



MIDLAND PARK PUBLIC SCHOOLS
Midland Park, New Jersey
CURRICULUM

Exploratories
STEAM
Grade 6

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STEAM Exploratory

Course Description:

STEAM provides a unique learning environment that incorporates science, technology, engineering, art, and mathematics. Students will learn to work together to share ideas and problem solve, developing creative solutions to real world, complex problems by engaging in multifaceted hands-on learning experiences. The student teams design goals, generate ideas, investigate, compare/select designs, build, and test their final products. This 10-week course provides an authentic learning experience that will develop students' 21st century skills.

Suggested Course Sequence:

Unit 1: Learning Skills / Styles – 2 weeks

Unit 2: Engineering Design Process – 2 weeks

Unit 3: Helmet Safety and the Egg Drop – 2 weeks

Unit 4: Bridge Building and a Spaghetti Bridge – 2 weeks

Unit 5: Motion and a Downhill Racer – 2 weeks

Unit Overview

Content Area:	Math
Unit Title:	Unit 7: Consumer Credit
Grade Level:	11 – 12

Unit Summary:

Students will discuss how credit is based on honesty, responsibility, and the ability to pay back money borrowed.

Interdisciplinary**Connections:**

Students will build upon prior knowledge and skills in arithmetic and mathematics as they apply these concepts in real world contexts. Students will have the opportunity to evaluate how the fields of psychology, government, sociology, business, and humanities impact real world decision-making processes and how relevant quantitative and computational thinking is for long-term success in life.

21st Century**Themes and Skills:**

- **CRP1.** Act as a responsible and contributing citizen and employee.
- **CRP2.** Apply appropriate academic and technical skills.
- **CRP3.** Attend to personal health and financial well-being.
- **CRP4.** Communicate clearly and effectively and with reason.
- **CRP5.** Consider the environmental, social and economic impacts of decisions.
- **CRP6.** Demonstrate creativity and innovation.
- **CRP7.** Employ valid and reliable research strategies.
- **CRP8.** Utilize critical thinking to make sense of problems and persevere in solving them.
- **CRP9.** Model integrity, ethical leadership and effective management.
- **CRP10.** Plan education and career paths aligned to personal goals.¶
- **CRP11.** Use technology to enhance productivity.¶
- **CRP12.** Work productively in teams while using cultural global competence.

Learning Targets

Standards (Content and Technology):

CPI#:	Statement:
A.SSE.1	Interpret expressions that represent a quantity in terms of its context.
A.SSE.3	Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.
A.CED.3	Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. <i>For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.</i>
F.BF.1A	Determine an explicit expression, a recursive process, or steps for calculation from a context.
SSE.1B	Interpret complicated expressions by viewing one or more of their parts as a single entity. <i>For example, interpret $P(1+r)^n$ as the product of P and a factor not depending on P.</i>
A.SSE.2	Use the structure of an expression to identify ways to rewrite it. <i>For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.</i>

F.IF.8B	Use the properties of exponents to interpret expressions for exponential functions. For example, identify percent rate of change in functions such as $y = (1.02)^t$, $y = (0.97)^t$, $y = (1.01)12^t$, $y = (1.2)^t/10$, and classify them as representing exponential growth or decay.
LE.5	Interpret the parameters in a linear or exponential function in terms of a context.
N.Q.1	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
S.ID.6A	Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models.
A.SSE.3C	Use the properties of exponents to transform expressions for exponential functions. <i>For example the expression 1.15^t can be rewritten as $(1.15^{1/12})^{12t} \approx 1.012^{12t}$ to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.</i>
8.1.12.A.1	Create a personal digital portfolio, which reflects personal and academic interests, achievements, and career aspirations by using a variety of digital tools and resources.
8.1.12.D.4	Research and understand the positive and negative impact of one's digital footprint.

Unit Essential Question(s):

- How does one live within their income, even if borrowing money is necessary?

Unit Enduring Understandings:

- Living within one's income does not mean not ever borrowing money.
- Borrow money that can be repaid.

Unit Learning Targets/Objectives:

Students will...

- Evaluate consumer credit systems
- Calculate interest on various loans
- Analyze credit card statements

Evidence of Learning
Formative Assessments:

Problem of the day; Classwork; Question and answer; Exit questions; Class participation; Teacher observation; Use of resources; and Students' responses/explanations

Summative/Benchmark Assessment(s):

Tests; Quizzes; Projects; Homework

Resources/Materials:

Chapter 4 in textbook and Teacher's CD
Financial Algebra. Gerver, R. & Sgroi, R. South-Western/Cengage Learning: Mason, OH: 2014.
TI-83+ Graphing Calculator

Modifications:
Special Education Students

- Allow errors
- Rephrase questions, directions, and explanations
- Allow extended time to answer questions, and permit drawing, as an explanation
- Accept participation at any level, even one word
- Consult with Case Managers and follow IEP accommodations/modifications

