

2024

Spreadsheets & Data Visualisation

 orbeducation



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Do This	Section
<input type="checkbox"/>	1. Wordlist
<input type="checkbox"/>	2. Introducing Spreadsheets
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<input type="checkbox"/>	4. Basic Skills Google Sheets
<input type="checkbox"/>	5. Sorting and Filtering
<input type="checkbox"/>	6. Formulas
<input type="checkbox"/>	7. Plots and Trendlines
<input type="checkbox"/>	8. Validating Data
<input type="checkbox"/>	9. Forecasting
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<input type="checkbox"/>	13. Skills 1 - Sports
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Spreadsheets are computer programs used to organise, analyse and store data. You may have used Microsoft Excel or Google Sheets to create a table or chart. The tasks below will introduce you to some of the terms used when working with spreadsheets.

Aim: To learn about spreadsheets and the terms used to describe them.

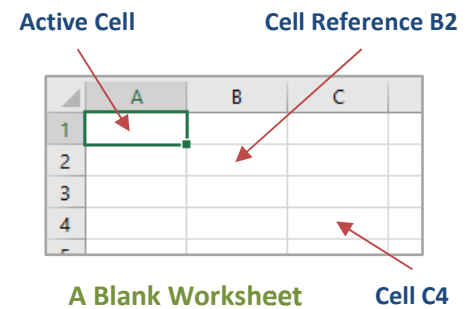
Note: It's a good idea to make sure you are familiar with these terms, even if you have used spreadsheets before.

Task 1 – Cells

Use the words below to complete the paragraph. The diagram will help.

reference active cell number cells type A1 worksheet letter

Spreadsheet applications generally open with a blank page called a _____. The rectangles covering the screen are known as _____. The cell with the thick border is called the _____ (this is where your data will appear when you _____). Each cell has a cell _____ given by the _____ above the cell followed by the _____ to the left. In the picture, the active cell has the reference _____.



Task 2 – Spreadsheets and Data Types

When you enter data, you are creating a spreadsheet. Answer the questions about the spreadsheet below.

- What item of data is found in cell A2? _____
- Which cell is the active cell? _____
- Which cell contains a **date**? _____
- Which cell contains **currency** data? _____
- Which piece of data is found in cell A1? _____
- Which cell contains a **number**? _____
- Which cell contains **text**? _____
- Which cell contains a **percentage**? _____

	A
1	dog
2	562
3	1/01/2026
4	25%
5	\$ 100.00



Formulas make a spreadsheet application a very powerful tool. They are mathematical sums that can be used to:

- Carry out additions, subtractions, multiplications and divisions (using the +, -, * and / symbols).
- Find the total of a group of numbers (using the SUM function).
- Find the average, highest or lowest of a set of numbers (using the AVERAGE, MAX and MIN functions).

Aim: To learn about the use of formulas in Excel and Google Sheets.

Note: These tasks can be completed in Excel or Google Sheets.

Task 1 – Addition

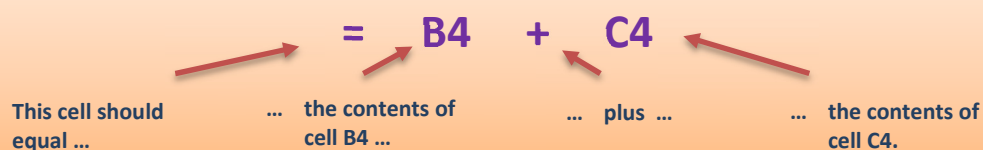
- Open a new workbook and copy the data on the right. Name the worksheet 'Bicycles' and the workbook '06. Formulas'.
- To calculate the total number of red bicycles, make cell **D4** the active cell and type the formula **=B4+C4**. You may notice some coloured borders appearing as you type.

3	Style	Store 1	Store 2	Total
4	Red	25	9	=B4+C4
5	Blue	45	17	

	A	B	C	D	E
1	Bicycle Inventory				
2					
3	Style	Store 1	Store 2	Total	
4	Red	25	9		
5	Blue	45	17		
6	Green	30	14		
7	Black	28	11		
8	Silver	42	15		
9	Total				
10					

- Press the *Enter* key to display the result.

What does the formula mean?



Note: All formulas begin with an equals sign. The coloured boxes show which cells are being used.

Task 2 – Fill

We could simply repeat this process for all the other colours of bicycle, but there is a much quicker way.

- Make cell **D4** active again.
- There is a small block in the bottom right of the active cell called the *fill handle* (it's green in **Excel**, blue in **Sheets**). Click on this and hold your mouse button down.

	A	B	C	D
1	Bicycle Inventory			
2				
3	Style	Store 1	Store 2	Total
4	Red	25	9	34
5	Blue	45	17	

Fill handle



Forecasting is concerned with making predictions about the future. Weather forecasting, for example, uses historical patterns and science to predict the sunshine, rainfall and wind for the coming days and weeks. Population trends are used to predict how the population in an area may change, allowing us to predict demand for resources such as food, water and energy, along with services such as health and education.

