



Park Hill School District

Building Successful Futures • Each Student • Every Day

6th Grade Technology Education Curriculum

This curriculum is formatted as a series of Missions and is not meant to be taught in a linear fashion. There are 8 total possible Missions during the course. Each student will complete 5-6 of the Missions. Students will work in teams and will be assigned roles. Their roles, teammates, and Missions will rotate every 6-7 class periods. Students will also complete at least one enrichment activity over the course of 4-6 days.

Course Description: This course involves a series of STEM “Missions” where students work in teams, exploring hands-on projects and activities to gain a basic understanding of the design, technology, and engineering fields. © 2017 Pitsco, Inc.

Scope and Sequence:

Unit	Instructional Topics
Technology and Design	Mission 1: Technology and Design
Power and Energy	Mission 1: Energy Mission 2: Limited Resources
Manufacturing and Construction	Mission 1: Engineering Structures
Inquiry	Mission 1: Body of Work Mission 2: Crime Lab
Transportation	Mission 1: Motion and Force Mission 2: Rocketry
Enrichment Discovery Day	Topic 1: Hot Air Balloons Topic 2: Balsa Wood Bridges

Curriculum Revision Tracking

Fall 2018

- Format of course changed to reflect 8 possible missions of which students will complete 5-6 and the inclusion of whole class enrichment activities.
- Unit 2
 - Removed Mission 1: Circuits
 - Changed “Mission 3: Simple Mechanics” to “Mission 2: Limited Resources”
 - Modified unit overview, essential questions, enduring understandings, and vocabulary to reflect Mission changes.
- Unit 3: Manufacturing and Construction
 - Removed Mission 1: Skyscrapers
 - Changed “Engineering” to “Engineering Structures”
 - Modified unit overview, essential questions, enduring understandings, and vocabulary to reflect Mission changes.
- Unit 4: Inquiry
 - Removed Mission 1: Puzzlers
 - Changed Mission 2: Epidemic to Mission 1: Body of Work
 - Changed Crime Lab to Mission 2
 - Modified unit overview, essential questions, enduring understandings, and vocabulary to reflect Mission changes.
- Unit 5: Transportation
 - Removed Mission 2: Flying Things
 - Modified unit overview, essential questions, enduring understandings, and vocabulary to reflect Mission changes.
- Added new unit - Unit 6: Enrichment Discovery Day
 - Added Topic 1: Hot Air Balloons
 - Added Topic 2: Balsa Wood Bridges

Unit 1: Technology and Design

Subject: Technology Education

Grade: 6th

Name of Unit: Communication

Overview of Unit: In *Technology and Design* students learn about how people create new things to solve problems. Students will experiment with rubber band power. They design, build, and test a vehicle to travel the farthest distance.

Essential Questions:

1. Why is it important to utilize the design process in solving real-life problems?

Enduring Understanding/Big Ideas:

1. Applying the design process helps students solve real-life problems in every content area and aspect of their lives.

Unit Vocabulary:

Academic Cross-Curricular Words	Content/Domain Specific
Solution Process Research Analysis Psychology System Invent	Brief Interview Three-view drawing

Resources for Vocabulary Development: Mission resources and technology glossary

Mission 1: Technology and Design

Suggested Length of Time: 6-7 days

Detailed Description/Instructions: Students will work through the design process to build a rubber band propelled vehicle that can go as far and as fast as possible. They will prototype and redesign based on initial test results.

Bloom's Levels: Create

Webb's DOK: 3

Unit 2: Power and Energy

Subject: Technology Education

Grade: 6th

Name of Unit: Power and Energy

Overview of Unit: In *Power and Energy* students will learn how electrical energy is produced and how it can be converted into other useful forms of energy. They will also learn the difference between potential & kinetic energy, renewable and nonrenewable energy sources.

Essential Questions:

1. How is energy produced?
2. How are the various forms of energy different?
3. What is the best source of alternative energy?

Enduring Understanding/Big Ideas:

1. Knowledge of how energy can be produced and how it can be converted into other useful forms of energy is necessary to successfully wire and connect various circuits.
2. Renewable energy and nonrenewable energy sources have different impact on the environment and come with tradeoffs.
3. The best source of alternative energy is situation dependent. Students should be able to identify which source of energy meets an appropriate scenario.

