



Flight and Space

Standards	Goals
<p>Lesson 1: Flight 18-19 days</p> <p>Activity 1.1: Instant Design Challenge</p> <p>Technology and Engineering</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>3.5.6-8.Q Apply a technology and engineering design thinking process.</p> <p>3.5.6-8.R Develop innovative products and systems that solve problems and extend capabilities based on individual or collective needs and wants.</p> <p>3.5.6-8.S Illustrate the benefits and opportunities associated with different approaches to design.</p> <p>3.5.6-8.U Evaluate and assess the strengths and weaknesses of various design solutions given established principles and elements of design.</p> <p>3.5.6-8.V Refine design solutions to address criteria and constraints.</p> <p>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.</p> <p>3.5.6-8.X Defend decisions related to a design problem.</p> <p>3.5.6-8.BB Demonstrate how knowledge gained from other content areas affects the development of technological products and systems.</p> <p>3.5.6-8.JJ Apply informed problem-solving strategies to the improvement of existing devices or processes or the development of new approaches.</p>	<ul style="list-style-type: none"> • Work in a team to solve an instant design challenge. • Design, build, test, and modify a paper airplane glider so that it lands accurately on a target. • Explore the steps of a design process.
<p>Activity 1.2: Forces of Flight</p> <p>Physical Science</p> <p>3.2.6-8.G Apply Newton’s Third Law to design a solution to a problem involving the motion of two colliding objects.</p>	<ul style="list-style-type: none"> • Explore how flight is possible. • Investigate Newton’s three laws of motion, and how they apply to flight. • Examine the four forces of flight: weight, lift, drag, and thrust.
<p>Activity 1.3: Test Flight</p> <p>Physical Science</p> <p>3.2.6-8.G Apply Newton’s Third Law to design a solution to a problem involving the motion of two colliding objects.</p> <p>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.</p>	



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<p>Activity 1.3: Test Flight cont.</p> <p>Technology and Engineering</p> <p>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.</p> <p>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.</p> <p>3.5.6-8.Q Apply a technology and engineering design thinking process.</p> <p>3.5.6-8.V Refine design solutions to address criteria and constraints.</p> <p>3.5.6-8.BB Demonstrate how knowledge gained from other content areas affects the development of technological products and systems.</p> <p>3.5.6-8.JJ Apply informed problem-solving strategies to the improvement of existing devices or processes or the development of new approaches.</p>	<ul style="list-style-type: none"> • Examine the directions of airplane motion: pitch, yaw, roll. • Design and test airfoils on a model jet. • Identify what is not working and propose modifications to improve the accuracy of a model jet’s flight path.
<p>Activity 1.4: Drones to the Rescue</p> <p>Technology and Engineering</p> <p>3.5.6-8.A Research information from various sources to use and maintain technological products or systems.</p> <p>3.5.6-8.BB Demonstrate how knowledge gained from other content areas affects the development of technological products and systems.</p>	<ul style="list-style-type: none"> • Explore examples of cutting-edge aircraft and ways drones are used in society.
<p>Activity 1.5: Flight Planning</p> <p>Technology and Engineering</p> <p>3.5.6-8.BB Demonstrate how knowledge gained from other content areas affects the development of technological products and systems.</p>	<ul style="list-style-type: none"> • Use symbols and visual cues to read a map. • Explore sectional aeronautical charts. • Work in a team to create a flight path, including determining the distance traveled, the fuel necessary, and time the trip will take.
<p>Activity 1.6: Flight Management</p>	<ul style="list-style-type: none"> • Investigate the construction and uses of Gantt charts. • Use Gantt charts to solve complex problems. • Collaborate with a teammate on the use of schedules and charts to handle events at airports.



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<p>Project 1.7: Cleared for Takeoff</p> <p>Technology and Engineering</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>3.5.6-8.Q Apply a technology and engineering design thinking process.</p> <p>3.5.6-8.R Develop innovative products and systems that solve problems and extend capabilities based on individual or collective needs and wants.</p> <p>3.5.6-8.U Evaluate and assess the strengths and weaknesses of various design solutions given established principles and elements of design.</p> <p>3.5.6-8.V Refine design solutions to address criteria and constraints.</p> <p>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.</p> <p>3.5.6-8.X Defend decisions related to a design problem.</p> <p>3.5.6-8.BB Demonstrate how knowledge gained from other content areas affects the development of technological products and systems.</p> <p>3.5.6-8.JJ Apply informed problem-solving strategies to the improvement of existing devices or processes or the development of new approaches.</p>	<ul style="list-style-type: none"> • Apply knowledge and skills learned in this lesson to design and build a prototype of an aircraft. • Create a flight plan, including a navigation route, and a crew schedule. • Collaborate within a team. • Use the design process to create a solution.
<p>Lesson 2: Space 16 days</p> <p>Activity 2.1: Explorers of the Universe</p> <p>Technology and Engineering</p> <p>3.5.6-8.A Research information from various sources to use and maintain technological products or systems.</p> <p>3.5.6-8.F Analyze examples of technologies that have changed the way people think, interact, live, and communicate.</p> <p>3.5.6-8.CC Consider historical factors that have contributed to the development of technologies and human progress.</p>	<ul style="list-style-type: none"> • Explore the history of flight and space flight and travel. • Investigate what is currently happening in space flight and travel.



