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

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

Born December 26, 1791, London, United Kingdom

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

He originated the concept of a digital programmable computer.

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

Was an automatic mechanical calculator designed to tabulate polynomial functions.

* 1. How did it work

A way to interpolate or tabulate functions by using a small set of polynomial coefficients.

* 1. How was it similar to modern computers?

Calculators are similar because they are used for polynomial coefficients and they can do more now

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

Born December 10, 1815, London, United Kingdom

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

Known for her work on Charles Babbage's proposed mechanical general-purpose computer, the Analytical Engine.

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

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

Was a proposed mechanical general-purpose computer

* 1. How did it work?

Incorporated an arithmetic logic unit, control flow in the form of conditional branching and loops, and integrated memory

* 1. How was it similar to modern computers?

Like a cpu fan but for controlling conditional branching.

**Level 2: Alan Turing**

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

Born: June 23, 1912, Maida Vale

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

Served the Allied forces by breaking German military codes, particularly those used by the German navy.

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

He laid the groundwork for modern computing and theorized about artificial intelligence.

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 was a type of enciphering machine used by the German armed forces to send messages securely. The reflector takes the input and reflects back the electrical signal for its return journey through the rotors. It is important that the signal is scrambled when reflected, because of the way the Enigma machine is designed -- if you enter the cipher text you get back the clear text.

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

So they could intercept any information about attacks and stop the Germans from attacking or intercepting supplies

* 1. How did Alan Turing solve the puzzle?

Alan Turing worked at the Government Code and Cipher School at Bletchley Park the forerunner of GCHQ where he devised the techniques which cracked the German Enigma code.

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

The citizens saw it as an openly gay Englishman who was as responsible as any man for winning the Second World War and would be mad with army and government.

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. If it wasn’t for him Britain may never would’ve cracked the Enigma code and Germany could have possibly won the war and take over the world. With his help he helped intercept some private calls and get secret information to help win battles.
2. 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?

If you were gay around these times people looked at you different and did not accept you so people disliked him.

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

His work was still continued after world war 2 but people still disliked him because of the fact he was gay and people always talked about him being gay which made him feel bad.

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

He was found dead from cyanide poisoning at the age of 41 in 1954, a half-eaten apple by his bedside. An inquest concluded that it was 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 formed the concept of the algorithms and computations with one of his inventions, the Turing machine. Many people contributed to the invention of the computer. But Turing was very important in inventing the modern computer and formalizing the underlying theory that allowed the computer to be invented and built. Charles Babbage created the concept of a programmable computer about a century before Alan Turing was active. He was a brilliant mathematician and logician. He developed the idea of the modern computer and artificial intelligence. During the Second World War he worked for the government breaking the enemies codes and Churchill said he shortened the war by two years.

**Level 3: Other Great Contributors**

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

Born: December 28, 1903, Budapest, Hungary

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

In 1937, von Neumann became a naturalized citizen of the US after migrating to America with his mother and brothers.

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

Von Neumann wrote 150 published papers in his life; 60 in pure mathematics, 20 in physics, and 60 in applied mathematics.

* 1. What was his contribution to computer science?

His work on artificial life focused on the problem of the self-reproduction of machines.

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

ENIAC was the world's first general-purpose computer. ENIAC was designed and built for the United States Army to calculate artillery firing tables.

* 1. How is it related to modern computers?

Almost like a calculator because it calculates firing tables for the US army.

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

All modern computers are "von Neumann machines" in that they have a single central combined program and data store: "memory." John Von Neumann was the one who suggested that computers do not need separate storage for data and instructions

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

Born: December 9, 1906, New York City, New York, United States

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

One of the first programmers of the Harvard Mark I computer, she was a pioneer of computer programming who invented one of the first compiler related tools.

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 is a compiled English like computer programming language designed for business use. It is imperative, procedural and, since 2002, object-oriented.

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

COBOL is still widely used in legacy applications deployed on mainframe computers, such as large-scale batch and transaction processing jobs. Most programming in COBOL is now purely to maintain existing applications.

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

Born: June 8, 1955 (age 63 years), London, United Kingdom

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

He was knighted in recognition for his "services to the global development of the Internet" through his invention of the World Wide Web, a system to organize, link, and browse Internet pages.

* 1. What is his contribution to computer science?

He is known as the inventor of the World Wide Web.

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

I cannot imagine how different my life would be without the world wide web. The world is all web based today and it is increasing and gradually upgrading through the years and into the future. Every day of my life I have used the world wide web and if I did not have it to help me I would be a very different person today.

**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 form Christmas break.)

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