Microsoft Excel 2013
Manipulating Data

Course Objectives

- Distinguish between relative and absolute cell references
- Use **IF** function
- Use the **Vlookup** function
- Use **PivotTable** for flexible data presentation
- Sort and filter to extract data

Staff Training (Bookings only)

Phone (07) 3365 2666
Email staffdev@uq.edu.au
Web http://www.uq.edu.au/staffdevelopment

Staff may contact their trainer with enquiries and feedback related to training content.

Please contact Staff Development for booking enquiries or your local I.T. Support for general technical enquiries.

Student Training and Support

Phone (07) 3365 8811 or 1300 738 082
Email help@askit.uq.edu.au
Web http://www.library.uq.edu.au/ask-it/

UQ Students may contact the Library's Ask I.T. team for I.T. support related to the Library and their studies.

Table of Contents

Exercise document:

Go to http://www.library.uq.edu.au/ask-it/exercises and click the green Manipulate Data button to open Excel2010_exercisesLvl2.xlsx. Make sure you are on the **Student Fees** sheet.

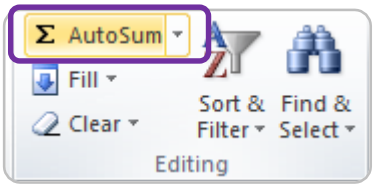
Relative & Absolute Cell References

Adjust column widths to see headings.

Exercise 1. *AutoSum*

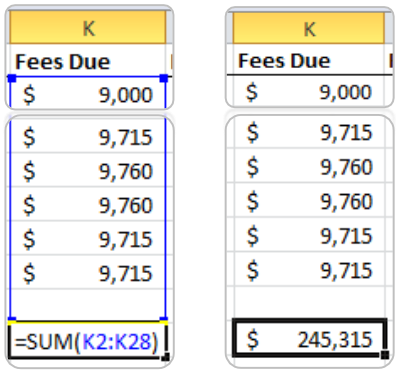
Use AutoSum to enter totals for 'Fees Paid' and 'Fees Due'

1. Select the cell where the total will be entered**: K29**
2. Click the **AutoSum** button from the **Editing** group on the **Home** tab.



3. Check the range is **K2:K29**
4. Press **Enter** to confirm

Note: The total will then be calculated. Repeat the steps above for the Fees Paid Column.

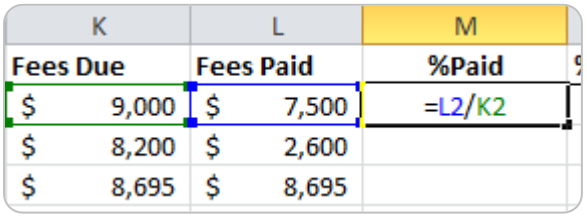


Exercise 2. *Relative cell references*

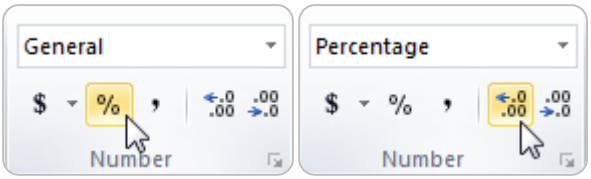
Calculate "% Paid"

1. Type in **"=L2/K2**"

Note: The numerator and denominator can also be inserted with a mouse click.

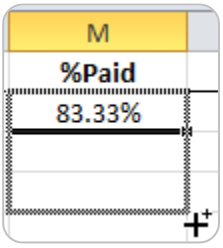


2. Select the **% button** from the **Number** group on the **Home** tab
3. Set 2 decimal places by clicking the **"Increase Decimal"** button



4. Use the **Autofill** tool to fill the remaining results in the column.

Note: this will also carry down the % formatting.



Notes

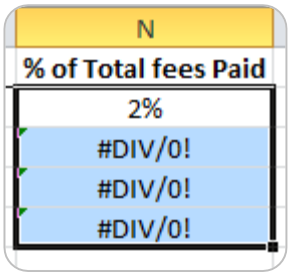
Exercise 3. *Absolute cell references*

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

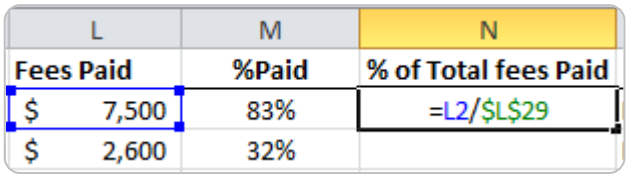
Calculate % of Total Fees Paid

1. Type in "**=L2/L29"**
2. Select the **% button**
3. Use the AutoFill tool to fill the remaining results

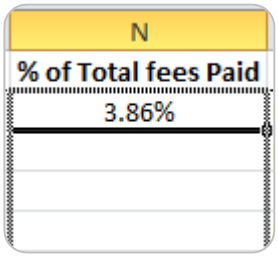
Note: an error will display as Excel will use relative cell references by default. To correct this the dividing cell reference should be a fixed cell or an absolute reference

