

# Using Pivot Tables and Using Simple Functions to Analyze Salary Data

There was a time when Ontario was one of the few jurisdictions to provide [public access](#) to the salaries of public-sector employees earning more than \$100,000 a year. We can debate whether that constitutes an exorbitant wage in expensive markets such as Vancouver and Toronto, especially when you factor in other variables such as inflation. Still, this disclosure is welcome. An increasing number of jurisdictions are following Ontario's lead.

In Canada's largest province, the list is released at the end of each fiscal year (March) and typically leads to stories about the highest paid employee.

Getting this data into a spreadsheet allows us to become more ambitious, which is what we will do in this tutorial.

## What you will learn in this tutorial

Download three years worth of data.

Reformat 2019 data using paste special.

Merge tables in the master file.

Use concatenate function to combine last and first names.

Create new columns that calculate total salary and taxable benefits as percent of total salary.

Create pivot table that compares institutions with the highest number employees on the list and how the totals compare year-to-year.

Use paste special to create a table for calculating percent difference.

## Downloading data

Go to the Ontario's [Public sector salary disclosure](#) site. Take a few minutes to examine the contents. As we discussed in the [first tutorial involving the Global COVID-19 data](#), it's always advisable to study what you are about to download.

The explanation begins with the "Overview".

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## Public sector salary disclosure

The names, positions, salaries and total taxable benefits of public sector employees paid \$100,000 or more in a calendar year.

[Search the 2019 disclosure](#)

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[Public sector salary disclosure background and FAQ](#)

### Overview

*The Public Sector Salary Disclosure Act, 1996 makes Ontario's public sector more open and accountable to taxpayers. The act requires organizations that receive public funding from the Province of Ontario to make public, by March 31 each year, the names, positions, salaries and total taxable benefits of employees paid \$100,000 or more in the previous calendar year.*

The act applies to organizations such as:

- the Government of Ontario
- Crown agencies
- municipalities

Among other things, you'll notice that the disclosure tables go all the way back to 1996, ideal for ambitious folks who want to take a deeper dive to, for instance, judge the progress Ontario's public sector has

made in hiring and promoting more women to executive positions. The archive also makes it possible track hiring at universities, colleges, school boards, hospitals and municipalities.

Let's begin by downloading the 2019 data.

Select the blue "Search the 2019 disclosure" tab you can see in the screen grab above.

Next, you'll see a preview page with three formats available for download.

**Public sector salary disclosure 2019: all sectors and seconded employees**

Information on all public sector employees who were paid \$100,000 or more in 2019 and are subject to the *Public Sector Salary Disclosure Act*.

This data is presented in the language in which it was provided.

**Download data**

- Spreadsheet 9 MB
- CSV 21 MB
- JSON 41 MB

Search table

Searches include hidden columns

[Show/hide columns](#)

Table

Sector	Last Name	First Name	Salary Paid	Taxable Benefits
test1	test2	test3	test4	test5
Colleges	Abbas	Sadiq	\$111,442.39	\$68.16
Colleges	Abboud	Nadim	\$114,484.25	\$114.44
Colleges	Agate	Jeffery	\$135,651.25	\$256.22
Colleges	Alexander	Doug	\$111,442.97	\$114.44
Colleges	Alexander	Tamra	\$107,906.18	\$68.16

The preview table allows you to see what you're about to download, as well as conduct an online search for a specific name. While online searches are useful, downloading the entire dataset is usually a better way to go.

Under the "Download data" section, you'll notice three datatypes: Spreadsheets; CSV (comma separated value); and JSON (a file format that stands for [J a v a S c r i p t O b j e c t N o t a t i o n .](#))

Download the spreadsheet version.

Save it in the folder you have created for this exercise.

Before downloading files for the previous two years, open the 2019 table.

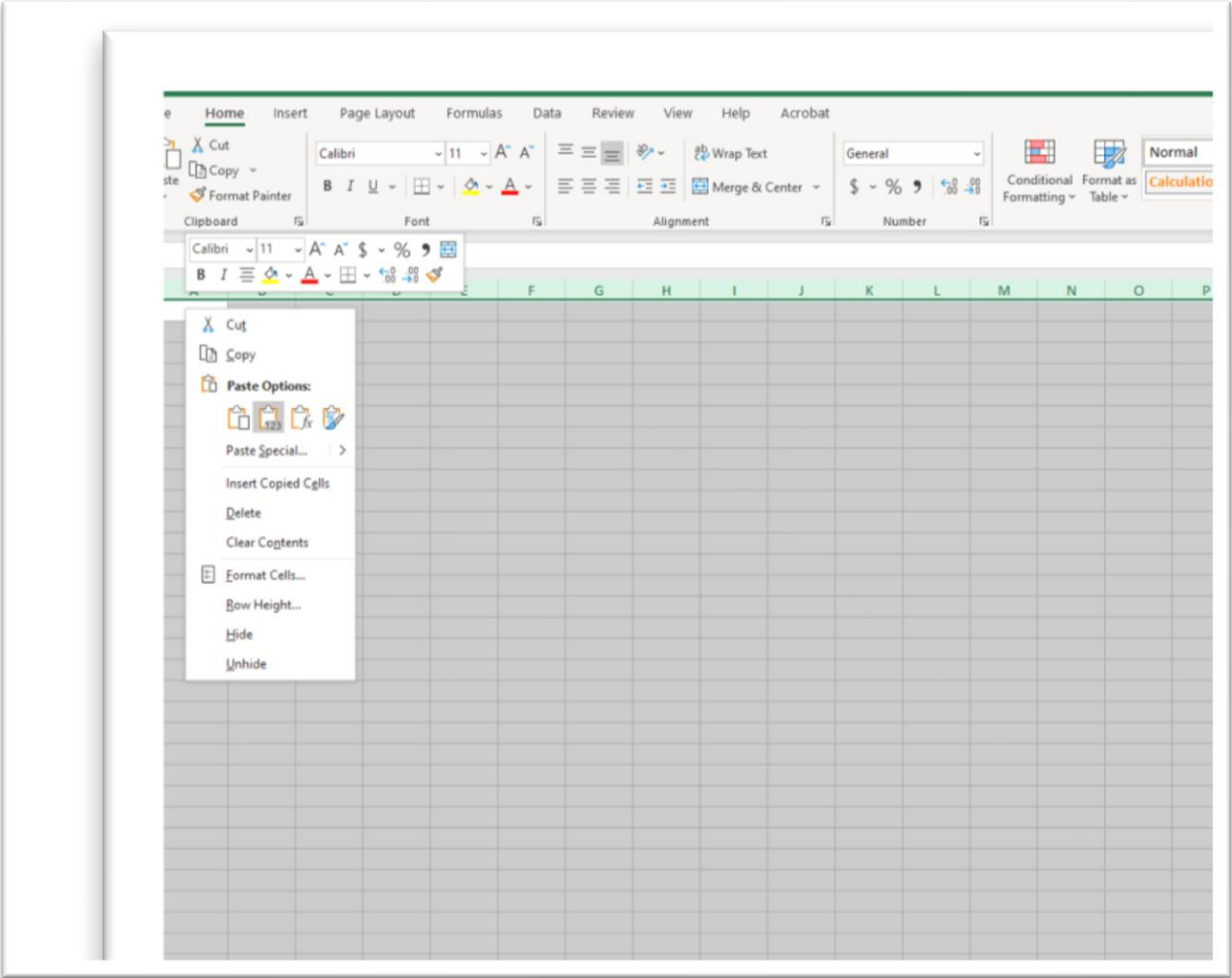
Sector	Last Name	First Name	Salary Paid	Taxable Base	Employer	Job Title	Calendar
Colleges	Abbas	Sadiq	\$111,442.39	\$68.16	Algonquin College Of Applied Arts and Technology	Professor	2019
Colleges	Abboud	Nadim	\$114,484.25	\$114.44	Algonquin College Of Applied Arts and Technology	Professor	2019
Colleges	Agate	Jeffery	\$135,651.25	\$256.22	Algonquin College Of Applied Arts and Technology	Associate Director Student Support Services	2019
Colleges	Alexander	Doug	\$111,442.97	\$114.44	Algonquin College Of Applied Arts and Technology	Professor	2019
Colleges	Alexander	Tamra	\$107,906.18	\$68.16	Algonquin College Of Applied Arts and Technology	Professor	2019
Colleges	Ali	Sabah	\$111,443.00	\$114.44	Algonquin College Of Applied Arts and Technology	Professor	2019
Colleges	Almuhtadi	Wahab	\$114,395.46	\$114.44	Algonquin College Of Applied Arts and Technology	Professor	2019
Colleges	Anderson	Daniel	\$113,026.61	\$68.16	Algonquin College Of Applied Arts and Technology	Professor	2019
Colleges	Anderson	Ian	\$111,443.00	\$106.90	Algonquin College Of Applied Arts and Technology	Professor	2019
Colleges	Anderson	Jeremy	\$111,443.00	\$114.44	Algonquin College Of Applied Arts and Technology	Professor	2019
Colleges	Anderson	Michael	\$116,723.41	\$114.44	Algonquin College Of Applied Arts and Technology	Professor	2019
Colleges	Atkinson	Michelle	\$107,665.32	\$114.44	Algonquin College Of Applied Arts and Technology	Professor	2019
Colleges	Aubin	Jerry	\$119,655.60	\$68.16	Algonquin College Of Applied Arts and Technology	Professor	2019
Colleges	Aubin	Tim	\$102,618.69	\$68.16	Algonquin College Of Applied Arts and Technology	Professor	2019
Colleges	Austen	Peggy	\$113,041.77	\$116.63	Algonquin College Of Applied Arts and Technology	Associate Director Development	2019
Colleges	Ayala	Carolina	\$111,443.00	\$388.44	Algonquin College Of Applied Arts and Technology	Professor	2019
Colleges	Ayoub	Fadi	\$111,443.00	\$114.44	Algonquin College Of Applied Arts and Technology	Professor	2019
Colleges	Bakogeorge	Michael	\$135,082.69	\$256.22	Algonquin College Of Applied Arts and Technology	Chair Culinary Programs	2019
Colleges	Ball	Karen	\$122,922.96	\$206.94	Algonquin College Of Applied Arts and Technology	Chair Nursing Studies	2019
Colleges	Banks	Joseph	\$114,394.48	\$114.44	Algonquin College Of Applied Arts and Technology	Professor	2019
Colleges	Barney	Victoria	\$115,980.92	\$114.44	Algonquin College Of Applied Arts and Technology	Professor	2019
Colleges	Baron	Cat	\$111,443.00	\$68.16	Algonquin College Of Applied Arts and Technology	Professor	2019
Colleges	Barr	Shaun	\$145,503.24	\$264.57	Algonquin College Of Applied Arts and Technology	Chair Construction Trades and Building Systems	2019
Colleges	Barteaux	John	\$111,696.34	\$114.44	Algonquin College Of Applied Arts and Technology	Professor	2019
Colleges	Baucom	Alfred	\$111,443.00	\$68.16	Algonquin College Of Applied Arts and Technology	Professor	2019
Colleges	Baxter	Mary	\$120,704.02	\$228.28	Algonquin College Of Applied Arts and Technology	General Manager Food Service Operations	2019
Colleges	Baynes	Jamie	\$100,874.32	\$114.44	Algonquin College Of Applied Arts and Technology	Professor	2019
Colleges	Beingessner	Sean	\$114,395.53	\$68.16	Algonquin College Of Applied Arts and Technology	Professor	2019
Colleges	Belanger	Maria	\$112,417.58	\$68.16	Algonquin College Of Applied Arts and Technology	Professor	2019
Colleges	Belisle	Jean (John)	\$108,557.75	\$114.44	Algonquin College Of Applied Arts and Technology	Professor	2019

This table contains some formatting that we will want to get rid of using the paste-special option we learned in the [second tutorial](#).

