

# Notes: Data Visualization in Spreadsheets

## Created by Wenxiao Zhou

### 1. Business Intelligence and Using Dashboards

#### How does Business Intelligence help us?

##### Business Intelligence

##### What data?

- Decision-making
- Measuring goals
- Operational efficiency
- Optimizing processes
- Pinpointing opportunities
- Sales
- Profits
- Target Customers
- Market opportunities
- Competitors
- Costs
- More

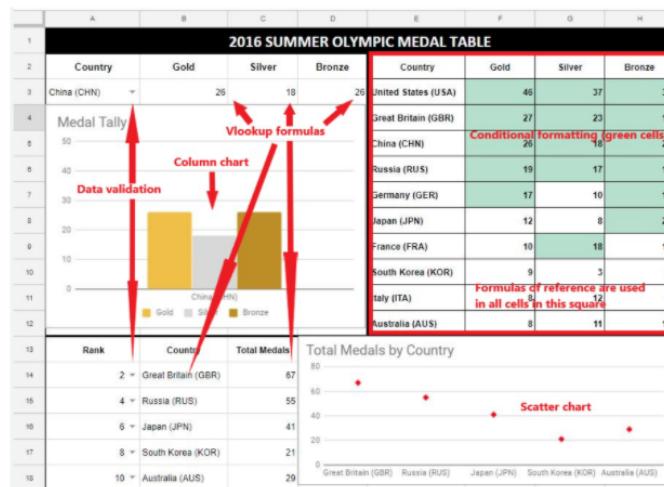
What message are you trying to convey?

What information? Who is your audience? How are they viewing it?

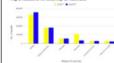
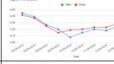
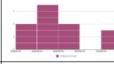
On the dashboard: what else matters?

Logos, Scenarios, Colors, Use 3D objects? How much detail is too much? What charts do you want?

### What functions does a dashboard use?



# Different types of charts

Column chart	Compare two or more values	
Line chart	Compare changes and visualize a trend	
Histograms	Plot frequency of occurrences	
Candlesticks	Financial chart used for price movement	
Scatter plots	Shows the relationship between 2 variables	
Sparklines	Embedded line chart that shows single series trend	

## Using data validation controls view medal tallies

In this completed basic dashboard example, you'll find the medal statistics by country taken from the 2016 Olympic Games held in Brazil.

You are going to use the data validation controls to view the gold, silver, and bronze medal tallies for Australia.

### Instructions

100XP

- Change the country to Australia using the drop-down menu.

2016 SUMMER OLYMPIC MEDAL TABLE								
	Country	Gold	Silver	Bronze	Country	Gold	Silver	
3	Australia (AUS)	8	11	10	United States (USA)	46	37	38
4	Australia (AUS)				Great Britain (GBR)	27	23	17
5	United States (USA)				China (CHN)	26	18	26
6	Great Britain (GBR)				Russia (RUS)	19	17	19
7	China (CHN)				Germany (GER)	17	10	15
8	Russia (RUS)				Japan (JPN)	12	8	21
9	Germany (GER)				France (FRA)	10	18	14
	Japan (JPN)				South Korea (KOR)			

## Using data validation controls to pick from a list

In the dashboard example, you are going to pick sequential numbers from a list to order countries by medal rankings. In this exercise, you will be sorting the countries by total number of medals, but country rank in the Olympics is typically determined by the number of Gold medals per country. Ties are broken using silver medals, and then bronze medals.

### Instructions

100YP

- Change the rank using the drop-down menu so that the ranks are displayed in order for countries 1 through 5.

Rank	Country	Total Medals
1	United States (USA)	121
2	Great Britain (GBR)	67
3	China (CHN)	70
4	Russia (RUS)	55
5	Germany (GER)	42

## Using conditional formatting on a dashboard

Conditional formatting is another functionality that completed dashboards can contain that allows users to modify the visual display on the dashboard. Here, you will explore the conditional formatting on the same dashboard for the 2016 Olympic Games in Brazil.

There is already a conditional formatting rule set that highlights medal counts greater than or equal to 15. Your task is to adapt this rule so that the dashboard only highlights cells **greater than or equal to 25**.

### Instructions

100YP

- Highlight Gold, Silver, and Bronze figures for the 10 countries and adapt the existing 'Conditional formatting' rule (*Value is greater than or equal to 15*) to instead highlight values that are greater than or equal to 25.

Country	Gold	Silver	Bronze
United States (USA)	46	37	38
Great Britain (GBR)	27	23	17
China (CHN)	26	18	26
Russia (RUS)	19	17	19
Germany (GER)	17	10	15
Japan (JPN)	12	8	21
France (FRA)	10	18	14
South Korea (KOR)	9	3	9
Italy (ITA)	8	12	8
Australia (AUS)	8	11	10

应用范围  
F3:H12

格式规则  
符合以下条件时为单元格应用格式:  
大于或等于  
25

格式样式  
默认  
B I U



<> Show Answer (-70 XP)

#### Hint

- The **Gold**, **Silver**, and **Bronze** medal tallies are in **F3:H12**.
- To use conditional formatting, go to Format, then Conditional formatting.
- Click on the existing rule, and adapt the 'greater than or equal to' condition.

## Setting up a basic dashboard:

The simple dashboard has user-friendly functions and controls to show only the data you want to report and uses the right visualization to showcase this data. You will explore this further as you set up and add features to your own dashboard, which will allow you to pull data from your main dataset. Using VLOOKUPs and formulas of reference, drilling data down further using data validation, plotting it, highlighting cells that meet certain criteria and using conditional formatting will make this easy. When creating a dashboard, you need to ensure you include the right tools to grab your audience's attention, so start with the outcome in mind and work backwards.

## Extracting your data

- Keep the message in mind
- Pull only the data you need
- Formula of reference

### Formulas of reference

- Calculation that picks up a value from another cell
- = Sheet2!A1
  - "Point to Sheet 2 cell A1 and return what is in cell A1"

A screenshot of a Google Sheets interface. The top menu bar includes File, Edit, View, Insert, Format, Data, Tools, Add-ons, Help, and 'All changes saved in Drive'. Below the menu is a toolbar with icons for print, preview, and various document formats. The main workspace shows a single row of columns labeled A, B, C, and D. Cell A1 contains the text 'Why do people come to Australia?'. The status bar at the bottom indicates 'Sheet2!A1'.

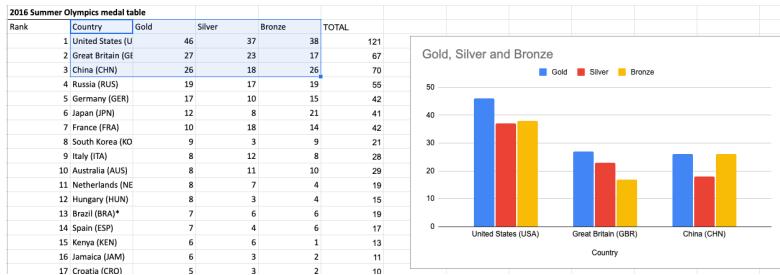
The formula of reference here is saying "point to Sheet 2, cell A1 and return whatever is in cell A1". To start a formula of reference, type in an equals sign. Then navigate to your cell, on either the current sheet or another sheet, and click enter. Doing so will ensure that if the data in Sheet 2, cell A1 changes, any cell in any sheet that references this will also change.

### Creating a column chart from your data

In the dataset you'll find the medal statistics by country from the 2016 Olympic Games held in Brazil in order of ranking. Let's use the data to create a column chart to show the medal tallies of the first 3 ranked countries.

- Instructions 100XP
- Highlight the **Country**, and then the **Gold**, **Silver**, and **Bronze** medal stats for the first three ranked countries, then create a **column chart** and move it to the right of the data.

A screenshot of the 'Chart editor' window. At the top, there are tabs for 'Setup' (which is selected) and 'Customize'. Under 'Setup', the 'Chart type' dropdown is set to 'Column chart'. The 'Stacking' dropdown is set to 'None'. The 'Data range' input field contains 'B1:E5'. There are also 'Previous' and 'Next' buttons on the right side of the editor.