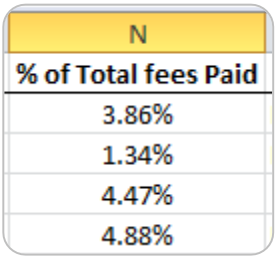


4. Edit formula in cell **N2** by double clicking.
5. Click in L29 cell reference
6. Use the function key **F4** to change the formula to an absolute reference **"=L2/$L$29"**



7. Select the **% button** from the **Number** group on the **Home** tab
8. Use **AutoFill** to calculate the remaining results



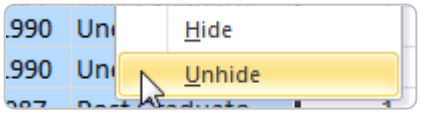


Date Calculations and Conditional Formatting

Exercise 4. *Date calculations*

Display hidden data

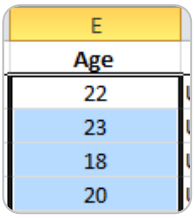
1. Select column **D** and column **F**
2. Right click on selection
3. Select **Unhide**



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).

1. Select cell **E2**
2. Type in formula …. **=ROUNDDOWN((TODAY()-d2)/365.25,0)**
3. Press **Enter**
4. Use the **AutoFill** tool to calculate the remaining results.



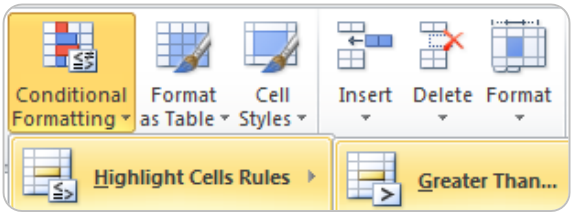
Note: The Rounddown function has the following structure. =Rounddown(number,num_digits). In the above formula the number portion is generated by the formula **(TODAY()-d2)/365.25.** The num_digits portion is designated zero meaning round down to zero e.g. 28.96 becomes 28.00.

Notes

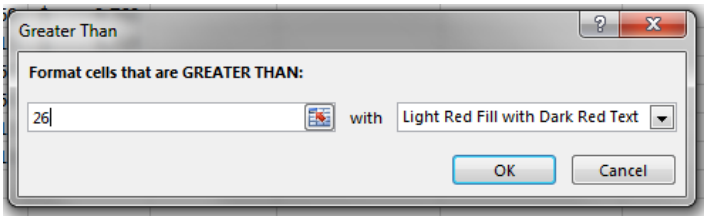
Exercise 5. *Apply conditional formatting*

Apply formats to students over 26 years

1. Select range to be formatted:**E2:E27**
2. Select the **Conditional Formatting** button from the **Styles** group on the **Home** tab
3. Hover over **Highlight Cell Rules**
4. Select **Greater Than…**



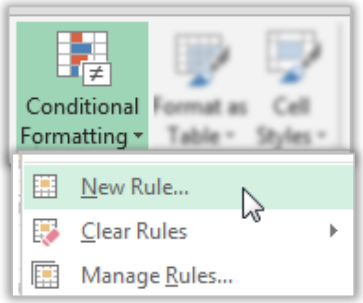
5. Type in **26**
6. Adjust formats to suit
7. Click **OK**



Exercise 6. *Apply conditional formatting to a whole row*

Apply formats to students over 26 years

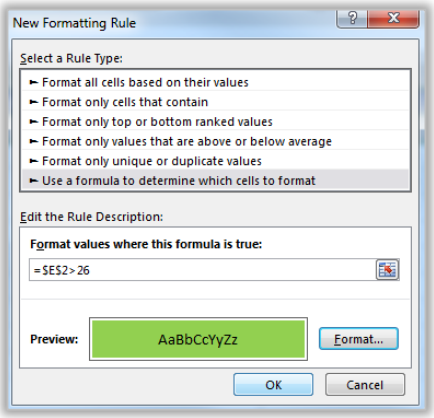
1. Select range to be formatted:**A2:N2**
2. Select the **Conditional Formatting** button from the **Styles** group on the **Home** tab
3. Select **New Rule…**



