LESSON 1 : SCIENCE AND TECHNOLOGY IN THE WORLD

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ANCIENT AGE: THREE-AGE SYSTEM

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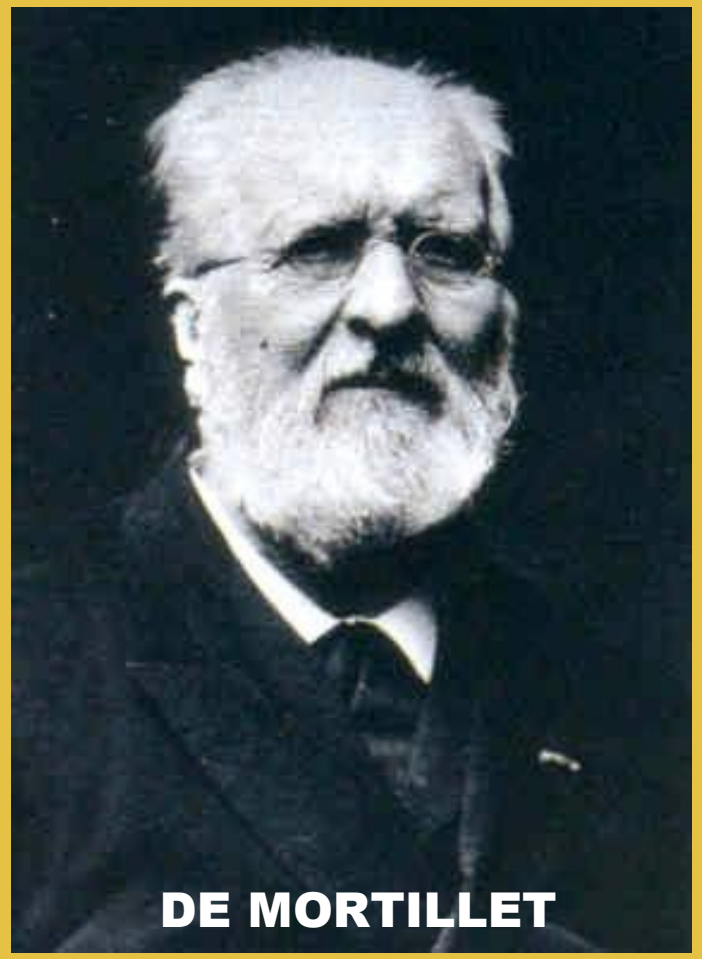
ANCIENT AGE: THREE-AGE SYSTEM

- The three-age system was introduced in the early 19th century by Christian Jurgensen Thomsen.
- It was originally formulated to classify artifacts in the possession of the museum based on the materials from which they were made.
- This gave birth to three chronologically successive prehistoric periods, namely the Stone Age, Bronze Age, and Iron Age.

STONE AGE (2.5 MYA–3000 BC)