### Setting up your worksheet with formulas of reference

In this next task, you will showcase only the data you want to chart using formulas of reference to extract the top 3 countries' medal tallies from the dataset and show them in the dashboard.

Instructions 100XP

- Create a formula of reference in cell A1 that shows the contents of A1 in the Olympics sheet.
- Copy the calculation down and across the sheet to show all data for the first 3 ranked countries.
- Make sure column B is wide enough to see the entire country name.

A1	f <sub>x</sub>	=Olympics!A1				
1	2016 Summer Olympics medal table					
2	Rank	Country	Gold	Silver	Bronze	TOTAL
3	1	United States (USA)	46	37	38	121
4	2	Great Britain (GBR)	27	23	17	67
5	3	China (CHN)	26	18	26	70

### Charting the medal statistics

Now that you have only the data you want to chart in this task you will create a column chart and display it underneath your extracted data.

Instructions 100XP

- Create a column chart showing the Country, Gold, Silver, and Bronze stats.
- Position the chart underneath the data.

## Setting up your data:

### Getting things ready

- Setting up your data in tables or lists
- Structure in your data
- Future requirements

### Exercise:

**Format dates and numbers**

To make your data clear at a glance, in this task you will apply a little bit of formatting to your data.

Instructions 100XP

- Format the date so that it shows the day as a number, month in full, and year (e.g. '1-January 2000'). Then widen the column so you can see it all.
- Ensure all numbers have 2 decimal places by highlighting the correct cells, and then using the arrow controls in the toolbar (next to the '123' drop-down menu).
- Note: to pass this exercise you need to use the arrow controls in the toolbar to adjust the decimal places, and not alternative number formatting options.

D4	A	B	C	D	E	F	G	H
91								
1	Shark Attacks in Australia - Last 100 Years					Today's Date	9 Aug 2018	
2	State	# Cases	Fatal	Injured	Uninjured			
3	NSW	221.00	47.00	119.00	55.00			
4	QLD	161.00	52.00	91.00	18.00			
5	WA	92.00	17.00	59.00	16.00			
6	SA	43.00	13.00	22.00	8.00			
7	VIC	34.00	3.00	20.00	11.00			
8	TAS	10.00	1.00	5.00	4.00			
9	NT	8.00	1.00	6.00	1.00			
10	Total	569.00	134.00	322.00	113.00			
11	Average Fatalities per Year	19.14						

## 2. Efficient Column Charts

## Tables and lists

A	B	C	D	E	F	G	H
Example of table. Data stored in columns and rows				Example of a List 1		Example of a List 2	
<b>Why do people come to Australia?</b>							
Reason for journey	Jun-2017	Jul-2017	Aug-2017	Reason for journey	Reason for journey	Reason for journey	
Holiday	300,800	330,900	358,500	Holiday	Holiday	June-2017	
Visiting friends/relatives	164,000	181,200	181,900	Visiting friends/relatives	Business	300,800	
Business	50,600	56,000	57,600	Education	Education	330,900	
Education	28,800	107,800	35,600	Convention/conference	Convention/conference	Aug-2017	
Convention/conference	17,700	25,500	28,100	Other & not stated	Employment	358,500	
Other & not stated	21,200	27,900	23,800	Employment			
Employment	22,900	16,800	17,300				

- Table - related data stored in columns and rows
- List - manage or analyze a smaller set or sets of data

## Exercise:

### Creating a column chart for your dashboard

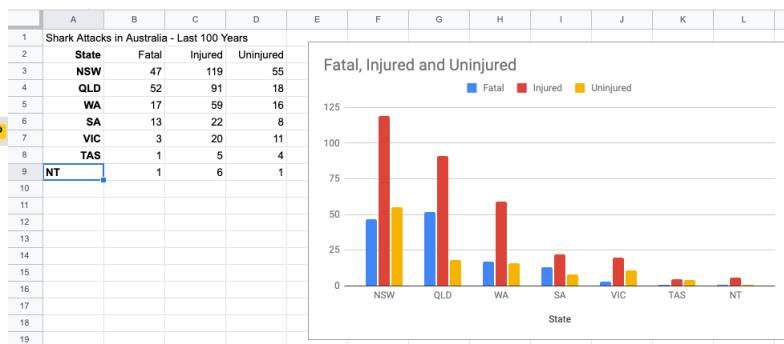
In this chapter, you will start to put together your own dashboard.

Your first step is to create a basic column chart showing fatalities, injured, and uninjured statistics for the states of Australia over the last 100 years.

#### Instructions

100XP

- In A1 of Sheet1, use a formula that refers to the heading in your Shark Attacks dataset. This can take the form of =Sheet Name'!A1.
- In your Shark Attacks dataset, select the State column and the Fatal, Injured, and Uninjured statistics, and then create a chart.
- Copy and paste this chart to Sheet 1 and change the chart to a column chart.



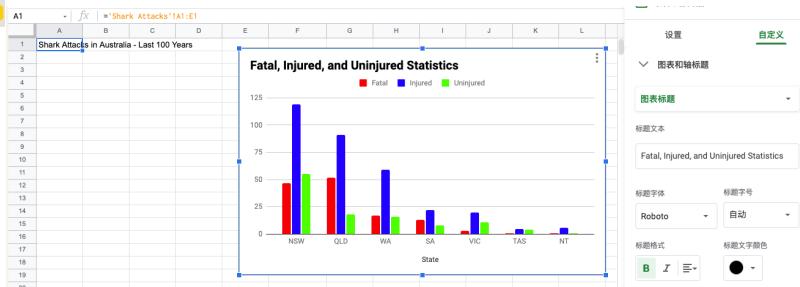
### Format chart, axis titles and series

Your next task is to apply some basic formatting to the same chart to jazz it up a bit and make it a bit more pleasing to the reader's eye.

#### Instructions

100XP

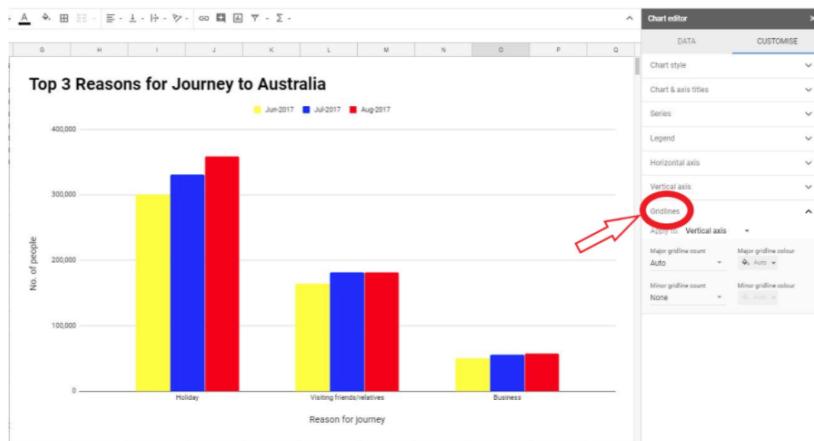
- Alter the title of your chart so that it now reads "Fatal, Injured, and Uninjured Statistics".
- The color of the title text is now a light grey. Let's change the color to black and make the font bold.
- Double-clicking the chart title will allow you to adapt the text and the formatting options in the Chart Editor to the right.
- While you're at it, change the series colors accordingly: Fatal : red, Injured : blue, and Uninjured : green.
- You can double-click each series to again open up the Chart Editor, and then select a new color for the series.



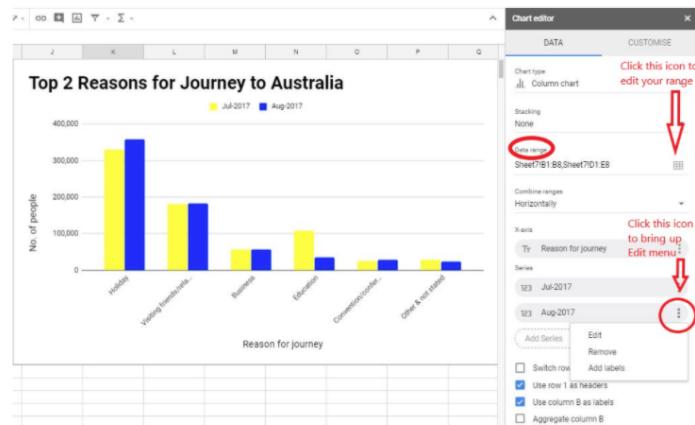
## Axis, gridlines, and changing the plot

If you are using numbers on your Vertical axis, the Chart editor menu offers you a Minimum and Maximum option. This is very useful and can be used to change the perception of the chart. There is also a scale factor you can use, but if you leave it at default, and you make sure that under Number format you have From data displayed, your chart will take its format from your dataset, which you have already optimized for best use.