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<p>Activity 2.2: 3...2...1...Liftoff</p> <p>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.</p> <p>Technology and Engineering 3.5.6-8.B Use instruments to gather data on the performance of everyday products. 3.5.6-8.BB Demonstrate how knowledge gained from other content areas affects the development of technological products and systems.</p>	<ul style="list-style-type: none"> • Explore liftoff. • Investigate propulsion systems. • Determine how the amount of fuel a rocket uses impacts its travel distance. • Compare how different types of fuel affect the distance a spacecraft travels.
<p>Activity 2.3: All Systems Go</p> <p>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.</p> <p>Earth and Space Science 3.3.6-8.B Use a model to describe the role of gravity in the motions within galaxies and the solar system. 3.5.6-8.BB Demonstrate how knowledge gained from other content areas affects the development of technological products and systems.</p>	<ul style="list-style-type: none"> • Examine the balance of forces needed for a spacecraft to orbit a body and escape to space. • Examine the layers of Earth’s atmosphere, including where most human-made satellites orbit. • Explore the phases of the Apollo 11 mission. • Describe techniques for landing a spacecraft.
<p>Activity 2.4: Out of This World Food</p> <p>Technology and Engineering 3.5.6-8.BB Demonstrate how knowledge gained from other content areas affects the development of technological products and systems.</p>	<ul style="list-style-type: none"> • Learn fundamentals of healthy eating during spaceflight and at a future off-Earth colony. • Use the astronaut process of food rehydration. • Review plant growth data to plan for gardening off-Earth.
<p>Activity 2.5: Fit For Space</p> <p>Technology and Engineering 3.5.6-8.E Consider the impacts of a proposed or existing technology and devise strategies for reducing, reusing, and recycling waste caused by its creation. 3.5.6-8.BB Demonstrate how knowledge gained from other content areas affects the development of technological products and systems.</p>	<ul style="list-style-type: none"> • Learn fundamentals of fitness and rest during spaceflight and at a future off-Earth colony. • Simulate exercise in space. • Play a game to identify health and hazards in space.



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<p>Activity 2.6: Stayin' Alive</p> <p>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.</p> <p>Technology and Engineering 3.5.6-8.L Design methods to gather data about technological systems. 3.5.6-8.BB Demonstrate how knowledge gained from other content areas affects the development of technological products and systems.</p>	<ul style="list-style-type: none"> • Explore systems that help recycle resources and maintain a healthy environment in space. • Examine the Sabatier System and the electrolysis of water as part of the spacecraft's environmental control system. • Create and test a water filtration system.
<p>Project 2.7: Take Two!</p> <p>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.</p> <p>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. 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.R Develop innovative products and systems that solve problems and extend capabilities based on individual or collective needs and wants. 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.AA Adapt and apply an existing product, system, or process to solve a problem in a different setting. 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.JJ Apply informed problem-solving strategies to the improvement of existing devices or processes or the development of new approaches.</p>	<ul style="list-style-type: none"> • Apply knowledge and skills learned in this lesson to design and build an improved balloon rocket or water treatment system. • Collaborate within a team. • Use the design process to create a solution.



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<p>Lesson 3: Destination: Mars 7 days</p> <p>Problem 3.1: Mission to Mars</p> <p>Physical Science</p> <p>3.2.6-8.G Apply Newton’s Third Law to design a solution to a problem involving the motion of two colliding objects.</p> <p>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.</p> <p>Technology and Engineering</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>3.5.6-8.Q Apply a technology and engineering design thinking process.</p> <p>3.5.6-8.R Develop innovative products and systems that solve problems and extend capabilities based on individual or collective needs and wants.</p> <p>3.5.6-8.S Illustrate the benefits and opportunities associated with different approaches to design.</p> <p>3.5.6-8.U Evaluate and assess the strengths and weaknesses of various design solutions given established principles and elements of design.</p> <p>3.5.6-8.V Refine design solutions to address criteria and constraints.</p> <p>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.</p> <p>3.5.6-8.X Defend decisions related to a design problem.</p> <p>3.5.6-8.JJ Apply informed problem-solving strategies to the improvement of existing devices or processes or the development of new approaches.</p>	<ul style="list-style-type: none"> • Work in teams to solve a multi-faceted problem. • Apply the knowledge and skills acquired in the unit. • Engage in problem solving and use creativity when developing solutions.