GLOSSARY:

Biomedical engineer: Biomedical engineers analyze and design solutions to issues in biology and medicine, with the goal of improving the quality and effectiveness of patient care.

Civil engineer: Civil engineers design and supervise construction projects, including roads, buildings, airports, tunnels, dams, bridges, and systems for water supply and sewage treatment.

Environmental engineer: Environmental engineers use the principles of engineering, soil science, biology, and chemistry to develop solutions to environmental issues. They are involved in efforts to improve recycling, waste disposal, public health, and control of water and air pollution.

Fusion: The joining together of atomic nuclei, especially hydrogen or other light nuclei, to form a heavier nucleus, especially a helium nucleus. Fusion occurs when plasmas are heated to extremely high temperatures, forcing the nuclei to collide at great speed. The resulting unstable nucleus emits one or more neutrons at very high speeds, releasing more energy than was required to fuse the nuclei, thereby making exothermic chain-reactions possible. Fusion reactions are the source of the energy in the Sun and in hydrogen bombs.

Ingenuity: 1. The quality of being cleverly inventive or resourceful; inventiveness: a designer of great ingenuity. 2. Cleverness or
skillfulness of conception or design.

Mechanical engineer: Mechanical engineering is one of the broadest engineering disciplines. Mechanical engineers design, develop, build, and test mechanical devices, including tools, engines, and machines.

Nanotechnology: The science and technology of devices and materials, such as electronic circuits or drug delivery systems,constructed on extremely small scales, as small as individual atoms and molecules.

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SYNOPSIS:

An engineer solves technical problems of applying knowledge of science and mathematics. Engineering is a broad discipline that has a wide variety of sub-disciplines such as agricultural, aerospace, civil, mechanical, environmental, biomedical engineering, just to name a few.

Unique skills and problem solving abilities make the engineer a useful member of teams that work to solve technically based problems relating to social and environmental issues all over the world. This issue describes the role of an engineer in our society and some of the work practices associated with a day in the life of an engineer.

CURRICULUM UNITS:

- Engineering
- Physical science
- Physics

CAREER OPPORTUNITIES:

- Engineer

PROGRAM OVERVIEW:

According to ABET, or the Accreditation Board for Engineering and Technology: “Engineering is the profession in which a knowledge of the mathematical and natural sciences, gained by study, experience, and practice, is applied with judgment to develop ways to utilize, economically, the materials and forces of nature for the benefit of humankind.”

There is considerable overlap between science and engineering. Research teams often consist of one or more engineers who work closely with scientists to design and build some of the tools required for lab experiments or to test theories in practice.

Engineers are motivated to improve our quality of life; here are some examples: making renewable energy economical, improving health informatics, making better medicines, improving automobile safety, and improving urban infrastructure.

Engineers typically develop new products using several steps – Design phase, testing, production and maintenance. During the design phase, engineers specify the functional requirements; design and test the components; produce a prototype; and evaluate the overall effectiveness, cost, reliability, and safety. This process is common in the development of many different products such as chemicals, computers, energy sources, and transportation.

During testing, production and maintenance, engineers determine if any failures of the components are likely and where they occur. This is where they estimate the time and cost required to produce a product. In these processes, engineers use computers to create designs, analyze functionality, and simulate how a machine, structure, or system operates.

ISSUES & CRITICAL THINKING:

1. Ask students to list products or objects that they encounter in their daily life that were designed by an engineer. Pick one item and discuss the steps the engineer used in creating the final product.

2. Have students research the schooling required to become an engineer. What paths might lead them to a specific discipline such as an environmental engineer?

3. Discuss how engineering has changed in the last 50 years. Have students discuss what they predict will be the most difficult problems engineers must try to solve in the next 50 years.