4. Select "**Use a formula to determine which cells to format**"

5. Enter **=$E2>26**

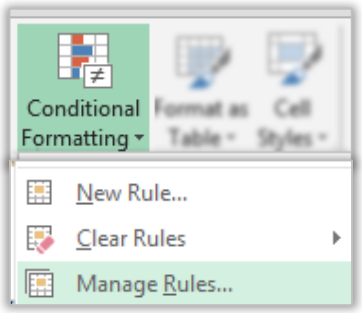
Note: This makes the column reference an absolute reference which means the condition will always be based on the content of that column but on a range of rows



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

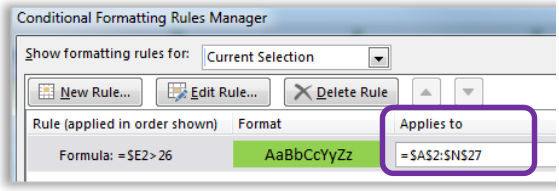
Notes

10. Select **Manage Rules**



11. Go to the Applies To field
12. 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

13. Click on **OK**



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

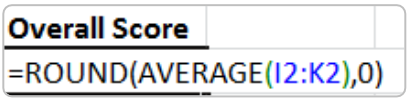
The **IF** function will analyse data and provide results defined by the user. The analysis returns either a true or false answer. The displayed results can be text or calculated values. **Average and Final Exam grades** will analyse exam results and provide a grade for students based on pre-defined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

Exercise 7. *Using 'IF' statements*

Go to the '**Exams'** sheet

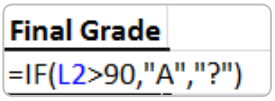
Calculate Overall score

1. Select cell **L2**
2. Enter formula **=Round(Average(I2:K2),0)**
   Round(Number ref, No of significant figures)
3. AutoFill down for other student scores



Using IF statement to display Final Grade

1. Go to cell **M2**
2. Enter formula =**IF(L2>90, "A","?")**
   IF(Logical test, Value if True, Value if False)
3. AutoFill down to other student grades



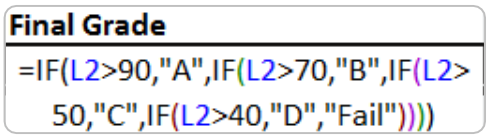
Notes

Exercise 8. *Using nested 'IF' statements*

If more than two results are required then Excel can retest the data by using another IF statement in either the Value if True or the Value if False portions of the formula. This is known as a nested "IF" statement. A maximum of 64 "IF" statements can be nested in any one cell. As a general rule you will always need one less IF statement than the number of outcomes possible. So an IF statement that can choose from 5 possible results will have 4 nested IFs.

Using Nested 'IF' Statement

1. Go to cell **F2**
2. Edit formula to include another "IF" statement in the *Value_if_False* parameter for grades
   >90 is an A,
   >70 is a B,
   >50 is a C,
   >40 is a D and less than 40 is a Fail
3. AutoFill down to other student grades



Lookup Functions

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:

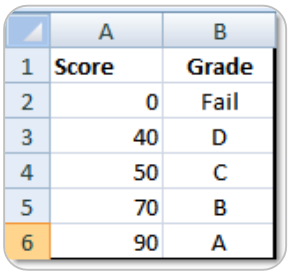
a) Here's a value.
b) Go to another location and find a match for my value,
c) When a match is found show the cell contents from within a specified column number

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.

Exercise 9. *Using V lookup*

Use VLOOKUP for student Grades

1. Go to the **"Lookup"** Sheet
2. Enter the Data as shown

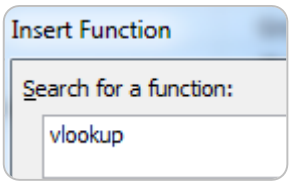


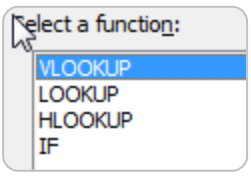
	A	B
1	Score	Grade
2	0	Fail
3	40	D
4	50	C
5	70	B
6	90	A

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

3. Go to cell **P2**
4. Click **insert function** button on formula bar

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

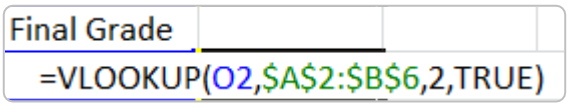




9. Enter VLOOKUP function as:

Notes

- The cell to check = **O2**
- The range to compare = **$A$1:$B$6**
- Column return Value is in = **2**
- Exact or Approximate match = **TRUE** (approx.)



