Unit 3: Solving Problems Creatively

Suggested Timeline: 21 Days

Unit Focus:
Unit 3 encourages **innovation** and helps students to lead **entrepreneurial** projects. Students will develop **innovative** solutions to real-world problems and develop marketable products for a specific field. The performance task asks students to investigate **innovation** in a specific career field, conduct research on **innovation** currently occurring in the market, and develop ideas based on a defined audience and target market.

Stage 1: Desired Results (both skills-based and concept-based)

Big Ideas:
Economic progress and social advancement is driven largely by **innovation** and **creative** thinking. Problems can be solved most easily by using a design approach and **project management** techniques, especially when working in groups.

Essential Questions:

- What habits and actions are taken by **innovative** thinkers to develop solutions to real-world problems?
- How can I develop and incorporate **innovative** qualities to help drive my personal and career goals?
- What are common characteristics of **entrepreneurs** and how have these characteristics helped to create **innovation**?
- How can I apply **creativity** to solve problems?
- How can processes such as the **engineering design process** help me develop **innovative** solutions to real-world problems?
- How can I use **the engineering design process** to effectively solve real-world problems?

Students Will Know and Be Able To…

- understand and apply **creativity** and the habits of effective **innovators** and **entrepreneurs.**
- identify and compare major **innovators** and **entrepreneurs** throughout American history.
- understand how **creative** qualities can be applied to achieve personal and career goals.
- understand and apply the **engineering design process** to develop a client-facing product and **business plan.**
- understand the purpose and major components of a **Request for Proposal (RFP).**
- understand, create and use a **project schedule.**
- create and present a **business plan** to a group of stakeholders.
- use the project evaluation template to reflect on the effectiveness of teams' implementation of the team contract and project schedule.

Goals

Career and Life Readiness Competencies

Applied Knowledge

- Critical Thinking Skills
  - thinking critically
  - thinking **creatively**
  - solving problems
  - reasoning
  - planning
  - organizing
- Career-Related Technical Skills
  - building background knowledge and understanding key concepts about the occupation or career pathway

Relational Skills and Personal Attributes

- Interpersonal Skills
  - understanding teamwork
  - working well with others
  - responding to customer needs
  - respecting individual differences
- Personal Qualities
  - demonstrating responsibility and self-discipline
  - adapting and showing flexibility

Executive and Communication Skills

- Information Use
  - locating information
  - organizing information
  - using information
  - communicating information

Financial Literacy

- finding, evaluating, and applying financial information

Louisiana K-12 Student Standards English Language Arts

Speaking and Listening Standards, Grade 8

SL.8.1: Engage effectively in a range of collaborative with diverse partners on grade 8 topics, texts, and issues, building on others' ideas and expressing their own clearly.

SL.8.4: Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-chosen details; use appropriate eye contact, adequate volume, and clear pronunciation.

SL.8.6: Adapt speech to a variety of contexts, audience, and tasks, demonstrating command of formal English when indicated or appropriate.

Speaking and Listening Standards, Grades 9-10

SL.9-10.4: Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.

SL.9-10.6: Adapt speech to a variety of contexts, audiences, and tasks, demonstrating command of formal English when indicated or appropriate.

Supports for Diverse Learners

- Provide notes and readings ahead of time that include additional details and background information. Highlight any key points or

Targeted Career Cluster(s)

Hospitality and Food Service

Goals	
topics and make notations to provide background information. ● Provide additional support for vocabulary ○ Preview the text or topic and identify vocabulary or sentence structures that might be new for the students. ○ Write these words and phrases on the board and have students write them in their notebooks or on index cards. ○ Use visuals, acting, translation or synonyms to relay the meaning of the word to the students. ○ Reinforce the newly learned language by asking the students to draw it, act it out, or use it in an appropriate sentence. ● Send out video links early and provide students with time to ask questions and retell the key points to the teacher. ● Provide project templates and set aside time for students to ask clarifying questions. ● Model directions and use gestures to support student understanding. ● Provide graphic organizers and or guided notes for students. ● Allow some students to use illustrations ● The teacher may provide more completed copies of handouts to scaffold for students. ● Use checklist for modifying lesson plans. ● Refer to Guidebook for Supporting Students with Disabilities and English Learner Guidebook as needed.	

