

Correspondence to the Benchmarks for Science Literacy

4E Energy Transformations

8th grade

- Energy cannot be created or destroyed, but only changed from one form to another.
- Energy in the form of heat is almost always one of the products of an energy transformation.

12th grade

- Whenever the amount of energy in one place or form diminishes, the amount in other places or forms increases by the same amount.
- Transformations of energy usually produce some energy in the form of heat, which spreads around by radiation or conduction into cooler places.

4G Forces of Nature

12th grade

- Different kinds of materials respond differently to electric forces. In conducting materials such as metals, electric charges flow easily, whereas in insulating materials such as glass, they can hardly move at all.

3C Issues in Technology

8th grade

- Technology has strongly influenced the course of history and continues to do so. It is largely responsible for the great revolutions in agriculture, manufacturing, sanitation and medicine, warfare, transportation, information processing, and communications that have radically changed how people live.

11A Systems

8th grade

- Thinking about things as systems means looking for how every part relates to others. The output from one part of a system (which can include material, energy, or information) can become the input to other parts. Such feedback can serve to control what goes on in the system as whole.
- Any system is usually connected to other systems, both internally and externally. Thus a system may be thought of as containing subsystems and as being a subsystem of a larger system.

12th grade

- Understanding how things work and designing solutions to problems of almost any kind can be facilitated by systems analysis. In defining a system, it is important to specify its boundaries and subsystems, indicate its relation to other systems, and identify what its input and output are expected to be.

1C The Scientific Enterprise

8th grade

- No matter who does science and mathematics or invents things, or when or where they do it, the knowledge and technology that result can eventually become available to everyone in the world.

12th grade

- Progress in science and invention depends heavily on what else is happening in society, and history often depends on scientific and technological developments.
- Science disciplines differ from one another in what is studied, techniques used, and outcomes sought, but they share a common purpose and philosophy, and all are part of the same scientific enterprise. Although each discipline provides a conceptual structure for organizing and pursuing knowledge, many problems are studied by scientists using information and skills from many disciplines. Disciplines do not have fixed boundaries, and it happens that new scientific disciplines are being formed where existing ones meet and that some subdisciplines spin off to become disciplines in their own right.

8B Materials and Manufacturing

8th grade

- The choice of materials for a job depends on their properties and how they interact with one another. Similarly, the usefulness of some manufactured parts of an object depends on how well they fit together with other parts.
- Manufacturing usually involves a series of steps, such as designing a product, obtaining and preparing raw materials, processing the materials mechanical or chemically, and assembling, testing, inspecting, and packaging. The sequence of these steps is also often important.
- Modern technology reduces manufacturing costs, produces more uniform products, and creates new synthetic materials that can help reduce the depletion of some natural resources.

12th grade

- Scientific research identifies new materials and new uses of known materials.
- Manufacturing processes have been changed by improved tools and techniques based on more thorough scientific understanding, increases in the forces that can be applied and the temperatures that can be reached, and the availability of electronic controls that make operations occur more rapidly and consistently.

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