

Computers Throughout History

Teacher Materials

In this activity, students will learn about the innovation of computers from 2700 BC to the mid 1940s. This activity showcases how computers have evolved over time to become what they are today.

Acknowledgements and License

This activity was contributed for UNO's TED 8006 course.

Lesson Details

Grade Level: 6th-8th graders

Activity Length: 20-30 minutes

Format: Students working in pairs or groups, materials for 1 group

Connection to Standards

This activity contains content and practices addressing elements of the following CSTA K-12 Computer Science Standards (2017):

CSTA Std	Description
1B-IC-18	Discuss computing technologies that have changed the world, and express how those technologies influence, and are influenced by, cultural practices.

This activity contains content and practices addressing elements of the following Nebraska K-12 Technology Scope & Sequence Standards:

NE Tech Standard	Description
Hardware / Software 3	Identify major computer components.
Hardware / Software 4	Describe the components and functions of computers and networks.

Bin Materials Checklist

#	Description
9	Device Cards
9	Definition Cards

Lesson Setup / Introduction

The word **computer** has existed in our vocabulary for hundreds of years. The historical definition of a computer is “one who calculates”. The term was first used for people but it began to be used to refer to machines that performed calculations as time progressed. In this activity, students will learn about the history of computers and their innovation.

Connection to Computing

This activity relates to computing by reinforcing the understanding of the history of computers. It allows the student to see how computing devices have changed through the years and their original purposes.

Further Related Resources

- Watch videos of how each of the devices worked.
- Research additional examples of early computers.
- Create your own timeline for “modern” computers.
- Research other inventions that each inventor is known for.
- Watch “The Imitation Game” about Alan Turing and WWII.

Task 1 Answer Key

1	Abacus	May have been used as early as 2700 BC	
2	Napier's Bones	1617	
3	Schickard's Calculating Machine	1623	
4	Pascal's Calculator / Pascaline	1642-1645	
5	Jacquard's Loom	1801	
6	Babbage - Analytical Engine	1837ish... a range of dates exist for when this project was started	
7	Hollerith Machine	1888	
8	Vannevar Bush - Differential Analyser	Built from 1928-1931	
9	Turing Machine / Bombe	Various designs from 1939 to 1945	

Task 2 Answer Key

Abacus (2700 BC)	This device was first used in the Middle East, possibly as early as 2700 BC. There is also evidence that it was used in ancient Egypt, Rome, and Greece. This computer can be used for both addition and subtraction. Various forms of this device are still used today in some parts of Asia.
Napier's Bones (1617)	A Scottish mathematician invented this device. This computer can be used to multiply or divide by selecting a set of rods. It can also be used to calculate square roots. This device works best for single digit multiplication (i.e. 517×8) but can be used for longer numbers also.
Schickard's Calculating Machine (1623)	This computer is also known as a "calculating clock". We only know about it because the inventor described this device to his friend Johannes Kepler in a series of letters. This device was designed to perform addition, subtraction, multiplication, and division. This computer was mostly forgotten until the 20th century because the inventor died of the bubonic plague and his prototypes were lost in a fire.
Pascal's Calculator / Pascaline (1642/45)	This inventor developed this computer to help his father with calculations for his job. The device is designed primarily for addition but subtraction can be done with some additional work. The limitation of this machine is that the largest sum it can work with is 6 digits. Multiple models were created of this device and its limitations helped inspire future mathematicians.
Jacquard's Loom (1801)	The process of textile production was completely changed with the invention of this machine. The machine used punched cards to be able to program the loom in order to create a design. This reduced the number of people needed for textile production and allowed for more complex patterns to be produced. The punch card system greatly influenced all programmable devices that came after it.
Babbage - Analytical Engine (1837-)	The idea behind this computer was that it would perform a calculation, store that number and print it out on a special printer. The machine was designed to read information from punched cards instead of the operator just inputting the numbers manually. The computer was unique for its time because it combined many functions and it could be used with numbers up to 50 digits. The inventor was not able to build a working model during his life but one does exist today in a museum.
Hollerith Machine (1888)	This machine was invented as part of a competition to help speed up the US Census. This device could perform the work significantly faster than the ones created by the other two contestants. The computer used electricity to read punched cards to input data and then the results were added up. The inventor later went on to develop other applications for his machine and he founded the company that became International Business Machines (IBM).
Vannevar Bush - Differential Analyser (1928-1931)	This computer was used to solve complex differential equations. It was located at MIT and it took up an entire room. Additional machines were built in the United States, the United Kingdom, Norway, Japan, and Canada. The machine allowed for advances in the military, meteorology, electrical networks, and more fields.
Turing Machine / Bombe (1939+)	This machine was designed to help break codes developed by Germany. The model in the picture replaced and improved on an original model that was developed in Poland. The machine proved invaluable to both the UK and the US who developed their own similar machine. The inventor behind the machine also went on to develop one of the first electronic computers.