10. AutoFill down other student grades

Note: The lookup function will determine the matching range and display the corresponding value from column 2.

Optional extension Use a wider range of grades by including results from A+ to C-

Using a wider range of grade results

1. Amend the data range as shown
2. Go to cell **P2**
3. Enter **VLOOKUP** function as:
   - The cell to check = **O2**
   - The range to compare = **$A$2:$B$12**
   - Column return Value is in = **2**
   - Exact or Approximate match = **TRUE** (approx.)
4. AutoFill down other student grades

	A	B
1	Score	Grade
2	0	Fail
3	40	D
4	45	C-
5	50	C
6	55	C+
7	60	B-
8	70	B
9	75	B+
10	85	A-
11	90	A
12	95	A+

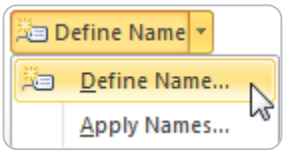
Pivot Table

Pivot tables allow you to pivot 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 and you will need to refresh to update any changes in the data.

Exercise 10. *Naming cells via ribbon*

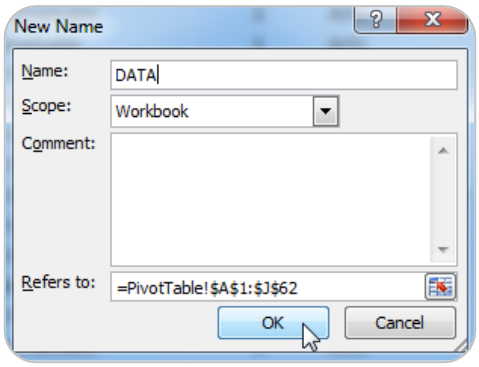
To name a range

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.

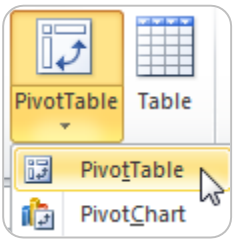
6. Enter a name for the range
   Note: Cell names cannot have any spaces
7. Click **OK**



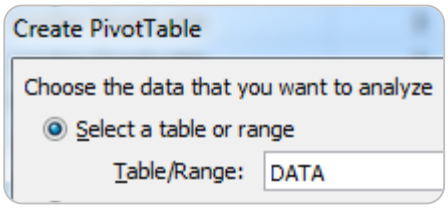
Notes

Exercise 11. *Create a pivot table*

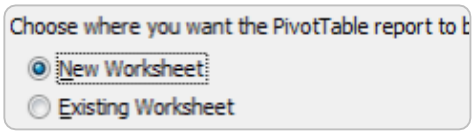
1. Click **Insert** tab
2. Click **Pivot Table** button
3. Select **PivotTable**



4. Enter the range name already defined, **DATA** or select the range you want to use.

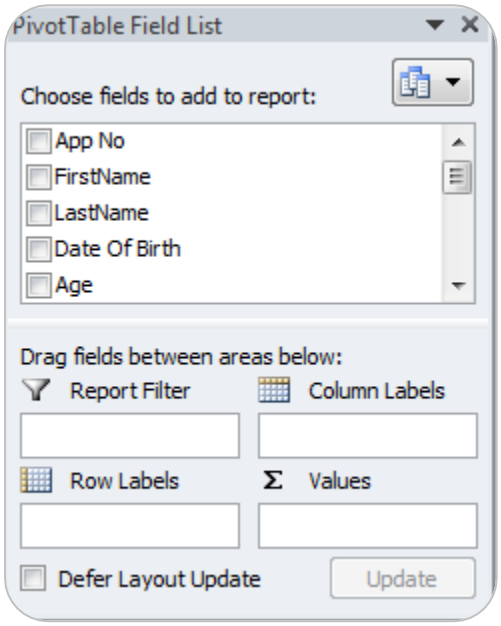


5. Click on **New Worksheet** to position PivotTable
6. Click **OK**



The fields available are displayed in the **PivotTable Field List**

Note: These are used to build the PivotTable.



