The Wright Brothers' Adventure, Learning to Fly

National Standards

Grades 6 – 8 Science

Source: Benchmarks for Science Literacy National Standards Science Literacy 2008

Lesson/Activity	Grades 6 – 8 Science Standards
The Society	1C/M1 Important contributions to the advancement of science, mathematics, and technology have been made by different kinds of people, in different cultures, at different times.
The Society	3B/M3a Almost all control systems have inputs, outputs, and feedback.
The Society	4F/M3a An unbalanced force acting on an object changes its speed or direction of motion, or both.
The Society	8B/M2 Manufacturing usually involves a series of steps, such as designing a product, obtaining and preparing raw materials, processing the materials mechanically or chemically, and assembling the product. All steps may occur at a single location or may occur at different locations.
The Society	8B/M3 Advances in manufacturing processes can reduce costs and improve products.
The Society	11B/M4 Simulations are often useful in modeling events and processes.
The Society	11B/M6 A model can sometimes be used to get ideas about how the thing being modeled actually works, but there is no guarantee that these ideas are correct if they are based on the model alone.
Meet the Wrights	1C/M1 Important contributions to the advancement of science, mathematics, and technology have been made by different kinds of people, in different cultures, at different times.
Meet the Wrights	3B/M3a Almost all control systems have inputs, outputs, and feedback.
Meet the Wrights	4F/M3a An unbalanced force acting on an object changes its speed or direction of motion, or both.
Meet the Wrights	8B/M2 Manufacturing usually involves a series of steps, such as designing a product, obtaining and preparing raw materials, processing the materials mechanically or chemically, and assembling the product. All steps may occur at a single location or may occur at different locations.
Meet the Wrights	8B/M3 Advances in manufacturing processes can reduce costs and improve products.
Meet the Wrights	11B/M4 Simulations are often useful in modeling events and processes.
Meet the Wrights	11B/M6 A model can sometimes be used to get ideas about how the thing being modeled actually works, but there is no guarantee that these ideas are correct if they are based on the model alone.
1900: Kitty Hawks	1C/M1 Important contributions to the advancement of science, mathematics, and technology have been made by different kinds of people, in different cultures, at different times.
1900: Kitty Hawks	3B/M3a Almost all control systems have inputs, outputs, and feedback.
1900: Kitty Hawks	4F/M3a An unbalanced force acting on an object changes its speed or direction of motion, or both.
1900: Kitty Hawks	8B/M2 Manufacturing usually involves a series of steps, such as designing a product, obtaining and preparing raw materials, processing the materials mechanically or chemically, and assembling the product. All steps may occur at a single location or may occur at different locations.
1900: Kitty Hawks	8B/M3 Advances in manufacturing processes can reduce costs and improve products.
1900: Kitty Hawks	11B/M4 Simulations are often useful in modeling events and processes.
1900: Kitty Hawks	11B/M6 A model can sometimes be used to get ideas about how the thing being modeled actually works, but there is no guarantee that these ideas are correct if they are based on the model alone.
1901: The First Improvement	1C/M1 Important contributions to the advancement of science, mathematics, and technology have been made by different kinds of people, in different cultures, at different times.
1901: The First Improvement	3B/M3a Almost all control systems have inputs, outputs, and feedback.
1901: The First Improvement	4F/M3a An unbalanced force acting on an object changes its speed or direction of motion, or both.
1901: The First Improvement	8B/M2 Manufacturing usually involves a series of steps, such as designing a product, obtaining and preparing raw materials, processing the materials mechanically or chemically, and assembling the product. All steps may occur at a single location or may occur at different locations.
1901: The First Improvement	8B/M3 Advances in manufacturing processes can reduce costs and improve products.
1901: The First Improvement	11B/M4 Simulations are often useful in modeling events and processes.
1901: The First Improvement	11B/M6 A model can sometimes be used to get ideas about how the thing being modeled actually works, but there is no guarantee that these ideas are correct if they are based on the model alone.
New Data	1C/M1 Important contributions to the advancement of science, mathematics, and technology have been made by different kinds of people, in different cultures, at different times.
New Data	3B/M3a Almost all control systems have inputs, outputs, and feedback.
New Data	4F/M3a An unbalanced force acting on an object changes its speed or direction of motion, or both.

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National Standards

Grades 6 – 8 Science

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Lesson/Activity	Grades 6 – 8 Science Standards
New Data	8B/M2 Manufacturing usually involves a series of steps, such as designing a product, obtaining and preparing raw materials, processing the materials mechanically or chemically, and assembling the product. All steps may occur at a single location or may occur at different locations.
New Data	8B/M3 Advances in manufacturing processes can reduce costs and improve products.
New Data	11B/M4 Simulations are often useful in modeling events and processes.
New Data	11B/M6 A model can sometimes be used to get ideas about how the thing being modeled actually works, but there is no guarantee that these ideas are correct if they are based on the model alone.
1902: Success at Last	1C/M1 Important contributions to the advancement of science, mathematics, and technology have been made by different kinds of people, in different cultures, at different times.
1902: Success at Last	3B/M3a Almost all control systems have inputs, outputs, and feedback.
1902: Success at Last	4F/M3a An unbalanced force acting on an object changes its speed or direction of motion, or both.
1902: Success at Last	8B/M2 Manufacturing usually involves a series of steps, such as designing a product, obtaining and preparing raw materials, processing the materials mechanically or chemically, and assembling the product. All steps may occur at a single location or may occur at different locations.
1902: Success at Last	8B/M3 Advances in manufacturing processes can reduce costs and improve products.
1902: Success at Last	11B/M4 Simulations are often useful in modeling events and processes.
1902: Success at Last	11B/M6 A model can sometimes be used to get ideas about how the thing being modeled actually works, but there is no guarantee that these ideas are correct if they are based on the model alone.
1903: Powered Flight	1C/M1 Important contributions to the advancement of science, mathematics, and technology have been made by different kinds of people, in different cultures, at different times.
1903: Powered Flight	3B/M3a Almost all control systems have inputs, outputs, and feedback.
1903: Powered Flight	4F/M3a An unbalanced force acting on an object changes its speed or direction of motion, or both.
1903: Powered Flight	8B/M2 Manufacturing usually involves a series of steps, such as designing a product, obtaining and preparing raw materials, processing the materials mechanically or chemically, and assembling the product. All steps may occur at a single location or may occur at different locations.
1903: Powered Flight	8B/M3 Advances in manufacturing processes can reduce costs and improve products.
1903: Powered Flight	11B/M4 Simulations are often useful in modeling events and processes.
1903: Powered Flight	11B/M6 A model can sometimes be used to get ideas about how the thing being modeled actually works, but there is no guarantee that these ideas are correct if they are based on the model alone.
1904: Improvement in Dayton	1C/M1 Important contributions to the advancement of science, mathematics, and technology have been made by different kinds of people, in different cultures, at different times.
1904: Improvement in Dayton	3B/M3a Almost all control systems have inputs, outputs, and feedback.
1904: Improvement in Dayton	4F/M3a An unbalanced force acting on an object changes its speed or direction of motion, or both.
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1904: Improvement in Dayton	11B/M4 Simulations are often useful in modeling events and processes.
1904: Improvement in Dayton	11B/M6 A model can sometimes be used to get ideas about how the thing being modeled actually works, but there is no guarantee that these ideas are correct if they are based on the model alone.
1905: Complete a Flight at Last	1C/M1 Important contributions to the advancement of science, mathematics, and technology have been made by different kinds of people, in different cultures, at different times.
1905: Complete a Flight at Last	3B/M3a Almost all control systems have inputs, outputs, and feedback.
1905: Complete a Flight at Last	4F/M3a An unbalanced force acting on an object changes its speed or direction of motion, or both.
1905: Complete a Flight at Last	8B/M2 Manufacturing usually involves a series of steps, such as designing a product, obtaining and preparing raw materials, processing the materials mechanically or chemically, and assembling the product. All steps may occur at a single location or may occur at different locations.
1905: Complete a Flight at Last	8B/M3 Advances in manufacturing processes can reduce costs and improve products.
1905: Complete a…	11B/M4 Simulations are often useful in modeling events and processes.

The Wright Brothers' Adventure, Learning to Fly

National Standards

Grades 6 – 8 Science

Source: Benchmarks for Science Literacy National Standards Science Literacy 2008

Lesson/Activity	Grades 6 – 8 Science Standards
1905: Complete a Flight at Last	11B/M6 A model can sometimes be used to get ideas about how the thing being modeled actually works, but there is no guarantee that these ideas are correct if they are based on the model alone.
Wright Brothers: 1900 Glider	1C/M1 Important contributions to the advancement of science, mathematics, and technology have been made by different kinds of people, in different cultures, at different times.
Wright Brothers: 1900 Glider	3B/M3a Almost all control systems have inputs, outputs, and feedback.
Wright Brothers: 1900 Glider	4F/M3a An unbalanced force acting on an object changes its speed or direction of motion, or both.
Wright Brothers: 1900 Glider	8B/M2 Manufacturing usually involves a series of steps, such as designing a product, obtaining and preparing raw materials, processing the materials mechanically or chemically, and assembling the product. All steps may occur at a single location or may occur at different locations.
Wright Brothers: 1900 Glider	8B/M3 Advances in manufacturing processes can reduce costs and improve products.
Wright Brothers: 1900 Glider	11B/M4 Simulations are often useful in modeling events and processes.
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Wright Brothers: 1902 Glider	8B/M3 Advances in manufacturing processes can reduce costs and improve products.
Wright Brothers: 1902 Glider	11B/M4 Simulations are often useful in modeling events and processes.
Wright Brothers: 1902 Glider	11B/M6 A model can sometimes be used to get ideas about how the thing being modeled actually works, but there is no guarantee that these ideas are correct if they are based on the model alone.
Wright Brothers: 1903 Flyer	1C/M1 Important contributions to the advancement of science, mathematics, and technology have been made by different kinds of people, in different cultures, at different times.
Wright Brothers: 1903 Flyer	3B/M3a Almost all control systems have inputs, outputs, and feedback.
Wright Brothers: 1903 Flyer	4F/M3a An unbalanced force acting on an object changes its speed or direction of motion, or both.
Wright Brothers: 1903 Flyer	8B/M2 Manufacturing usually involves a series of steps, such as designing a product, obtaining and preparing raw materials, processing the materials mechanically or chemically, and assembling the product. All steps may occur at a single location or may occur at different locations.
Wright Brothers: 1903 Flyer	8B/M3 Advances in manufacturing processes can reduce costs and improve products.
Wright Brothers: 1903 Flyer	11B/M4 Simulations are often useful in modeling events and processes.
Wright Brothers: 1903 Flyer	11B/M6 A model can sometimes be used to get ideas about how the thing being modeled actually works, but there is no guarantee that these ideas are correct if they are based on the model alone.

