# $6^{th}$ - $8^{th}$ Technology Education Curriculum

## Power Standards

Students will be able to:

1. Practice employability skills including teamwork, communication, problem-solving, and quality workmanship.
2. Demonstrate technical reading skills.
3. Develop the skills needed for a variety of career fields.

## Power Benchmarks

Students will be able to: (Identify the best power standard to put these power benchmarks under.)

1. Understand the basic framework of each module. - Orientation Module
2. Analyze CADD software to produce architectural and mechanical drawings. - CADD Module
3. Analyze the process of video graphic design by using computer software to create and produce graphics and an animated sequence. - Computer Graphics & Animation Module
4. Create computerized numerical control (CNC) graphics and text. – CNC Manufacturing Module
5. Solve an open-ended challenge by applying the steps of a problem-solving model. – Creative Solutions Module
6. Create video clips that include good editing principles, special effects, and manipulation of audio and video data. - Digital Video Module
7. Understand the basic elements and applications of electricity. - Electricity Module
8. Demonstrate a basic understanding of energy sources, the principles of power technology, and the concept of mechanical advantage and machines. - Energy Power Module
9. Understand the concepts and process involved in designing and constructing a truss-structured tower. - Engineering Towers Module (9)
10. Develop an understanding for two- and four-stroke engines. - Engines Module
11. Understand how ideas are communicated in a graphic format through drafting. - Graphic Communication Module
12. Understand concepts and usage of lights and lasers to create a clearer picture of the nature of light. - Lights & Lasers Module
13. Understand factors in designing packages based on appearance, practicality, and conservation of material. - Package Design Module
14. Understand the uses, characteristics, and molecular structures of polymers and monometers. - Plastics & Polymers Module
15. Develop skills needed to operate basic hand tools. - Practical Skills Module
16. Understand the importance of specifications, standards, and experimentation when designing/fabricating new products. - Research & Design Module
17. Investigate the history and operation of robots and their control programs. - Robotics Module

# $6^{th}$ - $8^{th}$ Technology Education Curriculum

## Power Standards

Students will be able to:

1. Practice employability skills including teamwork, communication, problem-solving, and quality workmanship.
   - Understand the basic framework of each module. - Orientation Module (1)

2. Demonstrate technical reading skills.
   - Solve an open-ended challenge by applying the steps of a problem-solving model. – Creative Solutions Module (5)

3. Develop the skills needed for a variety of career fields.
   - Analyze CADD software to produce architectural and mechanical drawings. - CADD Module (2)
   - Analyze the process of video graphic design by using computer software to create and produce graphics and an animated sequence. - Computer Graphics & Animation Module (3)
   - Create computerized numerical control (CNC) graphics and text. – CNC Manufacturing Module (4)
   - Create video clips that include good editing principles, special effects, and manipulation of audio and video data. - Digital Video Module (6)
   - Understand the basic elements and applications of electricity. - Electricity Module ((7)
   - Demonstrate a basic understanding of energy sources, the principles of power technology, and the concept of mechanical advantage and machines. - Energy Power Module (8)
   - Understand the concepts and process involved in designing and constructing a truss-structured tower. - Engineering Towers Module (9)
   - Develop an understanding for two- and four-stroke engines. - Engines Module (10)
   - Understand how ideas are communicated in a graphic format through drafting. - Graphic Communication Module (11)
   - Understand concepts and usage of lights and lasers to create a clearer picture of the nature of light. - Lights & Lasers Module (12)
   - Understand factors in designing packages based on appearance, practicality, and conservation of material. - Package Design Module (13)
   - Understand the uses, characteristics, and molecular structures of polymers and monometers. - Plastics & Polymers Module (14)
   - Develop skills needed to operate basic hand tools. - Practical Skills Module (15)
   - Understand the importance of specifications, standards, and experimentation when designing/fabricating new products. - Research & Design Module (16)
   - Investigate the history and operation of robots and their control programs. - Robotics Module (17)

# $6^{th}$ - $8^{th}$ Technology Education Curriculum

## Stage 1 – Desired Results

**Power Standard 1:** Practice employability skills including teamwork, communication, problem-solving, and quality workmanship.

**Orientation Module**
**Power Benchmark/Competency #1:**
Understand the basic framework of each module.

**Estimated Timeline:** 7 days/45 minutes each

**Place 'X' in square if goal addresses Essential/Content Standard(s).**

| Career | Technology | Critical Thinking | Global & Cultural | Personal Responsibility |
|---|---|---|---|---|
| x | x | x | | x |
| **Math** | **Science** | **Reading** | **Social Responsibility** | **Communications** |
| x | | x | x | x |

**Understandings:**
*Students will understand that (sentence):*
- Working with a partner is essential to success.
- Students will be responsible for determining personal progress.
- The purpose of orientation is to learn terminology, grading, steps, and safety procedures used in each module framework.
- Math skills are used to calculate percentages and grading.

**Essential Questions:**
- What are the benefits and strategies of successfully working with a module partner?
- How is your grade determined for each module?
- What is the purpose of orientation?

***Students will (know):***…(Include vocabulary)
- Explain benefits and define strategies of successfully working with a module partner.
- Describe when and how safety instructions should be followed.
- State the point value of Research/Challenge/ - Application (RCA) and explain how the points are determined.
- Define terminology.
  - Vocabulary: RCA, module, session, synergy, orientation, workstation, portfolio, module guide, performance assessment, enrichments, post test, agent

***Students will be able to:*** *(i.e. do)…*(Include vocabulary)
- Calculate the grade for the module.
- Demonstrate how to find the answer to a research question.
  - Vocabulary: student information button, call light

## Stage 2 – Assessment Evidence

**Performance Tasks:** (i.e. Assessment used to determine proficiency on competency)
- Orientation post-test assessment

**Key Criteria:** (Rubric)
- Exceeds - ability to answer questions without assistance
- Meets - ability to answer question without the need to rephrase on two or fewer occasions
- Needs – fails to answer question correctly after instructor assistance

| Question | Exceeds | Meets | Needs |
|---|---|---|---|
| What are the benefits and strategies of successfully working with a module partner? | 3 | 2 | I |
| How is your grade determined for each module? | 3 | 2 | I |
| What is the purpose of orientation? | 3 | 2 | I |

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| Stage 3 – Learning Plan | |
|---|---|
| **Learning Activities:**<br>➢ Learning to work with a partner<br>➢ Learning how to navigate through module<br>➢ Agent navigation<br>➢ Familiarization with module library<br>➢ Points / Scoring system and calculation | **Resources:**<br>➢ Module Library<br>➢ Calculator<br>➢ Orientation Module Activity Sheet<br>➢ Portfolio |

**Stage 3 – Learning Plan:**
**Power Benchmark/Competency #1:**
Understand the basic framework of each module.

| Learning Activities: | Resources: |
|---|---|
| **Day 1 Security, System/Navigation Controls, Attendance/Participation** | |
| **Day 2 RCA Questions, RCA Strategies** | |
| **Day 3 Delivery Methods, Interaction Types, F8 and F5 Keys, Student Tips, Agent Navigation** | |
| **Day 4 First Assessment, Safety, Worksheets** | |
| **Day 5 Second Assessment, Knowledge Survey** | |
| **Day 6 Enrichments** | |
| **Day 7 Third Assessment, Grades** | |
| **Enrichment Career Investigation, Vocabulary, Math/Science Enrichments** | |
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## Stage 1 – Desired Results

**Power Standard 3:** Develop the skills needed for a variety of career fields.

**CADD Module**
**Power Benchmark/Competency #2:**
Analyze CADD software to produce architectural and mechanical drawings.

**Estimated Timeline:** 7 days/45 minutes each

**Place 'X' in square if goal addresses Essential/Content Standard(s).**

| Career | Technology | Critical Thinking | Global & Cultural | Personal Responsibility |
|---|---|---|---|---|
| x | x | x | | x |
| **Math** | **Science** | **Reading** | **Social Responsibility** | **Communications** |
| x | | x | | x |

**Understandings:**
*Students will understand that (sentence):*
- The alphabet of lines is an essential concept for all CADD drawings.
- There is a standard procedure for dimensioning a multi-view drawing.
- Understanding the fundamentals to create a floor plan is essential for a quality design.

