

# Notes: Pivot Tables in Spreadsheets

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## 1. Introduction to Pivot Tables for Google Sheets

### Basic pivot table features

- Filter
- Sort
- Subtotal
- Analyze

How to create a pivot table:

(1) Select one cell----Top option “Data” ----choose Pivot Table

(2) Select the whole table including the headings—Top option “Data”----choose Pivot Table

Click anywhere within the dataset and create a pivot table.

Even though there is missing data, there aren't any completely empty rows or columns. So the pivot table should select the full range automatically.

Pivot table rows and columns:

#### Select rows

In this exercise, you'll begin to populate our pivot table by selecting the Row Labels. On the right, you'll find the blank pivot table that was created in the previous exercise, containing the Top 10 companies by Revenue for 2017.

You will populate the Rows by selecting among the following categories: **Name** , **Headquarters** , and **Industry** .

You'll start by selecting a single Row Label, then removing it, then you'll select multiple Row Labels

#### Instructions

100XP

- Select **Add** in the pivot table editor next to the **Rows** section, and choose **Name** ; this will list the name of each company in the dataset.
- Now click the X in the upper right section of the **Name** box in the pivot table editor, this will remove the names.
- Now select **Add** and choose **Headquarters** , select **Add** again, and choose **Industry** .

A1	-	Jx	Headquarters	
		A	B	C
1		Headquarters	Industry	
2		China	Petroleum refining	
3			Utilities	
4		China Total		
5		Germany	Automotive	
6		Germany Total		
7		Japan	Automotive	
8		Japan Total		
9		Netherlands	Petroleum refining	
10		Netherlands Total		
11		USA	Conglomerate	
12			Electronics	
13			General merchandisers	
14			Petroleum refining	
15		USA Total		
16		Grand Total		

数据透视表编辑器

×

'Data Source'!A1:F11

推荐使用

行

添加

Headquarters

×

顺序

升序

排序依据

Headquarters

☒ 显示总计
 ☐ 重复行标签

Industry

×

顺序

升序

排序依据

Industry

☒ 显示总计

列

添加

值

添加

过滤器

添加

### Select columns

In this exercise, you'll further populate your pivot table by selecting the Column Labels.

You will populate the Columns by selecting among the following categories: **Name** , **Headquarters** , and **Industry** .

You'll start by selecting a single Column Label, then removing it, then you'll select multiple Column Labels

#### Instructions

100XP

- Select **Add** in the pivot table editor next to the **Columns** section, and choose **Industry** ; this will list each industry in the dataset.
- Now click the **X** in the upper right section of the **Industry** box in the pivot table editor, this will remove the names.
- Now select **Add** and choose **Year** , select **Add** again, and choose **Headquarters** .

	Year	Headquarters					
	2017					2017 Total	Grand Total
Name	China	Germany	Japan	Netherlands	USA		
Apple							
Berkshire Hathaway							
China National Petroleum							
Exxon Mobil							
Royal Dutch Shell							
Sinopec Group							
State Grid							
Toyota							
Volkswagen Group							
Walmart							
Grand Total							

## Rearrange rows and columns

Once you have selected Row and Column Labels, you can further finetune your Pivot Table by rearranging them. To do this, all you need to do is Click and Drag the Labels and place them where you want them to go.

## Pivot Table values:

### Selecting values

The next step is to select the **Values**; which will populate the body of the pivot table.

You can click on the **Add** button in the **Values** section in order to choose the field that you want added to the pivot table.

The pivot table will then perform a calculation, such as **SUM** or **COUNT** on your selected value, and it will populate the pivot table with the result of that calculation.

#### Instructions

100XP

- Select **Profit** in the **Values** section.
- To remove the the value, click the **X** in the top right corner of the **Profit** box.
- Now select **Revenue** in the **Values** section.

B4		255
	A	B
1	Headquarters	SUM of Revenue (\$B)
2	China	846
3	Germany	240
4	Japan	255
5	Netherlands	240
6	USA	1,131
7	Grand Total	2,712

行

添加

Headquarters

×

顺序

升序

排序依据

Headquarters

☒ 显示总计

列

添加

值

添加

Revenue (\$B)

×

汇总方式

SUM

显示方式

默认

### Selecting multiple values

You can also select multiple values at the same time in order to see more data at once. The pivot table will then show each value separately.