English Language Learners

- Assign a buddy, same language or English speaking
- Allow errors in speaking
- Rephrase questions, directions, and explanations

At-Risk Students

- Provide extended time to complete tasks
- Consult with Guidance Counselors and follow I&RS procedures/action plans
- Consult with classroom teacher(s) for specific behavior interventions
- Provide rewards as necessary

Gifted and Talented Students

- Provide extension activities
- Build on students' intrinsic motivations
- Consult with parents to accommodate students'

- Allow extended time to answer questions
- Accept participation at any level, even one word

interests in completing tasks at their level of engagement

Lesson Plans

Lesson Name/Topic	Lesson Objective(s)	Time frame (day(s) to complete)
1	Introduction to Consumer Credit	2 days
2	Loans	2 days
3	Loan Calculators and Regressions	2 days
4	Credit Cards	2 days
5	Credit Card Statement	2 days
6	Average Daily Balance	2 days

Teacher Notes:

Additional Resources

<http://ahsavidandlinkcrew.weebly.com/financial-algebra.html>

Unit Overview

Content Area:	Math
Unit Title:	Unit 8: Business Plan
Grade Level:	11 – 12

Unit Summary:

In this unit, mathematical modeling is used to model a business. Point out that the word model can be used as a noun or a verb. You can create a mathematical model, or model a real-life situation mathematically. Students learn to graph and interpret scatterplots, linear functions, and parabolas.

Interdisciplinary**Connections:**

Students will build upon prior knowledge and skills in arithmetic and mathematics as they apply these concepts in real world contexts. Students will have the opportunity to evaluate how the fields of psychology, government, sociology, business, and humanities impact real world decision-making processes and how relevant quantitative and computational thinking is for long-term success in life.

21st Century**Themes and Skills:**

- **CRP1.** Act as a responsible and contributing citizen and employee.
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- **CRP9.** Model integrity, ethical leadership and effective management.
- **CRP10.** Plan education and career paths aligned to personal goals.
- **CRP11.** Use technology to enhance productivity.
- **CRP12.** Work productively in teams while using cultural global competence.

Learning Targets

Standards (Content and Technology):

CPI#:	Statement:
N.Q.2	Define appropriate quantities for the purpose of descriptive modeling.
N.Q.3	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
F.IF.7A	Graph linear and quadratic functions and show intercepts, maxima, and minima.
F.IF.1	Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then $f(x)$ denotes the output of f corresponding to the input x . The graph of f is the graph of the equation $y = f(x)$.
F.IF.4	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of

	the relationship. <i>Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.</i>
F.IF.5	Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. <i>For example, if the function $h(n)$ gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.</i>
F.IF.8	Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.
N.Q.1	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
S.ID.6	Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.
S.ID.9	Distinguish between correlation and causation.
S.ID.6C	Fit a linear function for a scatter plot that suggests a linear association.
S.ID.8	Compute (using technology) and interpret the correlation coefficient of a linear fit.
A.REI.2	Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.
A.REI.6	Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.
A.REI.4B	Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b .
A.REI.7	Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. For example, find the points of intersection between the line $y = -3x$ and the circle $x^2 + y^2 = 3$.
REI.10	Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).
A.REI.11	Explain why the x -coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.
A.SSE.1A	Interpret parts of an expression, such as terms, factors, and coefficients.
A.CED.2	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
A.CED.3	Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. <i>For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.</i>
A.REI.12	Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.
8.1.12.A.1	Create a personal digital portfolio, which reflects personal and academic interests, achievements, and career aspirations by using a variety of digital tools and resources.
8.1.12.D.4	Research and understand the positive and negative impact of one's digital footprint.
<div> <div> Unit Essential Question(s): <ul style="list-style-type: none"> How is a business plan developed? What factors contribute to long term success of a business? </div> <div> Unit Enduring Understandings: <ul style="list-style-type: none"> Business, more than any other occupation, is a continual dealing with the future; it is a continual calculation, an instructive exercise in foresight. </div> </div>	
Unit Learning Targets/Objectives: <i>Students will...</i>	

- Manipulate supply and demand and explain relationships between concepts
- Evaluate fixed and variable expenses
- Graph expenses and revenue functions
- Complete a breakeven analysis
- Create and present a business plan

Evidence of Learning

Formative Assessments:

Problem of the day; Classwork; Question and answer; Exit questions; Class participation; Teacher observation; Use of resources; and Students' responses/explanations

Summative/Benchmark Assessment(s):

Tests; Quizzes; Projects; Homework

Resources/Materials:

Chapter 2 in textbook and Teacher's CD

Financial Algebra. Gerver, R. & Sgroi, R. South-Western/Cengage Learning: Mason, OH: 2014.