## Gridlines



## Changing the plot



## Exercise:

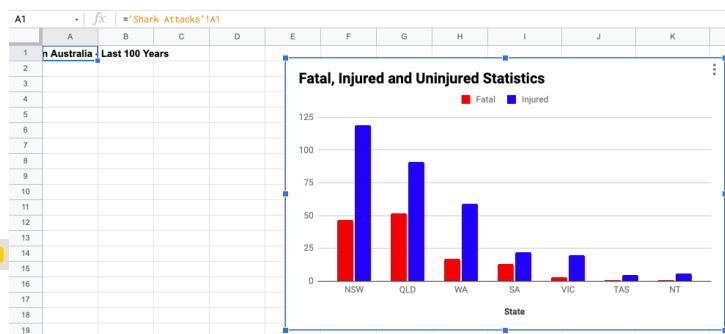
### Removing a series

Taking things a little further, in the next task you will manipulate the look of your chart a bit more and remove the Uninjured statistical data.

#### Instructions

100XP

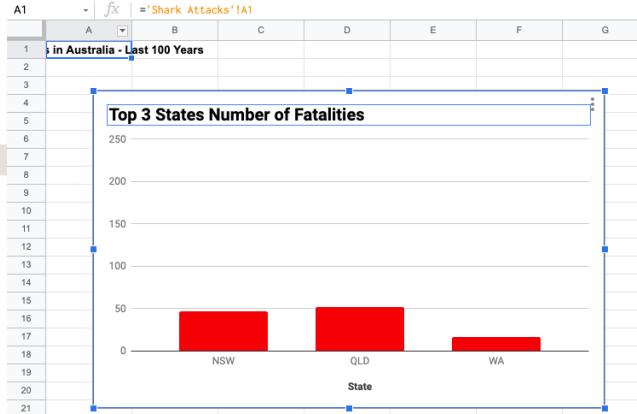
- Remove the Uninjured series from your chart.



## Changing the plotted range

It's just as easy to change a range as it is to delete it. For this task, have a go at changing the range of your chart so it now only showcases the top 3 states' fatal statistics.

- Remove the Injured series from your chart so you are **only** plotting the Fatal series.
  - Change the data range so that you are only plotting the first **three states** with the highest number of fatalities.
    - To do this, you will need to use the chart editor to adjust the existing data ranges 'Shark Attacks'!A1:A9 and 'Shark Attacks'!C1:C9 so that the chart only displays fatalities from **NSW** , **QLD** , and **WA** .
  - Finally, change the chart title to 'Top 3 States Number of Fatalities'.



## Named ranges

## What is a named range?

- One cell, a range, constant value, or a formula with a given name
  - User-friendly names for your cells
  - Make formulas easier to read and understand

A Named range can refer to one cell or a range of cells, a constant value, one that rarely changes, or a formula with a given name. It is a user-friendly name for a range of cells since it's easier to remember a name over a range reference. This makes formulas simpler to understand, especially when referencing a range from another sheet. Remember formulas of reference? We can name our tables and lists with user-friendly names, so, rather than using cell references, we can use these names to make things clearer. Again, the range reference can be changed globally in one place.

## Selecting data for the named range

- Highlight the range, go to the toolbar, select Data, select Named ranges
  - Replace default, "NamedRange1", with a meaningful name
  - Remember, Named ranges do not like spaces

## Creating a named range with the toolbar

- Select Data, Named ranges, Add a range, name it
- Select the data for your range

The screenshot shows the Google Sheets interface with the Data menu open. The 'Sort range...' option is highlighted. The main area displays a table with data for various reasons of travel. A sidebar on the left lists categories like Holiday, Visiting, Business, Education, etc.

## Editing your named ranges

- Go to Sheets, Data, Named range to see all Named ranges in your workbook
- To change the cell range, select it by clicking the grid to the right
- Less prone to error if you have a visual of your range

The screenshot shows the Google Sheets interface with the Data menu open and 'Named ranges' selected. The main area shows the same travel data table. A sidebar on the right lists named ranges: Months, Reasons, Total\_Visitors, and SharkStats.

## Exercise:

### Using named ranges

In this task you are going to find an existing range and insert a blank row within the range.

#### Instructions

**100XP**

- Select Data then Named ranges and click on the `SharkStats` Named range to see the highlighted range.
- Insert a blank row after row `2`.

### Summing using a named range

In addition to being a handy way of keeping track of a range of cells, named ranges can also be used in formulas.

For example, using the formula `=AVERAGE(Total)` would return the average of the totals contained within the `Total` named range.

In this task you will remove a blank row and use the named range `Total` in a formula.

#### Instructions

**100XP**

- Remove the blank row you inserted in the last exercise.
- In `B10`, use the `SUM()` function to aggregate the `Total` named range.

The screenshot shows the Google Sheets interface with the Data menu open and 'Named ranges' selected. The main area shows the shark attack data table. A sidebar on the right lists named ranges: Fatalities, SharkStats, and Total. The 'Total' range is highlighted.

The screenshot shows the Google Sheets interface with the Data menu open and 'Named ranges' selected. The main area shows the shark attack data table with a blank row inserted after row 2. Cell B10 contains the formula `=SUM(Total)`. A sidebar on the right lists named ranges: Fatalities, SharkStats, and Total.

**Averaging using a named range**

In this task you will use a named range within a formula to find an average.

Instructions 100XP

- In C11 use the Fatalities named range instead of cell references to average the number of fatalities.

C11	A	B	C	D	E	
1	Shark Attacks in Australia - Last 100 Years					
2	State	# Cases	Fatal	Injured	Uninjured	
3	NSW	221	47	119	55	
4	QLD	161	52	91	18	
5	WA	92	17	59	16	
6	SA	43	13	22	8	
7	VIC	34	3	20	11	
8	TAS	10	1	5	4	
9	NT	8	1	6	1	
10	Total	8	134	322	113	
11	Average Fatalities per Year					22

### 3. Dashboard Controls

#### Data validation

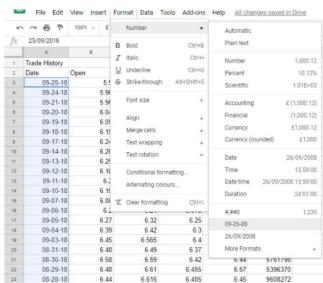
#### Remove blank rows or columns

1	Trade History	D	E	F
2	Date	Open	Close	Volume
3	09-03-18	6.45	6.42	
4	09-04-18	6.39	6.37	

#### Select dates from a list

1	Qantas - Australian Stock Exchange		
2	Date	Open	Close
3	09-03-18	6.45	6.42
4	09-04-18	6.39	6.37

#### Format dates



- Highlight the relevant range and select the Format tab
- Ex: MM/DD/YY

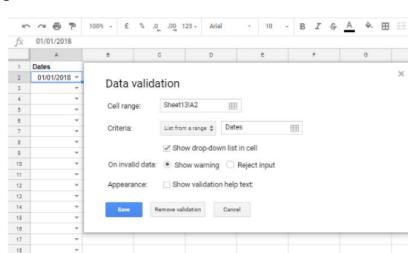
#### Format decimals



- Decimals should be consistent
- Spreadsheets round numbers with decimals
- Highlight, select increase or decrease tool on toolbar

#### Creating the data validation

- Under the Dates heading, select Data, Data validation
- Use your Named range
- "Show warning" to warn user of incorrect entry
- "Reject input" to reject anything other than selection from list



Make sure you test your list. You can set up your Validation to either show a warning or reject input to stop invalid entries. Select a few different dates from the list, then try to enter an invalid entry and see the message that appears.

