



JUNIOR SCIENCE BOWL 2019

GENERAL SCIENCE **GUIDE**

A world of wonder awaits

Preface

Understanding the world around us has always been a pursuit of humans, even to this day. In the General Knowledge section of our competition, **students are expected to conduct additional research into the topic** given in order to broaden their understanding of science as a whole, and promote interest and personal engagement in science.

That being said, please make sure to research on the topic of:

Significant Scientific Events Throughout History

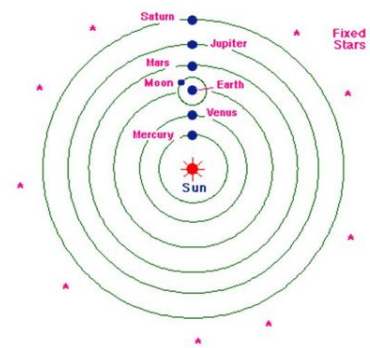
We have attached the important events which you will conduct research on (outside of the guide). The topics outlined will be crucial to your team's ability to succeed in the general knowledge section.



Significant Scientific Events of the 1500-1600s

- In 1543, while on his deathbed, Polish Astronomer **Nicholas Copernicus** published his theory that the **Sun is a motionless star in the center of our solar system**.
 - What was groundbreaking about Copernicus' findings was that the 1500s was a period when the entire globe believed the universe to be **geocentric** (or in other words, earth-revolving).

Copernican Model

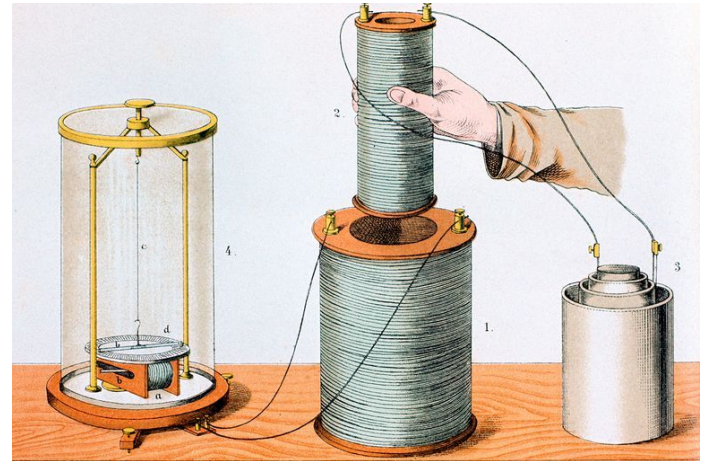


- An English mathematician and scientist by the name of **Isaac Newton**, considered by many to be the greatest scientist to ever live, discovered the **law of universal gravitation** in **1664**.
 - Newton figured out there is a fundamental force that pulls all objects with mass towards each other, consequently also explaining why planets orbit around the sun.

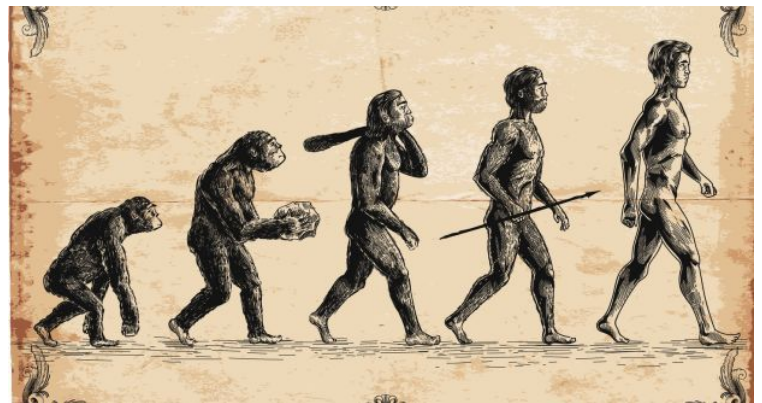


Significant Scientific Events of the 1700-1800s

- **Michael Faraday** is often credited with the discovery of **electricity**. In **1821**, he noticed that when a **wire** carrying an **electric current** was placed next to a **single magnetic pole**, the wire would start to **rotate**.
 - This discovery ultimately led to the development of the electric motor, which Faraday used to become the first person to produce an **electric current** by running a **wire** through a **magnetic field**.

