Exploring Aeronautics

National Standards

Grades 3 – 5 Science

Source: National Standards Science Literacy 2008

Lesson/Activity	Grades 3 – 5 - Science Standards
Integrating with Aeronautics	1B/E1 Scientific investigations may take many different forms, including observing what things are like or what is happening somewhere, collecting specimens for analysis, and doing experiments.
Integrating with Aeronautics	1B/E2b One reason for following directions carefully and for keeping records of one's work is to provide information on what might have caused differences in investigations.
Integrating with Aeronautics	3A/E1 Throughout all of history, people everywhere have invented and used tools. Most tools of today are different from those of the past but many are modifications of very ancient tools.
Integrating with Aeronautics	3A/E3 Measuring instruments can be used to gather accurate information for making scientific comparisons of objects and events and for designing and constructing things that will work properly.
Integrating with Aeronautics	4F/E1a Changes in speed or direction of motion are caused by forces.
Integrating with Aeronautics	4F/E1bc The greater the force is, the greater the change in motion will be. The more massive an object is, the less effect a given force will have.
Integrating with Aeronautics	4F/E2 How fast things move differs greatly. Some things are so slow that their journey takes a long time; others move too fast for people to even see them.
Fundamentals of Aeronautics (145-176)	1B/E1 Scientific investigations may take many different forms, including observing what things are like or what is happening somewhere, collecting specimens for analysis, and doing experiments.
Fundamentals of Aeronautics (145-176)	1B/E2b One reason for following directions carefully and for keeping records of one's work is to provide information on what might have caused differences in investigations.
Fundamentals of Aeronautics (145-176)	3A/E1 Throughout all of history, people everywhere have invented and used tools. Most tools of today are different from those of the past but many are modifications of very ancient tools.
Fundamentals of Aeronautics (145-176)	3A/E3 Measuring instruments can be used to gather accurate information for making scientific comparisons of objects and events and for designing and constructing things that will work properly.
Fundamentals of Aeronautics (145-176)	4F/E1a Changes in speed or direction of motion are caused by forces.
Fundamentals of Aeronautics (145-176)	4F/E1bc The greater the force is, the greater the change in motion will be. The more massive an object is, the less effect a given force will have.
Fundamentals of Aeronautics (145-176)	4F/E2 How fast things move differs greatly. Some things are so slow that their journey takes a long time; others move too fast for people to even see them.
Intro to Aeronautics (109-123)	1B/E1 Scientific investigations may take many different forms, including observing what things are like or what is happening somewhere, collecting specimens for analysis, and doing experiments.
Intro to Aeronautics (109-123)	1B/E2b One reason for following directions carefully and for keeping records of one's work is to provide information on what might have caused differences in investigations.
Intro to Aeronautics (109-123)	3A/E1 Throughout all of history, people everywhere have invented and used tools. Most tools of today are different from those of the past but many are modifications of very ancient tools.
Intro to Aeronautics (109-123)	3A/E3 Measuring instruments can be used to gather accurate information for making scientific comparisons of objects and events and for designing and constructing things that will work properly.
Intro to Aeronautics (109-123)	4F/E1a Changes in speed or direction of motion are caused by forces.
Intro to Aeronautics (109-123)	4F/E1bc The greater the force is, the greater the change in motion will be. The more massive an object is, the less effect a given force will have.
Intro to Aeronautics (109-123)	4F/E2 How fast things move differs greatly. Some things are so slow that their journey takes a long time; others move too fast for people to even see them.
Airplane Control(209-256)	1B/E1 Scientific investigations may take many different forms, including observing what things are like or what is happening somewhere, collecting specimens for analysis, and doing experiments.
Airplane Control(209-256)	1B/E2b One reason for following directions carefully and for keeping records of one's work is to provide information on what might have caused differences in investigations.

