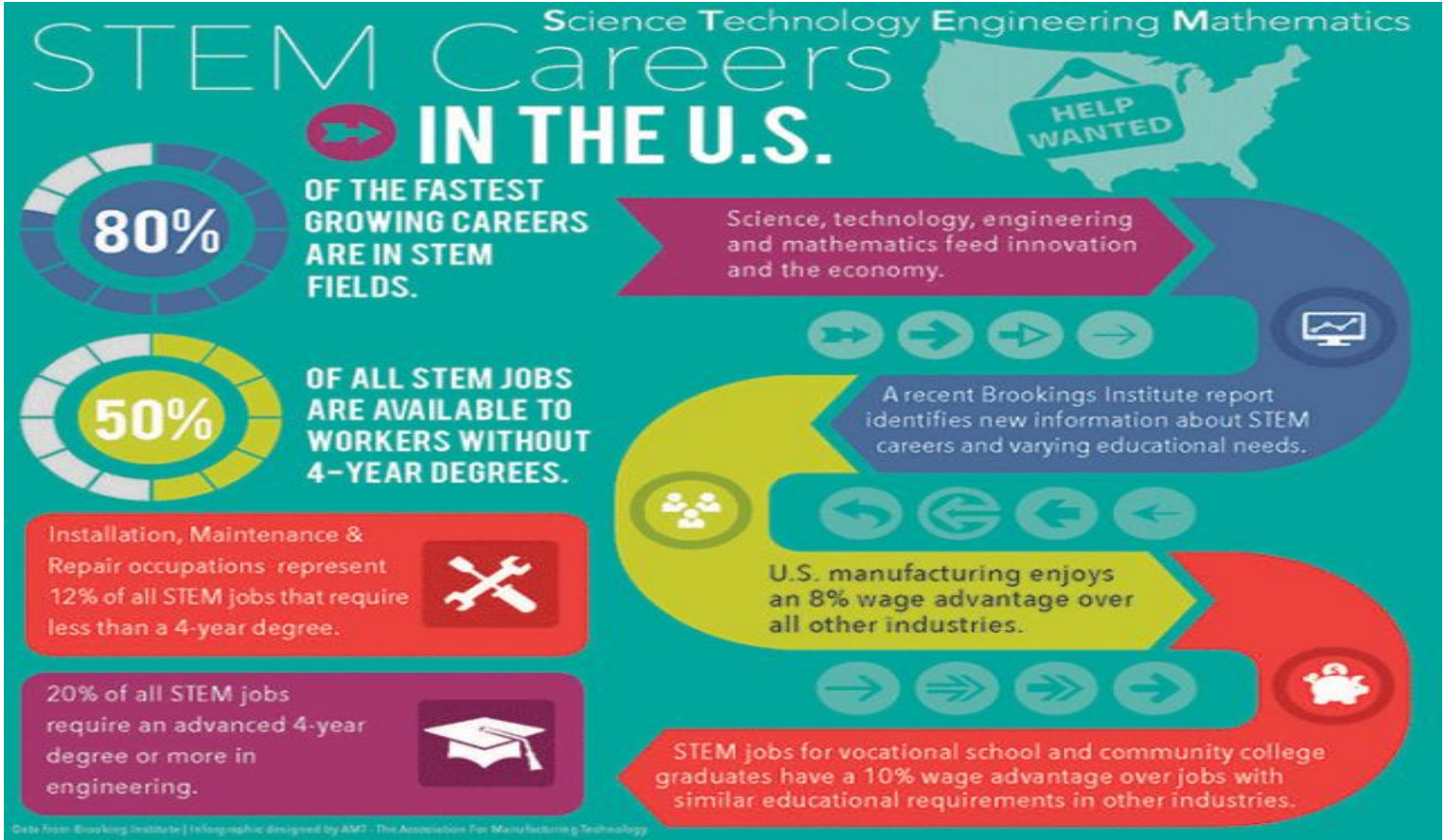
Metuchen STEM in 2026: Imagining the Possibilities

Inquiry:

What would the best STEM program imaginable and possible look like in 2026 in Metuchen?

STEM Statistics



What does a STEM classroom look like?