Stage 2: Assessment/Evidence of and for Student Learning	
Curriculum-Embedded Performance Task(s) **Performance Task 1: Food Truck Wars** Students will ● research careers in culinary and hospitality service and management, including food trucks and the impact of alternative services models;	**Formative Checkpoints** ● **Class Discussion—**Students actively participate in daily class discussions throughout unit. ● **Student Journal—**Teacher reviews the engineering design journal to provide feedback to support student understanding of **innovation** and **entrepreneurship**. ● **Teacher Observation—**Teacher observes students during class discussion.

• conduct **market research** and develop products that meet the stated needs of clients, including the development of a food truck concept and food truck menu; • develop and use a team contract and **project schedule**; • develop a food truck **prototype**; • create a **business plan** to take a defined product to market, including the development of financial capital to launch the food truck concept; • present their **business plan** and product concepts to a group of stakeholders; • use the **project evaluation** template to reflect on the effectiveness of the teams' implementation of the team contract and project schedule. *Note: This performance-based task was adapted from CTE Online: Project Planner.*	• **Exit Tickets—**Teacher reviews exit tickets to determine students' awareness of the culinary and hospitality industry. • **Activity Sheets—**Teacher reviews the activity sheets for students' understanding of the concepts. • **Peer Feedback—**Students develop product concepts for their food truck and menu and test those ideas through **market research.** • **Food Truck Concept, Menu, and Prototype—**Students develop a food truck concept and menu as part of the unit performance task. • **Business Plan—**Students work in teams to develop a **business plan** and model that includes **market research**, business concepts and delivery strategies, and client-facing products and services. • **Project Evaluation-** Students will use the project evaluation template to reflect on the effectiveness of teams' implementation of the team contract and project schedule.

Stage 3: Learning Plan Overview	
Lessons	**Lessons Overview**
Lesson One: Innovation and Entrepreneurship **3 days**	**Day 1:** Students will be introduced to the unit and discuss the ideas of **invention**, **innovation**, **entrepreneurship, and creativity**. Students will discuss how **inventors** propose ideas for **inventions** and learn about the **engineering design process**. Students will develop an engineering design journal to record ideas and responses to class discussion and problems. **Day 2:** Students will complete an activity to summarize and practice the **engineering design process**. Students will record each step of the process in their engineering design journal. **Day 3:** Students will use their experience from the tower activity to develop team norms and create their team contract. Students will develop a draft project schedule for PT 3.1
Lesson Two: Innovators Past and Present **5 days**	**Day 1 and 2:** Students will conduct research to learn about past and present **innovators** and **entrepreneurs**. Students will select one **inventor** or **entrepreneur** to further research and develop a narrative depiction. Students will prepare a report profiling a select **innovator** or **entrepreneurs** and the characteristics that made him/her successful. Students will describe the personal and career goals that the select **inventor** likely had/has and the leadership characteristics that made him/her successful. Students will develop a list of issues or problems the select **inventor** likely overcame in order to be successful.