Select and copy the entire table.

Open a new worksheet.

Use the paste special.



	A	B	C	D	E	F	G	H	I	J	K
1	Sector	Last Name	First Name	Salary Paid	Taxable Benefits	Employer	Job Title	Calendar Year			
2	Colleges	Abbas	Sadiq	111442.4	68.16	Algonquin	Professor	2019			
3	Colleges	Abboud	Nadim	114484.3	114.44	Algonquin	Professor	2019			
4	Colleges	Agate	Jeffery	135651.3	256.22	Algonquin	Associate	2019			
5	Colleges	Alexander	Doug	111443	114.44	Algonquin	Professor	2019			
6	Colleges	Alexander	Tamra	107906.2	68.16	Algonquin	Professor	2019			
7	Colleges	Ali	Sabah	111443	114.44	Algonquin	Professor	2019			
8	Colleges	Almuhtad	Wahab	114395.5	114.44	Algonquin	Professor	2019			
9	Colleges	Anderson	Daniel	113026.6	68.16	Algonquin	Professor	2019			
10	Colleges	Anderson	Ian	111443	106.9	Algonquin	Professor	2019			
11	Colleges	Anderson	Jeremy	111443	114.44	Algonquin	Professor	2019			
12	Colleges	Anderson	Michael	116723.4	114.44	Algonquin	Professor	2019			
13	Colleges	Atkinson	Michelle	107665.3	114.44	Algonquin	Professor	2019			
14	Colleges	Aubin	Jerry	119655.6	68.16	Algonquin	Professor	2019			
15	Colleges	Aubin	Tim	102618.7	68.16	Algonquin	Professor	2019			
16	Colleges	Austen	Peggy	113041.8	116.63	Algonquin	Associate	2019			
17	Colleges	Ayala	Carolina	111443	388.44	Algonquin	Professor	2019			
18	Colleges	Ayoub	Fadi	111443	114.44	Algonquin	Professor	2019			
19	Colleges	Bakogeorge	Michael	135082.7	256.22	Algonquin	Chair Culinary	2019			
20	Colleges	Ball	Karen	122923	206.94	Algonquin	Chair Nursing	2019			
21	Colleges	Banks	Joseph	114394.5	114.44	Algonquin	Professor	2019			

Adjust the column widths and scroll to the bottom to make sure you have all the data.

	A	B	C	D	E	F
1	Sector	Last Name	First Name	Salary Paid	Taxable Benefits	Employer
2	Colleges	Abbas	Sadiq	111442.39	68.16	Algonquin College Of Applied Arts and Technology
3	Colleges	Abboud	Nadim	114484.25	114.44	Algonquin College Of Applied Arts and Technology
4	Colleges	Agate	Jeffery	135651.25	256.22	Algonquin College Of Applied Arts and Technology
5	Colleges	Alexander	Doug	111442.97	114.44	Algonquin College Of Applied Arts and Technology
6	Colleges	Alexander	Tamra	107906.18	68.16	Algonquin College Of Applied Arts and Technology
7	Colleges	Ali	Sabah	111443	114.44	Algonquin College Of Applied Arts and Technology
8	Colleges	Almuhtadi	Wahab	114395.46	114.44	Algonquin College Of Applied Arts and Technology
9	Colleges	Anderson	Daniel	113026.61	68.16	Algonquin College Of Applied Arts and Technology
10	Colleges	Anderson	Ian	111443	106.9	Algonquin College Of Applied Arts and Technology
11	Colleges	Anderson	Jeremy	111443	114.44	Algonquin College Of Applied Arts and Technology
12	Colleges	Anderson	Michael	116723.41	114.44	Algonquin College Of Applied Arts and Technology
13	Colleges	Atkinson	Michelle	107665.32	114.44	Algonquin College Of Applied Arts and Technology
14	Colleges	Aubin	Jerry	119655.6	68.16	Algonquin College Of Applied Arts and Technology
15	Colleges	Aubin	Tim	102618.69	68.16	Algonquin College Of Applied Arts and Technology
16	Colleges	Austen	Peggy	113041.77	116.63	Algonquin College Of Applied Arts and Technology
17	Colleges	Ayala	Carolina	111443	388.44	Algonquin College Of Applied Arts and Technology
18	Colleges	Ayoub	Fadi	111443	114.44	Algonquin College Of Applied Arts and Technology
19	Colleges	Bakogeorge	Michael	135082.69	256.22	Algonquin College Of Applied Arts and Technology
20	Colleges	Ball	Karen	122922.96	206.94	Algonquin College Of Applied Arts and Technology
21	Colleges	Banks	Joseph	114394.48	114.44	Algonquin College Of Applied Arts and Technology

Return to the salary disclosure website, and to the main page that we saw on page two of the tutorial.

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## Public sector salary disclosure

The names, positions, salaries and total taxable benefits of public sector employees paid \$100,000 or more in a calendar year.

[Search the 2019 disclosure](#)

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## Overview

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The act applies to organizations such as:

- the Government of Ontario
- Crown agencies
- municipalities



Scroll down to the disclosure tables (“all sectors and seconded employees”).

## Public sector salary disclosure for 1996 to 2019

Public sector employees who were paid \$100,000 or more and organizations with no salaries to disclose in each calendar year.

### 2019 salary disclosure

- [all sectors and seconded employees](#)
- [organizations with no salaries over \\$100,000](#)

### 2018 salary disclosure

- [all sectors and seconded employees](#)
- [changes, additions and deletions to the initial publication](#)
- [organizations with no salaries over \\$100,000](#)

### 2017 salary disclosure

- [all sectors and seconded employees](#)
- [changes, additions and deletions to the initial publication](#)
- [organizations with no salaries over \\$100,000](#)

You’ll also notice that for 2018 and the previous years, there’s an option to download a table that contains “changes, additions and


deletions to the initial publication.”

### Public sector salary disclosure addendum for 2018

This addendum for the 2018 public sector salary disclosure includes changes, additions and deletions to the March 27, 2019 release.

This data is presented in the language in which it was provided.

For the complete disclosure, read the [2018 public sector salary disclosure](#).

Search table   [Show/hide columns](#)

Searches include hidden columns

Table

Status	Sector	Last Name	First Name	Salary
Addition	Municipalities & Services	Cunningham	Don	\$104,505.67
Addition	Municipalities & Services	Kidd	Darlene	\$106,568.95
Addition	Other Public Sector Emplo...	McCrimmon	Janet	\$148,528.13
Addition	Other Public Sector Emplo...	Fellegi	Zel	\$122,009.47
Addition	Other Public Sector Emplo...	Xanthos	Popi	\$121,777.64
Addition	Other Public Sector Emplo...	Nurse	Darryl	\$115,377.42
Addition	Other Public Sector Emplo...	Skinner	Rachell	\$113,092.24
Addition	Other Public Sector Emplo...	Franchi	Dina	\$100,095.94

Typically, we would have to use the information in this table to update the material in the main table. If we were building a master table beyond this tutorial, that’s exactly what we’d have to do. To save time, we will skip this crucial verification step. It was worth noting before going any further.

Download the 2018 data.

## Public sector salary disclosure for 1996 to 2019

Public sector employees who were paid \$100,000 or more and organizations with no salaries to disclose in each calendar year.

### 2019 salary disclosure

- all sectors and seconded employees
- organizations with no salaries over \$100,000

### 2018 salary disclosure

- all sectors and seconded employees
- changes, additions and deletions to the initial publication
- organizations with no salaries over \$100,000

### 2017 salary disclosure

- all sectors and seconded employees
- changes, additions and deletions to the initial publication
- organizations with no salaries over \$100,000

Sector	Last Name	First Name	Salary Paid	Taxable Benefits	Employer	Job Title	Calendar Year
Colleges	Jensen	Cheryl	\$ 337,533.24	\$ 3,408.12	Algonquin College	President	2018
Colleges	Brule	Claude	\$ 230,976.76	\$ 374.96	Algonquin College	Senior Vice President Academic	2018
Colleges	Wotherspoon	Doug	\$ 230,788.38	\$ 186.58	Algonquin College	Vice President Innovation and Strategy	2018
Colleges	Mcnaire	Duane	\$ 221,744.64	\$ 366.12	Algonquin College	Vice President Finance and Administration	2018
Colleges	Stanbra	Laura	\$ 221,744.64	\$ 366.12	Algonquin College	Vice President Student Services	2018
Colleges	Anderson	Scott	\$ 194,628.02	\$ 331.04	Algonquin College	Executive Director Communications Marketing External R	2018
Colleges	Mclester	Ronald	\$ 191,833.46	\$ 161.82	Algonquin College	Executive Director Truth Reconciliation Indigenization	2018
Colleges	Pollock	Lois	\$ 177,265.71	\$ 273.41	Algonquin College	Chief Digital Officer	2018
Colleges	Leduc	Mark	\$ 169,073.33	\$ 310.33	Algonquin College	Executive Director Academic Operations and Planning	2018
Colleges	Frederick	Catherine	\$ 168,347.03	\$ 131.30	Algonquin College	Vice President Human Resources	2018
Colleges	McCutcheon	Diane	\$ 166,846.12	\$ 188.64	Algonquin College	Vice President Human Resources	2018
Colleges	Schonewille	Todd	\$ 164,726.07	\$ 304.41	Algonquin College	Director Physical Resources	2018
Colleges	Janzen	Christopher	\$ 163,593.81	\$ 293.89	Algonquin College	Dean Faculty Technology and Trades	2018
Colleges	Foulds	Barbara	\$ 160,742.83	\$ 137.91	Algonquin College	Dean Faculty Health Public Safety and Community Studie	2018
Colleges	Tosh	Marlene	\$ 160,044.73	\$ 0.00	Algonquin College	Chair Speciality Nursing Programs and Contract Training	2018
Colleges	Devey	Patrick	\$ 159,588.61	\$ 137.19	Algonquin College	Dean Centre for Continuing and Online Learning	2018
Colleges	Kyte	James Gregory	\$ 158,873.70	\$ 290.78	Algonquin College	Dean School of Hospitality and Tourism	2018
Colleges	Davies	Karen	\$ 158,873.70	\$ 290.78	Algonquin College	Dean Algonquin College In The Ottawa Valley	2018

Thankfully, this table is in a more conventional format, as are all the tables for the previous years.