Teachers

- Facilitator rather than a lecturer
- Guide students through real-world problems
- Interdisciplinary Lessons

Students

- Work collaboratively
- Solve real-world problems
- Engage in inquiry
- Self-motivated

Classroom Environment

- Classroom arranged in a way that facilitates group work
- Computers or other instructional technology easily accessible

IMAGINING the possibilities. MAKING THEM HAPPEN.
Indiana Department of Education
Glenda Ritz, NBCT
Indiana Superintendent of Public Instruction

Florida STEM:

STEM education is the intentional integration of science, technology, engineering, and mathematics, and their associated practices to create a student-centered learning environment in which students investigate and engineer solutions to problems, and construct evidence-based explanations of real-world phenomena with a focus on a student's social, emotional, physical, and academic needs through shared contributions of schools, families, and community partners.

Quantifying the Range of STEM

- We recognize that STEM may be seen as a range of integration and application.
  - A science class without any of the other STEM components may be seen as STEM.
  - A fully integrated science class with all STEM components may also be seen as STEM.
    - STEM 1.0, 2.0, 3.0, 4.0?
  - How do we quantify our program?

STEM 2.0, 3.0, 4.0?

STEM Disciplines 2.0
Science and Technology
Science and Engineering
Science and Math
Technology and Engineering
Technology and Math
Engineering and Math

STEM Disciplines 3.0
Science, Technology, and Engineering
Science, Engineering, and Math
Technology, Engineering, and Math
Math, Technology, and Science

STEM Disciplines 4.0
Integrated Science, Technology, Engineering, and Math Programs

www.FLDOE.org

Examples: STEM 2.0

STEM Disciplines 2.0	Integrating two disciplines
Science and Technology	A science class uses computers to research a problem and develop a presentation A science lesson utilizes and embeds algebraic standards to teach a lesson A math class uses an online graphing program to solve problems and collaborate on solutions.
Science and Engineering	
Science and Math	
Technology and Engineering	
Technology and Math	
Engineering and Math	

Examples: STEM 3.0

STEM Disciplines 3.0	Integrating three disciplines
Science, Technology, and Engineering	A science class uses computers to research a problem and develop a presentation. Groups use engineering processes to develop a solution for a problem, modify the solution based on testing and research, and modify the solution. A science lesson utilizes and embeds algebraic standards to teach a lesson, then uses programmable calculators to calculate speed from the slope of the line.
Science, Engineering, and Math	
Technology, Engineering, and Math	
Math, Technology, and Science	

Examples: STEM 4.0

STEM Disciplines 4.0	Integrating 4 disciplines:
Integrated Science, Technology, Engineering, and Math Programs	A Science class examines data using statistics, then uses computers to research a problem and develop a presentation. Groups use engineering processes to develop a solution for a problem, modify the solution based on testing and research, and modify the solution.

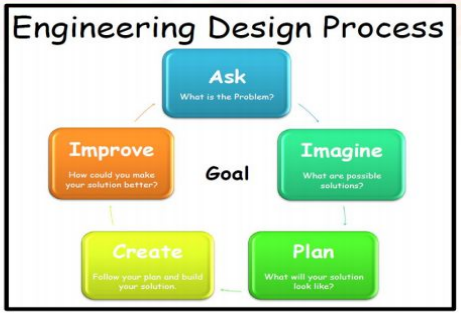
Brainstorm Possible Solutions for Metuchen: Chatham?

IMPLEMENTING THE GOAL

Philosophy & Goals:

The essential intent of the Design & Technology Department is to produce citizens that can work collaboratively in creating innovative solutions to problems present in our modern world.

