.

UPPER DARBY SCHOOL DISTRICT
UPPER DARBY, PENNSYLVANIA

TECHNOLOGY EDUCATION CURRICULUM

Middle School Curriculum
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6th Grade Curriculum
Exploring Technology

Prepared By:
Steve Marotta
Harry Crossgrove
Ed Marlin
Daniel J. Hyland

Middle School Technology Education Department

Edited by:
Mark Furey

District Supervisor Technology Education

Upper Darby School District
Middle School Education Curriculum
Exploring Technology

Course Narrative:

Exploring Technology is a course that introduces concepts of Engineering by Design to the Upper Darby students. Problem solving will be introduced using the Technical Design Loop Method. Through this format students will clarify the problem, brainstorm ideas, select a potential solution, model, test, evaluate, implement their solution, and communicate their results.

The overarching goal for sixth grade is the exploration of structures through research and exploration of the history of structures, the changes in modern construction and how they effect both society and the environment. Through group and individual activities, student experience ways in which technological knowledge and process contribute to effective design and solutions to technical problems.

Key Assessments:

1. Exhibit knowledge and proper usage of a standard fractional ruler.

2. Demonstrate knowledge and safe use and operation of all tools and lab procedures required or specific activities.

3. Demonstrate technological literacy of the terms, concepts and procedures.

4. Use of sketches, technical drawings and or C.A. D. to communicate a graphic idea completely and accurately.

5. Demonstrate proper knowledge of building techniques and the creation of various structures.

6. Demonstrate proper Internet Research Techniques in the creation of a written technical document.

7. Identify and apply practical uses of the 6 different simple machines.

8. Prepare and self evaluate a well-organized and comprehensive portfolio of a student's work.

National Standards for Technological Literacy

The Nature of Technology

Standard 1. Students will develop an understanding of the characteristics and scope of technology.
Standard 2. Students will develop an understanding of the core concepts of technology.
Standard 3. Students will develop an understanding of the relationships among technologies and the connections between technology and other fields of study.

Technology and Society

Standard 6. Students will develop an understanding of the role of society in the development and use of technology.
Standard 7. Students will develop an understanding of the influence of technology on history.

Design

Standard 8. Students will develop an understanding of the attributes of design.
Standard 10. Students will develop an understanding of the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving.

Abilities for a Technological World

Standard 11. Students will develop abilities to apply the design process.

The Designed World

Standard 17. Students will develop an understanding of and be able to select and use information and communication technologies.
Standard 19. Students will develop an understanding of and be able to select and use manufacturing technologies.
Standard 20. Students will develop an understanding of and be able to select and use construction technologies.

Pennsylvania State Academic Standards:
Engineering Drawing & Design II works toward satisfying the following Pennsylvania Standards:

Pennsylvania Academic Standards for Science and Technology

- 3.1.7 A Explain the parts of a simple system and their relationship to each other
- 3.1.7 B Describe the use of model as an application of scientific or technological concepts
- 3.2.7 A Explain and apply scientific and Technological knowledge
- 3.2.7 D Know and use the Technological design process to solve problems
- 3.4.7 C Identify and explain the principles of forces and motion
- 3.5.4 A Describe earth features and processes
- 3.6.7 B Explain information technologies of encoding, transmitting, receiving, storing, retrieving and decoding.
- 3.6.7 C Explain physical technologies of structural design, analysis and engineering.
- 3.7.7 A Describe the safe and appropriate use of tool, materials, and techniques to answer questions and solve problems.
- 3.7.7 C Explain and demonstrate basic computer operations and concepts.
- 3.7.7 D Apply computer software to solve specific problems.
- 3.7.7 E Explain basic computer communications systems.
- 3.8.7. B Explain how human ingenuity and technological resources satisfy specific human needs and improve the quality of life.

Pennsylvania Academic Standards for Mathematics

- 2.3.8 A Develop formulas and procedures for determining measurements.
- 2.9.8 H Use simple geometric figures to create figures in three dimension.
- 2.9.8 J Analyze geometric patterns and develop descriptions of the patterns.