Close this file and repeat the same process for 2017.

## Merge tables in master file

Now we have three years' worth of data, we can create a master file.

This is possible because the table for each year contains the identical structure: identical column names in the same order.

The image shows three overlapping Excel spreadsheets. The top spreadsheet, titled 'tbls-2018-compendium-en-2019\_updated.xlsx', displays a table with the following data:

Sector	Last Name	First Name	Salary Paid	Taxable Benefits	Employer	Job Title
Colleges	Abbas	Sadiq	111442.39	68.16	Algonquin College Of Applied Arts and Technology	Professor
Colleges	Abboud	Nadim	114484.25	114.44	Algonquin College Of Applied Arts and Technology	Professor
Colleges	Agate	Jeffery	135651.25	256.22	Algonquin College Of Applied Arts and Technology	Associate D

The middle spreadsheet, titled 'en-2018-2019-compendium-2019-12-23 (1).xlsx', displays a table with the following data:

Sector	Last Name	First Name	Salary Paid	Taxable Benefits	Employer	Job Title
Colleges	Jensen	Cheryl	\$ 337,533.24	\$ 3,408.12	Algonquin College	President
Colleges	Brule	Claude	\$ 230,976.76	\$ 374.96	Algonquin College	Senior Vice President A
Colleges	Wotherspoon	Doug	\$ 230,788.38	\$ 186.58	Algonquin College	Vice President Innovati

The bottom spreadsheet, titled 'PSSD 2018 compendium final', displays a table with the following data:

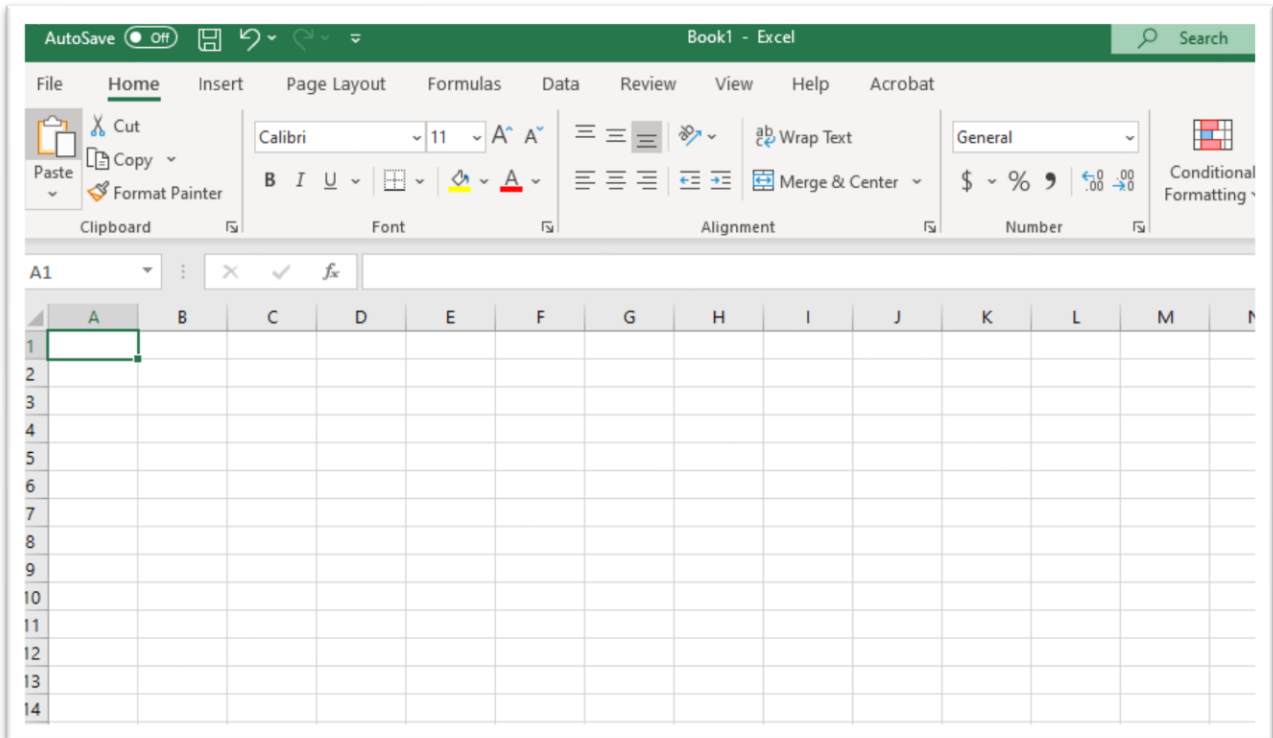
Sector	Last Name	First Name	Salary Paid	Taxable Ben	Employer	Job Title	Calendar Year
Colleges	Abiscott	Alexa	\$197,073.24	\$2,033.69	Sheridan College Institute of Techni	General Counsel And Information Privacy Office	2017
Colleges	Ahn	Song Ho	\$114,331.63	\$51.57	Sheridan College Institute of Techni	Visualization Researcher - Part-Time Faculty	2017
Colleges	Aitken	Sharon	\$118,650.76	\$1,250.00	Sheridan College Institute of Techni	Director Development and Campaign	2017

The columns are Sector; Last Name; First Name; Salary Paid; Taxable Benefits; Employer; Job Title.

If the tables were dissimilar, merging them to create a master file would be impossible without additional work.

Keep all three tables open.

Open a fourth Excel file and call it something like “MasterSalaries\_2017-2019.”



Copy and paste the 2019 file into the worksheet of the fourth, newly named Excel file.

	A	B	C	D	E	F	G	H	I	J
	Sector	Last Name	First Name	Salary Paid	Taxable Benefits	Employer	Job Title	Calendar Year		
2	Colleges	Abbas	Sadiq	111442.39	68.16	Algonquin College Of Applied Arts and Technology	Professor	2019		
3	Colleges	Abboud	Nadim	114484.25	114.44	Algonquin College Of Applied Arts and Technology	Professor	2019		
4	Colleges	Agate	Jeffery	135651.25	256.22	Algonquin College Of Applied Arts and Technology	Associate Director Student Support Services	2019		
5	Colleges	Alexander	Doug	111442.97	114.44	Algonquin College Of Applied Arts and Technology	Professor	2019		
6	Colleges	Alexander	Tamra	107906.18	68.16	Algonquin College Of Applied Arts and Technology	Professor	2019		
7	Colleges	Ali	Sabah	111443	114.44	Algonquin College Of Applied Arts and Technology	Professor	2019		
8	Colleges	Almuhadi	Wahab	114395.46	114.44	Algonquin College Of Applied Arts and Technology	Professor	2019		
9	Colleges	Anderson	Daniel	113026.61	68.16	Algonquin College Of Applied Arts and Technology	Professor	2019		
10	Colleges	Anderson	Ian	111443	106.9	Algonquin College Of Applied Arts and Technology	Professor	2019		
11	Colleges	Anderson	Jeremy	111443	114.44	Algonquin College Of Applied Arts and Technology	Professor	2019		
12	Colleges	Anderson	Michael	116723.41	114.44	Algonquin College Of Applied Arts and Technology	Professor	2019		
13	Colleges	Atkinson	Michelle	107665.32	114.44	Algonquin College Of Applied Arts and Technology	Professor	2019		
14	Colleges	Aubin	Jerry	119655.6	68.16	Algonquin College Of Applied Arts and Technology	Professor	2019		
15	Colleges	Aubin	Tim	102618.69	68.16	Algonquin College Of Applied Arts and Technology	Professor	2019		
16	Colleges	Austen	Peggy	113041.77	116.63	Algonquin College Of Applied Arts and Technology	Associate Director Development	2019		
17	Colleges	Ayala	Carolina	111443	388.44	Algonquin College Of Applied Arts and Technology	Professor	2019		
18	Colleges	Ayoub	Fadi	111443	114.44	Algonquin College Of Applied Arts and Technology	Professor	2019		
19	Colleges	Bakogeorge	Michael	135082.69	256.22	Algonquin College Of Applied Arts and Technology	Chair Culinary Programs	2019		
20	Colleges	Ball	Karen	122922.96	206.94	Algonquin College Of Applied Arts and Technology	Chair Nursing Studies	2019		
21	Colleges	Banks	Joseph	114394.48	114.44	Algonquin College Of Applied Arts and Technology	Professor	2019		
22	Colleges	Barney	Victoria	115980.92	114.44	Algonquin College Of Applied Arts and Technology	Professor	2019		
23	Colleges	Baron	Car	111443	68.16	Algonquin College Of Applied Arts and Technology	Professor	2019		

Be sure to readjust the column widths either manually with your cursor, or selecting column in question, right-clicking to obtain your short-cut menu and readjusting the width to a more manageable length of 30 to 50 characters.