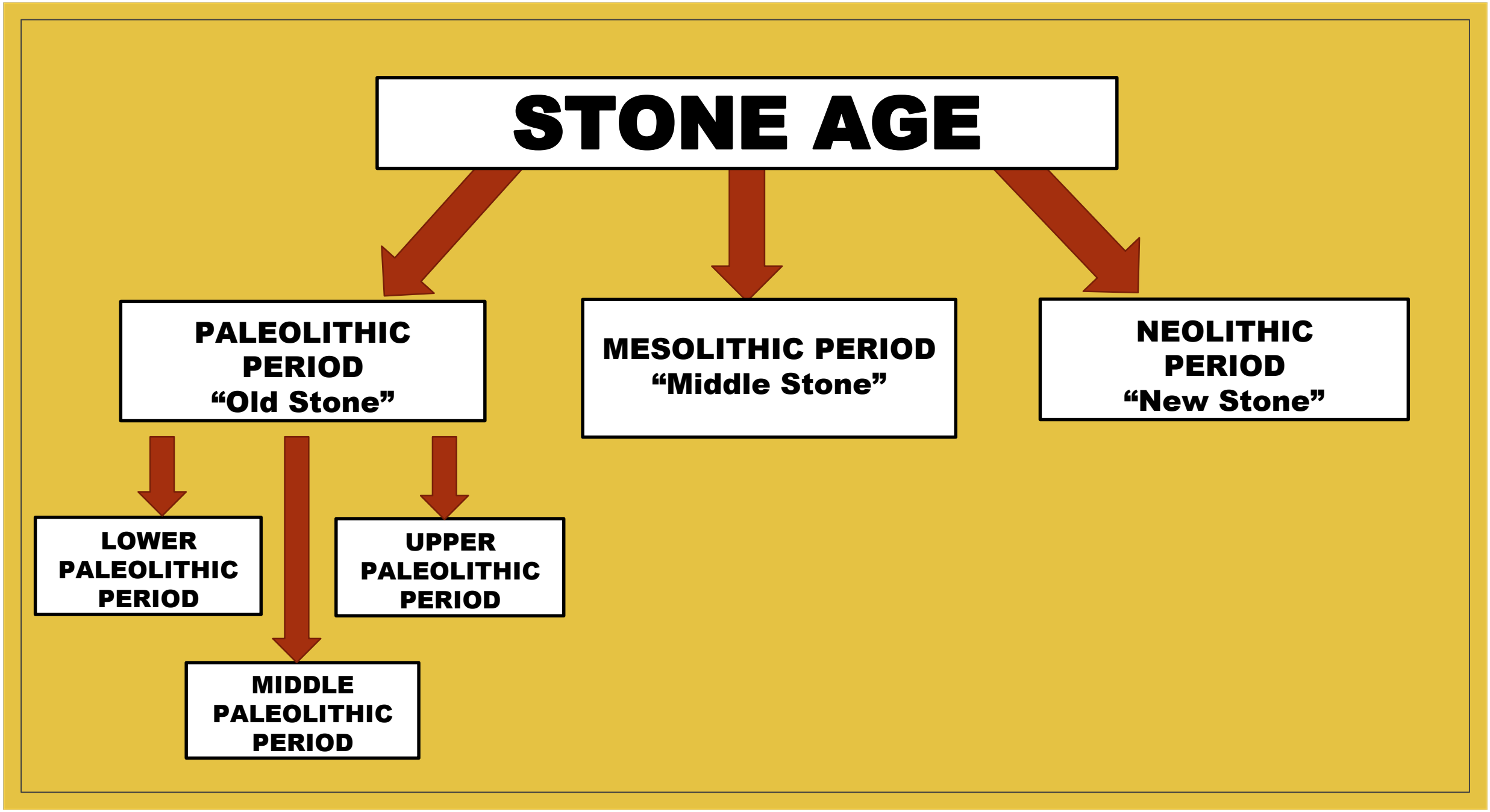
- The Stone Age is the period of weapons made of stone, wood, bone, or some other material aside from metal.
- John Lubbock subdivided the Stone Age into the Paleolithic and Neolithic periods, representing the cultural evolution of tools from chipped to polished stones.
- In 1883, De Mortillet suggested a transitional period between these two after the discovery of many stone tool deposits overlying those from the Paleolithic Period.
- This late Paleolithic to early Neolithic period was later termed Mesolithic by John Allen Brown in 1892.

JOHN LUBBOCK



DE MORTILLET

JOHN ALLEN BROWN

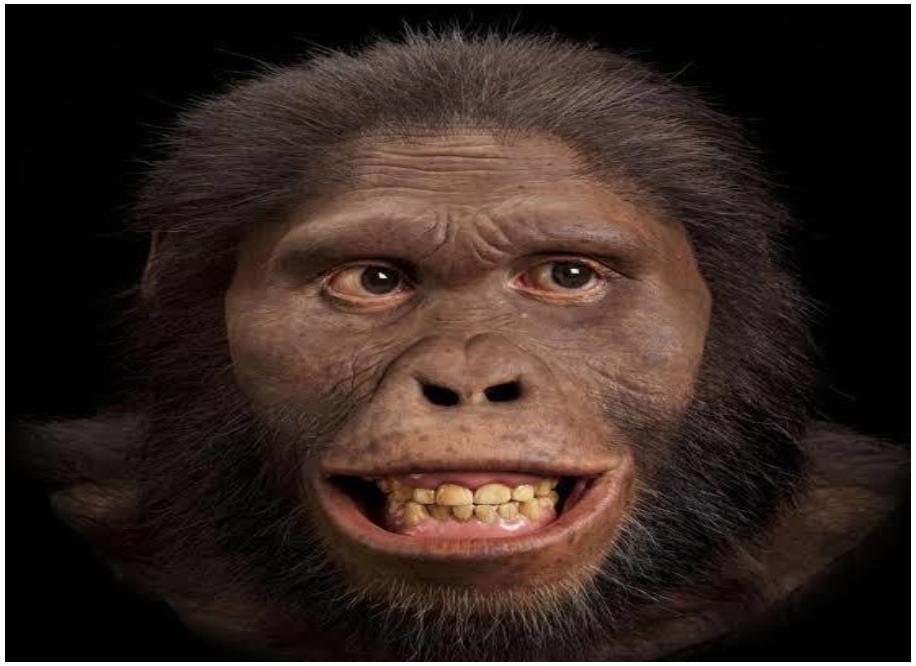

STONE AGE
PALEOLITHIC PERIOD "Old Stone"
MESOLITHIC PERIOD "Middle Stone"
NEOLITHIC PERIOD "New Stone"
LOWER PALEOLITHIC PERIOD
MIDDLE PALEOLITHIC PERIOD
UPPER PALEOLITHIC PERIOD

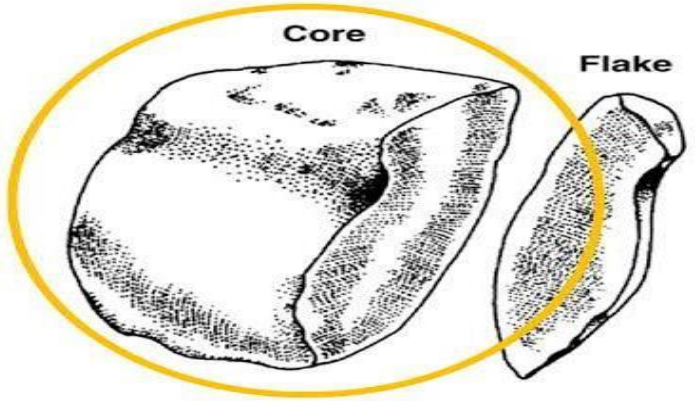
PALEOLITHIC PERIOD (OLD STONE)

- Known to be the longest phase of human history (2.5 mya-10,000 BC)
- Humans were suggested to evolve from an ape-like creature to a true Homo sapiens.
- They were hunter-gatherers.
- They used tools made of stones, flints, bones, and even antlers.
- They used to live in small bands and were either nomadic or semi nomadic, depending on food availability.

LOWER PALEOLITHIC PERIOD

- It is the earliest Paleolithic period, which was characterized by the development of simple tools, including stone choppers, believed to have been made more than a million years ago by one of our earliest ancestors, Australopithecus.
- The tools used in hunting and food gathering were either of the core (achieved by chipping stones to form a cutting edge) or flake (struck off stone fragments) types.





Core and flake.

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Understanding Physical Anthropology and Archaeology (8th ed), p. 351.

MIDDLE PALEOLITHIC PERIOD

- This period involved the early human ancestor, the Neanderthal man.
- Neanderthals were cavemen known to use fire, stone tools of flake types for hunting, and bone implements such as needles for sewing body coverings made of fur and skin.
- Evidence of painting of the dead before burial also suggests religious practice during this period.

UPPER PALEOLITHIC PERIOD

- Various Homo sapiens cultures dominated during this time period.
- This period was known for communal hunting, extensive fishing, supernatural beliefs, cloth sewing, sculpture, painting, and making personal ornaments out of bones, horns, and ivory.
- Pit houses, known as the first man-made dwellings, were built during this time.
- During this period, Paleolithic art arose after cave walls were decorated with carvings and paintings.

MESOLITHIC PERIOD (MIDDLE STONE)

- Occurring between the end of the Paleolithic Period and the beginning of the Neolithic Period, the Mesolithic period involved a gradual change in the way humans lived that could be attributed to the retreat of glaciers and the growth of forests and deserts in different parts of the world.
- People began to make pottery and use bows.
- There was also a gradual transition from food gathering to food production.
- They made use of stone tools known as microliths, which were smaller and more delicate than the Paleoliths.

NEOLITHIC PERIOD (NEW STONE)

- This stage was based primarily on agriculture. It is characterized by wide domestication of plants and animals, use of stone tools, and pottery and weaving in numerous settled villages. Agriculture continued to expand across inhabited regions of the world giving rise to a variety of urban civilizations.
- The end of this period is marked by the introduction of metal tools in these cultures.

BRONZE AGE (3000 BC -1200 BC)

- Bronze age started when tools were widely made with copper or bronze.
- This was achieved through metal extraction from ore (a process known as smelting) and melting and pouring it into a mold for shaping.
- Smelting was originally done with copper, a soft metal. However, it was discovered by Sumerians that a harder and stronger one could be made by blending copper and tin. This knowledge began in Southwest Asia and slowly radiated in different parts of the world.

IRON AGE (1500 BC – 450 AD)

- Iron age included those materials made of iron. This began when smelting pits made of sufficient advancement to produce higher temperatures that could smelt iron ore.

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MIDDLE AGE

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MIDDLE AGES (450-1450 AD)

◦ Middle age was subdivided into two smaller ages, Dark and high middle .

◦ Major developments in Science and Technology were done during this period. These are the following:

SCIENCE

- Motion is caused by force and stops by obstruction.
- Calendars with 365 ¼ days were developed.
- Numbers were expressed in decimals.
- Acupuncture began to effectively cure body illnesses.

TECHNOLOGY

- Paper – for writing and wall decor
- Seismograph – vibration sensitive device for earthquake detection.
- Mechanical clock
- Wheel barrow
- Gun powder
- Magnetic compass
- Horse collar

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SCIENTIFIC REVOLUTION

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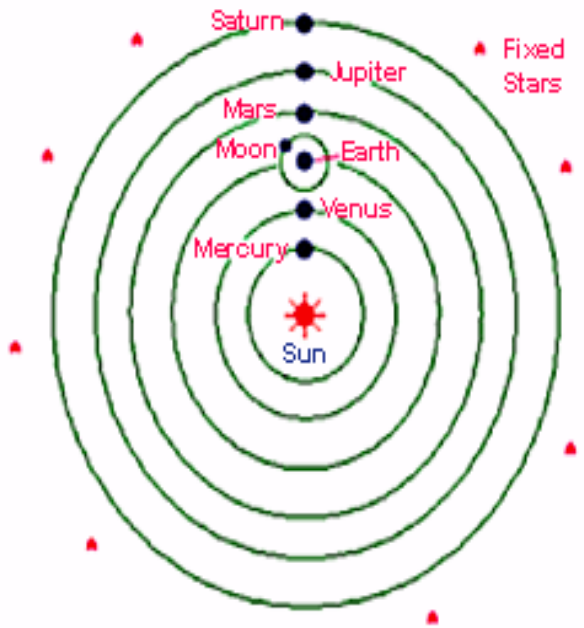
SCIENTIFIC REVOLUTION

This period refers to the great scientific and intellectual achievements that led to radical changes in scientific inquiry. Some of the important contributions to this scientific revolution are the following:

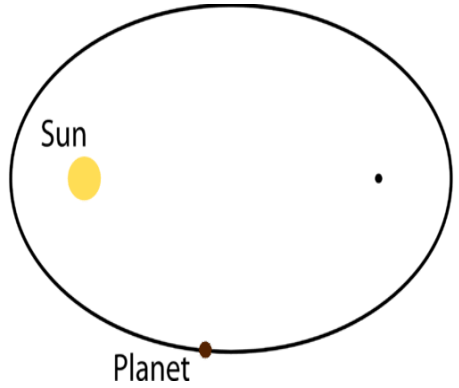
1. HELIOCENTRIC MODEL by Nicholas Copernicus

- This model describes the sun as the center of the universe and says that all the planets revolve around it in circles. This also suggests that the distance from the Sun determines the arrangement of planets.
- Before the idea of Copernicus, people believed in geocentrism, an earth-centered belief, which was supported by Ptolemy. Ptolemy had this idea because of Aristotle's four-element theory.



Copernicus' Universe

2. LAW OF PLANETARY MOTION by Johannes Kepler

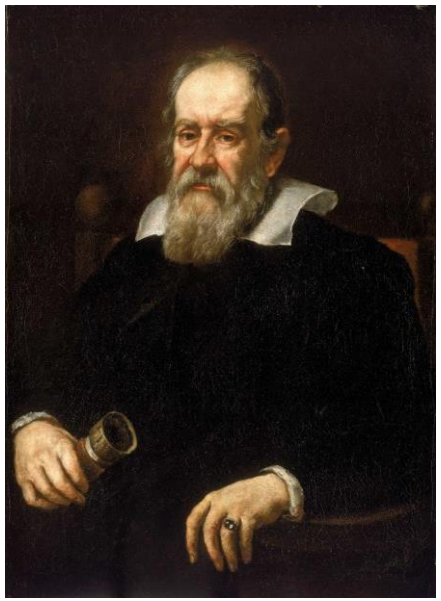


- This states that all planets revolve around the sun in an elliptical,not a circular orbit, and that closer planets to the sun move faster than the others.

3. WORK OF MOTION by Galileo Galilei

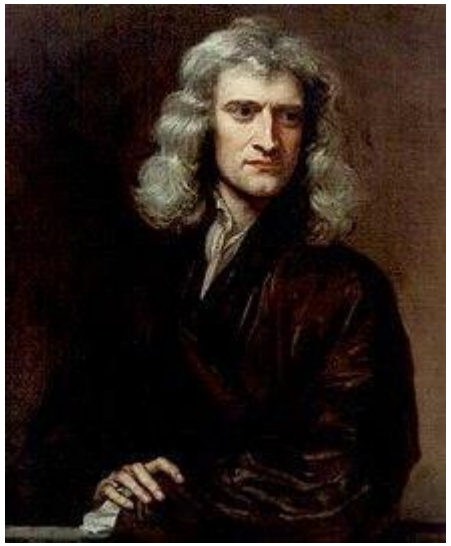
- This involves the discovery of the relations among distance, velocity, and acceleration using a new scientific approach.

A. Definition of concepts
B. Expression of the relationship of concepts
C. Giving a precise hypothesis
D. Deduction of consequences from a hypothesis
E. Experimentation to test the consequences
F. Analysis in terms of an abstract and ideal situation



- LAW OF MOTION by Isaac Newton
  - Law of Inertia (1st law of motion) - It states that an object at rest stays at rest and an object in motion stays in motion with the same speed and in the same direction unless acted upon by an unbalanced force.
  - Law of Acceleration (2nd law of motion) - It states that acceleration is produced when a force acts on a mass.
  - Law of Interaction (3rd law of motion) - This states that for every action, there is an equal and an opposite reaction.
- LAW OF UNIVERSAL GRAVITATION by Isaac Newton

  This law states that a particle in the universe attracts every other universal particle using a force that is directly proportional to the product of their masses and inversely to the square of the distance between their centers.



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INDUSTRIAL REVOLUTION

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INDUSTRIAL REVOLUTION

- Industrial revolution is the period that covers the complex technological innovation that led to the substitution of machines and inanimate power for human skill and human and animal forces.
- Some of these technological advancements are steamships, bunsen burners, telephones, radios, cotton gin, and fly-shuttle.

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18TH-19TH CENTURY

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18TH-19TH CENTURY

- During this era, the connection between science and technology was very minimal. This gradually shifted to the developmental stage during the 19th century, when science, technology, and industry united under a common ground and cause.
- Significant scientific advances are as follows:

DISCOVERER	CONTRIBUTION
Alessandro Volta	Cell or Battery
Wilhelm Roentgen	Discovery of X-rays
John Dalton	Atomic Theory
Robert Hooke	Discovery of Cell
Anton Van Leeuwenhoek	Observation and Discovery of Microorganism.
Robert Brown	Discovered cell nucleus

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20TH CENTURY TO DATE

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20TH CENTURY TO DATE

- During the 20th century, science and technology had structurally and methodologically changed. A number of scientific theories were introduced and influenced technological works in this century.
- Some of the important inventions that were based highly on various scientific theories are the following: biogas, cellular phones, atomic bombs, calculators, test tubes, babies, airplanes, etc.
- Significant advances in scientific knowledge during the 20th century include the following:

DISCOVERER	CONTRIBUTION
Ernest Rutherford	Discovery of Proton
James Chadwick	Discovery of Neutron
Neil Armstrong and Buzz Aldrin	First walk on the moon
Alfred Wegener	Continental Drift Theory

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INFORMATION AGE

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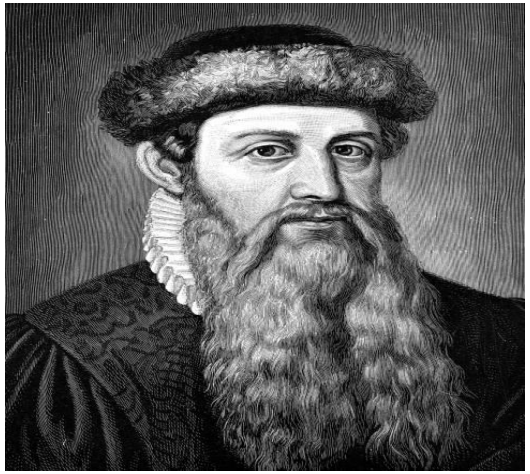
INFORMATION AGE

- Information age is the period that described the change from traditional industry to an economy based on information computerization.
- It is also known as the “digital age” and the “new media age.”
- It is coupled with the birth of personal computers and considered the era of easy access to information.

Pre-Gutenberg World

- During this time, books were written and produced by hand.
- Hand-produced books and other reading materials were restricted only to those elite groups of people.
- Some information was only relayed to others through word-of-mouth channels.

Gutenberg Revolution



Movable type printing was created by Johannes Gutenberg, a German publisher.
◦During this period, information could be passed on to every individual, but access was expensive.

- Books printed using presses were called "incunabula," which means “cradle or birthplace.”
- Most of the books that were printed first were religious texts and medical books.
- The books were initially written in Latin, but as time passed, other materials were written in the local language.

Post-Gutenberg World

- This era can be described as the emergence of the internet and the world wide web.
- This paved the way for the possible uploading and downloading of all forms of media instruments, such as video, audio, and images.
- During this era, passing and publishing information were faster and easier.

TECHNOLOGY IN DIGITAL AGE

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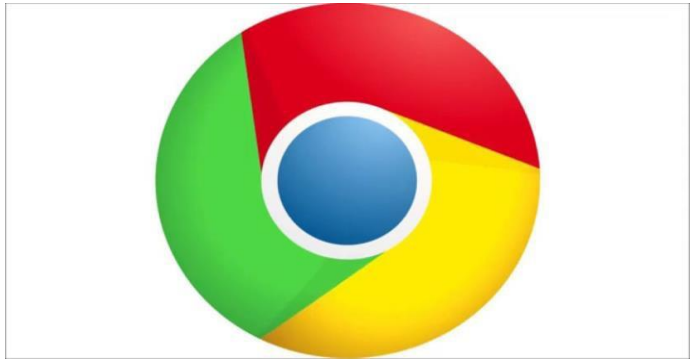
COMPUTERS

- Discovered by Charles Babbage, known as the “Father of Computers.”.
- Designed for computation and calculation and simple decision-making capabilities.