Sources:

<https://en.wikipedia.org/wiki/Abacus>

<http://www.encyclopedia.com/science-and-technology/mathematics/mathematics/abacus>

<http://www.encyclopedia.com/computing/news-wires-white-papers-and-books/napiers-bones>

https://en.wikipedia.org/wiki/Napier%27s_bones

<http://history-computer.com/CalculatingTools/NapiersBones.html>

<http://www.britannica.com/technology/Calculating-Clock>

https://en.wikipedia.org/wiki/Wilhelm_Schickard

https://en.wikipedia.org/wiki/Pascal%27s_calculator

<https://www.britannica.com/technology/Pascaline>

<https://www.youtube.com/watch?v=3h71HAJWnVU>

https://en.wikipedia.org/wiki/Jacquard_loom

<http://theinstitute.ieee.org/tech-history/technology-history/the-jacquard-loom-a-driver-of-the-industrial-revolution>

https://en.wikipedia.org/wiki/Analytical_Engine

<https://www.britannica.com/technology/Analytical-Engine>

<https://www.britannica.com/technology/Difference-Equation>

https://www.census.gov/history/www/innovations/technology/the_hollerith_tabulator.html

https://en.wikipedia.org/wiki/Tabulating_machine

https://en.wikipedia.org/wiki/Vannevar_Bush

https://en.wikipedia.org/wiki/Differential_analyser

<http://museum.mit.edu/150/22>

http://ethw.org/Differential_Analyzers

<https://www.britannica.com/biography/Alan-Turing>

<https://en.wikipedia.org/wiki/Bombe>



Computers Throughout History

Student Instructions

Introduction:

The word **computer** has existed in our vocabulary for hundreds of years. The historical definition of a computer is “one who calculates”. The term was first used for people but it began to be used to refer to machines that preformed calculations as time progressed.

Task 1:

Materials: Colored cards with pictures

Your first mission is to try and place the pictures in chronological order. (Hint: The dates range from 2700 BC to the 1940s.)

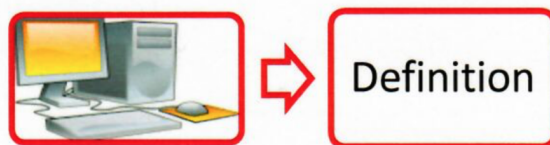


When you finish, check your answers.

Task 2:

Materials: Colored cards (in chronological order), white cards with definitions.

Now that you have the pictures in chronological order, try to match the definitions (on the white cards) with the pictures. (Hint: Electricity was not readily available until the later 1800s.)



When you finish, check your answers using page 2 of the answer key in the folder.

Extension Activities:

- Watch videos of how each of the devices worked.
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Hand-Outs

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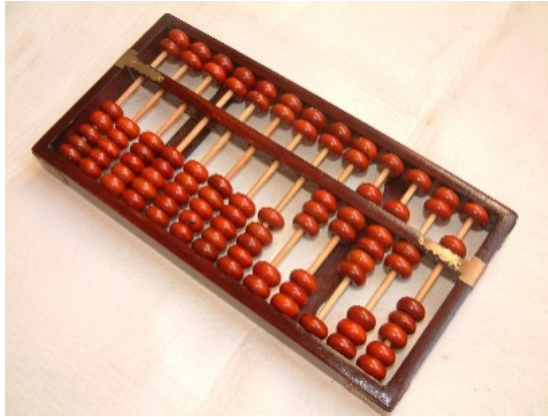
The process of textile production was completely changed with the invention of this machine. The machine used punched cards to be able to program the loom in order to create a design. This reduced the number of people needed for textile production and allowed for more complex patterns to be produced. The punch card system greatly influenced all programmable devices that came after it.

