National Aeronautics and
Space Administration
Langley Research Center

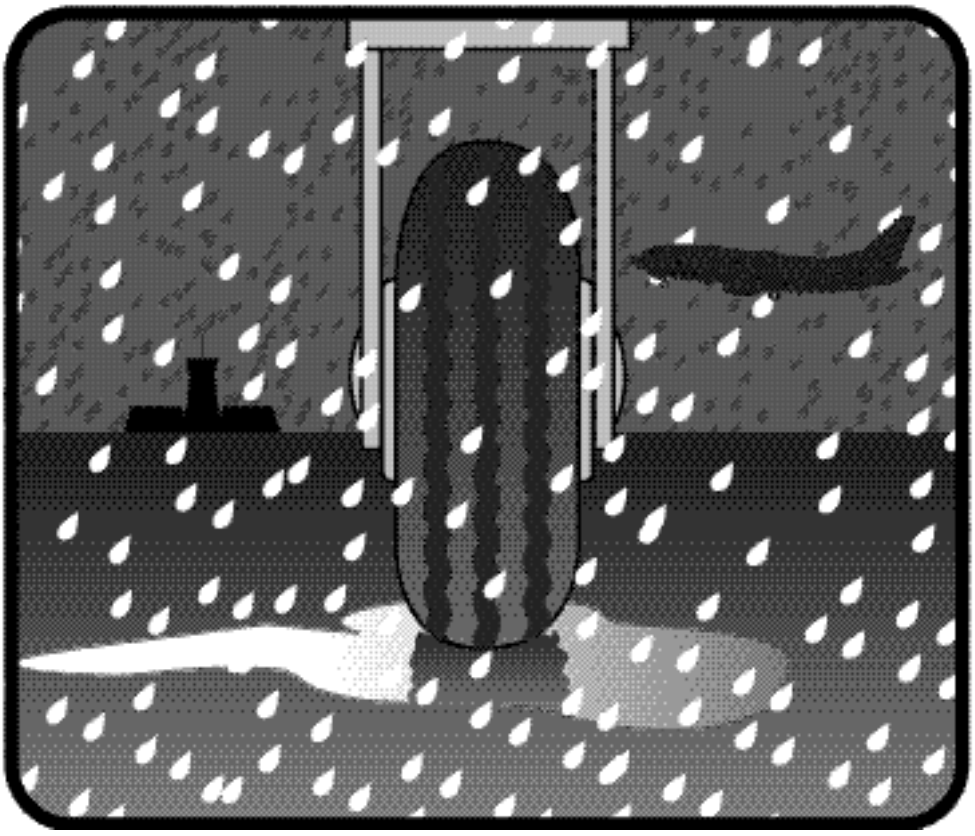
Educator's Guide	
Teachers & Students	Grades 4-8

A Series of Five Satellite (Television & Internet) Broadcasts

NASA Con²ect

1998-1999 SERIES

PLANE WEATHER



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1998-1999 NASA CONNECT Program Overview

INTRODUCTION TO THE NASA CONNECT SERIES

NASA CONNECT is an award-winning instructional series produced by the NASA Langley Research Center's Office of Education (Hampton, VA). The series links the national mathematics and science standards to aeronautics and demonstrates the application of the standards through electronic visits by satellite and the Internet to the NASA workplace. Students engage in real or near real-time interactions with researchers and are exposed to innovative research, along with the tools and methods being used to conduct the research. The target audience is students in grades 4-8.

Each program in the NASA CONNECT series consists of a 30-minute instructional television broadcast accompanied by a web-based component designed to complement and extend the video and to facilitate the connection between the classroom and home. Inquiry into authentic questions is a central strategy used to "hook" the students into actively participating in the program and using the web components. Connections between mathematics and science concepts taught in the classroom and the workplace are emphasized.

Learning in a meaningful context is important for all students. Many television and web activities within the NASA CONNECT series are linked to form in-depth investigations that can be used in flexible ways. The investigations can be complete replacement units for parts of the present school curriculum or blended with other sources to give students explanations of ideas or practice with skills that are introduced or used in basal texts. Full integration of the series teaching protocol allows for active student participation in activities, group work, data gathering, student discourse, and journal writing. The activities and investigations in NASA CONNECT will prove useful in helping upper elementary and middle school students learn mathematics and science.

