



# Excel 2016

## Processing Data

### Course objectives:

1. Use conditional formatting effectively
2. Use IF and VLOOKUP functions for data analysis
3. Use PivotTables for flexible data presentation
4. Use Sort and filter effectively

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### Exercise document:

Go to <https://web.library.uq.edu.au/library-services/training/training-resources> and click Excel. Locate and click the **Processing Data.xlsx** link. Make sure you are on the **Relative and Absolute Reference** sheet when the workbook opens.





## Relative & Absolute Cell References

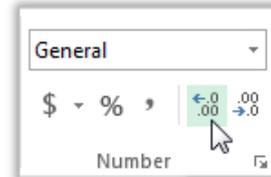
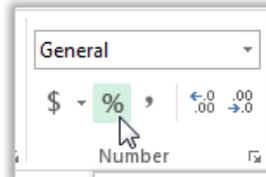
### Exercise 1.

### Relative cell references

Calculate “% Paid”

1. Select cell M2
2. Enter **=L2/K2**
3. Press Enter
4. Select cell M2
5. Select the % **button** from the **Number** group on the **Home** tab
6. Click the “**Increase Decimal**” button twice
7. Use the **Autofill** tool to fill the remaining results in the column.

	K	L	M
	Fees Due	Fees Paid	%Paid
	\$ 9,000	\$ 7,500	=L2/K2



**Note:** this will also carry down the % formatting.

	M
	%Paid
0	83.33%
0	
5	

### Exercise 2.

### Absolute cell references

**Absolute cell references** – This uses the exact address of a cell regardless of the position of the cell that contains the formula.

Calculate % of Total Fees Paid

1. Select cell N2
2. Type in **=L2/L28**
3. Click the % **button**
4. Click the **increase decimals** button
5. Use the AutoFill tool to fill the remaining results

	N
	% Total Fees Paid
	3.89%
	#DIV/0!
	#DIV/0!

**Note:** an error will display as Excel will use relative cell references by default. To correct this the dividing cell reference should be a fixed cell or an absolute reference

6. Edit formula in cell N2 by double clicking.
7. Click in L28 cell reference
8. Use the function key **F4** to change the formula to an absolute reference **=L2/\$L\$28**

	L	M	N
	Fees Paid	%Paid	% Total Fees Paid
	\$ 7,500	83.33%	=L2/\$L\$28
	\$ 2,600	31.71%	

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1. Use **AutoFill** to calculate the remaining results

N		N	
	% Total Fees Paid		% Total Fees Paid
%	3.89%		3.89%
%			1.35%
%			4.51%

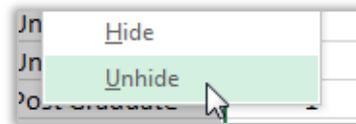
## Date Calculations and Conditional Formatting

### Exercise 3.

### Date calculations

#### Display hidden data

1. Select column **D** and column **F**
2. Right click on selection
3. Select **Unhide**



#### Calculate Age from Date of Birth

**Note:** Subtracting a date of birth from the current date will display the number of days between the two dates. To find out the age in years, divide by 365.25 (the .25 allows for leap years).

4. Select cell **E2**
5. Type in formula ....  
**=ROUNDDOWN((TODAY()-D2)/365.25,0)**
6. Press **Enter**
7. Use the **AutoFill** tool to calculate the remaining results.

E
Age
26
21
23
29

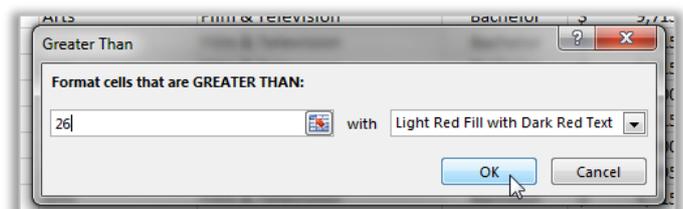
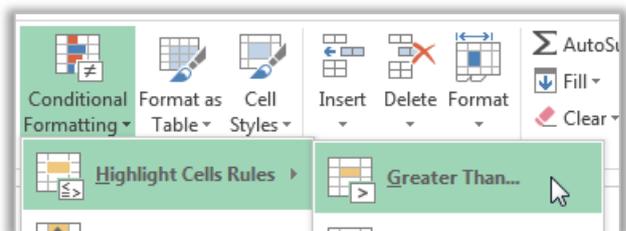
**Note:** The Rounddown function has the following structure. =Rounddown(number,num\_digits). In the above formula the number portion is generated by the formula (TODAY()-d2)/365.25. The num\_digits portion is designated zero meaning all the values after the decimal round down to zero e.g. 28.96 becomes 28.00.

### Exercise 4.

### Apply conditional formatting

#### Apply formats to students over 26 years

1. Select range to be formatted:**E2:E27**
2. Select **Conditional Formatting** on the **Home** tab
3. Hover over **Highlight Cell Rules**
4. Select **Greater Than...**
5. Type in **26**
6. Adjust formats to suit
7. Click **OK**



Notes

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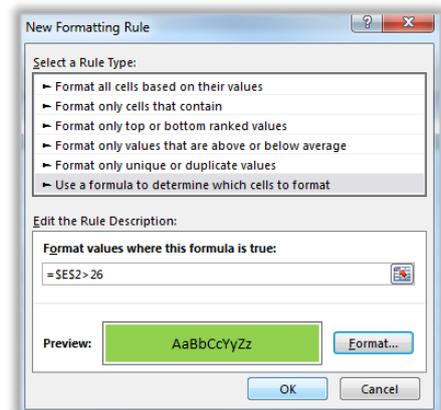
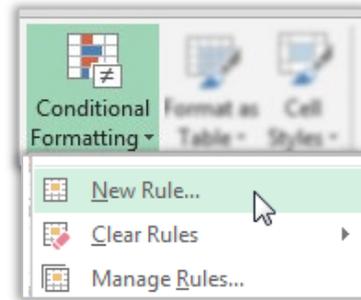
## Exercise 5. Apply conditional formatting to a whole row

