Brick Township Public Schools STEM (FUSE) CURRICULUM
(Grades 6, 7, 8)
Aligned to the NEXT GEN SCIENCE, CAREER READY PRACTICES, and TECHNOLOGY STANDARDS **ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY GLOBAL SKILLS**

BRICK TOWNSHIP PUBLIC SCHOOLS
(SUBJECT) CURRICULUM

Content Area: STEM

Course Title: FUSE | **Grade Level: 6,7,8**

(Unit)	(Timeframe)
Safety	**10 weeks** (Lab Safety Lesson & Challenge Safety)
STEM Process	**10 weeks** (FUSE Challenges, 3D You, Cookie Customizer, Eye Candy, Jewelry Designer, Keychain Customizer & Print my Ride)
Physical Science: Force and Motion	**2-3 weeks** (Coaster Boss, How to Train your Robot, Just Bead It)
Physical Science: Simple Machines	**2-3 weeks** (Music amplifier, Ringtones & Party Lights)
Physical Science: Structures	**2-3 weeks** (Dream Home, Gut Rehab, Smart Castle & Spaghetti Structure)
Energy and Power	**2-3 weeks** (Electric Apparel, Game Designer, Get in the Game, Laser Defender, LED Color Lights & Mini Jumbotron)
Environmental Awareness	**2-3 weeks** (Solar Roller & Wind Commander)

Date Created: **7/17/17**

Board Approved on: **9/14/17**

Unit or Title: FUSE

Grade Level: Middle School (6-8)

Topic/Theme/Nature of Investigation: Using level up engineering challenges that utilize the engineering design process

Anchoring Question: What design template or process can be used to engineer systems or products that will solve a given problem or meet a need?

Anchor Phenomena: FUSE is a new kind of interest-driven learning experience developed by researchers and educators in the School of Education and Social Policy at Northwestern University. https://embedwistia-a.akamaihd.net/deliveries/51ccc1825b6248b32501781f458aa4a5cd35d9c0/file.mp4

Cross Curricular Connection: History (Industrial Revolution), Civics (Quality of Life), Language Arts (Documenting Procedures and Outcomes/Reporting), Mathematics (Combinations and Permutations)

NGSS Disciplinary Core Ideas:

MS.LS1-1: Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells.

MS.PS2-1: Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects

MS.PS2-2: Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object

MS.PS3-3: Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.

MS-PS3-5: Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object.

MS-ESS2-5: Collect data to provide evidence for how the motions and complex interactions of air masses result in changes in weather conditions.

MS-ESS2-6: Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates.

MS.ETS1-1: Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions

MS-ETS1-2: Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem

MS-ETS1-3: Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

MS-ETS1-4: Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

Science and Engineering Practices:

ASKING QUESTIONS AND DEFINING PROBLEMS (investigate different types of materials or designs)

DEVELOPING AND USING MODELS (creating physical or digital models to test variables and outcomes)

PLANNING AND CARRYING OUT INVESTIGATIONS
(collect data on models reaction to different environmental and physical changes)
ANALYZING AND INTERPRETING DATA (calculate sums and averages of data to compare to predictions)

USING MATHEMATICS AND COMPUTATIONAL THINKING (uses of measurement conversion and geometry)

CONSTRUCTING EXPLANATIONS AND DESIGNING SOLUTIONS
(explain qualitative and quantitative relationships between variables)
ENGAGING IN ARGUMENT FROM EVIDENCE (town hall meeting with student roles)

OBTAINING, EVALUATING, AND COMMUNICATING INFORMATION (FUSE online level up lessons)

Cross Cutting Concepts:

PATTERNS (identify cause and effect relationships)

CAUSE AND EFFECT: MECHANISM AND PREDICTION
(phenomenas can have more than one cause creating multiple effects)

SCALE, PROPORTION AND QUANTITY
(viability and designing projects on school grounds/model relationship to reality)

SYSTEMS AND SYSTEMS MODELS (models can represent systems and interactions)

ENERGY AND MATTER (lesson of energy vocabulary and applications) (Brainpop)

(Investigative question: What is the difference between watts and volts?)

STRUCTURE AND FUNCTION (properties of materials: strength, shape, size, conductivity and flexibility)

STABILITY AND CHANGE
(small changes to a part of a system, may have larger effects on others or overall production and efficiency)