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National Standards

Grades 3 – 5 Science

Source: National Standards Science Literacy 2008

Lesson/Activity	Grades 3 – 5 Science Standards
Airplane Control(209-256)	3A/E1 Throughout all of history, people everywhere have invented and used tools. Most tools of today are different from those of the past but many are modifications of very ancient tools.
Airplane Control(209-256)	3A/E3 Measuring instruments can be used to gather accurate information for making scientific comparisons of objects and events and for designing and constructing things that will work properly.
Airplane Control(209-256)	4F/E1a Changes in speed or direction of motion are caused by forces.
Airplane Control(209-256)	4F/E1bc The greater the force is, the greater the change in motion will be. The more massive an object is, the less effect a given force will have.
Airplane Control(209-256)	4F/E2 How fast things move differs greatly. Some things are so slow that their journey takes a long time; others move too fast for people to even see them.
Wings(177-208)	1B/E1 Scientific investigations may take many different forms, including observing what things are like or what is happening somewhere, collecting specimens for analysis, and doing experiments.
Wings(177-208)	1B/E2b One reason for following directions carefully and for keeping records of one's work is to provide information on what might have caused differences in investigations.
Wings(177-208)	3A/E1 Throughout all of history, people everywhere have invented and used tools. Most tools of today are different from those of the past but many are modifications of very ancient tools.
Wings(177-208)	3A/E3 Measuring instruments can be used to gather accurate information for making scientific comparisons of objects and events and for designing and constructing things that will work properly.
Wings(177-208)	4F/E1a Changes in speed or direction of motion are caused by forces.
Wings(177-208)	4F/E1bc The greater the force is, the greater the change in motion will be. The more massive an object is, the less effect a given force will have.
Wings(177-208)	4F/E2 How fast things move differs greatly. Some things are so slow that their journey takes a long time; others move too fast for people to even see them.
Science of Flight	1B/E1 Scientific investigations may take many different forms, including observing what things are like or what is happening somewhere, collecting specimens for analysis, and doing experiments.
Science of Flight	1B/E2b One reason for following directions carefully and for keeping records of one's work is to provide information on what might have caused differences in investigations.
Science of Flight	3A/E1 Throughout all of history, people everywhere have invented and used tools. Most tools of today are different from those of the past but many are modifications of very ancient tools.
Science of Flight	3A/E3 Measuring instruments can be used to gather accurate information for making scientific comparisons of objects and events and for designing and constructing things that will work properly.
Science of Flight	4F/E1a Changes in speed or direction of motion are caused by forces.
Science of Flight	4F/E1bc The greater the force is, the greater the change in motion will be. The more massive an object is, the less effect a given force will have.
Science of Flight	4F/E2 How fast things move differs greatly. Some things are so slow that their journey takes a long time; others move too fast for people to even see them.
Scientific Method(124-144)	1B/E1 Scientific investigations may take many different forms, including observing what things are like or what is happening somewhere, collecting specimens for analysis, and doing experiments.
Scientific Method(124-144)	1B/E2b One reason for following directions carefully and for keeping records of one's work is to provide information on what might have caused differences in investigations.
Scientific Method(124-144)	3A/E1 Throughout all of history, people everywhere have invented and used tools. Most tools of today are different from those of the past but many are modifications of very ancient tools.
Scientific Method(124-144)	3A/E3 Measuring instruments can be used to gather accurate information for making scientific comparisons of objects and events and for designing and constructing things that will work properly.
Scientific Method(124-144)	4F/E1a Changes in speed or direction of motion are caused by forces.
Scientific Method(124-144)	4F/E1bc The greater the force is, the greater the change in motion will be. The more massive an object is, the less effect a given force will have.