### Apply formats to students over 26 years

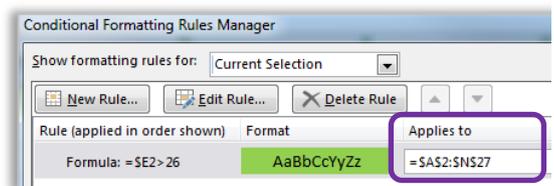
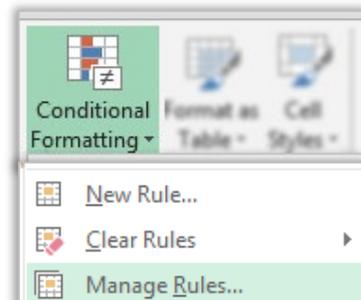
1. Select range to be formatted:**A2:N2**
2. Select the **Conditional Formatting** button from the **Styles** group on the **Home** tab
3. Select **New Rule...**
4. Select “**Use a formula to determine which cells to format**”
5. Enter **=SE2>26**

Note: This makes the column reference an absolute reference which means the condition will always be based on the content of that column but on a range of rows

6. Click the **Format...** button
7. Apply formatting as required
8. Click **OK**
9. Click on **OK**



1. Select **Manage Rules**
2. Go to the Applies To field
3. Change the range to **\$A\$2:\$N\$27**  
**Note:** This will ensure the conditional formatting criteria will apply to all rows in the defined range
4. Click on **OK**



Notes

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## Data Analysis

Excel can analyse a specified range of data using a variety of tools and can subsequently display results calculated from a formula or from user specified options

### 'IF' Function

The **IF** function will analyse data and provide results defined by the user. The analysis returns either a true or false answer. The displayed results can be text or calculated values. **Average and Final Exam grades** will analyse exam results and provide a grade for students based on pre-defined criteria.

#### Exercise 6. Using 'IF' statements

Go to the **If Statement** sheet

1. Select cell **D2**
2. Enter formula **=IF(C2>=B2,C2\*2%,0)**
3. Select cell **E2**
4. Enter formula **=IF(D2>=300,"Excellent","Poor")**
5. **Copy** the answers down the columns

**Commission**  
=IF(C2>=B2,C2\*2%,0)

**Assessment**  
=IF(D2>=300,"Excellent","Poor")

#### Exercise 7. Practice Exercise Basic IF Statements

Go to the **Basic If Exercise** sheet.

1. **Follow the instructions** below the table
2. **Create** the Average (Overall Score) and IF (Final Grade) statements in their respective columns
3. **Copy** the answers down the columns

App No	FirstName	LastName	Year of Study	Faculty	Field of Study	Degree Type	Exam 1	Exam 2	Final Exam	Overall Score	Final Grade
5	Kate	Miller	3	Science	Environmental Science	Bachelor	45	77	54		
7	Diana	Collins	3	Science	Environmental Science	Bachelor	66	80	67		
8	Richard	Prior	3	Science	Environmental Science	Bachelor	45	41	31		
10	Mitch	Walker	3	Science	Environmental Science	Bachelor	85	95	97		
13	Eddie	Walters	3	Science	Environmental Science	Bachelor	59	68	73		
15	Mason	Somers	3	Science	Environmental Science	Bachelor	58	69	71		
16	Jasmine	Lee	3	Science	Environmental Science	Bachelor	72	69	78		
24	Robbie	Coulter	3	Science	Environmental Science	Bachelor	58	62	70		
34	Gordon	Fuller	3	Science	Environmental Science	Bachelor	94	91	84		
38	Geraldine	Parker	3	Science	Environmental Science	Bachelor	86	75	81		
39	Sally	Ranger	3	Science	Environmental Science	Bachelor	58	48	62		
53	Serena	Peters	3	Science	Environmental Science	Bachelor	61	72	78		
59	Joshua	Payne	3	Science	Environmental Science	Bachelor	63	66	69		
<b>Overall Score</b>											
1. In cell L2 calculate the Average of the 3 exams. This will give the Overall Score											
<b>Final Grade</b>											
2. Use an IF statement to find the Final Grade. Students who score 75 or more get an A. Everyone else gets a B.											

See page 21 for the answer.

Notes

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## VLookup Function

You can also use the VLOOKUP function as an alternative to the IF function for elaborate tests. Lookup functions will analyse data and compare it against a predefined range prior to displaying the result. This works on the principle:

- a) **Here's a value.**
- b) **Go to another location and find a match for my value,**
- c) **When a match is found show the cell contents from within a specified column number**

A vertical array (or table) has headings in the first row and data in column beneath. This is the most common layout for information within Excel.