ts	Employer
68.16	Algonquin College Of Applied Arts and Technology
14.44	Algonquin College Of Applied Arts and Technology
156.22	Algonquin College Of Applied Arts and Technology
14.44	Algonquin College Of Applied Arts and Technology
68.16	Algonquin College Of Applied Arts and Technology
14.44	Algonquin College Of Applied Arts and Technology
14.44	Algonquin College Of Applied Arts and Technology
68.16	Algonquin College Of Applied Arts and Technology
106.9	Algonquin College Of Applied Arts and Technology
14.44	Algonquin College Of Applied Arts and Technology
14.44	Algonquin College Of Applied Arts and Technology
14.44	Algonquin College Of Applied Arts and Technology
68.16	Algonquin College Of Applied Arts and Technology
68.16	Algonquin College Of Applied Arts and Technology
16.63	Algonquin College Of Applied Arts and Technology
188.44	Algonquin College Of Applied Arts and Technology
14.44	Algonquin College Of Applied Arts and Technology
156.22	Algonquin College Of Applied Arts and Technology
106.94	Algonquin College Of Applied Arts and Technology
14.44	Algonquin College Of Applied Arts and Technology
14.44	Algonquin College Of Applied Arts and Technology
68.16	Algonquin College Of Applied Arts and Technology
164.57	Algonquin College Of Applied Arts and Technology
14.44	Algonquin College Of Applied Arts and Technology
68.16	Algonquin College Of Applied Arts and Technology
128.28	Algonquin College Of Applied Arts and Technology
14.44	Algonquin College Of Applied Arts and Technology
68.16	Algonquin College Of Applied Arts and Technology
68.16	Algonquin College Of Applied Arts and Technology
14.44	Algonquin College Of Applied Arts and Technology
14.44	Algonquin College Of Applied Arts and Technology
101.92	Algonquin College Of Applied Arts and Technology
14.44	Algonquin College Of Applied Arts and Technology
198.52	Algonquin College Of Applied Arts and Technology
14.44	Algonquin College Of Applied Arts and Technology
91.98	Algonquin College Of Applied Arts and Technology
288.71	Algonquin College Of Applied Arts and Technology

Column Width ? X

Column width: 50

OK Cancel

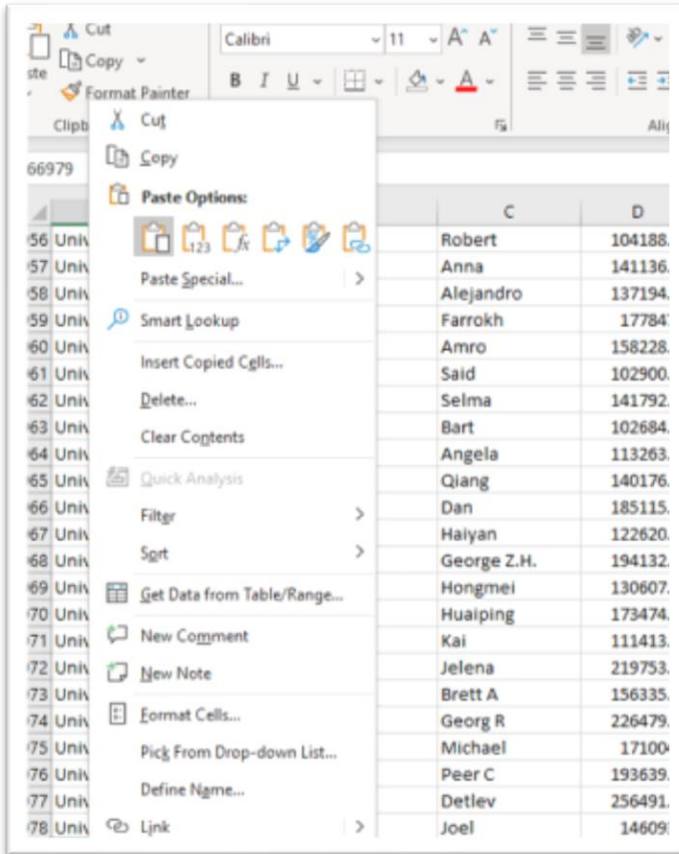




Return to the 2018 table, copy that table – minus the column titles because we already have them – and place your cursor on cell A166978.

66972	Universities	Zikic	Jelena	219753.06	1039.04	York University
66973	Universities	Zimmerman	Brett A	156335.82	842.52	York University
66974	Universities	Zoidl	Georg R	226479.06	1104.16	York University
66975	Universities	Zryd	Michael	171004.6	910.84	York University
66976	Universities	Zumbansen	Peer C	193639.44	1104.16	York University
66977	Universities	Zwick	Detlev	256491.58	1104.16	York University
66978	Universities	Zylberberg	Joel	146093.4	701.64	York University
66979						
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66981						
66982						
66983						
66984						

Paste.



66979									
56	Univ				Robert		104188.		
57	Univ				Anna		141136.		
58	Univ				Alejandro		137194.		
59	Univ				Farrokh		17784.		
60	Univ				Amro		158228.		
61	Univ				Said		102900.		
62	Univ				Selma		141792.		
63	Univ				Bart		102684.		
64	Univ				Angela		113263.		
65	Univ				Qiang		140176.		
66	Univ				Dan		185115.		
67	Univ				Haiyan		122620.		
68	Univ				George Z.H.		194132.		
69	Univ				Hongmei		130607.		
70	Univ				Hualping		173474.		
71	Univ				Kai		111413.		
72	Univ				Jelena		219753.		
73	Univ				Brett A		156335.		
74	Univ				Georg R		226479.		
75	Univ				Michael		17100.		
76	Univ				Peer C		193639.		
77	Univ				Detlev		256491.		
78	Univ				Joel		14609.		
66971	Universities	Zhuang	Kai	111413.38	188.84	York University	Educational Developer / Course Director	2019	
66972	Universities	Zick	Jelena	219753.06	1039.04	York University	Associate Professor	2019	
66973	Universities	Zimmerman	Brett A	156335.82	842.52	York University	Associate Professor	2019	
66974	Universities	Zoidl	Georg R	226479.06	1104.16	York University	Professor	2019	
66975	Universities	Zryd	Michael	171004.6	910.84	York University	Associate Professor	2019	
66976	Universities	Zumbansen	Peer C	193639.44	1104.16	York University	Professor	2019	
66977	Universities	Zwick	Detlev	256491.58	1104.16	York University	Associate Dean / Associate Professor	2019	
66978	Universities	Zyberberg	Joel	146093.4	701.64	York University	Assistant Professor / Canada Research Chair	2019	
66979	Colleges	Jensen	Cheryl	337533.2	3408.12	Algonquin College	President	2018	
66980	Colleges	Brule	Claude	230976.8	374.96	Algonquin College	Senior Vice President Academic	2018	
66981	Colleges	Wotherspoon	Doug	230788.4	186.58	Algonquin College	Vice President Innovation and Strategy	2018	
66982	Colleges	Mcnaire	Duane	221744.6	366.12	Algonquin College	Vice President Finance and Administration	2018	
66983	Colleges	Stanbra	Laura	221744.6	366.12	Algonquin College	Vice President Student Services	2018	
66984	Colleges	Anderson	Scott	194628	331.04	Algonquin College	Executive Director Communications Marketing Ext	2018	
66985	Colleges	Mclester	Ronald	191833.5	161.82	Algonquin College	Executive Director Truth Reconciliation Indigenizat	2018	
66986	Colleges	Pollock	Lois	177265.7	273.41	Algonquin College	Chief Digital Officer	2018	
66987	Colleges	Leduc	Mark	169073.3	310.33	Algonquin College	Executive Director Academic Operations and Plan	2018	
66988	Colleges	Frederick	Catherine	168347	131.3	Algonquin College	Vice President Human Resources	2018	
66989	Colleges	Mccutcheon	Diane	166846.1	188.64	Algonquin College	Vice President Human Resources	2018	
66990	Colleges	Schonewille	Todd	164726.1	304.41	Algonquin College	Director Physical Resources	2018	
66991	Colleges	Janzen	Christopher	163593.8	293.89	Algonquin College	Dean Faculty Technology and Trades	2018	
66992	Colleges	Foulds	Barbara	160742.8	137.91	Algonquin College	Dean Faculty Health Public Safety and Community	2018	

Scroll to the bottom of the 2018 data to repeat your verification.

Paste the 2017 table at the bottom of your merged (2019 and 2018 so far) table using the same techniques.

8350	Universities	Zoidl	Georg R	211344.3	1228.56	York University	Professor	2018
8351	Universities	Zzyd	Michael	161067	987.24	York University	Associate Professor	2018
8352	Universities	Zumbansen	Peer C	104358.5	614.28	York University	Professor	2018
8353	Universities	Zwick	Detlev	237181.2	1228.56	York University	Associate Dean / Associate Professor	2018
8354	Colleges	Abscott	Alexa	\$197,073.24	\$2,033.69	Shendun College Institute of Technology and Advanced Learning	General Counsel And Information Privacy Officer	2017
8355	Colleges	Ahn	Song Ho	\$114,331.63	\$51.57	Shendan College Institute of Technology and Advanced Learning	Visualization Researcher - Part-Time Faculty	2017
8356	Colleges	Atken	Sharon	\$118,650.76	\$1,250.00	Shendan College Institute of Technology and Advanced Learning	Director Development and Campaign	2017
8357	Colleges	Ali	Shirook	\$104,398.32	\$101.50	Shendan College Institute of Technology and Advanced Learning	Professor	2017
8358	Colleges	Allcott	Austin Micha	\$124,307.70	\$1,264.54	Shendan College Institute of Technology and Advanced Learning	Dean	2017
8359	Colleges	Andrews	Greg	\$100,208.66	\$62.88	Shendan College Institute of Technology and Advanced Learning	Professor	2017
8360	Colleges	Angelini	Paul	\$105,838.90	\$62.88	Shendan College Institute of Technology and Advanced Learning	Professor	2017
8361	Colleges	Armstrong	John	\$101,696.02	\$101.50	Shendan College Institute of Technology and Advanced Learning	Professor	2017

You should have 450262 rows of salary data, almost half a million rows. Save the table, calling the first worksheet something like “Salaries\_2017-19.” (NOTE: character limits mean we must be economical when naming worksheets.) Also be sure to save as you go.