If you want to give your user a bit of assistance, you can check the Show validation help text option and enter in a helpful message, like "Select a date from the list to see the Opening and Closing prices".

### Testing the list: validation help

	A	B	C
1	Qantas - Australian Stock Exchange		
2	Date	Open	Close
3	03/09/2018		
4	09-04-18		
5	09-05-18		
6	09-06-18		
7	09-07-18		
8	09-10-18		
9	09-11-18	6.20	6.23
10	09-12-18	6.18	6.23
11	09-13-18	6.25	6.29
12	09-14-18	6.26	6.27

### Exercise:

#### Setting up your data

In this task, you are going to use data from the ASX for a Company that sells shark repellent systems and prepare it for charting. The first step is to tidy up and format the data.

Instructions

100XP

- Remove the blank row and standardize your decimal places such that the numbers in columns B:E have three decimal places.
- Change the format of the date in [11](#) so that it has the same format as the dates in [Column A](#).
  - To do so you will need to select 'Format', and then 'Number' from the menu bar (or alternatively, you can use the '123' dropdown menu from the toolbar).
  - Depending on options available to you, you may need to select additional date formats by selecting 'More Formats', and then 'More date and time formats'. This menu will provide you with advanced formatting options.
  - Your new format should have the month, day, and year as an integer, separated by a hyphen!

#### Format numbers within your dataset

In your next task you will edit the numbers in your dataset so that they are all formatted the same way.

Instructions

100XP

- Format the numbers in the [Volume](#) column so that they all include commas to label thousands, but do not contain a decimal place.

## Using VLOOKUP with data validation

### VLOOKUP

- Vertical lookup
- Retrieve data from tables
- Find an exact match, or closest possible match, in a list
- Uses dates selected through data validation and look up data from main dataset

**VLOOKUP means vertical lookup.** It's perfect for retrieving data from tables. You can use it to find an exact match, or the closest possible match, in a list. The VLOOKUP will use the dates selected through data validation and look up the relevant data from the main dataset.

For VLOOKUP to work correctly your table must be sorted in ascending order by the first column. As with all formulas in spreadsheets, help is there for you if you need it. Once you start typing in your VLOOKUP formula, a help box will appear with more information.

### Partial absolution

File Edit View Insert Format Data Tools Add-ons Help All.c					
fx	=vlookup(\$A3,Qantas_Shares,2,FALSE)				
	A	B	C	D	E
1	Qantas - Australian Stock Exchange				
2	Date	Open	Close		
3	09-03-18	=vlookup(\$A3,Qantas_Shares,2,FALSE)			
4		The column reference (A) has partial absolution applied to it			
5					

## VLOOKUP arguments

- **search\_key**
  - Value to look for in the first column of a table
- **range**
  - Table to retrieve a value from
- **index**
  - Column in the table to retrieve value from
- **[is\_sorted]**
  - Optional argument
  - FALSE = exact match
  - TRUE = closest possible match

## Pasting the formula

	A	B	C	D	E	F	G	H	I	J	K	L
1	Trade History											
2	Date	Open	High	Low	Close	Volume						
3	09-25-18	5.90	5.91	5.81	5.85	7926476						

Qantas - Australian Stock Exchange  
Date Open High Low Close Volume

J2: =vlookup(\$A3,Qantas\_Shares,5,FALSE)

K2: =vlookup(\$A3,Qantas\_Shares,5,FALSE)

- Changing the column reference number
  - To show Close figure in column 5, change from 2 to 5
  - To show the Volume figure in column 6, change from 2 to 6

## Creating the line plot



- Use data validation and VLOOKUP to show only relevant values in your data
- Create a line chart
  - Highlight the range you want to plot, including headings
  - Click Insert chart icon, select line chart

## Exercise:

### Creating and testing the data validation

With your data optimized and your named ranges set up, in this task you will set up a data validation to allow a user to select a date from a list.

Sheet1!A17:A26

Instructions

fatalities

Fatal

State

SM8 Smart Marine Systems ASX

Date Open High Low Close

SM8 Smart Marine Systems ASX

Sheet1!A17:A26

=Dates

提示：使用绝对引用 (e.g. =\$A\$1:\$B\$1) 可锁定行和列。

在单元格内显示下拉列表

在数据无效的情况下： 显示警告 拒绝输入

外观：

显示验证帮助文本：

Select a date from the list to see Opening and Closing prices.

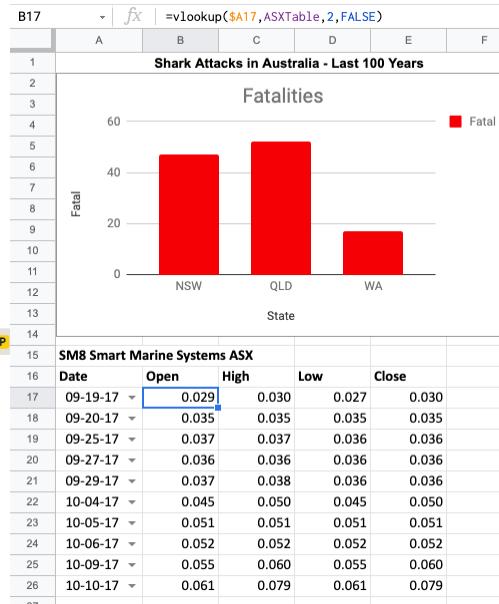
取消 删除验证 保存

### Adding the calculation

Your next task is to select the dates you want and then add in a VLOOKUP calculation to look at the date selected and find an exact match for the Open, High, Low, and Close Data from your dataset.

Remember that `VLOOKUP()` will take four arguments.

1. The search key (in this case, the date in Column A).
2. The range of data to search (in this case, the data in the sheet ASX Data ).
3. The column index to retrieve where 1 is the column of your search key, and subsequent columns are those that you are trying to access (i.e. 2 , 3 , 4 , and 5 ).
4. Whether you want an exact match, which can be specified by providing `FALSE` .



### Instructions

100XP

- Fill in the empty dates in cells A25 and A26 with 10-09-17 and 10-10-17 (respectively), using the list provided through the data validation.
- In cell B17 use `VLOOKUP()` to look for the date in your dataset and show the corresponding Open data. Then, copy the formula down through the rest of the column. *Don't forget to use partial absolute to make it easy to copy your formula to other cells!*
- Repeat the process in cells C17 , D17 , and E17 to look for the figures in the dataset that correspond to the column headings (again, copying the formulas down through the respective columns).

### Creating the line plot

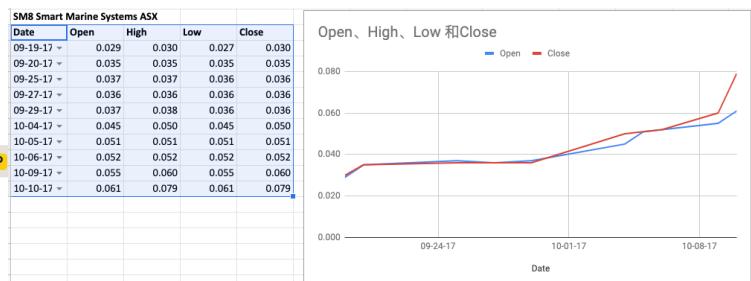
Now that you are just showing a snapshot of your data in your Dashboard you can chart it.

In this task you will create a line chart from your statistics to show the Open and Close prices for dates selected from the data validation you created earlier.

### Instructions

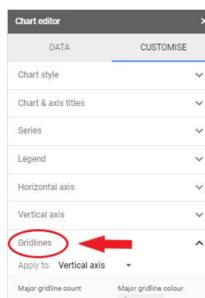
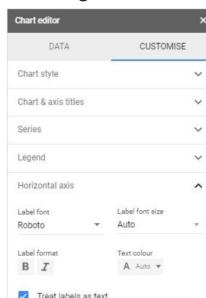
100XP

- Highlight the `Dates` , `Open` , and `Close` data and create a line chart.
- Resize it so it is to the right of your data.

