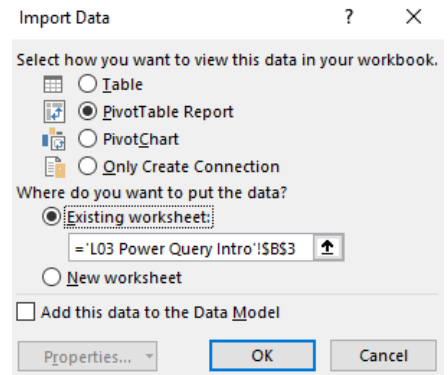


Profit
1246300
355900
58700
419600
2635800

Load the query to a Pivot Table Click **Home > Close & Load > Close & Load To...**



Choose the proper location Choose the radio button for **PivotTable Report**, and specify an **Existing Worksheet** location on **L03 Power Query Intro**.



Use the modifications to the data Create a Pivot Table that calculates **Total Profit** (a value that Power Query created), broken down by **Region**.

Row Labels	Sum of Profit
EX-US	231433500
US	647162000
Grand Total	878595500

Power Query creates a dynamic connection to outside data sets (Excel files, and many other sources), and allows you to *transform* the data with formatting, calculations, and other steps. Finally, this can be loaded directly into a Pivot Table.

Exercise 04: Understanding the Excel Data Model

Find the Data Model sheet Select the tab **L04 The Excel Data Model**.



Identify the situation In this data set, we recognize that there are different *types* of projects. We should try to avoid repeating ourselves, so instead of putting *Open Ocean* or *Coastal Waters* next to each project in the larger list, we create a smaller list to map each project to a project type.

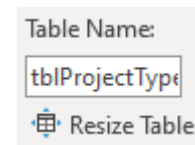
PROJECT SITE	PROJECT TYPE
Luanda	Open Ocean
Cascadia	Coastal Waters
Grey Coast	Coastal Waters
San Clemente	Coastal Waters
Santiago	Open Ocean

We decide to avoid *combining* these lists, if we can simply establish a *relationship*.

Convert lists into tables

Click cell **B5**, and convert the Shipment list into a Table called **tblShipments**. Click cell **O5**, and convert the Project Type list into a Table called **tblProjectTypes**.

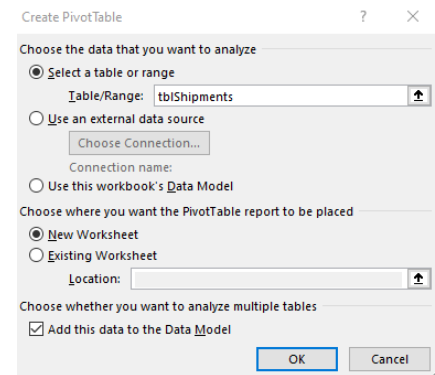
PROJECT SITE	PROJECT TYPE
Luanda	Open Ocean
Cascadia	Coastal Waters
Grey Coast	Coastal Waters
San Clemente	Coastal Waters
Santiago	Open Ocean
Hyderabad	Coastal Waters
Kano	Coastal Waters
Snake River	Inland Waters
Birmingham	Inland Waters
Surat	Open Ocean



Create a Pivot Table that adds to the **Excel Data Model**

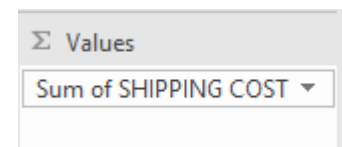
Click on **tblShipments**, and create a Pivot Table. Stop before clicking **OK** to see the checkbox **Add this data to the Data Model**

Click the checkbox to add the current Table to the Data Model.



Total the Shipping Costs

Click the checkbox for **Shipping Cost**, to add that to the **Values** field. However, don't add anything to the **Rows** field.



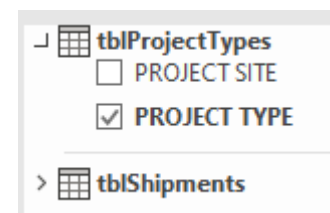
Search all the Tables

Notice that at the top of the **PivotTable Fields** panel, there is now an option to choose between **Active** and **All**. Choose **All**.



Find the Project Type field

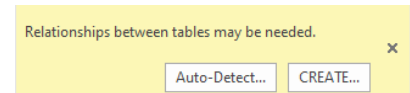
Expand **tblProjectTypes**, and click the checkbox for **Project Type**.



Create a Relationship

Notice that the Pivot Table is broken (the same value is repeated multiple times), and there is a yellow bar on the right side of the screen. This is because we haven't established the relationship between **tblShipments** and **tblProjectTypes**. Click **CREATE** to change this.

