

Standards Massachusetts Engineering Standards 6-8

● Indicates standard is focused on ○ Indicates standard is covered in a general way

| Standard 1: <i>Materials, Tools, and Machines</i> | | Inquiry Video | Tutorial | Heat | Motion | Sound | Light | Project |
|---|---|---------------|----------|------|--------|-------|-------|---------|
| 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., 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, sander, hammer, screwdriver, pliers, tape measure, screws, nails, and other mechanical fasteners) needed to construct a prototype of an engineering design. | | ○ | ○ | ○ | ○ | ○ | ● |

| Standard 2: <i>Engineering Design</i> | | Inquiry Video | Tutorial | Heat | Motion | Sound | Light | Project |
|--|--|---------------|----------|------|--------|-------|-------|---------|
| Engineering design is an iterative process that involves modeling and optimizing to develop 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, multiview 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. | | | | | | | ○ |

| Standard 3: <i>Communication Technologies</i> | | Inquiry Video | Tutorial | Heat | Motion | Sound | Light | Project |
|---|---|---------------|----------|------|--------|-------|-------|---------|
| Ideas can be communicated through engineering drawings, written reports, and pictures. | | | | | | | | |
| 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). | | | | | | | ○ |

| Standard 4: <i>Manufacturing Technologies</i> | | Inquiry Video | Tutorial | Heat | Motion | Sound | Light | Project |
|--|---|---------------|----------|------|--------|-------|-------|---------|
| 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). | | | | | | | | |
| 4.2 | 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. | | | ○ | ○ | ○ | ○ | ○ |

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| Standard 5: <i>Construction Technologies</i> | | Inquiry Video | Tutorial | Heat | Motion | Sound | Light | Project |
|--|---|---------------|----------|------|--------|-------|-------|-----------------------|
| Construction technology involves building structures in order to contain, shelter, manufacture, transport, communicate, and provide recreation. | | | | | | | | |
| 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). | | | | | | | <input type="radio"/> |
| 5.3 | Explain how the forces of tension, compression, torsion, bending, and shear affect the performance of bridges. | | | | | | | <input type="radio"/> |
| 5.4 | Describe and explain the effects of loads and structural shapes on bridges. | | | | | | | <input type="radio"/> |

| Standard 6: <i>Transportation Technologies</i> | | Inquiry Video | Tutorial | Heat | Motion | Sound | Light | Project |
|---|--|---------------|----------|------|-----------------------|-------|-------|---------|
| Transportation technologies are systems and devices that move goods and people from one place to another across or through land, air, water, or space. | | | | | | | | |
| 6.3 | Identify and describe three subsystems of a transportation vehicle or device, i.e., structural, propulsion, guidance, suspension, control, and support | | | | <input type="radio"/> | | | |
| 6.4 | Identify and explain lift, drag, friction, thrust, and gravity in a vehicle or device, e.g., cars, boats, airplanes, rockets. | | | | <input type="radio"/> | | | |