**Note:** If the Headers are in the first column and the data is in rows then you would use the HLookup function.

### Exercise 8.

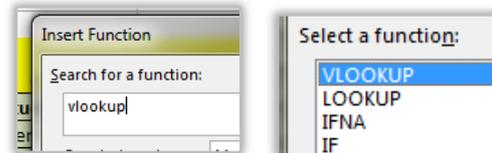
### Using V lookup

#### Use VLOOKUP to extract data from tables of information

1. Go to the "Vlookup" sheet
2. Go to cell **E22**
3. Click the **Insert Function** button on the formula bar

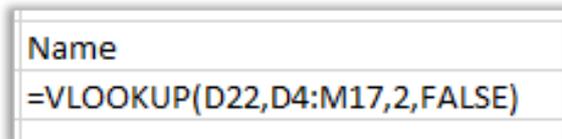


4. Type **VLOOKUP**
5. Click **Go**
6. Select **VLOOKUP**
7. Click **OK**



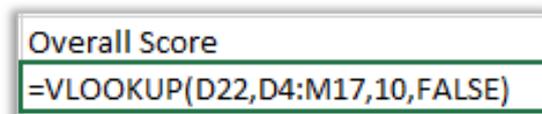
1. Enter the **Name** VLOOKUP function as:
  - The cell to check (Lookup\_value): **D22**
  - The range to compare (Table\_array): **D4:M17**
  - Column containing information (Col\_index\_num): **2**
  - Exact or Approximate match (Range\_lookup): **False** (exact)
  - **Select** cell **F22**

1



2. Enter the **Overall Score** VLOOKUP function as:
  - The cell to check (Lookup\_value): **D22**
  - The range to compare (Table\_array): **D4:M17**
  - Column containing information (Col\_index\_num): **10**
  - Exact or Approximate match (Range\_lookup): **False** (exact)
  - Select cell **G22**

2



3. Enter the data opposite into the **Table 1** area on the spreadsheet

3

Overall Score	Final Grade
0	Fail
40	D
50	C
70	B
90	A

Notes

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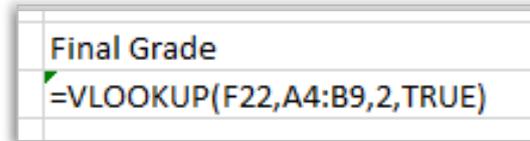
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4. Enter the **Final Grade** VLOOKUP function as:
  - The cell to check (Lookup\_value): **F22**
  - The range to compare (Table\_array): **A4:B9**
  - Column containing information (Col\_index\_num): **2**
  - Exact or Approximate match (Range\_lookup): **True** (range)
5. AutoFill down

4



**Note:** As we are looking for an **approximate** match the data in column 1 of the table array A4:B9 must be sorted in ascending order.

## Exercise 9.

## Practice Exercise Vlookup

Go to the **VLookup Exercise** sheet.

1. **Follow** the 6 instructions at the top right
2. **Create** a vertical lookup function to extract the name of the currency
3. **Create** a vertical lookup function to display the amount of converted currency.
4. See page 21 for the answer.

Currency conversion for holiday money			
1	Select a country		1. Click on
2	Enter amount in \$'s to change:		2. Use the
3	The name of currency used is:		3. In cell E
4	Total Currency is:		4. In cell B
5			5. In cell B
6			6. Test you
			Hint: Use
Country	Name of Currency	Exchange Rate per \$	
Argentina	Argentine Peso	7.207	
Canada	Canadian Dollar	1.034	
England	Pound	0.51	
France	Euro	0.705	

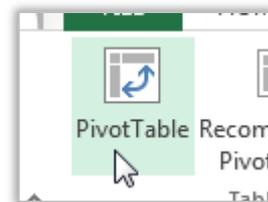
## Pivot Table

Pivot tables allow you to extract and arrange elements of your data to present it in an alternative table. With pivot tables you can group and summarise list data into a format that is easy for reporting and analysis. A pivot table won't automatically update if the raw data changes and you will need to refresh to update any changes in the data.

## Exercise 10.

## Create a pivot table

1. Select the **Fees PivotTable Data** sheet
2. Click any individual cell within the data
3. Click **Insert** tab
4. Click **Pivot Table** button



Notes

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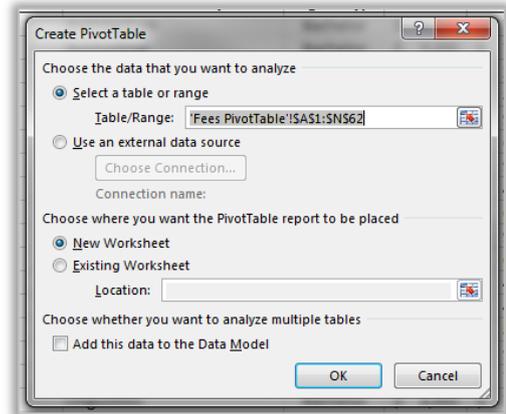


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5. In the Create Pivot Table dialog box check the correct data range has been selected and entered
6. Click on **New Worksheet**
7. Click **OK**

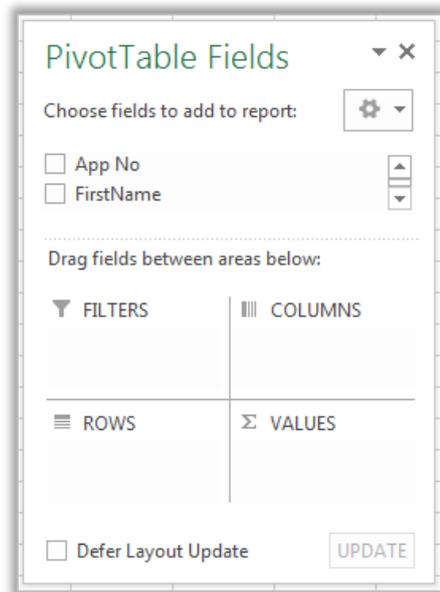


A new worksheet opens

8. **Rename** the worksheet **Pivot**

The fields available are displayed in the **PivotTable Fields** List at the right of the screen

**Note:** These are used to build the PivotTable.



Pivot Table categories define 3 main areas of information:

Filters	Column/Row Labels	Values
Gives an overall view which can be refined	<i>Groups of data:</i> e.g. Dept, Model, Product Type, Locations, Salespeople	<i>Groups of data:</i> e.g. Amounts

Notes

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## Exercise 11.