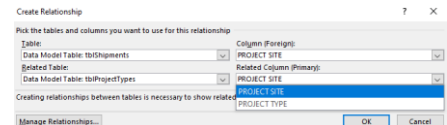
Row Labels	Sum of SHIPPING COST
Coastal Waters	74185.81
Inland Waters	74185.81
Open Ocean	74185.81
Grand Total	74185.81



Identify the matching columns

In the first set of drop-downs, tell Excel that we have **tblShipments** with a column called **PROJECT SITE**.

In the second set of drop-downs, tell Excel that **tblProjectTypes** also has a column called **PROJECT SITE**.



See the changes

You may have to click **Analyze > Refresh** to see the numbers change, but the Pivot Table will now break down the **Shipping Costs** by **Project Type**, which are in two different tables.

Row Labels	Sum of SHIPPING COST
Coastal Waters	41619.7
Inland Waters	12694.6
Open Ocean	19871.51
Grand Total	74185.81

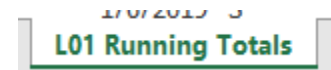
The Excel Data Model establishes that different **tables** in the file can have relationships with one another, that can be used in building Pivot Tables.

Module 04: Advanced Calculations

Beyond the straightforward sums and counts you typically generate in the calculation area of a Pivot Table, you can create a number of interesting insights from calculated fields, items, and other tools.

Exercise 01: Running Totals

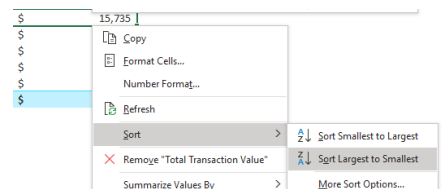
Open the Module 4 Workbook Open **M04 Advanced Calculations**, and begin with **L01 Running Totals**.



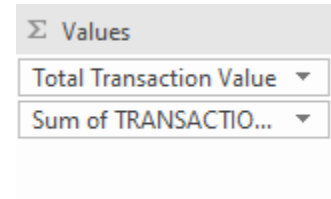
Add a Pivot Table From **tblExpenses**, create a Pivot Table for **Total Transaction Value by Department**.

Row Labels	Total Transaction Value
Corporate	\$ 15,735
Finance	\$ 33,307
Human Resources	\$ 66,000
Marketing	\$ 132,000
Production	\$ 60,000
Grand Total	\$ 315,149

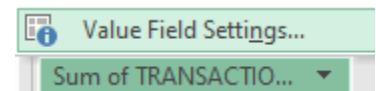
Sort by the values Click within the **Total Transaction Value** column, and Sort descending (largest on top).



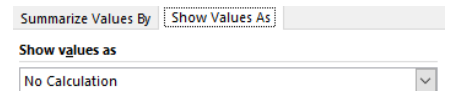
Add the Running Total **Drag-and-drop** the **Transaction Value** column into the **Values** field again.



Change the presentation Click the **drop-down arrow** for the **Transaction Value**, and change the **Value Field Settings**.



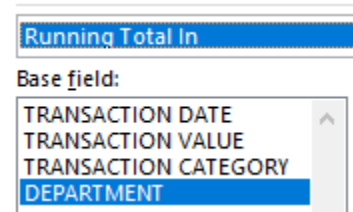
Choose the tab **Show Values As**.



Running Total

Choose **Running Total In** and the Base field **Department**.

Format the numbers as you like, and see the resulting setup.



Total Transaction Value	Running Total
\$ 139,663	\$ 139,663
\$ 66,398	\$ 206,061
\$ 60,046	\$ 266,107
\$ 33,307	\$ 299,414
\$ 15,735	\$ 315,149
\$ 315,149	

By changing to Running Total In Department, we get the same final value (**\$315K**), but we show it in two different presentations.

Exercise 02: Difference Functions

Find the Ticket tracker.

Select the tab for **L02 Difference Functions**.



Create a count of each product's tickets

Select the table **tblTickets**, and create a Pivot Table that **counts** the tickets, broken down by **Product**.

Row Labels	Count of STATUS
Accruex	92
Bedlam	79
Brainclip	99
Cubix	41
Empower	121
Teamfire	88
Vinyl	101
Grand Total	621

Sort the Pivot Table

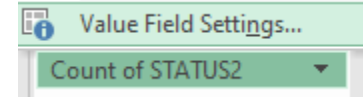
Sort Descending (high to low) by the number of tickets.

Count of STATUS
121
101
99
92

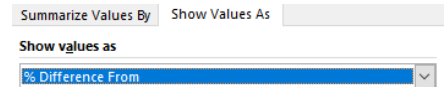
Add another count **Drag-and-drop** one of the fields into the Values field, and create another count.

Count of STATUS	Count of STATUS2
121	121
101	101
99	99
92	92
88	88
--	--

Change the presentation of the second count Click the Values drop-down menu and change the **Value Field Settings**



Switch to a different calculation On the **Show Values As** tab, change to **% Difference From**, and choose **Empower**. This will set Empower (the highest value) as the 100%, and the rest will show up below that.