The 1998-99 NASA CONNECT program season uses aeronautics and space transportation technology (ASTT) as its organizing theme. This theme will form the context to create interesting programs by featuring research questions that arise out of NASA's research. The theme addresses NASA's goals for ASTT that are grouped into three areas or "Three Pillars": *Global Civil Aviation*, *Revolutionary Technology Leaps*, and *Access to Space*. These goals reflect national priorities for the NASAAeronautics and Space Transportation Technology Enterprise and require taking risks and performing the long-term research and development programs needed to keep the United States the global leader in aeronautics and space.

ABOUT THIS LESSON - PLANE WEATHER

The first program in the 1998-1999 series is *Plane Weather*. The *Plane Weather* program involves students in the examination of aviation safety. NASA and Federal Aviation Administration (FAA) researchers introduce students to the math and science behind aviation weather and demonstrate how meteorological conditions such as icing influence flight. Students explore the relationship between science and technology and the tools, techniques, and technologies used by engineers to study aircraft icing to reduce its effect on aircraft operations. Research highlights include an examination of the Runway Friction Improvement Program and the NASA/FAA Tailplane Icing Program.

The *Plane Weather* program is a collaboration among four NASA installations: NASA Ames Research Center, NASA Headquarters, NASA Langley Research Center, and NASA Lewis Research Center. Additional program partners include the FAAAir Traffic System Command Center and The Weather Channel. These partners share a commitment to education and children and proudly present this NASA CONNECT program to the educational community.

PROGRAM FORMAT

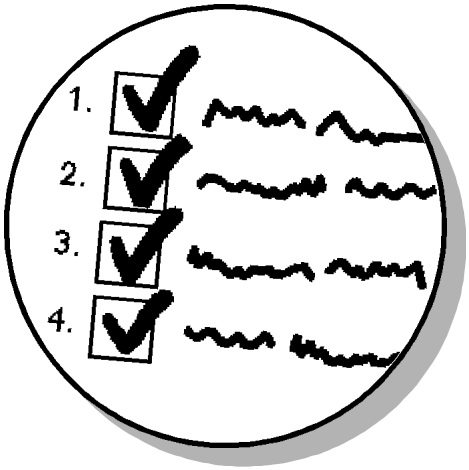
Each NASA CONNECT program includes the following:

- **NASAGuest** : The program features a program partner and a NASA engineer, scientist, or technician to illustrate the application of classroom lessons to the workplace.
- **Activities**: Students are involved in hands-on activities drawn from NASA educational products, including the NCTM math activity books, *Mission Mathematics*, developed in collaboration with NASA.
- **Students**: Middle school students who have conducted the program's experiment are highlighted. The results of their experiment are shared with viewers.
- **Challenge Point**: Most programs include a pause period in the flow of the program, in which students are presented with data and, working in pairs or small groups, are encouraged to perform analysis and data interpretation
- **Call-In/E-mail**: Students can call-in following the Challenge Point portion of the program with questions related to the program topic, the activity, or the guest. Students can also E-mail questions one week prior to and two weeks following the broadcast.
- **Print Materials**: Print materials are provided for registered educators. The materials include background on the program content and the featured activity, as well as a master copy of the Student Challenge Point Worksheets for copying and distribution to students. Also outlined is a teaching protocol for the implementation of the featured program activity and web investigation.
- **Web Site**: Throughout the program, the NASA CONNECT URL will be displayed to indicate points where further details and/or interactive activities relating to the video presentation can be examined.

WEB FORMAT

The broadcast and the Internet are closely weaved in the NASA CONNECT series. The series uses the Internet in several ways to enhance the teaching and learning process.

- **Inquiry Instruction**: Students are provided with questions and investigations that require them to discover the generalities of the subject on the basis of practice examples. Feedback and elaboration are provided. Students gain new insight by making observations, developing inferences, making comparisons, and interpreting data.
- **Home Connection**: Parents are encouraged to be partners in the explorations and activities. The web site provides a means for the parent and child to share in the learning process. Educators are encouraged to make parents aware of the web site and to encourage this one-on-one discovery between the parent and child about the mathematics and science concepts.
- **Internet Simulcast**: Each NASA CONNECT program is simulcast in real time through the Internet. Educators are encouraged to check NASA's Learning Technologies Channel (http://quest.arc.nasa.gov/ltc/) schedule for further details on technology requirements and the broadcast schedule.
- **Registration and Feedback**: Educators can register on-line for NASA CONNECT, can obtain broadcast schedule information for their state, can download print materials, and can submit feedback about a program through the NASA CONNECT web site.