TI-83+ Graphing Calculator

Modifications:

• Special Education Students

- Allow errors
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• At-Risk Students

- Provide extended time to complete tasks
- Consult with Guidance Counselors and follow I&RS procedures/action plans
- Consult with classroom teacher(s) for specific behavior interventions
- Provide rewards as necessary

• Gifted and Talented Students

- Provide extension activities
- Build on students' intrinsic motivations
- Consult with parents to accommodate students' interests in completing tasks at their level of engagement

Lesson Plans

Lesson Name/Topic	Lesson Objective(s)	Time frame (day(s) to complete)
1	Interpret Scatterplots	2 days
2	Linear Regression	2 days
3	Supply and Demand	2 days
4	Fixed and Variable Expenses	2 days
5	Graphs of Expense and Revenue Functions	2 days
6	Breakeven Analysis	2 days
7	The Profit Equation	2 days
8	Mathematically Modeling a Business	2 days

Teacher Notes:

Additional Resources

<http://ahsavidandlinkcrew.weebly.com/financial-algebra.html>

Unit Overview

Content Area:	Math
Unit Title:	Unit 9: The Stock Market
Grade Level:	11 – 12

Unit Summary:

An in-depth study of the stock market is the focus of this unit. Most students are familiar with the existence of the market, but are unfamiliar with how it works. The concept of risk and reward is a constant presence. Students use mathematics to understand market events and make wise decisions about personal investments.

Interdisciplinary**Connections:**

Students will build upon prior knowledge and skills in arithmetic and mathematics as they apply these concepts in real world contexts. Students will have the opportunity to evaluate how the fields of psychology, government, sociology, business, and humanities impact real world decision-making processes and how relevant quantitative and computational thinking is for long-term success in life.

21st Century**Themes and Skills:**

- **CRP1.** Act as a responsible and contributing citizen and employee.
- **CRP2.** Apply appropriate academic and technical skills.
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- **CRP7.** Employ valid and reliable research strategies.
- **CRP8.** Utilize critical thinking to make sense of problems and persevere in solving them.
- **CRP9.** Model integrity, ethical leadership and effective management.
- **CRP10.** Plan education and career paths aligned to personal goals.□
- **CRP11.** Use technology to enhance productivity.□
- **CRP12.** Work productively in teams while using cultural global competence.

Learning Targets

Standards (Content and Technology):

CPI#:	Statement:
N.Q.1	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
N.Q.2	Define appropriate quantities for the purpose of descriptive modeling.
N.Q.3	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
CED.1	Create equations and inequalities in one variable and use them to solve problems. <i>Include equations arising from linear and quadratic functions, and simple rational and exponential functions.</i>
A.CED.2	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

A.CED.4	Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. <i>For example, rearrange Ohm's law $V = IR$ to highlight resistance R.</i>
A.REI.3	Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
A.SSE.1	Interpret expressions that represent a quantity in terms of its context.
8.1.12.A.1	Create a personal digital portfolio, which reflects personal and academic interests, achievements, and career aspirations by using a variety of digital tools and resources.
8.1.12.D.4	Research and understand the positive and negative impact of one's digital footprint.

Unit Essential Question(s):

- How is wealth accumulated and managed via the stock market?

Unit Enduring Understandings:

- The stock market presents opportunities to make money; however, there are significant risks associated with managing money via stocks.

Unit Learning Targets/Objectives:

Students will...

- Analyze a business organization
- Compare and contrast stock market data and organize information using charts
- Calculate stock transaction fees
- Analyze dividend income and present findings

Evidence of Learning
Formative Assessments:

Problem of the day; Classwork; Question and answer; Exit questions; Class participation; Teacher observation; Use of resources; and Students' responses/explanations

Summative/Benchmark Assessment(s):

Tests; Quizzes; Projects; Homework

Resources/Materials:

Chapter 1 in textbook and Teacher's CD
Financial Algebra. Gerver, R. & Sgroi, R. South-Western/Cengage Learning: Mason, OH: 2014.
TI-83+ Graphing Calculator

Modifications:

- **Special Education Students**
 - Allow errors
 - Rephrase questions, directions, and explanations
 - Allow extended time to answer questions, and permit drawing, as an explanation
 - Accept participation at any level, even one word
 - Consult with Case Managers and follow IEP accommodations/modifications
- **English Language Learners**
 - Assign a buddy, same language or English speaking
 - Allow errors in speaking
 - Rephrase questions, directions, and explanations
 - Allow extended time to answer questions
 - Accept participation at any level, even one word
- **At-Risk Students**
 - Provide extended time to complete tasks
 - Consult with Guidance Counselors and follow I&RS procedures/action plans
 - Consult with classroom teacher(s) for specific behavior interventions
 - Provide rewards as necessary
- **Gifted and Talented Students**
 - Provide extension activities
 - Build on students' intrinsic motivations
 - Consult with parents to accommodate students' interests in completing tasks at their level of engagement

Lesson Plans

Lesson Name/Topic	Lesson Objective(s)	Time frame (day(s) to complete)
1	Business Organization	2 days

2	Stock Market Data	2 days
3	Stock Market Data Charts	2 days
4	Simple Moving Averages	2 days
5	Stock Market Ticker	2 days
6	Stock Transactions	2 days
7	Stock Transaction Fees	2 days
8	Stock Splits	2 days
9	Dividend Income	2 days

Teacher Notes:**Additional Resources**<http://ahsavidandlinkcrew.weebly.com/financial-algebra.html>

Unit Overview

Content Area:	Math
Unit Title:	Unit 10: Retirement
Grade Level:	11 – 12

Unit Summary:

This unit focuses on retirement vocabulary and formulas. The purpose of the chapter is to assist students in realizing that although retirement may be in their very distant future, planning for it should not be. There are things they can do as soon as they get their first job that will help them to be financially secure in their retirement.

