National Aeronautics and
Space Administration
Langley Research Center

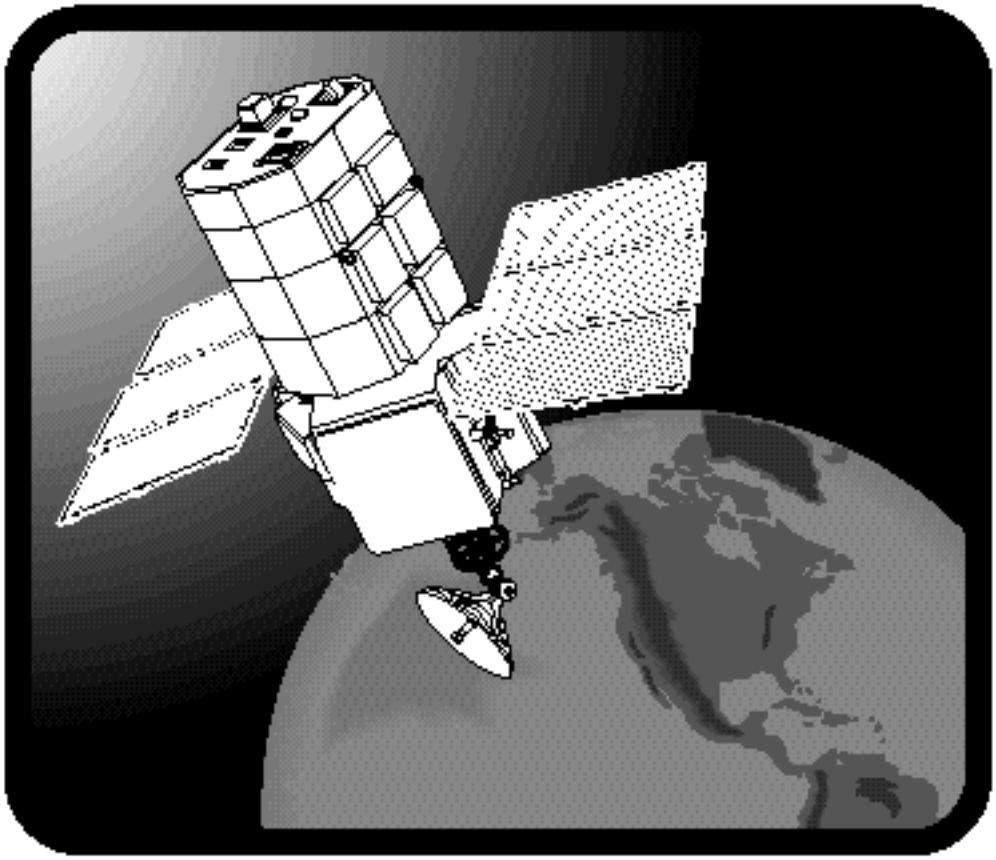
Educator's Guide	
Teachers & Students	Grades 4-8

A Series of Live Satellite (Television & Internet) Broadcasts

NASA Con²ect

Program 3 in the 1998-1999 SERIES

WHEREVER YOU GO, THERE YOU ARE



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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 technology (AST) 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 AST 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 NASAAero-Space 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 - WHEREVER YOU GO, THERE YOU ARE

The third program in the series, *Wherever You Go, There You Are,* introduces the students to the science of navigation and involves them in observing, measuring, and interpreting data to determine exact locations. NASA researchers will show students how math, science, and geography combine to make navigating safer and easier. Students will see how various professionals involved in the science of navigation require the use of math, science, and geography to get from one destination to another. They will learn how Global Positioning Satellites (GPS) now make navigation much easier and safer for civil, commercial, and military pilots. Students will plot a course by using a compass, a compass rose, and a transit. They will be actively involved in organizing, comparing, and interpreting data. *Wherever You Go, There You Are* is a collaboration between the U.S. Department of Transportation, the Federal Aviation Administration (FAA), and the NASA Langley Research Center. Additional program partners include the Mariners' Museum and Busch Gardens-Williamsburg.

PROGRAM FORMAT

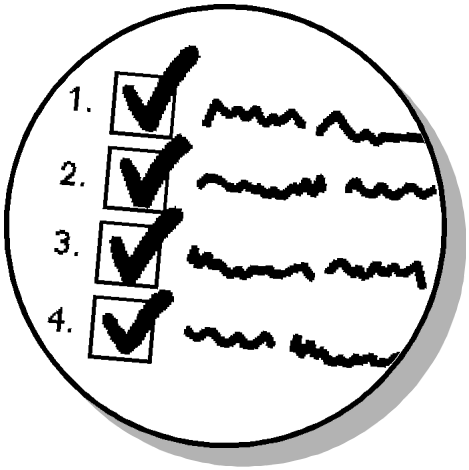
Each NASA CONNECT program includes the following:

- **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 National Council of Teachers of Mathematics (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 live 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 (http://edu.larc.nasa.gov/connect) 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 interwoven 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/special/connect) 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 evaluate the program through the NASA CONNECT web site (http://edu.larc.nasa.gov/connect).