INTERNET

- Created in California, United States, in the late 1960s by Vinton Cerf and Robert Kahn
- It was a government-controlled project until 1984.



WORLD WIDE WEB

- Created by Tim Berners-Lee.
- It is basically for commercial purposes. Home pages were made by companies in order to promote and sell their products.

ELECTRONIC MAIL OR E-MAIL

- Created by V.A. Shiva Ayyadurai
- E-mail is an avenue by which messages are exchanged between people from different locations at a faster rate.

GOOGLE

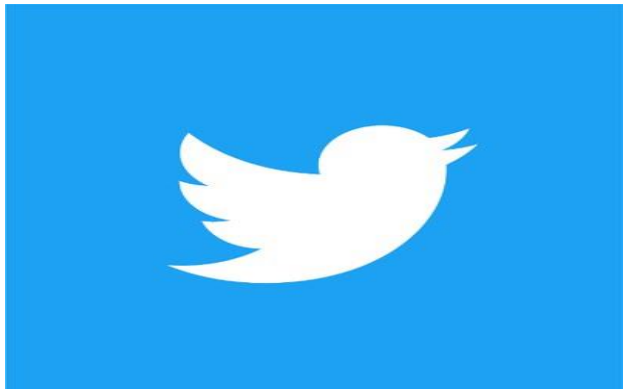
- A research project created by Larry Page and Sergey Brin in 1996.
- It is known as the most used search engine on the world wide web.

FACEBOOK

- A social networking website where people could contact one another and share each other's thoughts, photos, and experiences, created by Mark Zuckerberg.
- The membership was first limited to Harvard students, but later, students in Boston Area, Ivy League College, and Stanford University were allowed to get access to the website.

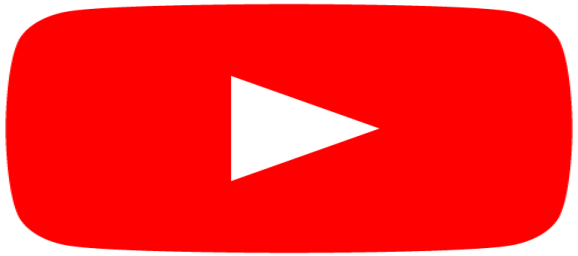
MESSENGER

- It was originally developed as Facebook Chat in 2008 but changed its messaging service in 2010. This can be used to send messages to other people through written messages, voice calls, or video calls.



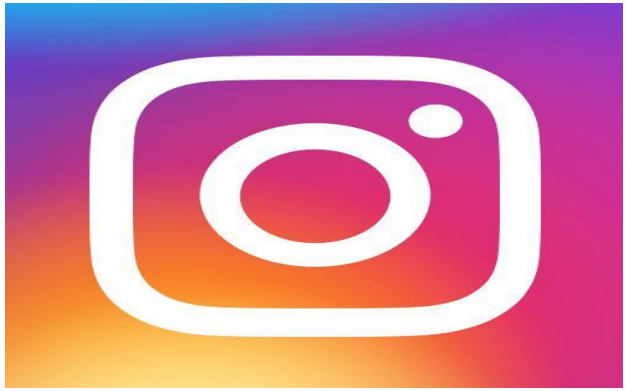
TWITTER

- One of the most visited websites and created by Jack Dorsey, Noah Glass, Biz Stone, and Evan Williams.
- SMS of the internet“
- Messages on Twitter are called "tweets.”



YOUTUBE

- The largest online destination was created by Chad Hurley and Steve Chen.
- Third most visited website where videos can be shared.



INSTAGRAM

- A fun photography application that was created by Kevin Systrom and Mike Krieger in 2010.

REFERENCE:

Ilagan Y, Balinado L, Digma J. et’al. Science, Technology and Society, Panday-Lahi Publishing Inc.

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GENERAL EDUCATION – Natural Science