Interdisciplinary Connections:

Students will build upon prior knowledge and skills in arithmetic and mathematics as they apply these concepts in real world contexts. Students will have the opportunity to evaluate how the fields of psychology, government, sociology, business, and humanities impact real world decision-making processes and how relevant quantitative and computational thinking is for long-term success in life.

21st Century**Themes and Skills:**

- **CRP1.** Act as a responsible and contributing citizen and employee.
- **CRP2.** Apply appropriate academic and technical skills.
- **CRP3.** Attend to personal health and financial well-being.
- **CRP4.** Communicate clearly and effectively and with reason.
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- **CRP6.** Demonstrate creativity and innovation.
- **CRP7.** Employ valid and reliable research strategies.
- **CRP8.** Utilize critical thinking to make sense of problems and persevere in solving them.
- **CRP9.** Model integrity, ethical leadership and effective management.
- **CRP10.** Plan education and career paths aligned to personal goals.¶
- **CRP11.** Use technology to enhance productivity.¶
- **CRP12.** Work productively in teams while using cultural global competence.

Learning Targets

Standards (Content and Technology):

CPI#:	Statement:
F.IF.1	Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then $f(x)$ denotes the output of f corresponding to the input x . The graph of f is the graph of the equation $y = f(x)$.
F.IF.8B	Use the properties of exponents to interpret expressions for exponential functions. For example, identify percent rate of change in functions such as $y = (1.02)^t$, $y = (0.97)^t$, $y = (1.01)^{12t}$, $y = (1.2)^{t/10}$, and classify them as representing exponential growth or decay.
S.MD.1	Define a random variable for a quantity of interest by assigning a numerical value to each event in a sample space; graph the corresponding probability distribution using the same graphical displays as for

	data distributions.
A.CED.3	Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. <i>For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.</i>
S.MD.2	Calculate the expected value of a random variable; interpret it as the mean of the probability distribution.
S.MD.4	Develop a probability distribution for a random variable defined for a sample space in which probabilities are assigned empirically; find the expected value. <i>For example, find a current data distribution on the number of TV sets per household in the United States, and calculate the expected number of sets per household. How many TV sets would you expect to find in 100 randomly selected households?</i>
S.MD.5	Weigh the possible outcomes of a decision by assigning probabilities to payoff values and finding expected values.
A.SSE.1	Interpret expressions that represent a quantity in terms of its context.
8.1.12.A.1	Create a personal digital portfolio, which reflects personal and academic interests, achievements, and career aspirations by using a variety of digital tools and resources.
8.1.12.D.4	Research and understand the positive and negative impact of one's digital footprint.
Unit Essential Question(s): <ul style="list-style-type: none"> How does one plan for retirement? What strategies support effective retirement planning? 	
Unit Enduring Understandings: <ul style="list-style-type: none"> Planning for retirement starts at the beginning of one's career. There are a variety of ways to prepare for retirement. 	
Unit Learning Targets/Objectives: <i>Students will...</i> <ul style="list-style-type: none"> Analyze retirement income from savings Explain how social security benefits contribute to retirement plans Present the differences between pensions and 401K plans Evaluate the pros and cons of life insurance policies 	
Evidence of Learning	
Formative Assessments: Problem of the day; Classwork; Question and answer; Exit questions; Class participation; Teacher observation; Use of resources; and Students' responses/explanations	
Summative/Benchmark Assessment(s): Tests; Quizzes; Projects; Homework	
Resources/Materials: Chapter 9 in textbook and Teacher's CD Financial Algebra. Gerver, R. & Sgroi, R. South-Western/Cengage Learning: Mason, OH: 2014. TI-83+ Graphing Calculator	
Modifications: <ul style="list-style-type: none"> Special Education Students <ul style="list-style-type: none"> Allow errors Rephrase questions, directions, and explanations Allow extended time to answer questions, and permit drawing, as an explanation Accept participation at any level, even one word Consult with Case Managers and follow IEP accommodations/modifications English Language Learners <ul style="list-style-type: none"> Assign a buddy, same language or English speaking At-Risk Students <ul style="list-style-type: none"> Provide extended time to complete tasks Consult with Guidance Counselors and follow I&RS procedures/action plans Consult with classroom teacher(s) for specific behavior interventions Provide rewards as necessary Gifted and Talented Students <ul style="list-style-type: none"> Provide extension activities Build on students' intrinsic motivations 	

