When reading the Common Core standards for mathematics from kindergarten to high school it was evident that multiple standards related to problem solving and engineering design. To narrow the focus, I decided to closely examine the high school standards, to identify standards related to problem solving and engineering design. The table below identifies these standards.

Standards related to problem solving		Standards related to engineering	
Standard	Rationale	Standard	Rationale
N-VM: Represent and model with vector quantities.	Real world problems are often used to solve vector problems.	F-BF: Build a function that models a relationship between two quantities.	Modeling requires some design thinking. Testing the function and making iterations until it is successful.
A-CED: Create equations that describe numbers or relationships.	Considers relationships between physical variables, such as ohm's law.	F-TF: Model periodic phenomena with trigonometric functions.	Modeling requires some design thinking. Testing the function and making iterations until it is successful.
F-TF: Model periodic phenomena with trigonometric functions.	Phenomena normally requires problem solving for explanation.	G-MG: Apply geometric concepts in modeling situations.	Students apply geometric methods to solve design problems such as designing an object or structure to satisfy physical constraints.
G-SRT: Define trigonometric ratios and solve problems involving right triangles. Apply trigonometry to general triangles.	Trigonometry is usually problem based.		

Tabel 1: High school Common Core Mathematics Standards related to problem solving and engineering.

The above standards are identified as the major standards that address problem solving and engineering design in high school. This is not to say other standards do not address problem solving and engineering design. In fact, a qualitative overview of the standards suggests that the majority of the standards involve problem solving and a few directly relate to engineering design. A deeper analysis would reveal exactly which standards address problem solving and engineering design.

The National Council of Teaching Mathematics (NCTM) standards are very broad and could incorporate problem solving and engineering design depending on teacher interpretation. However, this is not explicit apart from one process standard, problem solving. It could be argued that the connections process standard could be used to develop engineering design, since it makes connections between students lives and mathematics. Again, I am sure all content standards would all have some element of problem solving.

The standards for Technological Literacy all have some element of problem solving and/or engineering design. However, the standards in Chapter four are explicitly linked to problem solving.

Chapter four considers the implication of technology in society, culture, economy, politics and the environment. Each of these areas requires some type of complex problem solving, sometimes with no one definitive solution. Chapter five, and the standards in it, are explicitly related to engineering design. For example, one of the standards is called Engineering Design.

The Next Generation Science Standards (NGSS) are deliberate in implementing engineering design. In fact high school, middle school and each grade in elementary school have engineering standards addressing engineering design. Problem solving is a key feature of the NGSS and can be found in how all Disciplinary Core Ideas are taught within the Scientific Practices. The Scientific Practices all engage students in some form of problem solving activity when engaging with science phenomena.

All sets of standards aforementioned are similar in that they all try to engage students with the subject content. They all start out with broader concepts and become more specific as to what students should learn, but do not include references of how to teach what students should learn. The NGSS standards are accompanied by scientific practices and crosscutting concepts and these should assist in student learning and understanding of the standards. This is the advantage of the three dimensional learning model used by the NGSS. The NCTM standards are at least explicitly defined into content and process standards. This highlights to teachers and students how to deal with the content. Compared to the NGSS and NCTM, the Technological Literacy and Common Core standards are also clear and concise, however, they do not include how the standards could be met. Furthermore, all sets of standards place different amounts of emphasis between problem solving and engineering design. Where Common Core has more emphasis on problem solving, the NGSS has a balance between problem solving and engineering design. Also, all sets of standards have varying degrees of intent on including engineering design within the standards. Apart from Technological Literacy, which has a specific standard called engineering design, the NGSS is the only other set of standards that has deliberately included engineering design standards from K-12. The standards also differ in how they are presented. Some standards, such as Common Core, include command terms from Bloom's Taxonomy, whilst others are more broad and formed as general statements, as found in the Technological Literacy standards.

Engineering design problem solving is an elegant approach, to enable the break down of barriers students may have, between the disciplines of Science, Technology, Engineering and Mathematics. In most high schools these discipline are taught in isolation and students may not make connections between them, or transfer the skills developed, from one discipline to another. It is through problem solving and using a design thinking solution, that students can focus on a problem and dig deep into their learnt knowledge and skills, to solve the problem. It does not matter what discipline the knowledge or skill comes from, but rather the students' drive to solve the problem, no matter what it takes. Engineering design offers students an opportunity to apply knowledge and skills from multiple disciplines, thus making it a unifying concept/skill.