The Bubble Sort

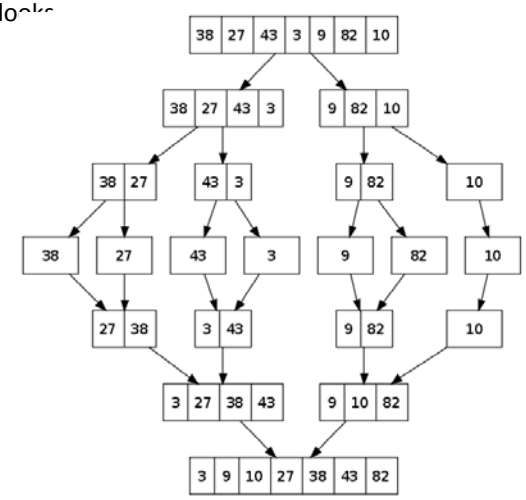
The Bubble Sort looks at a list of data and sorts it be comparing 2 items at a time. It will look at the first 2 items in a list and if the first item is bigger than the second it will swap them around. It will then look at the second and third items and compare them, if the second is bigger than the third, it will swap them around. It will keep going like this until it reaches the end of the list. It will then start back at the beginning of the list doing swaps again until it reaches the end of the list.

It will keep repeating this process until it reaches the end of the list without having made any swaps. With the Bubble Sort the largest item in your list will always end up at the end after the first go through the list.

5	1	12	-5	16	Starting list.
5	1	12	-5	16	5 > 1 so SWAP
1	5	12	-5	16	5 < 12 so NO SWAP
1	5	12	-5	16	12 > -5 so SWAP
1	5	-5	12	16	12 < 16 so NO SWAP

The Merge Sort

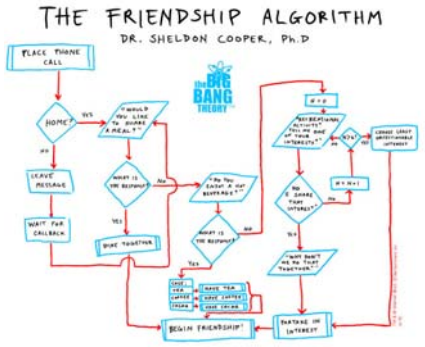
The Merge Sort takes your list and breaks it up into separate items. It then looks at the first pair of values and sorts them, then the second pair of values and sorts them and so on and so forth until it reaches the end of a list. It then looks at the first set of four values and sorts them, it then looks at the second set of 4 values and sorts them and so on and so forth until the end of a list. It then keeps merging larger groups of values together (8's, then 16's then 32's) until the entire list is sorted.



YEAR 7 COMPUTER SCIENCE

Homework Project:

"Algorithms - what are they, where do they exist and what are they used for?"



count ← 10

WHILE count > 0 **DO**

OUTPUT count

OUTPUT "seconds until take off."

OUTPUT "Blast off!"

Set:	
Check Point:	
Submission Date:	

Learning Opportunities

The below statements are things that you should be able to demonstrate within your project to show you have gained a wide variety of knowledge in this area. Meet all the criteria underneath the below signal strengths to achieve a certain level:

All signals shows you have **emerging** knowledge in this area.

All signals shows you have **developing** knowledge in this area.

All signals shows you have **strong** knowledge in this area.

Signal Strength	Statement	Included?
	I CAN state what an Algorithm is.	
	I CAN explain what an Algorithm is, giving examples.	
	I CAN identify several different algorithms that exist in every-	
	I CAN write out an algorithm for an everyday task.	
	I CAN use different algorithms to solve the same problem.	
	I CAN explain what the consequences could be for using	
	I CAN state a couple of areas where computer programs	
	I CAN state what the INPUTS, OUTPUTS and PROCCESSES	
	I CAN explain how these systems might be used to solve a problem and how this links to the INPUTS, PROCESSES and	
	I CAN sort a list of values.	
	I CAN state 2 algorithms that could be used to sort a list.	
	I CAN describe how 1 of these 2 algorithms works.	
	I CAN give examples of how 1 of these 2 algorithms work.	

Data is just a series of values, these could be numbers, names, holidays destinations etc.

The problem arises when we think about we as humans sort things, we are able to look at data and our brains work out what order to put things. E.g. sort the below list into alphabetical order:

Cheese, Stuart, Alphabetical, Lemonade, Aeroplane, Algorithm, Oreo

Did you have to think about that very much? Probably not.

Computers require an algorithm to sort data, some of which take longer than other, some of which use less computer memory than other.

Two of the main computer algorithms to sort data are known as the Bubble Sort and the Merge Sort.

Watch these videos to see them both in action:

Bubble Sort: www.youtube.com/watch?v=lyZQPjUT5B4

Merge Sort: www.youtube.com/watch?v=XaqR3G_NVoo

Using the information on the next page, and what you can tell from the videos, see if you can write down a series of instructions (an algorithm) for either the Bubble Sort or the Merge Sort. Try and detail how the data is sorted, feel free to also use an example if you wish.

Present this algorithm as a poster with a title and any other associated imagery you feel is appropriate to demonstrate your understanding of this.

Most algorithms contain INPUTS, PROCESSES and OUTPUTS.

Using this information, see if you can come up with two different business, companies or organisations that use computer programs for a specific purpose. Identify what this purpose is, then see if you can identify what the inputs, the processes and the outputs of that program are.

Name of organisation 1:	
Description of the computer program and what it is used for.	
Inputs?	
Processes?	
Outputs?	

Name of organisation 2:	
Description of the computer program and what it is used for.	
Inputs?	
Processes?	
Outputs?	

Task 4 - Searching & Sorting Poster

In a computer, one of the most common tasks performed is the searching & sorting of data, this could be things like hospital appointments, money made on certain days of the week or organising a series of tasks to be completed based on their priority.

"An algorithm is simply a series of steps/instructions that can be followed in order, that allows us to solve a problem."

Task 1 - Everyday Algorithms:

If an algorithms is just a series of instructions, what algorithms do you come across on a common day? Think about the instructions that you follow that allows you to solve a problem. For example, if I had to bake a cake, I would need to follow a series of steps to do so. Write down 3 to 6 examples of where you might find an algorithm on a normal day, then for one of them, write down the instructions you might actually follow.

Everyday Algorithm Examples		
Example List of Instructions		

Task 2 - Paper Aeroplane Algorithms

Using a piece of A4 paper, create a paper aeroplane. Once you have done this, write down the steps you took to make the paper aeroplane.

Aeroplane 1 - Algorithm

Now, using the internet or other research methods (e.g. ask someone) create another paper aeroplane using a **different method** (i.e. take different steps than you did before). Again, write these steps down underneath:

Aeroplane 2 - Algorithm

As you can (hopefully) see, you have managed to produce two paper aeroplanes (solved two problems) using two different algorithms. What observations (what do you think this means) can you make about algorithms to solve tasks?

My Observations

Task 3 - Algorithms in Computers

When we write up an algorithm in a programming language, we end up with a computer program.

Algorithm + Programming = Computer

Business, companies, schools, hospitals etc. all use computer programs to deal with a variety of different problems. For example, in schools we might use a computer program to allow us to monitor student attendance.
So how does this work?

- Every teacher takes a register - this is an **INPUT** (where data is being put into the system).
- The computer program sorts who was/wasn't in a class - this is a **PROCESS** (where data is analysed/figures are calculated)
- Ms Holt then creates a report of all student who missed registration - this is an **OUTPUT** (where data is retrieved from a computer program and shown to the user).