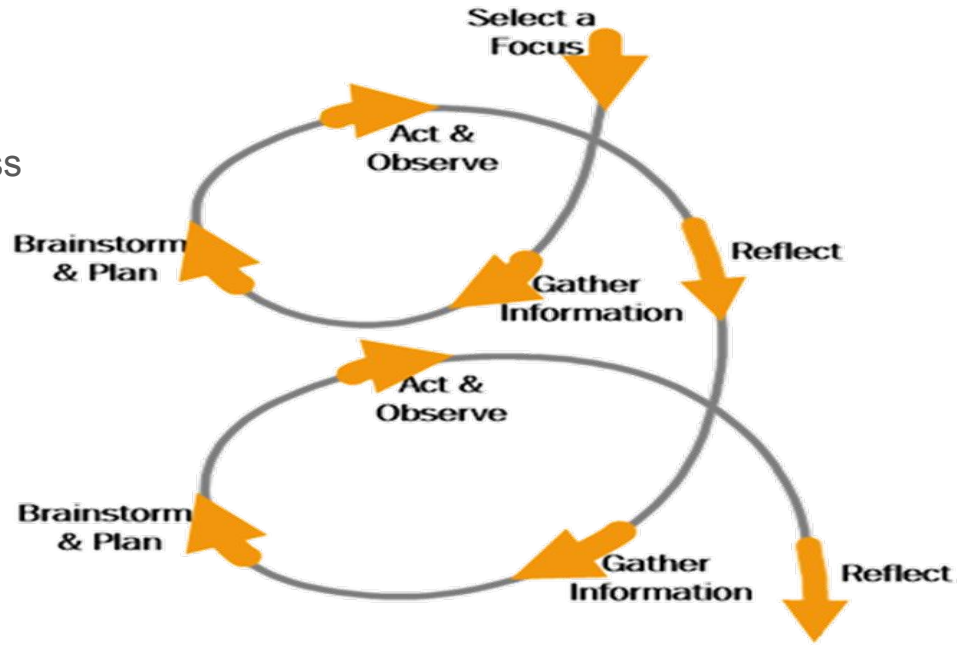
- Authentic Problem Solving
- Problem-Based Learning
- Collaboration
- Innovation
- Critical Thinking
- Perseverance/Grit



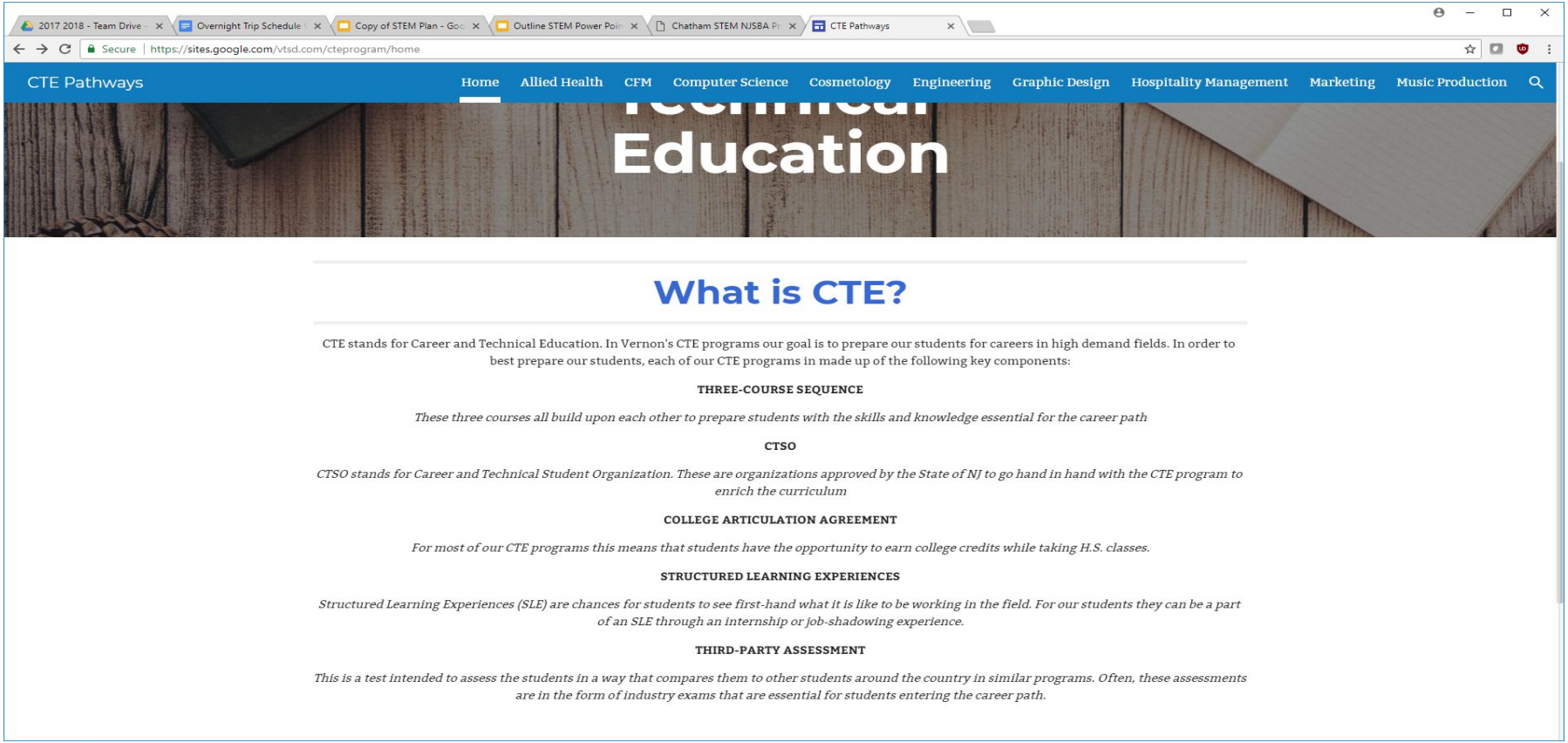
Brainstorm Possible Solutions for Metuchen STEM