See the changes

Row Labels	Count of STATUS	Count of STATUS2
Empower	121	
Vinyl	101	-16.53%
Brainclip	99	-18.18%
Accruex	92	-23.97%
Teamfire	88	-27.27%
Bedlam	79	-34.71%
Cubix	41	-66.12%
Grand Total	621	

This concept is to set a value, and demonstrate the difference from that value – whether percentages or whole numbers.

Exercise 03: Calculated Fields

Find the Calculated Field tab Select the tab **L03 Calculated Fields**.

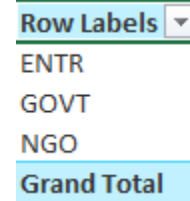


Identify an uncalculated bit of information In our sales data on this table, we have **COGS** and **Sale Price**, and the *difference* between these represents the Profit. We could calculate this *in the data*, or in the Pivot Table.

COGS	SALE PRICE
\$ 1,083,700.00	\$ 2,330,000.00
\$ 1,270,100.00	\$ 1,626,000.00
\$ 121,300.00	\$ 180,000.00
\$ 590,400.00	\$ 1,010,000.00
\$ 2,440,200.00	\$ 5,076,000.00

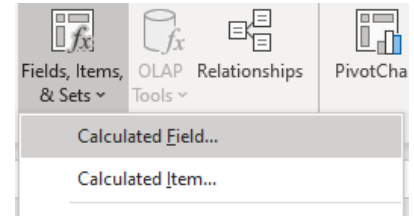
Create a Pivot Table

Create a Pivot Table using **tblSales2017to2019**, breaking the sales down by **Client Type**. Don't insert any numbers to be calculated at this time.



Add a Calculated Field

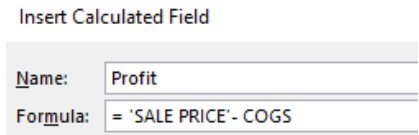
Click **Analyze Tab > Fields, Items, & Sets > Calculated Field**.



Create the field

Name the field **Profit**, and make it

= 'SALE PRICE' – COGS



A Calculated Field is the equivalent of having another **column** on your data set. Sometimes you can't alter the existing data, so creating a calculated field from the other fields can be helpful.

Exercise 04: Calculated Items

Find the Calculated Items sheet.

Select the tab for **L04 Calculated Items**.



Create a Pivot Table

On **tblInventory**, create a Pivot Table that totals **Quantity** by **Product**.

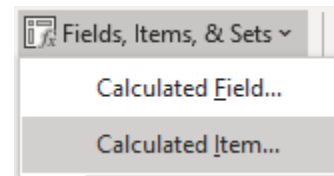
Row Labels	Sum of QUANTITY
Brightburn	790,120
Greylock	786,710
Hummingbird	811,020
Road Flare	779,100
Grand Total	3,166,950

Assume categorization

Let's say that we know **Brightburn**, **Hummingbird**, and **Road Flare** are **Optical** products, and **Greylock** is **Software**.

Click somewhere within the **Row Labels** area, to inform Excel you want to change the Row Labels.

Click **Analyze Tab > Fields, Items, & Sets > Calculated Item..**



Create a new item Name the Item **Optical**, and set it equal to **=Brightburn + Hummingbird + 'Road Flare'**.

Insert Calculated Item in "PRODUCT"

Name:

Formula:

Filter out the repeated elements Now that **Optical** is added to the Pivot Table, click the **Drop-down arrow** for **Row Labels**, and remove **Brightburn, Hummingbird, and Road Flare**.

Row Labels	Sum of QUANTITY
Brightburn	790,120
Greylock	786,710
Hummingbird	811,020
Road Flare	779,100
Optical	2,380,240
Grand Total	5,547,190

- (Select All)
- Brightburn
- Greylock
- Hummingbird
- Road Flare
- Optical

View the result Now, we've grouped together three **items** into a single item – much like we could do with the **Excel Data Model** if we have these categorizations.

Row Labels	Sum of QUANTITY
Hummingbird	811,020
Optical	2,380,240
Grand Total	3,191,260

Calculated Fields are the same as new **columns**. Calculated Items are the same as new **categories**.

Exercise 05: Using Pivot Tables as a Reference

Find the reference tab Select the tab **L05 Referencing Pivot Tables**.

L05 Referencing Pivot Tables

Find the two values we need for our calculation

On this sheet, we see two Pivot Tables, filtered by Slicers, that will fluctuate as we adjust the visual filters. We'd like the number values from these Pivot Tables to be used to calculate the **Percent of Total Revenue** during any period.