NCTM* MATHEMATICS STANDARDS

- Problem Solving
- Number Sense and Numeration
- Patterns and Relationships
- Statistics
- Measurement
- Geometry

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
- Science and Technology

NATIONAL GEOGRAPHY STANDARDS

- How to use maps and other geographic representations, tools, and technologies to acquire, process, and report information from a spatial perspective

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* National Council of Teachers of Mathematics
† National Science Teachers Association

NASA CONNECT MATRIX

The following matrix should help teachers organize the concepts from the *Wherever You Go, There You Are* 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	Investigate angles by plotting a course Calculate the shortest distance between two points using Pythagorean theorem	NASA researchers demonstrate the application of GPS in navigaton
Measurement	Measure distance to the nearest meter on an outdoor course Measure a plot to the nearest centimeter Read and mark degree bearings on a graph plot and outdoor course using a compass and compass rose	
Number Operations	Calculate distance traveled Calculate time traveled	
Data Analysis	Collect data Graph results	
Problem Solving	Determine advantages/disadvantages of airplane flying a direct route Engage in mathematical discourse to extend understanding of problem solving and capacity to reason and communicate mathematically	NASA researchers describe the technologies and application of GPS 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 jobs do you think require the ability to navigate?
2. How are math and science involved in the skill of navigating?
3. What do you see as the relationship between science and technology?
4. What role do mathematics and mathematical tools have in scientific inquiry?
5. What value might collaborations and partnerships play in conducting research?

STEP 2: VIDEO ENGAGEMENT

1. *Road Rally Notes.* Students observe the NASA CONNECT hosts competing in a team Road Rally, in which only GPS receivers are allowed. No maps are allowed and no one knows where the checkpoints are in the competition. Using only the receiver, each team must find each point. At each checkpoint, the competitors are logged in and receive instructions that will lead to the next checkpoint, in addition to information on how GPS applies to navigation in the given location. The checkpoints include these:
   - Busch Gardens - Williamsburg, Virginia
   - Mariners' Museum - Newport News, Virginia
   - Federal Aviation Administration (FAA) - Washington, D.C.
   - NASA Langley Research Center - Hampton, Virginia

   Teachers should copy the Road Rally Notes form on page 8 and distribute prior to video showing. Students are encouraged to record checkpoint information during the video as it is presented to the NASA CONNECT hosts.
2. *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 Worksheet is on page 9. Teachers should copy and distribute the worksheet to students prior to the Challenge Point. One calculator per student group is also recommended.
3. *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

Note: Only E-mail questions will be accepted during the call-in segment for the *Wherever You Go, There You Are* program.

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. Review the Road Rally Notes with students. Ask students to share what they recorded and learned at each "checkpoint." Discuss with them which math and science concepts they believe to be involved with each navigation source that was mentioned. For example, how might early sailors have computed distance, speed, and direction using the "dead reckoning" tools?
3. Return to the Student Challenge Point Worksheet (page 9) and, if necessary, provide students with additional time to complete the mathematical calculations and the data analysis. Challenge students to think of 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 is provided for the educator to use as a math/science lab. When using the NASA CONNECT Activity (page 10), 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 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 their lab experiment. 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. An on-line experiment or series of activities is incorporated into the NASA CONNECT web site for each program to augment the video theme and to provide additional opportunities for students to perform multiple trials and share their data with others. Also, from the web site, students might submit E-mail questions to the on-air program guests up to two weeks following a live broadcast.

Educators might use this site to provide a connection between the classroom and home, such as sending home a notice about the NASA CONNECT program and its Internet URL and by encouraging parents to explore this site and complete the activities with their children.

The web site for *Wherever You Go, There You Are* contains an on-line road rally that will take students across five continents and to five checkpoints. At each checkpoint, the students will look at an image of the location as seen from space. Students will try to "think like a geographer" when interpreting each image. Guided questions will be provided for those needing additional assistance in viewing an Earth location from the perspective of space. After "analyzing" the image, students will try to select which of four biome categories the image fits. A student's "score" will be determined by the student's accuracy in identifying the biome for each rally checkpoint. This activity supports the national geography standards.

Built within the program's design is a pause period (approximately four 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 to 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 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 displayed on the Challenge Point Worksheet. The data were recorded by the featured school.
2. Questions pertaining to the data will be presented one at a time on the videotape. Students will have a limited amount of time to discuss the question with their partner(s), calculate an answer, if necessary, and write down a response.
3. Feedback to the questions will be presented at the end of the Challenge Point period. Review the answers. Following the program, continue the discussions, if necessary.

Road Rally Notes

Checkpoint 1 Location: _____

Location Highlights: _____

_____

_____

_____

Checkpoint 2 Location: _____

Location Highlights: _____

_____

_____

_____

Checkpoint 3 Location: _____

Location Highlights: _____

_____

_____

_____

Checkpoint 4 Location: _____

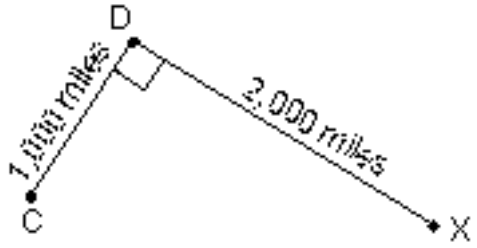
Location Highlights: _____

_____

_____

_____

Student Challenge Point Worksheet



Use the information in the diagram to determine the answers to the following questions. Use the formula to convert (change) miles to kilometers:

Number of miles (mi) x 1.6 = Number of kilometers (km)

1. What is the total distance (in miles) of an airplane flight that starts at point C, goes through point D, and ends at point X? What is the total distance in kilometers?

2. How long would it take an airplane traveling at 300 miles per hour (mph) to fly from point C to point D? From point D to point X? How long would the entire flight take?