The Wright Brothers' Adventure, Learning to Fly

National Standards

Grades 9 – 12 Science

Source: Benchmarks for Science Literacy National Standards Science Literacy 2008

Lesson/Activity	Grades 9 – 12 Science Standards
The Society	1B/H3 Sometimes, scientists can control conditions in order to obtain evidence. When that is not possible, practical, or ethical, they try to observe as wide a range of natural occurrences as possible to discern patterns.
The Society	4F/H1 The change in motion (direction or speed) of an object is proportional to the applied force and inversely proportional to the mass.
The Society	11B/H5 The behavior of a physical model cannot ever be expected to represent the full-scale phenomenon with complete accuracy, not even in the limited set of characteristics being studied. The inappropriateness of a model may be related to differences between the model and what is being modeled.
Meet the Wrights	1B/H3 Sometimes, scientists can control conditions in order to obtain evidence. When that is not possible, practical, or ethical, they try to observe as wide a range of natural occurrences as possible to discern patterns.
Meet the Wrights	4F/H1 The change in motion (direction or speed) of an object is proportional to the applied force and inversely proportional to the mass.
Meet the Wrights	11B/H5 The behavior of a physical model cannot ever be expected to represent the full-scale phenomenon with complete accuracy, not even in the limited set of characteristics being studied. The inappropriateness of a model may be related to differences between the model and what is being modeled.
1900: Kitty Hawks	1B/H3 Sometimes, scientists can control conditions in order to obtain evidence. When that is not possible, practical, or ethical, they try to observe as wide a range of natural occurrences as possible to discern patterns.
1900: Kitty Hawks	4F/H1 The change in motion (direction or speed) of an object is proportional to the applied force and inversely proportional to the mass.
1900: Kitty Hawks	11B/H5 The behavior of a physical model cannot ever be expected to represent the full-scale phenomenon with complete accuracy, not even in the limited set of characteristics being studied. The inappropriateness of a model may be related to differences between the model and what is being modeled.
1901: The First Improvement	1B/H3 Sometimes, scientists can control conditions in order to obtain evidence. When that is not possible, practical, or ethical, they try to observe as wide a range of natural occurrences as possible to discern patterns.
1901: The First Improvement	4F/H1 The change in motion (direction or speed) of an object is proportional to the applied force and inversely proportional to the mass.
1901: The First Improvement	11B/H5 The behavior of a physical model cannot ever be expected to represent the full-scale phenomenon with complete accuracy, not even in the limited set of characteristics being studied. The inappropriateness of a model may be related to differences between the model and what is being modeled.
New Data	1B/H3 Sometimes, scientists can control conditions in order to obtain evidence. When that is not possible, practical, or ethical, they try to observe as wide a range of natural occurrences as possible to discern patterns.
New Data	4F/H1 The change in motion (direction or speed) of an object is proportional to the applied force and inversely proportional to the mass.
New Data	11B/H5 The behavior of a physical model cannot ever be expected to represent the full-scale phenomenon with complete accuracy, not even in the limited set of characteristics being studied. The inappropriateness of a model may be related to differences between the model and what is being modeled.
1902: Success at Last	1B/H3 Sometimes, scientists can control conditions in order to obtain evidence. When that is not possible, practical, or ethical, they try to observe as wide a range of natural occurrences as possible to discern patterns.
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1902: Success at Last	11B/H5 The behavior of a physical model cannot ever be expected to represent the full-scale phenomenon with complete accuracy, not even in the limited set of characteristics being studied. The inappropriateness of a model may be related to differences between the model and what is being modeled.

The Wright Brothers' Adventure, Learning to Fly

National Standards

Grades 9 – 12 Science

Source: Benchmarks for Science Literacy National Standards Science Literacy 2008

Lesson/Activity	Grades 9 – 12 Science Standards
1903: Powered Flight	1B/H3 Sometimes, scientists can control conditions in order to obtain evidence. When that is not possible, practical, or ethical, they try to observe as wide a range of natural occurrences as possible to discern patterns.
1902: Success at Last	11B/H5 The behavior of a physical model cannot ever be expected to represent the full-scale phenomenon with complete accuracy, not even in the limited set of characteristics being studied. The inappropriateness of a model may be related to differences between the model and what is being modeled.
1903: Powered Flight	1B/H3 Sometimes, scientists can control conditions in order to obtain evidence. When that is not possible, practical, or ethical, they try to observe as wide a range of natural occurrences as possible to discern patterns.
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1903: Powered Flight	11B/H5 The behavior of a physical model cannot ever be expected to represent the full-scale phenomenon with complete accuracy, not even in the limited set of characteristics being studied. The inappropriateness of a model may be related to differences between the model and what is being modeled.
1904: Improvement in Dayton	1B/H3 Sometimes, scientists can control conditions in order to obtain evidence. When that is not possible, practical, or ethical, they try to observe as wide a range of natural occurrences as possible to discern patterns.
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1905: Complete a Flight at Last	1B/H3 Sometimes, scientists can control conditions in order to obtain evidence. When that is not possible, practical, or ethical, they try to observe as wide a range of natural occurrences as possible to discern patterns.
1905: Complete a Flight at Last	4F/H1 The change in motion (direction or speed) of an object is proportional to the applied force and inversely proportional to the mass.
1905: Complete a Flight at Last	11B/H5 The behavior of a physical model cannot ever be expected to represent the full-scale phenomenon with complete accuracy, not even in the limited set of characteristics being studied. The inappropriateness of a model may be related to differences between the model and what is being modeled.
Wright Brothers: 1900 Glider	1B/H3 Sometimes, scientists can control conditions in order to obtain evidence. When that is not possible, practical, or ethical, they try to observe as wide a range of natural occurrences as possible to discern patterns.
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The Wright Brothers' Adventure, Learning to Fly

National Standards

Grades 9 – 12 Science

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Wright Brothers: 1902 Glider	1B/H3 Sometimes, scientists can control conditions in order to obtain evidence. When that is not possible, practical, or ethical, they try to observe as wide a range of natural occurrences as possible to discern patterns.
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Wright Brothers: 1903 Flyer	1B/H3 Sometimes, scientists can control conditions in order to obtain evidence. When that is not possible, practical, or ethical, they try to observe as wide a range of natural occurrences as possible to discern patterns.
Wright Brothers: 1903 Flyer	4F/H1 The change in motion (direction or speed) of an object is proportional to the applied force and inversely proportional to the mass.
Wright Brothers: 1903 Flyer	11B/H5 The behavior of a physical model cannot ever be expected to represent the full-scale phenomenon with complete accuracy, not even in the limited set of characteristics being studied. The inappropriateness of a model may be related to differences between the model and what is being modeled.

The Wright Brothers' Adventure, Learning to Fly

National Standards

Grades 5 – 8 Science

Source: NSTA National Standards Science 1996

Lesson/Activity	Grades 5 – 8 Science Standards
The Society	Students should develop the ability to refine and refocus broad and ill-defined questions. An important aspect of this ability consists of students' ability to clarify questions and inquiries and direct them toward objects and phenomena that can be described, explained, or predicted by scientific investigations. Students should develop the ability to identify their questions with scientific ideas, concepts, and quantitative relationships that guide investigation.
The Society	Students should develop general abilities, such as systematic observation, making accurate measurements, and identifying and controlling variables. They should also develop the ability to clarify their ideas that are influencing and guiding the inquiry, and to understand how those ideas compare with current scientific knowledge. Students can learn to formulate questions, design investigations, execute investigations, interpret data, use evidence to generate explanations, propose alternative explanations, and critique explanations and procedures.
The Society	The use of tools and techniques, including mathematics, will be guided by the question asked and the investigations students design. The use of computers for the collection, summary, and display of evidence is part of this standard. Students should be able to access, gather, store, retrieve, and organize data, using hardware and software designed for these purposes.
The Society	Mathematics is essential to asking and answering questions about the natural world. Mathematics can be used to ask questions; to gather, organize, and present data; and to structure convincing explanations.
The Society	Science advances through legitimate skepticism. Asking questions and querying other scientists' explanations is part of scientific inquiry. Scientists evaluate the explanations proposed by other scientists by examining evidence, comparing evidence, identifying faulty reasoning, pointing out statements that go beyond the evidence, and suggesting alternative explanations for the same observations.
The Society	Students should organize materials and other resources, plan their work, make good use of group collaboration where appropriate, choose suitable tools and techniques, and work with appropriate measurement methods to ensure adequate accuracy.
The Society	Scientific inquiry and technological design have similarities and differences. Scientists propose explanations for questions about the natural world, and engineers propose solutions relating to human problems, needs, and aspirations. Technological solutions are temporary; technologies exist within nature and so they cannot contravene physical or biological principles; technological solutions have side effects; and technologies cost, carry risks, and provide benefits.
The Society	Science influences society through its knowledge and world view. Scientific knowledge and the procedures used by scientists influence the way many individuals in society think about themselves, others, and the environment. The effect of science on society is neither entirely beneficial nor entirely detrimental.
The Society	Societal challenges often inspire questions for scientific research, and social priorities often influence research priorities through the availability of funding for research.
The Society	Science and technology have advanced through contributions of many different people, in different cultures, at different times in history. Science and technology have contributed enormously to economic growth and productivity among societies and groups within societies.
The Society	Scientists and engineers work in many different settings, including colleges and universities, businesses and industries, specific research institutes, and government agencies.
The Society	Science cannot answer all questions and technology cannot solve all human problems or meet all human needs. Students should understand the difference between scientific and other questions. They should appreciate what science and technology can reasonably contribute to society and what they cannot do. For example, new technologies often will decrease some risks and increase others.