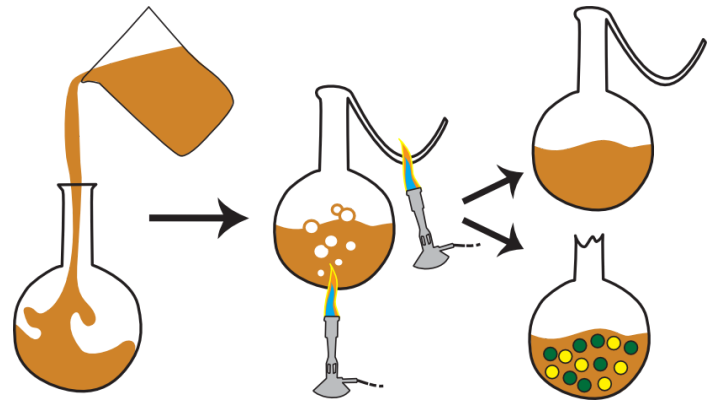


- **Charles Darwin**, a British scientist, came up with the **theory of evolution** in **1859** and changed the world's perception of how life on earth originally developed.
 - He argued that all organisms/species must evolve over time in order for their continued survival in the environment. Adaptations happen by chance and if a species doesn't adapt, it may become extinct.
 - Darwin went on to call this process **natural selection**, also known as the survival of the fittest.



- A French chemist by the name of **Louis Pasteur** informed the public about the **causes of disease** in the **1860s**.

- Not only did he discover that disease originated from **microorganisms** such as bacteria, but he also realized these organisms could be killed by heat and/or disinfectants.
- Pasteur's ideas caused doctors to begin washing their hands and sterilizing their instruments with heat, leading to the saving of millions of lives.



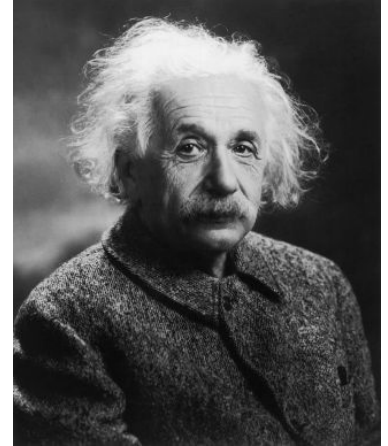
- Russian chemist **Dmitry Mendeleev** proposed the **Periodic Law** in **1869** that eventually went on to form the foundation of our modern-day periodic table.

- Mendeleev noticed that when arranging elements by atomic weight, he was able to predict the existence and properties of undiscovered elements.

A standard periodic table of elements, color-coded by groups. It includes element symbols, atomic numbers, and names. The title "Periodic Table of Elements" is at the top. The table is organized into rows and columns, with elements grouped by their chemical properties.

Significant Scientific Events of the 1900-2000s

- **Albert Einstein's** theory of **special relativity**, which he published in **1905**, explains the relationships between **time, speed and distance**.
 - The complicated equation states that the speed of light remains the same (300000 km/s) regardless of how fast someone or something is moving away/towards it.
 - This theory has become the foundation for **modern-day science**.



- Have you ever wondered about the origins of the universe? Nobody knows for sure how the universe came into existence, but in **1927**, **Georges Lemaître** proposed the **Big Bang theory of the universe**.
 - Lemaître's theory states that all the matter in the universe was originally compressed into a tiny **singularity** and in the fraction of a second, the singularity expanded and matter instantly filled what is now our universe.



- In **1953**, **James Watson** of the United States and **Francis Crick** of England discovered the **double-helix structure of DNA**.
 - They realized that DNA is made up of **two strands** that twist around each other and have an almost endless variety of chemical patterns.
 - Our genes are made up of this DNA and they determine our physical characteristics, such as our height, eye color, and hair color, etc.



- In **1983** and **1984**, **Luc Montagnier** of France and **Robert Gallo** of the United States discovered the HIV virus and determined that it was the cause of AIDS.
 - Scientists have since developed tests to determine if a person has HIV, and people who are HIV-positive are urged to take precautions to prevent further spread of the disease.