**Essential Questions:**
- How do you identify the hidden object and border lines on printed drawings?
- Why are there typically only three views on a multi-view drawing?
- What architectural symbols are used on a floor plan and what do they represent?
- Why is it important to plan the placement of dimensions in a multi-view drawing?

***Students will (know):***…(Include vocabulary)
- Define the term CADD.
- Give examples of occupations in which CADD skills are needed.
- Explain the phrase orthographic projection.
- Appreciate occupations in which skills learned in this module are used.
  - Vocabulary: object lines, dimension, angle, radius

***Students will be able to:*** *(i.e. do)…*(Include vocabulary)
- Produce and print mechanical drawings.
- Design an original architectural drawing.
  - Vocabulary: mechanical, architectural, drafting

## Stage 2 – Assessment Evidence

**Performance Tasks:** (i.e. Assessment used to determine proficiency on competency)
- CADD post-test

**Key Criteria:** (Rubric)
- Exceeds - ability to answer questions without assistance
- Meets - ability to answer question without the need to rephrase on two or fewer occasions
- Needs – fails to answer question correctly after instructor assistance

| Question | Exceeds | Meets | Needs |
|---|---|---|---|
| How do you identify the hidden object and border lines on printed drawings? | 3 | 2 | I |
| Why are there typically only three views on a multi-view drawing? | 3 | 2 | I |
| What architectural symbols are used on a floor plan and what do they represent? | 3 | 2 | I |
| Why is it important to plan the placement of dimensions in a multi-view drawing? | 3 | 2 | I |

| Stage 3 – Learning Plan | |
|---|---|
| **Learning Activities:**<br>➢ Use of three-dimensional drawings<br>➢ Learning the alphabet of lines<br>➢ Create and dimension a multiview drawing<br>➢ Create a floor plan<br>➢ Evaluate floor plan for improvement | **Resources:**<br>➢ Module Library<br>➢ Calculator Geometric objects<br>➢ 3-D software<br>➢ CADD software |

**Stage 3 – Learning Plan:**
**Power Benchmark/Competency #2:**
Analyze CADD software to produce architectural and mechanical drawings.

| **Learning Activities:** | **Resources:** |
|---|---|
| **Day 1: Introduction to CADD, Assessment** | Student Module Notebook, scissors, wheels, axles |
| **Day 2: Dimensioning and Multiview Drawings** | Student Module Notebook |
| **Day 3: Multiview Drawings, Assessment** | Geometric figures, Ruler |
| **Day 4: Cutaway Drawings** | Geometric Shapes, Ruler |
| **Day 5: Architectural Drawings** | "Planning Your House" worksheet, Sample House Plans |
| **Day 6: Floor Plan** | |
| **Day 7: Floor Plan Completion, Assessment** | |
| **Enrichment** | |
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## Stage 1 – Desired Results

**Power Standard 3:** Develop the skills needed for a variety of career fields.

**Computer Graphics & Animation Module**
**Power Benchmark/Competency #3:**
Analyze the process of video graphic design by using computer software to create and produce graphics and an animated sequence.

**Estimated Timeline:** 7 days/45 minutes each

**Place 'X' in square if goal addresses Essential/Content Standard(s).**

| Career | Technology | Critical Thinking | Global & Cultural | Personal Responsibility |
|---|---|---|---|---|
| x | x | x | | x |
| **Math** | **Science** | **Reading** | **Social Responsibility** | **Communications** |
| x | | x | x | |

**Understandings:**
*Students will understand that (sentence):*
- The use of computer and related software will be used to enhance graphics and animations.
- Digital movie camera will be used to capture a picture and create an animated project.

**Essential Questions:**
- What is an application of virtual reality?
- What does the "rendering process' mean?
- What is an advantage of using a computer to generate graphics or animation?

***Students will (know):***…(Include vocabulary)
- Utilize computer applications and video camera to complete a series of projects including virtual reality (VR), walk-through, 3-D logo design, and animation.
- Appreciate occupations in which skills learned in this module are used.
    - Vocabulary: pixel, resolution, interactive, cyberspace

***Students will be able to:*** *(i.e. do)…*(Include vocabulary)
- Create and produce graphics and animated sequences using computer software.
- Capture an image with a video camera and digitize the picture with the computer.
    - Vocabulary: animation, morph, virtual reality, hardware, stop-motion animation

## Stage 2 – Assessment Evidence

**Performance Tasks:** (i.e. Assessment used to determine proficiency on competency)
- Computer Graphics & Animation post-test assessment.

**Key Criteria:** (Rubric)
- Exceeds - ability to answer questions without assistance
- Meets - ability to answer question without the need to rephrase on two or fewer occasions
- Needs – fails to answer question correctly after instructor assistance

| Question | Exceeds | Meets | Needs |
|---|---|---|---|
| What is an application of virtual reality? | 3 | 2 | I |
| What does the "rendering process' mean? | 3 | 2 | I |
| What is an advantage of using a computer to generate graphics or animation? | 3 | 2 | I |

## Stage 3 – Learning Plan

**Learning Activities:**
- Using virtual reality to create a virtual environment
- Create a 3-D logo and render it with software
- Identify advantages of using computer-generated animation
- Identify one or more examples of computer-generate graphics
- Create an animated project using a camera and animation software

**Resources:**
- Module Library
- Calculator 3-D animation software
- Animation software
- Digital camera

| Stage 3 – Learning Plan: Power Benchmark/Competency #3: Analyze the process of video graphic design by using computer software to create and produce graphics and an animated sequence. | |
|---|---|
| **Learning Activities:** | **Resources:** |
| **Day 1: Digital Stop-Motion** | **Bendable Figures, Video camera** |
| **Day 2: Image Morphing** | **Video camera** |
| **Day 3: Virtual Reality** | |
| **Day 4: Virtual Reality Walk-through** | |
| **Day 5: 3-D Logo Design** | |
| **Day 6: 3-D Animation** | |
| **Day 7: Final 3-D Animation** | **Worksheet, Student Module Notebook** |
| **Enrichment** | **Module Library** |
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## Stage 1 – Desired Results

**Power Standard 3:** Develop the skills needed for a variety of career fields.

**CNC Manufacturing Module**
**Power Benchmark/Competency #4:**
Create computerized numerical control (CNC) graphic and text.

**Estimated Timeline:** 7 days/45 minutes each

**Place 'X' in square if goal addresses Essential/Content Standard(s).**

| Career | Technology | Critical Thinking | Global & Cultural | Personal Responsibility |
|---|---|---|---|---|
| x | x | | | x |
| **Math** | **Science** | **Reading** | **Social Responsibility** | **Communications** |
| x | | x | x | x |

**Understandings:**
*Students will understand that (sentence):*
- The Cartesian Coordinate System is the backbone of CNC programming.
- The importance of proper set-up, including home position, is essential in CNC programming.
- The concepts of tolerance and specifications are required in the manufacturing process.

**Essential Questions:**
- Why is the Cartesian Coordinate System thought to be the backbone of CNC programming?
- What is the importance of the home position in regards to proper set-up of a CNC mill?
- Why are tolerance and specifications required in the manufacturing process?