## Add data to PivotTable

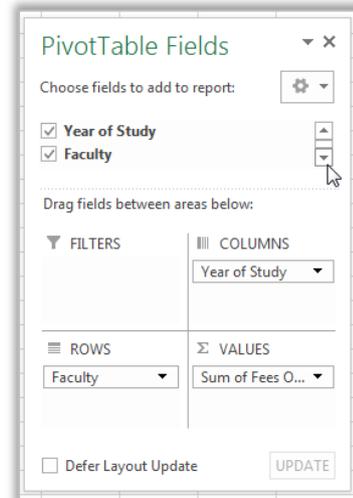
### To display fees owing in each faculty

Drag & Drop the following fields into the appropriate sections...

- **Year of Study** into **Column** section
- **Faculty** into **Rows** section
- **Fees Owing** into **Values** section

**Note 1:** The Report Filter allows you to apply filters to the Pivot Table to display select portions only e.g. Filter by Degree Type

**Note 2:** The PivotTable will automatically reflect changes as you work unless you select “**Defer Layout Update.**” This allows you to click the “**Update**” button when complete.



## Exercise 12.

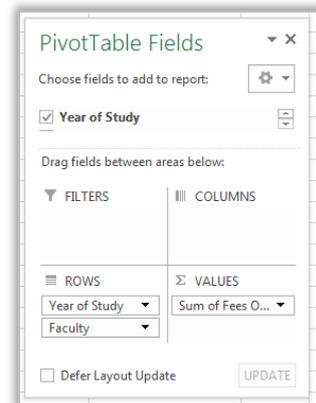
## Edit PivotTable

To rearrange the Pivot Table reposition fields as needed.

10. Drag **Year of Study** from Column to **Row**

**Note:** The Pivot Table will adjust to display the new data layout

11. Drag **Year of Study** above **Faculty** within the Row section



### To change Table values displayed

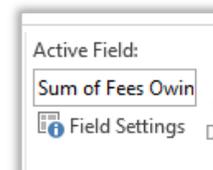
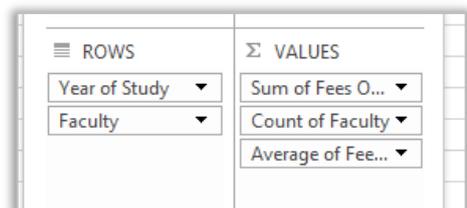
Pivot Tables can display more than one column of data at a time

1. Drag Faculty from the Fields List to the Values section

**Note:** Faculty as a value defaults to Count as it is text

2. Drag a second Fees Owing into the Values section

3. On the **PivotTable Tools; Analyze** tab Click on ‘**Field Settings**’ in **Active Field** group



Notes

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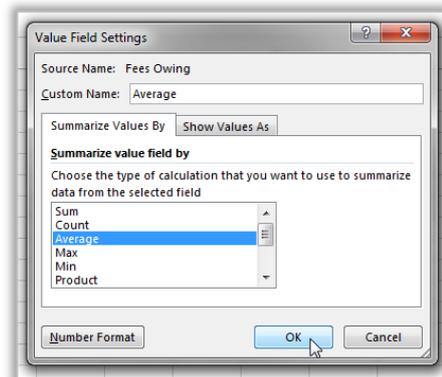
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4. Click **Average** function
5. Click **OK**

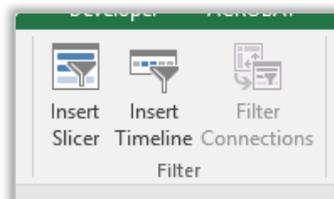
**Note:** PivotTable will automatically change to display new summary figures



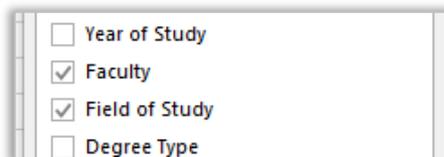
## Pivot Table Slicers

Pivot table slicers are a type of filter you can use to display select data within your pivot table quickly and efficiently.

1. Click Pivot Table Tools - Analyse tab  
In the Filter group
2. Click Insert Slicer

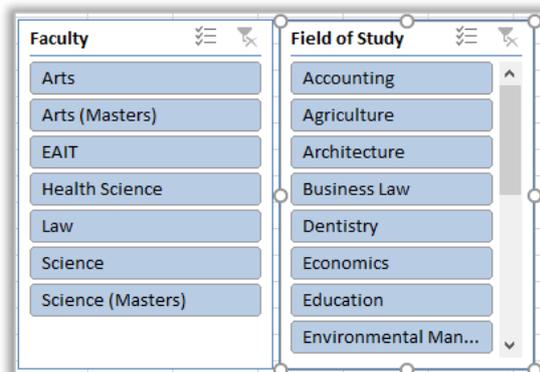


- In the Insert Slicers window
3. Tick Faculty and Field of Study
  4. Click OK

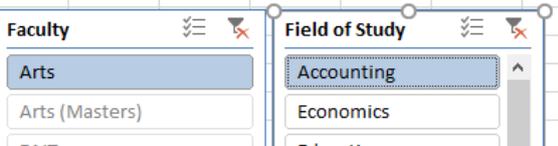


Clicking a slice will apply a filter to display the choice made

5. Click Arts in Faculty slice
6. Click Accounting in Field of Study slice



Row Labels	Sum of Fees Owing	Count of Faculty	Average
1	1500	1	1500.00
Arts	1500	1	1500.00
<b>Grand Total</b>	<b>1500</b>	<b>1</b>	<b>1500.00</b>



Notes

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- Remove a slice by clicking the clear filter button in the top right hand corner of the slicer



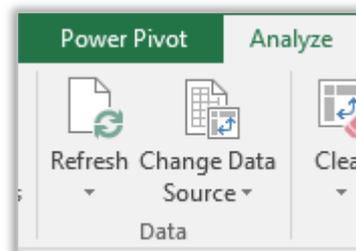
Choose new slicers to apply if needed

### Drill Downs

A drill down is a breakdown of select information contained within a pivot table. It is activated by double clicking on selected data. The drill down displays in a new sheet.