Pivot Table categories define 3 main areas of information:

Report Filter	Column/Row Labels	Values
Gives an overall view which can be refined	*Groups of data:* Dept, Model, Product Type, Locations, Salespeople	*Groups of data:* Amounts

Notes

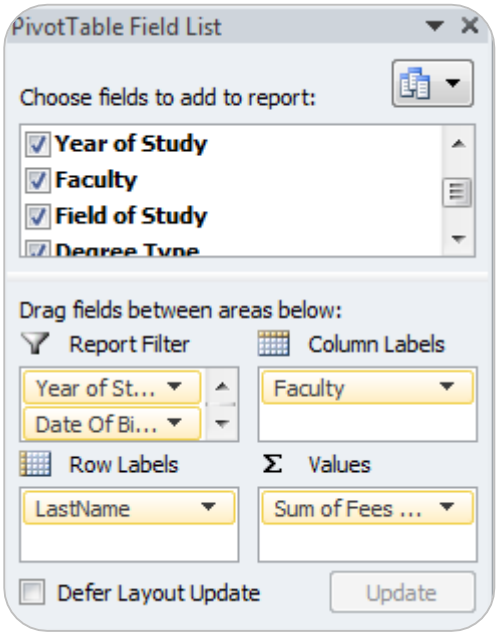
Exercise 12. *Add data to PivotTable*

To display fees owing in each faculty

Drag & Drop…

- **Faculty** into **Column** Labels
- **Last name** into **Row Labels**
- **Fees Owing** into **Values**

- Add remaining fields to the **Report Filter** Category



Note: 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.

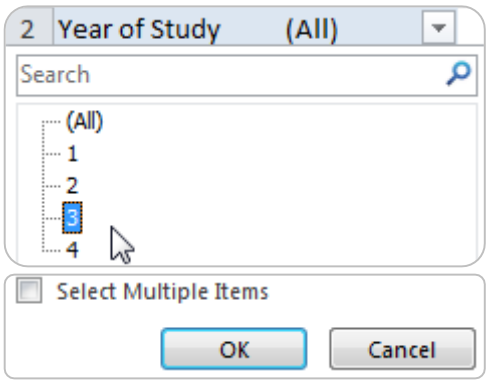
Exercise 13. *Edit PivotTable*

To filter display – show 3rd year students only:

1. Click down arrow to change **Year of Study**
2. Select "**Select 3**"
3. Click **OK**

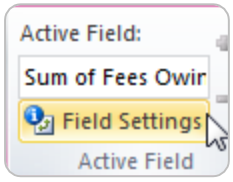
Note: The Pivot Table will adjust to display filtered data.

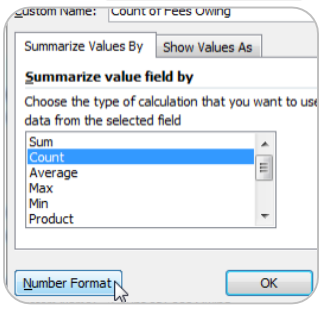
4. Click down arrow to change **Year of Study**
5. Click **(All)**
6. Click **OK**



To change Table values displayed

1. On the **PivotTable Tools**; **Options** tab
2. Click on **'Field Settings'** in **Active Field** group



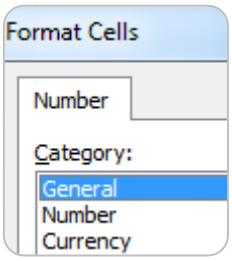


3. Click **Count** function
4. Click **Number Format** button

Notes

5. Select **General**
6. Click **OK**
7. Click **OK**

   Note: PivotTable will automatically change to display new summary figures



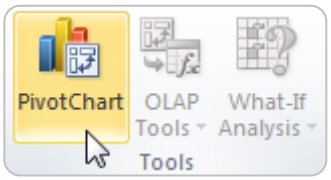
Optional Extension Tasks

- Change the PivotTable to present the fees due for Field of study in each Faculty
- Change the PivotTable to present the 1st years fee owing in each field of study