Exploring Aeronautics

National Standards

Grades 3 – 5 Science

Source: National Standards Science Literacy 2008

Lesson/Activity	Grades 3 – 5 Science Standards
Scientific Method(124-144)	4F/E2 How fast things move differs greatly. Some things are so slow that their journey takes a long time; others move too fast for people to even see them.
Tools of Aeronautics(257-326)	1B/E1 Scientific investigations may take many different forms, including observing what things are like or what is happening somewhere, collecting specimens for analysis, and doing experiments.
Tools of Aeronautics(257-326)	1B/E2b One reason for following directions carefully and for keeping records of one's work is to provide information on what might have caused differences in investigations.
Tools of Aeronautics(257-326)	3A/E1 Throughout all of history, people everywhere have invented and used tools. Most tools of today are different from those of the past but many are modifications of very ancient tools.
Tools of Aeronautics(257-326)	3A/E3 Measuring instruments can be used to gather accurate information for making scientific comparisons of objects and events and for designing and constructing things that will work properly.
Tools of Aeronautics(257-326)	4F/E1a Changes in speed or direction of motion are caused by forces.
Tools of Aeronautics(257-326)	4F/E1bc The greater the force is, the greater the change in motion will be. The more massive an object is, the less effect a given force will have.
Tools of Aeronautics(257-326)	4F/E2 How fast things move differs greatly. Some things are so slow that their journey takes a long time; others move too fast for people to even see them.
How an Airplane Flies	1B/E1 Scientific investigations may take many different forms, including observing what things are like or what is happening somewhere, collecting specimens for analysis, and doing experiments.
How an Airplane Flies	1B/E2b One reason for following directions carefully and for keeping records of one's work is to provide information on what might have caused differences in investigations.
How an Airplane Flies	3A/E1 Throughout all of history, people everywhere have invented and used tools. Most tools of today are different from those of the past but many are modifications of very ancient tools.
How an Airplane Flies	3A/E3 Measuring instruments can be used to gather accurate information for making scientific comparisons of objects and events and for designing and constructing things that will work properly.
How an Airplane Flies	4F/E1a Changes in speed or direction of motion are caused by forces.
How an Airplane Flies	4F/E1bc The greater the force is, the greater the change in motion will be. The more massive an object is, the less effect a given force will have.
How an Airplane Flies	4F/E2 How fast things move differs greatly. Some things are so slow that their journey takes a long time; others move too fast for people to even see them.
The Tools of Aeronautics	1B/E1 Scientific investigations may take many different forms, including observing what things are like or what is happening somewhere, collecting specimens for analysis, and doing experiments.
The Tools of Aeronautics	1B/E2b One reason for following directions carefully and for keeping records of one's work is to provide information on what might have caused differences in investigations.
The Tools of Aeronautics	3A/E1 Throughout all of history, people everywhere have invented and used tools. Most tools of today are different from those of the past but many are modifications of very ancient tools.
The Tools of Aeronautics	3A/E3 Measuring instruments can be used to gather accurate information for making scientific comparisons of objects and events and for designing and constructing things that will work properly.
The Tools of Aeronautics	4F/E1a Changes in speed or direction of motion are caused by forces.
The Tools of Aeronautics	4F/E1bc The greater the force is, the greater the change in motion will be. The more massive an object is, the less effect a given force will have.
The Tools of Aeronautics	4F/E2 How fast things move differs greatly. Some things are so slow that their journey takes a long time; others move too fast for people to even see them.
The Activity Center	1B/E1 Scientific investigations may take many different forms, including observing what things are like or what is happening somewhere, collecting specimens for analysis, and doing experiments.

Exploring Aeronautics

National Standards

Grades 3 – 5 Science

Source: National Standards Science Literacy 2008

Lesson/Activity	Grades 3 – 5 Science Standards
The Activity Center	1B/E2b One reason for following directions carefully and for keeping records of one's work is to provide information on what might have caused differences in investigations.
The Activity Center	3A/E1 Throughout all of history, people everywhere have invented and used tools. Most tools of today are different from those of the past but many are modifications of very ancient tools.
The Activity Center	3A/E3 Measuring instruments can be used to gather accurate information for making scientific comparisons of objects and events and for designing and constructing things that will work properly.
The Activity Center	4F/E1a Changes in speed or direction of motion are caused by forces.
The Activity Center	4F/E1bc The greater the force is, the greater the change in motion will be. The more massive an object is, the less effect a given force will have.
The Activity Center	4F/E2 How fast things move differs greatly. Some things are so slow that their journey takes a long time; others move too fast for people to even see them.
The Resource Center	1B/E1 Scientific investigations may take many different forms, including observing what things are like or what is happening somewhere, collecting specimens for analysis, and doing experiments.
The Resource Center	1B/E2b One reason for following directions carefully and for keeping records of one's work is to provide information on what might have caused differences in investigations.
The Resource Center	3A/E1 Throughout all of history, people everywhere have invented and used tools. Most tools of today are different from those of the past but many are modifications of very ancient tools.
The Resource Center	3A/E3 Measuring instruments can be used to gather accurate information for making scientific comparisons of objects and events and for designing and constructing things that will work properly.
The Resource Center	4F/E1a Changes in speed or direction of motion are caused by forces.
The Resource Center	4F/E1bc The greater the force is, the greater the change in motion will be. The more massive an object is, the less effect a given force will have.
The Resource Center	4F/E2 How fast things move differs greatly. Some things are so slow that their journey takes a long time; others move too fast for people to even see them.