3. How many miles are there in a direct flight from point C to point X? (Hint: Use the Pythagorean theorem to find your answer.)

4. Optional question: Why don't airplanes always fly the most direct route?

NASA CONNECT Activity

Students working INDIVIDUALLY will plot a course on graph paper using a compass rose and a ruler. They will then establish the course outdoors in TEAMS using a compass, compass rose, measuring tape, and transit. (See pages 14 and 15 for Compass Rose illustrations.)

EXPERIMENT MATERIAL

For Indoor Activity

- 1 sheet of graph paper per student (See example on page 16)
- 1 mini compass rose transparency (See page 15)
- 1 ruler
- 1 set of instructions

For Outdoor Activity

- 5 balls of string at least 15 meters in length
- 5 markers
- masking tape
- 5 compasses
- 5 large compass rose transparencies (See page 14)
- 15 pencils/sticks (to be used as field point markers)
- 15 pieces of paper or 3 x 5 cards marked A, B, C, D, E, F, G, H, I, J, X (5)
- 5 sets of instructions
- 10 meter sticks
- 5 paper towel rolls
- 5 pieces of thread (each approximately 1 foot long)
- 5 scissors

VOCABULARY TERMS

Bearing – the position or direction of an object on compass point readings

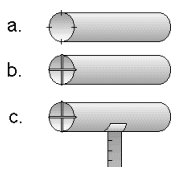
Navigation – the science of finding distance, direction, compass positions, and time of travel to establish a course or determine a certain position on a map

Triangulation – the mathematical and scientific determination of an unknown position using distances and/or bearings from known positions

Transit – a sighting device used in surveying to plot a course or establish levels (heights)

BEFORE THE ACTIVITY

1. Check materials list.
2. Establish team member duties for outdoor activity: Student(S)1calls out bearing and distance and takes care of field position marks; S2 handles the compass and compass rose; S3 handles transit sightings; S4 handles tape rule/measures distance; S5 confirms and checks transit sighting and distance measurement.
3. Make a copy of one large compass rose transparency for the Outdoor Activity.
4. Make transparencies of mini compass roses and provide one for each student to use for Indoor Activity.
5. Review how a compass is used and how to follow a bearing. Be sure students understand compass rose directions in letters and degrees.
   Suggestion: Place compasses on student desks and have students determine bearings to various points in the room (e.g., chalkboard, door, window, etc.).
6. Make transits as follows: a. Snip small notches at one end and make perpendicular diameter marks; b. Put string through the notches to form crosshair sightings; c. Tape the tube to the top of the meter stick to make a monopod.



STEP 1: CLASS REFLECTION/JOURNAL

List the following questions on the board for student discussion or to answer in journals:

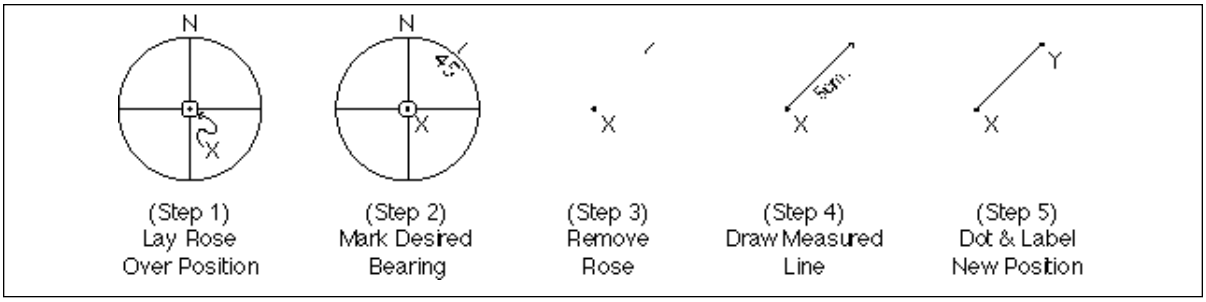
1. What items are necessary to plot a course on paper or a map? An outdoor course?
2. Who might find it necessary to plot a navigation course?
3. What weather conditions make the use of instrument navigation a necessity?
4. What electric device has been developed in recent years to make navigation a more precise and less complicated science?
5. What math concepts are used in navigation?

STEP 2: THE ACTIVITY

Indoor Activity, Navigation Plot on Graph Paper

Follow these directions to complete the activity:

1. Draw a horizontal line across the bottom of the graph paper.
2. Put points A,C,E,G, and I on the horizontal line 4 cm apart. (Start point A about 4 squares in from left side. The following points will not match a vertical line since you are measuring metric on nonmetric paper.)
3. Mark the scale as 1 cm = 1 meter on the bottom of the paper and label the top of the paper as N (Magnetic North).
4. The compass rose transparency is used much like a protractor; put the center hole of the crosshairs directly on the position dot with North (0˚) pointing straight up. Find the desired bearing and mark the paper at the outside edge of the rose. Remove the rose, use a ruler, and draw a line the correct measured distance from the original position point through the bearing mark. Put a new point at this measurement and label it. Move the compass rose to this new position and continue, using the same procedure.
   Example: Plot x 'y 45˚ bearing, distance 5 cm
5. Now proceed with the activity by plotting the following courses:



Outdoor Activity, Field Navigation Plot

	Position Points	Bearing	Distance
1st Course	A → B	0˚ (360˚)	10 cm
	B → X	080˚	5 cm
2nd Course	C → D	315˚	4 cm
	D → X	025˚	9 cm
3rd Course	E → F	0˚	14.8 cm
	F → X	220˚	4.9 cm
4th Course	G → H	030˚	5 cm
	H → X	304˚	11.7 cm
5th Course	I → J	350˚	9 cm
	J → X	283˚	9.8 cm

Special Note:

Plot each course to "x". It is true that each course ends at the same point "x", but doing <u>each</u> measurement is necessary to help you detect any navigation error and give you the required practice.