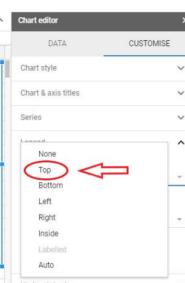
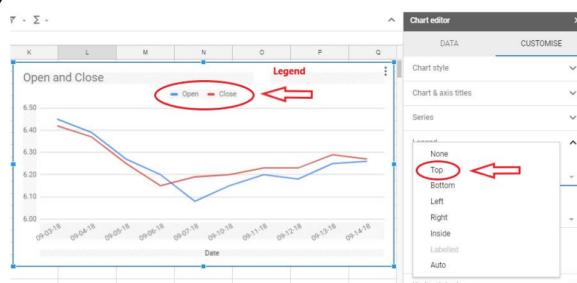


## Formatting your line chart:

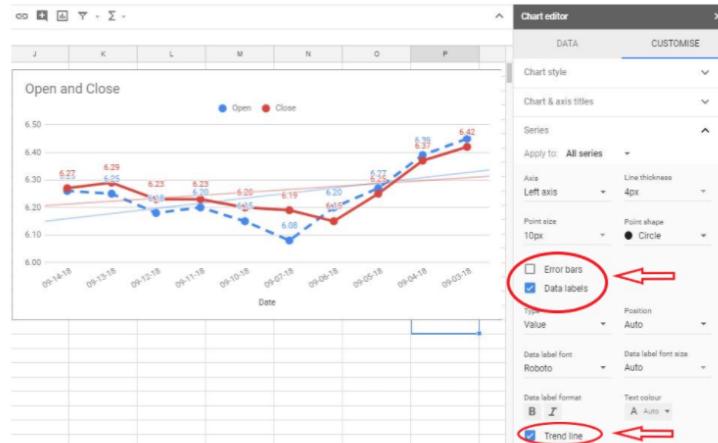
### Fonts and gridlines



### Legend Placement



## Error bars, data labels, and trendlines



Exercise:

### Chart titles, axis, font, gridlines

Now that you have created a line chart, you will want to format it to make it more pleasing to the eye and professional.

#### Instructions

100XP

- Change your chart title to **Open vs Close**.
- Add a title to your vertical axis **\$AUD**.



### Other formatting options

It's the little things like legend placement and font sizes that give your charts a bit of polish. In this task you will finish off formatting your chart to ensure maximum efficiency.

#### Instructions

100XP

- Move your legend inside the chart area by changing its 'Position' setting and change the font size to 10px.

## 4. Other Charts for Your Dashboard

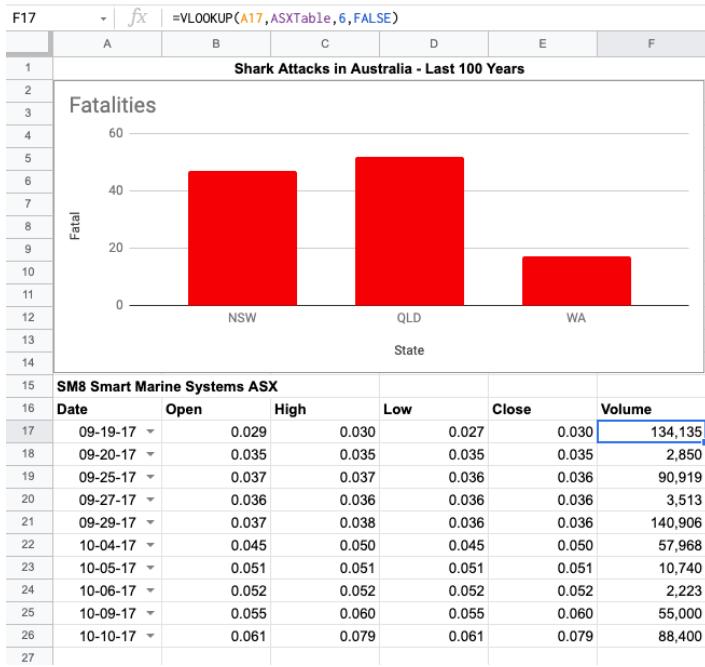
### Inserting the VLOOKUP

We want to create a histogram to show the distribution of volumes. You will need to start by getting the **Volume** data you want to show on the dashboard.

#### Instructions

100XP

- In F16, type in the heading "Volume".
- In F17, enter a formula that uses **VLOOKUP** to look at the date in column A and returns the **Volume** for that date from the **ASXTable**.
- Copy the calculation down the column from F17 to F26.



Recall that ASXTable is the named range define in the original dataset<ASX Data>, see the below:

#### Formatting your histogram

Formatting your histogram works similarly to the way it does in all charts. Your task is to format your chart by putting some of your previous skills into practice.

#### Instructions 100XP

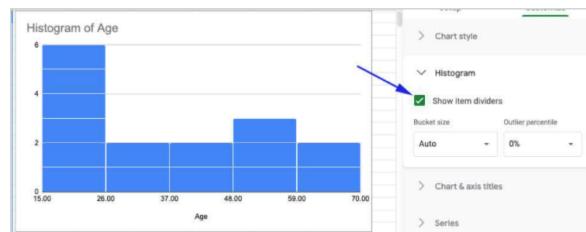
Scroll down to see your histogram and make the following formatting changes:

- Give your histogram the title "Share Volumes" and change the color of the series to "dark green 2".  
Note: when you move your cursor over the various color options, you should be able to see the names of the colors. Make sure you are selecting "dark green 2"!
- Move the legend to the bottom of your chart and include item dividers.

#### Histogram

While only having three options, the Histogram options section is the most powerful tool in Google Sheets for data formatting.

- Show item dividers (checkbox): Check this to add a line between each item in the chart.  
Depending on the data, this may help better represent the distribution.



#### Creating a histogram on the dashboard

Let's get more practice with creating histograms. You will show the volumes of stocks from SM8 Smart Marine Systems. Your data will be plotted at intervals.

#### Instructions 100XP

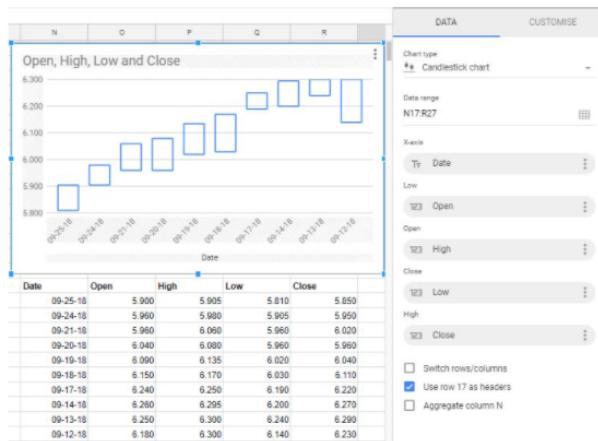
- Select the Volume data and create a histogram chart.
- Drag and size your chart underneath your data so it fits nicely in your dashboard.

- Bucket Size: This lets you choose the value range for each bucket. Google Sheets has automatic sorting. You can set buckets by 1, 2, 5, 10, 25, and 50 increments
- Outlier Percentile: Use this option to group data outliers with the closest relevant bucket.

## Candlestick Charts

Candlesticks are financial charts that are used to show price movements for securities, derivatives, currencies, stocks, bonds, and commodities. Each candlestick shows one day of behavior. They were originally developed in the 16th century by a Japanese rice trader as an ancient method of technical analysis to trade rice contracts. They have been around ever since.

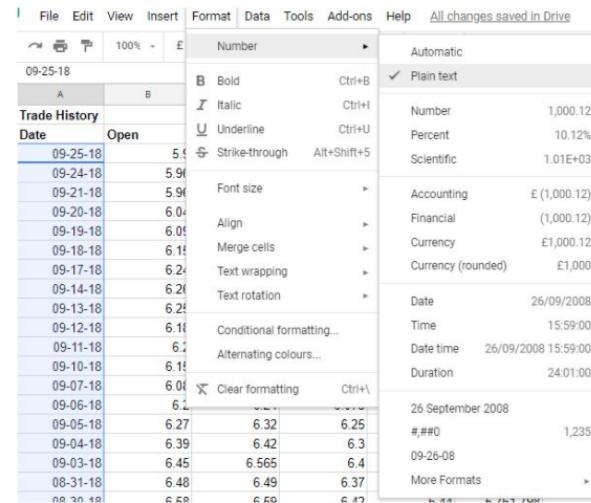
## Creating a candlestick



- Display price information
  - Show trends
  - Predict future behavior
  - Display day to day market movement

One of the drawbacks with a candlestick chart is that if you are using dates, they need to be formatted as text instead of as dates. This can be easily done by highlighting your dates and selecting Format, Number, and Plain text. Unfortunately, if you do this on your main dataset, it may affect the other charts that were already created. To avoid this, you will need another copy of the dataset so you can format the dates as plain text.

