In order to discuss how science can be different a working definition of “science” is important to observe. According to the Encyclopedia Britannica, it is defined *as “science, any system of knowledge that is concerned with the physical world and its phenomena and that entails unbiased observations and systematic experimentation. In general, a science involves a pursuit of knowledge covering general truths or the operations of fundamental laws”* (Gregersen, 2020, P 1). Merriam-Webster Dictionary adds that science covers *“…general truths or the operation of general laws especially as obtained and tested through the scientific method”* (Merriam-Webster, 2023, P 1). The science method is defined as a process involving observation, reasoning, experimentation and conclusion (adapted from Feynman et al, 1963). Generally, these definitions of the word “science” suggest it to be that intentional and systematic process concerned with the acquirement of knowledge about the physical nature of a particular world that is observed (i.e.: could be the universe is being studied) and is based on sound, logical, and repeatable experimentation that, as a conclusionary practice, prescribes to that particular observation a known law, or a new one that accurately describes the phenomenon of concern that is rigorously testable and its validity determined by repeatable experimentation that yields the same observations along with the mapping of a known law or new law as to the explanation of the particular observation being made.

Interestingly, the definitions do not mention the language of science. Nowhere in the definition is math stated as the language of science, or that graphs are a major communication tool in the scientific explanation of the physical world. Mathematics is defined by the Encyclopedia Britannica as: *“the science of structure, order, and relation that has evolved from elemental practices of counting, measuring, and describing the shapes of objects. It deals with logical reasoning and quantitative calculation, and its development has involved an increasing degree of idealization and abstraction of its subject matter”* (Berggren, 2023). Therefore, in the broadest sense, when one participates in a science, they are participating in mathematics too because math is defined to be a coherent, logical and sequential way of thinking about some phenomena and reasoning through to a conclusion. The definition of science doesn’t include numbers, and the definition of math stated that it evolved from numbers and deals with numbers, so I would say numbers (quantitative characters) aren’t necessary for one to do science, but are more often than not used in the sciences. Admittedly, it is rather difficult to imagine a world of science without numbers as numbers are like a standard of communication, recognized globally as a measurement for describing a phenomena. However it is possible to create another standardized form of communication recognized universally in place of numbers, I am just not sure what it would be.

An interesting question then arises, motivation. What caused humans to develop a systematic means of observing and understanding the physical world. In ancient times, humans used to “fear the illness of the sun” because it disappeared and the Earth became dark (Killian Jr, 1965). We now know through the advent of science that the motion of the moon around the sun causes the eclipse and this the reason for the periodic lightening and darkening of the skies. A yearning for understanding out of an abundance of fear and cautionary practice led one to begin experimentation in the pursuit of knowledge and understanding.

The fundamental quantities of mechanics are length, mass, and time. From these quantities other variables like speed can be derived and recorded as an observation or expressed as a mathematical relationship (Serway et al., 2019). In 1120 a standard unit of measure, length, was defined as the distance from the tip of the King of England’s nose to his outstretched arm and is equivalent to 1 yard. Historically, in France the standard measure of 1 foot equaled the length of King Louis XIV's foot. The problem with this definition of a yard and foot is that those quantities changed with each new King. There was never a consistent definition of length. (Serway et al., 2019). An example of the importance of having a standard of length is this: imagine if 2 states in the U.S. had different definitions of 1 meter. Then, a train going from 1 state to another could derail and crash because in one state the rails are 2 meters apart, and in another state are also 2 meters, but are really 4 meters in terms of the definition of 1 meter as defined by the first state. To maintain length consistency, a universal definition of 1 meter is important to have. Therefore, numeric math is the standardization tool of the physical sciences because it is universal in definition and doesn't vary across geographical locations.

