Plymouth Public Schools' Science and Technology/Engineering Program Technology Engineering for Grades 6 and 7 Learning Standards

STE046 Technology Engineering 1 (for students in grade 6)
STE056 Technology Engineering 2 (for students in grade 6)
STE027 Technology Engineering 3 (for students in grade 7)
STE037 Technology Engineering 4 (for students in grade 7)

An Introduction to the Massachusetts Department of Elementary and Secondary Education Science and Technology/Engineering Curriculum Framework
Effective teaching and learning in science fosters engagement and has rigor, relevance, and coherence embedded within. It couples practice with content to give the context for performance. A program with these components encourages students to analyze and explain phenomena and experience; engages with practices to build, use, and apply knowledge; and builds a storyline over time and among disciplines. The state standards that form this program are outcomes that reflect what a student should know and be able to do as a result of instruction. Science and engineering practices, which are included in these standards, are not teaching strategies; they are important learning goals and skills to be learned, also as a result of instruction. The standards listed below are not intended to represent an exhaustive list of all that could be included in our district's science program, nor should this list prevent students from going beyond the standards where appropriate. (Excerpts from Curriculum Framework)

Overarching Theme – Engineering Design
In grades 6 and 7, students are tasked with solving engineering-type problems by demonstrating mastery of the Engineering Design Process. What is critical in their mastery of this process is their ability to become flexible with it. Student mastery is reached once students have been able to develop multiple, successful iterations of this process in order to meet certain specifications. Additionally, students must use the Engineering Design Process to develop solutions needed to solve problems within different technological systems (e.g., transportation, structural, communication). (Excerpts from Curriculum Framework)

ETS1. Engineering Design

6.MS-ETS1-1. Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution. Include potential impacts on people and the natural environment that may limit possible solutions.

7.MS-ETS1-2. Evaluate competing solutions to a given design problem using a decision matrix to determine how well each meets the criteria and constraints of the problem. Use

a model of each solution to evaluate how variations in one or more design features, including size, shape, weight, or cost, may affect the function or effectiveness of the solution.

7.MS-ETS1-4. Generate and analyze data from iterative testing and modification of a proposed object, tool, or process to optimize the object, tool, or process for its intended purpose.

6.MS-ETS1-5(MA). Create visual representations of solutions to a design problem. Accurately interpret and apply scale and proportion to visual representations.

Clarification Statements:
1. Examples of visual representations can include sketches, scaled drawings, and orthographic projections.
2. Examples of scale can include ¼" = 1'0", 1 cm = 1 m.

6.MS-ETS1-6(MA). Communicate a design solution to an intended user, including design features and limitations of the solution.

Clarification Statement:
Examples of intended users can include students, parents, teachers, manufacturing personnel, engineers, and customers.

7.MS-ETS1-7(MA). Construct a prototype of a solution to a given design problem.

ETS2. Materials, Tools, and Manufacturing

6.MS-ETS2-1(MA). Analyze and compare properties of metals, plastics, wood and ceramics, including flexibility, ductility, hardness, thermal conductivity, electrical conductivity, and melting point.

6.MS-ETS2-2(MA). Given a design task, select appropriate materials based on specific properties needed in the construction of a solution.

Clarification Statement:
Examples of materials can include metals, plastics, wood, and ceramics.

6.MS-ETS2-3(MA). Choose and safely use appropriate measuring tools, hand tools, fasteners, and common hand-held power tools used to construct a prototype.

Clarification Statements:
1. Examples of measuring tools include a tape measure, a meter stick, and a ruler.

2. Examples of hand tools include a hammer, a screwdriver, a wrench, and pliers.
3. Examples of fasteners include nails, screws, nuts and bolts, staples, glue, and tape.
4. Examples of common power tools include jigsaw, drill, and sander.