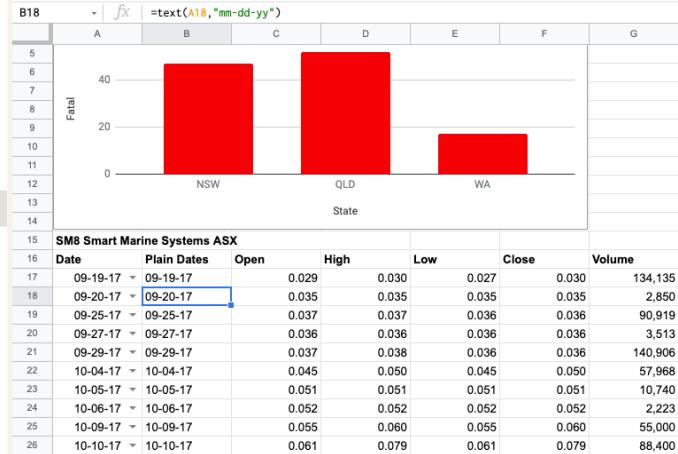
## Formatting dates as plain text



## Plain text using a formula

The figure shows a Google Sheets table with data. The first row contains the formula "=text(A3,"mm-dd-yy")" in cell B3. The second row is a header row with columns: Trade History, Plain Dates, Open, High, Low, and Close. The third row contains data: 09-25-18, 09-25-18, 5.900, 5.905, 5.810, and 5.850. The "Plain Dates" column is highlighted with a blue selection bar.

Trade History	Plain Dates	Open	High	Low	Close
Date	09-25-18	5.900	5.905	5.810	5.850
09-25-18	09-25-18	5.900	5.905	5.810	5.850



### Changing your dates to text

Your task is to format your dates as plain text so the user can plot a candlestick chart to show data from the `Open`, `Close`, `High` and `Low` prices. You will do this in the inserted column, using a formula.

#### Instructions

100XP

- Insert a new column so that `column B` is blank.
- Type the heading "Plain Dates" in `B16`.
- Enter a formula in `B17` using `text()` to show the date from the same row in `column A` with the same formatting but as plain text.
- Copy the formula down from `B17` through `B26` and remove the dates that have popped up on your line chart.

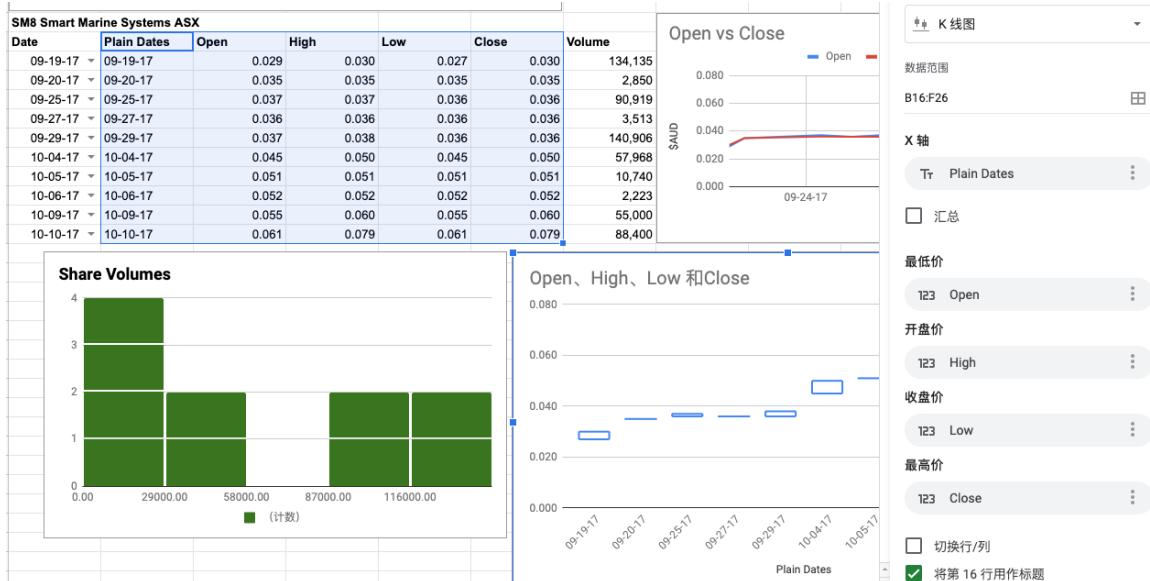
### Creating the candlestick for the dashboard

Now that you have your dates sorted, your next task is to create a candlestick chart on the dashboard to show the Open, High, Low and Close stats over a 10 day period.

#### Instructions

100XP

- Select the data from `Plain Dates` to `Close` and create a candlestick chart.
- Size the candlestick chart appropriately on your dashboard, to the right of the histogram.



### Formatting the candlestick

As with any other chart, once your candlestick chart is created, you should spend some time formatting it.

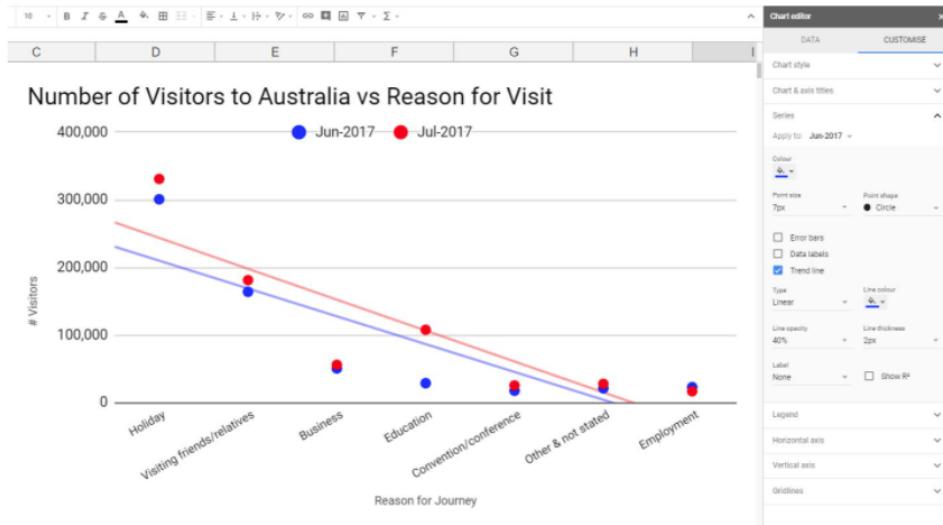
#### Instructions

100XP

- Change the Chart title to Price Movement.
- Make the chart title text black, size 18 font, and bold.

## Scatter Charts

# Trendlines



There are other 5 trendlines to select from; Logarithmic, when data levels increase or decrease quickly and then balance out, Polynomial, for data that fluctuates, Power, to compare measurements that increase at a specified rate, Exponential, for data that rises or falls at increasingly higher rates, and Moving average, to show a pattern or trend, as seen here. You can also have different trendlines for the different series and there are a range of formatting options for that as well.

### Creating a scatter chart

For the purpose of this exercise, you will create a scatter chart to show the trend of injuries in relation to the number of reported cases of shark attacks. You will take your data from the Shark Attacks Last 100 Yrs dataset.

#### Instructions

100XP

- Highlight the State, # Cases and Injured stats and create a scatter chart.
- Paste the chart onto your dashboard, and size it to the right of the Fatalities column chart.