- 2.9.8 K Analyze object to determine whether they illustrate tessellations, symmetry, congruence, similarity, and scale.

- 2.3.11 C Demonstrate the ability to produce measures with specific level of precision.

Pennsylvania Academic Standards for Reading, Writing, Speaking & Listening

- 1.1.8 F Understand the meaning of and apply key vocabulary across the various subject areas.

- 1.2.8 A Read and understand essential content of informational text and documents in all academic areas.

- 1.4.8 D Maintain a written record of activities, course work, experience, honors and interests.

- 1.5.8 B Write using well-developed content appropriate for the topic.

- 1.6.8 A Listen to others, Ask probing questions, Analyze information, ideas and opinions to determine relevancy and take notes when needed.

- 1.8.8 B Locate information using appropriate sources and strategies.

- 1.6.8 E Participate in small and large group discussions and presentations.

- 1.8.8 C Organize, Summarize and present the main idea from research.

Pennsylvania Academic Standards for Career Education and Work

- 13.1.8 A Relate careers to individual interests, abilities and aptitudes.

Upper Darby School District

Middle School Technology Education Curriculum

Exploring Technology

Course Outline

Core Units:

	Class Orientation	(2 Days)
I.	Structures	(6 Days)
II.	Simple Machines	(6 Days)
III.	Measurement	(6 Days)
IV.	Technical Writing & Internet Research	(5 Days)
V.	Sketching	(6 Days)
VI.	Career Exploration	(3 Days)
VII.	Portfolio Completion and Self Evaluation	(2 Days)

Optional Units:

I. Career Development Skills
II. Internet Research on Engineering Marvels
III. Explore Advanced Structures

Upper Darby School District
Exploring Technology

Unit I: Structures

National Standards- The following National Standards are addressed in this unit:

The Nature of Technology
Standard 1, Standard 2 and Standard 3

Technology and Society
Standard 6 and Standard 7

Design
Standard 8 and Standard 10

Abilities for a Technological World
Standard 11

The Designed World
Standard 17, Standard 19 and Standard 20

State Standards- The following Pennsylvania Academic Standards are addressed in this unit:

Science and Technology
3.1.7A, 3.1.7B, 3.2.7D, 3.4.7C. 3.6.7B, 3.6.7C, 3.7.A and 3.8.7B

Mathematics
2.9.8H, 2.9.8J, 2.9.8K, 2.3.8A and 2.3.11C

Career and Work
13.1.8A

Reading, Writing, Speaking and Listening
1.1.8F, 1.2.8.A, 1.4.8D, 1.5.8B, 1.6.8A, 1.8.8B, 1.6.8E and 1.8.8C

Unit I Standards

1. Research different types of structures.
2. Visually communicate ideas for models.
3. Construct and test models.

Unit I Assessments

1. Brief Constructed Response on Structural Work Sheet.
2. Performance Rubric for Visual Communications
3. Performance Rubric for Model Construction.

Unit I Learning Activities

1. Construct model bridges from diagrams using K-NEX materials
2. Construct model Tower, from student design within given constraints out of 50 craft sticks and carpenter glue.
3. Construct model bridges from student generated designs using craft sticks, glue and cardboard.

Unit I Technology

1. Mac computers.
2. Network ready printer
3. Internet and network connection in classroom
4. Epson Computer/VCR image projection unit with screen
5. DVD & VCR players
6. Flash Drive, CD-RW, for file and portfolio storage.
7. CAD software
8. Application Programs

Unit I Materials

1. K-NEX Bridges and Structural Buildings Kits
2. Craft Sticks and Tooth Picks
3. Glue
4. Cardboard and Paper

Unit I Structures

Unit I Remediation

1. Work with peer tutoring to learn skills and techniques missed in class.
2. Complete worksheets that address skills in need of improvement.
3. Utilize veteran students to mentor other students.