***Students will (know):***…(Include vocabulary)
- Give an example of the primary and secondary processes.
- Appreciate occupations in which skills learned in this module are used.
  - Vocabulary: Cartesian Coordinate System, CNC, raw materials, CADD, automation, engineering materials

***Students will be able to:*** *(i.e. do)…*(Include vocabulary)
- Demonstrate the ability to mill a simple geometric shape.
- Design and mill a nameplate.
- Produce a geometric shape with appropriate text.
  - Vocabulary: geometric

## Stage 2 – Assessment Evidence

**Performance Tasks:** (i.e. Assessment used to determine proficiency on competency)

- CNC Manufacturing post-test

**Key Criteria:** (Rubric)
- Exceeds - ability to answer questions without assistance
- Meets - ability to answer question without the need to rephrase on two or fewer occasions
- Needs – fails to answer question correctly after instructor assistance

| Question | Exceeds | Meets | Needs |
|---|---|---|---|
| Why is the Cartesian Coordinate System thought to be the backbone of CNC programming? | 3 | 2 | I |
| What is the importance of the home position in regards to proper set-up of a CNC mill? | 3 | 2 | I |
| Why are tolerance and specifications required in the manufacturing process? | 3 | 2 | I |

| Stage 3 – Learning Plan | |
|---|---|
| **Learning Activities:**<br>➤ Use Modela software to create desired shapes<br>➤ Explain the Cartesian coordinate system<br>➤ Machine stock using software to generate an image to be milled by the CNC software | **Resources:**<br>➤ Module Library<br>➤ Calculator Modela software<br>➤ CNC mill |

**Stage 3 – Learning Plan:**
**Power Benchmark/Competency #4:**
Create computerized numerical control (CNC) graphic and text.

| **Learning Activities:** | **Resources:** |
|---|---|
| **Day 1: Introduction to CNC Manufacturing** | |
| **Day 2: Draw a Square** | **Plastic Blank** |
| **Day 3: Draw a Circle** | **Plastic Blank** |
| **Day 4: Program a Circle** | **Plastic Blank** |
| **Day 5:** | |
| **Day 6:** | |
| **Day 7: Milling Name** | |
| **Enrichment** | **Module Library** |
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## Stage 1 – Desired Results

**Power Standard 2:** Demonstrate technical reading skills.

**Creative Solutions Module**
**Power Benchmark/Competency #5:**
Solve an open-ended challenge by applying the steps of a problem-solving model.

**Estimated Timeline:** 7 days/45 minutes each

**Place 'X' in square if goal addresses Essential/Content Standard(s).**

| Career | Technology | Critical Thinking | Global & Cultural | Personal Responsibility |
|---|---|---|---|---|
| x | | x | | x |
| **Math** | **Science** | **Reading** | **Social Responsibility** | **Communications** |
| x | x | x | x | x |

**Understandings:**
*Students will understand that (sentence):*
- The use of problem-solving methods helps to solve the problem and come up with new ideas.
- There is a formula used for calculating work and for determining how it relates to problem solving.
- The use of four simple machines is necessary to successfully engineer machines to traverse an obstacle course.

**Essential Questions:**
- What are the five steps of the Synergistic Problem Solving Model?
- What are the four simple machines, and how can they be used to traverse a Synergistic obstacle course?

***Students will (know):***…(Include vocabulary)
- Appreciate occupations in which skills learned in this module are used.
- Describe brain-storming
- Vocabulary
  - Hypothesis
  - Scientific method
  - Work
  - Mechanical advantage

***Students will be able to:*** *(i.e. do)…*(Include vocabulary)
- Apply the steps of problem solving to develop a solution to an open-ended task.
- Apply electrical, pneumatic, and mechanical principles while using building set to construct simple and compound machines.
- Vocabulary
  - Lever
  - Pneumatic
  - Pulley
  - Mechanical Principles

**Performance Tasks:** (i.e. Assessment used to determine proficiency on competency)
- Creative Solutions post-test assessment

**Key Criteria:** (Rubric)
- Exceeds - ability to answer questions without assistance
- Meets - ability to answer question without the need to rephrase on two or fewer occasions
- Needs – fails to answer question correctly after instructor assistance

| Question | Exceeds | Meets | Needs |
|---|---|---|---|
| What are the five steps of the Synergistic Problem Solving Model? | 3 | 2 | I |
| What are the four simple machines, and how can they be used to traverse a Synergistic obstacle course? | 3 | 2 | I |

| Stage 3 – Learning Plan | |
|---|---|
| **Learning Activities:**<br>➢ Brainstorming to identify a problem<br>➢ Evaluate using a formula to calculate work<br>➢ Recall four simple machines<br>➢ Testing of solutions<br>➢ Identify the five steps of the Synergistic Problem-Solving Model.<br>➢ Construct an obstacle course using LEGOs | **Resources:**<br>➢ Module Library<br>➢ Calculator Legos kit<br>➢ Lego Challenge Board |

**Stage 3 – Learning Plan:**
**Power Benchmark/Competency #5:**
Solve an open-ended challenge by applying the steps of a problem-solving model.

| Learning Activities: | Resources: |
|---|---|
| **Day 1 Step 1: Identify, Simple Machines** | **"Synergistic Problem Solving Model: Steps 1 & 2" worksheet, LEGO kit** |
| **Day 2 Step 2: Creative Solutions, LEGO Mechanical** | **"Synergistic Problem Solving Model: Steps 1 & 2" worksheet, LEGO kit** |
| **Day 3 Step 3: Test, LEGO Electrical** | **"Synergistic Problem Solving Model: Steps 3, 4, & 5" worksheet, LEGO kit** |
| **Day 4 Step 4: Evaluate, LEGO Pneumatic** | **"Synergistic Problem Solving Model: Steps 3, 4, & 5" worksheet, LEGO kit** |
| **Day 5 Step 5: Redesign or Implement** | **"Problem Solving Model Review" worksheet, "Challenge" worksheet, LEGO kit, challenge board** |
| **Day 6 The Challenge (cont.)** | **"Challenge" worksheet, LEGO kit, challenge board** |
| **Day 7 Test Your Solution** | **"Challenge" worksheet, LEGO kit, challenge board** |
| **Enrichment** | **Module Library** |
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## Stage 1 – Desired Results

**Power Standard 3:** Develop the skills needed for a variety of career fields.

**Digital Video Module**
**Power Benchmark/Competency #6:**
Create video clips that include good editing principles, special effects, and manipulation of audio and video data.

**Estimated Timeline:** 7 days/45 minutes each

**Place 'X' in square if goal addresses Essential/Content Standard(s).**

| Career | Technology | Critical Thinking | Global & Cultural | Personal Responsibility |
|---|---|---|---|---|
| X | X | | | x |
| **Math** | **Science** | **Reading** | **Social Responsibility** | **Communications** |
| X | | x | | |

**Understandings:**
*Students will understand that (sentence):*
- Sequencing creates meaning from the order of events and the flow of concepts.
- The storyboard is critical for maintaining the logical order of events.

**Essential Questions:**
- How can continuity in a video be broken?
- How do you record a digital video clip?
- How is "keying" used in production of television programs or movies?

***Students will (know):***…(Include vocabulary)
- Recognize the principles in producing a commercial.
- Appreciate occupations in which skills learned in this module are used.
  - Vocabulary: editing, continuity, pacing, animation

***Students will be able to:*** *(i.e. do)…*(Include vocabulary)
- Utilize a computer program to sequence a commercial correctly.
- Demonstrate the process of keying a live image onto a fake background.
- Compose a storyboard, write appropriate questions and video tape an interview.
  - Vocabulary: sequencing, clip, keying, fade-in, dissolve, cut

## Stage 2 – Assessment Evidence

**Performance Tasks:** (i.e. Assessment used to determine proficiency on competency)
- Digital Video post-test

**Key Criteria:** (Rubric)
- Exceeds - ability to answer questions without assistance
- Meets - ability to answer question without the need to rephrase on two or fewer occasions
- Needs – fails to answer question correctly after instructor assistance

| Question | Exceeds | Meets | Needs |
|---|---|---|---|
| How can continuity in a video be broken? | 3 | 2 | I |
| How do you record a digital video clip? | 3 | 2 | I |
| How is "keying" used in production of television programs or movies? | 3 | 2 | I |

| Stage 3 – Learning Plan | |
|---|---|
| **Learning Activities:**<br>➢ Create a TV advertisement<br>➢ Write an interview<br>➢ Video<br>➢ Using a green screen to key in a live image with existing background video<br>➢ Use of special effects for audio and video projects | **Resources:**<br>➢ Module Library<br>➢ Calculator Green screen<br>➢ Digital camera<br>➢ Video editing software<br>➢ Storyboard<br>➢ Scripting worksheet<br>➢ Lego kit |

**Stage 3 – Learning Plan:**
**Power Benchmark/Competency #6:**
Create video clips that include good editing principles, special effects, and manipulation of audio and video data.

| **Learning Activities:** | **Resources:** |
|---|---|
| **Day 1 Video Storyboard** | **"Storyboard" worksheet** |
| **Day 2 Digital Video Editing** | |
| **Day 3 TV Advertisement** | **"Storyboard" worksheet** |
| **Day 4 Time Lapse Demonstration** | **LEGO Dacta building kit, Video camera** |
| **Day 5 Interview** | **Video camera** |
| **Day 6 World Tour** | **Video camera** |
| **Day 7 Digital Portfolio** | **Video camera** |
| **Enrichment** | **Module Camera** |
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# 6th - 8th Technology Education Curriculum

## Stage 1 – Desired Results

**Power Standard 3:** Develop the skills needed for a variety of career fields.

**Electricity Module**
**Power Benchmark/Competency #7:**
Understand the basic elements and applications of electricity.

**Estimated Timeline:** 7 days/45 minutes each

**Place 'X' in square if goal addresses Essential/Content Standard(s).**

| Career | Technology | Critical Thinking | Global & Cultural | Personal Responsibility |
|---|---|---|---|---|
| x | x | x | | |
| **Math** | **Science** | **Reading** | **Social Responsibility** | **Communications** |
| X | x | x | | |

**Understandings:**
*Students will understand that (sentence):*
- Electricity is generated and transferred in different ways.
- Electricity travels in circuits.
- Insulators and conductors play vital roles in the use of electricity.