## Sparkline charts within a cell

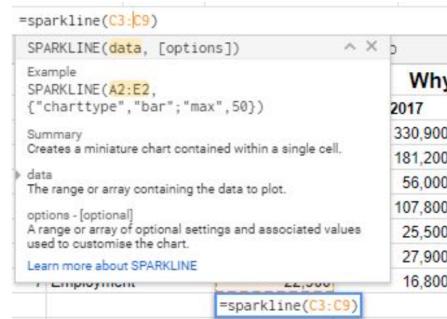
### Sparklines in your dashboard

- Give a quick snapshot
- Types of sparklines
- Work better in a single cell

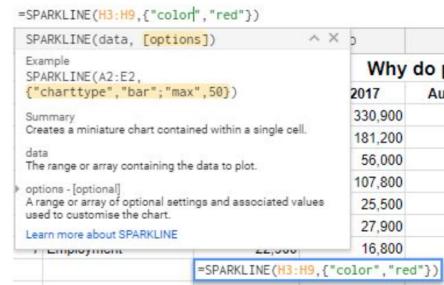
- Line
- Column
- Bar
- Winloss

Reason for journey	Jun-2017
Holiday	300,800
Visiting friends/relatives	164,000
Business	50,600
Education	28,800
Convention/conference	17,700
Other & not stated	21,200
Employment	22,900

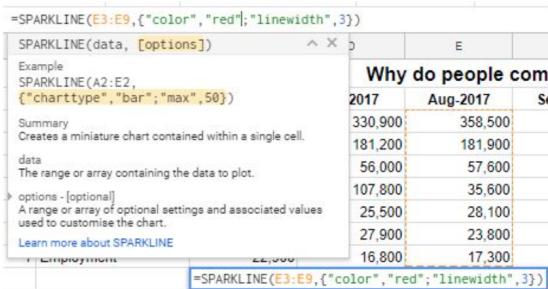
## Line sparklines



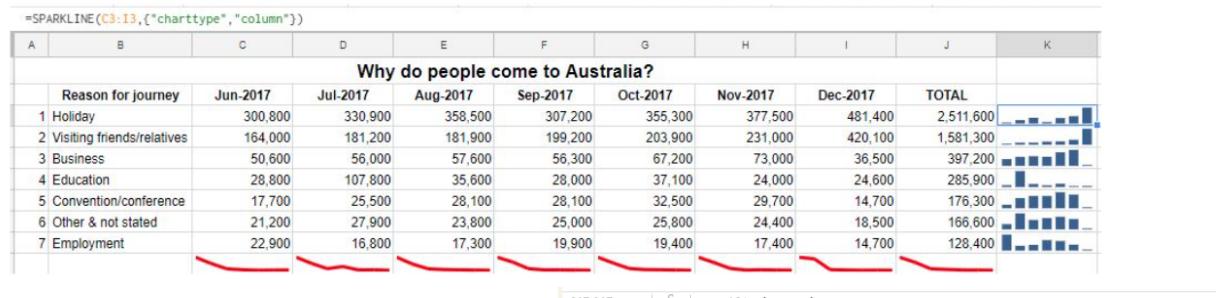
## Changing color



## Color and line width



## Column sparklines



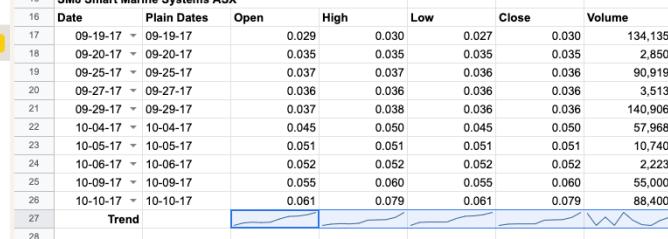
## Sparklines

In this task you will create a sparkline chart within a cell. You will add a line sparkline for the open/close data using the ASX Dataset.

### Instructions

100XP

- Move your histogram chart down so that you can see row 27, and in cell A27 type the word Trend .
- In C27 , enter a formula that will generate a line sparkline based on the data in range C17:C26 .
- Do the same for cells E27 and F27 (using their respective column data).



D27

fx

=SPARKLINE(D17:D26, {"color", "red"})

### The column sparkline

For the next task you will create a column sparkline to show the Volume of shares for the 10 dates selected via the drop-down arrows.

Instructions 100XP

- Immediately following the last entry for the `Volume` data, insert a `SPARKLINE` formula in `G27` to create a column sparkline and specify that the sparkline color should be blue.
- Remember that within the curly brackets (after specifying the range), you need to specify a `"charttype"` of `"column"`, and a `"color"` of `"blue"`.

`G27` =SPARKLINE(G17:G26,{ "charttype", "column"; "color", "blue"})

SM8 Smart Marine Systems ASX							
Date	Plain Dates	Open	High	Low	Close	Volume	
09-19-17	09-19-17	0.029	0.030	0.027	0.030	134,135	
09-20-17	09-20-17	0.035	0.035	0.035	0.035	2,850	
09-25-17	09-25-17	0.037	0.037	0.036	0.036	90,919	
09-27-17	09-27-17	0.036	0.036	0.036	0.036	3,513	
09-29-17	09-29-17	0.037	0.038	0.036	0.036	140,906	
10-04-17	10-04-17	0.045	0.050	0.045	0.050	57,968	
10-05-17	10-05-17	0.051	0.051	0.051	0.051	10,740	
10-06-17	10-06-17	0.052	0.052	0.052	0.052	2,223	
10-09-17	10-09-17	0.055	0.060	0.055	0.060	55,000	
10-10-17	10-10-17	0.061	0.079	0.061	0.079	88,400	
	Trend						

## 5. Conditional Formatting

Using conditional formatting:

Conditional formatting works by using rules. There are many rules you can select from to get the desired result, or you can use a custom formula. An example of this is highlighting all cells in a given range that are greater than 100 green. The greater than rule would be used for this.

First, let's look at the conditional formatting rules, before you move on to create a rule using the greater than condition. **Highlight your range and then go to Format, Conditional formatting.** You will notice that all the cells in the range you have highlighted are green. Notice that the Format cells if option is set to Cell is not empty. This is the default.

### Using a color scale

Why do people come to Australia?					
Reason for journey	Sep-2017	Oct-2017	Nov-2017	Dec-2017	TOTAL
1 Holiday	307,200	355,300	377,500	481,400	2,511,800
2 Visiting friends/relatives	199,200	203,900	231,000	420,100	1,581,300
3 Business	56,300	67,200	73,000	36,500	397,200
4 Education	28,000	37,100	24,000	24,600	285,900
5 Convention/conference	28,100	32,500	29,700	14,700	176,300
6 Other & not stated	25,000	25,800	24,400	18,500	166,600
7 Employment	19,900	19,400	17,400	14,700	128,400

Conditional format rules x

Single colour Colour scale

Apply to range R3:R9

Preview

Minpoint Default

Midpoint Percentile 50

Maxpoint Max value

Done Cancel

Add another rule

### Creating a simple rule to highlight cells

In this task, you want to highlight volume of shares from the SM8 Smart Marine Systems ASX that exceed 60,000. Using conditional formatting, you can create a rule that will highlight any numbers that are greater than a specified amount.

Instructions 100XP

- Highlight the `Volume` data in `G17:G26` and add a conditional formatting rule that will format cells "light yellow 2" if the value in them is greater than 60,000.

Volume

应用范围 G17:G26

格式规则

符合以下条件为单元格应用格式:

大于 60000

格式样式 自定义

取消 完成

### Highlighting cells between a range

In this next task, you will create a rule that will highlight cells in the **Close** column if the value in the cell falls between a certain range.

Instructions

100XP

- Highlight the **Close** data in F17:F26 and create a rule that bolds the text and sets the font color to 'blue' when the value is **between** 0.040 and 0.050.
- Make sure the background color in the conditional formatting is set to 'white'.

