Using Excel for codebreaking

1. Open **Excel** and create a new workbook
2. In **column A**, type the alphabet
3. In **column B**, type the character that you want to encode each letter as. This can be a letter, number, symbol or anything else you can type. Just make sure that each letter of the alphabet has a code character to match it
4. Leave **columns C and D** blank – trust me, we'll come back to these
5. In cell **E1**, type the first letter of the message you want to encode
6. In cell **F1** type the second letter and so on…
7. It helps if the columns are narrower. So:
    - click on the **A** at the top of **Column A** to highlight the column
    - hold **SHIFT** down on the keyboard
    - click on the letter at the top of the **last column** you used – something like column X
    - **Right click** somewhere > choose **Column Width**
    - Set the value to something like **0.8 cm** – it's up to you exactly what value

Encode the message

8. Click in cell **E2** – this should be the cell immediately **underneath** the first letter of the message you want to encode
9. We need to add a FUNCTION to this cell. Type this really carefully
10. Type: **=VLOOKUP(E1, A1:B26, 2)**
11. Press **Enter**

    The character from column A that corresponds to the first letter of your message should appear

    How this works:

    - VLOOKUP creates a vertical look up table
    - This looks for the character in E1, finds it in column A and then puts the value from Column B (the second column – that's the 2) in the cell

Now all we need to do is put the same function in each of the cells in row 2

Copying across

12. Click in cell **E2**

13. In the **bottom right hand corner** of the cell is a **very small square**

14. **Hover** your mouse over the square and the cursor on screen changes to a black plus sign

15. **Click and drag** the contents of cell **E2** <u>across</u> to the end of your message (cell S2 or wherever)

16. Release the mouse

    Hmmm – that doesn't work. You'll get a mess of stuff

    There's a way to solve this:

17. **Delete** everything from cell E2 across the sheet to the end of your message

18. Retype the function. This time use **dollar symbols** to lock in place cells $A$1 and $B$26

    Think of these as putting a pin through the A and the 1 so they don't change

19. Your function should say: `=VLOOKUP(E1, $A$1:$B$26, 2)`

20. Now **drag the function across** using the little square and this should work to encode your message

Decoding a message

21. Write a message using your code on scrap paper

22. Use **column C** to type the characters from **Column A** again

23. Now type an encoded message in cells **E5** to **X5** (or whatever)

24. In cell **E6** use the function: `=VLOOKUP(E5, B1:C26, 2)`

    That should decode a message – you'll need to use dollar signs again and copy it across of course

Combining cells as one string

Having the letters in individual columns is a bit annoying. You can combine them using the CONCAT function

25. In a handy cell, type the function: `= CONCAT(E2:X2)` – use the column letter at the end of your message

    This should combine the cell values in one cell so that they can be copied