NCTM MATHEMATICS STANDARDS

- Decimals
- Number Sense and Numeration
- Patterns and Relationships
- Statistics
- Measurement

NCTM ASSESSMENT STANDARDS

- Talking and writing about predictions and interpretation of data help students confirm their learning
- Observing which students can use a data-collections form and which students need to learn how
- Engaging students in tasks that involve problem solving, reasoning, and communication

NSTA SCIENCE STANDARDS

- Science as Inquiry
- Physical Science - Motion and Forces

NASA CONNECT MATRIX

The following matrix should help teachers organize the concepts from the *Plane Weather* program that complement each other (for better instruction). Teachers are encouraged to further extend and add to this matrix after viewing the program and reviewing their curriculum.

Math Standards	Science as Inquiry	Science & Technology
Geometry	Calculate the runway angle	
Measurement	Measure base and vertical heights to nearest mm	
Number Operations	Calculate the mean Calculate the friction coefficient	
Data Analysis	Collect data Keeping records Graph results	Findings from the Tailplane Icing and Runway Friction Improvement research programs presented by NASA researchers
Problem Solving	Make conjectures on which objects and surface textures reduce/increase friction Engage in mathematical discourse to extend understanding of problem solving and capacity to reason and communicate mathematically	NASA researchers describe the technologies and methods used to study aviation weather-related problems Technologies provide tools for investigations, inquiry, and analysis

NASA CONNECT Teaching Protocol

There is a definite difference between "doing science" and doing science activities. Educators have few opportunities to work with scientists to develop an understanding of the nature of scientific inquiry. The model proposed to educators through the NASA CONNECT series is a shift from "activitymania" – a collection of hands-on activities that are often disconnected from each other – to inquiry, in order to introduce students to the process of searching for patterns and relationships and to better develop their higher order cognitive skills. Below is a six-step teaching protocol designed to prepare students for more active mental engagement to the video program so that they can make stronger connections between the NASA CONNECT program activities and appropriate mathematics and scientific concepts.

The six-step protocol includes reflective discussion, video engagement, dialogue notes, NASA CONNECT activity, journal writing, and NASA CONNECT web. This protocol is consistent with constructivist theory. A learning environment that promotes rich discourse among students is central to the approach. Student teams that engage in discovery, decision making, and problem solving give students opportunities to develop and present their findings to the entire class. The proposed format is flexible and is an effective way to teach students complex math and science concepts, to model science inquiry, and to emphasize connections.

STEP 1: REFLECTIVE DISCUSSION

Before viewing the NASA CONNECT program, list on the chalkboard the following questions to help students form their own theories and to give them a place to start constructing their knowledge about the show's topic. Have students share their thoughts or write their responses. Keep these questions on the board during the video. In addition to helping students prepare for the video, these questions can also serve as a pretest for assessment purposes.

1. What do you see as the relationship between science and technology?
2. What role do mathematics and mathematical tools have in scientific inquiry?
3. What value might collaborations and partnerships play in conducting research?
4. How would you define weather? aviation weather?
5. What might be examples of aviation weather research that would be important to study? Why would this research be important?

STEP 2: VIDEO ENGAGEMENT

1. *Challenge Point.* Students work in cooperative groups to respond to the video's Challenge Point segment. During the Challenge Point, students are shown data from an experiment and are given a short time to respond to questions related to the data. The Student Challenge Point Worksheets appear on pages 7 and 8, and teachers should copy and distribute the worksheet to students in advance of the Challenge Point. One calculator per student group is also recommended.

2. *Call-In/E-Mail Opportunity.* Students can call and ask the NASA CONNECT guests questions during the call-in segment. E-mail questions can also be submitted for response one week before and two weeks following the live broadcast.

   Call in with questions (accepted during the live broadcast only) at
   Toll Free 1-888-835-0026 Local 864-3991

   E-mail questions (one week before and two weeks following the live broadcast date) to connect@edu.larc.nasa.gov

STEP 3: DIALOGUE NOTES

1. Immediately after the video, students should spend five to ten minutes reviewing the questions in the Step 1: Reflective Discussion section (page 5). Ask students to give examples from the video presentation that support their responses to each question.

2. Return to the Student Challenge Point Worksheets (pages 8 and 9), and if necessary, provide students with additional time to complete the mathematical calculations and the data analysis. Challenge students to come up with different kinds of investigations that can be created from the experiment.

STEP 4: NASA CONNECT ACTIVITY

Students learn from direct teaching, engaging in classroom discussion, conducting research, and taking notes. During the NASA CONNECT video an experiment is described. This activity (appearing on page 10) is provided for the educator to use as a science lab. When using the NASA CONNECT Activity, introduce students to the vocabulary, guide students toward connections, and explore misconceptions. Class data from the experiment can then be compared with the data collected by the students and highlighted in the video. Have students relate their science lab experiment to the NASA research discussed in the video.