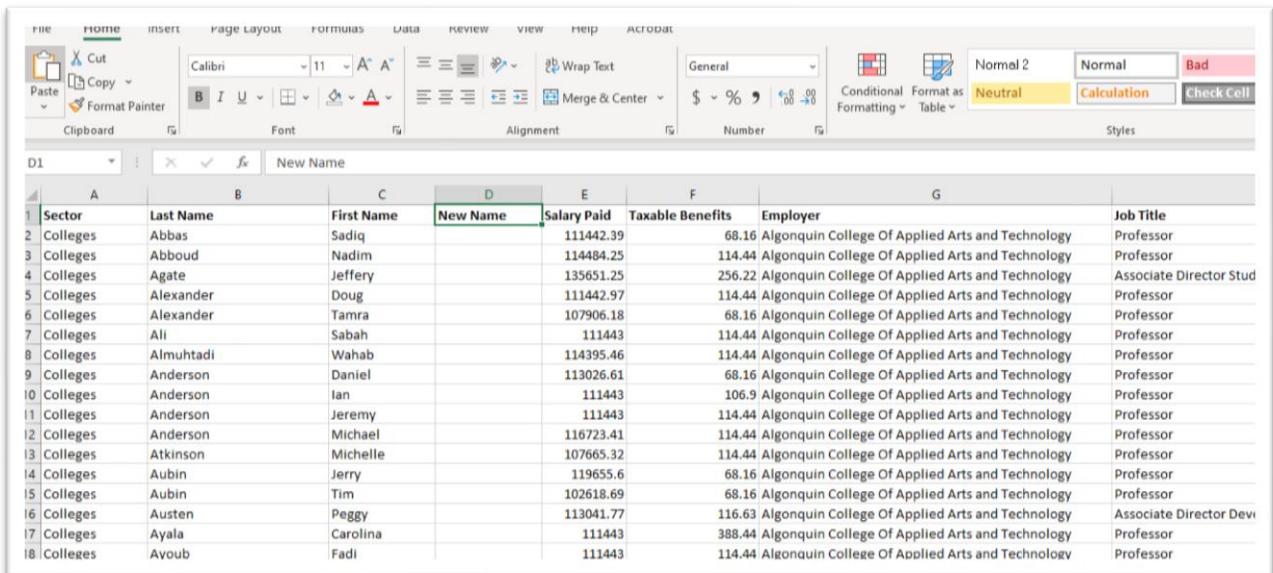
90257	Universities	Zoric	Terezia	\$132,909.96	\$223.80	University of Toronto	Associate Professor of Education, Teaching Stream	2017
90258	Universities	Zovkic	ha	\$104,927.39	\$201.36	University of Toronto	Assistant Professor of Psychology	2017
90259	Universities	Zuberi	Daniyal	\$158,128.98	\$20,631.84	University of Toronto	Associate Professor of Social Work and Associate Professor	2017
90260	Universities	Zuliani	Elisa	\$309,732.66	\$448.14	University of Toronto	Professor of Accounting	2017
90261	Universities	Zuniga-Pflucker	Juan Carlos	\$223,714.97	\$223.80	University of Toronto	Professor and Chair, Immunology	2017
90262	Universities	Zweig	David	\$343,913.54	\$16,999.66	University of Toronto	Professor and Chair of Management	2017
90263								
90264								
90265								
90266								
90267								
90268								
90269								

In the first two tutorials, you learned how to use sorting, filtering and simple observation to interview the data to determine what you have and what you don’t have. Take the time to do this before moving on to the next step.

### Use concatenate function to combine first and last name

Before we get this into a pivot table, we’ll use a concatenate function to combine the last and first names in columns B and C into a new column.

Insert a new column and call it something like “New Name”



	A	B	C	D	E	F	G	
1	Sector	Last Name	First Name	New Name	Salary Paid	Taxable Benefits	Employer	Job Title
2	Colleges	Abbas	Sadiq		111442.39	68.16	Algonquin College Of Applied Arts and Technology	Professor
3	Colleges	Abboud	Nadim		114484.25	114.44	Algonquin College Of Applied Arts and Technology	Professor
4	Colleges	Agate	Jeffery		135651.25	256.22	Algonquin College Of Applied Arts and Technology	Associate Director Stud
5	Colleges	Alexander	Doug		111442.97	114.44	Algonquin College Of Applied Arts and Technology	Professor
6	Colleges	Alexander	Tamra		107906.18	68.16	Algonquin College Of Applied Arts and Technology	Professor
7	Colleges	Ali	Sabah		111443	114.44	Algonquin College Of Applied Arts and Technology	Professor
8	Colleges	Almuhtadi	Wahab		114395.46	114.44	Algonquin College Of Applied Arts and Technology	Professor
9	Colleges	Anderson	Daniel		113026.61	68.16	Algonquin College Of Applied Arts and Technology	Professor
10	Colleges	Anderson	Ian		111443	106.9	Algonquin College Of Applied Arts and Technology	Professor
11	Colleges	Anderson	Jeremy		111443	114.44	Algonquin College Of Applied Arts and Technology	Professor
12	Colleges	Anderson	Michael		116723.41	114.44	Algonquin College Of Applied Arts and Technology	Professor
13	Colleges	Atkinson	Michelle		107665.32	114.44	Algonquin College Of Applied Arts and Technology	Professor
14	Colleges	Aubin	Jerry		119655.6	68.16	Algonquin College Of Applied Arts and Technology	Professor
15	Colleges	Aubin	Tim		102618.69	68.16	Algonquin College Of Applied Arts and Technology	Professor
16	Colleges	Austen	Peggy		113041.77	116.63	Algonquin College Of Applied Arts and Technology	Associate Director Devi
17	Colleges	Ayala	Carolina		111443	388.44	Algonquin College Of Applied Arts and Technology	Professor
18	Colleges	Avoub	Fadi		111443	114.44	Algonquin College Of Applied Arts and Technology	Professor

We'll use the concatenate operator “&” to combine the names with the formula `<<=B2&”, “&C2>>`

Let's translate this formula: Take B2 and combine it (&) with a comma and space which we will put in between quotation marks (“, “) and

combine C2.

The screenshot shows the Microsoft Excel interface with the Home tab selected. The formula bar displays the formula `=B2&","&C2`. The active cell is D2. The table below shows the following data:

	A	B	C	D	E	F
1	Sector	Last Name	First Name	New Name	Salary Paid	Taxable Benefit
2	Colleges	Abbas	Sadiq	=B2&","&C2	111442.39	
3	Colleges	Abboud	Nadim		114484.25	
4	Colleges	Agate	Jeffery		135651.25	
5	Colleges	Alexander	Doug		111442.97	
6	Colleges	Alexander	Tamra		107906.18	
7	Colleges	Ali	Sabah		111443	
8	Colleges	Almuhtadi	Wahab		114395.46	
9	Colleges	Anderson	Daniel		113026.61	

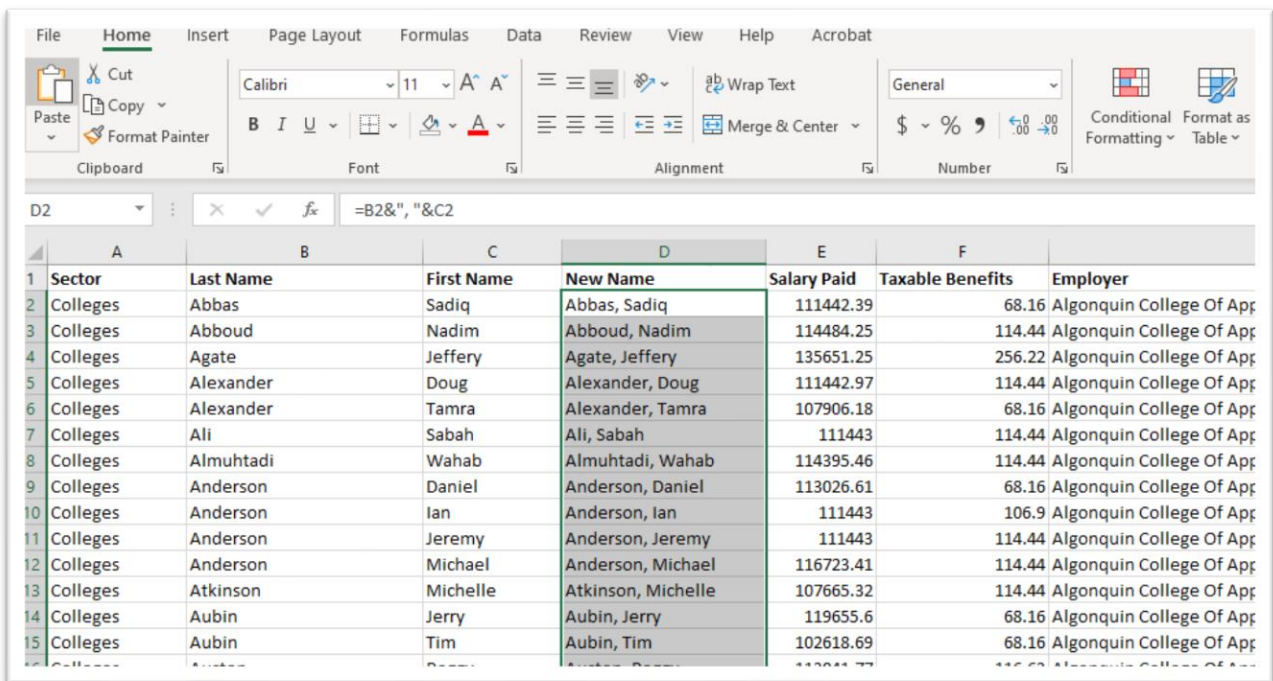
Hit enter.