**Essential Questions:**
- What is electricity?
- What are the advantages of using a parallel circuit instead of a series circuit?

***Students will (know):****…*(Include vocabulary)
- Describe how electricity can be produced.
- Differentiate between a series and parallel circuit.
- Appreciate occupations in which skills learned in this module are used.
- Vocabulary: electrons, current, conductor, resistance, ohm, switch

***Students will be able to:*** *(i.e. do)…*(Include vocabulary)
- Wire a series and parallel circuit.
- Evaluate materials as insulators or conductors using an ohm meter.
- Vocabulary: insulator, parallel circuit, series circuit, ohm meter

## Stage 2 – Assessment Evidence

**Performance Tasks:** (i.e. Assessment used to determine proficiency on competency)
- Electricity post-test

**Key Criteria:** (Rubric)
- Exceeds - ability to answer questions without assistance
- Meets - ability to answer question without the need to rephrase on two or fewer occasions
- Needs – fails to answer question correctly after instructor assistance

| Question | Exceeds | Meets | Needs |
|---|---|---|---|
| What is electricity? | 3 | 2 | I |
| What are the advantages of using a parallel circuit instead of a series circuit? | 3 | 2 | I |

| Stage 3 – Learning Plan | |
|---|---|
| **Learning Activities:**<br>➢ Draw an electrical schematic<br>➢ Assemble an electrical circuit<br>➢ Wire a motor circuit<br>➢ Demonstrate care of a volt-ohm meter<br>➢ Identify insulators and conductors<br>➢ Explain the differences between insulators and conductors<br>➢ Measuring voltage, current, and resistance | **Resources:**<br>➢ Module Library<br>➢ Calculator<br>➢ Simple circuit trainer board<br>➢ Insulator / conductor board<br>➢ Magnetism board<br>➢ Multimeter<br>➢ Dry erase board |

| Stage 3 – Learning Plan: Power Benchmark/Competency #7: Understand the basic elements and applications of electricity. | |
|---|---|
| **Learning Activities:** | **Resources:** |
| **Day 1: Simple Circuit** | **18-gage wire, Circuit Board, White marker board, Dry-erase marker board, easer, wire strippers, screwdriver** |
| **Day 2: Series Circuits** | **Wire from previous activity, 18-gage wire, Circuit Board, White marker board, Dry-erase marker board, easer, wire strippers, screwdriver** |
| **Day 3: Parallel Circuits** | **Wire from previous activity, 18-gage wire, Circuit Board, White marker board, Dry-erase marker board, easer, wire strippers, screwdriver** |
| **Day 4: Magnetism** | **White Board, Marker, Eraser, Iron filings board with two magnets** |
| **Day 5: Motor Circuits** | **18-gage wire, Circuit Board, White marker board, Dry-erase marker board, easer, wire strippers, screwdriver** |
| **Day 6: Measuring Voltage** | **18-gage wire, Multimeter, Trainer Board, Screwdriver, 12-gage wire** |
| **Day 7: Measuring Current, Measuring Resistance** | **18-gage wire, Multimeter, Trainer Board, Screwdriver, 12-gage wire** |
| **Enrichment** | **Module Library** |
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## Stage 1 – Desired Results

**Power Standard 3:** Develop the skills needed for a variety of career fields.

**Energy Power Module**
**Power Benchmark/Competency # 8:**
Demonstrate a basic understanding of energy sources, the principles of power technology, and the concept of mechanical advantage and machines.

**Estimated Timeline:** 7 days/45 minutes each

**Place 'X' in square if goal addresses Essential/Content Standard(s).**

| Career | Technology | Critical Thinking | Global & Cultural | Personal Responsibility |
|---|---|---|---|---|
| X | X | X | | X |
| **Math** | **Science** | **Reading** | **Social Responsibility** | **Communications** |
| X | X | X | | |

**Understandings:**
*Students will understand that (sentence):*
- Concepts of gears and gear ratio.
- The functions of and potential uses of pneumatics, hydraulics, and gears.
- Witness an alternative use of the Sun's energy by using a solar cooker.
- Differentiate between renewable and non-renewable resources.

**Essential Questions:**
- Name three non-renewable resources.
- Name three renewable resources.
- Describe how a pump functions.

***Students will (know):***…(Include vocabulary)
- Appreciate occupations in which skills learned in this module are used.
- Identify the three classes of levers.
- Renewable energy is a good source of alternative energy.
- Vocabulary: geothermal energy, hydroelectricity, mechanical advantage, lever

***Students will be able to:*** *(i.e. do)…*(Include vocabulary)
- Describe the pump functions using a cylinder and valves.
- Demonstrate proper plumbing of a pneumatic and hydraulic system.
- Demonstrate with a lever-trainer each of the three classes of levers.
- Vocabulary: pneumatics, fulcrum, work, load, solar energy, tidal energy wind energy

## Stage 2 – Assessment Evidence

**Performance Tasks:** (i.e. Assessment used to determine proficiency on competency)
- Energy Power Module post-test

**Key Criteria:** (Rubric)
- Exceeds - ability to answer questions without assistance
- Meets - ability to answer question without the need to rephrase on two or fewer occasions
- Needs – fails to answer question correctly after instructor assistance

| Question | Exceeds | Meets | Needs |
|---|---|---|---|
| Name three non-renewable resources. | 3 | 2 | I |
| Name three renewable resources. | 3 | 2 | I |
| Describe how a pump functions. | 3 | 2 | I |

| Stage 3 – Learning Plan | |
|---|---|
| **Learning Activities:**<br>➢ Measure the effects of a load using a wind generator and wind dynamo<br>➢ Use gear trainer to the about the mechanics of levers<br>➢ Learn the fundamentals of gear and fluid power<br>➢ Demonstrate proper plumbing techniques using a cylinder and valves<br>➢ Using data to justify conclusions regarding wind generator blade angle and energy output. | **Resources:**<br>➢ Module Library<br>➢ Calculator<br>➢ Wind turbine<br>➢ Wind Dynamo<br>➢ Box fan<br>➢ Meter stick<br>➢ Fluid Power Trainer<br>➢ Solar Hot Dog Cooker<br>➢ Gear Trainer<br>➢ Lever Trainer |

**Stage 3 – Learning Plan:**
**Power Benchmark/Competency #8:**
Demonstrate a basic understanding of energy sources, the principles of power technology, and the concept of mechanical advantage and machines.

| **Learning Activities:** | **Resources:** |
|---|---|
| **Day 1 Wind Energy** | |
| **Day 2 Wind Energy** | |
| **Day 3 Solar Cooking** | **Hot dogs, Aluminum foil, Condiments and buns for hot dogs** |
| **Day 4 Mechanical Systems** | |
| **Day 5 Levers** | |
| **Day 6 Fluid Mechanics** | |
| **Day 7 Fluid Systems** | |
| **Enrichment** | |
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## Stage 1 – Desired Results

**Power Standard 3:** Develop the skills needed for a variety of career fields.

**Engineering Towers Module**
**Power Benchmark/Competency #9:**
Understand the concepts and process involved in designing and constructing a truss structured tower

**Estimated Timeline:** 7 days/45 minutes each

**Place 'X' in square if goal addresses Essential/Content Standard(s).**

| Career | Technology | Critical Thinking | Global & Cultural | Personal Responsibility |
|---|---|---|---|---|
| x | x | x | | x |
| **Math** | **Science** | **Reading** | **Social Responsibility** | **Communications** |
| x | x | x | | x |

**Understandings:**
*Students will understand that (sentence):*
- There is a relationship between the design and the tower strength, which may be observed on the finished tower.
- Recognize and observe the relationship between design and tower strength by testing the finished tower.
- Engineering concepts and geometric symmetry are important when creating a structure.