- Allow errors in speaking
- Rephrase questions, directions, and explanations
- Allow extended time to answer questions
- Accept participation at any level, even one word
- Consult with parents to accommodate students' interests in completing tasks at their level of engagement

Lesson Plans

Lesson Name/Topic	Lesson Objective(s)	Time frame (day(s) to complete)
1	Retirement Income from Savings	2 days
2	Social Security Benefits	2 days
3	Pensions	2 days
4	Life Insurance	2 days

Teacher Notes:

Additional Resources

<http://ahsavidandlinkcrew.weebly.com/financial-algebra.html>

Unit Overview

Content Area: STEAM

Unit Title: Unit 1: Learning Skills / Styles

Grade Level: 6

Unit Summary:

Students will learn the demonstration and understanding of several types of learning styles and skills. Lesson will be driven by student survey results. Students will learn how different learning styles can work together to create a better product.

Interdisciplinary

Connections:

Science, Technology, Engineering, Art, and Mathematics

21st Century

Themes and Skills:

- **CRP1.** Act as a responsible and contributing citizen and employee.
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- **CRP9.** Model integrity, ethical leadership and effective management.
- **CRP10.** Plan education and career paths aligned to personal goals.
- **CRP11.** Use technology to enhance productivity.
- **CRP12.** Work productively in teams while using cultural global competence.

Learning Targets

Standards (Content and Technology):

CPI#:	Statement:
5.1.4.A.2.	Use outcomes of investigations to build and refine questions, models, and explanations.
5.1.8.B.1	Design investigations and use scientific instrumentation to collect, analyze, and evaluate evidence as part of building and revising models and explanations.
5.1.8.B.2.	Gather, evaluate, and represent evidence using scientific tools, technologies, and computational strategies.
5.1.8.D.1.	Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences.
5.1.8.D.2	Engage in productive scientific discussion practices during conversations with peers, both face-to-face and virtually, in the context of scientific investigations and model building.
8.1.8.A.1.	Demonstrate knowledge of a real world problem using digital tools.
8.1.8.D.4.	Assess the credibility and accuracy of digital content.
8.1.8.E.1.	Produce a position statement about a real world problem by developing a systematic plan of

[illegible]

Teacher Notes:

Additional Resources

Click links below to access additional resources used to design this unit:

Unit Overview

Content Area:	STEAM
Unit Title:	Unit 2: Engineering Design Process
Grade Level:	6

Unit Summary:

The organized method of the engineering design process where students work through a chart detailing the design process and then use its steps to consider how to solve three different problems.

Interdisciplinary**Connections:**

Science, Technology, Engineering, Art, and Mathematics

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- . **CRP11.** Use technology to enhance productivity.☐
- . **CRP12.** Work productively in teams while using cultural global competence.

Learning Targets

Standards (Content and Technology):

CPI#:	Statement:
5.1.4.A.2.	Use outcomes of investigations to build and refine questions, models, and explanations.
5.1.8.B.1	Design investigations and use scientific instrumentation to collect, analyze, and evaluate evidence as part of building and revising models and explanations.
5.1.8.B.2.	Gather, evaluate, and represent evidence using scientific tools, technologies, and computational strategies.
5.1.8.C.1	Monitor one's own thinking, as understandings of scientific concepts are refined.
5.1.8.D.1.	Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences.
5.1.8.D.2	Engage in productive scientific discussion practices during conversations with peers, both face-to-face and virtually, in the context of scientific investigations and model building.
8.1.8.A.1.	Demonstrate knowledge of a real world problem using digital tools.
8.1.8.A.3.	Use and/or develop a simulation that provides an environment to solve a real world problem or theory.

8.1.8.A.5.	Create a database query, sort and create a report and describe the process, and explain the report results.	
8.1.8.D.4.	Assess the credibility and accuracy of digital content.	
8.1.8.E.1.	Produce a position statement about a real world problem by developing a systematic plan of investigation with peers and experts synthesizing information from multiple sources.	
Unit Essential Question(s): <ul style="list-style-type: none"> What are the six steps in the engineering design process? How does this process help solve problems? 		Unit Enduring Understandings: <ul style="list-style-type: none"> The engineering design process is a useful way to solve problems.
Unit Learning Targets/Objectives: <i>Students will...</i> <ul style="list-style-type: none"> Apply and document an engineering design process that includes identifying criteria and constraints, making representation, testing and evaluation, and refining the design as needed to construct a product or system that solves a problem. 		
Evidence of Learning		
Formative Assessments: <ul style="list-style-type: none"> Engineering design process chart Pipe cleaner tower activity Class participation 		
Summative/Benchmark Assessment(s): <ul style="list-style-type: none"> Students will work in teams to solve three different types of problems using the engineering design process. 		
Resources/Materials: <ul style="list-style-type: none"> Websites pertinent to the topic, PowerPoint(s), worksheets, computers 		
Modifications: <ul style="list-style-type: none"> Special Education Students - Allow errors, Rephrase questions, directions, and explanations, Allow use of calculator English Language Learners - Allow errors in speaking, Rephrase questions, directions, and explanations At-Risk Students - Consult with Guidance Counselors and follow I&RS procedures/action plans Gifted and Talented Students – Make Peer Leaders, Provide extension activities 		
Lesson Plans		
Lesson Name/Topic	Lesson Objective(s)	Time frame (day(s) to complete)
1	Engineering Steps 1 -2	2 days
2	Engineering Steps 3-4	2 days
3	Engineering Steps 5-6	2 days
4	Engineering Project Presentation Preparation	2 days
5	Engineering Project Presentations	2 days