Curriculum - Chatham Model / Metuchen's Inquiry-Based Research Process

- Inquiry-Based Research Process
  - ELA
  - Social Studies 2018-2019
- STREAM Design/Engineering Process
- Problem Solving Process
  - K-5 Math
  - EMS Computer Science
  - Social Problem Solving



Brainstorm Possible Solutions for Metuchen: Vernon?



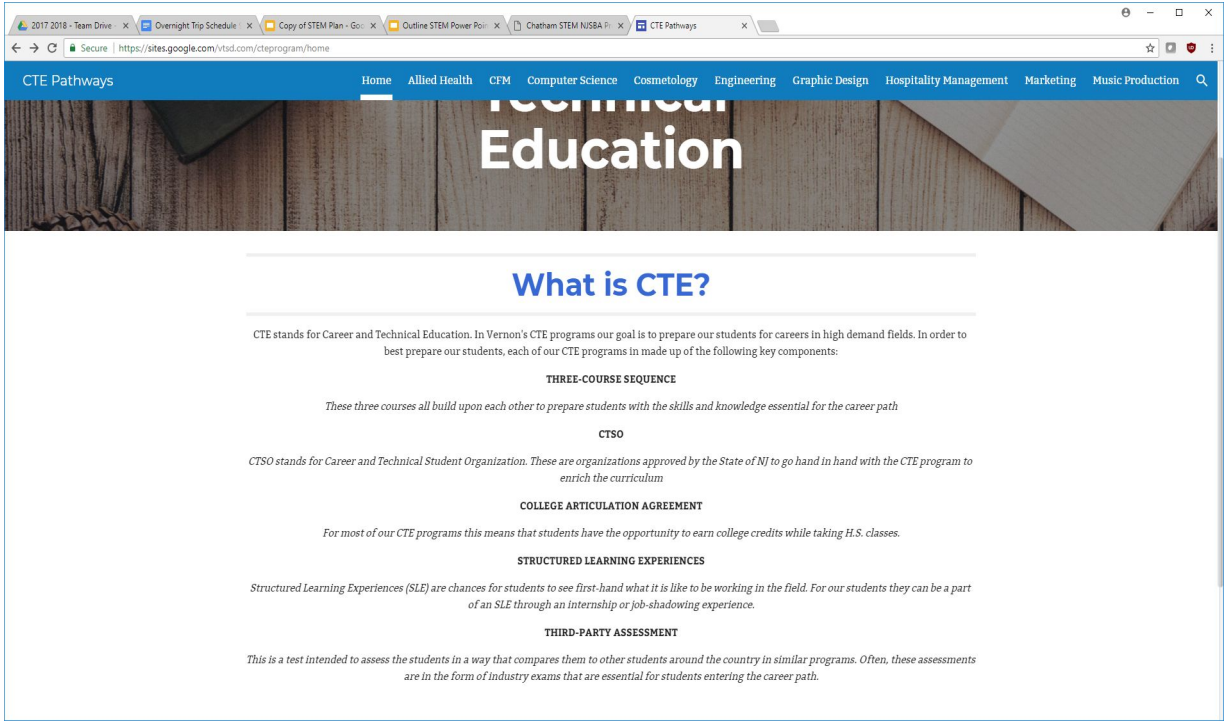
Brainstorm Possible Solutions for Metuchen STEM

Instruction **- Florida 4.0 & Vernon Models**

- Inquiry-Based Research
- Real World Problem Solving
- Experiential / Internships

Assessment **- Vernon Model**

- Performance Based
- Outside Assessment / Certification



Moss and CES Computer Science Fundamentals (Gr. K-5)

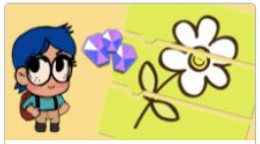
Computer Science Fundamentals for Elementary Schools

For pre-readers in elementary school classrooms

Course A

An introduction to computer science for pre-readers.

Ages: 4-7



Course B

An introduction to computer science for pre-readers. (Similar to Course A, but with more variety for older students.)

Ages: 5-8

For older students in elementary school classrooms

Course C

Learn the basics of computer science and create your own art, stories, and games.

Ages: 6-10

Course D

Quickly cover concepts from Course C, then go further with algorithms, nested loops, conditionals, and more.

Ages: 7-11

Course E

Quickly cover concepts in Course C & D and then go further with functions.

Ages: 8-12

Course F

Learn all the concepts in Computer Science Fundamentals and create your own art, story or game.

Ages: 9-13

EMS Computer Science Discoveries (Gr. 6-8)

Curriculum Overview

Unit 1

Problem Solving

Explore the problem-solving process and the different ways humans and computers solve problems.

View unit | Lesson plans

Unit 2

Web Development

Discover the languages powering the web. Build your own websites in HTML and CSS using Web Lab.

View unit | Lesson plans

Unit 3

Animations and Games

Learn the powerful constructs underlying programming languages. Build interactive games in JavaScript using Game Lab.

View unit | Lesson plans

Unit 4

The Design Process

Follow a design process to identify and empathize with problems faced by a target audience. Prototype an app to help solve that problem using App Lab.

View unit | Lesson plans

Unit 5

Data and Society

Develop binary representations of different kinds of information. Collect, analyze, visualize, and make automated decisions using data.

View unit | Lesson plans

Unit 6

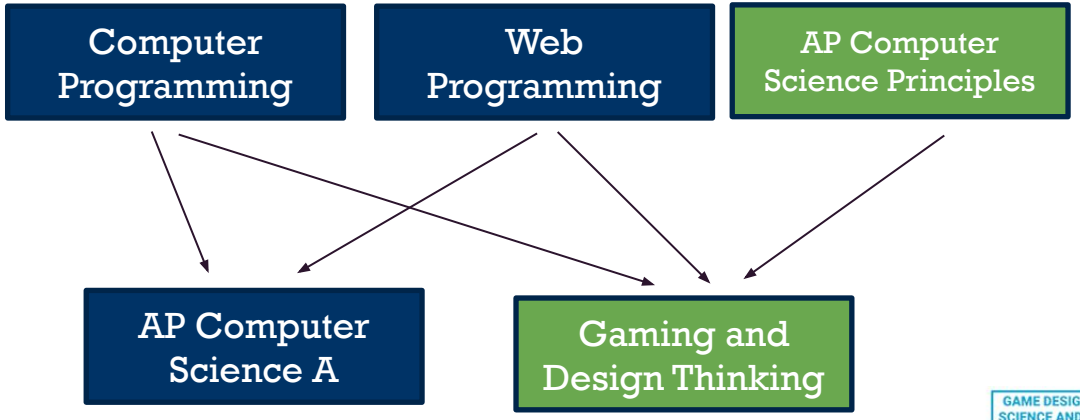
Physical Computing

Explore the relationship between hardware and software, while building interactive projects on Adafruit's Circuit Playground.