This activity replicates the indoor graph plot using actual distances.

1. Divide the class into 5 groups (A, C, E, G, I) of 4 to 5 students per group.
2. Take a ball of twine and mark each meter length with a piece of tape. (The twine will serve as your tape rule. Mark it up to 15 meters.)
3. Keep the meter stick and use it outside to measure any portion of a whole meter (if necessary).
4. Mark 3 x 5 cards with the 3 position letters for each group to use as field markers. (A = A,B,X; C = C,D,X; E = E,F,X; G = G,H,X; I = I,F,X)
5. Each group (A,C,E,G,I) is lined up on a starting line facing magnetic north with a compass and large compass rose transparency.
6. Teams mark the starting point with team's letter.
7. Holding the transit and compass at the starting point, the team confirms Magnetic North.
8. Use the compass rose as a guide [North (O˚) on the rose must always be pointing to Magnetic North on the field] and turn the transit to the first bearing given in the chart.
9. Direct the student with the tape rule to the appropriate direction using hand signal designating left or right.
10. The student with the tape rule takes the measurement from the team's starting point at the base of the transit. (Use student 1 to hold the tape at the starting point.)
11. When the correct distance is found, the point is marked with the second letter card.
12. Check to make sure the second point is on the correct bearing path.
13. Move the transit to point 2.
14. Complete Leg 2 using the same procedure. Your next new point is X.
15. When all groups have finished, check for navigation errors. Did everyone arrive at the same point X? (At least within a radius of one meter.)

Activity Chart to Follow

	Group A	Group C	Group E	Group G	Group I
Bearing Leg One	O˚	315˚	O˚	030˚	350˚
Distance Leg One	10 m (meters)	4 m	14.8 m	5 m	9 m
Bearing Leg Two	080˚	025˚	220˚	304˚	283˚
Distance Leg Two	5 m	9 m	4.9 m	11.7 m	9.8 m

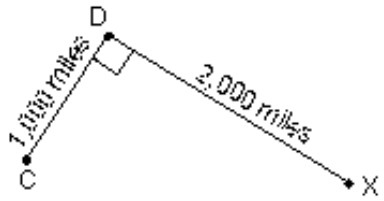
STEP 3: DIALOGUE NOTES

Students should review their observations and data and then respond to these questions in their logs.

1. Did you find the indoor graphing or the outdoor exercise to be more difficult?
2. Did each group arrive at the same common point "X"?
3. What would have been a quicker and easier way for each group to arrive at point "X"?
4. Why can't you use a straight line ("as the crow flies") method in navigation for many circumstances?

STEP 4: JOURNAL WRITING

Use the knowledge acquired in this NASA CONNECT program and the diagram below to answer the following questions on navigation.



1. How many miles are there from point “C” to point “X” through point “D”?
2. At 300 miles per hour (mph) how long (time) would it take to fly a route from C ’ D ’ X?
3. What is the distance to fly directly from C ’ X?
4. What is the difference in miles to fly from C ’ X and to fly from C ’ D ’ X? Which route is the shortest?
5. At 300 miles per hour (mph), how long (time) would it take to fly the C ’ X route instead of the C ’ D ’ X route?
6. What advantages might there be for an airline to fly the C ’ X route instead of the C ’ D ’ X route? What might be some disadvantages?