Teacher Notes:

Additional Resources

Click links below to access additional resources used to design this unit:

Unit Overview

Content Area: STEAM

Unit Title: Unit 3: Helmet Safety and The Egg Drop

Grade Level: 6

Unit Summary:

Students will learn the basic engineering related to helmet design, specifically about the physics of collisions and the biomechanical considerations of design. Students will identify and solve a design challenge to keep a raw egg safe from a 30-foot drop.

Interdisciplinary

Connections:

Science, Technology, Engineering, Art, and Mathematics

21st Century

Themes and Skills:

- **CRP1.** Act as a responsible and contributing citizen and employee.
- **CRP2.** Apply appropriate academic and technical skills.
- **CRP3.** Attend to personal health and financial well-being.
- **CRP4.** Communicate clearly and effectively and with reason.
- **CRP5.** Consider the environmental, social and economic impacts of decisions.
- **CRP6.** Demonstrate creativity and innovation.
- **CRP7.** Employ valid and reliable research strategies.
- **CRP8.** Utilize critical thinking to make sense of problems and persevere in solving them.
- **CRP9.** Model integrity, ethical leadership and effective management.
- **CRP10.** Plan education and career paths aligned to personal goals.
- **CRP11.** Use technology to enhance productivity.
- **CRP12.** Work productively in teams while using cultural global competence.

Learning Targets

Standards (Content and Technology):

CPI#:	Statement:
5.1.4.A.2.	Use outcomes of investigations to build and refine questions, models, and explanations.
5.1.8.A.3	Use scientific principles and models to frame and synthesize scientific arguments and pose theories.
5.1.8.B.1	Design investigations and use scientific instrumentation to collect, analyze, and evaluate evidence as part of building and revising models and explanations.
5.1.8.B.2.	Gather, evaluate, and represent evidence using scientific tools, technologies, and computational strategies.
5.1.8.B.4.	Use quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.
5.1.8.C.1	Monitor one's own thinking, as understandings of scientific concepts are refined.
5.1.8.C.2.	Revise predictions or explanations on the basis of discovering new evidence, learning new information, or using models.

5.1.8.C.3.	Generate new and productive questions to evaluate and refine core explanations.
5.1.8.D.1.	Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences.
5.1.8.D.2	Engage in productive scientific discussion practices during conversations with peers, both face-to-face and virtually, in the context of scientific investigations and model building.
8.1.8.A.1.	Demonstrate knowledge of a real world problem using digital tools.
8.1.8.A.3.	Use and/or develop a simulation that provides an environment to solve a real world problem or theory.
8.1.8.A.5.	Create a database query, sort and create a report and describe the process, and explain the report results.
8.1.8.D.4.	Assess the credibility and accuracy of digital content.
8.1.8.E.1.	Produce a position statement about a real world problem by developing a systematic plan of investigation with peers and experts synthesizing information from multiple sources.
8.1.8.F.1.	Explore a local issue, by using digital tools to collect and analyze data to identify a solution and make an informed decision.

Unit Essential Question(s):

- What are the basic physics and biomechanical aspects of helmet design?
- How can you use these aspects to create a safe device?

Unit Enduring Understandings:

- The importance of good design when creating a safety helmet.
- The importance of helmet safety and the risks of not wearing a helmet.

Unit Learning Targets/Objectives:*Students will...*

- Identify the importance of a helmet as a piece of safety equipment
- Describe how the helmet absorbs and dissipates energy in a collision
- Create a solution strategy for a helmet design challenge (egg drop)
- Present and explain their design solution to the class

Evidence of Learning**Formative Assessments:**

- Complete all worksheets related to learning basic engineering and helmet safety
- Written summary and presentation of helmet safety report
- Class participation

Summative/Benchmark Assessment(s):

- Egg drop design project – students will work in teams to design and create a safety product to protect a raw egg when dropped 30-feet.

