



## Science of Technology

### Lesson 1: Applied Chemistry | 6 days

#### Activity 1.1: Let's Make Ice Cream

##### Physical Science

3.2.6-8.D Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.

3.2.6-8.F Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.

3.5.6-8.N (ETS) Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

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#### Activity 1.1.a: Let's Make Yogurt

##### Physical Science

3.2.6-8.F Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.

3.5.6-8.N (ETS) Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

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#### Activity 1.2: Gluing It All Together

##### Physical Science

3.2.6-8.C Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.

##### Technology and Engineering

3.5.6-8.B Use instruments to gather data on the performance of everyday products.

3.5.6-8.G Analyze how an invention or innovation was influenced by the context and circumstances in which it is developed.

3.5.6-8.M (ETS) Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

3.5.6-8.N (ETS) Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

3.5.6-8.P (ETS) Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem

3.5.6-8.Q Apply a technology and engineering design thinking process.

3.5.6-8.U Evaluate and assess the strengths and weaknesses of various design solutions given established principles and elements of design.

3.5.6-8.V Refine design solutions to address criteria and constraints.

3.5.6-8.W (ETS) Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.

3.5.6-8.X Defend decisions related to a design problem.

3.5.6-8.CC Consider historical factors that have contributed to the development of technologies and human progress.

3.5.6-8.JJ Apply informed problem-solving strategies to the improvement of existing devices or processes or the development of new approaches.



## Science of Technology

### Project 1.3: Oil Spill Cleanup

#### Earth and Space Science

3.3.6-8.K Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.

#### Environmental Literacy and Sustainability

3.4.6-8.G Obtain and communicate information to describe how best resource management practices and environmental laws are designed to achieve environmental sustainability.

3.4.6-8.H Design a solution to an environmental issue in which individuals and societies can engage as stewards of the environment.

3.5.6-8.M (ETS) Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

3.5.6-8.N (ETS) Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

3.5.6-8.P (ETS) Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem

3.5.6-8.Q Apply a technology and engineering design thinking process.

3.5.6-8.W (ETS) Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.

3.5.6-8.X Defend decisions related to a design problem.

3.5.6-8.JJ Apply informed problem-solving strategies to the improvement of existing devices or processes or the development of new approaches.

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### Lesson 2: Nanotechnology | 10 days

#### Activity 2.1: Nanotechnology: Fact or Myth?

##### Physical Science

3.2.6-8.C Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.

##### Technology and Engineering

3.5.6-8.A Research information from various sources to use and maintain technological products or systems.

3.5.6-8.F Analyze examples of technologies that have changed the way people think, interact, live, and communicate.

3.5.6-8.I Examine the ways that technology can have both positive and negative effects at the same time.

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#### Activity 2.2: How Small is a Billionth?

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##### Activity 2.2.a: Build a Buckyball

##### Physical Science

3.2.6-8.A Develop models to describe the atomic composition of simple molecules and extended structures.



## Science of Technology

### Activity 2.3.a: Exploring Nanoproducts

#### Physical Science

3.2.6-8.C Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.

#### Technology and Engineering

3.5.6-8.A Research information from various sources to use and maintain technological products or systems.

3.5.6-8.B Use instruments to gather data on the performance of everyday products.

3.5.6-8.F Analyze examples of technologies that have changed the way people think, interact, live, and communicate.

3.5.6-8.L Design methods to gather data about technological systems.

3.5.6-8.N (ETS) Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

3.5.6-8.P (ETS) Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem

3.5.6-8.DD Engage in a research and development process to simulate how inventions and innovations have evolved through systematic tests and refinements.

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### Activity 2.3.b: Exploring Nanoproducts (Alternative Activity)

#### Physical Science

3.2.6-8.C Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.

#### Technology and Engineering

3.5.6-8.A Research information from various sources to use and maintain technological products or systems.

3.5.6-8.F Analyze examples of technologies that have changed the way people think, interact, live, and communicate.

3.5.6-8.O Interpret the accuracy of information collected.

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### Activity 2.4: Testing Nanofabric

#### Technology and Engineering

3.5.6-8.B Use instruments to gather data on the performance of everyday products.

3.5.6-8.F Analyze examples of technologies that have changed the way people think, interact, live, and communicate.

3.5.6-8.L Design methods to gather data about technological systems.

3.5.6-8.N (ETS) Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

3.5.6-8.P (ETS) Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem

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### Activity 2.5: Amazing Nanotechnology

#### Physical Science

3.2.6-8.C Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.

#### Technology and Engineering

3.5.6-8.A Research information from various sources to use and maintain technological products or systems.

3.5.6-8.I Examine the ways that technology can have both positive and negative effects at the same time.



## Science of Technology

### Lesson 3: Applied Physics | 29 days

#### Activity 3.1: Simple Machines Video

##### Technology and Engineering

3.5.6-8.F Analyze examples of technologies that have changed the way people think, interact, live, and communicate.

3.5.6-8.CC Consider historical factors that have contributed to the development of technologies and human progress.

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#### Activity 3.2: Simple Machines Scavenger Hunt

##### Technology and Engineering

3.5.6-8.F Analyze examples of technologies that have changed the way people think, interact, live, and communicate.

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#### Activity 3.3: Simple Machines Exploration

##### Technology and Engineering

3.5.6-8.F Analyze examples of technologies that have changed the way people think, interact, live, and communicate.

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#### Activity 3.4: Energy

##### Physical Science

3.2.6-8.H Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.

3.2.6-8.J Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects.

3.2.6-8.P Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system.

3.5.6-8.GG Create an open-loop system that has no feedback path and requires human intervention.

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#### Project 3.5: Roller Coaster Mania

##### Physical Science

3.2.6-8.H Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.

3.2.6-8.P Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system.

3.5.6-8.L Design methods to gather data about technological systems.

3.5.6-8.Q Apply a technology and engineering design thinking process.

3.5.6-8.BB Demonstrate how knowledge gained from other content areas affects the development of technological products and systems.

3.5.6-8.GG Create an open-loop system that has no feedback path and requires human intervention.

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#### Activity 3.6: Systems and Subsystems

##### Technology and Engineering

3.5.6-8.N (ETS) Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.



## Science of Technology

### Problem 3.7: Product Creation

#### Physical Science

3.2.6-8.G Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects.

3.2.6-8.H Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.

3.2.6-8.P Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system.

#### Technology and Engineering

3.5.6-8.M (ETS) Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

3.5.6-8.N (ETS) Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

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3.5.6-8.X Defend decisions related to a design problem.

3.5.6-8.BB Demonstrate how knowledge gained from other content areas affects the development of technological products and systems.

3.5.6-8.FF Demonstrate how systems thinking involves considering relationships between every part, as well as how the systems interact with the environment in which it is used.

3.5.6-8.GG Create an open-loop system that has no feedback path and requires human intervention.

3.5.6-8.JJ Apply informed problem-solving strategies to the improvement of existing devices or processes or the development of new approaches.