Aim: To use data in a spreadsheet to make predictions about the future.

Using spreadsheets, we can try and predict future events based on patterns in the data we already have. This forecast might be made by performing calculations using percentage changes. Alternatively, you may plot a graph, add a trendline and extend it into the future. We will try both methods below.

Task 1 – Crime Analysis with Percentages

The information in the spreadsheet shows the breakdown of crimes that occurred in the town of Hampton. We will use this data to predict the crimes in the years following.

	A	B	C	D	E	F	G
				2022/23	2024	2025	2026
1	Crime	2022	2023	Change	Predicted	Predicted	Predicted
2	Burglary (Residential)	49	32				
3	Burglary (Commercial)	3	5				
4	Burglary (Others)	4	5				
5	Theft of cars	8	14				
6	Theft of bikes	10	5				
7	Theft from cars	12	26				
8	Theft from shops	19	3				
9	Other crimes	4	9				
10							
11	Total Burglary						
12	Total Theft						
13	Total Crimes						

- Create a new workbook named '09. Forecasting' with a worksheet named 'Crime'.
- Copy the information to create a spreadsheet. Make sure the longer headings appear on two lines using 'Home / Alignment / Wrap Text' in Excel or 'Format / Wrapping / Wrap' in Sheets.

Note: You may also force new lines with 'Alt + Enter' (or 'Control + Option + Enter' on a Mac).
- Add calculations across the range **B11:C13** for the 'Total Burglary' [e.g. **=SUM(B2:B4)**], 'Total Theft' and 'Total Crimes' each year. Use the fill handle to copy the formulas across.



The most widespread use of spreadsheets around the world is to keep track of money. This might include:

- Storing data about income and expenses at home or for a business.
- Budgeting or predicting what will happen in the future.

We have assumed you have the basic skills such as formatting spreadsheets with labels, values and formulas, sorting and filtering data, writing formulas using the SUM, MAX, MIN and AVERAGE functions and creating basic charts.

Skills Check

- | | |
|---------------------|-------------------------------------|
| Validation | <input checked="" type="checkbox"/> |
| Sorting / Filtering | <input checked="" type="checkbox"/> |
| Formulas | <input checked="" type="checkbox"/> |
| Visualising Data | <input checked="" type="checkbox"/> |
| Conditional | <input checked="" type="checkbox"/> |
| Forecasting | <input type="checkbox"/> |

Task 1 – Your Balance this Week

Think about any amounts of money you have earned, been given and spent in the past week.

- **Income** Include any money you have gained from jobs, dinner money, pocket money, gifts etc.
- **Expenses** Include any money you have spent, for any reason.

- a. Create a spreadsheet like the one shown. You can use Excel or Google Sheets for these tasks. Choose your own backgrounds and borders; they don't have to be the same as ours.

	A	B	C	D	E
1	Income	Amount		Expenses	Amount
2	Pay	84.00		Match	22.50
3					
4					
5					
6					
7					
8					
9	Total	84.00		Total	22.50
10					
11				Balance	61.50

Name your workbook '14. Skills 2 - Finances' and the worksheet 'Balance'.

- b. Create validation rules on the cells that will contain amounts of money so that only (decimal) numbers above zero can be entered.

	A	B	C
1	Income	Amount	Expenses
2	Pay	84.00	Match
3			
4			
5			
6			

Income Amounts
Enter an amount over 0

- c. Add a few income and expense items, replacing the ones we have put in our spreadsheet.

- d. All amounts of money should be displayed to two decimal places. Use the *Increase Decimal* tool to do this. Remember that you can select multiple ranges at once if you hold down the *Ctrl* (or *Cmd*) key.

- e. Cells **B9** and **E9** should use the SUM function to total the amounts in each column.

- f. Cell **E11** should subtract the total expenses from the total income.



Businesses make use of spreadsheets for all sorts of things, including sales analysis, forecasting and future planning. Examples include:

- Analysis of what worked well financially and what didn't.
- Storing data about income and expenses as required for tax returns.
- Forecasting in order to plan future developments and ensure financial stability.

Skills Check

- | | |
|---------------------|-------------------------------------|
| Validation | <input type="checkbox"/> |
| Sorting / Filtering | <input checked="" type="checkbox"/> |
| Formulas | <input checked="" type="checkbox"/> |
| Visualising Data | <input checked="" type="checkbox"/> |
| Conditional | <input type="checkbox"/> |
| Forecasting | <input checked="" type="checkbox"/> |

Task 1 – Brad Pitt's Movies

The table shows information about Brad Pitt's movies between 2011 and 2019. They are sorted alphabetically.

Your task is to investigate if there are any patterns over time. Basically, are Brad Pitt's movies earning any more or less at the box office and are they receiving higher or lower star ratings?

Title	Year	Star Rating	Takings (\$M)
12 Years a Slave	2013	8.1	188
Ad Astra	2019	6.5	45
Allied	2016	7.1	120
By the Sea	2015	5.3	3
Fury	2014	7.6	212
Killing Them Softly	2012	6.2	38
Moneyball	2011	7.6	110
Once Upon a Time... in Hollywood	2019	7.6	345
The Big Short	2015	7.8	130
The Counselor	2013	5.4	71
The Tree of Life	2011	6.8	54
World War Z	2013	7	540

- Open a new workbook and save as '17. Skills 5 - Business'. Enter the data into a worksheet named 'Brad Pitt'.
- Format the spreadsheet. Don't use alternating background colours, however, as we will be sorting the rows.
- Select all the data and sort by Year, starting with the earliest.

Sort

+ Add Level X Delete Level Copy Level ^ v Options...

My data has headers

Column	Sort On	Order
Sort by: Year	Cell Values	Smallest to Largest



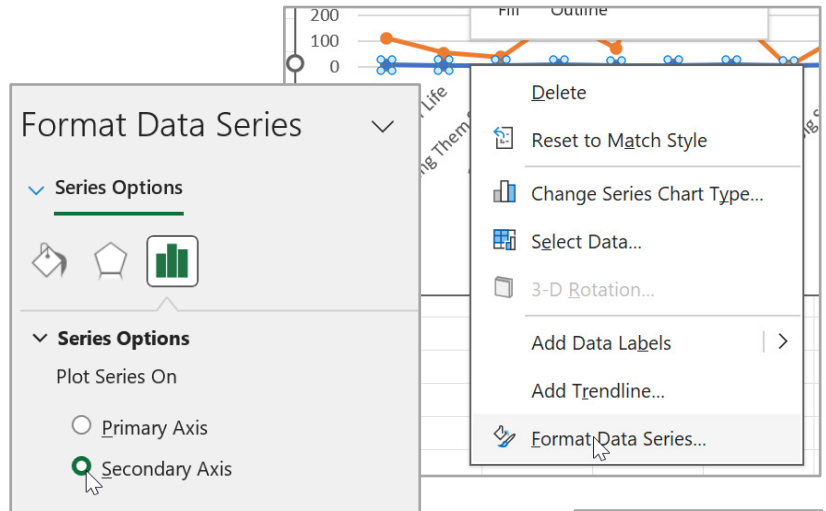
Task 1 – Brad Pitt’s Movies (cont.)

- d. Select the data in the range **A1:A13**. Then, whilst holding down the *Ctrl* (or *Cmd*) key, select the range **C1:D13**. This selection should include all the information except the *Year*. Insert a *Line Chart*.

e. Excel

Select the flat line showing the *Star Rating* data. Right click and select *Format Data Series*.

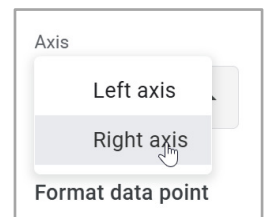
In the panel on the right, select *Secondary Axis* from the *Series Options*.



Sheets

Double-click on the flat line showing the *Star Rating* data.

In the *Customize* tab of the *Chart editor*, open the *Series* section and select *Right axis* from the *Axis* options (see right).

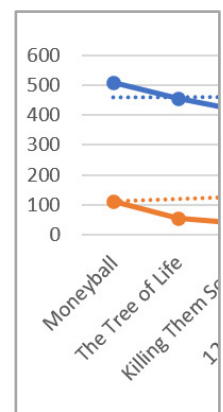


- f. Is there any obvious change over time to either the star ratings or the box office takings? What do your observations suggest?

Add a linear trendline to each series and see if this identifies any patterns.

- g. It looks like there is a correlation between the takings and the star ratings – both charts follow a similar pattern. Select both these columns of data and insert a *Scatter Chart*.

Note: In Excel, don't add a chart with connecting lines. The lines won't mean much, even if you sort the data first.



- h. The scatter chart will provide better analysis if we focus more closely on the data. None of the star ratings are below 5, so set this as the minimum value on the horizontal axis.

In Excel – right click on the axis, select *Format Axis* and set the *Minimum Bounds* in the *Axis Options*. Sheets should set the axis for you.

- i. Add a *Trendline* to the chart. How good is the correlation? Which film is the biggest outlier (i.e. furthest from the trendline)?

- j. Format your charts and give them suitable titles.

Note: Excel doesn't add axis titles by default. Click on the chart and select 'Chart Design / Chart Layouts / Add Chart Element / Axis Titles' and then 'Primary Horizontal' or 'Primary Vertical'.