- Find the 4<sup>th</sup> year law student
- Double click the Fees Owing value  
**Note:** a new worksheet opens and the displayed data is not connected to the original data sheet or pivot table.
- Click sheet **Fees Pivot Table Data**
- Go to App No. 52 – Michelle Dempsey
- Change her **Fees Paid** value to **14210**
- Click **Pivot** tab
- On the **PivotTable Tools; Analyze** tab
- Click **Refresh**  
**Note:** Data for 4<sup>th</sup> year law should now read 0
- Click **Sheet 1** tab  
**Note:** Data has not updated

4	356
Law	356
Grand Total	132155



4	0
Law	0
Grand Total	132155

## Exercise 13. Practice Exercise Pivot Table Exercise

Click **Pivot Table Exercise** tab

**Insert** a pivot table onto the **green cell (J3)** using the following layout to calculate the displayed values

Row Labels	Sum of SALARY	Average of SALARY	Oldest AGE	Yougest AGE
Adelaide	65194	21731.33	85	46
Brisbane	97603	16267.17	77	31
Darwin	123353	17621.86	76	22
Melbourne	121486	24297.20	84	42
Perth	79533	19883.25	85	32
Sydney	107914	21582.80	62	22
<b>Grand Total</b>	<b>595083</b>	<b>19836.10</b>	<b>85</b>	<b>22</b>

Notes

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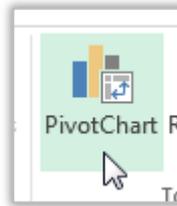
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## Exercise 14.

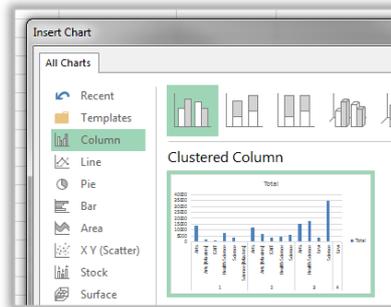
## Create a PivotChart

### To add a PivotChart

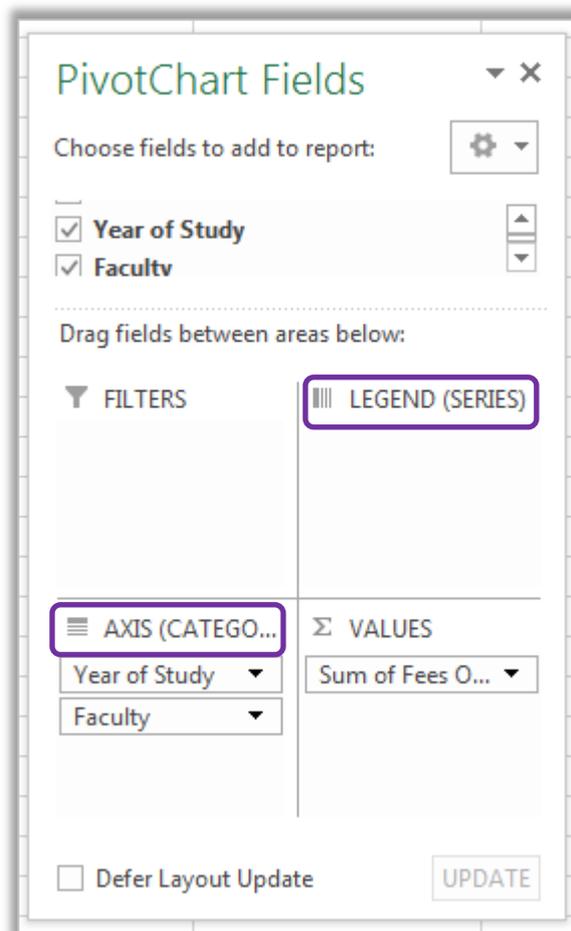
1. Click **Pivot** tab
2. Select a cell in the PivotTable to activate
3. Go to **Options** Tab
4. Select **PivotChart** button



5. Select a **column** chart
6. Click on **OK**



**Note:** The PivotTable Field List is available as a filter pane for the Pivot Chart. It offers **Legend Fields** and **Axis Fields** to edit the chart data displayed. This will also adjust the Pivot Table it is connected to.



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## Extras Sorting & Filtering Lists

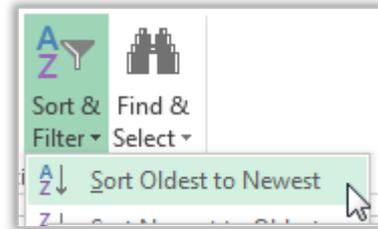
### Exercise 15.

