What are technology and engineering?
Technology and engineering solve problems within scientific and mathematical limits or constraints. Scientific inquiry (1) identifies a problem or question and (2) proposes a hypothesis that might offer a solution to the problem or answer the question. Similarly, technological and engineering design projects require (1) a problem or needs statement and (2) a design statement that identifies limiting factors and criteria for success. These limits might include cost or affordability; reliability, material limits (strength, weight, resistance to corrosion, color, surface texture, ease of manufacture or reproducibility), operating environment or conditions (temperature, humidity, barometric pressure, caustic conditions); ergonomics (human factors), health, safety and environmental concerns; and general ease of use or operation.

Like the methods used to test a scientific hypothesis, technological and engineering design projects must test the “design statement” to see, for example, how close a prototype meets design criteria. Generally, the results of an engineering and technological design project will describe the extent to which the prototype meets the design criteria. Scientific inquiry states the extent to which the results derived from experimentation validate or invalidate a hypothesis. Thus, a hypothesis is to inquiry as design is to engineering and technology. With science, technology and engineering, the results of repeated trials are important to validate or invalidate the hypothesis, or design.

Science deals with humans’ understanding of the real world about them—the inherent properties of space, matter, energy, time and their interactions. Engineering deals with the application of objective knowledge to the creation of plans, designs, and means for achieving desired objectives. Mathematics defines relationships and contributes logic to problem-solving. Engineering uses tools and techniques to carry out those plans.

Science tests and validates our understanding of nature, while engineering turns this understanding into new machines, processes, and technologies. Engineering consists of thinking and planning about nature and existing materials or products—about how they can be altered and improved to achieve objectives that benefit humankind by “designing under constraint”, where the constraints include the laws of nature, cost, safety, reliability, environmental impact, manufacturability, and other factors. While engineering requires the application of mathematical and scientific knowledge, it is the design process and the practical nature of the solutions that best distinguish this field.

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