STEP 5: JOURNAL WRITING

Journal writing supports students' reflective thinking processes. Students should reflect on what they learned from the video and from their own experimentation. Educators can also ask students questions that relate to the real-life applications of the concepts in the video and the science lab. Educators might use journal questions to assess student understanding of the concepts at all levels of comprehension.

STEP 6: NASA CONNECT WEB

The web site uses the inquisitory instruction strategy to place students in a contextual environment to encourage them to discover the math and science concepts and skills behind the program's topic and to present multiple perspectives to specific questions raised in the video. Educators can use this site to provide a connection between the classroom and home by sending home a notice about the NASA CONNECT program and its Internet URL and by encouraging parents to explore this site and its activities with their children.

At the *Plane Weather* web site, students are placed in an airplane cockpit and encouraged to explore three areas that provide the following experiences:

- *Introduction* to aviation and weather: gives basic fundamentals of weather and its impact on aviation.
- *Plane Answers*: Twelve panel experts, including a middle school student, a broadcast meteorologist from the Weather Channel, an FAA weather coordinator, a test pilot, NASA researchers, and key leaders from the Federal Government respond to questions presented in the *Plane Weather* video. Encourage students to discover the answers by listening to the multiple perspectives for each question from the panel experts.
- *Plane Fun*: Research has shown that middle school students might have trouble identifying variables, controlling more than one variable in an experiment, and understanding the influence of different variables in an experiment. The *Plane Fun* site provides a contextual activity of scientific inquiry for the student to complete. The student is challenged to manipulate and explore objects and surface textures in conducting an on-line friction experiment that simulates the Runway Friction Improvement research being conducted at NASA Langley.

Built within the program's design is a pause period (approximately 4 minutes long) in which students will be asked to look at generated data and, working in pairs or small groups, respond to questions, one at a time, as listed on the Challenge Point Worksheet. This pause period is important for providing students the opportunity to work with information presented up to this point and to actively examine and work with data in support of the NCTM standards.

During the Challenge Point Period

Teacher as Facilitator

1. Depending on the students, teachers may wish to have a large group or divide students into pairs or smaller groups. This grouping should be done before the program.
2. The teacher is to act as a facilitator during this program time, supporting and guiding the students in discussion and in responding to the worksheet questions.

Student as Researcher

By working in pairs or small groups, students will better understand how NASA research teams must work together to analyze and interpret findings and to communicate results in written, oral, and graph forms.

1. Observe the data shown on the television, as recorded by the featured school and as displayed on the Challenge Point Worksheet.
2. Questions pertaining to the data will be presented one at a time on the videotape. You will have a limited amount of time to discuss the question with your partner(s), calculate an answer, if necessary, and write down a response.
3. Feedback to the questions will be presented to you at the end of the Challenge Point period. Review your answers. Following the program, continue your discussions if necessary.

Student Challenge Point Worksheet

ROUGH (SANDPAPER) SURFACE

Object	Height (opposite)	Length (adjacent)	Friction Coefficient
Rubber Eraser	18.0	24.6	
	18.4	25.1	
	17.6	25.7	
Average			
Large Paper Clip	19.7	22.8	
	19.4	23.2	
	18.6	24.6	
Average			
Film Canister Top	12.2	28.7	
	12.6	27.9	
	12.6	27.9	
Average			
Die	16.8	25.7	
	17.5	24.5	
	18.6	24.7	
Average			

Student Challenge Point Worksheet

SMOOTH SURFACE

Object	Height (opposite)	Length (adjacent)	Friction Coefficient
Rubber Eraser	17.7	25.1	
	17.4	25.0	
	17.0	25.3	
Average			
Large Paper Clip	11.8	28.5	
	11.8	28.0	
	11.3	27.3	
Average			
Film Canister Top	13.0	27.2	
	13.5	27.8	
	11.8	28.3	
Average			
Die	11.0	28.5	
	10.5	28.9	
	10.8	28.3	
Average			

NASA CONNECT Activity

Students working in teams will test how objects slide on two different surfaces – rough and smooth. They will observe and collect data of various objects sliding on the two surfaces and then determine the average value of the trial runs to calculate the friction coefficient for each object on each surface type.