Stage 3: Learning Plan Overview	
	Day 3: Students will present their reports to the class. Students will listen for common characteristics these **innovators** or **entrepreneurs** possess. Students will reflect on the personal values/ leadership strengths that they need to accomplish their career goals. Students will list possible problems they may have to overcome to achieve their career goal. **Day 4:** Students will discuss how **entrepreneurs** develop business concepts and plans to deploy products and services. Students will use the engineering design process and think about how they could become an **inventor** or **entrepreneur**. Students will work in groups to develop an invention. **Day 5:** Students will develop a feedback model to vet their ideas through a list of questions and **market research**. Students will use feedback to improve their invention.
Lesson Three: Solving a Problem through Creativity **2 days**	**Day 1:** Students will develop **creativity** skills and discuss ways in which **innovators** have developed **inventions** and **innovation**. Students will work in teams of four to develop examples of possible innovations. **Day 2:** Students will apply the **engineering design process** to develop an **invention** or **innovation** that solves a problem and will work in teams to apply **creativity** and peer iteration to the solution. Students will document the **engineering design process** in their engineering journal and develop reflection statements on the experience.
Lesson Four: Innovation and Entrepreneurship at Work **11 days**	**Day 1:** Students will be introduced to PT 3.1 and ask clarifying questions. Students will watch the video History of Food Trucks. Students will form groups (typically three-four students in each group) to discuss the project guidelines and the performance task rubric. Students will determine roles and responsibilities within their group. Students will develop a list of team rules and norms that they agree to follow and other functions. Student teams will create a team contract. Students will conduct research on careers in culinary and hospitality management and **entrepreneurs** in this occupational sector. Students will be able to identify 3 or more possible careers in the culinary and hospitality industry and discuss the skills necessary for these careers. **Day 2:** Students will review and discuss PT 3.1 and the **business plan** template. Student teams will apply the **engineering design process** to complete PT 3.1. Student teams will review PT 3.1 to identify the stated problem and constraints (i.e. act phase). Student teams will imagine and brainstorm solutions to the problem. Student teams will conduct research on restaurants and hospitality groups in their local or regional communities. Student teams will review menus and promotion concepts from local businesses on sites like Yelp.com. Students may use a decision matrix to evaluate ideas (i.e. imagine phase). Students will document the **engineering design process** in their engineering journal and develop reflection statements for the act and imagine phases. **Day 3:** Students will watch a video about food trucks and review phases of the **engineering design process**. Student teams will begin to plan their food truck project and **business plan**. Student teams will update their **project schedule** for the food truck project to ensure that all team members have active roles and responsibilities to execute the project. Students will document the **engineering design process** in their engineering design

Stage 3: Learning Plan Overview	
	journal. **Day 4:** Student teams will meet to review their **project schedule** for the food truck project. Student teams should discuss how they know that they are on-track for project completion by the deadline. Student teams will use the remaining class time to finalize their plan for the food truck project and begin to develop the food truck concept and menu**.** The teacher should provide support to student teams. Students will document the **engineering design process** in their engineering journal. **Days 5:** Student teams will reflect and refine their **project schedule**. Teams should use the **project schedule** to manage group time and execute tasks associated with the project. Student teams will complete their food truck concept and menu**.** Menus will be posted, and students will give and receive feedback from peers. Students will document the **engineering design process** in their engineering journal. **Days 6:** Student teams will complete their food truck concept and menu. Students will create a list of equipment and design the interior of a food truck. Students will document the **engineering design process** in their engineering design journal. **Day 7:** Students will design a prototype of their food truck using common classroom/household materials. Students will understand the purpose and components of a **Request for Proposal (RFP)**. Students will document the engineering design process in their engineering design journal. Students will create reflection statements for the create phase. **Days 8 and 9:** Student teams will read and discuss an article about food trucks. Student teams will conduct market research and iterating on the idea and concept. Students will document the **engineering design process** in their engineering design journal. Students will develop and record reflection statements for the create and improve phases and record them in their engineering design journal. **Day 10:** Student teams will complete their food truck concept, menu, and the **business plan**. Student teams will develop a group presentation on their **business plan** and related products and determine roles and responsibilities for giving the presentation. **Day 11:** Students will present their **business plans** to another class, upper classmen in the CTE pathway or to members of the culinary and hospitality industry. Students will use the **project evaluation** template to reflect on the effectiveness of the teams' implementation of the team contract and team schedule.

Lesson One Learning Plan: Innovation and Entrepreneurship: What does it mean, and how is it done?	
Synopsis Students will learn about the ideas of **innovation** and **entrepreneurship**. Students will practice thinking like an **inventor** and brainstorm ideas for	**Essential Questions** ● What habits and actions are taken by **innovative** thinkers to develop solutions to real-world problems?