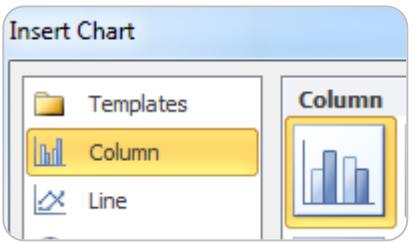
Exercise 14. *Create a PivotChart*

To add a PivotChart

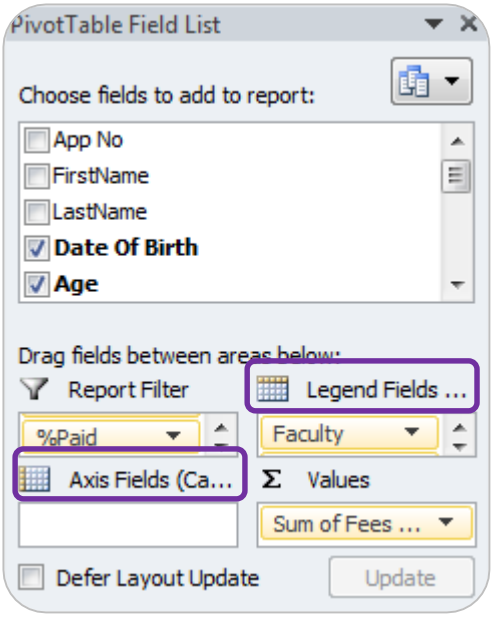
1. Go to worksheet with **PivotTable**
2. Select a cell in the PivotTable to activate
3. Go to **Options** Tab
4. Select **PivotChart** button



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.



Notes

Optional Extension Tasks

- Change the PivotChart to present the Amount of Fees Owing in each Faculty by Degree Type
- Change the PivotChart to present the number of students with fees owing in year by Degree Type

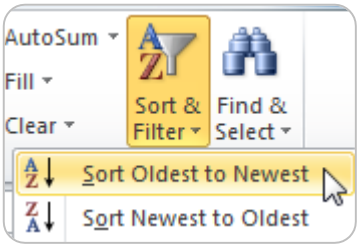
Sorting & Filtering Lists

Exercise 15. *Sort by single criteria*

Go to the **Sort & Filter** worksheet

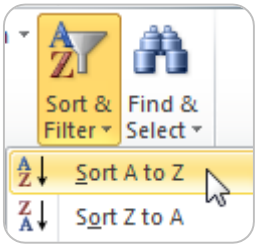
To sort data by Date of Birth

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 list of data
2. On the **Home** tab
3. Go to the **Editing** group
4. Click the **Sort & Filter** button
5. Select sort order **"Sort A to Z"**

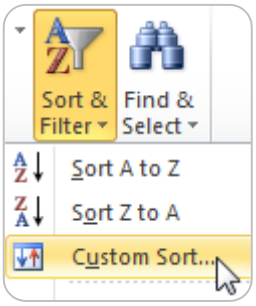


Exercise 16. *Sort by multiple criteria*

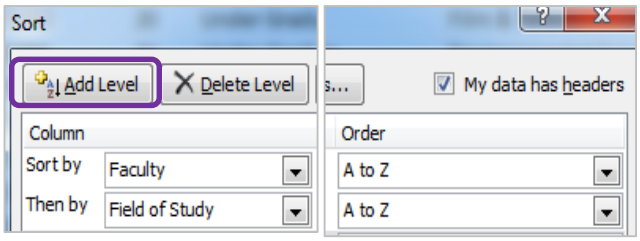
To sort by Faculty, Field of Study then Year

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.

Notes

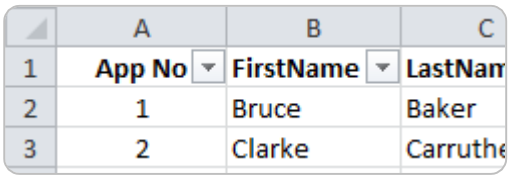
Sorting Data allows you to present it in a specified order. If you want to extract data use the filtering tool available from AutoFilter.

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.

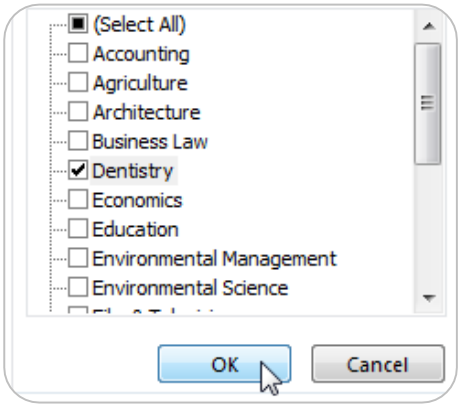


	A	B	C
1	App No	FirstName	LastNam
2	1	Bruce	Baker
3	2	Clarke	Carruthe

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.

