

Wallenpaupack Area School District

Planned Course Curriculum Guide

BCIT

STEM 8

Course Description:

The middle school STEM course introduces students to the fundamental concepts of science, technology, engineering, and mathematics through engaging hands-on projects and experiments. Students will develop critical thinking skills, problem-solving abilities, and teamwork through activities that emphasize real-world applications of STEM principles. This course aims to inspire curiosity, creativity, and a lifelong passion for STEM fields.

Initial Creation Date (if applicable) and Revision Dates:

Written 4/15/24

Wallenpaupack Area School District Curriculum	
COURSE: STEM	GRADE/S: 8
UNIT 1: Science	TIMEFRAME: 5 days

PA COMMON CORE/NATIONAL STANDARDS:

- 3.2.8.A1 – Differentiate between mass and weight.
- 3.2.8.B1 – Explain how **inertia** is a measure of an object's **mass**.
Explain how momentum is related to the forces acting on an object.
- 3.2.8.B2 – Identify situations where kinetic energy is transformed into potential energy, and vice versa.
- 3.2.8.B6 – Explain how physics principles underlie everyday phenomena and important technologies.
- 3.4.8.E6 – Analyze the steps involved in the manufacturing process (e.g., design, development, production, marketing and servicing of products and **systems**).
- 3.4.8.E7 – Analyze factors that determine structural design (e.g., building laws and codes, style, convenience, cost, climate, and function).

UNIT OBJECTIVES (SWBATS):

- Explain basic physics terms.
- Apply physics knowledge to the design of their projects.
- Demonstrate how physics principles underlie everyday phenomena and important technologies.
- Identify laws and codes that regulate structural design.
- Work independently as well as in a group to problem solve and communicate through a task.

INSTRUCTIONAL STRATEGIES/ACTIVITIES:

- Projects
- Video
- Presentations
- Internet Resources

ASSESSMENTS (Diagnostic/Benchmark/Formative/Summative):

- Projects
- Classwork
- Quizzes

DIFFERENTIATED INSTRUCTION (Acceleration/Enrichment):

Appropriate accommodations based on the student's IEP/504 Plan and/or student ability.

RESOURCES (Technology Based Resources, Text Resources, etc.):

- Computers
- TV Display
- Internet
- Project Supplies (miscellaneous items)

KEY VOCABULARY:

Gravity, mass, energy, momentum, force, inertia, motion, Newton's Law of Motion, velocity, acceleration/deceleration, design, engineering, physics, speed, velocity, potential energy, kinetic energy, centripetal force, friction

Wallenpaupack Area School District Curriculum	
COURSE: STEM	GRADE/S: 8
UNIT 2: Technology	TIMEFRAME: 5 days

PA COMMON CORE/NATIONAL STANDARDS:

- 3.2.8.A3 – Explain how changes in matter are accompanied by changes in energy.
- 3.4.8.B3 – Explain how throughout history, new **technologies** have resulted from the demands, values, and interests of individuals, businesses, industries, and societies.
- 3.4.8.B4 – Explain how societal and cultural priorities and values are reflected in technological devices.
- 3.4.8.C1 – Evaluate the criteria and constraints of a design.
- 3.4.8.C3 – Analyze how a multi-disciplinary (**STEM**) approach to problem solving will yield greater results.
- 3.4.8.E6 – Analyze the steps involved in the manufacturing process (e.g., design, development, production, marketing and servicing of products and **systems**).
- 3.2.8.B3 – Explain how changes in temperature are accompanied by changes in kinetic energy.
- 3.2.8.B6 – Explain how physics principles underlie everyday phenomena and important technologies.
- 3.4.8.A1 – Analyze the development of **technology** based on affordability or urgency.
- 3.3.8.A2 – Describe renewable and nonrenewable energy resources.

UNIT OBJECTIVES (SWBATS):

- Explain basic physics terms.
- Apply physics knowledge to the design of their projects.
- Explain how and why technology has evolved over time.
- Distinguish between renewable and nonrenewable resources.
- Identify laws and codes that regulate air traffic.
- Describe basic coding terms.
- Work independently as well as in a group to problem solve and communicate through a task.

