# In webster. william thomson, a scots and irish

In the nearly five hundred yearsbetween 1500 and 1980, there have been many technological innovations andadvancements in the world.

During the 19th century specifically, asignificant amount of the world's inventions and discoveries were developed in thesubject of physical sciences. Physical sciences are defined as the study ofinanimate and natural objects – this includes, but is not limited to physics, chemistry, and astronomy Webster. William Thomson, a Scots and Irishphysicist, is known for his large contribution to the innovation of physics andthermodynamics during this time. William Thomson influenced innovations in manydifferent areas of study including but not limited to engineering, mathematics, and physics.

He is credited for formulating the first and second laws ofthermodynamics, determining the value of absolute zero, and the dynamicaltheory of heat, among other important inventions and discoveries in a vastamount of subjects. WilliamThomson grew up in an environment that fostered his tremendous knowledge andcomprehension. Thomson's father, James Thomson, was a mathematics professor andtextbook writer at the University of Glasgow. His mother died when he was 6years old, so sitting in on his father's lectures was a common normalcy for himand his six other siblings. William actively participated in his father'slectures and sometimes would even know more than his fathers' studentsthemselves! Because of this, by the time he was 10 years old William was readyfor college.

He enrolled at the University of Glasgow where he was a topstudent in his classes, and received many awards and medals for his writing. Williamdid

not follow his father’s footsteps into mathematics; he actually found aninterest in Fourier’s theories of heat after being loaned a book written byJean Baptiste Joseph Fourier, The Analytical Theory of Heat, by one of hisprofessors. Receiving this book from his professor is what instigated William’sinterest in thermodynamics, which is what Fourier studied. Before even turning17 years old, William wrote two published articles in justification ofFourier’s writing, which was being refuted by other scientists at the time. At Glasgow, he received many awards and recognition for his writing and research.

Alongwith his interest in physical sciences, Thomson was also interested in thephysics of the earth – specifically, the shape of the earth – and some ofDarwin’s research about the age of the earth. He won an award for an essay hewrote about the figure of the earth, where he used tremendous mathematicalskill and finesse. He wrote a mathematical explanation on why the earth isround, because at the time, many people believed our planet to be flat. Thisessay, along with many others that he wrote in his youth, was a paper that hereferred to up until his last few months of life. These papers containedmathematical skill beyond anyone of his time and even 60 years after writingthem, were relevant and the most up to date research. This is an incrediblefeat for anyone who has lived, before and after Thomson. He went on to attend CambridgeUniversity and received a B. A.

degree. At the age of 18, he was the first topromote the idea that the Fourier’s mathematics could be related to other formsof energy, and not exclusively heat. By the time he was 22 years old, Williamwas asked to be the chair and professor of the natural philosophy department (alsoknown as

physics) at the University of Glasgow where he remained in thatposition for 53 years. Aside from studies, William had a notably outgoing, youthful personality. He was known to be very self-confident about hisexpertise. William was an avid rower, for which he won awards at Cambridge forracing. Predictably, he also enjoyed traveling and used every chance he got totravel to other places. He lived in many different cities throughout his life.

Thomsonstudied the writings of many scientists of his time and was able to usegeneralizations and experiments to formulate concepts of energy andthermodynamics. His avid interest in Fourier's writing along with his immense knowledgeabilityled to his idea expanding Fourier's mathematics from the flow of heat to anyother forms of energy. He proposed that Fourier's mathematics, which wasoriginally focused solely on the flow of heat, could be used to understandother forms of energy as well. After accomplishing this understanding, Thomsonproposed another idea, which is called the " heat death of the universe" theory. This theory states that heat from a high temperature energy source cannot beentirely converted to ' work' and that some of the heat will be reduced to lowquality energy and can be lost in the process. This idea led to studies thatprove that it is impossible to have a 100% efficient heat engine.

JamesPrescott Joule and William Thomson studied together to do research about the effectof heat conservation. They were able to come to the conclusion that gasexpansion in a vacuum will cause it to lower its heat levels. During thesestudies with Joule, Thomson realized that the Celsius scale was an inefficientand unrealistic representation of the relationship of temperature to heat. He suggesteda scale for temperature with the zero

value set at the point where no movementof molecules can be found, which made more sense to him than the Celsius scale. This is known as the Kelvin scale. The improvement of the Celsius temperaturescale is the background of the studies that support his hypothesis ofsuperconductivity. His hypothesis was that superconductive materials arematerials that are particularly efficient at conducting electricity only at lowtemperatures (Thompson).

WilliamThomson played an extremely important role in the creation of thermodynamicideas and theories in the 19th century that we still use regularly today in the21st century. Engineers and scientists in all areas of studies apply his ideasto their work and research. Along with these discoveries, Thomson improved uponand invented many other instruments such as telegraph cables, mariner’scompass, astronomical clock, sounding machine, and the tetrakaidecahedron Sharlin. Thomsonbecame the Director of the Atlantic Telegraph Company in 1856. This company wastrying to instate a telegraph communication cable through the Atlantic Ocean. WithThomson’s help and guidance, the team was able to accomplish this using a toolhe invented called the mirror galvanometer. This invention was used through therest of the 19th and into the 20th century until the invention of newtechnologies. Because of this invention, he was knighted by Queen Victoria andgiven the name Baron Kelvin of Largs.

This is why the temperature scale hecreated is called the Kelvin scale. The marineinstruments that Thomson invented – mariner’s compass, astronomical clock, andsounding machine – were big advancements at the time he founded them. The mariner’scompass and astronomical clock that

Thomson invented were the most accurate oftheir own kind. These inventions that Thomson created in the 19thcentury are still used daily in the 21st century. Along with thesemarine instruments, Thomson also invented a form of the analog computer, whichallowed sailors to measure tides at any hours, sounding equipment, andelectrical measuring devices. By the age of 85, Thomson had writtenand published over 600 papers and was permitted many patents and had many otherpatent applications and patents pending.

It is extraordinary that a singleperson could have so much knowledge and revolutionary skill. It is said thatWilliam Thomson was titled more letters after his name than anyone else in theterritories of the British Empire. Before William Thomson’s discoveriesand innovations, science and thermodynamics were much different. By then end ofhis life, his name was “ William Thomson, 1st Baron Kelvin, OM, GCVO, PC, FRS, FRSE” because of the vast accomplishments and education he received in hislife. In the eighty three years of William Thomson’s life, he changed the fieldof physical sciences to make it as we know it today. He discovered the firstand second laws of thermodynamics, determined the value of absolute zero, created the Kevlin temperature scale, figured out the dynamical theory of heat, perfected telegraph cables, mariner’s compass, astronomical clock, soundingmachine, and the tetrakaidecahedron.

This is a feat that only a few otherpeople to ever exist can match. Without Thomson’s discoveries and inventions, the world as we know it today would not be the same.