STEP 5: ELECTRONIC EXTENSION

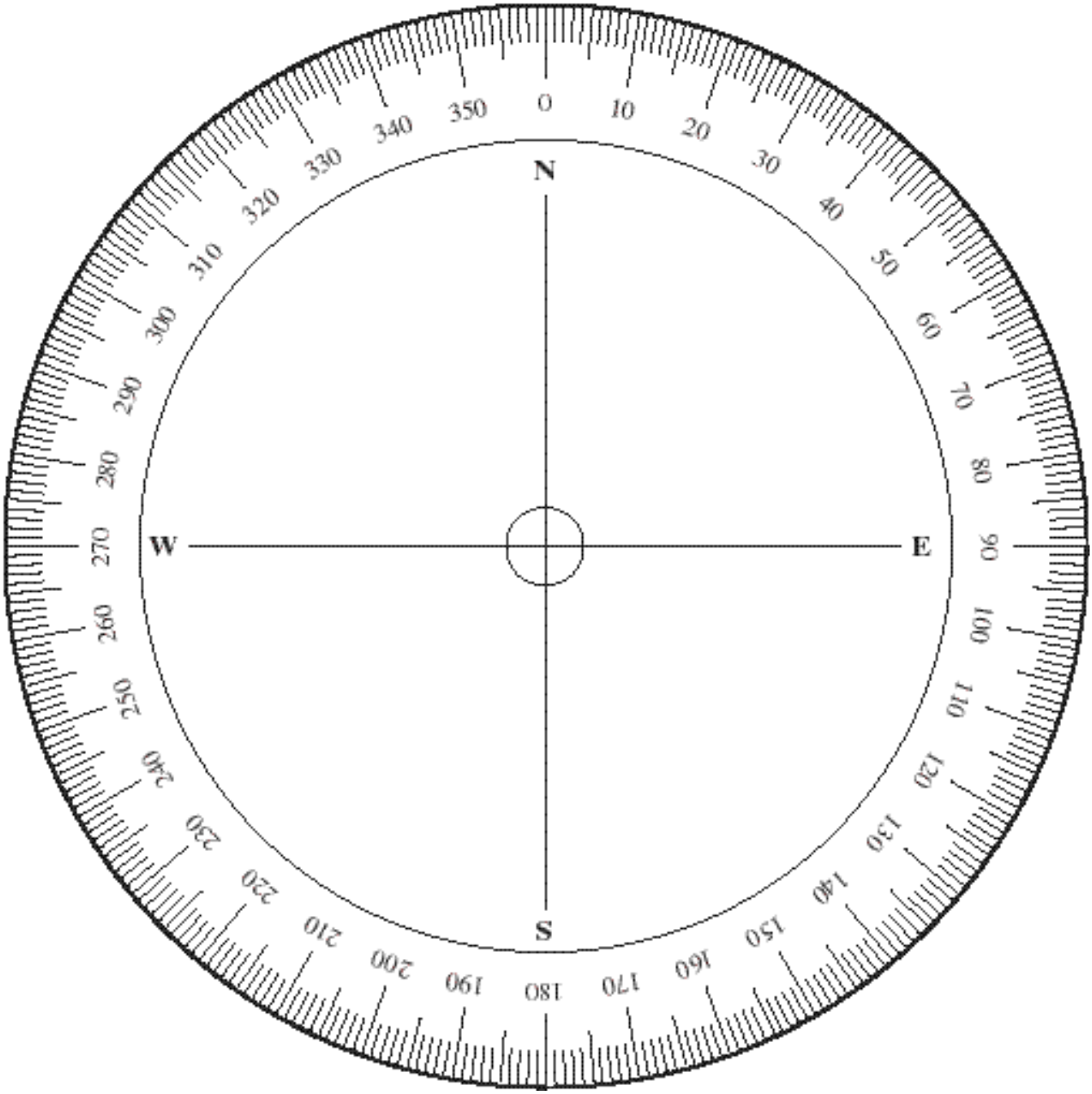
1. Divide students into small groups. Have each group check out the *Wherever You Go, There You Are* web site and complete the on-line investigation.
2. Inform parents about the web site and invite them to explore this site with their children.

STEP 6: ADDITIONAL CLASSROOM EXTENSION ACTIVITIES

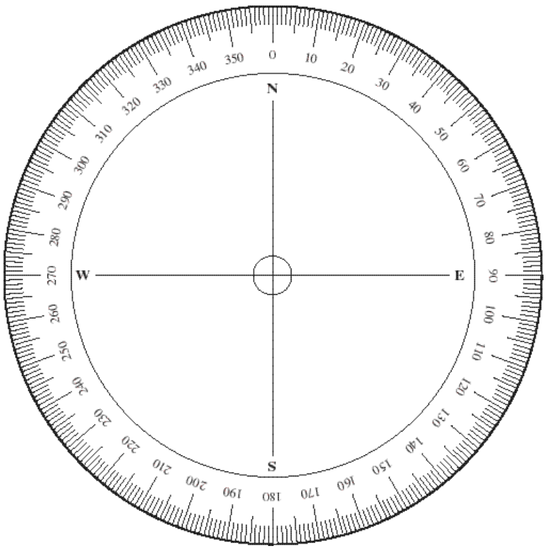
Follow these directions to complete the activity:

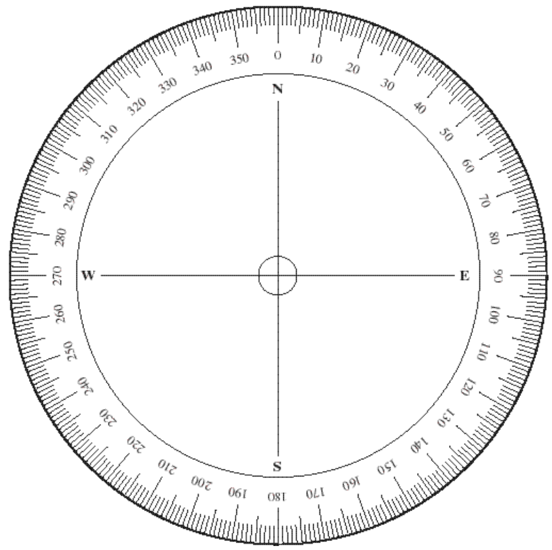
1. Magnetize a large needle or small nail (threepenny) by stroking it in one direction with a strong magnet or by sliding it across the magnet in one direction. (NOTE: You can alter the poles of the needle or nail by reversing the direction of the stroke. Try two nails this way. On one nail, the head becomes North. On the other, the point becomes North.)
2. Cut out a small piece (about 2 inches long) of styrofoam from a plate or bottom of a coffee cup.
3. Lay the needle or nail on top of the styrofoam piece.
4. Float the newly made magnetic compass in a cup, bowl, or beaker of water.
5. Notice that the nail/needle magnet will turn and orient itself with the Earth’s magnetic field with the head or point of the nail pointing north, depending upon which way it was stroked.
6. You can check this homemade compass against a commercial one. They should be identical in operation!