### Sort by single criteria

Go to the **Sort & Filter** worksheet tab

#### To sort data by Date of Birth

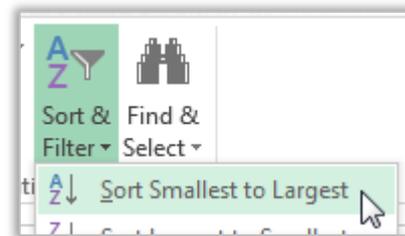
1. Click in the **Date of Birth** column
2. On the **Home** tab
3. Go to the **Editing** group
4. Click the **Sort & Filter** button
5. Select the date order '**Oldest to Newest**'



#### To sort data by another criteria

1. Click in any cell in **App No** column
2. On the **Home** tab
3. Go to the **Editing** group
4. Click the **Sort & Filter** button
5. Select sort order "**Sort Smallest to Largest**"

**Note:** If you had selected data that was recognised as text the option would be "**Sort A to Z**"



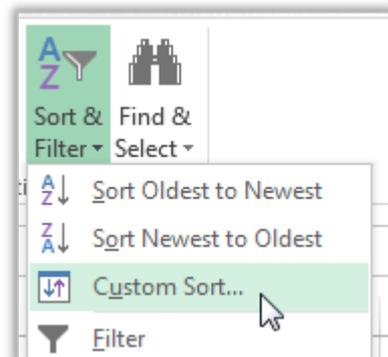
### Exercise 16.

### Sort by multiple criteria

#### To sort by Faculty, Field of Study then Year

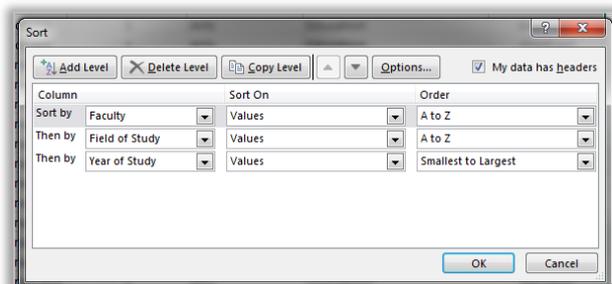
1. On the **Home** tab
2. Click **Sort & Filter** button
3. Select **Custom Sort...**

**Note:** The sort window will appear to add levels and criteria to sort the data.



1. Click the down arrow to **sort by...**
2. Select **Faculty (A to Z)**
3. Click on the **Add level** button
4. Click the down arrow beside **Then by**
5. Select **Field of Study (A to Z)**

**Note:** The data will be sorted according to the criteria entered.



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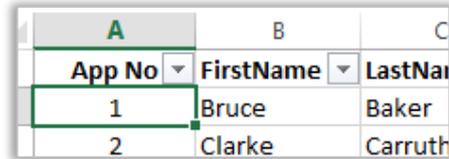
Sorting Data allows you to present it in a specified order. If you want to temporarily hide or extract data use the filtering tool available from AutoFilter.

## Exercise 17. Filtering with AutoFilter

### To activate AutoFilter

1. Go to the **Home** tab
2. Click **Sort & Filter**
3. Select **Filter**

**Note:** All columns will have an AutoFilter arrow in the heading cell.

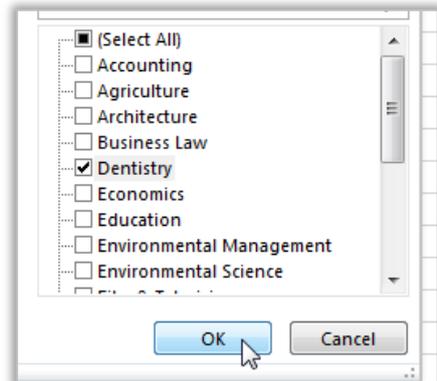


App No	FirstName	LastNa
1	Bruce	Baker
2	Clarke	Carruth

### To filter for one Field of Study

1. Click on column AutoFilter arrow
2. Clear tick beside **Select All**
3. Select **Dentistry**

**Note:** All data is filtered to display records matching the criteria.

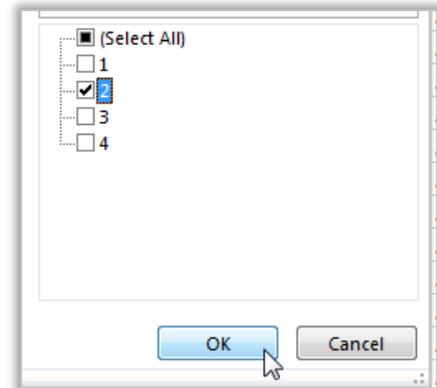


### To remove filter

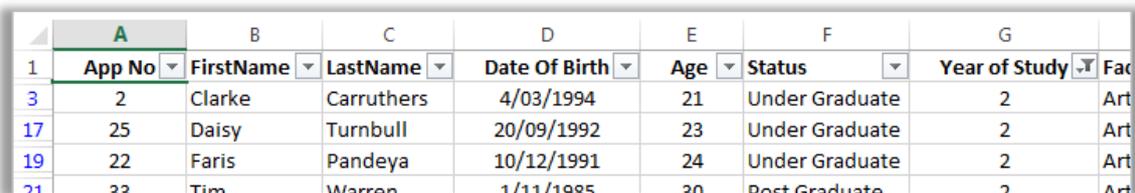
1. Click AutoFilter arrow
2. Click **Select All**
3. Click **OK**

### To filter for Year 2 - Year of Study

1. Click on column AutoFilter arrow
2. Clear tick beside **Select All**
3. Select **2**



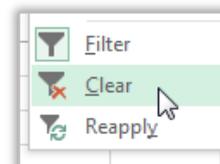
**Note:** All data is filtered to display only records matching the criteria



App No	FirstName	LastName	Date Of Birth	Age	Status	Year of Study	Fac
2	Clarke	Carruthers	4/03/1994	21	Under Graduate	2	Art
25	Daisy	Turnbull	20/09/1992	23	Under Graduate	2	Art
22	Faris	Pandeya	10/12/1991	24	Under Graduate	2	Art
33	Tim	Warren	1/11/1985	30	Post Graduate	2	Art

### To remove filter:

1. Click **Sort & Filter** button
2. Select **Clear**



Notes

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## Exercise 18.