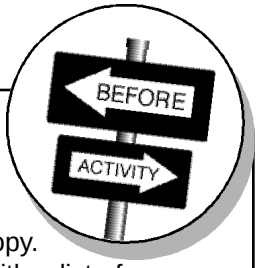
EXPERIMENT MATERIAL (For each group of four students)

- 3 rulers (1 ruler with a smooth, flat surface; 2 metric rulers)
- sheet of sandpaper large enough to cover the surface of the flat ruler
- 4 different objects to slide on the ruler (e.g., large metal paper clip, rubber eraser, top of a plastic film canister, small die)
- student activity worksheets on pages 12 and 13

VOCABULARY TERMS

friction - the rubbing of one object or surface against another, the force of two bodies in contact that resists the motion or tendency to motion of one relative to the other

friction coefficient - the numerical measure of friction that represents a constant for an object under specified conditions, derived by mathematical formula, $\text{Mew} = \frac{\text{opposite}}{\text{adjacent}}$



BEFORE THE ACTIVITY

1. Precut the sandpaper into strips large enough to cover a ruler.
2. Make copies of data sheet or draw on chalkboard for students to copy.
3. Divide the class into small groups and have each group come up with a list of questions they have about the program topic. Have groups share their group questions.
   a. List each group's questions on the board and then select, as a class, 2 to 3 questions from the list.
   b. E-mail these questions to NASA CONNECT at connect@edu.larc.nasa.gov

STEP: 1 CLASS REFLECTION/JOURNAL

List the following questions on the board for student discussion.

1. Could you walk without friction?
2. What is friction? Is it a good or a bad thing?
3. List examples of how friction affects you daily.
   Next to each example, write whether the effect could be seen as slowing an object down, making an object move faster, or changing an object's direction (i.e., riding bicycle, roller skating, walking across rough surface or slippery surface).
4. What effect does the type of surface have on an object's ability to slide?
5. Does the friction coefficient change when an object is placed at an angle on a smooth versus a rough surface?
6. What effect does a runway surface have on an airplane's ability to land?

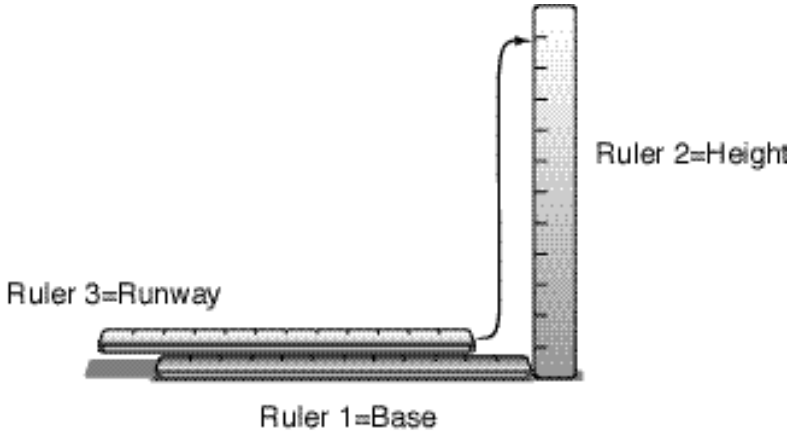
7. Consider the situation of an airplane taking off or landing on a wet runway. What impact might the surface condition have on runway friction and the operations of the aircraft?

STEP 2: THE ACTIVITY

Follow these directions to complete the activity.

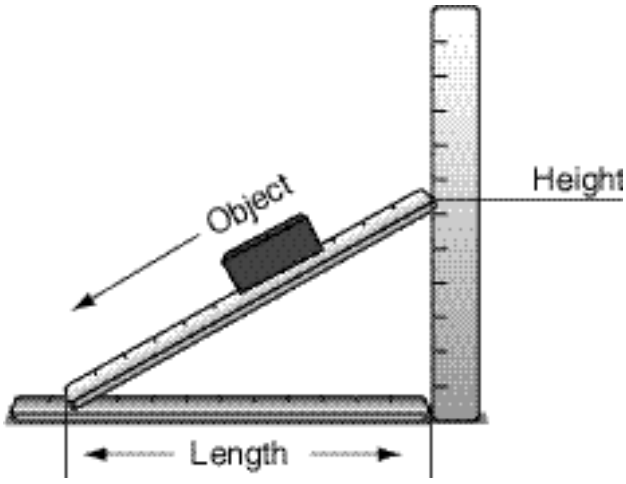
Place metric ruler 1 on a flat surface. Place the second metric ruler at a 90˚ angle to the first ruler. Make sure the metric numbers on the rulers are in **ascending order** from lowest to highest. Cover the **flat surface** of ruler 3 with sandpaper and place it on top of ruler 1 on the flat surface. See diagram.

Assign tasks to each student team member: One completes the experiment by raising ruler 3;



another holds the vertical ruler 2; a third reads the height measurement and measures the base; a fourth student records the data.