View unit | Lesson plans

2026 MHS Computer Science

For students who completed Algebra 1 or Exploring Computer Science



Suggested 4 year sequence

- AP Computer Science Principles
- Computer Programming
- AP Computer Science A
- Gaming and Design Thinking

= New Course

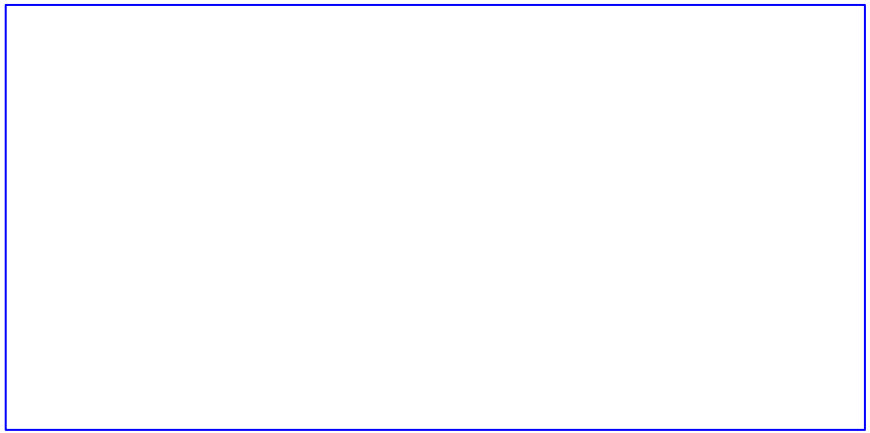
303 – Game Design for Computer Science and Design Thinking
(JavaScript, HTML, CSS, Unity)

MHS Computer Science

Adopting Project Lead the Way - Computer Science

Computer Science empowers students to become creators, instead of merely consumers, of the technology all around them. --- engages students in collaborative projects that help them develop in-demand computer science knowledge as well as transportable skills like creative thinking and communication. And whether they're creating an online art gallery or using automation to process and analyze DNA-sequence data, ---- Computer Science students are seeing how their learning connects to the real world.

- Computer Science Essentials
- AP Computer Science Principles
- AP Computer Science A
- Cybersecurity



MHS Science

Modern Sequence

- Modern Biology
- Modern Chemistry
- Modern Physics

Honors Sequence

- Honors Biology
- Honors Chemistry
- AP Physics 1

Electives

- STEM Capstone
- AP Physics 2
- AP Biology
- Honors Health Science
- AP Chemistry
- AP Environmental

= Existing Course

= Modified Course

= New Course

STEM at MHS: Elective Courses

1. Capstone for Modern Sequence: All standards covered. Free to design application oriented STEM course. Possible ideas:
    a. Environmental Problem Solving
    b. Engineering Design
    c. Bioethics
    d. Sustainability: manufacturing, energy use, farming, water use, resources, etc…
    e. Curriculum Planning throughout next year.
2. Health Science course: align with Career Cluster to enhance “real world” applications and provide practical art within science. Curriculum planning this summer.
3. AP Options remain.
4. Engineering: new staff being hired.
5. Robotics
6. Waksman Science Scholars Program: DNA Research

As we proceed: investigate iSTEM, Project Lead the Way and programs in other districts through site visits.

MHS Career Sequences

Health

- Honors Health Science
- Anatomy/ Physiology
- Medical Course

Engineering

- Drafting/CAD
- Woods Design
- Engineering & Technology
- Robotics
- Architecture
- Home Construction/ Maintenance
- iSTEM or Project Lead the Way Sequence

Business and Technology

- Digital Graphics I and II
- Digital Marketing and Bus. Info. Mgt.
- Entrepreneurship

= Existing Course

= Modified Course

= New Course

= Ideas for growth

We are increasing STEM and NGSS alignment within our classrooms

Students engage in STEM activities in science in every unit.