## Progressive filtering

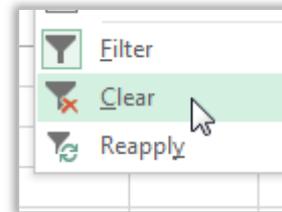
To filter data for Undergraduates in their first year studying Arts

1. Click on **Status** AutoFilter arrow
2. Clear tick beside **Select All**
3. Select **Undergraduate**
4. Click **Year of Study** AutoFilter arrow
5. Clear tick beside **Select All**
6. Select **1**
7. Click on **Faculty** AutoFilter arrow
8. Clear tick beside **Select All**
9. Select **Arts**

	A	B	C	
1	App No	FirstName	LastName	Date
2	1	Bruce	Baker	7/
6	26	Joseph	Cooper	19,
18	3	Chris	Bennett	2/
63				
64				

To remove all filters

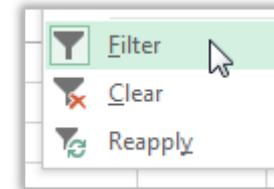
1. Go to **Home** tab
2. Click **Sort & Filter** button
3. Select **Clear**



To switch AutoFilter off

1. Go to **Home** tab
2. Click **Sort & Filter** button
3. Select **Filter**

**Note:** This is a toggle option, if AutoFilter is on it will be switched off.



## Find Unique Values and Remove Duplicates

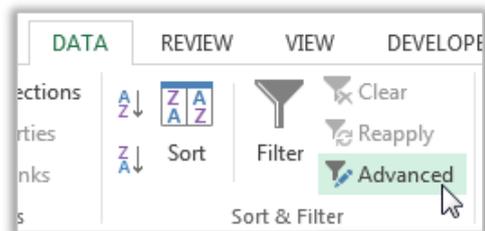
### Exercise 19.

### Find unique values

Go to **Remove Duplicates** sheet

To Find Unique Values

1. Sort by **App No** column
2. Go to **Data** tab
3. Click **Advanced** button in **Sort and filter** group



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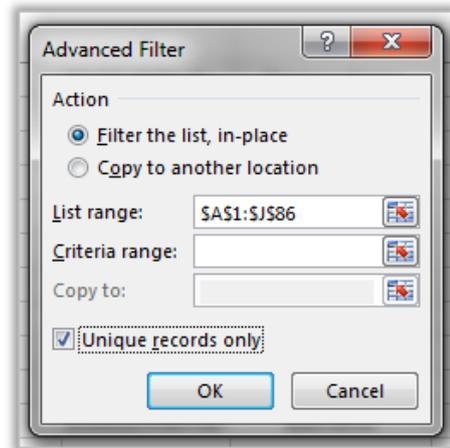


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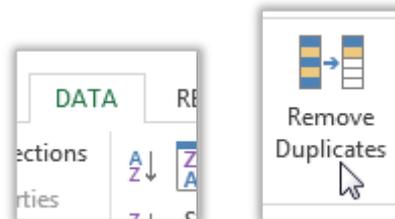
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4. Check List Range = **(\$A\$1:\$J\$86)**
5. Click **Unique records only**
6. Click **OK**



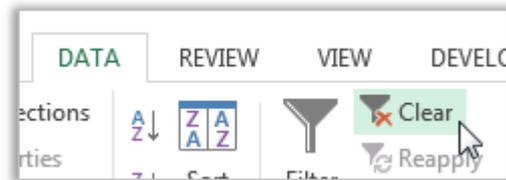
### To Remove Duplicates

1. Go to **Data** tab
2. Click **Remove Duplicates** button in **Data Tools** group



### To remove Filter

1. Go to **Data** tab
2. Click **Clear** button in **Sort and filter** group



## Protection

To prevent a user from accidentally or deliberately changing, moving, or deleting important data from a worksheet or workbook, you can protect certain worksheet or workbook elements, with or without a password.

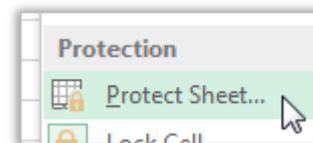
### Exercise 20.

### Worksheet protection

If you **protect** a worksheet; all cells will be locked by default. Users cannot make any changes to a locked cell. For example, they cannot insert, modify, delete, or format data in a locked cell.

#### To Protect a worksheet

1. Go to **Home** tab
2. In the **Cells** group
3. Click **Format**
4. Select **Protect Sheet...**



Notes

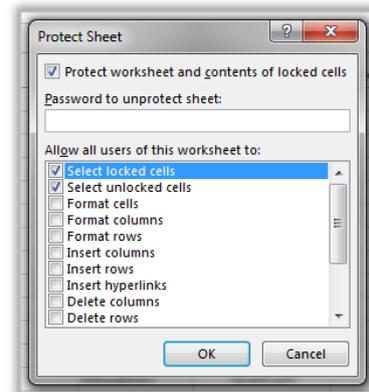
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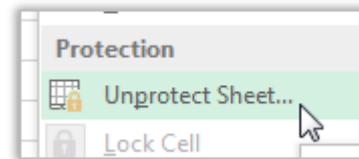
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**Note:** You will not be able to change **any** of the cells in the worksheet when protection is on. A password can be entered for further security.