Select one of the objects and place it in the middle of the sandpaper covered ruler. Slowly raise ruler 3 until the object begins to **continuously slide** down the ruler. Read the metric measurement where ruler 3 intersects the base ruler (1) and record the number on the data sheet in the appropriate space, **Length (adjacent)**. Repeat the process where the other end of ruler 3 intersects the vertical ruler (2) and record the metric measurement in the space for the **Height (opposite)**. Check each time to ensure that ruler 2 is straight and standing at a 90˚ angle, perpendicular to the surface. Repeat the trial three times for each object to allow students to see a pattern emerge.



At the end of the three trials, the students should compute the average for each object. Using the average for the **Height (opposite)** and **Length (adjacent)**, the students then compute the Friction Coefficient, Mew (μ). Mew equals the height divided by the base of the triangle,

$$\text{Mew} = \frac{\text{opposite}}{\text{adjacent}}$$

Following the directions as outlined above, repeat the experiment by removing the sandpaper and using the **smooth, flat** surface of the ruler.

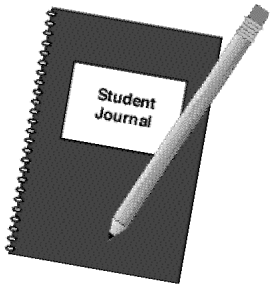
STEP 3: DIALOGUE NOTES

Review your observations and data and then respond to these questions in your log.

1. Which surface contributed to a higher friction coefficient for the test objects? Why do you think this surface would have such an effect?
2. What effect did raising the test ruler have on the base of the triangle? On the height of the triangle?
3. What effect does increasing the height of the triangle have on the opposite angle?
4. What are the different ways in which the results of the experiment might be compared?
5. Predict what would happen to the friction coefficient if the smooth surface was icy or wet?
6. What effect does a rough concrete surface (graveled road) versus a smooth surface (asphalt or smooth concrete) have on bicycling, rollerblading, or skateboarding?
7. Make a list of an object's characteristics and/or surface characteristics that could be tested. Consider what other experiments might be done. Propose a follow-up experiment, including an experiment question, hypothesis, and explanation for your prediction.

STEP 4: JOURNAL WRITING

Reflect on what you have observed and analyzed from this experiment. Consider the research efforts underway by NASA, FAA, and Transport Canada on improving technology concepts for a better understanding of runway friction. Apply your new knowledge by writing a response to these questions.



1. Would a bumpier surface be more or less safe? Explain your choice.
2. Which "landing surface" texture would be the safest for airplane landings? Explain your choice.
3. Which surface would wear out rubber tires faster? Explain your choice.

STEP 5: ELECTRONIC EXTENSION

1. Divide students into small groups. Have each group check out the *Plane Weather* web site (http://edu.larc.nasa.gov/connect/planeweather.html) and complete the on-line runway investigation.
2. Inform parents about the *Plane Weather* web site and invite them to explore this site with their child.

Student Activity Worksheet

ROUGH (SANDPAPER) SURFACE

Object	Height (opposite)	Length (adjacent)	Friction Coefficient
Rubber Eraser			
Average			
Large Paper Clip			
Average			
Film Canister Top			
Average			
Die			
Average			

Student Activity Worksheet

SMOOTH SURFACE

Object	Height (opposite)	Length (adjacent)	Friction Coefficient
Rubber Eraser			
Average			
Large Paper Clip			
Average			
Film Canister Top			
Average			
Die			
Average			

NASA Aeronautics Educator Resources

The NASAAeronautics and Space Transportation Technology (ASTT) Enterprise and the aviation and educational communities are partners in developing materials to stimulate student interest and enthusiasm for science and mathematics. By augmenting learning environments with ideas and experiences that use mathematics and science, we share with students and educators the excitement of how these tools can be used and how their power can change the world.

NASA ON-LINE AERONAUTIC PROJECTS

Follow these on-line links to more aeronautics-related projects which provide curriculum, interactive materials, activities, and more, as developed by NASA's ASTT Centers and Learning Technologies Project (LTP) Offices and by external partners through LTP-funded electronic projects!