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Abacus

<https://en.wikipedia.org/wiki/Abacus#/media/File:Boulier1.JPG>



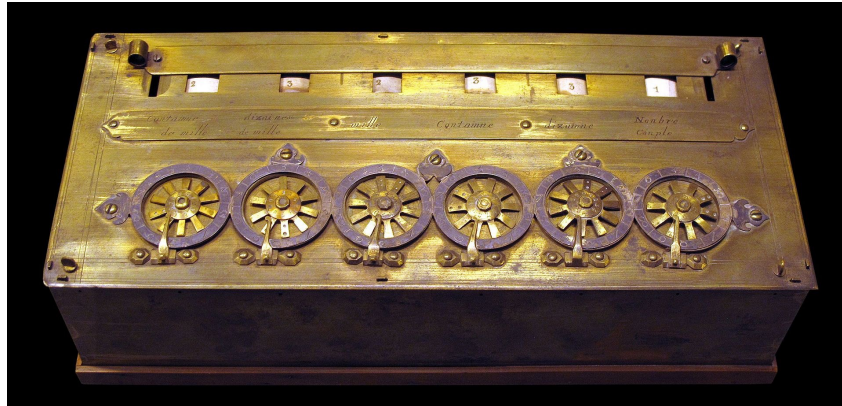
Napier's Bones

https://en.wikipedia.org/wiki/Napier%27s_bones#/media/File:An_18th_century_set_of_Napier%27s_Bones.JPG



Schickard's Calculating Machine

<https://upload.wikimedia.org/wikipedia/commons/5/5a/Schickardmaschine.jpg>



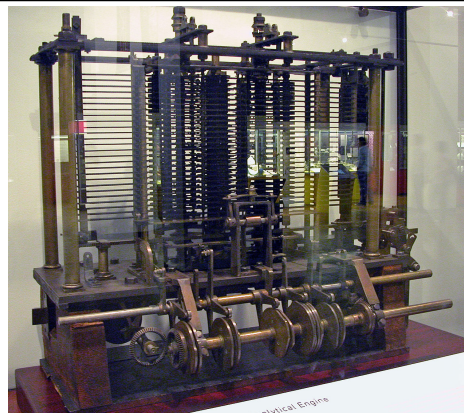
Pascal's Calculator / Pascaline

https://en.wikipedia.org/wiki/Pascal%27s_calculator#/media/File:Pascaline-CnAM_823-1-IMG_1506-black.jpg



Jacquard's Loom

https://en.wikipedia.org/wiki/File:Jacquard_loom_p1040320.jpg



Babbage - Analytical Engine

https://en.wikipedia.org/wiki/Analytical_Engine#/media/File:AnalyticalMachine_Babbage_London.jpg



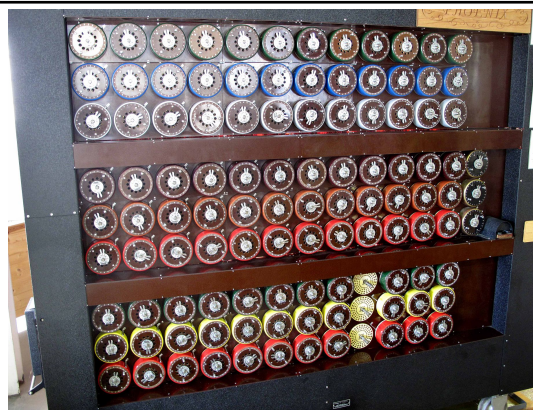
Hollerith Tabulating Machine

https://en.wikipedia.org/wiki/Herman_Hollerith#/media/File:HollerithMachine.CHM.jpg



Vannevar Bush - Differential Analyser

https://en.wikipedia.org/wiki/Vannevar_Bush#/media/File:Cambridge_differential_analyser.jpg



Bombe

https://en.wikipedia.org/wiki/Cryptanalysis_of_the_Enigma#/media/File:RebuiltBombeFrontView.jpg



Resupply

- None