<table>
<tr><th colspan="3">Lesson One Learning Plan: Innovation and Entrepreneurship: What does it mean, and how is it done?</th></tr>
<tr><td colspan="2">innovation.</td><td>• How can processes such as the engineering design process help to develop innovative solutions to real-world problems?</td></tr>
<tr><th colspan="3">Assessed Career and Life Readiness Competencies:</th></tr>
<tr><td colspan="3">Thinking creatively is demonstrated through the design process for creating the tallest tower.
Solving problems is demonstrated as students identify constraints and solutions to building the tallest tower.
Reasoning is demonstrated as students reflect on how they could improve their towers.
Adapting and showing flexibility is demonstrated as students work together in groups and share engineering ideas.</td></tr>
<tr><th colspan="3">Suggested Texts and Resources:</th></tr>
<tr><td colspan="2">Resources
• Engineering Is Elementary
• A STEM Project Just in Time for Earth Day
• Engineering Design Process Worksheet
• Design Journals
• Keep a Great Science or Engineering Project Laboratory Notebook
• Engineering on a Dime: 3 STEM Challenges You Can Do Today</td><td>New Vocabulary for the Learning Plan
• creativity
• entrepreneur
• innovation
• patent</td></tr>
<tr><th colspan="3">Learning Events and Formative Checkpoints:</th></tr>
<tr><td>Day 1</td><td colspan="2">Students will know and be able to understand and apply creativity and habits of effective innovators and entrepreneurs. Students will know the engineering and design process.</td></tr>
<tr><td></td><td colspan="2">Formative Assessment
• teacher observation of class discussion
• teacher review of engineering design journal
• exit ticket on the engineering design process</td></tr>
<tr><td></td><td colspan="2">Materials/Resources:
• engineering design process link
• graphic depictions of the engineering design process
• graphic depictions of an engineering journal</td></tr>
<tr><td>Day 2</td><td colspan="2">Students will know and be able to use the engineering design process.</td></tr>
<tr><td></td><td colspan="2">Formative Assessment
• teacher observation of class discussion
• teacher review of engineering design journal</td></tr>
<tr><td></td><td colspan="2">Materials/Resources:
• engineering design process
• graphic depictions of the engineering design process</td></tr>
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Lesson One Learning Plan: Innovation and Entrepreneurship: What does it mean, and how is it done?	
	• tower activity
Day 3	Students will: • develop team norms and create their team contract. • develop a draft project schedule for PT 3.1
	Formative Assessment • PT 3.1 team contract • PT 3.1 **project schedule**
	Materials/Resources: • PT 3.1 Student Resource

Lesson Two Learning Plan: Innovators Past and Present	
Synopsis Students will research **innovators** and **entrepreneurs** and understand their common characteristics.	**Essential Questions** • What are common characteristics of **entrepreneurs,** and how have these characteristics helped to create **innovation**?
Assessed Career and Life Readiness Competencies:	
*Thinking critically is demonstrated as students use the **engineering design process** to define a problem and brainstorm solutions.* *Locating information is demonstrated through the research process.* *Organizing information is demonstrated by students as they organize research information into a presentation.* *Using information is demonstrated by students as they organize research information into a presentation.* *Communicating information is demonstrated through a presentation.*	
Suggested Texts and Resources:	
Resources (optional) • Inc. Magazine • Black Enterprise Magazine • Success Magazine • Entrepreneur Magazine	
Learning Events and Formative Checkpoints:	
Day 1 and 2	Students will be able to identify and compare major **innovators** and **entrepreneurs** throughout American history.
	Formative Assessment

	• teacher observation of class discussion • teacher observation of student presentations
	Materials/Resources • computer access (one per student) • Internet access (see links above for possible sites)
Day 3	Students will be able to • identify and compare major **innovators** and **entrepreneurs** throughout American history. • identify common characteristics of **innovators** and **entrepreneurs.** • identify personal leadership strengths and how they can be used to accomplish personal career goal.
	Formative Assessment • teacher observation of class discussion • teacher review of engineering design journal
	Materials/Resources • engineering design journal
Day 4	Students will be able to • discuss how **entrepreneurs** develop business concepts and create plans to deploy products and services. • develop an invention.
	Formative Assessment • teacher observation of class discussion • teacher review of engineering design journal
	Materials/Resources • **Engineering Design Process** Graphic Organizer PT 3.1 • engineering design journal
Day 5	Students will be able to develop a feedback model to vet their ideas through a list of questions and market research.
	Formative Assessment • teacher observation of class discussion • teacher review of engineering design journal
	Materials/Resources • engineering design journal