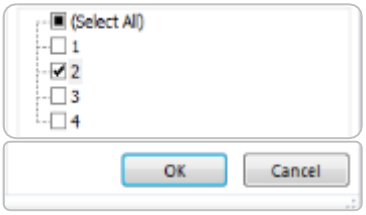


To remove filter

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**

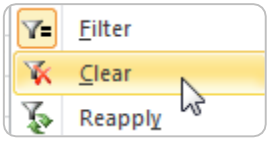


Note: All data is filtered to display only records matching the criteria

	A	B	C	D	E	F	G
1	App No	FirstName	LastName	Date Of Birth	Age	Status	Year of Study
3	2	Clarke	Carruthers	4/03/1994	18	Under Graduate	2
17	25	Daisy	Turnbull	20/09/1992	19	Under Graduate	2
19	21	Faris	Pandeya	10/12/1991	20	Under Graduate	2
21	27	James	Klein	23/09/1988	23	Post Graduate	2
22	31	Joe	Diamond	3/03/1988	24	Post Graduate	2

To remove filter:

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



Notes

Exercise 18. *Progressive filtering*

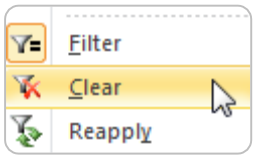
To filter data for Undergraduates in their first year studying Arts

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
2	1	Bruce	Baker
6	26	Joseph	Cooper
18	3	Chris	Bennett

To remove all filters

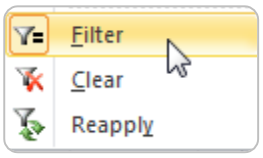
1. Go to **Home** tab
2. Click **Sort & Filter** button
3. Select **Clear**



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.



Notes

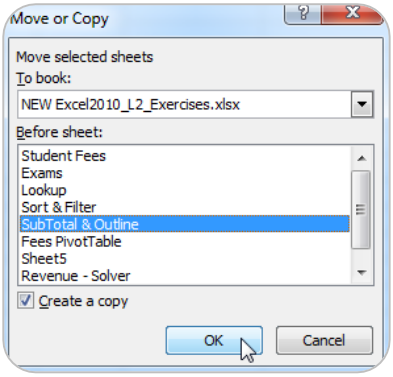
Find Unique Values and Remove Duplicates

Exercise 19. *Find unique values*

Go to **Subtotal & Outline** sheet

Copy original data

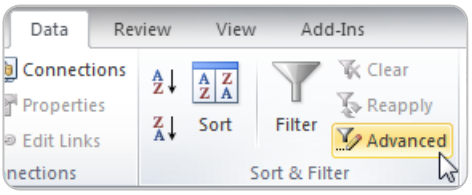
1. Right click on **Subtotal & Outline** tab
2. Click **Move or Copy…**
3. Select **Subtotal & Outline**
4. Click **Create a copy** option
5. Click **OK**



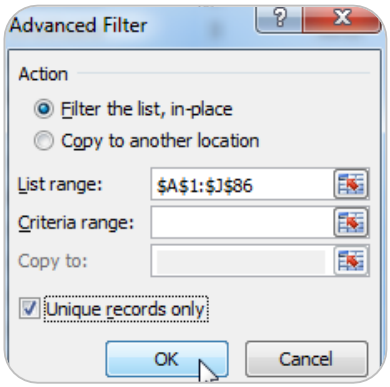
Note: you will now have a new worksheet with the tab name "**Subtotal and Outline(2)"** to use for the exercises below.

To Find Unique Values

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

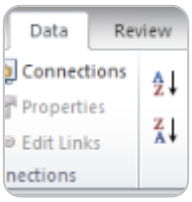


4. Check List Range = **($A$1:$J$86)**
5. Click **Unique records only**
6. Click **OK**



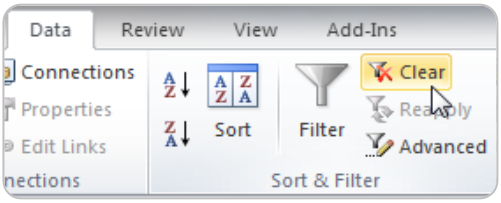
To Remove Duplicates

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



Notes

Protection

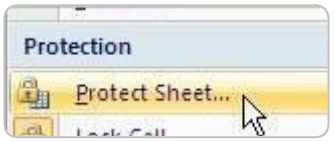
To prevent a user from accidentally or deliberately changing, moving, or deleting important data from a worksheet or workbook, you can protect certain worksheet or workbook elements, with or without a password.