You can rearrange the values using the same **Click and Drag** method as before.

#### Instructions

- Select **Profit** in the **Values** section.
- Then select **Revenue** in the **Values** section.
- Now move Revenue above Profit.

## 2. Behind the Scenes of the Pivot Table

What does a pivot table do:

It takes a dataset of any size, and allows you to build custom summaries of the data in an easy-to-manage table

### Selecting filters

Now that you know how to create the body and layout of a pivot table, let's start organizing the data.

One option is to filter the data. You can do this by selecting a field in the **Filter** section of the pivot table editor.

This will then give you the option to filter based on the contents of that field.

#### Filtering by using a string

Sometimes you will need to select multiple entries within the Filter, which you can do by clicking each selection individually.

However, this can become time-consuming if there are many items to scroll through, such as this example which contains a list of 50 cities.

There is a shortcut to save you some time though, as you can type in a text-string, and select all of the entries that contain that string. For instance, if you want to select all of the cities in California, you can type "Cal" in the filter, and it will return only those items that contain that string.

#### Instructions

100XP

- Click on the **Add** button in the **Filters** section and select **Month**.
- Once the **Month** box appears, you can then click the dropdown box that appears, and select an individual month. This time, select January.

#### Instructions

100XP

- Click on the **Add** button in the **Filters** section and select **City**.
- Once the **City** box appears, you will need to clear all of the selections, then select only the cities in California.

### Filtering on min/max values

Even though filters are often used to select different groups of items, you can also filter on numerical values as well. In this example you will select the highest and lowest values in order to determine the extreme outliers of the dataset.

#### Instructions

100XP

- In the **Filters** section, select the two highest and two lowest values.

### Filtering on values

Let's try another example. This time you'll need to find the cities that receive the most days of rainfall in a month.

#### Instructions

100XP

- In the **Filters** section, select **Days** and then filter it to only show values of 20 or higher.

B4		$\sum x$	58
	A	B	
1	City	SUM of Days	
2	Los Angeles, California	36	
3	Riverside, California	33	
4	Sacramento, California	58	
5	San Diego, California	42	
6	San Francisco, California	65	
7	San Jose, California	59	
8	Grand Total	293	
9			

	A	B	C
1	City	Month	SUM of Inches
2	Portland, Oregon	01-Jan	6.1
3		12-Dec	6.9
4	Portland, Oregon Total		13.0
5	Grand Total		13.0
6			

按条件过滤

按值过滤

[全选](#) [清除](#)

18  
19  
✓ 20  
✓ 21

过滤器 

Days 

状态  
当前显示 2 项内容

Exercise: Building a complete pivot table  
Showing the rainfall by month in each city:

Instructions:

(1) In the Rows section, select City and Month  
In the Values section, select Millimetres

(2) In the Rows section, select Days  
In the Column section, select Month  
In the Values section, select City

(3) In the Rows section, select City  
In the Values section, select Days and Inches  
In the Filters section, select Month and then choose January

	A	B	C
1	City	SUM of Days	SUM of Inches
2	Atlanta, Georgia	11	4.2
3	Austin, Texas	7	2.2
4	Baltimore, Maryland	10	3.1
5	Birmingham, Alabama	11	4.8
6	Boston, Massachusetts	11	3.4
7	Buffalo, New York	19	3.2
8	Charlotte, North Carolina	10	3.4
9	Chicago, Illinois	11	1.7
10	Cincinnati, Ohio	11	2.8
11	Cleveland, Ohio	17	2.7

### 3. Advanced Options

Changing the calculation of values:

## Other calculation options for values

- Counting Calculations
  - COUNT : Counts numerical values only
  - COUNTA : Counts all non-blank values
  - COUNTUNIQUE : Counts all non-blank values (excluding duplicates)
- Ranking Calculations
  - AVERAGE , MAX , MIN , MEDIAN
- Mathematical Calculations
  - PRODUCT
- Statistical Calculations
  - STANDARD DEVIATION , VARIANCE

### (1)COUNTA: counts all non-blank values

**Exercise**

#### Counting text values

You just saw several ways to count data in a pivot table. In this example you will need to count how many films were released in each year.

In order to do this, you'll need to use the following fields:  
Release Year and Title

Instructions 100XP

- Add Release Year to the Rows section to list all of the years.
- Add Title to the Values section, and select the proper counting method.