Lesson Three Learning Plan: Solving Problems Through Creativity	
Synopsis Students will practice **creativity** by finding **creative** solutions to problems.	**Addresses Essential Question:** • How can I apply **creativity** to solve problems?

Career and Life Readiness Competencies	
Thinking critically is demonstrated as students work to create a successful catapult. *Solving problems is demonstrated as students brainstorm ways to create, evaluate, and improve their catapult design.*	
Suggested Texts and Resources:	
Resources ● Engineering on a Dime: 3 STEM Challenges You Can Do Today Materials ● pompom ball ● paper towel rolls ● rubber bands ● spoons, tape ● cardboard ● (Materials can be adapted using common classroom resources as the teacher sees fit—craft sticks and tape, binder clips, etc.)	**Links to Resources:**
Learning Events and Formative Checkpoints:	
Day 1	Students will know and be able to: ● discuss ways in which **innovators** have developed inventions and innovation. ● work in teams of four to develop examples of possible innovations. ● understand how **creative** qualities can be applied to achieve their personal and career goals.
	Formative Assessment ● teacher observation of class discussion ● teacher review of the engineering design journal
	Materials ● engineering design journal ● question guide from teacher guide
Day 2	Students will know and be able to ● apply the **engineering design process** to develop an invention or innovation that solves a problem. ● work in teams to apply creativity and peer iteration to their solution.
	Formative Assessment ● teacher observation of class discussion ● teacher review of the **engineering design process** during the catapult activity ● teacher review of the engineering design journal
	Materials ● pompom ball

	• paper towel rolls • rubber bands • spoons, tape • cardboard • (Materials can be adapted using common classroom resources as the teacher sees fit—craft sticks and tape, binder clips, etc.)

Lesson Four Learning Plan: Innovation and Entrepreneurship at Work	
Synopsis Students will demonstrate **creativity** by designing and creating a food truck menu and food truck model. Students will understand **innovators** often have to seek financial support to make their dream reality. Students will create and present a business plan.	**Essential Question(s)** • How can I apply **creativity** to solve problems? • How can processes such as the **engineering design process** help me develop **innovative** solutions to real-world problems? • How can I use **the engineering design process** to effectively solve real-world problems?
Assessed Career and Life Readiness Competencies:	
*Thinking critically is demonstrated by using the **engineering design process** and project management skills to design a food truck and develop a business plan.* *Thinking **creatively** is demonstrated by designing an original food truck.* *Making sound decisions is demonstrated by creating a workable **business plan*** *Planning and organizing is demonstrated by completing all of the required components.* *Understanding background knowledge and understanding of key concepts about the occupation or career pathway is demonstrated through student research of the hospitality and culinary industry.* *Understanding teamwork and being able to work with others is demonstrated by students' ability to work through a complex design project, development of a business plan, and the presentation to stakeholders.* *Finding, evaluating, and applying financial information is demonstrated through the successful completion of a business plan.*	
Suggested Texts and Resources:	
Resources • PT 3.1: Student Resource • PT 3.1: Rubric • History of Food Trucks Venn Diagram Sheet • **Business plan** template (Student Resources PT 3.1) • Stop and Say Something Protocol • Unique Food Truck PPT • Inside a Food Truck PPT • History of Food Trucks PPT • Creative and Unique Food Trucks PPT	Notes