INSTRUCTIONAL STRATEGIES/ACTIVITIES:

- Projects
- Video
- Presentations
- Internet Resources

ASSESSMENTS (Diagnostic/Benchmark/Formative/Summative):

- Projects
- Classwork
- Quizzes

DIFFERENTIATED INSTRUCTION (Acceleration/Enrichment):

Appropriate accommodations based on the student's IEP/504 Plan and/or student ability.

RESOURCES (Technology Based Resources, Text Resources, etc.):

- Computers
- TV Display
- Internet
- Project Supplies (miscellaneous items)

KEY VOCABULARY:

Text coding, block coding, physics, flight dynamics, flight, lift, drag, roll, yaw, gravity, thrust, renewable/nonrenewable resources

Wallenpaupack Area School District Curriculum	
COURSE: STEM	GRADE/S: 8
UNIT 3: Engineering	TIMEFRAME: 5 Days

PA COMMON CORE/NATIONAL STANDARDS:

- 3.2.8.A1 – Differentiate between mass and weight.
- 3.2.8.A6 – Explain the importance of accuracy and precision in making valid measurements.
- 3.4.8.C1 – Evaluate the criteria and constraints of a design.
- 3.4.8.E5 – Describe how governmental regulations influence the design, operation and efficiency of transportation systems.
- 3.4.8.E6 – Analyze the steps involved in the manufacturing process (e.g., design, development, production, marketing and servicing of products and **systems**).
- 3.4.8.E7 – Analyze factors that determine structural design (e.g., building laws and codes, style, convenience, cost, climate, and function).

UNIT OBJECTIVES (SWBATS):

- Explain and demonstrate the importance of design in structures.
- Describe the different elements of structural design.
- Compare pros and cons to different building strategies.
- Demonstrate the efficiency of different types of materials in the manufacturing/building process.

INSTRUCTIONAL STRATEGIES/ACTIVITIES:

- Projects
- Video
- Presentations
- Internet Resources

ASSESSMENTS (Diagnostic/Benchmark/Formative/Summative):

- Projects
- Classwork
- Quizzes

DIFFERENTIATED INSTRUCTION (Acceleration/Enrichment):

Appropriate accommodations based on the student's IEP/504 Plan and/or student ability.

RESOURCES (Technology Based Resources, Text Resources, etc.):

- Computers
- TV Display
- Internet
- Project Supplies (miscellaneous items)

KEY VOCABULARY:

Design, strength, engineering, tension, compression, buoyancy

Wallenpaupack Area School District Curriculum	
COURSE: STEM	GRADE/S: 8
UNIT 4: Math	TIMEFRAME: 5 Days

PA COMMON CORE/NATIONAL STANDARDS:

3.1.8.A9 – Explain the importance of accuracy and precision in making valid measurements.
 3.4.8.C3 – Analyze how a multi-disciplinary **(STEM)** approach to problem solving will yield greater results.
 3.4.8.D3 – Interpret and evaluate the accuracy of the information obtained and determine its usefulness.
 15.2.8.D – Compare and contrast occupations in a virtual versus a traditional work environment.
 CC.2.2.8.B.2 – Understand the connections between proportional relationships, lines, and linear equations.

UNIT OBJECTIVES (SWBATS):

- Collect data from various experiments.
- Analyze and present data collected.
- Use algebraic expressions to present their findings.
- Demonstrate buying and selling stocks.
- Demonstrate scale.
- Calculate interest.

INSTRUCTIONAL STRATEGIES/ACTIVITIES:

- Projects
- Video
- Presentations
- Internet Resources

ASSESSMENTS (Diagnostic/Benchmark/Formative/Summative):

- Projects
- Classwork
- Quizzes

DIFFERENTIATED INSTRUCTION (Acceleration/Enrichment):

Appropriate accommodations based on the student's IEP/504 Plan and/or student ability.

RESOURCES (Technology Based Resources, Text Resources, etc.):

- Computers
- TV Display
- Internet
- Project Supplies (miscellaneous items)

KEY VOCABULARY:

Stocks, investments, interest, statistics, proportions, scale