应用范围  
F17:F26  
格式规则  
符合以下条件时为单元格应用格式:  
介于  
0.04 和 0.05  
格式样式  
自定义  
**B** I U  $\neq$  **A**  $\downarrow$

Using formulas and tidying up the dashboard

## Some common uses for formulas

- Highlight a row that meets a certain condition, rather than a cell
- Comparing lists and values
- Highlight duplicates and discrepancies
- Highlight specific number or text entry
- Highlight alternate rows
- Enable the use of a dynamic named range
- Find errors and blanks

## Highlight a row using a formula

Conditional format rules  
Single colour Colour scale  
Apply to range N3:Q9  
Format cells if... Custom formula is  $=\$R3<200000$   
Formatting style Custom  
**B** I U  $\neq$  **A**  $\downarrow$

Why do people come to Australia?					
Reason for journey	Sep-2017	Oct-2017	Nov-2017	Dec-2017	TOTAL
1 Business	56,300	67,200	73,000	36,500	397,200
2 Convention/conference	28,100	32,500	29,700	14,700	176,300
3 Education	28,000	37,100	24,000	24,600	285,900
4 Employment	19,900	19,400	17,400	14,700	128,400
5 Holiday	307,200	355,300	377,500	481,400	2,511,600
6 Other & not stated	25,000	25,800	24,400	18,500	166,600
7 Visiting friends/relatives	199,200	203,900	231,000	420,100	1,581,300

## Highlight duplicates

Conditional format rules  
Single colour Colour scale  
Apply to range S3:S9  
Format rules  
Format cells if... Custom formula is  $=COUNTIF($S:$S,S3)>1$   
Formatting style Custom  
**R** I U  $\neq$  **A**  $\downarrow$

Why do people come to Australia?					
Reason for journey	Sep-2017	Oct-2017	Nov-2017	Dec-2017	TOTAL
1 Business	56,300	67,200	73,000	36,500	397,200
2 Convention/conference	28,100	32,500	29,700	14,700	176,300
3 Education	28,000	37,100	24,000	24,600	285,900
4 Employment	19,900	19,400	17,400	14,700	128,400
5 Holiday	307,200	355,300	377,500	481,400	2,511,600
6 Other & not stated	25,000	25,800	24,400	18,500	166,600
7 Visiting friends/relatives	199,200	203,900	231,000	420,100	1,581,300

## Wildcard characters

The screenshot shows a table with columns G, H, I, and J. The header 'Product Numbers' is in row 2. Rows 3 through 11 contain data. Row 3: M12, M12, M12. Row 4: M1345, M1345, M1345. Row 5: M12345, M12345, M12345. Row 6: M123456, M123456, M123456. Row 7: M123B, M123B, M123B. Row 8: M5423, M5423, M5423. Row 9: M1256, M1256, M1256. Row 10: M2435, M2435, M2435. Row 11: M1345A, M1345A, M1345A. Row 12: M123, M123, M123. A 'Conditional format rules' dialog box is open, listing three rules:

- Text contains "M?2" (G2:G11)
- Text contains "M???" (H2:H11)
- Text contains "M\*2" (I2:I11)

At the bottom of the dialog, there are buttons for 'Add new rule' and a '+' sign.

## Hiding the toolbars

Using borders will help group certain sets of data. You can also hide irrelevant sheets by **right-clicking the sheet name and selecting Hide sheet**.

If you want your audience to simply view your dashboard without being able to edit it, you should hide the toolbars. **Select View and formula bar to hide the formula bar and View and full screen to hide the other toolbars.** To get out of full-screen mode, press the escape key on the top left-hand side of your keyboard. **To reinstate the formula bar, you will need to select View then Formula bar again.**

### Using a custom formula to highlight a row

In this task, rather than just highlighting individual cells, you will highlight any rows of your data when the value of the Volume is less than 3,000.

To accomplish this, you can use a custom formula in the form of `=A1<x`, where in this example A1 is the first cell in the column you want to check, and x is the value that you are comparing the cell with.

For example, `=A1<5000` would apply the conditional formatting to all rows where the value in column A is less than 5000.

The screenshot shows a table titled 'SM8 Smart Marine Systems ASX'. The columns are Date, Open, High, Low, Close, and Volume. The Volume column has conditional formatting applied to highlight rows where the value is less than 3000. The 'Trend' chart at the bottom shows a line graph with blue and red segments corresponding to the highlighted rows.

**Instructions** **100XP**

Create a new conditional formatting rule that highlights rows when the value in the **Volume** column is **less** than 3000.

- Highlight all of the data in the range **A17:G26** and create a new conditional format rule, and use the 'Custom formula is' option to specify a formula.
- The formula should use **partial absolution** (i.e. **\$G17**) to compare the volume column with the value of interest (in this case, **3000**).
- Set the formatting options below so that the text is "red", and **bold** when the condition is fulfilled. The 'Fill color' should be set to 'None'!
- If you're struggling with your formula, try adapting the example provided above!*

应用范围  
A17:G26

格式规则  
符合以下条件时为单元格应用格式:  
自定义公式为  
=\$G17<3000

格式样式  
自定义  
B I U G A | ♦. .

### Highlighting duplicates

For this task, have a go at creating a formula that will highlight the duplicates in the **Low** data.

#### Instructions

100XP

- Highlight the **Low** data in E17:E26 and create a conditional format rule using the 'Custom formula is' entering the formula `=countif($E:$E,E17)>1`.
- Change the formatting such that any duplicated cells are highlighted by changing the 'Fill color' to 'light red 2'.

The screenshot shows a table with data in columns A through E. The first column contains labels: 'Low', 'Date', and 'Close'. The second column contains numerical values: 0.027, 0.035, 0.036, 0.036, 0.036, 0.045, 0.051, 0.052, 0.055, and 0.061. The third column contains dates: 09-19-17, 09-20-17, 09-25-17, 09-27-17, 09-29-17, 10-04-17, 10-05-17, 10-06-17, 01-02-18, and 01-03-18. The fourth column contains numerical values: 0.030, 0.035, 0.036, 0.036, 0.036, 0.050, 0.051, 0.052, 0.040, and 0.040. The fifth column contains labels: 'Trend' and '应用范围' (Scope). The 'Format rules' section shows a rule for the range E17:E26 with the formula `=countif($E:$E,E17)>1`. The 'Format style' is set to 'Custom' with a light red fill color.

### Using wildcard characters to highlight dates

In this task, you will create a formula using wildcard characters to highlight any dates that are in 2018.

#### Instructions

100XP

- Highlight the **Date** values in A17:A26 and use conditional formatting with a 'Text contains' rule, passing in the value `?-?-18`.
- Set the formatting such that the cell background of any date in 2018 is 'light green 2'.

The screenshot shows a table with data in columns A through E. The first column contains labels: 'Date', 'Close', and 'Trend'. The second column contains dates: 09-19-17, 09-20-17, 09-25-17, 09-27-17, 09-29-17, 10-04-17, 10-05-17, 10-06-17, 01-02-18, and 01-03-18. The third column contains numerical values: 0.030, 0.035, 0.036, 0.036, 0.036, 0.050, 0.051, 0.052, 0.040, and 0.040. The fourth column contains labels: 'Trend' and '应用范围' (Scope). The 'Format rules' section shows a rule for the range A17:A26 with the formula `?-?-18`. The 'Format style' is set to 'Custom' with a light green fill color.

### Change a condition in a format

Now, you will amend an existing conditional formatting rule by changing the values of the condition.

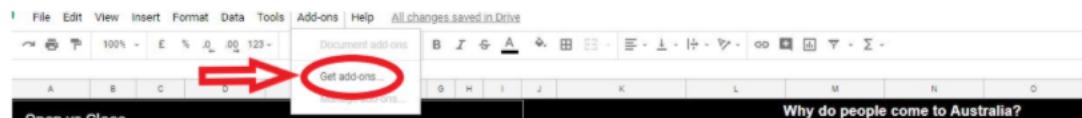
#### Instructions

100XP

- Modify the current rule that formats the **Close** data in F17:F26 so that the rule bolds the text and formats the font color of cells "blue" when the value is between 0.050 and 0.060.

The screenshot shows a table with data in columns A through E. The first column contains labels: 'Close', 'Trend', and '应用范围' (Scope). The second column contains numerical values: 0.030, 0.035, 0.036, 0.036, 0.036, 0.050, 0.051, 0.052, 0.040, and 0.040. The third column contains labels: 'Trend' and '应用范围' (Scope). The 'Format rules' section shows a rule for the range F17:F26 with the formula `介于 0.050 和 0.060`. The 'Format style' is set to 'Custom' with bold and blue font colors.

## Next steps



For instance, there are also Add-ons that you can use to really make your dashboard pack a punch. The Add-ons are built by developers and found by selecting the Add-ons tab within Sheets. Give them a whirl and see how you go!