Total Revenue	
\$	22,477,930,000

Row Labels	Total Revenue
US GOVT	\$15,068,790,000
Grand Total	\$15,068,790,000

QUARTER

Q1 Q2

Q3 Q4

FISCAL YEAR

2015 2016

2017 2018

2019

US GOVT Revenue for the Period:

Total Revenue for the Period:

Percent of Total Revenue for the Period:

Reference the first value

In cell **H21**, enter an =, then click the cell with the US GOVT Revenue (**H8**).

```
=GETPIVOTDATA("REVENUE",$G$7,"CLIENT","US GOVT")
```

Reference the second value

In cell **H22**, enter an =, then click the cell with Total Revenue (**G4**).

US GOVT Revenue for the Period:

Total Revenue for the Period:

Use these values

In cell **H24**, enter the formula **=H21/H22** to calculate the **Percentage of Revenue**.

US GOVT Revenue for the Period:

Total Revenue for the Period:

Percent of Total Revenue for the Period:

Adjust the calculation with the Slicers

By clicking different **Fiscal Years** and different **Quarters**, see that the calculations adjust.

FISCAL YEAR

2015 2016

2017 2018

2019

ie Period:

ie Period:

ie Period:

Whether by using the GETPIVOTDATA function or a cell reference, we can pull a numeric value from a Pivot Table, then use it in other calculations. Because the Pivot Table is controlled by Slicers, so to is our calculation.

Module 05: Data Visualization

A Pivot Chart is effectively just a chart based on a Pivot Table, so there are a number of customizations that we can perform on them to make beautiful, effective communication pieces.

Exercise 01: Creating a Pivot Chart

Open the first tab of the Data Visualization workbook

Open **M05 Data Visualization**, and begin with **L01 Creating a Pivot Chart**

L01 Creating a Pivot Chart

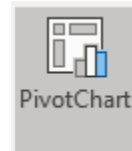
Find the Pivot Table

In cells **N3:O9**, you'll find an already-created Pivot Table.

Row Labels	Total Lifetime Value
ENTR	\$ 601,700
MUNI	\$ 178,600
NONP	\$ 93,500
Non-Profit	\$ 12,700
SMB	\$ 503,000
Grand Total	\$ 1,389,500

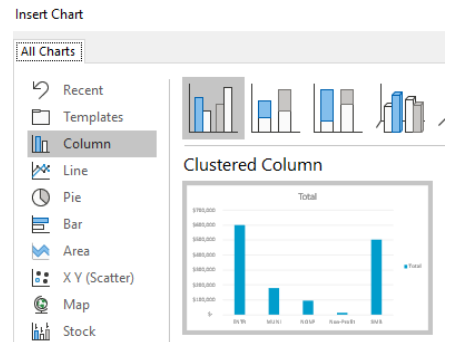
Add a Pivot Chart

At this point, click on the Pivot Table, and choose **Analyze > Pivot Chart**.



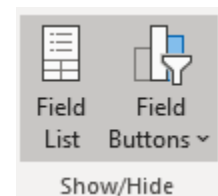
Choose an appropriate chart

Click on **Clustered Column** and click **OK**.



Change the labeling on the Pivot Chart

To remove the **Total Lifetime Value** and **Client Type** markers, press **Analyze > Field Buttons**.



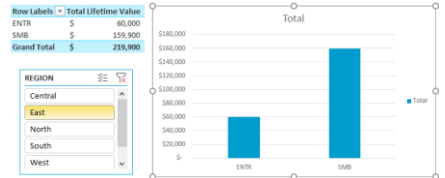
Filter the chart

Click **Analyze > Insert Slicer**, and add a slicer to the **Region** information.



Slice the chart

As you choose different regions, both the table and the chart fluctuate.



A Pivot Chart is a 1:1 reflection of the contents of the Pivot Table. As the Pivot Table is filtered, so too will the Pivot Chart.

Exercise 02: Customizing a Pivot Chart

Find the next tab.

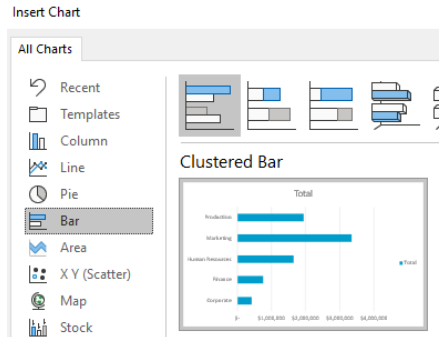
Select the tab for **L02 Custom Pivot Charts**.



Add a chart to the existing Pivot Table.

Click cell **L3**, and choose **Analyze > Pivot Chart**.

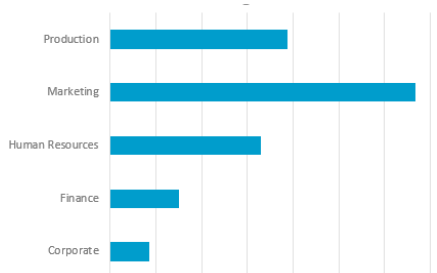
Select a **Clustered Bar Chart**.



