

Grades 6, 7, 8 Expectations in Technology/Engineering

Learning standards are taken from the October 2006 MA Science and Technology/Engineering Curriculum Framework. The learning standard numbers in this document correspond to the learning standard numbers in the Framework.

Learning standards from the MA Science and Technology/Engineering Curriculum Framework for the end of Grade 8 are numbered and printed in bold. All students are expected to master all grade level expectations.

Technology/Engineering Curriculum Framework Learning Standards

1. Materials, Tools, and Machines

Central Concept: Appropriate materials, tools, and machines enable us to solve problems, invent, and construct.
1.1 Given a design task, identify appropriate materials (e.g., wood, paper, plastic, aggregates, ceramics, metals, solvents, adhesives) based on specific properties and characteristics (e.g., weight, strength, hardness, and flexibility).
1.2 Identify and explain appropriate measuring tools, hand tools, and power tools used to hold, lift, carry, fasten, and separate, and explain their safe and proper use.
1.3 Identify and explain the safe and proper use of measuring tools, hand tools, and machines (e.g., band saw, drill press, sanders, hammer, screwdriver, pliers, tape measure, screws, nails, and other mechanical fasteners) needed to construct a prototype of an engineering design.

Technology/Engineering Curriculum Framework Learning Standards

2. Engineering Design

Central Concept: Engineering design is an iterative process involving modeling and optimizing for developing technological solutions to problems within given constraints.
2.1 Identify and explain the steps of the engineering design process, i.e., identify the need or problem, research the problem, develop possible solutions, select the best possible solution(s), construct a prototype, test and evaluate, communicate the solution(s), and redesign.
2.2 Demonstrate methods of representing solutions to a design problem, e.g., sketches, orthographic projections, and multi-view drawings.
2.3 Describe and explain the purpose of a given prototype.
2.4 Identify appropriate materials, tools, and machines needed to construct a prototype of a given engineering design.
2.5 Explain how such design features as size, shape, weight, function, and cost limitations would affect the construction of a given prototype.
2.6 Identify the five elements of a universal systems model: goal, inputs, processes, outputs, and feedback.

Technology/Engineering Curriculum Framework Learning Standards

3. Communication Technologies

Central Concept: Ideas can be communicated through engineering drawings, written reports, and pictures.
3.1 Identify and explain the components of a communication system, i.e., source, encoder, transmitter, receiver, decoder, storage, retrieval, and destination.
3.2 Identify and explain the appropriate tools, machines, and electronic devices (e.g., drawing tools, computer-aided design, and cameras) used to produce and/or reproduce design solutions (e.g., engineering drawings, prototypes, and reports).
3.3 Identify and compare communication technologies and systems, i.e., audio, visual, printed, and mass communication.
3.4 Identify and explain how symbols and icons (e.g., international symbols and graphics) are used to communicate a message.

Technology/Engineering Curriculum Framework Learning Standards

4. Manufacturing Technologies

Central Concept: Manufacturing is the process of converting raw materials (primary process) into physical goods (secondary process), involving multiple industrial processes, e.g., assembly, multiple stages of production, quality control.
4.1 Describe and explain the manufacturing systems of custom and mass production.
4.2 Explain and give examples of the impacts of interchangeable parts, components of mass-produced products, and the use of automation, e.g., robotics.
4.3 Describe a manufacturing organization, e.g., corporate structure, research and development, production, marketing, quality control, distribution.
4.4 Explain basic processes in manufacturing systems, e.g., cutting, shaping, assembling, joining, finishing, quality control, and safety.

Technology/Engineering Curriculum Framework Learning Standards

5. Construction Technologies

Central Concept: Construction technology involves building structures in order to contain, shelter, manufacture, transport, communicate, and provide recreation.
5.1 Describe and explain parts of a structure, e.g., foundation, flooring, decking, wall, roofing systems.
5.2 Identify and describe three major types of bridges (e.g., arch, beam, and suspension) and their appropriate uses (e.g., site, span, resources, and load).
5.3 Explain how the forces of tension, compression, torsion, bending, and shear affect the performance of bridges.
5.4 Describe and explain the effects of loads and structural shapes on bridges.

Technology/Engineering Curriculum Framework Learning Standards

6. Transportation Technologies

Central Concept: Transportation technologies are systems and devices that move goods and people from one place to another across or through land, air, water, or space.
6.1 Identify and compare examples of transportation systems and devices that operate on each of the following: land, air, water, and space.
6.2 Given a transportation problem, explain a possible solution using the universal systems model.
6.3 Identify and describe three subsystems of a transportation vehicle or device, i.e., structural, propulsion, guidance, suspension, control, and support.
6.4 Identify and explain lift, drag, friction, thrust, and gravity in a vehicle or device, e.g., cars, boats, airplanes, rockets.

Technology/Engineering Curriculum Framework Learning Standards

7. Bioengineering Technologies

Central Concept: Bioengineering technologies explore the production of mechanical devices, products, biological substances, and organisms to improve health and/or contribute improvement to our daily lives.
7.1 Explain examples of adaptive or assistive devices, e.g., prosthetic devices, wheelchairs, eyeglasses, grab bars, hearing aids, lifts, and braces.
7.2 Describe and explain adaptive and assistive bioengineered products, e.g., food, bio-fuels, irradiation, integrated pest management.