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

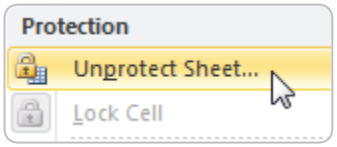
1. Go to **Home** tab
2. In the **Cells** group
3. Click **Format**
4. Select **Protect Sheet…**



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**

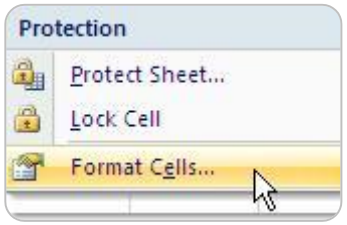


Exercise 21. *Unprotected cells*

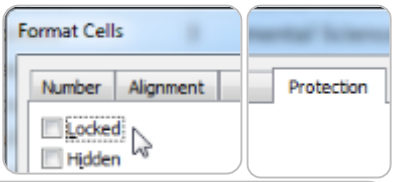
Excel protects **all** cells that are locked. All cells are locked by default, so when protection is applied all cells are unavailable. To enabling editing, cells must be unlocked before they are protected.

Selective Protection: Unlock Cells

1. Select the cells you want users to be able to change - **"Final Exam" (N2:N14)**
2. Go to the **Home** tab
3. Click the **Format** button
4. Select **Format Cells…**

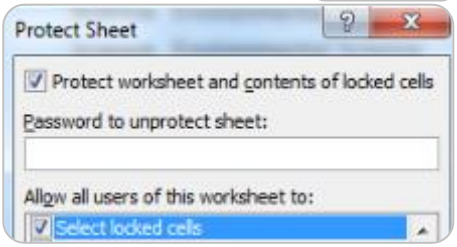


5. Click the **Protection** tab
6. Clear the tick beside **'Locked'**
7. Click **OK**



Selective Protection: Apply Protection:

8. Go to **Home** tab
9. In the **Cells** group
10. Click **Format**
11. Select **Protect Sheet**
12. Click **OK**



Note: the **Final Exams** cells can be edited but the remainder of cells are protected.

Notes

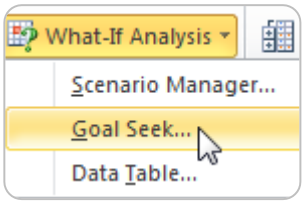
Goal Seek

If you know the result that you want from a formula, but are not sure what input value the formula needs to get that result, use the Goal Seek feature.
Work out how much of the fees due should be paid to reach 90% of the total.

Exercise 22. *Use 'Goal Seek' tool*

To have paid 90% of total fees due

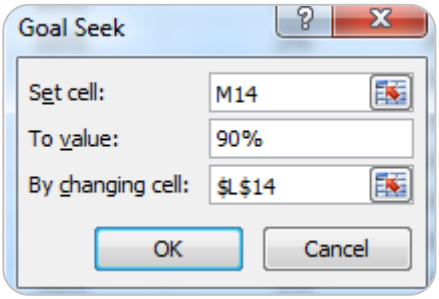
1. Click on **Data** tab
2. Click **What if Analysis** button
3. Select **Goal Seek**



4. Enter the **Set cell** reference - **M14**
   Note: Set cell **must** have a formula

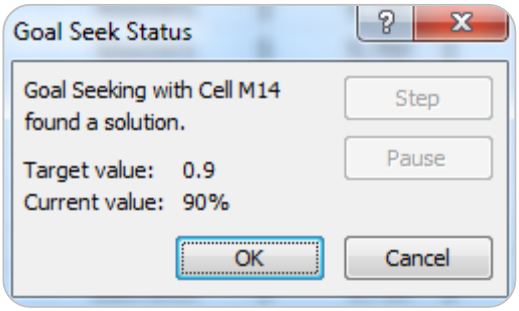
5. Type in the **result** you want - 90%
   Note: % sign is essential or alternative enter 0.9

6. Enter **Changing cell** reference - **$L$14**
   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.



Notes