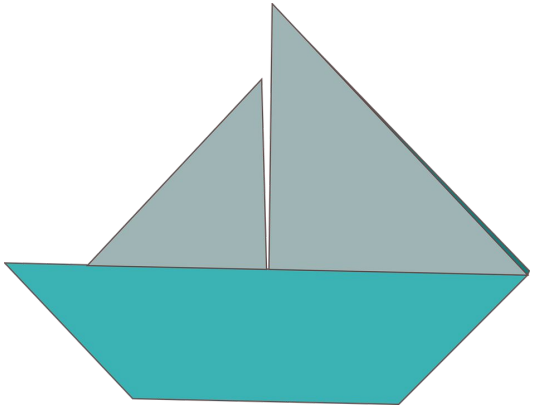
In Kindergarten we...

Plant a butterfly garden.

In Grade 1 we...

Build terrariums to study insects and plants.

In Grade 2 we design, build and test apple baskets and sailboats



In Grade 3 we plan to

Design a weather shelter from recycled materials

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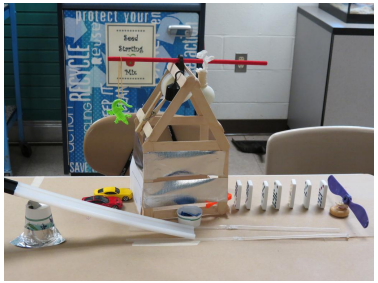
And in Grade 4 we

Develop safe locations to build houses.

In Grade 5 we

Build and redesign a car



Design and build Rube Goldberg devices

In Grade 6 we

Calculate how to reduce our carbon footprint

In Grade 7 we

Propose ways to limit negative impacts on ecosystems

The Monarch Project: grow and release Monarch butterflies. Study them to learn ways to protect them.

In Grade 8 we

Use chemistry to design a device to release or absorb thermal energy.

In Grade 5-7 G&T we

Engage in design projects (5)

Design Future Cities

Design and build robots

Science STEM at MHS: Meet NGSS in Grades 9-11

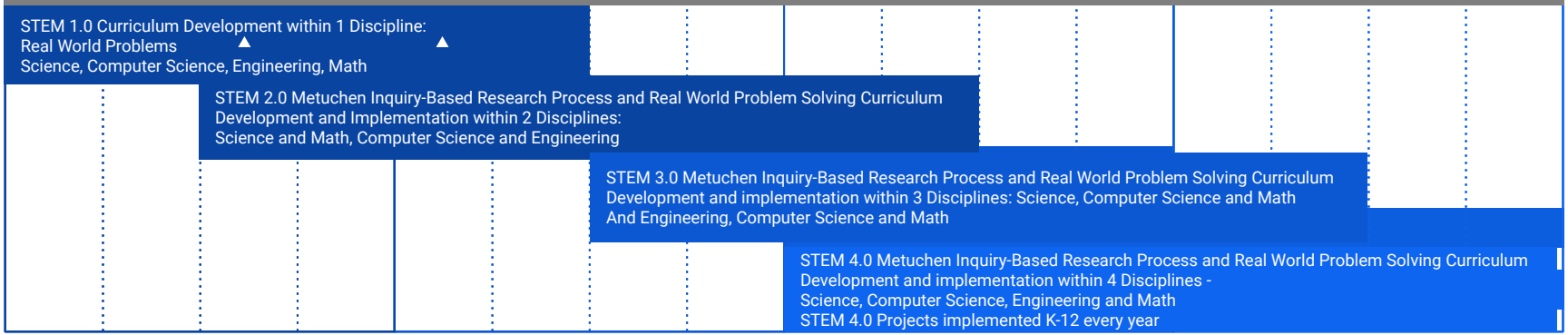
1. Biology:
    a. Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.
    b. Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.
    c. Evaluate diets in light of learning about biological processes.
2. Chemistry
    a. Refine the design of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium.
    b. Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.
    c. Develop a quantitative model for determining carbon footprint.
3. Physics
    a. Apply scientific and engineering ideas to design, evaluate, and refine a device that minimized the force on a macroscopic object during collision.
    b. Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.

