Samantha Todres
Standards Analysis
The E in STEM
September 15th, 2021

1) Which technology education, mathematics, and science standards relate to problem solving or engineering design?
Since I teach high school in New York City, I will focus on the high school/secondary common core standards.

Technology:

- Enter formulas and functions; use the auto-fill feature in a spreadsheet application.
- Use advanced formatting features of a spreadsheet application (e.g., reposition columns and rows, add and name worksheets).
- Explain and demonstrate how specialized technology tools can be used for problem solving, decision making, and creativity in all subject areas (e.g., simulation software, environmental probes, computer aided design, geographic information systems, dynamic geometric software, graphing calculators)
- Independently use appropriate technology tools(e.g., graphic organizer, audio, visual) to define problems and propose hypotheses.
- Develop and use guidelines to evaluate the content, organization, design, use of citations, and presentation of technologically enhanced projects.
- Demonstrate how the use of various techniques and effect (e.g., editing, music, color, rhetorical devices) can be used to convey meaning in media
- Plus more

Mathematics:

- CCSS.MATH.CONTENT.HSN.RN.A.2 - Rewrite expressions involving radicals and rational exponents using the properties of exponents.
- CCSS.MATH.CONTENT.HSN.CN.C.7 - Solve quadratic equations with real coefficients that have complex solutions.
- CCSS.MATH.CONTENT.HSN.VM.A.3 - (+) Solve problems involving velocity and other quantities that can be represented by vectors.
- CCSS.MATH.CONTENT.HSA.SSE.B.3.C - Use the properties of exponents to transform expressions for exponential functions. *For example the expression* 1.15^t *can be rewritten as* $(1.15^{1/12})^{12t} \approx 1.012^{12t}$ *to reveal*

the approximate equivalent monthly interest rate if the annual rate is 15%.

- CCSS.MATH.CONTENT.HSA.CED.A.1 - Create equations and inequalities in one variable and use them to solve problems. *Include equations arising from linear and quadratic functions, and simple rational and exponential functions*.
- CCSS.MATH.CONTENT.HSA.CED.A.2 - Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
- Plus more

Science:

- All Engineering standards
- HS-PS1-8. Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay
- HS-PS1-2. Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties.
- HS-PS1-7. Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.
- HS-PS2-2. Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system.
- HS-PS2-4. Use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects.
- HS-PS2-5. Plan and conduct an investigation to provide evidence that an electric current can produce a magnetic field and that a changing magnetic field can produce an electric current.
- Plus more

2) How are these standards similar to each other?
   These standards are similar because they all require students to build, develop, construct, or create something.

3) How are they different from each other?
   These standards are different from each other because they require different things from each student depending on the subject and skill being practiced.

4) What are your thoughts on engineering design problem solving as a “unifying” concept/skill?

I think that engineering design and problem solving are unifying concepts and skills. These standards and more allow for students to build on important skills that transfer over into other subjects and help with life. They also allow for subjects to crossover and connect.