Resources/Materials:

- Websites pertinent to the topic, PowerPoint(s), computers, examples of helmets, poster board, one raw egg per group, building materials

Modifications:

- | | |
|--|---|
| <ul style="list-style-type: none"> • Special Education Students - Allow errors, Rephrase questions, directions, and explanations, Allow use of calculator • English Language Learners - Allow errors in speaking, Rephrase questions, directions, and explanations | <ul style="list-style-type: none"> • At-Risk Students - Consult with Guidance Counselors and follow I&RS procedures/action plans • Gifted and Talented Students – Make Peer Leaders, Provide extension activities |
|--|---|

Lesson Plans

Lesson Name/Topic	Lesson Objective(s)	Time frame (day(s) to complete)
1	Basic Physics of a Helmet	2 days
2	Biomechanical Aspects of a Helmet	2 days

3	Engineering Design Process	2 days
4	Preparation for Project Presentation	2 days
5	Project Presentations	2 days

Teacher Notes:**Additional Resources**

Click links below to access additional resources used to design this unit:

Unit Overview

Content Area: STEAM

Unit Title: Unit 4: Bridge Building and The Spaghetti Bridge

Grade Level: 6

Unit Summary:

Students will learn the basic design of a truss bridge, specifically, the triangulated framework that acts primarily in tension and compression. Students will identify and solve a design challenge to create a model bridge using spaghetti that must hold weight.

Interdisciplinary

Connections:

Science, Technology, Engineering, Art, and Mathematics

21st Century

Themes and Skills:

- CRP1. Act as a responsible and contributing citizen and employee.
- CRP2. Apply appropriate academic and technical skills.
- CRP3. Attend to personal health and financial well-being.
- CRP4. Communicate clearly and effectively and with reason.
- CRP5. Consider the environmental, social and economic impacts of decisions.
- CRP6. Demonstrate creativity and innovation.
- CRP7. Employ valid and reliable research strategies.
- CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
- CRP9. Model integrity, ethical leadership and effective management.
- CRP10. Plan education and career paths aligned to personal goals.
- CRP11. Use technology to enhance productivity.
- CRP12. Work productively in teams while using cultural global competence.

Learning Targets

Standards (Content and Technology):

CPI#:	Statement:
5.1.4.A.2.	Use outcomes of investigations to build and refine questions, models, and explanations.
5.1.8.A.3	Use scientific principles and models to frame and synthesize scientific arguments and pose theories.
5.1.8.B.1	Design investigations and use scientific instrumentation to collect, analyze, and evaluate evidence as part of building and revising models and explanations.
5.1.8.B.2.	Gather, evaluate, and represent evidence using scientific tools, technologies, and computational strategies.
5.1.8.B.4.	Use quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.
5.1.8.C.1	Monitor one's own thinking, as understandings of scientific concepts are refined.
5.1.8.C.2.	Revise predictions or explanations on the basis of discovering new evidence, learning new information, or using models.

5.1.8.C.3.	Generate new and productive questions to evaluate and refine core explanations.
5.1.8.D.1.	Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences.
5.1.8.D.2	Engage in productive scientific discussion practices during conversations with peers, both face-to-face and virtually, in the context of scientific investigations and model building.
8.1.8.A.1.	Demonstrate knowledge of a real world problem using digital tools.
8.1.8.A.3.	Use and/or develop a simulation that provides an environment to solve a real world problem or theory.
8.1.8.A.5.	Create a database query, sort and create a report and describe the process, and explain the report results.
8.1.8.D.4.	Assess the credibility and accuracy of digital content.
8.1.8.E.1.	Produce a position statement about a real world problem by developing a systematic plan of investigation with peers and experts synthesizing information from multiple sources.
8.1.8.F.1.	Explore a local issue, by using digital tools to collect and analyze data to identify a solution and make an informed decision.

Unit Essential Question(s):

- How is a truss bridge designed?
- How can you design a truss bridge to hold the most weight?

Unit Enduring Understandings:

- The importance of an effective design to create the strongest bridge.

Unit Learning Targets/Objectives:

Students will...

- Use their knowledge of truss bridges to create a bridge using spaghetti to hold as much weight as possible.

Evidence of Learning
Formative Assessments:

- Complete all worksheets related to learning about truss bridges
- Class participation

Summative/Benchmark Assessment(s):

- Spaghetti Bridge project – students will work in teams to design and create a truss bridge out of spaghetti with the ability to hold the most weight possible. Each team will be responsible for a blueprint, planning log, and actual model bridge.

