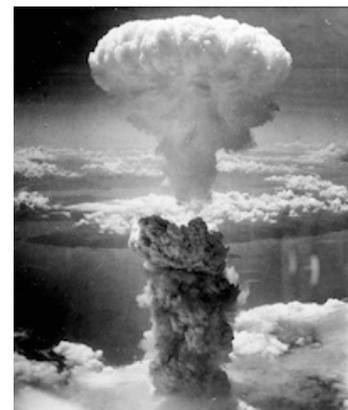


I. A Very Brief History of Medicine

1. For thousands of years, people treated diseases by giving those who suffered roots, herbs, mushrooms, and every other kind of natural cure imaginable. Sometimes it worked, but nobody knew why.
2. Scientific knowledge of health and disease only became possible when the microscope was invented by the Dutch scientist Antonie Van Leewenhoek **c.1668**. Leewenhoek was the first to see minuscule organism which he called “microbes,” and which we today know as “bacteria” (and “viruses”).
3. Microscopy led to the first scientific theory of medicine, called “germ theory.”
 - a) **c.1798**, a British scientist named Edward Jenner and others began to experiment with fighting microbes. Jenner used a weak version of smallpox to treat humans who were infected with that disease. It turned out that the body’s immune system learned from being in contact with the weaker disease, and became strong enough to fight the worst form of it. This was the first successful vaccine in history.
 - b) Soon other scientists were gaining new insight into how to fight germs. Louis Pasteur of France became the most famous.
 - i. “Pasteurization” is a process now widely used to remove germs from certain kinds of food.
 - ii. Pasteur also developed a vaccine for rabies (transmitted by rabid animals) according to the Germ Theory **c.1857**.
 - iii. Also relying on Germ Theory, the Scottish scientist Alexander Fleming developed the first *antibiotic*, known as penicillin, **c.1928**.
 - iv. Each time an advance of this kind was made, countless lives were saved.
5. In addition to the treatment of disease, modern scientific medicine helps us survive physical injuries.
 - a) **c.1846**, an American dentist named William Morton pioneered the use of nitrous oxide for anesthesia (making patients unconsciousness to save them from experiencing physical pain during surgery).
 - b) **c.1895**, a German scientist named William Rontgen developed the method of x-ray photography, allowing doctors to see inside the body and to better treat injuries like broken bones.
 - c) The most amazing example of fixing a broken part of the body is the method of transplants. In **1967** a South African doctor replaced the heart of a sick person with a healthy heart from a donor (a person who had died but agreed to give their organs to science). The recipient was able to continue living!

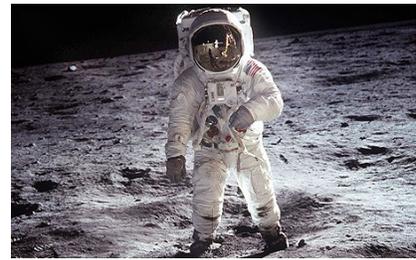


The use of the atomic bomb in **1945** signaled the beginning of a new era of technological development.

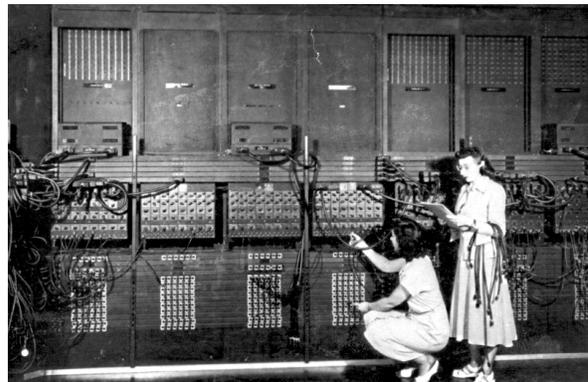
J. The *Advanced* Industrial Period of Technology

1. We now live in the "advanced industrial" period because of three inventions:
 - a) nuclear power
 - b) space exploration
 - c) computers
2. The first of the milestones of the period of advanced technology is the use of the atomic bomb in **1945** as part of World War II.
3. A single atomic bomb can destroy an entire city, it is true, but an atomic power plant can generate the electricity for many cities.

4. Human beings began to develop another technology during World War II: rockets. After the war, space exploration proceeded with remarkable progress until **1969**, when Neil Armstrong became the first man to walk on the moon.
5. Sadly, as with nuclear power, space exploration has not advanced very much. Modest efforts are underway to take the next step: manned space travel to Mars, but it has been nearly 50 years since the greatest accomplishment in the field of space exploration took place.
6. The one technology that truly distinguishes our advanced society from any previous time is *computers*. This technology does continue to advance.
7. In **1946** a government project to calculate how to position cannons in times of war led to the design of the most famous early computer called the “ENIAC” (Electronic Numerical Integrator and Computer). It was 130 feet long and weighed 30 metric tons. It was nicknamed a “Giant Brain”. It could perform mathematical calculations 2400 times faster than a person.
8. Since that time, computers have advanced with incredible speed. The most amazing modern computer, the *smartphone*, is 40,000,000 times smaller than the ENIAC, but 1700 times *more powerful*!
9. So how does it all add up? Thanks to all these advancements, we have the highest quality of life and the highest life expectancy ever!
 - a) During pre-industrial times, humans lived on average 25-35 years.
 - b) During the proto-industrial period that increased to 40.
 - c) During industrial times, it catapulted to previously unheard-of level of 70 years.
 - d) Now, with our latest advances, we are close to 80 as an average lifespan.



Space travel is not yet normal, but maybe you will be able to walk on the moon in your lifetime!



“Programmers” work to configure the ENIAC to perform a mathematical calculation. It was large and clunky by our standards, but once configured, it could perform a complex mathematical calculation 2400 times faster than a human being.