Unit I Enrichment

Students who have completed basic structural assignments will progress to advanced structural activities:

1. Internet research of famous structures in the world.
2. Construct advanced models.

Upper Darby School District
Exploring Technology

Unit II: Simple Machines

National Standards- The following National Standards are addressed in this unit:

The Nature of Technology
Standard 1, Standard 2 and Standard 3

Technology and Society
Standard 6 and Standard 7

Design
Standard 8 and Standard 10

Abilities for a Technological World
Standard 11

The Designed World
Standard 17, Standard 19 and Standard 20

State Standards- The following Pennsylvania Academic Standards are addressed in this unit:

Science and Technology
3.1.7A, 3.1.7B, 3.2.7A, 3.2.7D, 3.4.7C, 3.6.7C, 3.7.7A, 3.7.7C, 3.7.7D and 3.8.7B

Mathematics
2.9.8H, 2.9.8J, 2.9.8K, 2.3.8A and 2.3.11C

Reading, Writing, Speaking and Listening
1.1.8F, 1.2.8.A, 1.4.8D, 1.5.8B, 1.6.8A, 1.8.8B, 1.6.8E and 1.8.8C

Career and Work
13.1.8A

Unit II Standards

1. Research different types of simple machines.
2. Visually communicate ideas for models.
3. Construct and test models.
4. Internet research

Unit II Assessments

1. Brief Constructed Response on Simple Machines Work Sheet.
2. Performance Rubric for Visual Communications
3. Performance Rubric for Model Construction.
4. Computer Response to Interactive Internet Activities

Unit II Learning Activities

1. Construct simple machines diagrams using K-NEX materials.
2. Internet and Video research.
3. Identify, Sketch and Demonstrate usages of Simple Machines.
4. Discuss common uses of simple machines.

Unit II Technology

1.Mac computers.
2. Network ready printer
3. Internet and network connection in classroom
4. Epson Computer/VCR image projection unit with screen
5. DVD & VCR players
6. Flash Drive, CD-RW, for file and portfolio storage.
7. CAD software
8. Application Programs

Unit II Materials

1. K-NEX Simple Machine Building Kits
2. Gears, Pulleys, Inclined Planes, Wheel & Axle, Wedge and Levers
3. Graph Paper

Unit II Remediation

1. Work with peer tutoring to learn skills and techniques missed in class.
2. Complete worksheets that address skills in need of improvement.
3. Utilize veteran students to mentor other students.

Unit II Enrichment

Students who have completed basic Simple Machine assignments will progress to advanced structural activities:

1. Internet research of applications of Simple Machines in the world.
2. Construct advanced models.

Upper Darby School District
Exploring Technology

Unit III: Measurement

National Standards- The following National Standards are addressed in this unit:

The Nature of Technology
Standard 2 and Standard 3

Abilities for a Technological World
Standard 11

The Designed World
Standard 17, Standard 19 and Standard 20

State Standards- The following Pennsylvania Academic Standards are addressed in this unit:

Science and Technology
3.1.7A, 3.1.7B, 3.2.7A, 3.6.7C and 3.7.7A

Mathematics
2.3.8A and 2.3.11C

Reading, Writing, Speaking and Listening
1.1.8F, 1.2.8.A, 1.4.8D, 1.5.8B, 1.6.8A, 1.8.8B, 1.6.8E and 1.8.8C

Career and Work
13.1.8A

Unit III Standards

1. Identify fractional measurements of a ruler.
2. Measure length of different objects.
3. Internet research

Unit III Assessments
1. Brief Constructed Response on Measurement Work Sheets.
2. Performance Rubric for Measurement Activity
3. Computer Response to Interactive Internet Activities

Unit III Learning Activities

1. Sketch Fractional Divisions of an Inch
2. Internet and Video research.
3. Identify, Sketch and Demonstrate usages of Linear Measurement.
4. Discuss common uses of Measurement Applications.