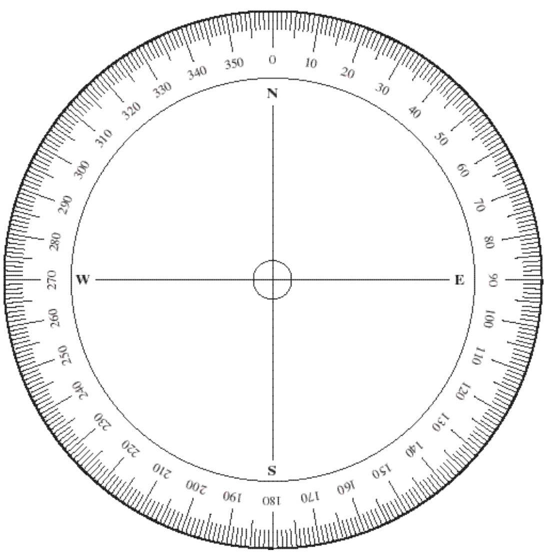
Compass Rose

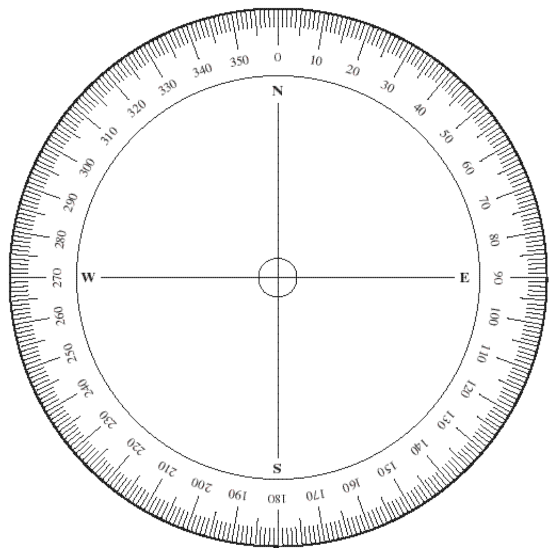


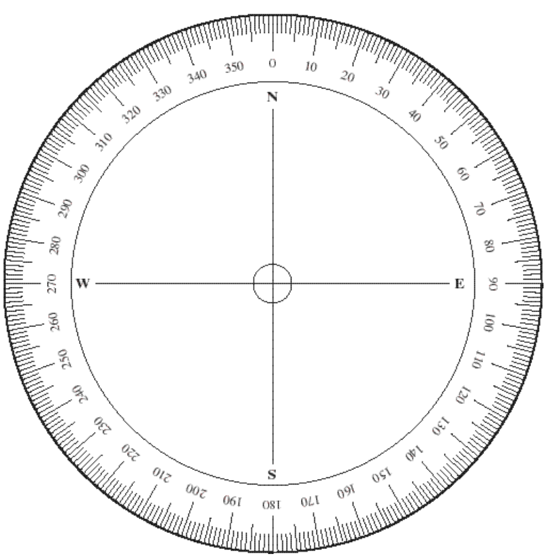
Mini Compass Roses

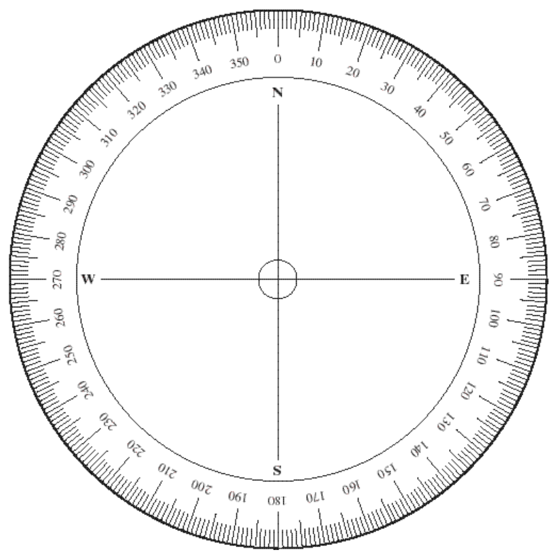




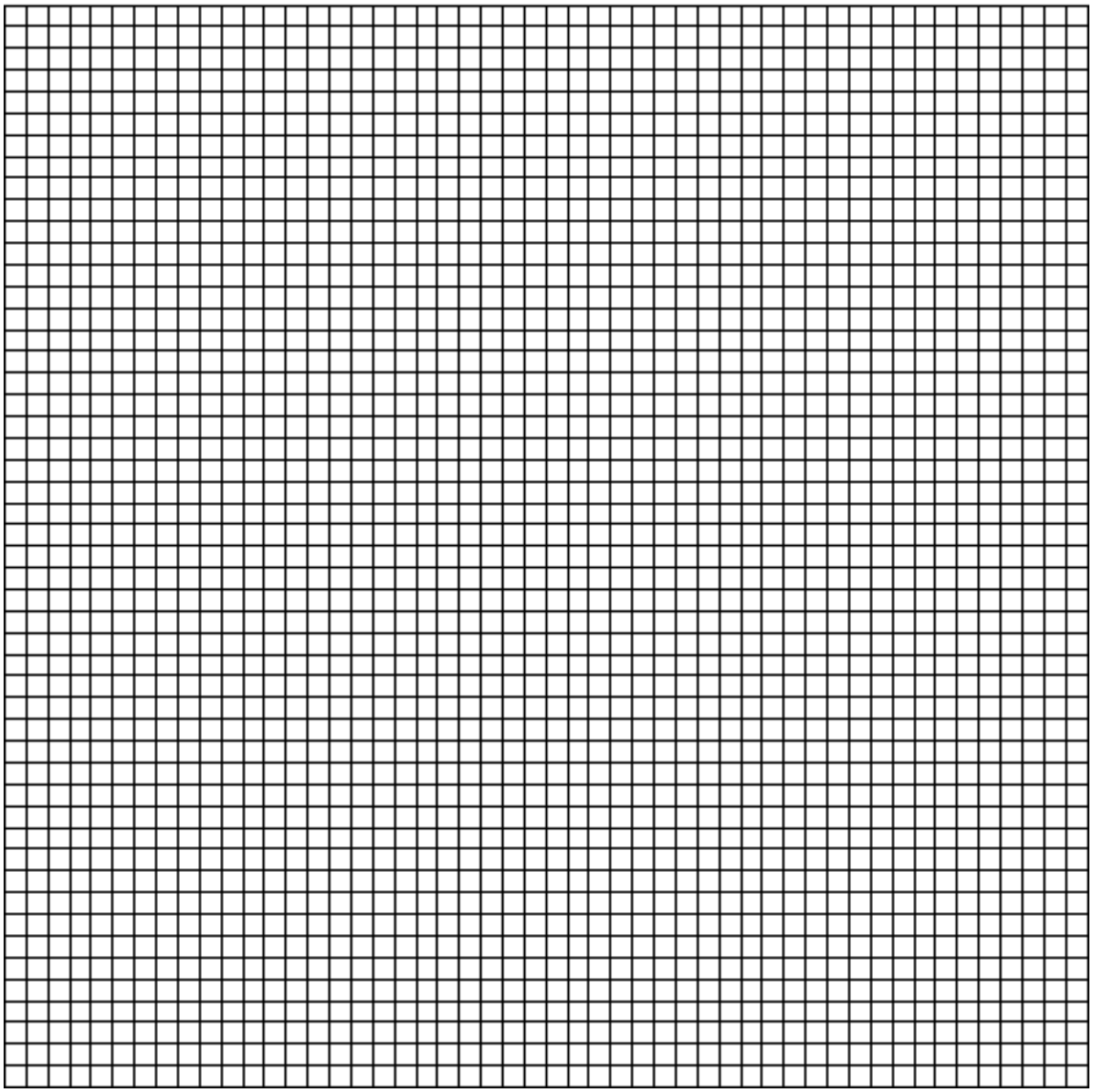




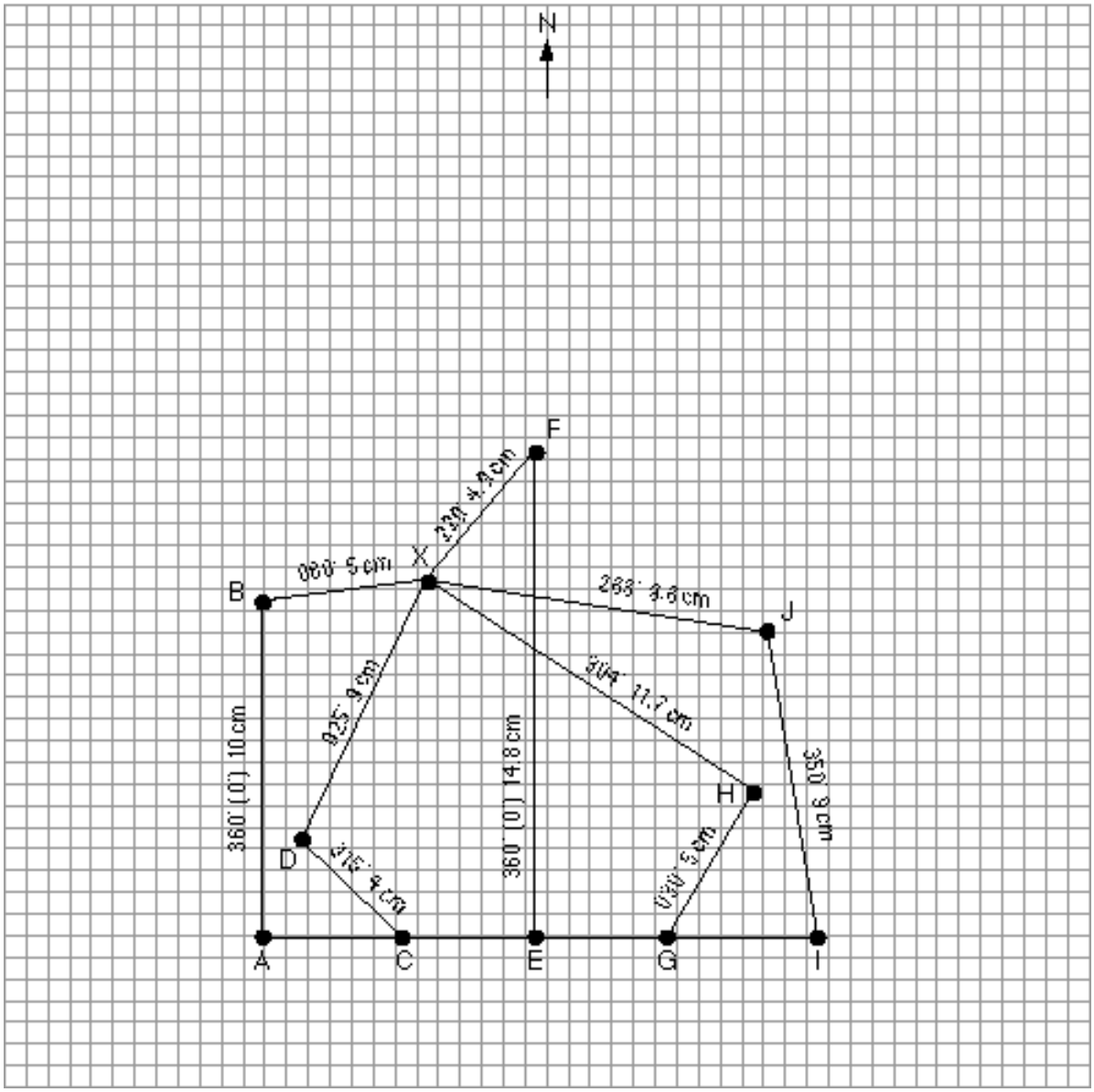




Graph Paper



Graph Paper Answer Copy for Teacher



Scale: 1 cm = 1 m

NASA Aeronautics Educator Resources

The NASAAero-Space Technology (AST) Enterprise and the Federal Aviation Administration (FAA) 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 AERONAUTICS PROJECTS

Follow these on-line links to more aeronautics-related projects that provide curriculum, interactive materials, activities, and more, as developed by NASA's AST 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
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/
Sharing NASA (NASAAmes)	http://quest.arc.nasa.gov
Wright Flyer Online (NASAAmes)	http://quest.arc.nasa.gov/aero/wright/

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.

ADDITIONAL ON-LINE RESOURCES

NASA CONNECT partners provide additional on-line resources that relate to the *Wherever You Go, There You Are* program.

Mariners' Museum	http://www.mariner.org/age/index.html
Federal Aviation Administration (FAA)	http://www.faa.gov/education
Department of Transportation (DOT)	http://www.dot.gov/edu
Garrett A. Morgan Technology and Transportation Futures Program	http://education.dot.gov