Another comparable language other than numeric math is entirely possible. There are just certain conditions that have to be met for it to remain science. As an example, in 2015 there was a case in Dover, PA where the schoolboard wanted to have an alternative taught to evolution, intelligent design (AI). The judge ruled that intelligent design can't be taught as an alternative to evolution in Biology class because intelligent design isn't science. It is merely a religious façade of creationism that was created by Christians to try to get God back in the classroom. In his rebuke to creationism Judge Jones III states: "To be sure, Darwin's theory of evolution is imperfect". However, the fact that a scientific theory cannot yet render an explanation on every point should not be used as a pretext to thrust an untestable alternative hypothesis grounded in religion into the science classroom or to misrepresent well-established scientific propositions" (Goodstein, 2005). So, if proponents of intelligent design wanted it to be taught in an English Mythology class that would be OK. But to present it as science in any subject is wrong because AI isn't science. So, if in English class an Intelligent Design reading was read, and then an evolution article was read and they were compared, this might be OK as long as AI isn't presented as science. Examining how the papers are told (1, 2nd, 3rd person) and examining the story chart of rise-up, conflict, and resolution for both and comparing would be OK. Admittedly, any kind of comparison between an evolution article and an intelligent design article that is non-inclusive of science would be very difficult (and even harder to prevent or rectify those misconceptions students might develop as to whether AI is science and how it relates to evolution) .This court ruling and past court rulings (like the scopes trial) indicate science does have a precise definition, and there are conditions that have to be met for a concept to be considered science. The previously mentioned general definition of math provides a framework for evaluating whether a particular concept can be considered science or not. The reason AI can't be presented as science is because it is untestable. The existence of God cannot be experimentally verified. God is believed because of the passage of narratives down the centuries.

The origins of science date back to at least 20,000 years with the discovery of fire and use of tools (Ford, 1993). The Paleolithic peoples used fire for heat and light, as well as to cook foods to make them more easily digestible. On a cave wall in Lascaux, France a mare is painted in black charcoal and ochre. Its purpose is revealed when an arrow is observed penetrating through the shoulder blade of the animal. It is believed these sorts of cave paintings of fauna and flora were used by the earliest homosapiens to convey understanding of the natural world, and to instruct the young on how to hunt and gather crops (Ford, 1993). On a piece of preserved tree bark, an ancient drawing by a Kakadu Tribesmen of the internal anatomy of a kangaroo is comparable to a modern-day x-ray image of animals' internal organs (Ford, 1993) which shows a historical understanding of people wanting to discover the internal structure of an animal.

The origins of mathematics date to 3000 B.C where the Babylonian and Egyptian cultures used cuneiform text to record quantities like workers' pay and loans. Cuneiform is a kind of logo-syllabic (Wikipedia, 2020) text meaning that it employs symbols or characters to represents words. Cuneiform text had symbols for words like star, water, head, fish, etc (Spielvogel, 1997). The Mesopotamians developed a number system based on 60, used multiplication and division, and produced tables of interest. Mesopotamians also used Geometry for measuring the area of a field and for building projects (Spielvogel, 1997). Numeration was also utilized by the Egyptians who developed an additive system and the Babylonians developed place value (Miller et al., 2008). The Moscow Papyrus came out in 1700 BC and reveals the earliest known uses of algebra and geometry in problem solving (Miller et al., 2008). The Rhind Mathematical Papyrus was developed in Ancient Egypt and its contents include arithmetic such as fraction, addition and subtraction, multiplication and division, and Geometry specifically relating to calculating the area and slope of a pyramid. Calculus goes back to the Ancient Greeks who could find the area of any polygon by dividing it into smaller triangles, and then summing the areas of those triangles (Stewart et al., 1999). The Greeks also used the "Method of Exhaustion" by inscribing polygons in a circle and letting the numbers of sides of the polygon increase until it approached the area of the circle (Stewart et al., 1999).

From what I have learned in my research numeric mathematics aren't necessary for the language of science. The evolutionary history of the topic clearly shows pictures, drawings, and diagrams as the launching point for science. And by the definition of math as being a kind of sequential and logical reasoning, when humans engage in science they are automatically doing math, just not necessarily in the normal sense of it as often thought of as including numbers. As humans progressed these images and symbols were refined to assist humans in articulating things requiring high specificity like financial transactions and temperatures. Thus, one could say numbers are an intermediary between words and pictures. Math began as symbols and images, and through time developed into a numeric system that we now understand today to be closely associated with mathematics. Therefore, it is possible for science to look different. Perhaps a helpful starting place would be the addition of pictures and diagrams when discussing forces first. Then bring in the math later on when the audience has a conceptual mental picture of a force.