**Essential Questions:**
- Why are working drawings important in the design process?
- How can we evaluate the relationship between the design and the strength of the tower created?
- Why is it important to have an understanding of geometric symmetry in your tower design?

***Students will (know):**…*(Include vocabulary)
- Follow tower limitations rules and size requirements
- Understand the importance of diagonals and triangles through their thumbnail sketches
- Explain the purpose of a structural truss
- Demonstrate the ability to follow a pattern
- Appreciate occupations in which skills learned in this module are used.
- Vocabulary: suspension structure, abutment, span, civil engineer, keystone, arch

***Students will be able to:** (i.e. do)…*(Include vocabulary)
- Demonstrate the ability to transfer a thumbnail sketch to a full-size drawing.
- Justify choice of thumbnail sketch for final design.
- Construct a complete tower.
- Assemble tower in compliance with rules and limitations.
- Vocabulary: compression, substructure, tension, superstructure

## Stage 2 – Assessment Evidence

**Performance Tasks:** (i.e. Assessment used to determine proficiency on competency)
- Engineering Towers post-test

**Key Criteria:** (Rubric)
- Exceeds - ability to answer questions without assistance
- Meets - ability to answer question without the need to rephrase on two or fewer occasions
- Needs – fails to answer question correctly after instructor assistance

| Question | Exceeds | Meets | Needs |
|---|---|---|---|
| Why are working drawings important in the design process? | 3 | 2 | I |
| How can we evaluate the relationship between the design and the strength of the tower created? | 3 | 2 | I |
| Why is it important to have an understanding of geometric symmetry in your tower design? | 3 | 2 | I |

## Stage 3 – Learning Plan

| **Learning Activities:** | **Resources:** |
|---|---|
| ➢ Create a thumbnail sketches<br>➢ Sketch full-scale drawing from thumbnail sketch<br>➢ Design a tower<br>➢ Build a tower using balsa sticks<br>➢ Compete against other students to build the strongest towers | ➢ Module Library<br>➢ Calculator<br>➢ Balsa sticks<br>➢ Timber cutter<br>➢ Scale<br>➢ Glue<br>➢ Wax paper<br>➢ Foam board<br>➢ Design sheet<br>➢ Ruler |

**Stage 3 – Learning Plan:**
**Power Benchmark/Competency #9:**
Understand the concepts and process involved in designing and constructing a truss structured tower

| **Learning Activities:** | **Resources:** |
|---|---|
| **Day 1 Designing A Tower** | **"Engineering Towers" worksheet** |
| **Day 2 Making a Pattern** | **Pattern, Foam board, Waxed Paper** |
| **Day 3 Constructing a Tower** | **Masking Tape, Glue, Balsa sticks** |
| **Day 4 Constructing a Tower** | **Masking Tape, Glue, Balsa sticks** |
| **Day 5 Constructing a Tower** | **Masking Tape, Glue, Balsa sticks** |
| **Day 6 Constructing a Tower** | **Masking Tape, Glue, Balsa sticks** |
| **Day 7 Assembling a Tower** | **Masking Tape, Glue** |
| **Enrichment** | |
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## Stage 1 – Desired Results

**Power Standard 3:** Develop the skills needed for a variety of career fields.

**Engines Module**
**Power Benchmark/Competency #10:**
Develop an understanding for two- and four-stroke engines.

**Estimated Timeline:** 7 days/45 minutes each

**Place 'X' in square if goal addresses Essential/Content Standard(s).**

| Career | Technology | Critical Thinking | Global & Cultural | Personal Responsibility |
|---|---|---|---|---|
| x | x | x | x | |
| **Math** | **Science** | **Reading** | **Social Responsibility** | **Communications** |
| x | | x | x | |

**Understandings:**
*Students will understand that (sentence):*
- Develop basic technical skills and the knowledge to perform routine maintenance.
- Identify tools, major engine parts, and the different parts of the compression system.
- Display the ability to accurately evaluate the situation for safety.

**Essential Questions:**
- What are the different parts of and functions of the compression system?
- How would you identify and categorize each of the tools in your tool chest?
- What are the main parts of the engine and where are they located?
- How would you safely and efficiently use hand tools?

***Students will (know):****…*(Include vocabulary)
- Use correct names for identifying tools and engine parts.
- Appreciate occupations in which skills learned in this module are used.
  - Vocabulary: torque, crank shaft, stroke, cam lobes, cam shaft, flywheel, piston, torque wrench, rubber mallet, nut drivers, calipers, combination wrench

***Students will be able to:*** *(i.e. do)…*(Include vocabulary)
- Complete "Hand-Tool Safety Test" to assess prior knowledge about hand tools.
- Utilize repair manuals to identify engine parts.
- Use appropriate tools to disassemble various parts of the engine to identify major components of both the engine and compression system.
- Demonstrate the proper care of tools.
- Relate the observed movement of compression-system components to each of the four strokes in the four-stroke process.
  - Vocabulary: intake stroke, combustion stroke, power stroke, exhaust stroke, block, head, cylinder head, cylinder block, crank case

## Stage 2 – Assessment Evidence

**Performance Tasks:** (i.e. Assessment used to determine proficiency on competency)
- Engines post-test

**Key Criteria:** (Rubric)
- Exceeds - ability to answer questions without assistance
- Meets - ability to answer question without the need to rephrase on two or fewer occasions
- Needs – fails to answer question correctly after instructor assistance

| Question | Exceeds | Meets | Needs |
|---|---|---|---|
| What are the different parts of and functions of the compression system? | 3 | 2 | I |
| How would you identify and categorize each of the tools in your tool chest? | 3 | 2 | I |

| Stage 3 – Learning Plan | |
|---|---|
| **Learning Activities:**<br>➢ Identify head block, cylinder head, cylinder block, and crankcase.<br>➢ Identify tools and safety<br>➢ Identify parts of an engine related to the compression system | **Resources:**<br>➢ Module Library<br>➢ Calculator<br>➢ 4-stroke engine & stand<br>➢ Tool set<br>➢ Torque wrench<br>➢ Safety Glasses<br>➢ Gloves<br>➢ Apron |

**Stage 3 – Learning Plan:**
**Power Benchmark/Competency #10:**
Develop an understanding for two- and four-stroke engines.

| **Learning Activities:** | **Resources:** |
|---|---|
| **Day 1 Two-Stroke Process, Four-Stroke Process** | |
| **Day 2 Tool ID, Tool Classification, Tool ID & Safety** | |
| **Day 3 Parts and Procedures** | |
| **Day 4 Valve Train Components, Valve Clearance, Spark Plug Air Gap** | |
| **Day 5 Compression System, Four-Stroke Process, Measurements** | |
| **Day 6 Compression System, Governor System, Engine Systems** | |
| **Day 7 Ignition System, Cooling System, Spark Tester** | |
| **Enrichment** | |
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# $6^{th}$ - $8^{th}$ Technology Education Curriculum

## Stage 1 – Desired Results

**Power Standard 3:** Develop the skills needed for a variety of career fields.

**Graphic Communication Module**
**Power Benchmark/Competency #11:**
Understand how ideas are communicated in a graphic format through drafting

**Estimated Timeline:** 7 days/45 minutes each

**Place 'X' in square if goal addresses Essential/Content Standard(s).**

| Career | Technology | Critical Thinking | Global & Cultural | Personal Responsibility |
|---|---|---|---|---|
| x | x | x | | |
| **Math** | **Science** | **Reading** | **Social Responsibility** | **Communications** |
| x | | | | x |

**Understandings:**
*Students will understand that (sentence):*
- Accurate measurement is critical when communicating in a graphic format.
- Drafting uses symbols, line types or conventions and figures.
- Ideas can be conveyed using multi-view and pictorial drawings
  - Vocabulary: oblique, isometric, DI

**Essential Questions:**
- What would occur if the lines on a drawing were not drawn accurately?
- What is the difference among a 30°, 45°, and 60° angle and how do you draw each?
- What is the difference between an isometric and oblique drawing?