Unit Vocabulary:

Academic Cross-Curricular Words	Content/Domain Specific
Generated Renewable Energy Potential energy Kinetic energy Thermal energy Chemical energy Force Effort Friction Motion Movable	Joule Perpetual Mechanical energy

Resources for Vocabulary Development: Mission resources and technology glossary

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Mission 1: Energy

Title: Energy

Suggested Length of Time: 6-7 days

Detailed Description/Instructions: In *Energy* students learn about joules, potential and kinetic energy. They will learn about renewable and nonrenewable energy sources and conduct experiments with different types of energy using wind turbines, water wheels, and solar cars.

Bloom's Levels: Analyze

Webb's DOK: 3

Mission 2: Limited Resources

Title: Limited Resources

Suggested Length of Time: 6-7 days

Detailed Description/Instructions: In *Limited Resources* students learn about fossil fuels and limited nonrenewable resources. They engineer a solar car, make recycled jewelry, and inspect the components of soil.

Bloom's Levels: Create

Webb's DOK: 3

Unit 3: Manufacturing and Construction

Subject: Technology Education

Grade: 6th

Name of Unit: Manufacturing and Construction

Overview of Unit: In *Manufacturing and Construction* students will test their building skills. They will design, build and test parts of structures. They will learn that structures are made from parts arranged in a definite pattern and are designed to serve a purpose.

Essential Questions:

1. Why are some structures stronger than others?
2. How does one design, build and test parts of structures?

Enduring Understanding/Big Ideas:

1. Footprint, center of gravity and weight distribution directly affect the performance of a structure.
2. The concepts of compression & tension forces affect structures and are critical to the design of a successful truss. This can be tested using weights to determine efficiency of the structure.

Unit Vocabulary:

Academic Cross-Curricular Words	Content/Domain Specific
Efficiency	Property
Meters	Compress
Flexible	Architect
Vertical	Failure
Cylinder	Frame
	Static load
	Dynamic load

Resources for Vocabulary Development: Mission resources and technology glossary

Mission 1: Engineering Structures

Title: Engineering Structures

Suggested Length of Time: 6-7 days

Detailed Description/Instructions: In *Engineering Structures* students learn about designing, building, and testing parts of structures. Students will learn that structures are made from parts arranged in a definite pattern and are designed to serve a purpose.

Bloom's Levels: Create

Webb's DOK: 3

Unit 4: Inquiry

Subject: Technology Education

Grade: 6th

Name of Unit: Inquiry

Overview of Unit: In *Inquiry* students are introduced to various content that allows them to utilize specific tools to solve real world problems. They will be introduced to tools that forensic scientists use to solve crimes, learn how to identify diseases & ways to keep them from spreading and be challenged to think outside the box to find a solution to a situation or problem.

Essential Questions:

1. How do we solve problems and puzzles?
2. Why can diseases be spread from person to person?
3. How do forensic scientists use to solve crimes?

Enduring Understanding/Big Ideas:

1. It is necessary to be able to think creatively and brainstorm when thinking about ways to solve problems or puzzles.
2. Diseases can be spread from one person to another by either direct or indirect contact.
3. Forensic scientists utilize DNA, fingerprinting, blood types, surveillance cameras, physical traits and genetics to solve crimes.

Unit Vocabulary:

Academic Cross-Curricular Words	Content/Domain Specific
Brain Disease Trait inherit	Eyewitness Evidence Gene Forensic scientist Dominant Recessive Conviction Fatal

Resources for Vocabulary Development: Mission resources and technology glossary

Mission 1: Body of Work

Title: Body of Work

Suggested Length of Time: 6-7 days

Detailed Description/Instructions: In *Body of Work* students learn about the different body systems and complete activities utilizing these body systems.

Bloom's Levels: Evaluate

Webb's DOK: 3

Mission 2: Crime Lab

Title: Crime Lab

Suggested Length of Time: 6-7 days

Detailed Description/Instructions: In *Crime Lab* students solve mysteries using surveillance camera pictures, reports from forensic scientists, and physical evidence found at crime scenes.

Bloom's Levels: Evaluate

Webb's DOK: 3

Unit 5: Transportation

Subject: Technology Education

Grade: 6th

Name of Unit: Transportation

Overview of Unit: In *Transportation* students will learn the concepts of Newton's three laws of motion, study forces & lift and trajectory & thrust. They will utilize rubber band propelled LEGO cars and straw rockets to experiment and/or demonstrate these principles.

Essential Questions:

1. What affects objects in motion?
2. How do trajectory and thrust impact a rocket's flight?

Enduring Understanding/Big Ideas:

1. Students should be able to apply Newton's three laws of motion to various moving objects.
2. Trajectory and thrust determine the flight and performance of a rocket's flight.