The screenshot shows the Microsoft Excel interface with the Home tab selected. The formula bar displays the formula `=B2&","&C2`. The active cell is D2. The table below shows the resulting data after the formula is applied:

	A	B	C	D	E	F
1	Sector	Last Name	First Name	New Name	Salary Paid	Taxable Benefit
2	Colleges	Abbas	Sadiq	Abbas, Sadiq	111442.39	
3	Colleges	Abboud	Nadim		114484.25	
4	Colleges	Agate	Jeffery		135651.25	
5	Colleges	Alexander	Doug		111442.97	
6	Colleges	Alexander	Tamra		107906.18	
7	Colleges	Ali	Sabah		111443	
8	Colleges	Almuhtadi	Wahab		114395.46	
9	Colleges	Anderson	Daniel		113026.61	

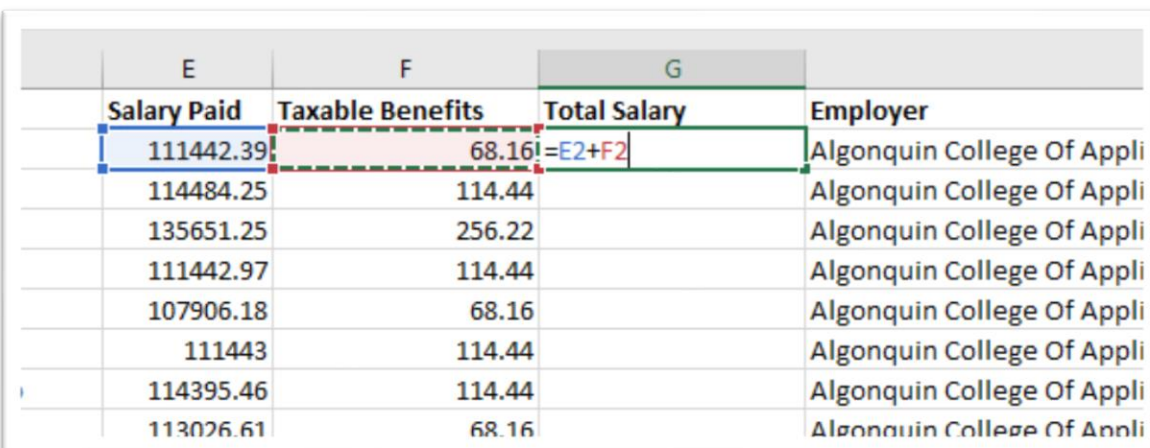


Copy the formula to bottom of the column and adjust the column length.



We'll now create a column that adds the Salary Paid to Taxable Benefits for a total salary.

Add a column to the right of Taxable Benefits and use the addition operator "+" to obtain your total.



Copy the formula to the bottom of the column and format the numbers as currency with no decimal places.

Sector	Last Name	First Name	New Name	Salary Paid	Taxable Benefits	Total Salary	Employer
Colleges	Abbas	Sadiq	Abbas, Sadiq	111442.39	68.16	\$111,511	Algonquin College Of Applied Arts and T
Colleges	Abboud	Nadim	Abboud, Nadim	114484.25	114.44	\$114,599	Algonquin College Of Applied Arts and T
Colleges	Agate	Jeffery	Agate, Jeffery	135651.25	256.22	\$135,907	Algonquin College Of Applied Arts and T
Colleges	Alexander	Doug	Alexander, Doug	111442.97	114.44	\$111,557	Algonquin College Of Applied Arts and T
Colleges	Alexander	Tamra	Alexander, Tamra	107906.18	68.16	\$107,974	Algonquin College Of Applied Arts and T
Colleges	Ali	Sabah	Ali, Sabah	111443	114.44	\$111,557	Algonquin College Of Applied Arts and T
Colleges	Almuhtadi	Wahab	Almuhtadi, Wahab	114395.46	114.44	\$114,510	Algonquin College Of Applied Arts and T
Colleges	Anderson	Daniel	Anderson, Daniel	113026.61	68.16	\$113,095	Algonquin College Of Applied Arts and T
Colleges	Anderson	Ian	Anderson, Ian	111443	106.9	\$111,550	Algonquin College Of Applied Arts and T
Colleges	Anderson	Jeremy	Anderson, Jeremy	111443	114.44	\$111,557	Algonquin College Of Applied Arts and T
Colleges	Anderson	Michael	Anderson, Michael	116723.41	114.44	\$116,838	Algonquin College Of Applied Arts and T
Colleges	Atkinson	Michelle	Atkinson, Michelle	107665.32	114.44	\$107,780	Algonquin College Of Applied Arts and T
Colleges	Aubin	Jerry	Aubin, Jerry	119655.6	68.16	\$119,724	Algonquin College Of Applied Arts and T
Colleges	Aubin	Tim	Aubin, Tim	102618.69	68.16	\$102,687	Algonquin College Of Applied Arts and T

Good.

Now let's create a new column which calculates the taxable benefit as a percent of the total salary.

Insert a new column, and divide the taxable benefit by the total salary. Reformat with as a percent with two decimal places.

id	Taxable Benefits	Total Salary	Taxable Benefit Percent	Employer
2.39	68.16	\$111,511	=F2/G2	Algonquin College Of Appli
4.25	114.44	\$114,599		Algonquin College Of Appli
1.25	256.22	\$135,907		Algonquin College Of Appli
2.97	114.44	\$111,557		Algonquin College Of Appli
6.18	68.16	\$107,974		Algonquin College Of Appli
1443	114.44	\$111,557		Algonquin College Of Appli
5.46	114.44	\$114,510		Algonquin College Of Appli
6.61	68.16	\$113,095		Algonquin College Of Appli
1443	106.9	\$111,550		Algonquin College Of Appli
1443	114.44	\$111,557		Algonquin College Of Appli

	G	H	
Benefits	Total Salary	Taxable Benefit Percent	Employer
68.16	\$111,511	0.06%	Algonquin College
114.44	\$114,599	0.10%	Algonquin College
256.22	\$135,907	0.19%	Algonquin College
114.44	\$111,557	0.10%	Algonquin College
68.16	\$107,974	0.06%	Algonquin College
114.44	\$111,557	0.10%	Algonquin College
114.44	\$114,510	0.10%	Algonquin College
68.16	\$113,095	0.06%	Algonquin College
106.9	\$111,550	0.10%	Algonquin College
114.44	\$111,557	0.10%	Algonquin College
114.44	\$116,838	0.10%	Algonquin College
114.44	\$107,780	0.11%	Algonquin College
68.16	\$119,724	0.06%	Algonquin College
68.16	\$102,687	0.07%	Algonquin College
116.63	\$113,158	0.10%	Algonquin College
388.44	\$111,831	0.35%	Algonquin College
114.44	\$111,557	0.10%	Algonquin College
256.22	\$135,339	0.19%	Algonquin College

It's time to perform some analysis.

Filter the table for the year 2019. Sort the "Total Salary" column to see who earned the most.

Then sort the "Taxable Benefit Percent" column in descending order. You'll be surprised at some of the results.

Before we even get into a pivot table, the new columns we've created in this master table for the three years now convey a lot more information that takes us beyond the typical, who earned the most in 2019. We can filter for universities, and professors to see which institutions are doling out the most cash.



Simply filtering and sorting on the main table produces useful, and perhaps newsworthy information.

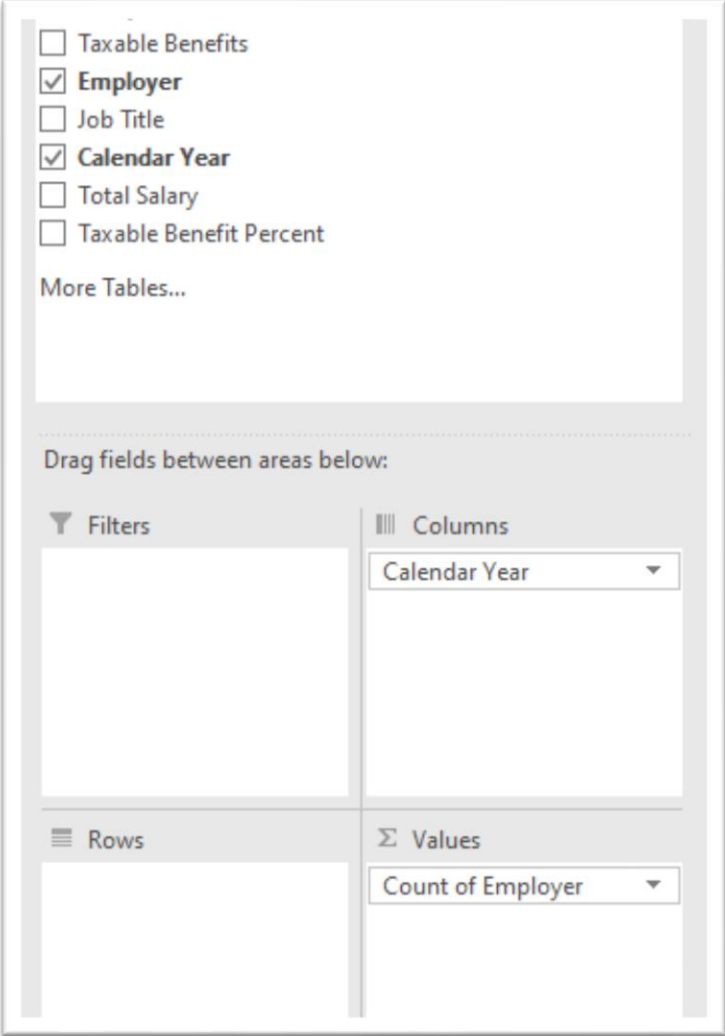
Now you can use the pivot table to determine what's happening at the institutional level.

**Create pivot table that compares institutions with the most employees on the list and how those numbers compare year-to-year**

Each row in our original table is an employee. The master table filtered for 2019, contains 166,977 rows. Or put another way, 166,977 public-sector employees who earned more than \$100,000 that year.

Let's create a pivot table to provide a closer look.

We can use the pivot table to group (Rows) the employees, count (values) them, and subdivide (Columns) by year.



The image shows a screenshot of an Excel spreadsheet with a pivot table. The pivot table is located in the range A4:E5. The columns are labeled '2017', '2018', '2019', and 'Grand Total'. The row is labeled 'Count of Employer'. The data values are 131,909 for 2017, 151,375 for 2018, 166,977 for 2019, and 450,261 for the Grand Total. A dropdown menu labeled 'Column Labels' is visible in cell A3.

	A	B	C	D	E	F	G	H	I
1									
2									
3		Column Labels ▾							
4		2017	2018	2019	Grand Total				
5	Count of Employer	131,909	151,375	166,977	450,261				
6									
7									
8									
9									
10									
11									

We can see that the 2019 number corresponds with the filtered number in the main table.

It's also clear that the number of employees on the list has been increasing, an additional piece of information that pivot table has just provided.

Now we can subdivide the table by employer (yes, we can count on the employer field and group it in another section of the pivot table) and

filter it for the one we want.

The image shows a software interface for configuring a data visualization. At the top, there is a list of fields with checkboxes:

- New Name
- Salary Paid
- Taxable Benefits
- Employer**
- Job Title
- Calendar Year**
- Total Salary
- Taxable Benefit Percent

Below the list is a link that says "More Tables...".

A dashed line separates this from the configuration area, which is titled "Drag fields between areas below:". This area is divided into four quadrants:

- Filters:** An empty box for adding filter fields.
- Columns:** A dropdown menu containing "Calendar Year".
- Rows:** A dropdown menu containing "Employer".
- Values:** A dropdown menu containing "Count of Employer".

Let's do that for Humber.