***Students will (know):***…(Include vocabulary)
- Identify different types of drawings
- Appreciate occupations in which skills learned in this module are used.

***Students will be able to:*** *(i.e. do)…*(Include vocabulary)
- Draw 30°, 60°, and 45° lines using object lines.

## Stage 2 – Assessment Evidence

**Performance Tasks:** (i.e. Assessment used to determine proficiency on competency)
- Graphic Communication post-test

**Key Criteria:** (Rubric)
- Exceeds - ability to answer questions without assistance
- Meets - ability to answer question without the need to rephrase on two or fewer occasions
- Needs – fails to answer question correctly after instructor assistance

| Question | Exceeds | Meets | Needs |
|---|---|---|---|
| What would occur if the lines on a drawing were not drawn accurately? | 3 | 2 | I |
| What is the difference among a 30°, 45°, and 60° angle and how do you draw each? | 3 | 2 | I |
| What is the difference between an isometric and oblique drawing? | 3 | 2 | I |

## Stage 3 – Learning Plan

**Learning Activities:**
- Describe a drawing board, T square, and other tools used in graphic communications
- Draw multi-view drawings
- Blueprint reading

**Resources:**
- Module Library
- Calculator
- Drawing board
- T square
- Triangles
- Compass
- Geometric shapes

| **Stage 3 – Learning Plan:**<br>**Power Benchmark/Competency #11:**<br>Understand how ideas are communicated in a graphic format through drafting | |
|---|---|
| **Learning Activities:** | **Resources:** |
| **Day 1 Getting Started** | **“Getting Started” worksheet,**<br>**“Measurement” worksheet** |
| **Day 2 Geometrics** | **“Geometrics” worksheet,**<br>**“Exploratory Drafting” textbook** |
| **Day 3 Shape Description** | **“Shape Description” worksheet,**<br>**“Multiview” worksheets** |
| **Day 4 Alphabet of Lines, Shuttle Drawing, Floor Plan Drawing** | **“Alphabet of Lines” worksheet,**<br>**“Draftng Worksheet #1” worksheet** |
| **Day 5 Auto Sketch** | |
| **Day 6 CAD Assignment** | |
| **Day 7 CAD Assignment** | |
| **Enrichment** | |
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## Stage 1 – Desired Results

**Power Standard 3:** Develop the skills needed for a variety of career fields.

**Lights & Lasers Module**
**Power Benchmark/Competency #12:**
Understand concepts and usage of lights and lasers to create a clearer picture of the nature of light.

**Estimated Timeline:** 7 days/45 minutes each

**Place 'X' in square if goal addresses Essential/Content Standard(s).**

| Career | Technology | Critical Thinking | Global & Cultural | Personal Responsibility |
|---|---|---|---|---|
| x | x | x | | x |
| **Math** | **Science** | **Reading** | **Social Responsibility** | **Communications** |
| x | x | x | x | x |

**Understandings:**
*Students will understand that (sentence):*
- There is a relationship between angle of incidence and angle of reflection.
- The shape of a lens determines the magnification property of light.
- The color and intensity of light is affected by the source of light

**Essential Questions:**
- How are relationships between angle of incidence and angle of reflection determined?
- What are the differences between magnification properties and a concave lens as opposed to a convex lens?
- Why and how do color samples affect the color and intensity of light in different ways?

***Students will (know):****…*(Include vocabulary)
- Explain why objects in a mirror appear backwards.
- Predict the angle of incidence and angle of reflection of a laser beam pointing at a specific angle into a mirror.
- Calculate the formula for the magnification of different lenses.
- Explain what determines the color and intensity of light.
- Appreciate occupations in which skills learned in this module are used.
  - Vocabulary: reflection, refraction, magnification, infrared light, ultraviolet light,

***Students will be able to:*** *(i.e. do)…*(Include vocabulary)
- Compare the amount of light blocked by two paddles of the same color to the amount of light blocked by two paddles of different colors
- Organize mirrors to reflect a laser beam in a 4-sided path that returns the beam to the laser.
- Measure illumination and intensity of light.
  - Vocabulary: illumination, intensity, convex lens, concave lens

## Stage 2 – Assessment Evidence

**Performance Tasks:** (i.e. Assessment used to determine proficiency on competency)
- Lights & Lasers post-test

**Key Criteria:** (Rubric)
- Exceeds - ability to answer questions without assistance
- Meets - ability to answer question without the need to rephrase on two or fewer occasions
- Needs – fails to answer question correctly after instructor assistance

| Question | Exceeds | Meets | Needs |
|---|---|---|---|
| How are relationships between angle of incidence and angle of reflection determined? | 3 | 2 | I |
| What are the differences between magnification properties and a concave lens as opposed to a convex lens? | 3 | 2 | I |
| Why and how do color samples affect the color and intensity of light in different ways? | 3 | 2 | I |

| Stage 3 – Learning Plan | |
|---|---|
| **Learning Activities:**<br>➢ Demonstrate understanding of angle of reflection and angle of incidence.<br>➢ Describe the magnification properties of concave and convex lenses.<br>➢ Determine the effect of color and intensity of light passing through a color slide. | **Resources:**<br>➢ Module Library<br>➢ Calculator<br>➢ Laser receiver and transmitter<br>➢ Ruler<br>➢ Light meter<br>➢ Mirrors<br>➢ Prisms<br>➢ Color paddles<br>➢ Lens set<br>➢ AM/FM pocket radio |

**Stage 3 – Learning Plan:**
**Power Benchmark/Competency #12:**
Understand concepts and usage of lights and lasers to create a clearer picture of the nature of light.

| **Learning Activities:** | **Resources:** |
|---|---|
| **Day 1 Basics of Light** | |
| **Day 2 Refraction** | |
| **Day 3 Reflection** | **"Reflection" worksheet** |
| **Day 4 Magnification** | |
| **Day 5 Intensity and Color** | |
| **Day 6 Laser Signal Path** | **String** |
| **Day 7 Laser Alarm** | **String** |
| **Enrichment** | |
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## Stage 1 – Desired Results

**Power Standard 3:** Develop the skills needed for a variety of career fields.

**Package Design Module**
**Power Benchmark/Competency #13:**
Understand factors in designing packages based on appearance, practicality, and conserving material.

**Estimated Timeline:** 7 days/45 minutes each

**Place 'X' in square if goal addresses Essential/Content Standard(s).**

| Career | Technology | Critical Thinking | Global & Cultural | Personal Responsibility |
|---|---|---|---|---|
| x | x | x | x | |
| **Math** | **Science** | **Reading** | **Social Responsibility** | **Communications** |
| x | x | x | x | x |

**Understandings:**
*Students will understand that (sentence):*
- There are 4 factors that are required for designing an acceptable package.
- Tessellations are created from rotations, reflections, and translations.
- Enhanced mathematical skills, through coordinate graphing using X, Y grid, ensure product quality and conformance.

**Essential Questions:**
- What are the 4 factors required for designing an acceptable package and why are they important?
- How do you use rotations, reflections, and translations to create a tessellation?
- How are coordinates on an X, Y grid used to measure conformance?

