

**Smart Skies****National Standards**

Grades 3 – 5 Science

Source: Benchmarks for Science Literacy National Standards Science Literacy 2008

Lesson/Activity	Grades 3 – 5 Science Standards
Line Up with Math	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.
Line Up with Math	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.
Line Up with Math	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.
Line Up with Math	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.
Line Up with Math	4F/E1a Changes in speed or direction of motion are caused by forces.
Line Up with Math	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.
Line Up with Math	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.
Fly by Math	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.
Fly by Math	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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Fly by Math	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.
Fly by Math	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.

## **Smart Skies**

### **National Standards**

Grades 6 – 8 Science

Source: Benchmarks for Science Literacy National Standards Science Literacy 2008

<b>Lesson/Activity</b>	<b>Grades 6 – 8 Science Standards</b>
Fly by Math	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.
Fly by Math	4F/M3a An unbalanced force acting on an object changes its speed or direction of motion, or both.
Line Up with Math	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.
Line Up with Math	4F/M3a An unbalanced force acting on an object changes its speed or direction of motion, or both.

### **National Standards**

Grades 9 – 12 Science

Source: Benchmarks for Science Literacy National Standards Science Literacy 2008

<b>Lesson/Activity</b>	<b>Grades 9 – 12 Science Standards</b>
Fly by Math	1B/H1 Investigations are conducted for different reasons, including to explore new phenomena, to check on previous results, to test how well a theory predicts, and to compare theories.
Fly by Math	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.
Fly by Math	4F/H1 The change in motion (direction or speed) of an object is proportional to the applied force and inversely proportional to the mass.
Fly by Math	4F/H4 whenever one thing exerts a force on another, an equal amount of force is exerted back on it.
Fly by Math	4F/H8 Any object maintains a constant speed and direction of motion unless an unbalanced outside force acts on it.
Line Up with Math	1B/H1 Investigations are conducted for different reasons, including to explore new phenomena, to check on previous results, to test how well a theory predicts, and to compare theories.
Line Up with Math	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.
Line Up with Math	4F/H1 The change in motion (direction or speed) of an object is proportional to the applied force and inversely proportional to the mass.
Line Up with Math	4F/H4 whenever one thing exerts a force on another, an equal amount of force is exerted back on it.
Line Up with Math	4F/H8 Any object maintains a constant speed and direction of motion unless an unbalanced outside force acts on it.

## **Smart Skies**

### **National Standards**

#### **Grades 5 – 8 Science**

Source: NSTA National Science Education Standards 1996

<b>Lesson/Activity</b>	<b>Grades 5 – 8 Science Standards</b>
Fly by Math	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.
Fly by Math	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.
Fly by Math	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.
Fly by Math	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.
Fly by Math	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.
Fly by Math	Technology used to gather data enhances accuracy and allows scientists to analyze and quantify results of investigations.
Fly by Math	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.
Fly by Math	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.
Fly by Math	An object that is not being subjected to a force will continue to move at a constant speed and in a straight line.
Fly by Math	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.
Line Up with Math	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.
Line Up with Math	An object that is not being subjected to a force will continue to move at a constant speed and in a straight line.
Line Up with Math	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.

## **Smart Skies**

### **National Standards**

Grades 9 – 12 Science

Source: NSTA National Science Education Standards 1996

<b>Lesson/Activity</b>	<b>Grades 9 – 12 Science Standards</b>
Fly by Math	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.
Fly by Math	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.
Fly by Math	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.
Fly by Math	Scientists rely on technology to enhance the gathering and manipulation of data. New techniques and tools provide new evidence to guide inquiry and new methods to gather data, thereby contributing to the advance of science. The accuracy and precision of the data, and therefore the quality of the exploration, depends on the technology used.
Fly by Math	Mathematics is essential in scientific inquiry. Mathematical tools and models guide and improve the posing of questions, gathering data, constructing explanations and communicating results.
Fly by Math	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.
Fly by Math	The electric force is a universal force that exists between any two charged objects. Opposite charges attract while like charges repel. The strength of the force is proportional to the charges, and, as with gravitation, inversely proportional to the square of the distance between them.
Line Up with Math	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.