The screenshot shows an Excel spreadsheet with a PivotTable summarizing the 'Count of Employer' data. The PivotTable is structured as follows:

Count of Employer	2017	2018	2019	Grand Total
2021 Canada Games Host Society Inc	1	5	6	
2021833 Ontario Inc (O/A Finishing Trades Institute of Ontario)		3	3	
360kids Support Services	1	2	3	
Abilities Centre	1	1	2	4
AbleLiving Services Inc	1	1	1	3
Abriqo Centre		1	1	2
Access Alliance Multicultural Health And Community Services	6	8	8	22
Access Community Services Incorporated	1	1		2
Access For Parents and Children in Ontario			1	1
Access Independent Living Services	1	1	1	3
Accessibility Directorate of Ontario		32		32
Accessibility Directorate of Ontario / Direction générale de l'accessibilité pour l'Ontario	26			26
Accessible Community Counselling And Employment Services (ACCES)	9	10	12	31
Acclaim Health And Community Care Services	7	5	12	24
Accommodation Info & Support Inc	1			1
Accommodation Info and Support Inc		1	1	2
Accross Boundaries	1			1
Addiction and Mental Health Services - KFLA	4	4		8
Addiction Services Of Thames Valley	1	1	1	3
Addiction Services Of York Region	1	1	2	4
Addictions And Mental Health Ontario	1		1	2
Addictions And Mental Health Services - Hastings Prince Edward	2	2	3	7
Advanced Education and Skills Development		190		190
Advanced Education and Skills Development / Enseignement supérieur et de la Formatic	162			162
Advent Health Care Corporation		2	2	4
Adventure Place	2	3	4	9
Advertising Review Board		2		2
Advertising Review Board		2	2	4
Advertising Review Board / Commission de révision de la publicité	3			3
Affiliated Services For Children and Youth Inc	1	1	1	3

The PivotTable Fields task pane on the right shows the following configuration:

- Filters:** None
- Columns:** Calendar Year
- Rows:** Employer
- Values:** Count of Employer

Filter the Row Label for Humber.

The screenshot shows a PivotTable titled 'Count of Employer' with columns for 2017, 2018, 2019, and Grand Total. A filter dialog box is open, showing a list of employers. The 'Number' filter is applied, and 'Humber College Institute Of Technology and Advanced Learning' is selected. The Grand Total for Humber is 1,428.

Employer	2017	2018	2019	Grand Total
2021 Canada Games Host Society Inc	5			5
2021633 Ontario Inc (O/A Finishing Trades Inc	3			3
360Kids Support Services	2			2
Abilities Centre	2			2
Able Living Services Inc	1			1
Abrigo Centre	1			1
Access Alliance Multicultural Health And Con	8			8
Access Community Services Incorporated	2			2
Access For Parents and Children In Ontario	1			1
Access Independent Living Services	1			1
Accessibility Directorate of Ontario				32
Accessibility Directorate of Ontario / Directio				26
Accessible Community Counselling And Empl				31
Acclaim Health And Community Care Service				24
Accommodation Info & Support Inc				1
Accommodation Info and Support Inc	1			1
Across Boundaries				1
Addiction and Mental Health Services - KFLA				8
Addiction Services Of Thames Valley	1			1
Addiction Services Of York Region	2			2
Additions And Mental Health Ontario	1			1
Additions And Mental Health Services - Hact	3			3
Advanced Education and Skills Development				190
Advanced Education and Skills Development				162
Advent Health Care Corporation	2			2
Adventure Place	4			4
Advertising Review Board				9
Advertising Review Board				2
Advertising Review Board / Commission de r	2			2
Affiliated Services For Children and Youth Inc				3
Afghans Women's Counselling and Integration Community Support Organization	1			1
Agrisorp	1			1
<b>Grand Total</b>	<b>40</b>	<b>35</b>	<b>75</b>	<b>150</b>

The screenshot shows a PivotTable with the following data:

Count of Employer	2017	2018	2019	Grand Total
Humber College Institute Of Technology and Advanced Learning	244	560	624	1,428
<b>Grand Total</b>	<b>244</b>	<b>560</b>	<b>624</b>	<b>1,428</b>

The number of Humber employees on the list is growing. If you wanted to see all the employees on list, click on any of the totals to see the underlying data that will be presented in a separate, formatted worksheet with drop-down menus.

Clear the Row Label Filter to return to the complete pivot table we've just created.

The screenshot shows an Excel pivot table with the following data:

Count of Employer	2017	2018	2019	Grand Total
2021 Canada Games Host Society Inc		1	5	6
2021633 Ontario Inc (O/A Finishing Trades Institute of Ontario)			3	3
360Kids Support Services		1	2	3
Abilities Centre	1	1	2	4
AbleLiving Services Inc	1	1	1	3
Abrigo Centre		1	1	2
Access Alliance Multicultural Health And Community Services	6	8	8	22
Access Community Services Incorporated	1	1		2
Access For Parents and Children In Ontario			1	1
Access Independent Living Services	1	1	1	3
Accessibility Directorate of Ontario		32		32
Accessibility Directorate of Ontario / Direction générale de l'accessibilité pour l'Ontario	26			26
Accessible Community Counselling And Employment Services (ACCES)	9	10	12	31
Acclaim Health And Community Care Services	7	5	12	24
Accommodation Info & Support Inc	1			1
Accommodation Info and Support Inc		1	1	2
Across Boundaries	1			1
Addiction and Mental Health Services - KFLA	4	4		8
Addiction Services Of Thames Valley	1	1	1	3
Addiction Services Of York Region	1	1	2	4
Additions And Mental Health Ontario	1		1	2

Sort the Grand Total in descending order.

Count of Employer	2017	2018	2019	Grand Total
Ontario Power Generation	7,878	7,919	8,043	23,840
City Of Toronto	5,872	6,188	6,806	18,866
City Of Toronto - Police Service	4,828	4,963	4,876	14,667
University Of Toronto	3,738	4,037	4,342	12,117
Toronto District School Board	2,579	3,337	3,743	9,659
City Of Toronto - Toronto Transit Commission	2,632	2,734	3,033	8,399
City Of Ottawa	2,115	2,484	3,251	7,850
Community Safety and Correctional Services	28	6,399		6,427
Community Safety and Correctional Services / Sécurité communautaire et Services correctionnels	6,210			6,210
Regional Municipality Of Peel Police Services	1,645	1,784	1,842	5,271
York University	1,681	1,691	1,850	5,222
City Of Hamilton	1,569	1,761	1,849	5,179
Ontario Provincial Police		5	5,062	5,067
University Of Waterloo	1,450	1,556	1,676	4,682
University Of Ottawa	1,496	1,530	1,595	4,621
Peel District School Board	1,240	1,303	2,051	4,594
York Region District School Board	1,038	1,491	2,050	4,579
Toronto Catholic District School Board	1,083	1,389	1,773	4,245
Attorney General		2,032	2,196	4,228
Regional Municipality Of Durham	1,285	1,388	1,529	4,202
Regional Municipality Of York Police Services	1,305	1,398	1,467	4,170
University Of Western Ontario	1,358	1,375	1,396	4,129
City Of Ottawa - Police Services	1,302	1,326	1,375	4,003
Ryerson University	1,201	1,280	1,363	3,844
City Of Mississauga	1,048	1,363	1,381	3,792

Sorting the Grand Total in descending order, we can easily see how some of the top employers stack up. Ontario Power Generation, City of Toronto, City of Toronto Police Service (interesting because of the defund the police campaign), University of Toronto, etc. have all seen an increase in numbers.

To compare more of the major employers and calculate the rate at which the employees are growing, let's use the paste special.

**Use paste special to create a table for calculating percent difference**

Copy the pivot table, go to a new worksheet and use the paste special option.





Row Label	2017	2018	2019	Grand Total
Ontario Pe	7878	7919	8043	23840
City Of To	5872	6188	6806	18866
City Of To	4828	4963	4876	14667
University	3738	4037	4342	12117
Toronto D	2579	3337	3743	9659
City Of To	2632	2734	3033	8399
City Of Ot	2115	2484	3251	7850
Communi	28	6399		6427
Communi	6210			6210
Regional M	1645	1784	1842	5271
York Unive	1681	1691	1850	5222
City Of Ha	1569	1761	1849	5179
Ontario Provincial Pe		5	5062	5067
University	1450	1556	1676	4682
University	1496	1530	1595	4621
Peel Distr	1240	1303	2051	4594
York Regic	1038	1491	2050	4579
Toronto C	1083	1389	1773	4245
Attorney General		2032	2196	4228
Regional M	1285	1388	1529	4202
Regional M	1305	1398	1467	4170
University	1358	1375	1396	4129
City Of Ot	1302	1326	1375	4003
Ryerson U	1201	1280	1363	3844
City Of Mi	1048	1363	1381	3792
McMaster	1203	1256	1300	3759

Time for some clean-up. Delete first three rows.

Rename column A "Employer"

Delete the Grand Total column (E) and the Grand Total row (2473).

Create a new column “Percent Diff 2017-2019”.

The screenshot shows an Excel spreadsheet with the following data:

	A	B	C	D	E	F
1	Employer	2017	2018	2019	Percent Diff 2017-2019	
2	Ontario Power Generation	7878	7919	8043		
3	City Of Toronto	5872	6188	6806		
4	City Of Toronto - Police Service	4828	4963	4876		
5	University Of Toronto	3738	4037	4342		
6	Toronto District School Board	2579	3337	3743		
7	City Of Toronto - Toronto Transit Commission	2632	2734	3033		
8	City Of Ottawa	2115	2484	3251		
9	Community Safety and Correctional Services	28	6399			
10	Community Safety and Correctional Services / Sécurité co	6210				
11	Regional Municipality Of Peel Police Services	1645	1784	1842		
12	York University	1681	1691	1850		
13	City Of Hamilton	1569	1761	1849		
14	Ontario Provincial Police		5	5062		
15	University Of Waterloo	1450	1556	1676		
16	University Of Ottawa	1496	1530	1595		
17	Peel District School Board	1240	1303	2051		
18	York Region District School Board	1038	1491	2050		
19	Toronto Catholic District School Board	1083	1389	1773		
20	Attorney General		2032	2196		

We'll use the formula for percent increase ( generically: =(NEW NUMBER-OLD NUMBER)/OLD NUMBER)). We put the numbers in brackets because Excel will perform that caculation before dividing.