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 NASA Aero-Space Technology (AST) 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

National Program:

Phillip S. Woodruff, AHT-100
FAA Headquarters
Aviation Education Program
800 Independence Avenue SW
Tele: (202) 267-3788
Fax: (202) 267-7737

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

Technical Center:

Carleen Genna-Stoltzfus, ACT-70
FAA William J. Hughes Technical Center
Atlantic City International Airport
Atlantic City, New Jersey 08405
Tele: (609) 485-6515
Fax: (609) 485-4825

Tom Christian, ACT-10
FAA William J. Hughes Technical Center
Atlantic City International Airport
Atlantic City, New Jersey 08405
Tele: (609) 485-6182
Fax: (609) 485-6660

Alaskan Region:

Alice L. Gommol, AAL-233
FAAAlaskan Region
222 West 7th Avenue, #14
Anchorage, Alaska 99513-7587
Tele: (907) 271-3017
Fax: (907) 276-6207
alice.l.gommoll@faa.gov

Alaska

Central Region:

Maria Z. Navarro, ACE-41F
FAA Central Region
Room 1514
601 East 12th Street
Kansas City, Missouri 64106
Tele: (816) 426-6547
Fax: (816) 426-3124
Maria.Navarro@faa.gov

Iowa
Kansas
Missouri
Nebraska

Eastern Region:

Mary Ann Poindexter, AEA-60
FAA Eastern Region
John Fitzgerald Building
JFK International Airport
Jamaica, New York 11430
Tele: (718) 553-3363
Fax: (718) 995-5663
Maryann.Poindexter@faa.gov

Delaware
Maryland
New Jersey