Exploring Aeronautics

National Standards

Grades 6 – 8 Science

Source: National Standards Science Literacy 2008

Lesson/Activity	Grades 6 – 8 Science Standards
Integrating with Aeronautics	1B/M1b Scientific investigations usually involve the collection of relevant data, the use of logical reasoning, and the application of imagination in devising hypotheses and explanations to make sense of the collected data.
Integrating with Aeronautics	4F/M3a An unbalanced force acting on an object changes its speed or direction of motion, or both.
Fundamentals of Aeronautics (145-176)	1B/M1b Scientific investigations usually involve the collection of relevant data, the use of logical reasoning, and the application of imagination in devising hypotheses and explanations to make sense of the collected data.
Fundamentals of Aeronautics (145-176)	4F/M3a An unbalanced force acting on an object changes its speed or direction of motion, or both.
Intro to Aeronautics (109-123)	1B/M1b Scientific investigations usually involve the collection of relevant data, the use of logical reasoning, and the application of imagination in devising hypotheses and explanations to make sense of the collected data.
Intro to Aeronautics (109-123)	4F/M3a An unbalanced force acting on an object changes its speed or direction of motion, or both.
Airplane Control(209-256)	1B/M1b Scientific investigations usually involve the collection of relevant data, the use of logical reasoning, and the application of imagination in devising hypotheses and explanations to make sense of the collected data.
Airplane Control(209-256)	4F/M3a An unbalanced force acting on an object changes its speed or direction of motion, or both.
Wings(177-208)	1B/M1b Scientific investigations usually involve the collection of relevant data, the use of logical reasoning, and the application of imagination in devising hypotheses and explanations to make sense of the collected data.
Wings(177-208)	4F/M3a An unbalanced force acting on an object changes its speed or direction of motion, or both.
Tools of Aeronautics(257-326)	1B/M1b Scientific investigations usually involve the collection of relevant data, the use of logical reasoning, and the application of imagination in devising hypotheses and explanations to make sense of the collected data.
Tools of Aeronautics	4F/M3a An unbalanced force acting on an object changes its speed or direction of motion, or both.
Science of Flight	1B/M1b Scientific investigations usually involve the collection of relevant data, the use of logical reasoning, and the application of imagination in devising hypotheses and explanations to make sense of the collected data.
Science of Flight	4F/M3a An unbalanced force acting on an object changes its speed or direction of motion, or both.
Scientific Method(124-144)	1B/M1b Scientific investigations usually involve the collection of relevant data, the use of logical reasoning, and the application of imagination in devising hypotheses and explanations to make sense of the collected data.
Scientific Method(124-144)	4F/M3a An unbalanced force acting on an object changes its speed or direction of motion, or both.
How an Airplane Flies	1B/M1b Scientific investigations usually involve the collection of relevant data, the use of logical reasoning, and the application of imagination in devising hypotheses and explanations to make sense of the collected data.

Exploring Aeronautics

National Standards

Grades 6 – 8 Science

Source: National Standards Science Literacy 2008

Lesson/Activity	Grades 6 – 8 Science Standards
How an Airplane Flies	4F/M3a An unbalanced force acting on an object changes its speed or direction of motion, or both.
The Tools of Aeronautics	1B/M1b Scientific investigations usually involve the collection of relevant data, the use of logical reasoning, and the application of imagination in devising hypotheses and explanations to make sense of the collected data.
The Tools of Aeronautics	4F/M3a An unbalanced force acting on an object changes its speed or direction of motion, or both.
The Activity Center	1B/M1b Scientific investigations usually involve the collection of relevant data, the use of logical reasoning, and the application of imagination in devising hypotheses and explanations to make sense of the collected data.
The Activity Center	4F/M3a An unbalanced force acting on an object changes its speed or direction of motion, or both.
The Resource Center	1B/M1b Scientific investigations usually involve the collection of relevant data, the use of logical reasoning, and the application of imagination in devising hypotheses and explanations to make sense of the collected data.
The Resource Center	4F/M3a An unbalanced force acting on an object changes its speed or direction of motion, or both.

Exploring Aeronautics

National Standards

Grades 5 – 8 Science

Source: NSTA National Standards Science 1996

Lesson/Activity	Grades 5 – 8 Science Standards
Fundamentals of Aeronautics (145-176)	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.
Fundamentals of Aeronautics (145-176)	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.
Fundamentals of Aeronautics (145-176)	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.
Fundamentals of Aeronautics (145-176)	Technology used to gather data enhances accuracy and allows scientists to analyze and quantify results of investigations.
Fundamentals of Aeronautics (145-176)	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.
Fundamentals of Aeronautics (145-176)	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.
Fundamentals of Aeronautics (145-176)	An object that is not being subjected to a force will continue to move at a constant speed and in a straight line.
Fundamentals of Aeronautics (145-176)	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.
Fundamentals of Aeronautics (145-176)	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.
Fundamentals of Aeronautics (145-176)	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.
Fundamentals of Aeronautics (145-176)	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.
Intro to Aeronautics (109-123)	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.

Exploring Aeronautics

National Standards

Grades 5 – 8 Science

Source: NSTA National Standards Science 1996

Lesson/Activity	Grades 5 – 8 Science Standards
Intro to Aeronautics (109-123)	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.
Intro to Aeronautics (109-123)	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.
Intro to Aeronautics (109-123)	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.
Intro to Aeronautics (109-123)	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.
Intro to Aeronautics (109-123)	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.
Intro to Aeronautics (109-123)	Technology used to gather data enhances accuracy and allows scientists to analyze and quantify results of investigations.
Intro to Aeronautics (109-123)	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.
Intro to Aeronautics (109-123)	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.
Intro to Aeronautics (109-123)	An object that is not being subjected to a force will continue to move at a constant speed and in a straight line.
Intro to Aeronautics (109-123)	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.
Intro to Aeronautics (109-123)	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.
Intro to Aeronautics (109-123)	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.
Intro to Aeronautics (109-123)	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.
Intro to Aeronautics (109-123)	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.

Exploring Aeronautics

National Standards

Grades 5 – 8 Science

Source: NSTA National Standards Science 1996

Lesson/Activity	Grades 5 – 8 Science Standards
Intro to Aeronautics (109-123)	Students should review and describe any completed piece of work and identify the stages of problem identification, solution design, implementation, and evaluation.
Intro to Aeronautics (109-123)	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.
Intro to Aeronautics (109-123)	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.
Intro to Aeronautics (109-123)	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.
Intro to Aeronautics (109-123)	Societal challenges often inspire questions for scientific research, and social priorities often influence research priorities through the availability of funding for research.
Intro to Aeronautics (109-123)	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.
Intro to Aeronautics (109-123)	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.
Intro to Aeronautics (109-123)	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.
Intro to Aeronautics (109-123)	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.
Intro to Aeronautics (109-123)	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.
Intro to Aeronautics (109-123)	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.
Integrating with Aeronautics	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.

Exploring Aeronautics

National Standards

Grades 5 – 8 Science

Source: NSTA National Standards Science 1996

Lesson/Activity	Grades 5 – 8 Science Standards
Integrating with Aeronautics	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.
Integrating with Aeronautics	An object that is not being subjected to a force will continue to move at a constant speed and in a straight line.
Integrating with Aeronautics	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.
Integrating with Aeronautics	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.
Integrating with Aeronautics	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.
Integrating with Aeronautics	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.
Integrating with Aeronautics	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.
Integrating with Aeronautics	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.
Integrating with Aeronautics	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.
Integrating with Aeronautics	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.
Integrating with Aeronautics	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.
Airplane Control(209-256)	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.
Airplane Control(209-256)	An object that is not being subjected to a force will continue to move at a constant speed and in a straight line.
Airplane Control(209-256)	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.
Airplane Control(209-256)	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.
Airplane Control(209-256)	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.
Airplane Control(209-256)	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.
Airplane Control(209-256)	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.
Airplane Control(209-256)	Students should review and describe any completed piece of work and identify the stages of problem identification, solution design, implementation, and evaluation.

Exploring Aeronautics

National Standards

Grades 5 – 8 Science

Source: NSTA National Standards Science 1996

Lesson/Activity	Grades 5 – 8 Science Standards
Airplane Control(209-256)	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.
Airplane Control(209-256)	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.
Airplane Control(209-256)	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.
Wings(177-208)	A substance has characteristic properties, such as density, a boiling point, and solubility, all of which are independent of the amount of the sample. A mixture of substances often can be separated into the original substances using one or more of the characteristic properties.
Wings(177-208)	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.
Wings(177-208)	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.
Wings(177-208)	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.
Wings(177-208)	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.
Wings(177-208)	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.
Wings(177-208)	Students should review and describe any completed piece of work and identify the stages of problem identification, solution design, implementation, and evaluation.
Wings(177-208)	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.
Wings(177-208)	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.
Wings(177-208)	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.
Wings(177-208)	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.
Wings(177-208)	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.
Wings(177-208)	Scientists and engineers work in many different settings, including colleges and universities, businesses and industries, specific research institutes, and government agencies.
Wings(177-208)	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.

Exploring Aeronautics

National Standards

Grades 5 – 8 Science

Source: NSTA National Standards Science 1996

Lesson/Activity	Grades 5 – 8 Science Standards
Wings(177-208)	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.
Wings(177-208)	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.
Wings(177-208)	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.
Science of Flight	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.
Science of 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.
Science of Flight	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.
Science of Flight	Students should base their explanation on what they observed, and as they develop cognitive skills, they should be able to differentiate explanation from description--providing causes for effects and establishing relationships based on evidence and logical argument. This standard requires a subject matter knowledge base so the students can effectively conduct investigations, because developing explanations establishes connections between the content of science and the contexts within which students develop new knowledge.
Science of Flight	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.
Science of Flight	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.
Science of 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.
Science of Flight	Technology used to gather data enhances accuracy and allows scientists to analyze and quantify results of investigations.
Science of 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.
Science of Flight	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.
Science of Flight	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.
Science of 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.

Exploring Aeronautics

National Standards

Grades 5 – 8 Science

Source: NSTA National Standards Science 1996

Lesson/Activity	Grades 5 – 8 Science Standards
Science of Flight	An object that is not being subjected to a force will continue to move at a constant speed and in a straight line.
Science of 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.
Science of Flight	Energy is a property of many substances and is associated with heat, light, electricity, mechanical motion, sound, nuclei, and the nature of a chemical. Energy is transferred in many ways.
Science of Flight	Electrical circuits provide a means of transferring electrical energy when heat, light, sound, and chemical changes are produced.
Science of Flight	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.
Science of 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.
Science of 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.
Science of 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.
Science of Flight	Students should review and describe any completed piece of work and identify the stages of problem identification, solution design, implementation, and evaluation.
Science of 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.
Science of Flight	Science and technology are reciprocal. Science helps drive technology, as it addresses questions that demand more sophisticated instruments and provides principles for better instrumentation and technique. Technology is essential to science, because it provides instruments and techniques that enable observations of objects and phenomena that are otherwise unobservable due to factors such as quantity, distance, location, size, and speed. Technology also provides tools for investigations, inquiry, and analysis.
Science of 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.
Science of 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.
Science of Flight	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.
Science of Flight	Societal challenges often inspire questions for scientific research, and social priorities often influence research priorities through the availability of funding for research.
Science of Flight	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.
Science of Flight	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.

Exploring Aeronautics

National Standards

Grades 5 – 8 Science

Source: NSTA National Standards Science 1996

Lesson/Activity	Grades 5 – 8 Science Standards
Science of Flight	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.
Science of Flight	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.
Science of Flight	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.
Science of Flight	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.
Science of Flight	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.
Tools of Aeronautics(257-326)	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.
Tools of Aeronautics(257-326)	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.
Tools of Aeronautics(257-326)	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.
Tools of Aeronautics(257-326)	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.
Tools of Aeronautics(257-326)	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.
Tools of Aeronautics(257-326)	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.
Tools of Aeronautics(257-326)	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.
Tools of Aeronautics(257-326)	Students should review and describe any completed piece of work and identify the stages of problem identification, solution design, implementation, and evaluation.
Tools of Aeronautics(257-326)	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.
Tools of Aeronautics(257-326)	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.
Tools of Aeronautics(257-326)	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.

Exploring Aeronautics

National Standards

Grades 5 – 8 Science

Source: NSTA National Standards Science 1996

Lesson/Activity	Grades 5 – 8 Science Standards
Scientific Method(124-144)	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.
Scientific Method(124-144)	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.
Scientific Method(124-144)	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.
Scientific Method(124-144)	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.
Scientific Method(124-144)	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.
Scientific Method(124-144)	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.
Scientific Method(124-144)	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.
Scientific Method(124-144)	Technology used to gather data enhances accuracy and allows scientists to analyze and quantify results of investigations.
Scientific Method(124-144)	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.
Scientific Method(124-144)	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.
Scientific Method(124-144)	An object that is not being subjected to a force will continue to move at a constant speed and in a straight line.
Scientific Method(124-144)	Students should review and describe any completed piece of work and identify the stages of problem identification, solution design, implementation, and evaluation.
Scientific Method(124-144)	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.
Scientific Method(124-144)	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.
Scientific Method(124-144)	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.

Exploring Aeronautics

National Standards

Grades 5 – 8 Science

Source: NSTA National Standards Science 1996

Lesson/Activity	Grades 5 – 8 Science Standards
Scientific Method(124-144)	Societal challenges often inspire questions for scientific research, and social priorities often influence research priorities through the availability of funding for research.
Scientific Method(124-144)	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.
Scientific Method(124-144)	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.
Scientific Method(124-144)	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.
How an Airplane Flies	An object that is not being subjected to a force will continue to move at a constant speed and in a straight line.
How an Airplane Flies	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.
The Tools of Aeronautics	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.
The Tools of Aeronautics	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.
The Tools of Aeronautics	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 Tools of Aeronautics	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 Tools of Aeronautics	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.
The Tools of Aeronautics	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 Tools of Aeronautics	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.
The Tools of Aeronautics	Students should review and describe any completed piece of work and identify the stages of problem identification, solution design, implementation, and evaluation.

Exploring Aeronautics

National Standards

Grades 5 – 8 Science

Source: NSTA National Standards Science 1996

Lesson/Activity	Grades 5 – 8 Science Standards
Science of Flight	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.
Science of Flight	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.
Science of Flight	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.
Science of Flight	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.
Science of Flight	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.
Tools of Aeronautics(257-326)	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.
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Tools of Aeronautics(257-326)	Students should review and describe any completed piece of work and identify the stages of problem identification, solution design, implementation, and evaluation.
Tools of Aeronautics(257-326)	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.
Tools of Aeronautics(257-326)	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.
Tools of Aeronautics(257-326)	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.

Exploring Aeronautics

National Standards

Grades 5 – 8 Science

Source: NSTA National Standards Science 1996

Lesson/Activity	Grades 5 – 8 Science Standards
The Tools of Aeronautics	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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The Tools of Aeronautics	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.
The Activity Center	An object that is not being subjected to a force will continue to move at a constant speed and in a straight line.
The Activity Center	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.
The Activity Center	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.
The Activity Center	Students should review and describe any completed piece of work and identify the stages of problem identification, solution design, implementation, and evaluation.
The Activity Center	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.
The Resource Center	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 Resource Center	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 Resource Center	Scientists and engineers work in many different settings, including colleges and universities, businesses and industries, specific research institutes, and government agencies.
The Resource Center	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 Resource Center	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 Resource Center	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 Resource Center	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.