Lesson Four Learning Plan: Innovation and Entrepreneurship at Work	
• History of Food Trucks • Food Truck History PPT • The Great Food Truck Race • How Entrepreneurs are Making Big Bucks with Food Trucks • Computers for research	
Learning Events and Formative Checkpoints:	
Day 1	Students will know and be able to • research and discuss local career opportunities in the culinary and hospitality industry • explain in writing the occupational skills needed for careers in the culinary and hospitality industry within the local community
	Formative Assessment • teacher observation of class discussion • teacher review of exit tickets to determine students' awareness on the culinary and hospitality industry
	Resources • PT 3.1: student handout • PT 3.1: rubric • History of Food Trucks Venn Diagram Sheet • History Channel video History of Food Trucks
Day 2	Students will know and be able to • understand and apply the **engineering design process** to develop a client facing product and business plan • demonstrate **creativity** and **entrepreneurship** using the **engineering design process** to design and create a local business model • utilize a decision matrix to evaluate their food truck idea.
	Formative Assessment • teacher observation of class discussion • teacher review of engineering design journal • teacher review of reflection statements
	Resources • PT 3.1: student handout • PT 3.1: rubric • **business plan** template
Day 3	Students will know and be able to • understand and apply the **engineering design process** to develop a client facing product and **business plan**. • demonstrate **creativity** and **entrepreneurship** using the **engineering design process** to design and create a local business model.

Lesson Four Learning Plan: Innovation and Entrepreneurship at Work	
	• revise their project schedule to ensure on-time completion of the project.
	Formative Assessment • teacher observation of class discussion • teacher review of engineering design journal • teacher review of reflection statements
	Resources • Food Network video "Food Truck Wars"
Day 4	Students will know and be able to • understand and apply the **engineering design process** to develop a client facing product and **business plan.** • demonstrate **creativity** and **entrepreneurship** using the **engineering design process** to design and create a local business model.
	Formative Assessment • teacher observation of class discussion • teacher review of engineering design journal • teacher review of reflection statements
	Resources • **business plan template**
Day 5	Students will know and be able to • understand and apply the **engineering design process** to develop a client facing product and **business plan.** • demonstrate **creativity** and **entrepreneurship** using the **engineering design process** to design and create a local business model. • complete their food truck menu
	Formative Assessment • teacher observation of class discussion • teacher review of engineering design journal • teacher review of menus
	Resources • Food Truck Menu PPT
Day 6	Students will know and be able to • understand and apply the **engineering design process** to develop a client facing product and **business plan** • demonstrate **creativity** and **entrepreneurship** using the **engineering design process** to design and create a local business model.
	Formative Assessment • teacher observation of class discussion • teacher review of engineering design journal • teacher review of student design of truck interiors

Lesson Four Learning Plan: Innovation and Entrepreneurship at Work	
	Resources • Inside a Food Truck Video • Inside a Food Truck PPT • Creative and Unique Food Trucks PPT
Days 7	Students will know and be able to • understand and apply the **engineering design process** to develop a client facing product and business plan. • demonstrate **creativity** and **entrepreneurship** using the **engineering design process** to design and create a local business model. • understand how food trucks may need to apply through an RFP to operate their business.
	Formative Assessment • teacher observation of class discussion • teacher review of engineering design journal • teacher review of reflection statements • teacher review of prototypes
	Resources • Creative and Unique Food Trucks PPT • cereal boxes • shoe boxes • soda bottles • Styrofoam cups • construction paper • glue • tape • scissors
Days 8 and 9	Students will know and be able to • create and present a **business plan** to a group of stakeholders.
	Formative Assessment • teacher observation of class discussion • teacher review of engineering design journal • teacher review of reflection statements
	Resources • Say Something Protocol • How Entrepreneurs are Making Big Bucks with Food Trucks
Day 10	Students will know and be able to

Lesson Four Learning Plan: Innovation and Entrepreneurship at Work	
	● create a **business plan** and a presentation for stakeholders.
	Formative Assessment ● teacher observation of class discussion ● teacher review of business plans
	Resources ● business plan template
Day 11	Students will know and be able to ● create and present a **business plan** to a group of stakeholders. ● reflect on the project and complete the **project evaluation**.
	Formative Assessment ● teacher observation of class discussion ● teacher review of projects and **business plans** ● teacher observation of presentations