Resources/Materials:

- Websites pertinent to the topic, video, computers, spaghetti, glue

Modifications:

- | | |
|--|---|
| <ul style="list-style-type: none"> • Special Education Students - Allow errors, Rephrase questions, directions, and explanations, Allow use of calculator • English Language Learners - Allow errors in speaking, Rephrase questions, directions, and explanations | <ul style="list-style-type: none"> • At-Risk Students - Consult with Guidance Counselors and follow I&RS procedures/action plans • Gifted and Talented Students – Make Peer Leaders, Provide extension activities |
|--|---|

Lesson Plans

Lesson Name/Topic	Lesson Objective(s)	Time frame (day(s) to complete)
1	Background and Introduction to Bridges and Trusses	2 days
2	Engineering Design Process	2 days
3	Engineering Design Process	2 days
	Preparation for Project	2 days

4	Presentation	
5	Project Presentations	2 days

Teacher Notes:

Additional Resources
Click links below to access additional resources used to design this unit:

Unit Overview

Content Area:	STEAM
Unit Title:	Unit 5: Motion and a Downhill Racer
Grade Level:	6

Unit Summary:

Students will learn about the motion of car, specifically, about inclined planes, friction, gravity, momentum, and potential vs. kinetic energy. Students will identify and solve a design challenge to create a downhill racer that can go the distance.

Interdisciplinary**Connections:**

Science, Technology, Engineering, Art, and Mathematics

21st Century**Themes and Skills:**

- **CRP1.** Act as a responsible and contributing citizen and employee.
- **CRP2.** Apply appropriate academic and technical skills.
- **CRP3.** Attend to personal health and financial well-being.
- **CRP4.** Communicate clearly and effectively and with reason.
- **CRP5.** Consider the environmental, social and economic impacts of decisions.
- **CRP6.** Demonstrate creativity and innovation.
- **CRP7.** Employ valid and reliable research strategies.
- **CRP8.** Utilize critical thinking to make sense of problems and persevere in solving them.
- **CRP9.** Model integrity, ethical leadership and effective management.
- **CRP10.** Plan education and career paths aligned to personal goals.□
- **CRP11.** Use technology to enhance productivity.□
- **CRP12.** Work productively in teams while using cultural global competence.

Learning Targets

Standards (Content and Technology):

CPI#:	Statement:
5.1.4.A.2.	Use outcomes of investigations to build and refine questions, models, and explanations.
5.1.8.A.3	Use scientific principles and models to frame and synthesize scientific arguments and pose theories.
5.1.8.B.1	Design investigations and use scientific instrumentation to collect, analyze, and evaluate evidence as part of building and revising models and explanations.
5.1.8.B.2.	Gather, evaluate, and represent evidence using scientific tools, technologies, and computational strategies.
5.1.8.B.4.	Use quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.
5.1.8.C.1	Monitor one's own thinking, as understandings of scientific concepts are refined.
5.1.8.C.2.	Revise predictions or explanations on the basis of discovering new evidence, learning new information, or using models.

5.1.8.C.3.	Generate new and productive questions to evaluate and refine core explanations.
5.1.8.D.1.	Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences.
5.1.8.D.2.	Engage in productive scientific discussion practices during conversations with peers, both face-to-face and virtually, in the context of scientific investigations and model building.
8.1.8.A.1.	Demonstrate knowledge of a real world problem using digital tools.
8.1.8.A.3.	Use and/or develop a simulation that provides an environment to solve a real world problem or theory.
8.1.8.A.5.	Create a database query, sort and create a report and describe the process, and explain the report results.
8.1.8.D.4.	Assess the credibility and accuracy of digital content.
8.1.8.E.1.	Produce a position statement about a real world problem by developing a systematic plan of investigation with peers and experts synthesizing information from multiple sources.
8.1.8.F.1.	Explore a local issue, by using digital tools to collect and analyze data to identify a solution and make an informed decision.

Unit Essential Question(s):

- How does a simple machine work?
- How can you create a car that produces minimal friction and allows the car to the farthest with little energy input?

Unit Enduring Understandings:

- The importance of design when creating a simple machine with the conservation of energy.

Unit Learning Targets/Objectives:*Students will...*

- Learn the science of motion, momentum, friction, and kinematics by designing and constructing a downhill simple machine (model car).

Evidence of Learning**Formative Assessments:**

- Complete all worksheets related to learning about motion
- Class participation

Summative/Benchmark Assessment(s):

- Downhill Racer project – students will work in teams to design and create a model car with the ability to travel a suitable distance. Each team will be responsible for a blueprint, planning log, and actual model car.

Resources/Materials:

- Websites pertinent to the topic, computers, Legos

Modifications:

- **Special Education Students** - Allow errors, Rephrase questions, directions, and explanations, Allow use of calculator
- **English Language Learners** - Allow errors in speaking, Rephrase questions, directions, and explanations
- **At-Risk Students** - Consult with Guidance Counselors and follow I&RS procedures/action plans
- **Gifted and Talented Students** – Make Peer Leaders, Provide extension activities

Lesson Plans

Lesson Name/Topic	Lesson Objective(s)	Time frame (day(s) to complete)
1	Motion and Momentum	2 days
2	Friction and Kinematics	2 days
3	Engineering Design Process (model car)	2 days
	Preparation for Project	2 days

4	Presentation	
5	Project Presentations	2 days

Teacher Notes:

Additional Resources

Click links below to access additional resources used to design this unit: