Spreadsheets & Data

Total Time for 200m

Checklist

Spreadsheets and Data

☐	**1. Data in our Lives**
☐	**2. Representing Data**
☐	**3. Working with Data**
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Computer data includes numbers, text, images, documents, sounds and code. Data is stored on hard drives, discs and other storage devices. It is transferred around the world via the cables and airways that form the internet. There is now an incredible amount of digital data in existence.

Aim: *To learn about data and how it affects us.*

Task 1 – What Data do you Use?

Write down answers to the questions below. They do not need to be too accurate; approximations are fine.

a. How many photos do you have stored on your phone, computers and social media sites? _____

b. Do you store music on your devices? If so, how many songs do you have? _____

c. How many emails are sitting in all your email accounts? _____

d. Roughly how many minutes of video do you watch through the internet each week? _____

e. How many documents and other files containing school work do you store, both at school and at home? _____

f. What is the total storage capacity of all your devices and computer hard drives, in gigabytes? _____

g. How much data can you download through your internet and phone accounts each month? _____

Task 2 – Big Data

There is so much data in the world now that many companies have outgrown the databases and other traditional methods used to organise it. This is *Big Data*.

Try and match the big numbers with the descriptions given. Look on the internet for help, if needed.

Number			Description
95 million	●	●	Number of people with access to the internet.
500 million	●	●	New pictures uploaded daily to Instagram.
1.86 billion	●	●	Tweets per day.
3.77 billion	●	●	Videos watched on YouTube every day.
5 billion	●	●	Total bytes of data stored in the world.
128 billion	●	●	Monthly active users on Facebook.
Over 1 billion billion	●	●	Bytes of data stored on an iPhone.
10 000 billion billion	●	●	New bytes of data stored each day in the world.

Note: Numbers correct as of 2017. Some are growing quickly.

Extension

Research some facts about big data and share three of your favourites.

Spreadsheets are computer programs used to organise, analyse and store data. You may well 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 a spreadsheet before.*

Task 1 – Cells

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

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 _____.

Active Cell   Cell Reference B2

A Blank Worksheet   Cell C4
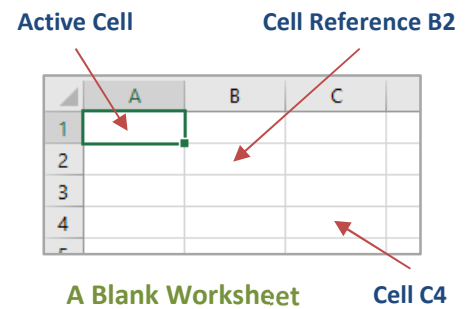
Task 2 – Spreadsheets and Data Types

When you enter data, you are creating a spreadsheet. Use the picture of a spreadsheet to answer the questions.

a.   What item of data is found in cell A2?   _____

b.   Which cell is the active cell?   _____

c.   Which cell contains a **date**?   _____

d.   Which cell contains **currency** data?   _____

e.   Which piece of data is found in cell A1?   _____

f.   Which cell contains a **number**?   _____

g.   Which cell contains **text**?   _____

h.   Which cell contains a **percentage**?   _____

	A
1	dog
2	562
3	1/1/2017
4	25%
5	$ 100.00
6	

Note: Text, number, date, percentage and currency are known as data types.

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).

Note: These tasks can be completed in Excel or Google Sheets.
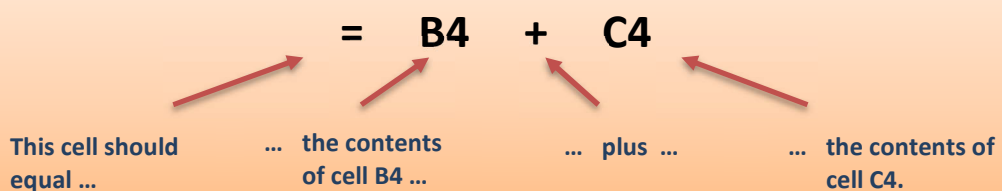
Task 1 – Addition

a. Open a new blank Excel workbook or Google sheet and copy the data on the right.

b. To find 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.

	A	B	C	D
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				

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

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

What does the formula mean?

= B4 + C4

This cell should equal … … the contents of cell B4 … … plus … … the contents of cell C4.

Note: All formulas begin with an <u>equals</u> symbol. 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.

a. Make cell **D4** active again.

b. There is a small square 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**

Formulas (page 2)

c. Drag the mouse pointer down to cell **D8** so that that the box appears around all the cells in the range **D4:D8**. Release the mouse button. The formula should have been copied into all five cells as shown below-left.

3	Style	Store 1	Store 2	Total
4	Red	25	9	34
5	Blue	45	17	62
6	Green	30	14	44
7	Black	28	11	39
8	Silver	42	15	57
9	Total			

3	Style	Store 1	Store 2	Total
4	Red	25	9	=B4+C4
5	Blue	45	17	=B5+C5
6	Green	30	14	=B6+C6
7	Black	28	11	=B7+C7
8	Silver	42	15	=B8+C8
9	Total			

d. You can view the actual formulas rather than the results (as above-right) by selecting '**Formulas / Show Formulas**' (or '**View / Show formulas**' in Google Sheets). Repeat this action to hide them again.

Task 3 – SUM

The method used in the last task is fine for adding 2 or 3 numbers together, but adding 20 numbers would mean typing a very long formula (=B4+C4+D4+E4+F4…). To perform this calculation quickly, we use the *SUM* function.

a. To find the total number of bicycles in Store 1, click on cell B9 to make it the active cell and type the formula **=SUM(B4:B8)**. Press the *Enter* key to display the result.

> **What does the formula mean?**
>
> $$= \quad SUM \quad (B4:B8)$$
>
> This cell should equal …   … the sum of …   … all the data in the range B4 to B8.

b. Use the fill method to copy this formula to cells in the range C9:D9 and save or name your work as "**08 Formulas**".

Task 4 – Other Operators

We used the **+** symbol in the task above for an addition sum. The other common operators are:

Subtract - (e.g. =B1-A1)   **Multiply *** (e.g. =B2*A2)   **Divide /** (e.g. =B3/A3)

Write out the formulas needed to produce the calculations below. Remember that all formulas must begin with an equals sign.

a. Add the contents of cells C1 and C2 together.   _____

b. Sum the contents of the cells in the range A2 to A9.   _____

c. Multiply the data in cell B3 by the data in B7.   _____

d. Divide the data in cell C4 by the data in cell C2.   _____

e. Subtract the data in cell F3 from the data in F2.   _____

f. Add the contents of cells B1 and B2, then subtract B3.   _____

Validation is used to control the data that can be entered into a cell. For instance, you may allow only the following:

- Numbers between 1 and 100

- Dates after 1995

- Text of 15 characters or less

- Whole numbers over 10 (Excel only)

An alert is shown when the user tries to enter a value outside the limits. Depending on the spreadsheet application you are using, the following styles of alert may be available:

- **Stop / Reject**   The value will not be accepted. The user will have to change it.

- **Warning**   A warning will be given and the user has the option of changing the value or continuing.

- **Information**   The user is informed that the value is outside the limits, but no change is requested.

Task 1 – Validating Numbers

a.   Open a new workbook and copy the data below. Widen each column if necessary.

b.   Select cell A2 and click on '**Data / Data Validation**'.

Excel

Set up a *Stop* validation with the settings shown in the three pictures. In Excel, you can insist that only whole numbers are entered, so we will do this.

Validating Data (page 2)

Google Sheets

Setting up validation cells is quicker in Sheets but there are fewer available options. Sheets doesn't have an easy method of making sure that whole numbers are entered, so we will allow all numbers within the range.

Use the settings shown on the right.

Data validation

Cell range: Sheet1!A2

Criteria: Number ⇕ between ⇕ 10 and 100

On invalid data: ○ Show warning ● Reject input

Appearance: ☑ Show validation help text:

Enter a number between 10 and 100

Testing Your Validation Cell

a. Test your validation by entering a range of values or text into cell A2 (e.g. 0, 10, 50, 100, 101, 150, 15.5, 12/12/02, "hello" etc.).

b. Format the input cell so that the user knows data can be entered (ours is yellow with a border) and save or name your workbook "**13 Validating Data**".

Task 2 – Other validations

a. Create a validation in cell B2. Use the criteria below. (In Excel, you will need to allow decimals.)

Minimum number	1.5
Maximum number	5.5
Titles	"Decimal Restriction"
Input message	"You must enter a number between 1.5 and 5.5"
Error alert style	Warning
Error message (Excel only)	"This is not a number between 1.5 and 5.5"

Test your validation with numbers outside the range. In Excel, an alert box is shown with a set of options for continuing. In Sheets, a small coloured triangle is shown in the top-right of the cell.

Conditional formatting is a cross between normal formatting and the IF Function. You can set conditional formatting on cells so that, for example:

- Numbers turn red and bold IF they are negative;

- Words change colour IF they begin with the letter B;

- Payment dates are highlighted IF they are overdue.

-4	-2	0
Apple	Boat	Banana
1/1/2015	2/2/2016	3/3/2017

Aim: *To format cells depending on set conditions.*

Task 1 – Conditional Formatting on Numbers

a. Start by creating the spreadsheet shown. You can use Excel or Google Sheets for this task. Name your worksheet '**Conditional**' and save or name your workbook '**16 Conditional Formatting**'.

◢	A	B	C	D	E	F	G	H
1								
2		Numbers		-4	-2	0	2	4
3								
4		Words		Apple	Boat	Banana	Dart	Bat
5								
6		Dates		1/1/2015	2/2/2016	3/3/2017	4/4/2018	5/5/2019
7								

b. We will start by colouring cells in the range D2:H2 if they contain numbers below zero. Select this range.

Excel
Click '**Home / Conditional Formatting / Highlight Cell Rules / Less Than**'. Leave the default settings in place, with a '0' in the *Less Than* box (below-left). Click *OK*.

Sheets
Click '**Format / Conditional Formatting**' then select *Less than* and '0' in the panel that opens on the right (see below-right). Select some font and fill colours. Click *Done* when you have finished.

Any entries less than zero should now stand out. Try changing the value in F2 to a negative number.

Less Than ? ✕

Format cells that are LESS THAN:

| 0 | ↥ | with | Light Red Fill with Dark Red Text ⌄ |

OK   Cancel

| | -4 | -2 | 0 | 2 | 4 |

Format cells if...

| Less than | ⇕ |

| 0 |

Formatting style

| Custom | ▾ |

B *I* U S A ▾ 🖌 ▾

c. Add a second rule to the same five cells that highlights any numbers <u>over</u> 2. The five cells should now look something like those shown:

| **Numbers** | -4 | -2 | 0 | 2 | 4 |

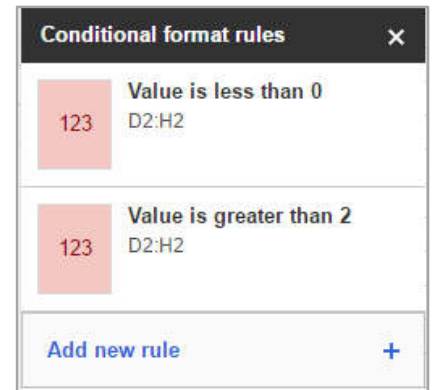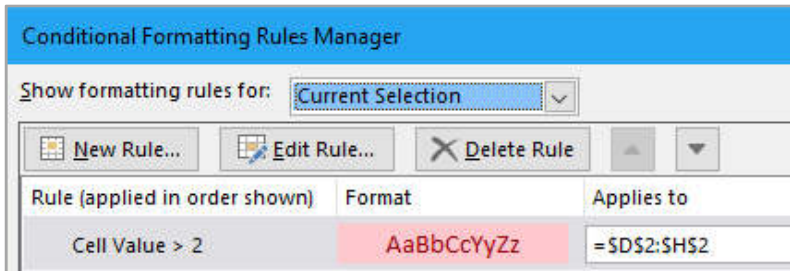# Conditional Formatting (page 2)

Task 2 – Managing Conditional Formatting Rules

Rules can be edited or deleted. Select one of the cells which uses conditional formatting, then:

Excel   Click '**Home / Conditional Formatting / Manage Rules**'.

Sheets   Click on one of the formatting rules in the panel on the right of the spreadsheet to edit it. (Select '**Format / Conditional Formatting**' first if the panel isn't on display).

Task 3 – Conditional Formatting using Words

Conditional formatting can also be used to highlight certain words. We will use this method to format all cells containing words that begin with the letter B.

To achieve this task, you need to consider how a dictionary is set out. All words beginning with a B come between the letters B and C in a dictionary, e.g.:

> **A** , **Ant** , **Axe** , **B** , **Bald** , **Bend** , **Bold** , **Byte** , **C** , **Card** , **Cold**

Select the range D4:H4, then:

Excel

Click '**Home / Conditional Formatting / Highlight Cell Rules /Between**'. Enter the letters 'B' and 'C' in the boxes as shown. Select Custom Format and choose some bold red text. Save.
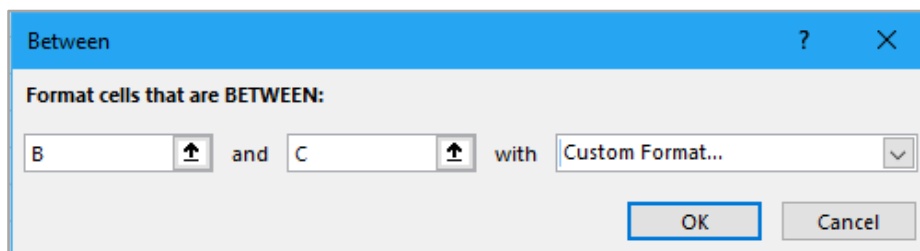
Sheets

Click '**Format / Conditional Formatting**' then select *is between*. Pick some bold red text and no fill colours (as on the right).