Unit Vocabulary:

Academic Cross-Curricular Words	Content/Domain Specific
Motion	Reaction
Gravity	Interact
Scientific law	Inertia
Force	Specification
Accelerate	Trajectory
Mass	Thrust
Lift	Rocket
Similar	Propellant
Stability	Fuel
Top view	Exhaust
Action	Multistage
	Space shuttle

Resources for Vocabulary Development: Mission resources and technology glossary

Mission 1: Motion and Force

Title: Motion and Force

Suggested Length of Time: 6-7 days

Detailed Description/Instructions: In *Motion and Force* students learn about Newton's three laws of motion. Students build LEGO cars and test the cars based on Newton's laws.

Bloom's Levels: Create

Webb's DOK: 3

Mission 2: Rocketry

Title: Rocketry

Suggested Length of Time: 6-7 days

Detailed Description/Instructions: In *Rocketry* students design, build, and test straw rockets. They work together to determine the best design for a rocket to land in a specific target area.

Bloom's Levels: Create

Webb's DOK: 3

Unit 6: Enrichment Discovery Days

Subject: Technology Education

Grade: 6th

Name of Unit: Enrichment Discovery Days

Overview of Unit: Enrichment discovery days will maintain student engagement through creativity, hands-on application, and real-life experimentation.

Essential Questions:

1. How do different forces impact structures?
2. Why are some bridge shapes stronger than others?
3. How does balloon size impact the flight characteristics of the balloons?
4. How do you calculate the volume of an inflated balloon (modeled as a sphere)?

Enduring Understanding/Big Ideas:

1. Compression pushes the structure and tension pulls the structure apart.
2. The structure and design of the bridge impacts the strength of the bridge. The geometric shape that is chosen for the bridge will impact the bridge's strength.
3. The larger the balloon, the more hot air that it can hold. The heavier the balloon is, the more hot air that it will take to rise.
4. Volume of a sphere = $\frac{4}{3} \cdot \pi \cdot \text{radius}^3$

Unit Vocabulary:

Academic Cross-Curricular Words	Content/Domain Specific
angle compression conclusion hypothesis side view sphere volume analyze	cubic foot deflate function inflate joint side grain end grain

Resources for Vocabulary Development: Mission resources and technology glossary

Enrichment Activity 1: Hot Air Balloons

Suggested Length of Time: 4-5 Days

Detailed Description/Instructions: Students will work with a partner(s) to design, construct, test and evaluate the test results of a hot air balloon. Students will investigate the properties of hot air balloons.

Bloom's Levels: Create

Webb's DOK: 3

Enrichment Activity 2: Balsa Wood Bridges

Suggested Length of Time: 6-7 Days

Detailed Description/Instructions: Students will work with a partner to design, construct, test, and evaluate the test results of a balsa wood bridge. Students will investigate the strength of various truss joints to create a bridge design to efficiently hold a minimum amount of weight.

Bloom's Levels: Create

Webb's DOK: 3

Unit of Study Terminology

Appendices: All Appendices and supporting material can be found in this course's shell course in the District's Learning Management System.

Assessment Leveling Guide: A tool to use when writing assessments in order to maintain the appropriate level of rigor that matches the standard.

Big Ideas/Enduring Understandings: Foundational understandings teachers want students to be able to discover and state in their own words by the end of the unit of study. These are answers to the essential questions.

Engaging Experience: Each topic is broken into a list of engaging experiences for students. These experiences are aligned to priority and supporting standards, thus stating what students should be able to do. An example of an engaging experience is provided in the description, but a teacher has the autonomy to substitute one of their own that aligns to the level of rigor stated in the standards.

Engaging Scenario: This is a culminating activity in which students are given a role, situation, challenge, audience, and a product or performance is specified. Each unit contains an example of an engaging scenario, but a teacher has the ability to substitute with the same intent in mind.

Essential Questions: Engaging, open-ended questions that teachers can use to engage students in the learning.

Priority Standards: What every student should know and be able to do. These were chosen because of their necessity for success in the next course, the state assessment, and life.

Supporting Standards: Additional standards that support the learning within the unit.

Topic: These are the main teaching points for the unit. Units can have anywhere from one topic to many, depending on the depth of the unit.

Unit of Study: Series of learning experiences/related assessments based on designated priority standards and related supporting standards.

Unit Vocabulary: Words students will encounter within the unit that are essential to understanding. Academic Cross-Curricular words (also called Tier 2 words) are those that can be found in multiple content areas, not just this one. Content/Domain Specific vocabulary words are those found specifically within the content.