***Students will (know):****…*(Include vocabulary)
- Explain what requirements are needed for an acceptable package design.
- Describe how to design concepts that may relate to different packaging requirements.
- Learn how technological problem-solving may be solved through trial-and-error and brainstorming.
- Appreciate occupations in which skills learned in this module are used.
  - Vocabulary: rotation, transformation, reflection, package construction, translation

***Students will be able to:*** *(i.e. do)…*(Include vocabulary)
- List four factors for designing acceptable package design.
- Explain how rotation, reflections, and translations are used to create tessellations.
- Give accurate X, Y coordinate reading on a coordinate grid given the X coordinate as the first number in their readings.
  - Vocabulary: tessellations

## Stage 2 – Assessment Evidence

**Performance Tasks:** (i.e. Assessment used to determine proficiency on competency)
- Package Design post-test

**Key Criteria:** (Rubric)
- Exceeds - ability to answer questions without assistance
- Meets - ability to answer question without the need to rephrase on two or fewer occasions
- Needs – fails to answer question correctly after instructor assistance

| Question | Exceeds | Meets | Needs |
|---|---|---|---|
| What are the 4 factors required for designing an acceptable package and why are they important? | 3 | 2 | I |
| Explain how rotation, reflections, and translations are used to create tessellations. | 3 | 2 | I |
| How are coordinates on an X, Y grid used to measure conformance? | 3 | 2 | I |

| Stage 3 – Learning Plan | |
|---|---|
| **Learning Activities:**<br>➢ Create tessellations to be used a packaging graphics<br>➢ Create a package for a shape<br>➢ Study rotation, reflections, and translations on a grid<br>➢ Identify ways to improve package design | **Resources:**<br>➢ Module Library<br>➢ Calculator<br>➢ Compass<br>➢ Geo reflector<br>➢ Joy stick<br>➢ Tag board<br>➢ Ruler<br>➢ CD disk<br>➢ Foam wheels<br>➢ Construction paper<br>➢ Graph paper<br>➢ Wooden blocks |

**Stage 3 – Learning Plan:**
**Power Benchmark/Competency #13:**
Understand factors in designing packages based on appearance, practicality, and conserving material.

| Learning Activities: | Resources: |
|---|---|
| Day 1 Package Matching | Paper 10"x10" |
| Day 2 Package Layout | Tag board |
| Day 3 Translation | Paper |
| Day 4 Reflections | Paper |
| Day 5 Rotations, Reflections, and Translations | Paper |
| Day 6 Artwork Design | |
| Day 7 Package Construction | Scotch tape, glue |
| Enrichment | |
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## Stage 1 – Desired Results

**Power Standard 3:** Develop the skills needed for a variety of career fields.

**Plastics & Polymers Module**
**Power Benchmark/Competency #14:**
Understand the uses, characteristics, and molecular structures of polymers and monometers.

**Estimated Timeline:** 7 days/45 minutes each

**Place 'X' in square if goal addresses Essential/Content Standard(s).**

| Career | Technology | Critical Thinking | Global & Cultural | Personal Responsibility |
|---|---|---|---|---|
| x | x | x | | |
| **Math** | **Science** | **Reading** | **Social Responsibility** | **Communications** |
| x | x | x | x | |

**Understandings:**
*Students will understand that (sentence):*
- There is a difference between an element and a compound.
- There is a difference between an atom and a molecule.
- Safety equipment is required and safety standards must be followed when working with plastics and associated machines.
- There are differences and similarities between polymers, polyethylene, and polystyrene.
-

**Essential Questions:**
- How do atoms and molecules relate to elements and compounds?
- What determines the protective equipment that is used in a given situation when working with plastics?
- What are the similarities and differences between polyethylene and polystyrene?

***Students will (know):****…*(Include vocabulary)
- Use correct terminology as it relates to plastics.
- Appreciate occupations in which skills learned in this module are used.
  - Vocabulary: atom, molecule, element, compound, polymer, conservation of mass

***Students will be able to:*** *(i.e. do)…*(Include vocabulary)
- Demonstrate proper use of safety equipment.
- Compare and contrast how polymers have different and similar characteristics.
- Produce products using an injection molder and a vacuum former.
  - Vocabulary: polymers, injection molding, atom, molecule

## Stage 2 – Assessment Evidence

**Performance Tasks:** (i.e. Assessment used to determine proficiency on competency)
- Plastics & Polymers post-test

**Key Criteria:** (Rubric)
- Exceeds - ability to answer questions without assistance
- Meets - ability to answer question without the need to rephrase on two or fewer occasions
- Needs – fails to answer question correctly after instructor assistance

| Question | Exceeds | Meets | Needs |
|---|---|---|---|
| How do atoms and molecules relate to elements and compounds? | 3 | 2 | I |
| What determines the protective equipment that is used in a given situation when working with plastics? | 3 | 2 | I |
| What are the similarities and differences between polyethylene and polystyrene? | 3 | 2 | I |

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| Stage 3 – Learning Plan | |
|---|---|
| **Learning Activities:**<br>➢ Study a variety of polymers<br>➢ Make two types of polymers<br>➢ Make golf tees<br>➢ Create a vacuum formed blank | **Resources:**<br>➢ Module Library<br>➢ Calculator<br>➢ Injection molder<br>➢ Vacuum former<br>➢ Polymer<br>➢ Safety glasses<br>➢ Gloves<br>➢ Borax<br>➢ Glue<br>➢ Beaker set<br>➢ Scale |

**Stage 3 – Learning Plan:**
**Power Benchmark/Competency #14:**
Understand the uses, characteristics, and molecular structures of polymers and monometers.

| Learning Activities: | Resources: |
|---|---|
| **Day 1** | |
| **Day 2** | |
| **Day 3** | |
| **Day 4** | |
| **Day 5** | |
| **Day 6** | |
| **Day 7** | |
| **Enrichment** | |
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# 6th - 8th Technology Education Curriculum

## Stage 1 – Desired Results

**Power Standard 3:** Develop the skills needed for a variety of career fields.

**Practical Skills Module**
**Power Benchmark/Competency #15:**
Develop skills needed to operate basic hand skills.

**Estimated Timeline:** 7 days/45 minutes each

**Place 'X' in square if goal addresses Essential/Content Standard(s).**

| Career | Technology | Critical Thinking | Global & Cultural | Personal Responsibility |
|---|---|---|---|---|
| x | x | x | | |
| **Math** | **Science** | **Reading** | **Social Responsibility** | **Communications** |
| x | | x | | |

**Understandings:**
*Students will understand that (sentence):*
- Accurate measurement is critical for a successful project.
- Different tasks require specific tools.
- Technical reading skills are valuable in the successful completion of a project.

**Essential Questions:**
- How do you read a tape measure?
- How do the two systems of measurement differ?
- What possible problems can arise when a tool is used for a task it was not designed to do?
- What is the importance of following instructions in a logical order?

***Students will (know):****…*(Include vocabulary)
- Explain divisions on a tape measure in inches.
- Summarize the importance of performing simple tasks/repairs in the home.
- Appreciate occupations in which skills learned in this module are used.
  - Vocabulary: metric system, English measurement, hand tools, fasteners, plumbing, prefabricate

***Students will be able to:*** *(i.e. do)…*(Include vocabulary)
- Demonstrate the proper use of common household tools.
- Assemble drain and supply lines for a sink, a lockset, and a pull cart using step-by-step instructions.
  - Vocabulary: hammer, combination wrench, pliers, standard screwdriver, Phillips screwdriver, cordless drill

## Stage 2 – Assessment Evidence

**Performance Tasks:** (i.e. Assessment used to determine proficiency on competency)
- Practical Skills post-test

**Key Criteria:** (Rubric)
- Exceeds - ability to answer questions without assistance
- Meets - ability to answer question without the need to rephrase on two or fewer occasions
- Needs – fails to answer question correctly after instructor assistance

| Question | Exceeds | Meets | Needs |
|---|---|---|---|
| How do you read a tape measure? | 3 | 2 | I |
| How do the two systems of measurement differ? | 3 | 2 | I |
| What possible problems can arise when a tool is used for a task it was not designed to do? | 3 | 2 | I |
| What is the importance of following instructions in a logical order? | 3 | 2 | I |

| Stage 3 – Learning Plan | |
|---|---|
| **Learning Activities:**<br>➢ Learn to use a tape measure<br>➢ Mount a shelf bracket<br>➢ Assemble a prefabricated cart<br>➢ Learn about repair of faulty systems<br>➢ Assemble a deadbolt<br>➢ Assemble the plumbing system to a sink | **Resources:**<br>➢ Module Library<br>➢ Calculator<br>➢ Tool set<br>➢ Cordless drill<br>➢ Dead Bolt set<br>➢ Dimmer switch controlled light<br>➢ Door knob set<br>➢ Motion controlled light<br>➢ Photocell controlled light<br>➢ Sheetrock |

| **Stage 3 – Learning Plan:**<br>**Power Benchmark/Competency #15:**<br>Develop skills needed to operate basic hand skills. | |
|---|---|
| **Learning Activities:** | **Resources:** |
| **Day 1 Ruler & Tape Measure, Measurement** | |
| **Day 2 Pliers, Supply Lines &** | |
| **Day 3 Wrenches, DWV System** | |
| **Day 4 Socket Wrench Set, Security Lights** | **Masking tape, String** |
| **Day 5 Screwdrivers, Mini Door** | |
| **Day 6 Hammer, Level, & Drill** | **Sheetrock, 4 plastic anchors, 4 fasteners** |
| **Day 7 Toolbox, Prefabricated Pull-Cart** | **"Pull-Cart Assembly Instructions" (student Module notebook)** |
| **Enrichment** | |
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## Stage 1 – Desired Results

**Power Standard 3:** Develop the skills needed for a variety of career fields.

**Research & Design Module**
**Power Benchmark/Competency #16:**
Understand the importance of specifications, standards, and experimentation when designing/fabricating new products.