A	B
Release Year	COUNTA of Title
2010	222
2011	223
2012	213
2013	230
2014	243
2015	211
2016	98
Grand Total	1440

值 添加

Title X

汇总方式 显示方式

COUNTA 默认

### (2)COUNT: count numerical values

**Counting numerical values**

Let's try another example. This time we want to count how many films of each language made any amount of Gross Revenue.

You'll need to find a way to distinguish the films by language, and then count how many have a numerical value for Gross Revenue.

Instructions 100XP

- Add Language to the Rows section to list all of the languages.
- Add Gross to the Values section, and select the proper counting method. Several methods may work, but in this case we want to use the method that counts numerical values.

	A	B
1	Language	COUNT of Gross
2		0
3	Arabic	0
4	Bosnian	1
5	Cantonese	2
6	Chinese	1
7	Danish	1
8	English	1038
9	French	11
10	German	2
11	Hebrew	3
12	Hindi	8
13	Icelandic	1

值 添加

Gross X

汇总方式 显示方式

COUNT 默认

### (3)Maximum, Minimum values

## Minimum and maximum values

In this example, you'll need to find the Minimum and Maximum Budgets for films in each country.

You'll need to add **Budget** to the **Values** section twice, with the first one showing the minimum value, and the second one showing the maximum value.

### Instructions 100XP

- Add **Country** to the **Rows** section to list all of the countries.
- Add **Budget** to the **Values** section twice, and select the proper calculations. Make sure that the minimum value appears first, followed by the maximum value.

	A	B	C
1	Country	MIN of Budget	MAX of Budget
2		3,500,000	3,500,000
3	Australia	2,500,000	150,000,000
4	Bahamas	5,000,000	5,000,000
5	Belgium	15,000,000	34,000,000
6	Brazil	3,000,000	4,000,000
7	Bulgaria	7,000,000	7,000,000
8	Cambodia	0	0
9	Canada	100,000	80,000,000
10	Chile	26,000,000	26,000,000
11	China	6,000,000	150,000,000
12	Czech Republic	50,000,000	50,000,000
13	Denmark	1,000,000	7,400,000
14	Dominican Republic	500,000	500,000

值以: 列 添加

Budget

汇总方式

MIN

显示方式

默认

Budget

汇总方式

MAX

显示方式

默认

## (4)Average and median

### Average and median

In this example, you'll need to find the Average and Median values for Gross Revenue each year.

You'll need to add **Gross** to the **Values** section twice, with the first one showing the average value, and the second one showing the median value.

### Instructions 100XP

- Add **Release Year** to the **Rows** section to list all of the years.
- Add **Gross** to the **Values** section twice, and select the proper calculations.

	A	B	C
1	Release Year	AVERAGE of Gross	MEDIAN of Gross
2	2010	47,319,892	24,155,659
3	2011	45,705,263	27,959,561
4	2012	57,375,066	27,871,675
5	2013	55,299,656	26,616,999
6	2014	62,024,831	38,543,473
7	2015	72,602,821.73	33,661,445.5
8	2016	72,700,510	47,952,020
9	Grand Total	56,704,653	30,538,669
10			

值以: 列 添加

Gross

汇总方式

AVERAGE

显示方式

默认

Gross

汇总方式

MEDIAN

显示方式

默认

## Calculated Fields

Sometimes you will want to include a field in your pivot table, but it may not exist in the original dataset. If the new field can be calculated from the existing data, then your answer may be to create a Calculated Field.

## Values—Calculated Field—Add the formula of calculation

Calculated Field 1

Formula

=Gross-Budget

Summarize by

SUM

Show as

Default

### What can be done with a calculated field

- Which answer best describes what a Calculated Field does?
- It allows you to add additional fields to your pivot table, by performing simple mathematical functions on the existing data

## Calculated Field

### Create a calculated field

In this example, you'll need to calculate the profit by year. The pivot table is already partially built, showing the Gross Revenue and Budget for each year. You'll need to add the calculated field.

#### Instructions 100XP

- Create a Calculated Field that will calculate the Profit for each year; `Gross` minus `Budget`.

	A	B	C	D
1	Release Year	SUM of Gross	SUM of Budget	Sum of Profit
2	2010	9,180,059,122	8322365000	857,694,122
3	2011	8,683,999,896	7,676,151,350	1,007,848,546
4	2012	9,983,261,565	7,425,368,375	2,557,893,190
5	2013	10,009,237,720	8,215,556,567	1,793,681,153
6	2014	9,861,948,098	7,483,608,000	2,378,340,098
7	2015	9583572468	7,034,754,148	2,548,818,320
8	2016	5,016,335,158	4,525,775,000	490,560,158
9	Grand Total	62,318,414,027	50683578440	11,634,835,587

值以: 列 添加

Gross

汇总方式: SUM 显示方式: 默认

Budget

汇总方式: SUM 显示方式: 默认

Sum of Profit

公式: =Gross-Budget 汇总方式: SUM 显示方式: 默认

### Create a calculated field pt 2

There have been budget cuts! In this exercise we are going to look at the ten films with the highest total budgets, and we need to cut them in half!

#### Instructions 100XP

- Create a Calculated Field that will calculate the Revised Budget for each film. The formula should be `Budget/2`

	A	B	C
1	Title	SUM of Budget	计算字段1
2	Avengers: Age c	250,000,000	125000000
3	Batman v Super	250,000,000	125000000
4	Captain America	250,000,000	125000000
5	John Carter	263,700,000	131850000
6	Pirates of the Ca	250,000,000	125000000
7	Spectre	245,000,000	122500000
8	Star Wars: Episc	245,000,000	122500000
9	Tangled	260,000,000	130000000
10	The Dark Knight	250,000,000	125000000
11	The Hobbit: The	250,000,000	125000000
12	Grand Total	2,513,700,000	1256850000

值以: 列 添加

Budget

汇总方式: SUM 显示方式: 默认

计算字段1

公式: =Budget/2 汇总方式: SUM 显示方式: 默认

### Create a calculated field pt 3

This pivot table lists the top ten grossing films in the dataset. What would happen if the studios that produced these films decided to donate 1% of Gross Revenues to charity? Let's calculate how much that would amount to. Create a calculated field that shows 1% of Gross Revenue for each of these films.

#### Instructions 100XP

- Create a Calculated Field that will calculate the charitable contribution for each film. The formula should be `Gross*1%`

	A	B	C
1	Title	SUM of Gross	计算字段1
2	Avengers: Age c	458,991,599	4589915.99
3	Captain America	407,197,282	4071972.82
4	Iron Man 3	408,992,272	4089922.72
5	Jurassic World	652,177,271	6521772.71
6	Star Wars: Episc	936,627,416	9366274.16
7	The Avengers	623,279,547	6232795.47
8	The Dark Knight	448,130,642	4481306.42
9	The Hunger Gar	407,999,255	4079992.55
10	The Hunger Gar	424,645,577	4246455.77
11	Toy Story 3	414,984,497	4149844.97
12	Grand Total	5,183,025,358	51830253.58

值以: 列 添加

Gross

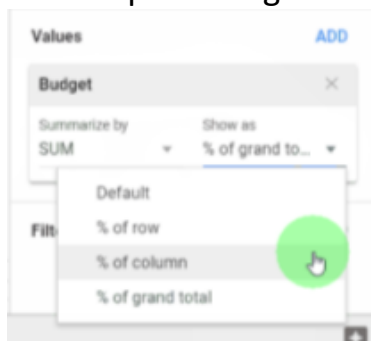
汇总方式: SUM 显示方式: 默认

计算字段1

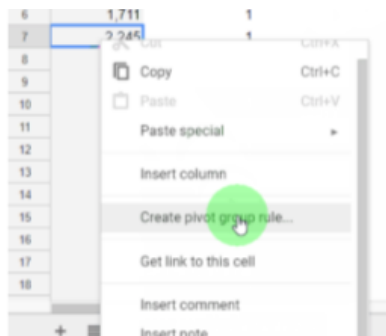
公式: =Gross\*1% 汇总方式: SUM 显示方式: 默认

## Data as percentages, drilling down, & grouping

### Data as percentages



### Grouping



## Exercise:

### Percentage of grand total

Let's calculate the percentage of Gross Revenue that is earned by each rating.

#### Instructions

100XP

- Add **Gross** to the **Values** section a second time, and modify it so that it shows the data as a percentage of the grand total. You may also need to change the number formatting afterwards, to show the values as percentages.

	A	B	C
1	Certification	SUM of Gross	SUM of Gross
2	G	1,540,370,967	2.47%
3	PG	13,267,829,501	21.30%
4	PG-13	32,065,822,644	51.48%
5	R	15,409,503,885	24.74%
6	Grand Total	62,283,526,997	100.00%

值以: 列 添加

Gross

汇总方式: SUM 显示方式: 默认

Gross

汇总方式: SUM 显示方式: 占总和的百...

过滤器 添加

### Percentage of rows

Let's look at a selection of films released in various languages over several years. You'll need to calculate the percentage of Gross Revenue that can be attributed to a certain language in each year. For instance, in 2010 there were films released in French, Hindi, and Spanish, totalling \$30M of Gross Revenue. What percentage of that \$30M can be attributed to each language.

You will not need to add any additional fields to the pivot table editor for this exercise.

#### Instructions

100XP

- Modify the options for **Gross** so that the data in the pivot table is shown as percentages for each year. (Each year should add up to 100%). You may need to change the number format to show the data as percentages.

	A	B	C	D	E	F	G
1	SUM of Gross	Language					
2	Release Year	Cantonese	French	Hindi	Italian	Spanish	Grand Total
3	2010		65.93%	17.17%	0.00%	16.90%	100.00%
4	2011		28.59%	20.58%		50.82%	100.00%
5	2012		1.94%	22.28%		75.78%	100.00%
6	2013			14.66%	5.10%	80.24%	100.00%
7	2014	0.73%	1.30%	0.00%		97.97%	100.00%
8	2015	100.00%	0.00%			0.00%	100.00%
9	Grand Total	1.82%	17.15%	13.99%	2.29%	64.74%	100.00%

What does drilling down do? <If you were to double-click on cell B4 what would happen?>

A new tab would open which contains a sub-selection of the original dataset which corresponds to the number you double-clicked.

	A	B	C	D	E
1	COUNTA of Title Certification				
2	Release Year	G	PG	PG-13	Grand Total
3	2010	3	39	72	114
4	2011	5	29	76	110
5	2012	2	26	71	99
6	2013	1	26	68	95
7	2014	3	28	72	103
8	2015	1	22	60	83
9	2016		11	41	52
10	Grand Total	15	181	460	656



行 添加

Release Year

顺序

升序

排序依据

Release Year

☒ 显示总计

列 添加

Certification

顺序

升序

排序依据

Certification

☒ 显示总计

值 添加

Title

汇总方式

COUNTA

显示方式

默认

过滤器 添加

Certification

状态

当前显示 3 项内容

### Grouping rows

In this example you are going to be looking at the Budgets for every film within the dataset. You'll need to determine how many films fell into specific ranges of budgets. For instance, how many had a budget of \$0 - \$50 Million; how many had a budget of \$50 - \$100 Million, and so on.

#### Instructions

100XP

- Create a Group Rule using an interval of 50,000,000. You can leave the Min and Max at their default settings.
- This is one option that is not found in the pivot table editor; instead, you'll need to right-click somewhere.

### 分组规则

最小值 0 最大值 50000000

间隔大小 50

取消 确定

A4	-	fx	15000 - 15049
	A	B	
1	Grouped Budget	COUNTA of Title	
2	1400 - 1449	1	
3	9000 - 9049	1	
4	15000 - 15049	1	
5	17350 - 17399	1	
6	20000 - 20049	2	
7	22000 - 22049	1	
8	25000 - 25049	1	
9	40000 - 40049	1	
10	42000 - 42049	1	
11	45000 - 45049	1	
12	50000 - 50049	4	
13	60000 - 60049	3	
14	65000 - 65049	1	
15	70000 - 70049	2	

## 4. Editing Data and Troubleshooting

### Adding or changing data

When you change data, you only need to change the actual dataset. But when you are adding new data, you will need to adjust the pivot table source range as well.

#### Correcting Inconsistent Source Data

- This pivot table has some data that is classified incorrectly. The pivot table shows a category for *Automotive* and another category for *Automobiles*. This is an error, as both categories should be combined into one.
- Which of the solutions below will correct the pivot table?

- Go to the Data Source tab, and use **Ctrl+F** to find where *Automobiles* is listed. Change this cell to *Automotive*.

快捷键：Ctrl+F 查找功能

- This pivot table is missing some data. Exxon Mobil is blank for 2015. Let's add this data to our pivot table.
- Which of the solutions below will correct the pivot table?

- ## Using COUNTA to identify missing data

The COUNTA formula will count how many non-blank cells exist within a range.

The quickest way to find the blank cell within a column is to select the header of that column, then **hold the control key (or the command key on a mac)** and hit the down arrow. This will take you to the first break in the data. Then you can decide whether to fill in the data.

- If you suspect that your dataset may have missing data, what is one possible way to check to see if this is the case?

- One way to find the blank cell, is to use the **COUNTA** formula. That formula has been added to Column A already. You'll need to **Copy & Paste** this formula across all of the columns in order to identify which column is missing data.

## 100XP

- | A33:F33 |      | $\sum x$                 | =COUNTA(A2:A31)       |     |      |             |
|---------|------|--------------------------|-----------------------|-----|------|-------------|
|         | A    | B                        | C                     | D   | E    | F           |
| 11      | 2017 | Exxon Mobil              | Petroleum refining    | 205 | 7.8  | USA         |
| 12      | 2016 | Walmart                  | General merchandisers | 482 | 14.7 | USA         |
| 13      | 2016 | State Grid               | Utilities             | 330 | 10.2 | China       |
| 14      | 2016 | Sinopec Group            | Petroleum refining    | 294 | 3.6  | China       |
| 15      | 2016 | China National Petroleum | Petroleum refining    | 299 | 7.1  | China       |
| 16      | 2016 | Toyota                   | Automobiles           | 237 | 19.3 | Japan       |
| 17      | 2016 | Volkswagen Group         | Automotive            | 237 | -1.5 | Germany     |
| 18      | 2016 | Royal Dutch Shell        | Petroleum refining    | 272 | 1.9  | Netherlands |
| 19      | 2016 | Berkshire Hathaway       | Conglomerate          | 211 | 24.1 | USA         |
| 20      | 2016 | Apple                    | Electronics           | 234 | 53.4 | USA         |
| 21      | 2016 | Exxon Mobil              | Petroleum refining    | 246 | 16.2 | USA         |
| 22      | 2015 | Walmart                  | General merchandisers | 486 | 16.4 | USA         |
| 23      | 2015 | State Grid               | Utilities             | 339 | 9.8  | China       |
| 24      | 2015 | Sinopec Group            | Petroleum refining    | 447 | 5.2  | China       |
| 25      | 2015 | China National Petroleum | Petroleum refining    | 429 | 16.4 | China       |
| 26      | 2015 | Toyota                   | Automotive            | 248 | 19.8 | Japan       |
| 27      | 2015 | Volkswagen Group         | Automotive            | 269 | 14.6 | Germany     |
| 28      | 2015 | Royal Dutch Shell        | Petroleum refining    | 431 | 14.9 | Netherlands |
| 29      | 2015 | Berkshire Hathaway       | Conglomerate          | 195 | 19.9 | USA         |
| 30      | 2015 | Apple                    | Electronics           | 183 | 39.5 | USA         |
| 31      | 2015 | Exxon Mobil              | Petroleum refining    | 383 | 32.5 | USA         |
| 32      |      |                          |                       |     |      |             |
| 33      | 30   | 30                       | 30                    | 30  | 29   | 30          |

## Best practices for selecting pivot table fields

### - Rows & Columns

- Descriptive Fields: Non-numerical fields such as Industry, Year, or Product Type
- Use these fields to sort and organize data

### - Values

- Measurements: Numerical categories such as Revenue, Profit, or Inches of Rainfall
- Use these fields to perform mathematical calculations



## When not to use a pivot table:

Another thing to keep in mind is that a pivot table may not always be the best solution. Pivot tables are great for summarizing large quantities of data. They can quickly perform basic calculations on large amounts of data, and they allow for great interactivity. However, they are not always the best solution. If your dataset is very small, sometimes it may be easier to just use filters or subtotals.

Also, if you need to have strict control over formatting and layout, the pivot table may be a bit restrictive. Overall, pivot tables are an extremely powerful tool that you will find lots of use for.

## When not to use a pivot table

### - Small Datasets

- Consider using Sort, Subtotal, & Filter

### - Strict Formatting

- Precise control of layout and formatting may not be available with a pivot table

## Alternatives to Pivot Tables

- Pivot Tables may not always be the best solution. If you have a small dataset, which of the following may be a good alternative for you to consider?

☒ Sorting, Filtering, Subtotaling