The Wright Brothers' Adventure, Learning to Fly

National Standards

Grades 5 – 8 Science

Source: NSTA National Standards Science 1996

Lesson/Activity	Grades 5 – 8 Science Standards
The Society	Women and men of various social and ethnic backgrounds--and with diverse interests, talents, qualities, and motivations--engage in the activities of science, engineering, and related fields such as the health professions. Some scientists work in teams, and some work alone, but all communicate extensively with others.
The Society	It is part of scientific inquiry to evaluate the results of scientific investigations, experiments, observations, theoretical models, and the explanations proposed by other scientists. Evaluation includes reviewing the experimental procedures, examining the evidence, identifying faulty reasoning, pointing out statements that go beyond the evidence, and suggesting alternative explanations for the same observations. Although scientists may disagree about explanations of phenomena, about interpretations of data, or about the value of rival theories, they do agree that questioning, response to criticism, and open communication are integral to the process of science. As scientific knowledge evolves, major disagreements are eventually resolved through such interactions between scientists.
The Society	Many individuals have contributed to the traditions of science. Studying some of these individuals provides further understanding of scientific inquiry, science as a human endeavor, the nature of science, and the relationships between science and society.
The Society	In historical perspective, science has been practiced by different individuals in different cultures. In looking at the history of many peoples, one finds that scientists and engineers of high achievement are considered to be among the most valued contributors to their culture.
The Society	Tracing the history of science can show how difficult it was for scientific innovators to break through the accepted ideas of their time to reach the conclusions that we currently take for granted.
Meet the Wrights	Science influences society through its knowledge and world view. Scientific knowledge and the procedures used by scientists influence the way many individuals in society think about themselves, others, and the environment. The effect of science on society is neither entirely beneficial nor entirely detrimental.
Meet the Wrights	Science and technology have advanced through contributions of many different people, in different cultures, at different times in history. Science and technology have contributed enormously to economic growth and productivity among societies and groups within societies.
Meet the Wrights	Scientists and engineers work in many different settings, including colleges and universities, businesses and industries, specific research institutes, and government agencies.
Meet the Wrights	Women and men of various social and ethnic backgrounds--and with diverse interests, talents, qualities, and motivations--engage in the activities of science, engineering, and related fields such as the health professions. Some scientists work in teams, and some work alone, but all communicate extensively with others.
Meet the Wrights	Many individuals have contributed to the traditions of science. Studying some of these individuals provides further understanding of scientific inquiry, science as a human endeavor, the nature of science, and the relationships between science and society.
Meet the Wrights	In historical perspective, science has been practiced by different individuals in different cultures. In looking at the history of many peoples, one finds that scientists and engineers of high achievement are considered to be among the most valued contributors to their culture.
Meet the Wrights	Tracing the history of science can show how difficult it was for scientific innovators to break through the accepted ideas of their time to reach the conclusions that we currently take for granted.
1900: Kitty Hawks	Students should review and describe any completed piece of work and identify the stages of problem identification, solution design, implementation, and evaluation.
1900: Kitty Hawks	Scientific inquiry and technological design have similarities and differences. Scientists propose explanations for questions about the natural world, and engineers propose solutions relating to human problems, needs, and aspirations. Technological solutions are temporary; technologies exist within nature and so they cannot contravene physical or biological principles; technological solutions have side effects; and technologies cost, carry risks, and provide benefits.
1900: Kitty Hawks	Perfectly designed solutions do not exist. All technological solutions have trade-offs, such as safety, cost, efficiency, and appearance. Engineers often build in back-up systems to provide safety. Risk is part of living in a highly technological world. Reducing risk often results in new technology.

The Wright Brothers' Adventure, Learning to Fly

National Standards

Grades 5 – 8 Science

Source: NSTA National Standards Science 1996

Lesson/Activity	Grades 5 – 8 Science Standards
1900: Kitty Hawks	Technological designs have constraints. Some constraints are unavoidable, for example, properties of materials, or effects of weather and friction; other constraints limit choices in the design, for example, environmental protection, human safety, and aesthetics.
1900: Kitty Hawks	Science influences society through its knowledge and world view. Scientific knowledge and the procedures used by scientists influence the way many individuals in society think about themselves, others, and the environment. The effect of science on society is neither entirely beneficial nor entirely detrimental.
1900: Kitty Hawks	Scientists and engineers work in many different settings, including colleges and universities, businesses and industries, specific research institutes, and government agencies.
1900: Kitty Hawks	Women and men of various social and ethnic backgrounds--and with diverse interests, talents, qualities, and motivations--engage in the activities of science, engineering, and related fields such as the health professions. Some scientists work in teams, and some work alone, but all communicate extensively with others.
1900: Kitty Hawks	Many individuals have contributed to the traditions of science. Studying some of these individuals provides further understanding of scientific inquiry, science as a human endeavor, the nature of science, and the relationships between science and society.
1900: Kitty Hawks	In historical perspective, science has been practiced by different individuals in different cultures. In looking at the history of many peoples, one finds that scientists and engineers of high achievement are considered to be among the most valued contributors to their culture.
1901: The First Improvement	Students should develop general abilities, such as systematic observation, making accurate measurements, and identifying and controlling variables. They should also develop the ability to clarify their ideas that are influencing and guiding the inquiry, and to understand how those ideas compare with current scientific knowledge. Students can learn to formulate questions, design investigations, execute investigations, interpret data, use evidence to generate explanations, propose alternative explanations, and critique explanations and procedures.
1901: The First Improvement	Different kinds of questions suggest different kinds of scientific investigations. Some investigations involve observing and describing objects, organisms, or events; some involve collecting specimens; some involve experiments; some involve seeking more information; some involve discovery of new objects and phenomena; and some involve making models.
1901: The First Improvement	Scientific explanations emphasize evidence, have logically consistent arguments, and use scientific principles, models, and theories. The scientific community accepts and uses such explanations until displaced by better scientific ones. When such displacement occurs, science advances.
1901: The First Improvement	An object that is not being subjected to a force will continue to move at a constant speed and in a straight line.
1901: The First Improvement	If more than one force acts on an object along a straight line, then the forces will reinforce or cancel one another, depending on their direction and magnitude. Unbalanced forces will cause changes in the speed or direction of an object's motion.
1901: The First Improvement	The sun is the major source of energy for phenomena on the earth's surface, such as growth of plants, winds, ocean currents, and the water cycle. Seasons result from variations in the amount of the sun's energy hitting the surface, due to the tilt of the earth's rotation on its axis and the length of the day.
1901: The First Improvement	Students should make and compare different proposals in the light of the criteria they have selected. They must consider constraints--such as cost, time, trade-offs, and materials needed--and communicate ideas with drawings and simple models.
1901: The First Improvement	Technological designs have constraints. Some constraints are unavoidable, for example, properties of materials, or effects of weather and friction; other constraints limit choices in the design, for example, environmental protection, human safety, and aesthetics.
1901: The First Improvement	Science influences society through its knowledge and world view. Scientific knowledge and the procedures used by scientists influence the way many individuals in society think about themselves, others, and the environment. The effect of science on society is neither entirely beneficial nor entirely detrimental.
1901: The First Improvement	Societal challenges often inspire questions for scientific research, and social priorities often influence research priorities through the availability of funding for research.

The Wright Brothers' Adventure, Learning to Fly

National Standards

Grades 5 – 8 Science

Source: NSTA National Standards Science 1996

Lesson/Activity	Grades 5 – 8 Science Standards
1901: The First Improvement	Science and technology have advanced through contributions of many different people, in different cultures, at different times in history. Science and technology have contributed enormously to economic growth and productivity among societies and groups within societies.
1901: The First Improvement	Scientists and engineers work in many different settings, including colleges and universities, businesses and industries, specific research institutes, and government agencies.
1901: The First Improvement	Women and men of various social and ethnic backgrounds--and with diverse interests, talents, qualities, and motivations--engage in the activities of science, engineering, and related fields such as the health professions. Some scientists work in teams, and some work alone, but all communicate extensively with others.
1901: The First Improvement	Many individuals have contributed to the traditions of science. Studying some of these individuals provides further understanding of scientific inquiry, science as a human endeavor, the nature of science, and the relationships between science and society.
1901: The First Improvement	In historical perspective, science has been practiced by different individuals in different cultures. In looking at the history of many peoples, one finds that scientists and engineers of high achievement are considered to be among the most valued contributors to their culture.
1901: The First Improvement	Tracing the history of science can show how difficult it was for scientific innovators to break through the accepted ideas of their time to reach the conclusions that we currently take for granted.
New Data	Thinking critically about evidence includes deciding what evidence should be used and accounting for anomalous data. Specifically, students should be able to review data from a simple experiment, summarize the data, and form a logical argument about the cause-and-effect relationships in the experiment. Students should begin to state some explanations in terms of the relationship between two or more variables.
New Data	With practice, students should become competent at communicating experimental methods, following instructions, describing observations, summarizing the results of other groups, and telling other students about investigations and explanations.
New Data	Different kinds of questions suggest different kinds of scientific investigations. Some investigations involve observing and describing objects, organisms, or events; some involve collecting specimens; some involve experiments; some involve seeking more information; some involve discovery of new objects and phenomena; and some involve making models.
New Data	Technology used to gather data enhances accuracy and allows scientists to analyze and quantify results of investigations.
New Data	Scientific investigations sometimes result in new ideas and phenomena for study, generate new methods or procedures for an investigation, or develop new technologies to improve the collection of data. All of these results can lead to new investigations.
New Data	The sun is the major source of energy for phenomena on the earth's surface, such as growth of plants, winds, ocean currents, and the water cycle. Seasons result from variations in the amount of the sun's energy hitting the surface, due to the tilt of the earth's rotation on its axis and the length of the day.
New Data	Scientists formulate and test their explanations of nature using observation, experiments, and theoretical and mathematical models. Although all scientific ideas are tentative and subject to change and improvement in principle, for most major ideas in science, there is much experimental and observational confirmation. Those ideas are not likely to change greatly in the future. Scientists do and have changed their ideas about nature when they encounter new experimental evidence that does not match their existing explanations.
New Data	In areas where active research is being pursued and in which there is not a great deal of experimental or observational evidence and understanding, it is normal for scientists to differ with one another about the interpretation of the evidence or theory being considered. Different scientists might publish conflicting experimental results or might draw different conclusions from the same data. Ideally, scientists acknowledge such conflict and work towards finding evidence that will resolve their disagreement.

The Wright Brothers' Adventure, Learning to Fly

National Standards

Grades 5 – 8 Science

Source: NSTA National Standards Science 1996

Lesson/Activity	Grades 5 – 8 Science Standards
New Data	It is part of scientific inquiry to evaluate the results of scientific investigations, experiments, observations, theoretical models, and the explanations proposed by other scientists. Evaluation includes reviewing the experimental procedures, examining the evidence, identifying faulty reasoning, pointing out statements that go beyond the evidence, and suggesting alternative explanations for the same observations. Although scientists may disagree about explanations of phenomena, about interpretations of data, or about the value of rival theories, they do agree that questioning, response to criticism, and open communication are integral to the process of science. As scientific knowledge evolves, major disagreements are eventually resolved through such interactions between scientists.
1902: Success at Last	Different kinds of questions suggest different kinds of scientific investigations. Some investigations involve observing and describing objects, organisms, or events; some involve collecting specimens; some involve experiments; some involve seeking more information; some involve discovery of new objects and phenomena; and some involve making models.
1902: Success at Last	Scientific explanations emphasize evidence, have logically consistent arguments, and use scientific principles, models, and theories. The scientific community accepts and uses such explanations until displaced by better scientific ones. When such displacement occurs, science advances.
1902: Success at Last	Students should make and compare different proposals in the light of the criteria they have selected. They must consider constraints--such as cost, time, trade-offs, and materials needed--and communicate ideas with drawings and simple models.
1902: Success at Last	Students should review and describe any completed piece of work and identify the stages of problem identification, solution design, implementation, and evaluation.
1902: Success at Last	Scientific inquiry and technological design have similarities and differences. Scientists propose explanations for questions about the natural world, and engineers propose solutions relating to human problems, needs, and aspirations. Technological solutions are temporary; technologies exist within nature and so they cannot contravene physical or biological principles; technological solutions have side effects; and technologies cost, carry risks, and provide benefits.
1902: Success at Last	Perfectly designed solutions do not exist. All technological solutions have trade-offs, such as safety, cost, efficiency, and appearance. Engineers often build in back-up systems to provide safety. Risk is part of living in a highly technological world. Reducing risk often results in new technology.
1902: Success at Last	Technological designs have constraints. Some constraints are unavoidable, for example, properties of materials, or effects of weather and friction; other constraints limit choices in the design, for example, environmental protection, human safety, and aesthetics.
1903: Powered Flight	Students should develop general abilities, such as systematic observation, making accurate measurements, and identifying and controlling variables. They should also develop the ability to clarify their ideas that are influencing and guiding the inquiry, and to understand how those ideas compare with current scientific knowledge. Students can learn to formulate questions, design investigations, execute investigations, interpret data, use evidence to generate explanations, propose alternative explanations, and critique explanations and procedures.
1903: Powered Flight	Different kinds of questions suggest different kinds of scientific investigations. Some investigations involve observing and describing objects, organisms, or events; some involve collecting specimens; some involve experiments; some involve seeking more information; some involve discovery of new objects and phenomena; and some involve making models.
1903: Powered Flight	Scientific explanations emphasize evidence, have logically consistent arguments, and use scientific principles, models, and theories. The scientific community accepts and uses such explanations until displaced by better scientific ones. When such displacement occurs, science advances.
1903: Powered Flight	The motion of an object can be described by its position, direction of motion, and speed. That motion can be measured and represented on a graph.
1903: Powered Flight	If more than one force acts on an object along a straight line, then the forces will reinforce or cancel one another, depending on their direction and magnitude. Unbalanced forces will cause changes in the speed or direction of an object's motion.
1903: Powered Flight	Students should develop their abilities by identifying a specified need, considering its various aspects, and talking to different potential users or beneficiaries. They should appreciate that for some needs, the cultural backgrounds and beliefs of different groups can affect the criteria for a suitable product.

The Wright Brothers' Adventure, Learning to Fly

National Standards

Grades 5 – 8 Science

Source: NSTA National Standards Science 1996

Lesson/Activity	Grades 5 – 8 Science Standards
1903: Powered Flight	Students should make and compare different proposals in the light of the criteria they have selected. They must consider constraints--such as cost, time, trade-offs, and materials needed--and communicate ideas with drawings and simple models.
1903: Powered Flight	Students should organize materials and other resources, plan their work, make good use of group collaboration where appropriate, choose suitable tools and techniques, and work with appropriate measurement methods to ensure adequate accuracy.
1903: Powered Flight	Students should use criteria relevant to the original purpose or need, consider a variety of factors that might affect acceptability and suitability for intended users or beneficiaries, and develop measures of quality with respect to such criteria and factors; they should also suggest improvements and, for their own products, try proposed modifications.
1903: Powered Flight	Students should review and describe any completed piece of work and identify the stages of problem identification, solution design, implementation, and evaluation.
1903: Powered Flight	Scientific inquiry and technological design have similarities and differences. Scientists propose explanations for questions about the natural world, and engineers propose solutions relating to human problems, needs, and aspirations. Technological solutions are temporary; technologies exist within nature and so they cannot contravene physical or biological principles; technological solutions have side effects; and technologies cost, carry risks, and provide benefits.
1903: Powered Flight	Perfectly designed solutions do not exist. All technological solutions have trade-offs, such as safety, cost, efficiency, and appearance. Engineers often build in back-up systems to provide safety. Risk is part of living in a highly technological world. Reducing risk often results in new technology.
1903: Powered Flight	Technological designs have constraints. Some constraints are unavoidable, for example, properties of materials, or effects of weather and friction; other constraints limit choices in the design, for example, environmental protection, human safety, and aesthetics.
1903: Powered Flight	Natural hazards can present personal and societal challenges because misidentifying the change or incorrectly estimating the rate and scale of change may result in either too little attention and significant human costs or too much cost for unneeded preventive measures.
1903: Powered Flight	Risk analysis considers the type of hazard and estimates the number of people that might be exposed and the number likely to suffer consequences. The results are used to determine the options for reducing or eliminating risks.
1903: Powered Flight	Individuals can use a systematic approach to thinking critically about risks and benefits. Examples include applying probability estimates to risks and comparing them to estimated personal and social benefits.
1904: Improvement in Dayton	With practice, students should become competent at communicating experimental methods, following instructions, describing observations, summarizing the results of other groups, and telling other students about investigations and explanations.
1904: Improvement in Dayton	Mathematics is essential to asking and answering questions about the natural world. Mathematics can be used to ask questions; to gather, organize, and present data; and to structure convincing explanations.
1904: Improvement in Dayton	An object that is not being subjected to a force will continue to move at a constant speed and in a straight line.
1904: Improvement in Dayton	If more than one force acts on an object along a straight line, then the forces will reinforce or cancel one another, depending on their direction and magnitude. Unbalanced forces will cause changes in the speed or direction of an object's motion.
1904: Improvement in Dayton	The sun is the major source of energy for phenomena on the earth's surface, such as growth of plants, winds, ocean currents, and the water cycle. Seasons result from variations in the amount of the sun's energy hitting the surface, due to the tilt of the earth's rotation on its axis and the length of the day.

The Wright Brothers' Adventure, Learning to Fly

National Standards

Grades 5 – 8 Science

Source: NSTA National Standards Science 1996

Lesson/Activity	Grades 5 – 8 Science Standards
1904: Improvement in Dayton	Scientists and engineers have ethical codes requiring that human subjects involved with research be fully informed about risks and benefits associated with the research before the individuals choose to participate. This ethic extends to potential risks to communities and property. In short, prior knowledge and consent are required for research involving human subjects or potential damage to property.
1904: Improvement in Dayton	Women and men of various social and ethnic backgrounds--and with diverse interests, talents, qualities, and motivations--engage in the activities of science, engineering, and related fields such as the health professions. Some scientists work in teams, and some work alone, but all communicate extensively with others.
1904: Improvement in Dayton	It is part of scientific inquiry to evaluate the results of scientific investigations, experiments, observations, theoretical models, and the explanations proposed by other scientists. Evaluation includes reviewing the experimental procedures, examining the evidence, identifying faulty reasoning, pointing out statements that go beyond the evidence, and suggesting alternative explanations for the same observations. Although scientists may disagree about explanations of phenomena, about interpretations of data, or about the value of rival theories, they do agree that questioning, response to criticism, and open communication are integral to the process of science. As scientific knowledge evolves, major disagreements are eventually resolved through such interactions between scientists.
1905: Complete a Flight at Last	Students should develop their abilities by identifying a specified need, considering its various aspects, and talking to different potential users or beneficiaries. They should appreciate that for some needs, the cultural backgrounds and beliefs of different groups can affect the criteria for a suitable product.
1905: Complete a Flight at Last	Students should organize materials and other resources, plan their work, make good use of group collaboration where appropriate, choose suitable tools and techniques, and work with appropriate measurement methods to ensure adequate accuracy.
1905: Complete a Flight at Last	Students should use criteria relevant to the original purpose or need, consider a variety of factors that might affect acceptability and suitability for intended users or beneficiaries, and develop measures of quality with respect to such criteria and factors; they should also suggest improvements and, for their own products, try proposed modifications.
1905: Complete a Flight at Last	Students should review and describe any completed piece of work and identify the stages of problem identification, solution design, implementation, and evaluation.
1905: Complete a Flight at Last	Scientific inquiry and technological design have similarities and differences. Scientists propose explanations for questions about the natural world, and engineers propose solutions relating to human problems, needs, and aspirations. Technological solutions are temporary; technologies exist within nature and so they cannot contravene physical or biological principles; technological solutions have side effects; and technologies cost, carry risks, and provide benefits.
1905: Complete a Flight at Last	Perfectly designed solutions do not exist. All technological solutions have trade-offs, such as safety, cost, efficiency, and appearance. Engineers often build in back-up systems to provide safety. Risk is part of living in a highly technological world. Reducing risk often results in new technology.
1905: Complete a Flight at Last	Technological designs have constraints. Some constraints are unavoidable, for example, properties of materials, or effects of weather and friction; other constraints limit choices in the design, for example, environmental protection, human safety, and aesthetics.
1905: Complete a Flight at Last	Science influences society through its knowledge and world view. Scientific knowledge and the procedures used by scientists influence the way many individuals in society think about themselves, others, and the environment. The effect of science on society is neither entirely beneficial nor entirely detrimental.
1905: Complete a Flight at Last	Technology influences society through its products and processes. Technology influences the quality of life and the ways people act and interact. Technological changes are often accompanied by social, political, and economic changes that can be beneficial or detrimental to individuals and to society. Social needs, attitudes, and values influence the direction of technological development.
1905: Complete a Flight at Last	Science and technology have advanced through contributions of many different people, in different cultures, at different times in history. Science and technology have contributed enormously to economic growth and productivity among societies and groups within societies.
1905: Complete a Flight at Last	Scientists and engineers work in many different settings, including colleges and universities, businesses and industries, specific research institutes, and government agencies.

The Wright Brothers' Adventure, Learning to Fly

National Standards

Grades 5 – 8 Science

Source: NSTA National Standards Science 1996

Lesson/Activity	Grades 5 – 8 Science Standards
1905: Complete a Flight at Last	Women and men of various social and ethnic backgrounds--and with diverse interests, talents, qualities, and motivations--engage in the activities of science, engineering, and related fields such as the health professions. Some scientists work in teams, and some work alone, but all communicate extensively with others.
1905: Complete a Flight at Last	Science requires different abilities, depending on such factors as the field of study and type of inquiry. Science is very much a human endeavor, and the work of science relies on basic human qualities, such as reasoning, insight, energy, skill, and creativity--as well as on scientific habits of mind, such as intellectual honesty, tolerance of ambiguity, skepticism, and openness to new ideas.
1905: Complete a Flight at Last	Many individuals have contributed to the traditions of science. Studying some of these individuals provides further understanding of scientific inquiry, science as a human endeavor, the nature of science, and the relationships between science and society.
1905: Complete a Flight at Last	In historical perspective, science has been practiced by different individuals in different cultures. In looking at the history of many peoples, one finds that scientists and engineers of high achievement are considered to be among the most valued contributors to their culture.
1905: Complete a Flight at Last	Tracing the history of science can show how difficult it was for scientific innovators to break through the accepted ideas of their time to reach the conclusions that we currently take for granted.
Wright Brothers: 1900 Glider	Students should develop their abilities by identifying a specified need, considering its various aspects, and talking to different potential users or beneficiaries. They should appreciate that for some needs, the cultural backgrounds and beliefs of different groups can affect the criteria for a suitable product.
Wright Brothers: 1900 Glider	Students should organize materials and other resources, plan their work, make good use of group collaboration where appropriate, choose suitable tools and techniques, and work with appropriate measurement methods to ensure adequate accuracy.
Wright Brothers: 1900 Glider	Students should use criteria relevant to the original purpose or need, consider a variety of factors that might affect acceptability and suitability for intended users or beneficiaries, and develop measures of quality with respect to such criteria and factors; they should also suggest improvements and, for their own products, try proposed modifications.
Wright Brothers: 1900 Glider	Students should review and describe any completed piece of work and identify the stages of problem identification, solution design, implementation, and evaluation.
Wright Brothers: 1900 Glider	Scientific inquiry and technological design have similarities and differences. Scientists propose explanations for questions about the natural world, and engineers propose solutions relating to human problems, needs, and aspirations. Technological solutions are temporary; technologies exist within nature and so they cannot contravene physical or biological principles; technological solutions have side effects; and technologies cost, carry risks, and provide benefits.
Wright Brothers: 1900 Glider	Perfectly designed solutions do not exist. All technological solutions have trade-offs, such as safety, cost, efficiency, and appearance. Engineers often build in back-up systems to provide safety. Risk is part of living in a highly technological world. Reducing risk often results in new technology.
Wright Brothers: 1900 Glider	Technological designs have constraints. Some constraints are unavoidable, for example, properties of materials, or effects of weather and friction; other constraints limit choices in the design, for example, environmental protection, human safety, and aesthetics.
Wright Brothers: 1900 Glider	Students should understand the risks associated with natural hazards (fires, floods, tornadoes, hurricanes, earthquakes, and volcanic eruptions), with chemical hazards (pollutants in air, water, soil, and food), with biological hazards (pollen, viruses, bacterial, and parasites), social hazards (occupational safety and transportation), and with personal hazards (smoking, dieting, and drinking).
Wright Brothers: 1900 Glider	Science influences society through its knowledge and world view. Scientific knowledge and the procedures used by scientists influence the way many individuals in society think about themselves, others, and the environment. The effect of science on society is neither entirely beneficial nor entirely detrimental.
Wright Brothers: 1900 Glider	Scientists and engineers work in many different settings, including colleges and universities, businesses and industries, specific research institutes, and government agencies.

The Wright Brothers' Adventure, Learning to Fly

National Standards

Grades 5 – 8 Science

Source: NSTA National Standards Science 1996

Lesson/Activity	Grades 5 – 8 Science Standards
Wright Brothers: 1900 Glider	Women and men of various social and ethnic backgrounds--and with diverse interests, talents, qualities, and motivations--engage in the activities of science, engineering, and related fields such as the health professions. Some scientists work in teams, and some work alone, but all communicate extensively with others.
Wright Brothers: 1900 Glider	Many individuals have contributed to the traditions of science. Studying some of these individuals provides further understanding of scientific inquiry, science as a human endeavor, the nature of science, and the relationships between science and society.
Wright Brothers: 1900 Glider	In historical perspective, science has been practiced by different individuals in different cultures. In looking at the history of many peoples, one finds that scientists and engineers of high achievement are considered to be among the most valued contributors to their culture.
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Wright Brothers: 1901 Glider	Perfectly designed solutions do not exist. All technological solutions have trade-offs, such as safety, cost, efficiency, and appearance. Engineers often build in back-up systems to provide safety. Risk is part of living in a highly technological world. Reducing risk often results in new technology.
Wright Brothers: 1901 Glider	Technological designs have constraints. Some constraints are unavoidable, for example, properties of materials, or effects of weather and friction; other constraints limit choices in the design, for example, environmental protection, human safety, and aesthetics.
Wright Brothers: 1901 Glider	Students should understand the risks associated with natural hazards (fires, floods, tornadoes, hurricanes, earthquakes, and volcanic eruptions), with chemical hazards (pollutants in air, water, soil, and food), with biological hazards (pollen, viruses, bacterial, and parasites), social hazards (occupational safety and transportation), and with personal hazards (smoking, dieting, and drinking).
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Wright Brothers: 1901 Glider	Scientists and engineers work in many different settings, including colleges and universities, businesses and industries, specific research institutes, and government agencies.
Wright Brothers: 1901 Glider	Women and men of various social and ethnic backgrounds--and with diverse interests, talents, qualities, and motivations--engage in the activities of science, engineering, and related fields such as the health professions. Some scientists work in teams, and some work alone, but all communicate extensively with others.
Wright Brothers: 1901 Glider	Many individuals have contributed to the traditions of science. Studying some of these individuals provides further understanding of scientific inquiry, science as a human endeavor, the nature of science, and the relationships between science and society.
Wright Brothers: 1901 Glider	In historical perspective, science has been practiced by different individuals in different cultures. In looking at the history of many peoples, one finds that scientists and engineers of high achievement are considered to be among the most valued contributors to their culture.

The Wright Brothers' Adventure, Learning to Fly

National Standards

Grades 5 – 8 Science

Source: NSTA National Standards Science 1996

Lesson/Activity	Grades 5 – 8 Science Standards
Wright Brothers: 1902 Glider	Students should develop their abilities by identifying a specified need, considering its various aspects, and talking to different potential users or beneficiaries. They should appreciate that for some needs, the cultural backgrounds and beliefs of different groups can affect the criteria for a suitable product.
Wright Brothers: 1902 Glider	Students should organize materials and other resources, plan their work, make good use of group collaboration where appropriate, choose suitable tools and techniques, and work with appropriate measurement methods to ensure adequate accuracy.
Wright Brothers: 1902 Glider	Students should use criteria relevant to the original purpose or need, consider a variety of factors that might affect acceptability and suitability for intended users or beneficiaries, and develop measures of quality with respect to such criteria and factors; they should also suggest improvements and, for their own products, try proposed modifications.
Wright Brothers: 1902 Glider	Students should review and describe any completed piece of work and identify the stages of problem identification, solution design, implementation, and evaluation.
Wright Brothers: 1902 Glider	Scientific inquiry and technological design have similarities and differences. Scientists propose explanations for questions about the natural world, and engineers propose solutions relating to human problems, needs, and aspirations. Technological solutions are temporary; technologies exist within nature and so they cannot contravene physical or biological principles; technological solutions have side effects; and technologies cost, carry risks, and provide benefits.
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Wright Brothers: 1902 Glider	Technological designs have constraints. Some constraints are unavoidable, for example, properties of materials, or effects of weather and friction; other constraints limit choices in the design, for example, environmental protection, human safety, and aesthetics.
Wright Brothers: 1902 Glider	Students should understand the risks associated with natural hazards (fires, floods, tornadoes, hurricanes, earthquakes, and volcanic eruptions), with chemical hazards (pollutants in air, water, soil, and food), with biological hazards (pollen, viruses, bacterial, and parasites), social hazards (occupational safety and transportation), and with personal hazards (smoking, dieting, and drinking).
Wright Brothers: 1902 Glider	Science influences society through its knowledge and world view. Scientific knowledge and the procedures used by scientists influence the way many individuals in society think about themselves, others, and the environment. The effect of science on society is neither entirely beneficial nor entirely detrimental.
Wright Brothers: 1902 Glider	Scientists and engineers work in many different settings, including colleges and universities, businesses and industries, specific research institutes, and government agencies.
Wright Brothers: 1902 Glider	Women and men of various social and ethnic backgrounds--and with diverse interests, talents, qualities, and motivations--engage in the activities of science, engineering, and related fields such as the health professions. Some scientists work in teams, and some work alone, but all communicate extensively with others.
Wright Brothers: 1902 Glider	Many individuals have contributed to the traditions of science. Studying some of these individuals provides further understanding of scientific inquiry, science as a human endeavor, the nature of science, and the relationships between science and society.
Wright Brothers: 1902 Glider	In historical perspective, science has been practiced by different individuals in different cultures. In looking at the history of many peoples, one finds that scientists and engineers of high achievement are considered to be among the most valued contributors to their culture.
Wright Brothers: 1903 Flyer	Students should develop their abilities by identifying a specified need, considering its various aspects, and talking to different potential users or beneficiaries. They should appreciate that for some needs, the cultural backgrounds and beliefs of different groups can affect the criteria for a suitable product.
Wright Brothers: 1903 Flyer	Students should organize materials and other resources, plan their work, make good use of group collaboration where appropriate, choose suitable tools and techniques, and work with appropriate measurement methods to ensure adequate accuracy.
Wright Brothers: 1903 Flyer	Students should use criteria relevant to the original purpose or need, consider a variety of factors that might affect acceptability and suitability for intended users or beneficiaries, and develop measures of quality with respect to such criteria and factors; they should also suggest improvements and, for their own products, try proposed modifications.
Wright Brothers: 1903 Flyer	Students should review and describe any completed piece of work and identify the stages of problem identification, solution design, implementation, and evaluation.

The Wright Brothers' Adventure, Learning to Fly

National Standards

Grades 5 – 8 Science

Source: NSTA National Standards Science 1996

Lesson/Activity	Grades 5 – 8 Science Standards
Wright Brothers: 1903 Flyer	Scientific inquiry and technological design have similarities and differences. Scientists propose explanations for questions about the natural world, and engineers propose solutions relating to human problems, needs, and aspirations. Technological solutions are temporary; technologies exist within nature and so they cannot contravene physical or biological principles; technological solutions have side effects; and technologies cost, carry risks, and provide benefits.
Wright Brothers: 1903 Flyer	Perfectly designed solutions do not exist. All technological solutions have trade-offs, such as safety, cost, efficiency, and appearance. Engineers often build in back-up systems to provide safety. Risk is part of living in a highly technological world. Reducing risk often results in new technology.
Wright Brothers: 1903 Flyer	Technological designs have constraints. Some constraints are unavoidable, for example, properties of materials, or effects of weather and friction; other constraints limit choices in the design, for example, environmental protection, human safety, and aesthetics.
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Wright Brothers: 1903 Flyer	Science influences society through its knowledge and world view. Scientific knowledge and the procedures used by scientists influence the way many individuals in society think about themselves, others, and the environment. The effect of science on society is neither entirely beneficial nor entirely detrimental.
Wright Brothers: 1903 Flyer	Scientists and engineers work in many different settings, including colleges and universities, businesses and industries, specific research institutes, and government agencies.
Wright Brothers: 1903 Flyer	Women and men of various social and ethnic backgrounds--and with diverse interests, talents, qualities, and motivations--engage in the activities of science, engineering, and related fields such as the health professions. Some scientists work in teams, and some work alone, but all communicate extensively with others.
Wright Brothers: 1903 Flyer	Many individuals have contributed to the traditions of science. Studying some of these individuals provides further understanding of scientific inquiry, science as a human endeavor, the nature of science, and the relationships between science and society.
Wright Brothers: 1903 Flyer	In historical perspective, science has been practiced by different individuals in different cultures. In looking at the history of many peoples, one finds that scientists and engineers of high achievement are considered to be among the most valued contributors to their culture.

The Wright Brothers' Adventure, Learning to Fly

National Standards

Grades 9 – 12 Science

Source: NSTA National Standards Science 1996

Lesson/Activity	Grades 9 – 12 Science Standards
The Society	Designing and conducting a scientific investigation requires introduction to the major concepts in the area being investigated, proper equipment, safety precautions, assistance with methodological problems, recommendations for use of technologies, clarification of ideas that guide the inquiry, and scientific knowledge obtained from sources other than the actual investigation. The investigation may also require student clarification of the question, method, controls, and variables; student organization and display of data; student revision of methods and explanations; and a public presentation of the results with a critical response from peers. Regardless of the scientific investigation performed, students must use evidence, apply logic, and construct an argument for their proposed explanations.
The Society	Student inquiries should culminate in formulating an explanation or model. Models should be physical, conceptual, and mathematical. In the process of answering the questions, the students should engage in discussions and arguments that result in the revision of their explanations. These discussions should be based on scientific knowledge, the use of logic, and evidence from their investigation.
The Society	Scientists usually inquire about how physical, living, or designed systems function. Conceptual principles and knowledge guide scientific inquiries. Historical and current scientific knowledge influence the design and interpretation of investigations and the evaluation of proposed explanations made by other scientists.
The Society	Mathematics is essential in scientific inquiry. Mathematical tools and models guide and improve the posing of questions, gathering data, constructing explanations and communicating results.
The Society	Scientific explanations must adhere to criteria such as: a proposed explanation must be logically consistent; it must abide by the rules of evidence; it must be open to questions and possible modification; and it must be based on historical and current scientific knowledge.
The Society	Results of scientific inquiry--new knowledge and methods--emerge from different types of investigations and public communication among scientists. In communicating and defending the results of scientific inquiry, arguments must be logical and demonstrate connections between natural phenomena, investigations, and the historical body of scientific knowledge. In addition, the methods and procedures that scientists used to obtain evidence must be clearly reported to enhance opportunities for further investigation.
The Society	Scientists in different disciplines ask different questions, use different methods of investigation, and accept different types of evidence to support their explanations. Many scientific investigations require the contributions of individuals from different disciplines, including engineering. New disciplines of science, such as geophysics and biochemistry often emerge at the interface of two older disciplines.
The Society	Science and technology are pursued for different purposes. Scientific inquiry is driven by the desire to understand the natural world, and technological design is driven by the need to meet human needs and solve human problems. Technology, by its nature, has a more direct effect on society than science because its purpose is to solve human problems, help humans adapt, and fulfill human aspirations. Technological solutions may create new problems. Science, by its nature, answers questions that may or may not directly influence humans. Sometimes scientific advances challenge people's beliefs and practical explanations concerning various aspects of the world.
The Society	Individuals and society must decide on proposals involving new research and the introduction of new technologies into society. Decisions involve assessment of alternatives, risks, costs, and benefits and consideration of who benefits and who suffers, who pays and gains, and what the risks are and who bears them. Students should understand the appropriateness and value of basic questions--"What can happen?"--"What are the odds?"--and "How do scientists and engineers know what will happen?"
The Society	Individuals and teams have contributed and will continue to contribute to the scientific enterprise. Doing science or engineering can be as simple as an individual conducting field studies or as complex as hundreds of people working on a major scientific question or technological problem. Pursuing science as a career or as a hobby can be both fascinating and intellectually rewarding.
The Society	Because all scientific ideas depend on experimental and observational confirmation, all scientific knowledge is, in principle, subject to change as new evidence becomes available. The core ideas of science such as the conservation of energy or the laws of motion have been subjected to a wide variety of confirmations and are therefore unlikely to change in the areas in which they have been tested. In areas where data or understanding are incomplete, such as the details of human evolution or questions surrounding global warming, new data may well lead to changes in current ideas or resolve current conflicts. In situations where information is still fragmentary, it is normal for scientific ideas to be incomplete, but this is also where the opportunity for making advances may be greatest.

The Wright Brothers' Adventure, Learning to Fly

National Standards

Grades 9 – 12 Science

Source: NSTA National Standards Science 1996

Lesson/Activity	Grades 9 – 12 Science Standards
The Society	In history, diverse cultures have contributed scientific knowledge and technologic inventions. Modern science began to evolve rapidly in Europe several hundred years ago. During the past two centuries, it has contributed significantly to the industrialization of Western and non-Western cultures. However, other, non-European cultures have developed scientific ideas and solved human problems through technology.
The Society	Usually, changes in science occur as small modifications in extant knowledge. The daily work of science and engineering results in incremental advances in our understanding of the world and our ability to meet human needs and aspirations. Much can be learned about the internal workings of science and the nature of science from study of individual scientists, their daily work, and their efforts to advance scientific knowledge in their area of study.
The Society	The historical perspective of scientific explanations demonstrates how scientific knowledge changes by evolving over time, almost always building on earlier knowledge.
Meet the Wrights	Scientists usually inquire about how physical, living, or designed systems function. Conceptual principles and knowledge guide scientific inquiries. Historical and current scientific knowledge influence the design and interpretation of investigations and the evaluation of proposed explanations made by other scientists.
Meet the Wrights	Scientific explanations must adhere to criteria such as: a proposed explanation must be logically consistent; it must abide by the rules of evidence; it must be open to questions and possible modification; and it must be based on historical and current scientific knowledge.
Meet the Wrights	Results of scientific inquiry--new knowledge and methods--emerge from different types of investigations and public communication among scientists. In communicating and defending the results of scientific inquiry, arguments must be logical and demonstrate connections between natural phenomena, investigations, and the historical body of scientific knowledge. In addition, the methods and procedures that scientists used to obtain evidence must be clearly reported to enhance opportunities for further investigation.
Meet the Wrights	In history, diverse cultures have contributed scientific knowledge and technologic inventions. Modern science began to evolve rapidly in Europe several hundred years ago. During the past two centuries, it has contributed significantly to the industrialization of Western and non-Western cultures. However, other, non-European cultures have developed scientific ideas and solved human problems through technology.
Meet the Wrights	Usually, changes in science occur as small modifications in extant knowledge. The daily work of science and engineering results in incremental advances in our understanding of the world and our ability to meet human needs and aspirations. Much can be learned about the internal workings of science and the nature of science from study of individual scientists, their daily work, and their efforts to advance scientific knowledge in their area of study.
Meet the Wrights	The historical perspective of scientific explanations demonstrates how scientific knowledge changes by evolving over time, almost always building on earlier knowledge.
1900: Kitty Hawks	Students in school science programs should develop the abilities associated with accurate and effective communication. These include writing and following procedures, expressing concepts, reviewing information, summarizing data, using language appropriately, developing diagrams and charts, explaining statistical analysis, speaking clearly and logically, constructing a reasoned argument, and responding appropriately to critical comments.
1900: Kitty Hawks	Scientists usually inquire about how physical, living, or designed systems function. Conceptual principles and knowledge guide scientific inquiries. Historical and current scientific knowledge influence the design and interpretation of investigations and the evaluation of proposed explanations made by other scientists.
1900: Kitty Hawks	Students should present their results to students, teachers, and others in a variety of ways, such as orally, in writing, and in other forms--including models, diagrams, and demonstrations.
1900: Kitty Hawks	Usually, changes in science occur as small modifications in extant knowledge. The daily work of science and engineering results in incremental advances in our understanding of the world and our ability to meet human needs and aspirations. Much can be learned about the internal workings of science and the nature of science from study of individual scientists, their daily work, and their efforts to advance scientific knowledge in their area of study.

The Wright Brothers' Adventure, Learning to Fly

National Standards

Grades 9 – 12 Science

Source: NSTA National Standards Science 1996

Lesson/Activity	Grades 9 – 12 Science Standards
1901: The First Improvement	Designing and conducting a scientific investigation requires introduction to the major concepts in the area being investigated, proper equipment, safety precautions, assistance with methodological problems, recommendations for use of technologies, clarification of ideas that guide the inquiry, and scientific knowledge obtained from sources other than the actual investigation. The investigation may also require student clarification of the question, method, controls, and variables; student organization and display of data; student revision of methods and explanations; and a public presentation of the results with a critical response from peers. Regardless of the scientific investigation performed, students must use evidence, apply logic, and construct an argument for their proposed explanations.
1901: The First Improvement	Student inquiries should culminate in formulating an explanation or model. Models should be physical, conceptual, and mathematical. In the process of answering the questions, the students should engage in discussions and arguments that result in the revision of their explanations. These discussions should be based on scientific knowledge, the use of logic, and evidence from their investigation.
1901: The First Improvement	This aspect of the standard emphasizes the critical abilities of analyzing an argument by reviewing current scientific understanding, weighing the evidence, and examining the logic so as to decide which explanations and models are best. In other words, although there may be several plausible explanations, they do not all have equal weight. Students should be able to use scientific criteria to find the preferred explanations.
1901: The First Improvement	Scientists usually inquire about how physical, living, or designed systems function. Conceptual principles and knowledge guide scientific inquiries. Historical and current scientific knowledge influence the design and interpretation of investigations and the evaluation of proposed explanations made by other scientists.
1901: The First Improvement	Scientific explanations must adhere to criteria such as: a proposed explanation must be logically consistent; it must abide by the rules of evidence; it must be open to questions and possible modification; and it must be based on historical and current scientific knowledge.
1901: The First Improvement	Results of scientific inquiry--new knowledge and methods--emerge from different types of investigations and public communication among scientists. In communicating and defending the results of scientific inquiry, arguments must be logical and demonstrate connections between natural phenomena, investigations, and the historical body of scientific knowledge. In addition, the methods and procedures that scientists used to obtain evidence must be clearly reported to enhance opportunities for further investigation.
1901: The First Improvement	Objects change their motion only when a net force is applied. Laws of motion are used to calculate precisely the effects of forces on the motion of objects. The magnitude of the change in motion can be calculated using the relationship F = ma, which is independent of the nature of the force. Whenever one object exerts force on another, a force equal in magnitude and opposite in direction is exerted on the first object.
1901: The First Improvement	Between any two charged particles, electric force is vastly greater than the gravitational force. Most observable forces such as those exerted by a coiled spring or friction may be traced to electric forces acting between atoms and molecules.
1901: The First Improvement	Earth systems have internal and external sources of energy, both of which create heat. The sun is the major external source of energy. Two primary sources of internal energy are the decay of radioactive isotopes and the gravitational energy from the earth's original formation.
1901: The First Improvement	Heating of earth's surface and atmosphere by the sun drives convection within the atmosphere and oceans, producing winds and ocean currents.
1901: The First Improvement	Students should demonstrate thoughtful planning for a piece of technology or technique. Students should be introduced to the roles of models and simulations in these processes.
1901: The First Improvement	Students should present their results to students, teachers, and others in a variety of ways, such as orally, in writing, and in other forms--including models, diagrams, and demonstrations.
1901: The First Improvement	In history, diverse cultures have contributed scientific knowledge and technologic inventions. Modern science began to evolve rapidly in Europe several hundred years ago. During the past two centuries, it has contributed significantly to the industrialization of Western and non-Western cultures. However, other, non-European cultures have developed scientific ideas and solved human problems through technology.

The Wright Brothers' Adventure, Learning to Fly

National Standards

Grades 9 – 12 Science

Source: NSTA National Standards Science 1996

Lesson/Activity	Grades 9 – 12 Science Standards
1901: The First Improvement	Usually, changes in science occur as small modifications in extant knowledge. The daily work of science and engineering results in incremental advances in our understanding of the world and our ability to meet human needs and aspirations. Much can be learned about the internal workings of science and the nature of science from study of individual scientists, their daily work, and their efforts to advance scientific knowledge in their area of study.
1901: The First Improvement	The historical perspective of scientific explanations demonstrates how scientific knowledge changes by evolving over time, almost always building on earlier knowledge.
New Data	Results of scientific inquiry--new knowledge and methods--emerge from different types of investigations and public communication among scientists. In communicating and defending the results of scientific inquiry, arguments must be logical and demonstrate connections between natural phenomena, investigations, and the historical body of scientific knowledge. In addition, the methods and procedures that scientists used to obtain evidence must be clearly reported to enhance opportunities for further investigation.
New Data	Heating of earth's surface and atmosphere by the sun drives convection within the atmosphere and oceans, producing winds and ocean currents.
New Data	Scientists have ethical traditions. Scientists value peer review, truthful reporting about the methods and outcomes of investigations, and making public the results of work. Violations of such norms do occur, but scientists responsible for such violations are censured by their peers.
New Data	Scientific explanations must meet certain criteria. First and foremost, they must be consistent with experimental and observational evidence about nature, and must make accurate predictions, when appropriate, about systems being studied. They should also be logical, respect the rules of evidence, be open to criticism, report methods and procedures, and make knowledge public. Explanations on how the natural world changes based on myths, personal beliefs, religious values, mystical inspiration, superstition, or authority may be personally useful and socially relevant, but they are not scientific.
New Data	Because all scientific ideas depend on experimental and observational confirmation, all scientific knowledge is, in principle, subject to change as new evidence becomes available. The core ideas of science such as the conservation of energy or the laws of motion have been subjected to a wide variety of confirmations and are therefore unlikely to change in the areas in which they have been tested. In areas where data or understanding are incomplete, such as the details of human evolution or questions surrounding global warming, new data may well lead to changes in current ideas or resolve current conflicts. In situations where information is still fragmentary, it is normal for scientific ideas to be incomplete, but this is also where the opportunity for making advances may be greatest.
1902: Success at Last	Student inquiries should culminate in formulating an explanation or model. Models should be physical, conceptual, and mathematical. In the process of answering the questions, the students should engage in discussions and arguments that result in the revision of their explanations. These discussions should be based on scientific knowledge, the use of logic, and evidence from their investigation.
1902: Success at Last	This aspect of the standard emphasizes the critical abilities of analyzing an argument by reviewing current scientific understanding, weighing the evidence, and examining the logic so as to decide which explanations and models are best. In other words, although there may be several plausible explanations, they do not all have equal weight. Students should be able to use scientific criteria to find the preferred explanations.
1902: Success at Last	Scientists usually inquire about how physical, living, or designed systems function. Conceptual principles and knowledge guide scientific inquiries. Historical and current scientific knowledge influence the design and interpretation of investigations and the evaluation of proposed explanations made by other scientists.
1902: Success at Last	Students should demonstrate thoughtful planning for a piece of technology or technique. Students should be introduced to the roles of models and simulations in these processes.
1902: Success at Last	Students should present their results to students, teachers, and others in a variety of ways, such as orally, in writing, and in other forms--including models, diagrams, and demonstrations.
1903: Powered Flight	A variety of technologies, such as hand tools, measuring instruments, and calculators, should be an integral component of scientific investigations. The use of computers for the collection, analysis, and display of data is also a part of this standard. Mathematics plays an essential role in all aspects of an inquiry. For example, measurement is used for posing questions, formulas are used for developing explanations, and charts and graphs are used for communicating results.

The Wright Brothers' Adventure, Learning to Fly

National Standards

Grades 9 – 12 Science

Source: NSTA National Standards Science 1996

Lesson/Activity	Grades 9 – 12 Science Standards
1903: Powered Flight	Student inquiries should culminate in formulating an explanation or model. Models should be physical, conceptual, and mathematical. In the process of answering the questions, the students should engage in discussions and arguments that result in the revision of their explanations. These discussions should be based on scientific knowledge, the use of logic, and evidence from their investigation.
1903: Powered Flight	This aspect of the standard emphasizes the critical abilities of analyzing an argument by reviewing current scientific understanding, weighing the evidence, and examining the logic so as to decide which explanations and models are best. In other words, although there may be several plausible explanations, they do not all have equal weight. Students should be able to use scientific criteria to find the preferred explanations.
1903: Powered Flight	Scientists usually inquire about how physical, living, or designed systems function. Conceptual principles and knowledge guide scientific inquiries. Historical and current scientific knowledge influence the design and interpretation of investigations and the evaluation of proposed explanations made by other scientists.
1903: Powered Flight	Students should be able to identify new problems or needs and to change and improve current technological designs.
1903: Powered Flight	Students should demonstrate thoughtful planning for a piece of technology or technique. Students should be introduced to the roles of models and simulations in these processes.
1903: Powered Flight	Students should present their results to students, teachers, and others in a variety of ways, such as orally, in writing, and in other forms--including models, diagrams, and demonstrations.
1903: Powered Flight	Science and technology are pursued for different purposes. Scientific inquiry is driven by the desire to understand the natural world, and technological design is driven by the need to meet human needs and solve human problems. Technology, by its nature, has a more direct effect on society than science because its purpose is to solve human problems, help humans adapt, and fulfill human aspirations. Technological solutions may create new problems. Science, by its nature, answers questions that may or may not directly influence humans. Sometimes scientific advances challenge people's beliefs and practical explanations concerning various aspects of the world.
1904: Improvement in Dayton	Designing and conducting a scientific investigation requires introduction to the major concepts in the area being investigated, proper equipment, safety precautions, assistance with methodological problems, recommendations for use of technologies, clarification of ideas that guide the inquiry, and scientific knowledge obtained from sources other than the actual investigation. The investigation may also require student clarification of the question, method, controls, and variables; student organization and display of data; student revision of methods and explanations; and a public presentation of the results with a critical response from peers. Regardless of the scientific investigation performed, students must use evidence, apply logic, and construct an argument for their proposed explanations.
1904: Improvement in Dayton	A variety of technologies, such as hand tools, measuring instruments, and calculators, should be an integral component of scientific investigations. The use of computers for the collection, analysis, and display of data is also a part of this standard. Mathematics plays an essential role in all aspects of an inquiry. For example, measurement is used for posing questions, formulas are used for developing explanations, and charts and graphs are used for communicating results.
1904: Improvement in Dayton	Student inquiries should culminate in formulating an explanation or model. Models should be physical, conceptual, and mathematical. In the process of answering the questions, the students should engage in discussions and arguments that result in the revision of their explanations. These discussions should be based on scientific knowledge, the use of logic, and evidence from their investigation.

The Wright Brothers' Adventure, Learning to Fly

National Standards

Grades 9 – 12 Science

Source: NSTA National Standards Science 1996

Lesson/Activity	Grades 9 – 12 Science Standards
1904: Improvement in Dayton	Students in school science programs should develop the abilities associated with accurate and effective communication. These include writing and following procedures, expressing concepts, reviewing information, summarizing data, using language appropriately, developing diagrams and charts, explaining statistical analysis, speaking clearly and logically, constructing a reasoned argument, and responding appropriately to critical comments.
1904: Improvement in Dayton	Mathematics is essential in scientific inquiry. Mathematical tools and models guide and improve the posing of questions, gathering data, constructing explanations and communicating results.
1904: Improvement in Dayton	Results of scientific inquiry--new knowledge and methods--emerge from different types of investigations and public communication among scientists. In communicating and defending the results of scientific inquiry, arguments must be logical and demonstrate connections between natural phenomena, investigations, and the historical body of scientific knowledge. In addition, the methods and procedures that scientists used to obtain evidence must be clearly reported to enhance opportunities for further investigation.
1904: Improvement in Dayton	Objects change their motion only when a net force is applied. Laws of motion are used to calculate precisely the effects of forces on the motion of objects. The magnitude of the change in motion can be calculated using the relationship F = ma, which is independent of the nature of the force. Whenever one object exerts force on another, a force equal in magnitude and opposite in direction is exerted on the first object.
1904: Improvement in Dayton	Heating of earth's surface and atmosphere by the sun drives convection within the atmosphere and oceans, producing winds and ocean currents.
1904: Improvement in Dayton	Students should present their results to students, teachers, and others in a variety of ways, such as orally, in writing, and in other forms--including models, diagrams, and demonstrations.
1904: Improvement in Dayton	Technological knowledge is often not made public because of patents and the financial potential of the idea or invention. Scientific knowledge is made public through presentations at professional meetings and publications in scientific journals.
1905: Complete a Flight at Last	Scientists usually inquire about how physical, living, or designed systems function. Conceptual principles and knowledge guide scientific inquiries. Historical and current scientific knowledge influence the design and interpretation of investigations and the evaluation of proposed explanations made by other scientists.
1905: Complete a Flight at Last	Scientific explanations must adhere to criteria such as: a proposed explanation must be logically consistent; it must abide by the rules of evidence; it must be open to questions and possible modification; and it must be based on historical and current scientific knowledge.
1905: Complete a Flight at Last	Results of scientific inquiry--new knowledge and methods--emerge from different types of investigations and public communication among scientists. In communicating and defending the results of scientific inquiry, arguments must be logical and demonstrate connections between natural phenomena, investigations, and the historical body of scientific knowledge. In addition, the methods and procedures that scientists used to obtain evidence must be clearly reported to enhance opportunities for further investigation.
1905: Complete a Flight at Last	Students should be able to identify new problems or needs and to change and improve current technological designs.
1905: Complete a Flight at Last	Students should demonstrate thoughtful planning for a piece of technology or technique. Students should be introduced to the roles of models and simulations in these processes.
1905: Complete a Flight at Last	Creativity, imagination, and a good knowledge base are all required in the work of science and engineering.
1905: Complete a Flight at Last	Science and technology are pursued for different purposes. Scientific inquiry is driven by the desire to understand the natural world, and technological design is driven by the need to meet human needs and solve human problems. Technology, by its nature, has a more direct effect on society than science because its purpose is to solve human problems, help humans adapt, and fulfill human aspirations. Technological solutions may create new problems. Science, by its nature, answers questions that may or may not directly influence humans. Sometimes scientific advances challenge people's beliefs and practical explanations concerning various aspects of the world.
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The Wright Brothers' Adventure, Learning to Fly

National Standards

Grades 9 – 12 Science

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Lesson/Activity	Grades 9 – 12 Science Standards
1905: Complete a Flight at Last	Scientific explanations must meet certain criteria. First and foremost, they must be consistent with experimental and observational evidence about nature, and must make accurate predictions, when appropriate, about systems being studied. They should also be logical, respect the rules of evidence, be open to criticism, report methods and procedures, and make knowledge public. Explanations on how the natural world changes based on myths, personal beliefs, religious values, mystical inspiration, superstition, or authority may be personally useful and socially relevant, but they are not scientific.
1905: Complete a Flight at Last	In history, diverse cultures have contributed scientific knowledge and technologic inventions. Modern science began to evolve rapidly in Europe several hundred years ago. During the past two centuries, it has contributed significantly to the industrialization of Western and non-Western cultures. However, other, non-European cultures have developed scientific ideas and solved human problems through technology.
1905: Complete a Flight at Last	Usually, changes in science occur as small modifications in extant knowledge. The daily work of science and engineering results in incremental advances in our understanding of the world and our ability to meet human needs and aspirations. Much can be learned about the internal workings of science and the nature of science from study of individual scientists, their daily work, and their efforts to advance scientific knowledge in their area of study.
1905: Complete a Flight at Last	The historical perspective of scientific explanations demonstrates how scientific knowledge changes by evolving over time, almost always building on earlier knowledge.
Wright Brothers: 1900 Glider	Designing and conducting a scientific investigation requires introduction to the major concepts in the area being investigated, proper equipment, safety precautions, assistance with methodological problems, recommendations for use of technologies, clarification of ideas that guide the inquiry, and scientific knowledge obtained from sources other than the actual investigation. The investigation may also require student clarification of the question, method, controls, and variables; student organization and display of data; student revision of methods and explanations; and a public presentation of the results with a critical response from peers. Regardless of the scientific investigation performed, students must use evidence, apply logic, and construct an argument for their proposed explanations.
Wright Brothers: 1900 Glider	Students in school science programs should develop the abilities associated with accurate and effective communication. These include writing and following procedures, expressing concepts, reviewing information, summarizing data, using language appropriately, developing diagrams and charts, explaining statistical analysis, speaking clearly and logically, constructing a reasoned argument, and responding appropriately to critical comments.
Wright Brothers: 1900 Glider	Scientists usually inquire about how physical, living, or designed systems function. Conceptual principles and knowledge guide scientific inquiries. Historical and current scientific knowledge influence the design and interpretation of investigations and the evaluation of proposed explanations made by other scientists.
Wright Brothers: 1900 Glider	Students should be able to identify new problems or needs and to change and improve current technological designs.
Wright Brothers: 1900 Glider	Students should demonstrate thoughtful planning for a piece of technology or technique. Students should be introduced to the roles of models and simulations in these processes.
Wright Brothers: 1900 Glider	Students should present their results to students, teachers, and others in a variety of ways, such as orally, in writing, and in other forms--including models, diagrams, and demonstrations.
Wright Brothers: 1900 Glider	Science and technology are pursued for different purposes. Scientific inquiry is driven by the desire to understand the natural world, and technological design is driven by the need to meet human needs and solve human problems. Technology, by its nature, has a more direct effect on society than science because its purpose is to solve human problems, help humans adapt, and fulfill human aspirations. Technological solutions may create new problems. Science, by its nature, answers questions that may or may not directly influence humans. Sometimes scientific advances challenge people's beliefs and practical explanations concerning various aspects of the world.
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National Standards

Grades 9 – 12 Science

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Wright Brothers: 1903 Flyer	Designing and conducting a scientific investigation requires introduction to the major concepts in the area being investigated, proper equipment, safety precautions, assistance with methodological problems, recommendations for use of technologies, clarification of ideas that guide the inquiry, and scientific knowledge obtained from sources other than the actual investigation. The investigation may also require student clarification of the question, method, controls, and variables; student organization and display of data; student revision of methods and explanations; and a public presentation of the results with a critical response from peers. Regardless of the scientific investigation performed, students must use evidence, apply logic, and construct an argument for their proposed explanations.
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