Aeronautics and Aviation Science Careers and Opportunities (Massachusetts Corporation for Educational Telecommunications)	http://mcet.edu/nasa
Aeronautics Learning Laboratory for Science, Technology and Research (ALL STAR) (Florida International University)	http://allstar.fiu.edu/aero
IITA K-12 Wind Tunnel Program (NASA Lewis)	http://www.lerc.nasa.gov/WWW/K-12/WindTunnel/windlist.html
Internet-based Curriculum on Math and Aeronautics for Children with Physical Disabilities (InfoUse, Inc.)	http://planemath.com/
K-8 Aeronautics Internet Textbook (Cislunar Aerospace, Inc.)	http://wings.ucdavis.edu/
Kids Corner (NASA Langley)	http://kidscorner.larc.nasa.gov/
Lego Data Acquisition and Prototyping System (Tufts University)	http://ldaps.ivv.nasa.gov/
NASAAeronautics Enterprise Web Ground School (NASA Headquarters)	http://www.hq.nasa.gov/office/aero/edu/
Off to a Flying Start (NASA Langley)	http://k12unix.larc.nasa.gov/flyingstart/
Sharing NASA (NASAAmes)	http://quest.arc.nasa.gov
SRA On-line (NASA Dryden)	http://quest.arc.nasa.gov/sra

NASA ON-LINE RESOURCES FOR EDUCATORS

NASA Spacelink (http://spacelink.nasa.gov) is one of NASA's electronic resources specifically developed for use by the education community. This comprehensive electronic library offers teacher guides, wall sheets, and listings of videos, computer software, and other materials that have been developed to meet national education standards. Educators can search specific curriculum materials by grade level and subject matter. Current and historical information related to NASA's aeronautic and space research can be found from Spacelink. Links to other NASA resources, news releases, current state reports on agency projects and events, and television broadcast schedules for NASA Television are also given. Finally, a contact list of NASA Educator Resource Centers is located in most states, and the Central Operation of Resources for Educators (CORE) is available through NASA Spacelink.

Quest (http://quest.arc.nasa.gov) is the home of NASA's K-12 Internet Initiative. The electronic resource specializes in providing programs, materials, and opportunities for teachers and students to use NASA resources as learning tools to explore the Internet. One of its unique projects is "Sharing NASA," a series about on-line, interactive units where students can communicate with NASA scientists and researchers to experience the excitement of real science in real time. During the 1998-99 academic year, Aero Design Team On-line will be a featured project of "Sharing NASA."

Learning Technologies Channel (LTC) (http://quest.arc.nasa.gov/ltc/) is a NASA location on the Internet that allows you to participate in on-line courses and to remotely attend some NASA workshops and seminars. A primary focus of the LTC is to broaden the uses of the Internet to include in-service teacher training and to bring new Internet experiences into the classroom.

NASA CENTRAL OPERATION OF RESOURCES FOR EDUCATORS (CORE)

NASA's CORE is a worldwide distribution center for NASA's multimedia educational materials. Educational materials include videotape programs, slide sets, and computer software. For a minimal fee, NASA CORE will provide educators with materials through its mail order service. A free NASA CORE catalog is available.

NASA CORE
15181 State Route 58
Oberlin, OH 44074-9799
phone: (440) 775-1400
fax: (440) 775-1460
E-mail: nasaco@leeca.esu.k12.oh.us
URL: http://core.spacelink.nasa.gov

NASA EDUCATIONAL PROGRAMS AND MATERIALS

The widest possible distribution and use of NASA educational programs and materials is encouraged. Specifically, there is no claim of copyright by the U.S. Government concerning the NASA CONNECT series. Therefore, permission is not required to either tape each broadcast or to copy the associated print materials for classroom use and/or retention in your school's library.

NASA EDUCATOR RESOURCE CENTERS (ERC)

The NASA ERC Network is composed of Educator Resource Centers located at or near all NASA installations and ERCs located at planetariums, universities, museums, and other nonprofit organizations nationwide. These centers supply instructional activities, videotapes, slides, and computer software generated by NASA programs, technologies, and discoveries. These materials are designed for educators of all disciplines and are aligned to the national education standards.

For more information on NASA education programs and aeronautics-related materials, educators may contact the following NASA Centers' ERCs. The NASA installations that have the lead research programs in the NASAAeronautics and Space Transportation Technology (ASTT) Enterprise are underlined:

AK, AZ, CA, HI, ID, MT, NV, OR, UT, WA, WY
NASA Ames Educator Resource Center
Mail Stop 253-2
Moffett Field, CA 94035-1000
(650) 604-3574

CA cities near the center
NASA Dryden Educator Resource Center
45108 North Third Street East
Lancaster, CA 93535
(805) 948-7347

CT, DE, DC, ME, MD, MA, NH, NJ, NY, PA, RI, VT
NASA Goddard Educator Resource Center
Mail Code 130.3
Greenbelt, MD 20771-0001
(301) 286-8570

CO, KS, NE, NM, ND, OK, SD, TX
NASA Johnson Educator Resource Center
Mail Code AP2
2101 NASA Road One
Houston, TX 77058-3696
(281) 483-8696

NASA JPL Educator Resource Center
Mail Stop 601-107
4800 Oak Grove Drive
Pasadena, CA 91109-8099
(818) 354-8080 - fax

FL, GA, PR, VI
NASA Kennedy Educator Resource Center
Mail Code ERL
Kennedy Space Center, FL 32899-0001
(407) 867-4090

KY, NC, SC, VA, WV
NASA Langley Educator Resource Center
Virginia Air and Space Center
600 Settlers Landing Road
Hampton, VA 23669-4033
(757) 727-0900, ext. 757

IL, IN, MI, MN, OH, WI
NASA Lewis Educator Resource Center
Mail Stop 8-1
21000 Brookpark Road
Cleveland, OH 44135-3191

AL, AR, IA, LA, MO, TN
NASA Marshall Educator Resource Center
U.S. Space and Rocket Center
P.O. Box 070015
Huntsville, AL 35807-7015
(205) 544-5812

MS
NASA Stennis Educator Resource Center
Building 1200
Stennis Space Center, MS 39539-6000
(601) 688-3338

VA's and MD's Eastern Shore
NASA Wallops Educator Resource Center
Education Complex - Visitor Center
Building J-1
Wallops Island, VA 23337-5099
(757) 824-2297/2298

FEDERAL AVIATION ADMINISTRATION
AVIATION EDUCATION PROGAM MANAGERS

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Aeronautical Center:	Robert L. Hoppers, AMC-3 FAA Mike Monroney Aeronautic Center P.O. Box 25082 Oklahoma City, Oklahoma 73125 Tele: (405) 954-5332 Fax: (405) 954-4779	
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FEDERAL AVIATION ADMINISTRATION
AVIATION EDUCATION PROGAM MANAGERS (CONT.)

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Western Pacific Region:	Hank Verbais, AWP-4 Program Manager, External Services FAA Western Pacific Region P.O. Box 92007 WPC Los Angeles, California 90009 Tele: (310) 725-3802 Fax: (301) 536-8404 Hank.Verbais.@faa.gov	Arizona California Hawaii Nevada

Return by Fax to: (757) 864-8835

1998-99 NASA CONNECT Series Program Evaluation

About the Program

1. The program was used (please circle)
   a. to introduce a curriculum topic, objective, or skill. Yes No
   b. to reinforce a curriculum topic, objective, or skill. Yes No
   c. as a special interest topic. Yes No
   d. other (please specify)_____

2. The program was viewed Live Videotaped

3. Indicate the grade level(s) that viewed the program: 4 5 6 7 8
   Other (please specify) _____

The Program's Value

Please circle the number that best reflects your opinion.

	Strongly Disagree				Strongly Agree	No Opinion
4. The program met its stated objectives.	1	2	3	4	5	0
5. The program's content was developmentally appropriate for grade level.	1	2	3	4	5	0
6. The program's content was aligned with the National Math and Science Standards.	1	2	3	4	5	0
7. The program's content was easily integrated into the curriculum.	1	2	3	4	5	0
8. The program's content enhanced the teaching of math and science.	1	2	3	4	5	0
9. The program raised student awareness of careers that require math and science knowledge.	1	2	3	4	5	0
10. The program presented:						
a. the application of math and science on the job.	1	2	3	4	5	0
b. workplace science as a collaborative process.	1	2	3	4	5	0
c. science as a process requiring creativity, critical thinking, and problem-solving skills.	1	2	3	4	5	0
11. The technical aspects of the video production were professional.	1	2	3	4	5	0
12. The program's web-based component enhanced student interest in learning math and science.	1	2	3	4	5	0

The Lesson Guide/Classroom Activity's Value

13. The Lesson Guide was complete.	1	2	3	4	5	0
14. The Lesson Guide was easily understood.	1	2	3	4	5	0
15. The classroom activity (experiment) was developmentally appropriate for grade level.	1	2	3	4	5	0

Overall Evaluation

16. The program was a valuable instructional opportunity.	1	2	3	4	5	0

Please record any comments or suggestions on an additional sheet of paper and fax with this form.

Evaluator's Characteristics (please circle)

17. Gender: Female Male

18. Ethnicity: African American Asian Caucasian Hispanic Native American Pacific Islander Other (please specify) _____

19. Highest Degree attained
    Baccalaureate/BA or BS
    Master's/Master's Equivalency
    Doctorate

20. Total years' teaching experience _____