A	B	C	D	E	F
Employer	2017	2018	2019	Percent Diff 2017-2019	
Ontario Power Generation	7878	7919	8043	$=(D2-B2)/B2$	
City Of Toronto	5872	6188	6806		
City Of Toronto - Police Service	4828	4963	4876		
University Of Toronto	3738	4037	4342		
Toronto District School Board	2579	3337	3743		
City Of Toronto - Toronto Transit Commission	2632	2734	3033		

A	B	C	D	E	F
1 Employer	2017	2018	2019	Percent Diff 2017-2019	
2 Ontario Power Generation	7878	7919	8043	0.020944402	
3 City Of Toronto	5872	6188	6806		
4 City Of Toronto - Police Service	4828	4963	4876		
5 University Of Toronto	3738	4037	4342		
6 Toronto District School Board	2579	3337	3743		
7 City Of Toronto - Toronto Transit Commission	2632	2734	3033		
8 City Of Ottawa	2115	2484	3251		

Reformat the number as a percent with one decimal place and copy the formula to the bottom of the row.

Microsoft Excel interface showing a spreadsheet with the following data:

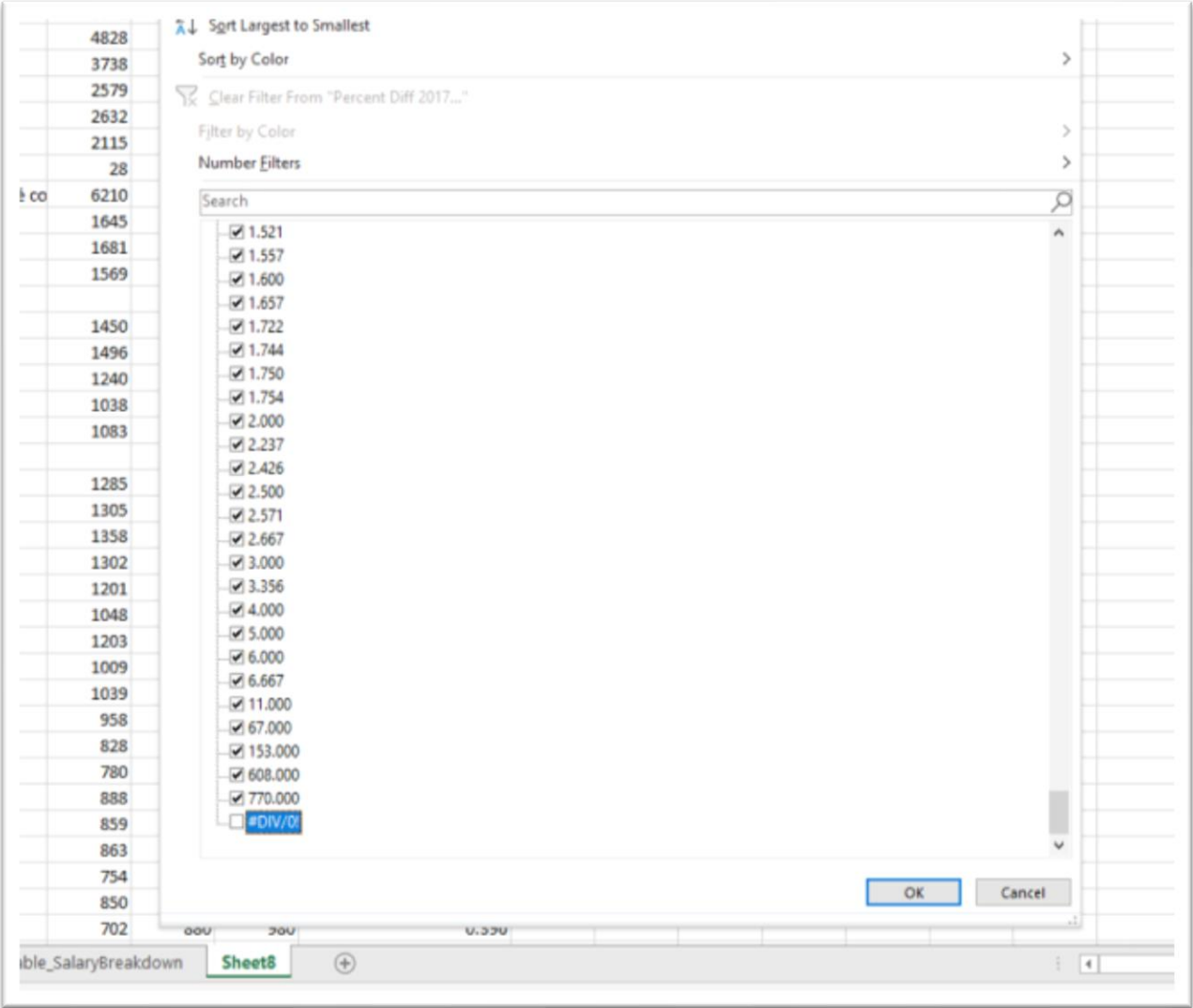
	A	B	C	D	E	F
1	Employer	2017	2018	2019	Percent Diff 2017-2019	
2	Ontario Power Generation	7878	7919	8043	0.021	
3	City Of Toronto	5872	6188	6806		
4	City Of Toronto - Police Service	4828	4963	4876		
5	University Of Toronto	3738	4037	4342		
6	Toronto District School Board	2579	3337	3743		
7	City Of Toronto - Toronto Transit Commission	2632	2734	3033		
8	City Of Ottawa	2115	2484	3251		
9	Community Safety and Correctional Services	28	6399			
10	Community Safety and Correctional Services / Sécurité co	6210				
11	Regional Municipality Of Peel Police Services	1645	1784	1842		

Microsoft Excel interface showing a spreadsheet with the following data:

	A	B	C	D	E	F	G
1	Employer	2017	2018	2019	Percent Diff 2017-2019		
2	Ontario Power Generation	7878	7919	8043	2.1%		
3	City Of Toronto	5872	6188	6806	15.9%		
4	City Of Toronto - Police Service	4828	4963	4876	1.0%		
5	University Of Toronto	3738	4037	4342	16.2%		
6	Toronto District School Board	2579	3337	3743	45.1%		
7	City Of Toronto - Toronto Transit Commission	2632	2734	3033	15.2%		
8	City Of Ottawa	2115	2484	3251	53.7%		
9	Community Safety and Correctional Services	28	6399		-100.0%		
10	Community Safety and Correctional Services / Sécurité co	6210			-100.0%		
11	Regional Municipality Of Peel Police Services	1645	1784	1842	12.0%		
12	York University	1681	1691	1850	10.1%		
13	City Of Hamilton	1569	1761	1849	17.8%		
14	Ontario Provincial Police		5	5062	#DIV/0!		
15	University Of Waterloo	1450	1556	1676	15.6%		
16	University Of Ottawa	1496	1530	1595	6.6%		
17	Peel District School Board	1240	1303	2051	65.4%		
18	York Region District School Board	1038	1491	2050	97.5%		
19	Toronto Catholic District School Board	1083	1389	1773	63.7%		
20	Attorney General		2032	2196	#DIV/0!		
21	Regional Municipality Of Durham	1285	1388	1529	19.0%		
22	Regional Municipality Of York Police Services	1305	1398	1467	12.4%		
23	University Of Western Ontario	1358	1375	1396	2.8%		
24	City Of Ottawa - Police Services	1302	1326	1375	5.6%		
25	Ryerson University	1201	1280	1363	13.5%		
26	City Of Mississauga	1048	1363	1381	31.8%		
27	McMaster University	1203	1256	1300	8.1%		
28	University Health Network	1009	1205	1242	23.1%		

Dividing by zero produces an error message (#DIV/0!). Use the filter to de-select the error message.

Sort the new column in descending order to see which employer had the fastest growth rate.





Sort column E in descending order.

The screenshot shows an Excel spreadsheet with the following data:

	A	B	C	D	E	F
Employer		20	20	20	Percent Diff 2017-2019	
Treasury Board Secretariat		1	1203	771	77000.0%	
Education		1	567	609	60800.0%	
Ontario Court Of Justice		4	609	616	15300.0%	
Local Health Integration Network - Toronto Central		1	61	68	6700.0%	
Nog-da-win-da-min Family And Community Services		1	9	12	1100.0%	
Vector Institute		3	13	23	666.7%	
Township Of Wellesley		1	6	7	600.0%	
Upper Thames River Conservation Authority		1	1	7	600.0%	
Chatham Kent Family Health Team		1	4	6	500.0%	
Canadian Mental Health Association-Simcoe County Branch		1	2	6	500.0%	
Keewatinook Okimakanak Northern Chiefs Council		2	6	10	400.0%	
Fred Victor Centre		1	6	5	400.0%	
City Of London - London Convention Centre Corporation		1	2	5	400.0%	
Algoma District School Board		101	144	440	335.6%	
St. Francis Memorial Hospital		2	6	8	300.0%	
Carefirst Seniors And Community Services Association		1	4	4	300.0%	
Township Of Mapleton		1	3	4	300.0%	
Associated Youth Services Of Peel		1	3	4	300.0%	
Children's Mental Health Services (Serving Children And Families)		1	2	4	300.0%	
Seven Generations Education Institute		1	1	4	300.0%	
Ontario Institute For Regenerative Medicine		1	1	4	300.0%	
Matawa First Nations Management		1	1	4	300.0%	
Municipality Of South Huron		1	1	4	300.0%	
The Ontario Community Centre For The Deaf Inc		1		4	300.0%	
Carleton Place And District Memorial Hospital		3	8	11	266.7%	
Children's Aid Society Of The District Of Sudbury-Manitoulin		7	19	25	257.1%	
Niagara North Family Health Team		2	5	7	250.0%	
Dilico Anishinabek Family Care		2	4	7	250.0%	

You can use the filters to compare some of the larger employers. Let's take Humber, Ryerson and Sheridan for instance.

The screenshot shows an Excel spreadsheet with the following data:

Employer	B	C	D	E	F
Sheridan College Institute Of Technology and Advanced Learning	203	526	557	174.4%	
Humber College Institute Of Technology and Advanced Learning	244	560	624	155.7%	
Ryerson University	1201	1280	1363	13.5%	

Sheridan grew the fastest.

There are many ways to perform value-added analysis using many of the techniques we have learned in this tutorial that take us beyond the tried and true “who earned the most of all employers.”

The spreadsheet is a powerful tool, which forms the bedrock (for non-programmers, at least) for data-driven stories.