Remove unnecessary labeling

Click **Analyze > Field Buttons** to disable the field buttons.

Click and delete the **Total** entries in the Title and Legend.



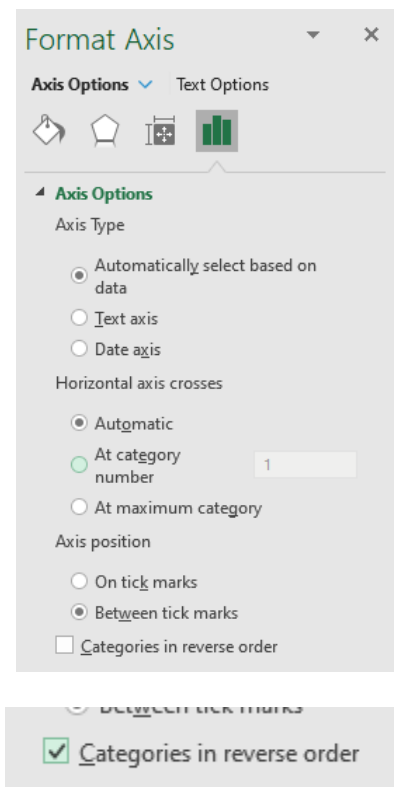
Note that bar charts are flipped

Because of the location of the two axes, Corporate and Production are flipped between the chart and the table. Click on the labels of your Bar Chart.



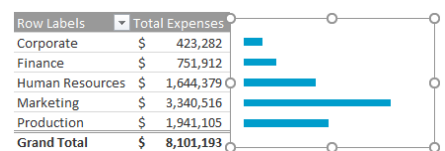
Access the Chart Formatting Tools

Use the shortcut **[CTRL] + [1]** to change the order of these labels.



Continue to remove unnecessary visuals

Delete the Axis labels, and remove the lines from the chart.



Line up the bars

Now, by resizing and moving the chart, you can see it matched up with the Pivot Table nicely.

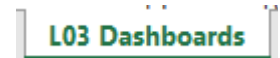
Row Labels	Total Expenses
Corporate	\$ 423,282
Finance	\$ 751,912
Human Resources	\$ 1,644,379
Marketing	\$ 3,340,516
Production	\$ 1,941,105
Grand Total	\$ 8,101,193

While Pivot Tables may look a bit clunky when they first come onto a page, you can clean them up and make them very pleasant to interact with.

Exercise 03: Creating Dashboards

Find the Dashboard tab

Select the tab **L03 Dashboards**.



Add another Pivot Table and Chart

Note that we have a **Total Salary by Division** Pivot Table and Pivot Chart.

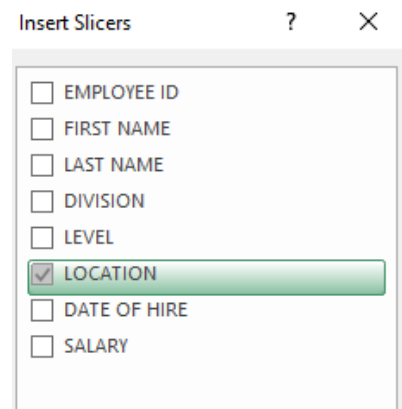
Row Labels	Total Salary
Administrative	\$ 6,257,400
Executive	\$ 7,633,600
Finance	\$ 5,862,300
Information Se	\$ 5,704,300
Marketing	\$ 4,975,000
Operations	\$ 8,410,700
Production	\$ 17,361,400
Research	\$ 11,258,500
Sales	\$ 5,539,000
Grand Total	\$ 73,002,200

Below this combination, add a Pivot Table and Pivot Chart representing **Avg Salary by Level**.

Row Labels	Avg Salary
L8	\$ 216,109
L7	\$ 156,553
L6	\$ 114,095
L5	\$ 85,300
L4	\$ 75,567
L3	\$ 64,955
L2	\$ 54,992
L1	\$ 44,767
Grand Total	\$ 69,792

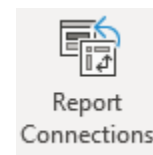
Add a Slicer for **Location**

Click onto one of the two Pivot Tables, and choose **Analyze > Insert Slicer**. Click the checkbox for **Location**.



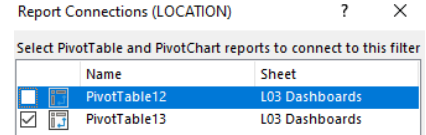
Connect the Slicer to the other Pivot Table

Click on the Slicer, and choose **Slicer > Report Connections**.



Choose the other Pivot Table

At this point, there should be two Pivot Tables listed on this page. Make sure that both checkboxes are marked.