**To turn off Protection**

1. Go to **Home** tab
2. In the **Cells** group
3. Click **Format**
4. Select **Unprotect Sheet**

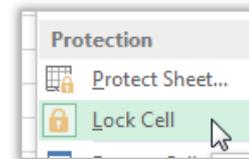


**Exercise 21. Unprotected cells**

Excel protects **all** cells that are locked. All cells are locked by default, so when protection is applied all cells are unavailable. To enabling editing, cells must be unlocked before they are protected.

**Selective Protection: Unlock Cells**

1. Select the cells you want users to be able to change - **“Remove Duplicates” (K1:K4)**
2. Go to the **Home** tab
3. Click the **Format** button
4. Select **Lock Cell**

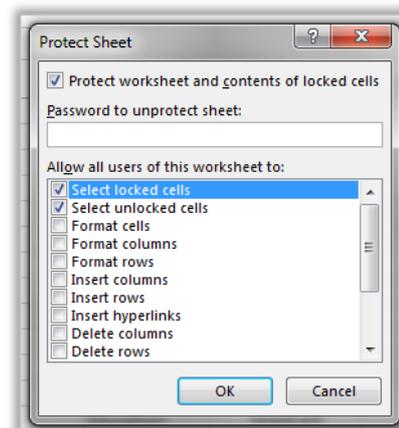


**Note:** This will “unlock” the selected cells. When protection is applied these cells will still be accessible

**Selective Protection: Apply Protection:**

5. Go to **Home** tab
6. In the **Cells** group
7. Click **Format**
8. Select **Protect Sheet**
9. Click **OK**

**Note:** the unlocked cells K1:K4 can be edited but the remainder of cells are protected.



**Goal Seek**

If you know the result that you want from a formula, but are not sure what input value the

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formula needs to get that result, use the Goal Seek feature. This feature will change the actual values on a spreadsheet.

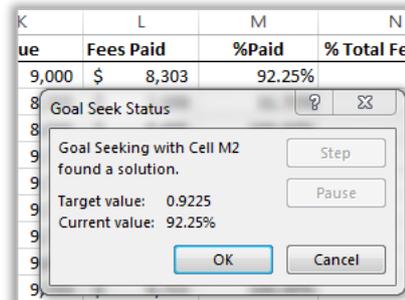
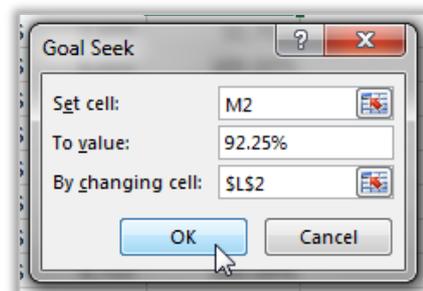
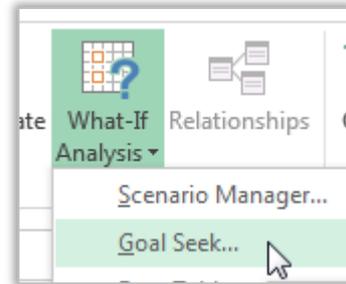
## Exercise 22.

## Use 'Goal Seek' tool

Select the **Relative and Absolute Reference** worksheet and select cell M2.

Calculate how much of the fees due should be paid to reach 92.25% of the total.

1. Click on **Data** tab
2. Click **What if Analysis** button
3. Select **Goal Seek**
  
4. Enter the **Set cell** reference – M2  
**Note:** Set cell must have a formula
5. Type in the **result** you want – 92.25%  
**Note:** % sign is essential or alternative enter 0.9225
6. Enter **Changing cell** reference - \$L\$2  
**Note:** Changing cell must NOT have a formula
  
7. Click **OK**  
**Note:** Goal Seek will provide a solution in a dialog box for acceptance or rejection
  
8. Click **OK** again to accept.



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## Naming Cells

Naming cells or ranges allows you to use those names in formulas. This has the same effect as making a cell or range absolute. See Exercise 2 on page 4 for further information on absolute cell references.

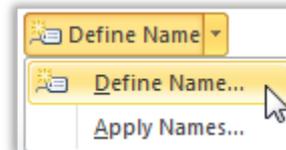
**Note:** Cell/Range names cannot have any spaces. They must start with a letter and can have numbers but they cannot be the same as a cell reference or a function name. E.g. You cannot use SUM or A1 as a cell/range name but you could use AAAA1 or SUM111 if you wish.

### Exercise 23.

### Naming cells via ribbon

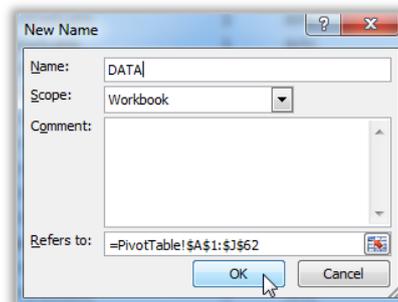
#### To name a range

1. Go to **Fees PivotTable** worksheet
2. Select range - (**A1:N62**)
3. Click **Formulas** tab
4. Click **Define Name**
5. Select **Define Name...**



**Note:** Excel will automatically insert a name from an adjacent cell if available.

6. Enter a name for the range e.g. Data
7. Click **OK**



## Answers

### Basic If Exercise:

L	M
<b>Overall Score</b>	<b>Final Grade</b>
=AVERAGE(I2:K2)	=IF(L2>=75,"A","B")

### Vlookup Exercise

<b>The name of currency used is:</b>	=VLOOKUP(B3,A10:C22,2,FALSE)
<b>Total Currency is:</b>	=VLOOKUP(B3,A10:C22,3,FALSE)*B4

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