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

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

[**Born**](https://www.google.com/search?safe=strict&rlz=1C1GGRV_enCA813CA813&q=charles+babbage+born&stick=H4sIAAAAAAAAAOPgE-LQz9U3MCzMrdISy0620i9IzS_ISQVSRcX5eVZJ-UV5AL9qwuokAAAA&sa=X&ved=2ahUKEwjD6cLlgaffAhURooMKHZIIBYgQ6BMoADAeegQIBxAG)**: December 26, 1791,**[**London, United Kingdom**](https://www.google.com/search?safe=strict&rlz=1C1GGRV_enCA813CA813&q=London&stick=H4sIAAAAAAAAAOPgE-LQz9U3MCzMrVICs0yyCnK0xLKTrfQLUvMLclKBVFFxfp5VUn5RHgBrmkgpLgAAAA&sa=X&ved=2ahUKEwjD6cLlgaffAhURooMKHZIIBYgQmxMoATAeegQIBxAH)

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

**Inventor who is credited with having conceived the first automatic digital computer.**

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

**A difference engine created by Charles Babbage is an automatic mechanical calculator designed to tabulate polynomial functions.**

* 1. How did it work?

**You put in the problem then turn a lever to get the answer.**

* 1. How was it similar to modern computers?

**You can put in a problem then it will give you the answer.**

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

[**Born**](https://www.google.com/search?safe=strict&rlz=1C1GGRV_enCA813CA813&q=ada+lovelace+born&stick=H4sIAAAAAAAAAOPgE2LXz9U3yEky0hLLTrbSL0jNL8hJBVJFxfl5Vkn5RXkAsOqtXCMAAAA&sa=X&ved=2ahUKEwjPwcqBkKffAhUl1oMKHTSLDj8Q6BMoADAeegQIAxAG)**: December 10, 1815,**[**London, United Kingdom**](https://www.google.com/search?safe=strict&rlz=1C1GGRV_enCA813CA813&q=London&stick=H4sIAAAAAAAAAOPgE2LXz9U3yEkyUuIAMUyyCnK0xLKTrfQLUvMLclKBVFFxfp5VUn5RHgAkCXj0LQAAAA&sa=X&ved=2ahUKEwjPwcqBkKffAhUl1oMKHTSLDj8QmxMoATAeegQIAxAH)

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

**Her main contribution to computer science was she created a detailed and elaborate**[**annotations**](https://www.merriam-webster.com/dictionary/annotations)**, to help make Charles Babbage machine to work.**

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

**Computer language that is named after her** **Ada.**

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

[**Analytical Engine**](https://www.britannica.com/technology/Analytical-Engine)**could be programmed to compute Bernoulli numbers**

* 1. How did it work?

**The**[**Analytical**](https://www.merriam-webster.com/dictionary/Analytical)**Engine,” she said, weaves algebraic patterns”.**

* 1. How was it similar to modern computers?

**It is similar to modern computers by being able to program something to make it work.**

**Level 2: Alan Turing**

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

**Born June 23, 1912,**[**London**](https://www.britannica.com/place/London)**, England.**

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

**During World War II, Turing served the Allied forces by breaking German military codes,** **tasked with solving encoded German naval messages.**

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

**Alan Turing broke the German Enigma code during World War II and devised the Turing machine and the Turing test of computer 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.**

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

**It was important for Britain to "crack" the Enigma code so they can intercept the Germany’s plan of an attack.**

* 1. How did Alan Turing solve the puzzle?

**He had to create the first computer to solve the problem.**

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

**Turing's work kept top secret because he was gay and the government was ashamed of that to address the public about.**

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.

* **He cracked the Enigma code**
* **He made the first computer**

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?

**In Britain it was illegal to gay. He was going to be punished because of that after the war.**

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

**We ask the HM Government to grant a pardon to Alan Turing for the conviction of "gross indecency". In 1952, he was convicted of "gross indecency" with another man and was forced to undergo so-called "organo-therapy"—chemical castration.**

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

**Two years later, he killed himself with cyanide, aged just 41.**

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 created the Turing test for artificial intelligence.**
* **He came up with the theory were an artificial intelligence can have emotions of humans.**

**Level 3: Other Great Contributors**

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

**December 28, 1903,**[**Budapest, Hungary**](https://www.google.com/search?safe=strict&rlz=1C1GGRV_enCA813CA813&q=Budapest&stick=H4sIAAAAAAAAAOPgE-LQz9U3MDEyTFMCsyxNy-O1xLKTrfQLUvMLclKBVFFxfp5VUn5RHgDmvLiCLgAAAA&sa=X&ved=2ahUKEwj9jPexg6zfAhVMUK0KHW7iBvMQmxMoATAdegQIChAH)

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

**Von Neumann was part of a serial exodus of Hungarians who fled to**[**Germany**](https://www.britannica.com/place/Germany)**and then to**[**America**](https://www.britannica.com/place/United-States)**, forging remarkable careers in the sciences.**

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

**Von Neumann’s gift for applied**[**mathematics**](https://www.britannica.com/science/mathematics)**took his work in directions that influenced**[**quantum theory**](https://www.britannica.com/science/quantum-field-theory)**,**[**automata theory**](https://www.britannica.com/topic/automata-theory)**,**[**economics**](https://www.britannica.com/topic/economics)**, and defense planning.**

* 1. What was his contribution to computer science?

