Toward the Modern Age

(1776-1917)
II. **Scientific** & Cultural Advances in the Industrial Age

A. Biology & Medicine- scientists use the **microscope** to study cells and identify microorganisms (**germ** theory of disease)
1. Louis Pasteur- developed pasteurization, process kills bacteria (1860s), led to new antiseptics and vaccines to fight disease
Edward Jenner, a British biologist, was the developer of the smallpox vaccine.
Discovery of the Antibiotic Penicillin (1928)

Alexander Fleming
Scottish Biologist
(1881-1955)
B. Charles Darwin wrote *The Origin of Species* (1859), developed the theory of evolution - idea that life evolved based on natural selection (survival of the fittest) and mutations.
The Theory of Evolution by Natural Selection

1. **Overproduction**
   Every species tends to produce more individuals than can survive to maturity.

2. **Variation**
   The individuals of a population have many characteristics that differ.

3. **Selection**
   Some individuals survive longer and reproduce more than others do.

4. **Adaptation**
   The traits of those individuals that survive and reproduce will become more common in a population.

One general law, leading to the advancement of all organic beings, namely, multiply, vary, let the strongest live and the weakest die.

--Charles Darwin
Gregor Mendel
(1822-1884)
C. Chemistry and Physics- scientists discovered all matter made of **atoms**, developed the **periodic table** of elements.
COOL STUFF!
Albert Einstein
(1879-1955)
1. Albert Einstein wrote that time/space are related & energy/matter are interchangeable—theory of relativity (1905)
"Science without religion is lame. Religion without science is blind."

“If you can’t explain it simply, you don’t know it well enough.”

“Try not to become a man of success; rather become a man of value.”

"I know not with what weapons World War III will be fought, but World War IV will be fought with sticks and stones."
Nothing in life is to be feared, it is only to be understood
-Marie Curie
D. Art & Literature- early 1800s influenced by **Romanticism** which emphasized emotion/imagination, later influenced by **Realism** which focused on everyday life.
1. People were inspired by the poetry and literature of Lord Byron, Mary Shelley, Johann Wolfgang von Goethe and Charles Dickens, the art of Pierre-Auguste Renior and Vincent Van Gogh,

Outbreak of Vesuvius by Johan Christian Dahl (1826)
“...I began the creation of a human being. As the minuteness of the parts formed a great hindrance, I resolved, to make the being of a gigantic stature; about eight feet in height......No one can conceive the variety of feelings which bore me onwards, like a hurricane, in the first enthusiasm of success. Life and death appeared to me ideal bounds, which I should first break through, and pour a torrent of light into our dark world. A new species would bless me as its creator and source. No father could claim the gratitude of his child so completely as I should deserve theirs.”

--Mary Shelley, Frankenstein (1818)
“All the knowledge I possess everyone else can acquire, but my heart is all my own.”

“You can easily judge the character of a man by how he treats those who can do nothing for him.”

“If we treat people as they are, we make them worse. If we treat people as they ought to be, we help them become what they are capable of becoming.”

“We are our own devils; we drive ourselves out of our Edens.”

“Nothing shows a man’s character more than what he laughs at.”

“There is nothing more dreadful than imagination without taste.”

“Choose well. Your choice is brief, and yet endless.”

“What is not started today is never finished tomorrow.”

“A rainbow which lasts for a quarter of an hour is looked at no longer.”

“Too many parents make life hard for their children by trying, too zealously, to make it
Romanticism in Art

Caspar David Friedrich
(1774-1840)

The Wanderer Above the Sea of Fog
(1818)
Romanticism in Art

Charles Gustave Wappers (1803-1874)

The Belgian Revolution (1835)
Romanticism in Art

The Lady of Shalott (1888)

John William Waterhouse (1849-1917)
Realism in Art

Jean-Francois Millet (1814-1875)

The Gleaners (1857)
Post-Impressionism

Vincent van Gogh (1853-1890)

The Starry Night (1889)
Romanticism in Music

and the music of Ludwig van _Beethoven_ and Richard Wagner

Ludwig van Beethoven
German composer (1770-1827)

No. 5

Fur Elise

No. 9
Romanticism in Music

Richard Wagner
German writer, composer
(1813-1888)

Ride of the Valkyries

Ride of the Valkyries
*What is an example of a movie, book, TV show, or song that could be an example of modern day Romanticism or Realism?