Metuchen's Proposed 8 Year STEM Action Plan:

Timeline of Activities for Years 1-4

Including all planning for years 5-8 (next slide)

Year 1 Year 2 Year 3 Year 4



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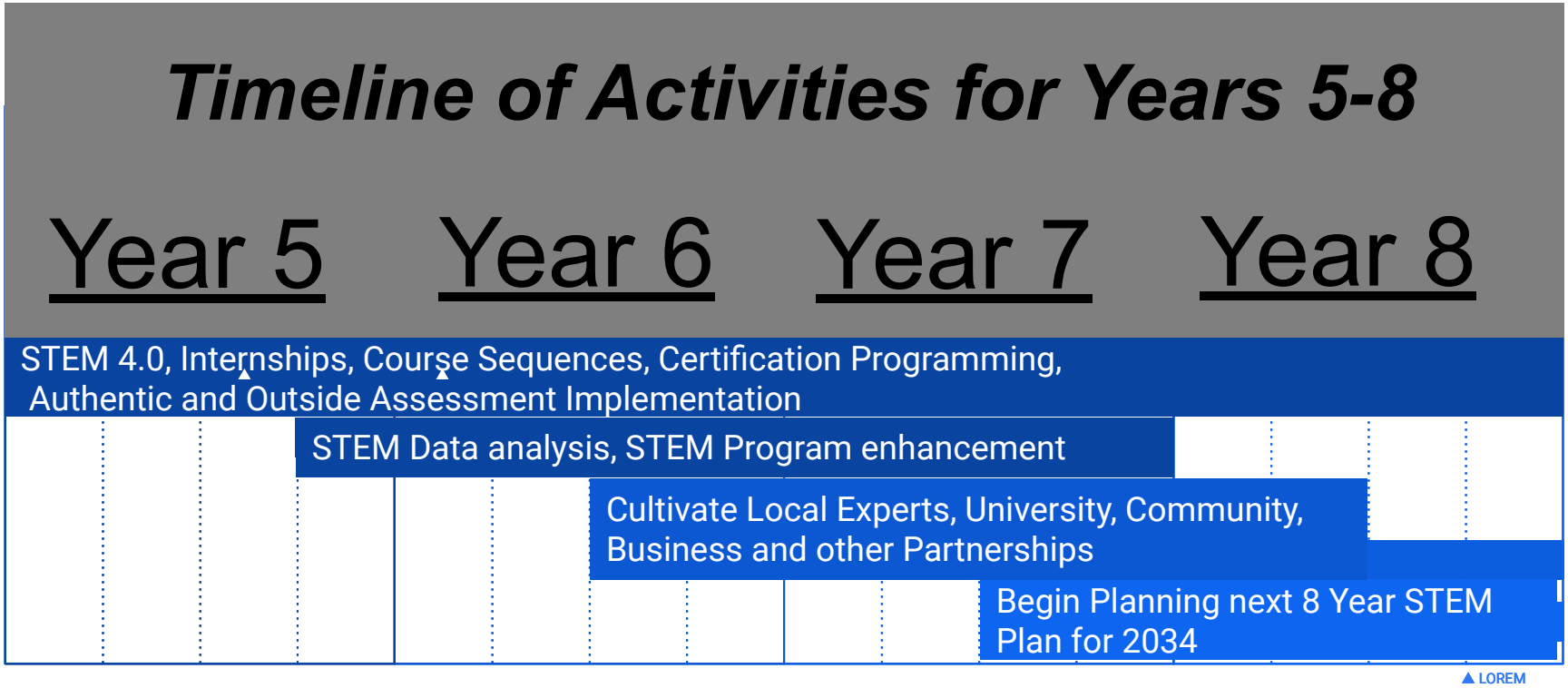
Metuchen's Proposed 8 Year STEM Action Plan:



To be researched for future:
Internships, Career Technical Education
Dual Credit, Certification & Assessment Possibilities

Computer Science Certifications

Adobe Certification

Computer Programming Job Ready Cert

Computer Science Dual Credit (PLTW)

Essentials

Principles

AP Comp Science

Cyber-Security

Medical Field Certifications

Emergency/Clinical (EMT)

Internships at sporting events?

Computer Science Internship:

Metuchen Tech Department Senior Interns (IT support & Summer work)

Outside Assessments:

iSTEM?