**Level 1: Charles Babbage & Ada Lovelace**

1. Who was Charles Babbage?
   1. When and where was he born?

He was born on December 26, 1791 in London.

* 1. What was his main contribution to computer science?

His main contribution to computer science was working on the Analytical Engine which was able to solve any mathematical equation using punch cards for instructions and having a memory unit as well. This was revolutionary because he started the basis for computer science by creating a device that can solve math problems which was later developed on by other people to create a computer.

1. What is the "Difference Engine" proposed by Charles Babbage?
   1. What did it do?

It performed mathematical equations.

* 1. How did it work?

It operated by using decimal numbers which were 0-9 which were represented on a toothed wheel. When that wheel turned it caused the other wheel to move carrying that number and continuing the calculation.

* 1. How was it similar to modern computers?

This was similar to modern computers because it had a memory unit and was able to solve math problems.

1. Who was Ada Lovelace?
   1. When and where was she born?

She was born on December 10, 1815 in London.

* 1. What was his main contribution to computer science?

Her main contribution to computer science was working writing the world’s first machine algorithm for the computing machine that was written on paper. She became the first computer programmer in the world.

* 1. What is the computer language that is named after her?

The United States Department of Defence made a computer language after her called Ada for her contributions in computer science.

1. What is the "Analytical Engine" worked on by Ada Lovelace?
   1. What did it do?

It solved calculations.

* 1. How did it work?

It worked by entering punch cards in with a math problem and than another punch card will appear with the answer.

* 1. How was it similar to modern computers?

It was similar modern computers because it had a storage area.

**Level 2: Alan Turing**

1. Who was Alan Turing?
   1. When and where was he born?

He was born on June 23,1912 in Paddington, London.

* 1. What was his main contribution during World War II?

His main contribution during the second world war was that he developed a machine that broke the German Enigma code.

* 1. What were his main contributions to computer science after World War II?

He created the Turing test to test AI and started the basis of hardware and software in computers.

1. What is the "Enigma" that Alan Turing worked on during World War II?
   1. What was the "Enigma code" used by the Germans and how did it work?

The Enigma code was used by the Germans to communicate with naval ships and parts of its armies in code that was claimed unbreakable. The message was mixed up by many notched wheels or rotors that showed different letters of the alphabet and the only way to decode it is if you knew the exact settings of the rotors.

* 1. Why was it so important for Britain to "crack" the Enigma code?

It was important to crack it because then the Allies would know where the Germans will be attacking or defending and be there intercept it. It would be an advantage for the Allies because they can find out where the Germans will be and be there to ambush them. This could help the Allies win the war.

* 1. How did Alan Turing solve the puzzle?

He solved the puzzle by creating the Bombe which was an electromechanical machine that mimicked the German Enigmas. The machine was wired to act exactly like the Enigmas and so when it was turned on it would dismiss certain possibilities and use logic to find the plausible outcomes. Then the machine would hook up to the Enigma and see if the code is correct.

* 1. Why was Turing's work kept top secret?

His work was kept top secret because if the Germans found out that their unbreakable code was broken then they would abandon the Enigma altogether. This would mean the Allies would lose their advantage they had will be blind to any incoming attack from the Germans.

1. Many people call Alan Turing the "Greatest Unknown Hero of World War II". Provide some examples of the impact of his work that would support this claim.

Without Turing’s help to break the Enigma Code the Allies would never had the advantage of over hearing German plans. By breaking the code the Allies were able to find out where the German navy is, where communication lines are, secret intelligences agents and other German conversations that were valuable. All this was accomplishable because Turing broke the Enigma Code.

1. How did being gay affect Alan Turing's life and work as a computer scientist?
   1. How did being gay affect his work during World War II?

Being gay affected his work because he wasn’t recognized as a great scientist and was looked down upon by others as a stranger.

* 1. How did being gay affect his work after World War II?

Being gay affected his work because back in Britain being homosexual was illegal and so he was arrested by the police. He was found guilty of gross indecency and avoided prison, but he had to take chemical castration. He was later found dead in 1954.

* 1. How did Alan Turing's life end?

He was found dead in his home by a maid by cyanide poisoning and was later ruled out by the judge that it was a suicide.

1. Many people call Alan Turing the "Father of Computer Science". Provide some examples of the impact of his work that would support this claim.

He was called the “Father of Computer Science” because he helped create algorithms and computations with the Turing machine. He created his own paper about Computable numbers with an Application to the Entscheidungs problem which was the start of the Turing machine. He also helped create the Bombe which helped crack the Enigma code faster. He also brought up the idea about artificial intelligence and started his own prototype. Alan Turing was considered the Father of Computer Science because he helped create many theories and inventions that made computer science possible.

**Level 3: Other Great Contributors**

1. Who was John von Neumann?
   1. When and where was he born?

He was born on December 28, 1903 in Budapest, Hungary

* 1. When and why did he move to America?

He moved to America

* 1. What was his contribution to mathematics & science?

His contribution to mathematics and science was AI and physics.

* 1. What was his contribution to computer science?

His contribution to computer science was creating a stored program in a digital computer.

1. What was the "ENIAC" computer and the "von Neumann Machine"?
   1. What did it do and how did it work?

The ENIAC computer was the most powerful calculating device to date back then and it worked by using functional units wiring them in different ways to solve a new problem. The von Neumann Machine kept data and instructions in a single store where the instructions were encoded so that they can be modified by other instructions. This mean’t that a program can be treated as data by another program. The Von Neumann Machine made high level programming possible.

* 1. How is it related to modern computers?

The ENIAC and von Neumann Machine made it so that a computer can carry out calculations and be able to edit a program using another program. This allowed us to create high level program to create games and certain tools to help us.

* 1. Explain how a "von Neumann Machine" applies to modern PCs.

The von Neumann Machine applies to modern PCs they take a program and use it as data in certain programs

1. Who was Grace Hopper?
   1. When and where was she born?

Was born on December 9 , 1906.

* 1. What were some of her contributions to computer science?

She was a pioneer in developing computer technology and helped to devise UNIVAC the first commercial electronic computer as well as naval applications for COBOL.

1. What was the "COBOL" computer language that Hopper helped to develop?
   1. How was COBOL different from other computer languages of the time?

COBOL was a computer language that used English words or phrases which made it easier for business users to understand because many companies had different brand laptops. This mean’t that the programming languages were different. But thanks to COBOL it made it easier.

* 1. Is COBOL still in use today? Explain your answer.

1. Who is Tim Berners-Lee?
   1. When and where was he born?

He was born on June 8, 1955.

* 1. Why was he knighted by Queen Elizabeth II?

He was knighted by Queen Elizabeth II for his services to the global development of the Internet.

* 1. What is his contribution to computer science?

He helped create the first version of the World Wide Web which soon became the Internet.

1. List some ways that your life would be different if Tim Berners-Lee did not invent the World Wide Web.

It would be much harder to do research because I’ll have to use books and other materials instead of having to rely on the computer. It also limits what I watch because without the World Wide Web I wouldn’t be able to watch Youtube videos or read interesting news articles or stories. I won’t what time stores will be opening or closing. Without the World Wide Web there’ll be some serious changes to my lifestyle.

**Level 4: Presentation**

Pick one of the above "heroes" of computer science and prepare a brief presentation about their life and contributions.

Your presentation will be shared with other students in the class in a "trade show" format. (When we return from Christmas break.)

Your presentation should be shared with Mr. Nestor through Google Docs or via email at p0079141@pdsb.net.