New York
Pennsylvania
Virginia
West Virginia

FEDERAL AVIATION ADMINISTRATION
AVIATION EDUCATION PROGAM MANAGERS (CONT.)

Great Lakes Region	Estela Hamersma, AGL-4 FAA Great Lakes Region O'Hara Lake Office Center 2300 East Devon Avenue Des Plaines, Illinois 60018 Tele: (847) 294-7106 Fax: (847) 294-7184 Estela.Hamersma@faa.gov	Illinois Indiana Michigan Minnesota North Dakota Ohio South Dakota Wisconsin
New England:	Sheila Bauer, ANE-40 FAA New England Region 12 New England Executive Park Burlington, Massachusetts 01803 Tele: (781) 238-7378 Fax: (781) 238-7377 Sheila.Bauer@faa.gov	Connecticut Maine Massachusetts New Hampshire Rhode Island Vermont
North Mountain Region:	Megan Pursell, ANM-15 FAA Northwest Mountain Region 1601 Lind Avenue SW Renton, Washington 98055 Tele: (425) 227-1725 Fax: (425) 227-1010 Megan.Pursell@faa.gov	Colorado Idaho Montana Oregon Utah Washington Wyoming
Southern Region:	Opal R. Neely, ASO-17B FAA Southern Region 1701 Columbia Avenue College Park, GA 30337 Tele: (404) 305-5310 Fax: (404) 305-5311 Opal.Neely@faa.gov	Alabama Florida Georgia Kentucky Mississippi North Carolina South Carolina Tennessee
Southwest Region	Debra Myers, ASW-18B FAA Southwest Region 2601 Meecham Blvd Fort Worth, Texas 76137-4298 Tele: (817) 222-5833 Fax: (817) 222-5950 Debra.Myers@faa.gov	Arkansas Louisiana New Mexico Oklahoma Texas
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 _____