View the impact of the Slicer on both Pivots

Click the options on the Slicer, and watch as both Pivot Tables are filtered simultaneously.

As many Pivot Tables and Pivot Charts as you like can be filtered by the same Slicer.

Exercise 04: Custom Labeling

Find the donut chart tab

Select the tab **L04 Custom Labeling**.



Identify the data visualization benefit

In the donut chart in columns **O:P**, we see that a large label, stating the percentage of our total volume was conducted by truck, would be a good visualization element to have in the middle of the donut.

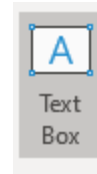
Row Labels	Total Volume (cubic meters)
Truck	71%
Air	29%
Grand Total	100%



Rather than using the built-in data label tool, we'll use a **linked textbox**.

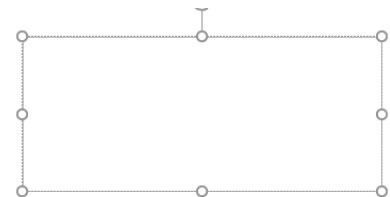
Insert a textbox

Click cell **Q1** (outside the chart and Pivot Table), and choose **Insert Tab > Text Box**.



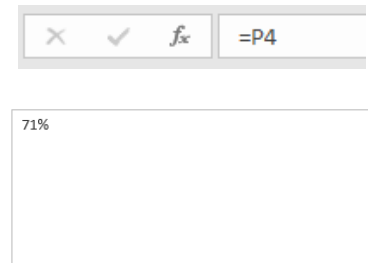
Draw the textbox

Click-and-Drag a box on the spreadsheet.



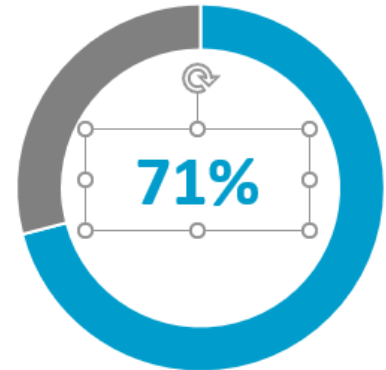
Connect the textbox to the value

Don't type anything directly into the text box. Instead, click in the **Formula Bar** at the top of the screen, and **reference the cell from the Pivot Table**. Now, when you press **[ENTER]**, you'll see the value show up dynamically.



Customize the text box

Resize, change the font, and otherwise make the text box appropriate to your needs.



While every chart can use data labels, sometimes placing a larger label on your chart, wherever and however you need it, is more useful. In this exercise, we linked our text box to a cell in the spreadsheet, and it will dynamically update whenever the data or the filter changes.

Module 06: Advanced Pivot Table Techniques

This is the wrap-up module for the course – everything we can think of, in one place!

Exercise 01: Refreshing Data

Open the final workbook

Open **M06 Advanced Options**, and start with **L01 Automatic Refreshing**.



Change the Pivot Table contents

Change a value in one of the two Tables on this page – either to a number value for expenses, or to the name of one of the Approvers.

HUMAN RESOURCES	FY19 Q1	\$	80,000.00
HUMAN RESOURCES	FY19 Q2	\$	84,270.00
HUMAN RESOURCES	FY19 Q3	\$	91,860.00
HUMAN RESOURCES	FY19 Q4	\$	97,780.00

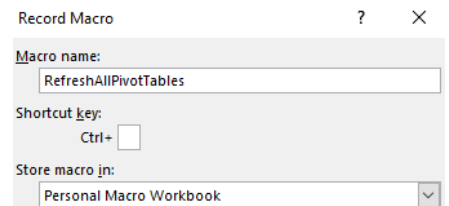
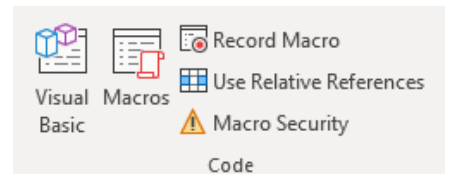
DEPARTMENT	PERIOD	EXPENSES
HUMAN RESOURCES	FY19 Q1	\$ 86,870.00
HUMAN RESOURCES	FY19 Q2	\$ 87,600.00
HUMAN RESOURCES	FY19 Q3	\$ 91,860.00

Notice that the Pivot Table *does not change*

The Pivot Table is accessing information from these Tables, but does not automatically update.

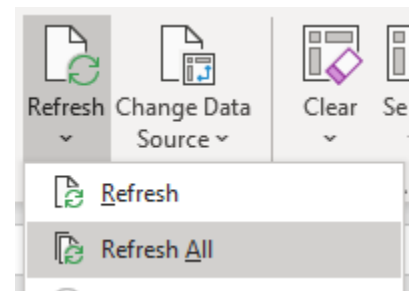
Record a Refresh All

Click on the Pivot Table, and click **Developer Tab > Record Macro**. Save the macro to your **Personal Macro Workbook**.



