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

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

[**Born**](https://www.google.ca/search?safe=strict&rlz=1C1GCEV_enCA827CA827&q=charles+babbage+born&stick=H4sIAAAAAAAAAOPgE-LQz9U3MCzMrdISy0620i9IzS_ISQVSRcX5eVZJ-UV5AL9qwuokAAAA&sa=X&ved=2ahUKEwjv4PztxqnfAhXK8YMKHWwtAAMQ6BMoADAfegQIAxAG)**:**December 26, 1791, [London, United Kingdom](https://www.google.ca/search?safe=strict&rlz=1C1GCEV_enCA827CA827&q=London&stick=H4sIAAAAAAAAAOPgE-LQz9U3MCzMrVICs0yyCnK0xLKTrfQLUvMLclKBVFFxfp5VUn5RHgBrmkgpLgAAAA&sa=X&ved=2ahUKEwjv4PztxqnfAhXK8YMKHWwtAAMQmxMoATAfegQIAxAH)

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

 Babbage originated the concept of a digital programmable computer

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

designed to tabulate polynomial functions.

* 1. How did it work?

Used gears to calculate polynomials

* 1. How was it similar to modern computers?

**Charles Babbage** was considered to be the **father of computing** after his invention and concept of the Analytical Engine in 1837. The Analytical Engine contained an Arithmetic Logic Unit (ALU), basic flow control, and integrated memory; hailed as the first general-purpose **computer** concept

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

[**Born**](https://www.google.ca/search?safe=strict&rlz=1C1GCEV_enCA827CA827&q=ada+lovelace+born&stick=H4sIAAAAAAAAAOPgE2LXz9U3yEky0hLLTrbSL0jNL8hJBVJFxfl5Vkn5RXkAsOqtXCMAAAA&sa=X&ved=2ahUKEwjC7pbNyKnfAhWvj4MKHa91AN8Q6BMoADAeegQICRAG)**:**December 10, 1815, [London, United Kingdom](https://www.google.ca/search?safe=strict&rlz=1C1GCEV_enCA827CA827&q=London&stick=H4sIAAAAAAAAAOPgE2LXz9U3yEkyUuIAMUyyCnK0xLKTrfQLUvMLclKBVFFxfp5VUn5RHgAkCXj0LQAAAA&sa=X&ved=2ahUKEwjC7pbNyKnfAhWvj4MKHa91AN8QmxMoATAeegQICRAH)

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

Ada is often referred to as 'the first programmer'. The collaboration with Babbage was close and biographers debate the extent and originality of Ada's contribution.

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

Ada is a structured, statically typed, imperative, and object-oriented high-level computer programming language, extended from Pascal and other languages.

1. What is the "Analytical Engine" worked on by Ada Lovelace?
   1. What did it do?
   2. How did it work?
   3. How was it similar to modern computers?

**Level 2: Alan Turing**

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

June 23, 1912, [Maida Vale](https://www.google.ca/search?safe=strict&rlz=1C1GCEV_enCA827CA827&biw=1680&bih=939&q=Maida+Vale&stick=H4sIAAAAAAAAAOPgE2LXz9U3yDMwUOIEMYxMK4oqtcSyk630C1LzC3JSgVRRcX6eVVJ-UR4A9pUtpC4AAAA&sa=X&ved=2ahUKEwicsfWeyqnfAhWQ_YMKHZDzBdIQmxMoATAYegQIBxAH)

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

In 1942 Turing devised the first systematic method for breaking messages encrypted by the sophisticated German cipher machine that the British called “Tunny.”

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

He invented the Turing test.

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 a secret Nazi code used to hide their messages

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

The Nazi code was used in the Nazi communication to plan and coordinate Nazi u boat attacks

* 1. How did Alan Turing solve the puzzle?

He invented a machine that could decode the messages.

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

So the Germans did not know that their enigma had been Brocken so they would continue to use it

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.

Because of his work the allies knew where the Germans were planning to attack so they could be strategically stopped, stopping the Germans from advancing.

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?

It didn’t

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

He was persecuted and humiliated.

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

He poisoned himself with cyanide

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.

Turing was a founding father of artificial intelligence and of modern [cognitive](https://www.merriam-webster.com/dictionary/cognitive) science, and he was a leading early exponent of the [hypothesis](https://www.merriam-webster.com/dictionary/hypothesis) that the human brain is in large part a digital computing machine. He theorized that the cortex at birth is an “unorganized machine” that through “training” becomes organized “into a universal machine or something like it.” Turing proposed what subsequently became known as the Turing test as a [criterion](https://www.merriam-webster.com/dictionary/criterion) for whether an artificial computer is thinking (1950).

**Level 3: Other Great Contributors**

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

[**Born**](https://www.google.ca/search?safe=strict&rlz=1C1GCEV_enCA827CA827&q=john+von+neumann+born&stick=H4sIAAAAAAAAAOPgE-LQz9U3MDEyTNMSy0620i9IzS_ISQVSRcX5eVZJ-UV5ABucA2IkAAAA&sa=X&ved=2ahUKEwjW-emoz6nfAhWSxIMKHQgECX4Q6BMoADAmegQICRAG)**:**December 28, 1903, [Budapest, Hungary](https://www.google.ca/search?safe=strict&rlz=1C1GCEV_enCA827CA827&q=Budapest&stick=H4sIAAAAAAAAAOPgE-LQz9U3MDEyTFMCsyxNy-O1xLKTrfQLUvMLclKBVFFxfp5VUn5RHgDmvLiCLgAAAA&sa=X&ved=2ahUKEwjW-emoz6nfAhWSxIMKHQgECX4QmxMoATAmegQICRAH)

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

1933 is when he moves to the U.S , he was offered a lifetime professorship on the faculty of the Institute for Advanced Study in New Jersey

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

Von Neumann founded the field of continuous geometry.[[76]](https://en.wikipedia.org/wiki/John_von_Neumann#cite_note-76) It followed his path-breaking work on rings of operators

* 1. What was his contribution to computer science?

During World War II, von Neumann worked on the Manhattan Project; he developed the mathematical models that were behind the explosive lenses used in the implosion-type nuclear weapon.

1. What was the "ENIAC" computer and the "von Neumann Machine"?
   1. What did it do and how did it work?
   2. How is it related to modern computers?
   3. Explain how a "von Neumann Machine" applies to modern PCs.
2. Who was Grace Hopper?
   1. When and where was she born?
   2. What were some of her contributions to computer science?
3. What was the "COBOL" computer language that Hopper helped to develop?
   1. How was COBOL different from other computer languages of the time?
   2. Is COBOL still in use today? Explain your answer.
4. Who is Tim Berners-Lee?
   1. When and where was he born?
   2. Why was he knighted by Queen Elizabeth II?
   3. What is his contribution to computer science?
5. List some ways that your life would be different if Tim Berners-Lee did not invent the World Wide Web.

**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.