**Estimated Timeline:** 7 days/45 minutes each

**Place 'X' in square if goal addresses Essential/Content Standard(s).**

| Career | Technology | Critical Thinking | Global & Cultural | Personal Responsibility |
|---|---|---|---|---|
| X | X | X | | X |
| **Math** | **Science** | **Reading** | **Social Responsibility** | **Communications** |
| X | X | X | | X |

**Understandings:**
*Students will understand that (sentence):*
- There is a need for consistency and standards for developing new products in the research and development phase.
- When fabricating new products and designs, experimentation, through trial and error, are required to build a quality product.
- There is a need for specifications, drawings, standards, and design concepts to assure a consistent and standard product.
- *Quality products are the results of continual research and design efforts to achieve a product which has high quality standards and achievements.

**Essential Questions:**
- Why are standards and specifications important when designing a new product?
- Why is it important to document your results and findings?
- Why is it important to function test your designs and products?
- What tools and are used in the fabrication of a CO2 car?

***Students will (know):***…(Include vocabulary)
- Appreciate occupations in which skills learned in this module are used and how they are applied.
- The tools required to build a CO2 car and how to properly use them.
- Demonstrate through drawings and specifications why tolerances are important for building a quality product.
- What forces act upon their CO2 design and what impact they have on the cars performance?
- Define terminology. Vocabulary: aerodynamics, drag, prototype, tolerance

***Students will be able to:*** *(i.e. do)…*(Include vocabulary)
- Draw a thumbnail sketch of the product to be produced, refine it, and provide a final drawing with standards, specifications and measurements.
- Fabricate a CO2 car from the material provided and efficiently and safely use the required tools to build a product based on their final drawing.
- Define what forces act upon their CO2 car and ways to reduce their effects on the product they have designed and built.
- Vocabulary: pattern, limitations, sketch, standards, CO2

## Stage 2 – Assessment Evidence

**Performance Tasks:** (i.e. Assessment used to determine proficiency on competency)
- Research and Design post test

**Key Criteria:** (Rubric)
- Exceeds - ability to answer questions without assistance
- Meets - ability to answer question without the need to rephrase on two or fewer occasions
- Needs – fails to answer question correctly after instructor assistance

| Question | Exceeds | Meets | Needs |
|---|---|---|---|
| Why are standards and specifications important when designing a new product? | 3 | 2 | I |
| Why is it important to document your results and findings? | 3 | 2 | I |
| Why is it important to function test your designs and products? | 3 | 2 | I |
| Vocabulary: pattern, limitations, sketch, standards, CO2 | 3 | 2 | I |

| Stage 3 – Learning Plan | |
|---|---|
| **Learning Activities:**<br>➢ Design a CO2 dragster<br>➢ Build a CO2 dragster<br>➢ Test the performance of their dragsters | **Resources:**<br>➢ Module Library<br>➢ Calculator<br>➢ CO2 Dragster worksheet<br>➢ Acrylic paint<br>➢ Safety glasses<br>➢ Wood blanks<br>➢ CO2 cartridges<br>➢ Paint stand |

**Stage 3 – Learning Plan:**
**Power Benchmark/Competency #16:**
Understand the importance of specifications, standards, and experimentation when designing/fabricating new products.

| **Learning Activities:** | **Resources:** |
|---|---|
| **Day 1 Design a Dragster** | **"CO2 Dragster" worksheet, Pencil** |
| **Day 2 Design a Dragster** | **Car blank** |
| **Day 3 Drilling Axle Holes, Cutting Out Dragster** | **Masking tape** |
| **Day 4 Shaping Your Dragster, Shaping and Sanding** | **Sandpaper** |
| **Day 5 Smooth a Dragster, Apply Primer** | **Sandpaper, Primer** |
| **Day 6 Finishing Your Dragster** | **Sandpaper, Primer** |
| **Day 7 Assembling Your Dragster, Test and Predict Performance** | **Rear wheels 2, front wheels 2, axles 1, straw 2, screw eyes 4, brass washers 1** |
| **Enrichment** | |
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## Stage 1 – Desired Results

**Power Standard 3:** Develop the skills needed for a variety of career fields.

**Robotics Module**
**Power Benchmark/Competency #17:**
Investigate the history of robots and operation of robots and their control programs.

**Estimated Timeline:** 7 days/45 minutes each

**Place 'X' in square if goal addresses Essential/Content Standard(s).**

| Career | Technology | Critical Thinking | Global & Cultural | Personal Responsibility |
|---|---|---|---|---|
| x | x | | | x |
| **Math** | **Science** | **Reading** | **Social Responsibility** | **Communications** |
| x | x | x | x | |

**Understandings:**
*Students will understand that (sentence):*
- The Cartesian Coordinate System in the backbone on robotics programming.
- Planning is necessary in creating a robotic program.
- Remote control robots have become an important and necessary part of society.

**Essential Questions:**
- Why is the Cartesian Coordinate System thought to be the backbone of robotic programming?
- Why is planning necessary when creating a program?
- How do you trim a remote control?

***Students will (know):****…*(Include vocabulary)
- Define the vocabulary: robot, Cartesian Coordinate System, end effector, programming, axis, remote control teach pendant, and work envelope.
- Give examples of occupations in which robotic skills are needed.
- Explain the power rating of a servo.
- Appreciate occupations in which skills learned in this module are used.
- Vocabulary: servo

***Students will be able to:*** *(i.e. do)…*(Include vocabulary)
- Program and save a logical series of movements for SAM.
- Trim the control levers on the Radio Control System that maneuvers the rooster.

## Stage 2 – Assessment Evidence

**Performance Tasks:** (i.e. Assessment used to determine proficiency on competency)
- Robotics post test assessment.

**Key Criteria:** (Rubric)
- Exceeds - ability to answer questions without assistance
- Meets - ability to answer question without the need to rephrase on two or fewer occasions
- Needs – fails to answer question correctly after instructor assistance

| Question | Exceeds | Meets | Needs |
|---|---|---|---|
| Why is the Cartesian Coordinate System thought to be the backbone of robotic programming? | 3 | 2 | I |
| Why is planning necessary when creating a program? | 3 | 2 | I |
| How do you trim a remote control? | 3 | 2 | I |

| Stage 3 – Learning Plan | |
|---|---|
| **Learning Activities:**<br>➢ Program a robotic arm<br>➢ Operate a remote controlled robot using video surveillance camera<br>➢ Navigate a Cartesian coordinate system | **Resources:**<br>➢ Module Library<br>➢ Calculator<br>➢ SAM robot<br>➢ Rooster robot<br>➢ Radio-controller for rooster<br>➢ Laser assemble<br>➢ Trainer board |

**Stage 3 – Learning Plan:**
**Power Benchmark/Competency #17:**
Investigate the history of robots and operation of robots and their control programs.

| Learning Activities: | Resources: |
|---|---|
| **Day 1 Exploring Robots** | |
| **Day 2 Operating SAM** | |
| **Day 3 Programming SAM** | |
| **Day 4 Cartesian Navigator** | |
| **Day 5 SAM Assembly, Gripper Assembly** | |
| **Day 6 Rooster Challenge** | |
| **Day 7 Remote Manipulation** | |
| **Enrichment** | |
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