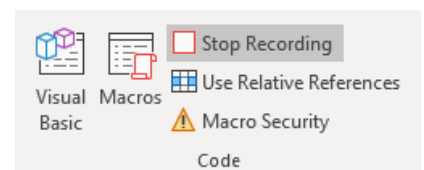
Refresh all the Pivot Tables

Click **Analyze Tab > Refresh > Refresh All..**



Stop recording

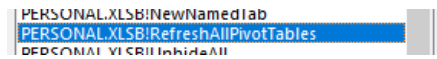
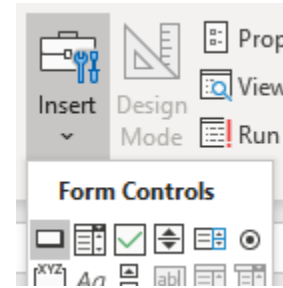
Click **Developer Tab > Stop Recording**. You now have a macro that refreshes all connections in your workbook.



Add a Refresh Button

There are many ways to execute this macro, but we'll click **Developer Tab > Insert > Button**.

Then, simply assign the macro we recorded (**RefreshAllPivotTables**) to the button press.



Make a change and press the button

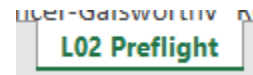
Change some part of the data going into your Pivot Table, and press the refresh button.

Pivot Tables, Power Query, and a few other tools, require connections to data. That data connection needs to be refreshed, and the button press of **Refresh All** automatically refreshes everything that needs it in your workbook.

Exercise 02: Preflighting a Pivot

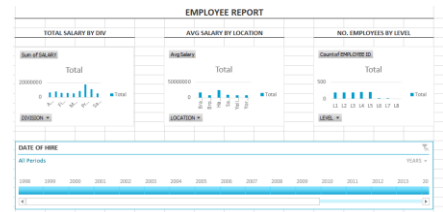
Find the two Preflight tabs.

Note the contents of **L02 Preflight** and **L02 REPORT**.



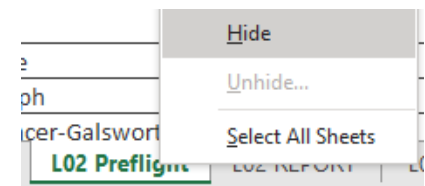
Consider the best end-user scenario

The end user would like to see the reporting as clearly as possible, with as little unnecessary navigation as possible. For this reason, we'll be 'cleaning up' our work.



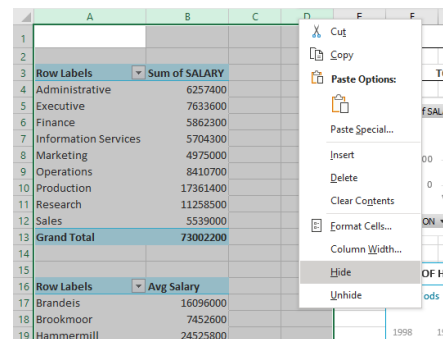
Hide the data tab

Right-click the tab **L02 Preflight**, and choose **Hide**. Now the end user will only be concerned with the Report tab.



Hide the unnecessary Pivot Tables

Select columns A:D on **L02 REPORT**, then **right-click** and choose **Hide**. Now, only the Pivot Charts and Timeline are visible.



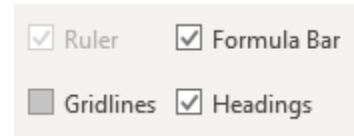
Snap the charts to the Grid

Clicking on each chart's corners, **[ALT] + [CLICK] + [DRAG]** these corners toward the Gridlines on the page, and the charts will snap directly to those lines.



Hide the Gridlines

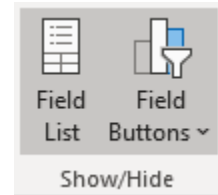
Click **View Tab > Gridlines** to hide gridlines.