Unit III Technology

1. Mac computers.
2. Network ready printer
3. Internet and network connection in classroom
4. Epson Computer/VCR image projection unit with screen
5. DVD & VCR players
6. Flash Drive, CD-RW, for file and portfolio storage.
7. CAD software
8. Application Programs

Unit III Materials

1. Rulers and Engineering Scales
2. Drafting Triangles
3. Graph Paper

Unit III Remediation

1. Work with peer tutoring to learn skills and techniques missed in class.
2. Complete worksheets that address skills in need of improvement.
3. Utilize veteran students to mentor other students.

Unit III Enrichment

Students who have completed basic Measurement Assignments will progress to advanced activities:

1. Internet Research of Applications in Measurement
2. Complete Complex Measurement Assignment.

Upper Darby School District
Exploring Technology

Unit IV: Technical Writing & Internet Research

National Standards- The following National Standards are addressed in this unit:

The Nature of Technology
Standard 1, Standard 2 and Standard 3

Technology and Society
Standard 6 and Standard 7

Design
Standard 8 and Standard 10

Abilities for a Technological World
Standard 11

The Designed World
Standard 17, Standard 19 and Standard 20

State Standards- The following Pennsylvania Academic Standards are addressed in this unit:

Science and Technology
3.4.7C, 3.6.7C, 3.7.7C and 3.8.7B

Reading, Writing, Speaking and Listening
1.1.8F, 1.2.8.A, 1.4.8D, 1.5.8B, 1.6.8A, 1.8.8B, 1.6.8E and 1.8.8C

Unit IV Standards

1. Identify Technical Terminology and words.
2. Communicate written ideas with correct spelling and accuracy.
3. Internet research for Technology Topics and Information

Unit IV Assessments
1. Brief Constructed Response on Vocabulary Work Sheet.
2. Performance Rubric for Writing Graphic Organizer.
3. Performance Rubric for Written Computer Word Processing.

Unit IV Learning Activities

1. Internet and Video research.
2. Complete Graphic Organizer worksheet.
3. Computer Word Processing and Print Out.

Unit IV Technology

1. Mac computers.
2. Network ready printer
3. Internet and network connection in classroom
4. Epson Computer/VCR image projection unit with screen
5. DVD & VCR players
6. Flash Drive, CD-RW, for file and portfolio storage.
7. Application Programs

Unit IV Materials

1. Paper
2. Graphic Organizer Worksheet

Unit IV Remediation

1. Work with peer tutoring to learn skills and techniques missed in class.
2. Complete worksheets that address skills in need of improvement.
3. Utilize veteran students to mentor other students.

Unit IV Enrichment

Students who have completed basic Technical Writing Assignments will progress to advanced activities:

1. Internet Research of additional Written Topics.
2. Complete Additional Technical Writing Assignment.

Upper Darby School District
Exploring Technology

Unit V Sketching

National Standards- The following National Standards are addressed in this unit:

The Nature of Technology
Standard 1and Standard 2

Design
Standard 8 and Standard 10

Abilities for a Technological World
Standard 11

The Designed World
Standard 17, Standard 19 and Standard 20

State Standards- The following Pennsylvania Academic Standards are addressed in this unit:

Science and Technology
3.1.7B, 3.2.7D, 3.6.7B, 3.6.7C, 3.7.7C and 3.7.7D

Mathematics
2.3.8A, 2.3.11C, 2.9.8H and 2.9.8K

Reading, Writing, Speaking and Listening
1.1.8F, 1.2.8.A and 1.4.8D

Career and Work
13.1.8A

Unit V Standards

1. Demonstrate proper usage of Drawing Techniques.
2. Communicate Graphic Ideas through Drawings.
3. Discussion of Career Opportunities in Graphic Industry

Unit V Assessments
1. Performance Rubric of Technical Drawings.
2. Performance Rubric for Graphic Communications.
3. Participation in Career Class Discussions.