**Von Neumann pioneered**[**game theory**](https://www.britannica.com/science/game-theory)**and, along with**[**Alan Turing**](https://www.britannica.com/biography/Alan-Turing)**and**[**Claude Shannon**](https://www.britannica.com/biography/Claude-Shannon)**, was one of the**[**conceptual**](https://www.merriam-webster.com/dictionary/conceptual) **inventors of the stored-program digital**[**computer**](https://www.britannica.com/technology/computer)**.**

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

**Most important, von Neumann modified ENIAC to run as a stored-program machine. The IAS machine, which began operating in 1951, used**[**binary**](https://www.britannica.com/technology/binary-code)[**arithmetic**](https://www.britannica.com/science/arithmetic)**—ENIAC had used**[**decimal numbers**](https://www.britannica.com/science/decimal-number-system)**—and shared the same memory for code and data, a design that greatly**[**facilitated**](https://www.merriam-webster.com/dictionary/facilitated)**the “conditional loops” at the heart of all subsequent coding.**

* 1. How is it related to modern computers?

**It is related to modern computers by having memory for code and data, a design that greatly**[**facilitated**](https://www.merriam-webster.com/dictionary/facilitated)**the “conditional loops” at the heart of all subsequent coding.**

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

**The von Neumann architecture is a design model for a stored-program digital computer that uses a processing unit and a single separate storage structure to hold both instructions and data.**

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

[**Born**](https://www.google.com/search?safe=strict&rlz=1C1GGRV_enCA813CA813&q=grace+hopper+born&stick=H4sIAAAAAAAAAOPgE-LQz9U3MLbMydMSy0620i9IzS_ISQVSRcX5eVZJ-UV5ABgmP80kAAAA&sa=X&ved=2ahUKEwjOkZfliKzfAhUD26wKHVZmCJMQ6BMoADAaegQIBxAG)**: December 9, 1906,**[**New York City, New York, United States**](https://www.google.com/search?safe=strict&rlz=1C1GGRV_enCA813CA813&q=New+York+City&stick=H4sIAAAAAAAAAOPgE-LQz9U3MLbMyVPiBLGM4o0szLTEspOt9AtS8wtyUoFUUXF-nlVSflEeAKPkdmUvAAAA&sa=X&ved=2ahUKEwjOkZfliKzfAhUD26wKHVZmCJMQmxMoATAaegQIBxAH)

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

**American mathematician and rear admiral in the**[**U.S. Navy**](https://www.britannica.com/topic/The-United-States-Navy)**who was a pioneer in developing**[**computer**](https://www.britannica.com/technology/computer)[**technology**](https://www.britannica.com/technology/technology)**, helping to devise**[**UNIVAC I**](https://www.britannica.com/technology/UNIVAC)**, the first commercial electronic computer, and naval applications for**[**COBOL**](https://www.britannica.com/technology/COBOL)**(*co*mmon-*b*usiness-*o*riented *l*anguage).**

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 known for** [**COBOL**](https://www.britannica.com/technology/COBOL)**(*co*mmon-*b*usiness-*o*riented *l*anguage).**

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

**COBOL is a programming language that reads like regular English and is often used for business and administrative purposes. The name means Common Business Oriented Language.**

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

[**Born**](https://www.google.com/search?safe=strict&rlz=1C1GGRV_enCA813CA813&q=tim+berners-lee+born&stick=H4sIAAAAAAAAAOPgE-LQz9U3ME8xTdISy0620i9IzS_ISQVSRcX5eVZJ-UV5AJ4aevEkAAAA&sa=X&ved=2ahUKEwiKts-ei6zfAhUEUKwKHTzwAS8Q6BMoADAoegQIBBAG)**: June 8, 1955 (age 63 years),**[**London, United Kingdom**](https://www.google.com/search?safe=strict&rlz=1C1GGRV_enCA813CA813&q=London&stick=H4sIAAAAAAAAAOPgE-LQz9U3ME8xTVICs0yyCnK0xLKTrfQLUvMLclKBVFFxfp5VUn5RHgB2NL4ZLgAAAA&sa=X&ved=2ahUKEwiKts-ei6zfAhUEUKwKHTzwAS8QmxMoATAoegQIBBAH)

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

**Sir Tim Berners-Lee, (born June 8, 1955,**[**London**](https://www.britannica.com/place/London)**, England), British computer scientist, generally credited as the inventor of the**[**World Wide Web**](https://www.britannica.com/topic/World-Wide-Web)**. In 2004 he was awarded a knighthood by Queen**[**Elizabeth II**](https://www.britannica.com/biography/Elizabeth-II)**.**

* 1. What is his contribution to computer science?

**He was 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.

* **There would be no social media, like YouTube and Facebook.**
* **We can’t work with others around the world.**
* **Play games with others around the world.**

**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.