Hide the unnecessary elements from the charts

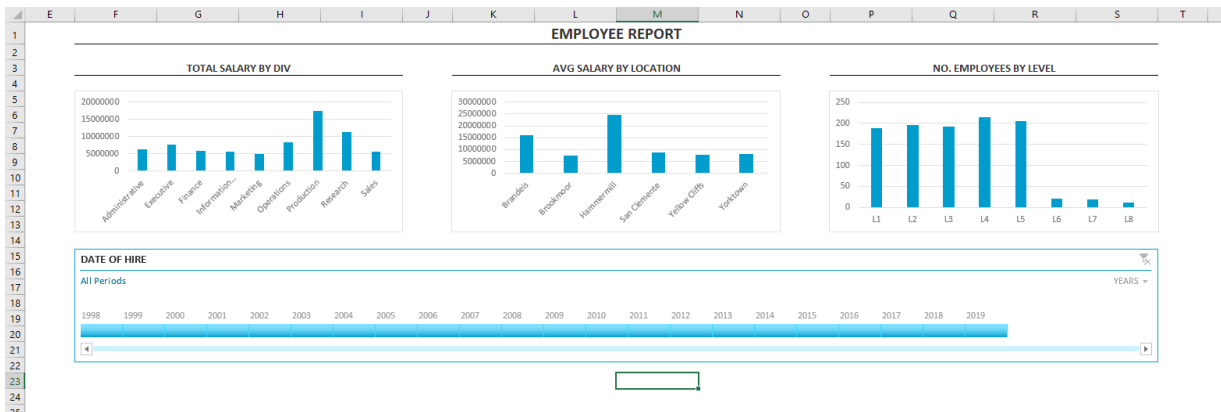
By clicking the **Field Buttons** button, you can turn off the grey boxes on each chart.

By clicking on unnecessary elements and pressing **[DELETE]**, we remove those elements.



Use the cell widths to stretch the charts

Now that each chart is snapped to the grid, clicking-and-dragging the borders between cells will make the charts the correct size.



Preflighting your workbook means preparing it for interaction with others. By hiding the core data and only providing chart interaction, you simplify the work for others. By removing visual clutter and snapping the elements to the same grid, you bring a simplicity to the visual space that users will engage with.

Exercise 03: Custom Number Formatting

Find the Custom Number Formatting Pivot Table

Select the tab **L03 Number Formatting**. Note the Pivot Table already built there.

Our goal is to make this as readable as possible.

EMPLOYEES	
Row Labels	Sum of SALARY
Administrative	6257400
Executive	7633600
Finance	5862300
Information Services	5704300
Marketing	4975000
Operations	8410700
Production	17361400
Research	11258500
Sales	5539000
Grand Total	73002200

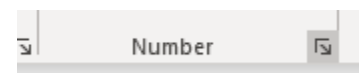
Select the numeric cells

Highlight all the cells that have the salary numbers. Note that all salary numbers begin in the **millions**.

	Sum of SALARY
	6257400
	7633600
	5862300
ces	5704300
	4975000
	8410700
	17361400
	11258500
	5539000
	73002200
	Sum of SALA
	Value: 730022

Change the number formatting

Click **Home > Number Formatting > Pop-Out Button**.



Choose custom

Click the **Custom** entry, and type the following:

\$ 0.0,, "M"

Sample
\$ 6.3 M

Type:
\$ 0.0,, "M"

Watch the application

By changing the number formatting on these cells to a custom setting, we can present these rather large numbers as smaller, easier-to-consume representations.

Sum of SALARY	
	\$ 6.3 M
	\$ 7.6 M
	\$ 5.9 M
	\$ 5.7 M
	\$ 5.0 M
	\$ 8.4 M
	\$ 17.4 M
	\$ 11.3 M
	\$ 5.5 M
	\$ 73.0 M

Number formatting takes a numeric input and presents it in varied ways. This allows us to get interesting date, number, time, and currency representations.

Exercise 04: Conditional Formatting

Find the final tab

Select the tab **L04 Conditional Formatting**. Find the Pivot Table on the page.

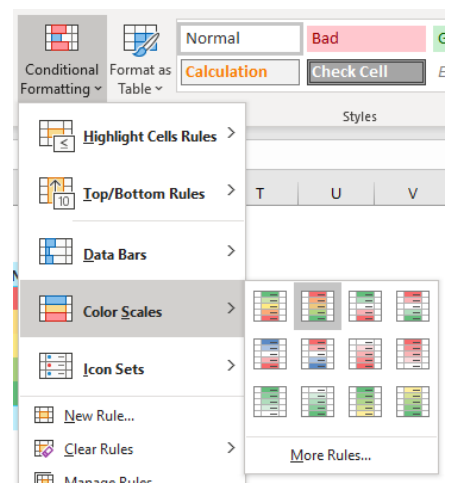
Highlight the numeric cells

Excluding the Grand Total, select all the number cells.

No. Working Days Assigned	
	191
	150
	146
	93
	48
	No. Working Day

Turn on Conditional Formatting

Click **Home Tab > Conditional Formatting > Color Scales**, and choose the **Red-Green** color scale.



View the impact of your choice

By adding color-coding to the cells in our Pivot Table, we are able to more quickly find the relevant information.

Row Labels	No. Working Days Assigned
Douglas, Leonard	191
Gillespie, Hannah	150
Salame, Estella	146
Talley, Lena	93
McDaniel, Roosevelt	48
Grand Total	628

Pivot Tables by themselves are powerful analysis and visualization tools. However, combined with color-coding, custom number formatting, and other tools like Power Query, they become part of an incredibly robust analysis suite.