Unit V Learning Activities

1. Various Sketching Activities.
2. Complete Mechanical Drawings.
3.Complete class discussion and/or Internet Activity.

Unit V Technology

1. Mac computers.
2. Network ready printer
3. Internet and network connection in classroom
4. Epson Computer/VCR image projection unit with screen
5. DVD & VCR players
6. Flash Drive, CD-RW, for file and portfolio storage.
7. Application Programs

Unit V Materials

1. Paper
2. Basic Drafting Equipment

Unit V Remediation

1. Work with peer tutoring to learn skills and techniques missed in class.
2. Complete worksheets that address skills in need of improvement.
3. Utilize veteran students to mentor other students.

Unit V Enrichment

Students who have completed basic Technical Drawing Assignments will progress to advanced activities:

1. Internet Research of additional Career Topics.
2. Complete Additional Technical Drawing Assignment.

Upper Darby School District
Exploring Technology

Unit VI: Career Exploration

State Standards- The following Pennsylvania Academic Standards are addressed in this unit:

Science and Technology
3.4.7C, 3.6.7C, 3.7.7C and 3.8.7B

Reading, Writing, Speaking and Listening
1.1.8F, 1.2.8.A, 1.4.8D, 1.5.8B, 1.6.8A, 1.8.8B, 1.6.8E and 1.8.8C

Unit VI Standards

1. Identify Technical Careers associated with class projects.
2. Communicate written ideas with correct spelling and accuracy.
3. Internet research for Technology Topics and Information

Unit VI Assessments
1. Brief Constructed Response on Vocabulary Work Sheet.
2. Performance Rubric for 4-Block Writing Technique.
3. Performance Rubric for Written Computer Word Processing.

Unit VI Learning Activities

1. Internet and Video research.
2. Complete 4-Block diagram worksheet.
3. Computer Word Processing and Print Out.

Unit VI Career Exploration

Unit VI Technology

1. Mac computers.
2. Network ready printer
3. Internet and network connection in classroom
4. Epson Computer/VCR image projection unit with screen
5. DVD & VCR players
6. Flash Drive, CD-RW, for file and portfolio storage.
7. Application Programs

Unit VI Materials

1. Paper
2. Worksheets

Unit VI Remediation

1. Work with peer tutoring to learn skills and techniques missed in class.
2. Complete worksheets that address skills in need of improvement.
3. Utilize veteran students to mentor other students.

Unit VI Enrichment

Students who have completed basic Technical Writing Assignments will progress to advanced activities:

1. Internet Research of additional Written Topics.
2. Complete Additional Technical Writing Assignment

Upper Darby School District
Exploring Technology

Unit VII Portfolio Completion and Self Evaluation

National Standards- The following National Standards are addressed in this unit:

The Nature of Technology
Standard 1 and Standard 2

Design
Standard 8 and Standard 10

Abilities for a Technological World
Standard 11

The Designed World
Standard 17, Standard 19 and Standard 20

State Standards- The following Pennsylvania Academic Standards are addressed in this unit:

Science and Technology
3.7.7C, 3.7.7D and 3.7.7E

Reading, Writing, Speaking and Listening
1.1.8F, 1.2.8.A, 1.4.8D, 1.5.8B, 1.6.8A, 1.8.8B, 1.6.8E and 1.8.8C

Career and Work
13.1.8A

Unit VII Standards

1. Create an Organized Portfolio of Classroom Activities.

Unit VII Assessments
1. Performance Rubric of Technology Education Portfolio.
2. Self Evaluation of Student Progress.

Unit VII Learning Activities

1. Organize Classroom Activities.
2. Create Portfolio Coverage Page.

Unit VII Technology

1. Mac computers.
2. Network ready printer
3. Internet and network connection in classroom
4. Epson Computer/VCR image projection unit with screen
5. DVD & VCR players
6. Flash Drive, CD-RW, for file and portfolio storage.
7. Application Programs

Unit VII Materials

1. Paper

Unit VII Remediation

1. Work with peer tutoring to learn skills and techniques missed in class.
2. Utilize veteran students to mentor other students.

Unit VII Enrichment

Students who have completed Portfolio Assignment will progress to advanced activities:

1. Computer Designed Portfolio Cover Page.
2. Computer Designed Table of Contents.
3. Additional Portfolio Examples of Student Work.