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Minnesota Educational Computing Consortium

EARTH SCIENCE

Lessons on earthquakes, minerals, and the solar system

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User-Written Software for ATARI Home Computers

MINNESOTA
EDUCATIONAL
COMPUTING
CONSORTIUM

EARTH SCIENCE

Developed for the ATARI(R) Computer

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EARTH SCIENCE

Version 1

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INTRODUCTION

The Earth Science module contains lessons for upper elementary or junior high science classes. The astronomy topics of distance in space and rotation of constellations are covered by three of the programs. EARTHQUAKES and MINERALS instruct students on calculating the distance to an earthquake epicenter and on identifying 29 common minerals.

EARTHQUAKES, SOLAR DISTANCE and URSA ROTATION take advantage of the computer's ability to calculate mathematical relationships—such as siesmic waves or interplanetary distances—quickly and accurately.

Handout pages in this booklet may be duplicated for use with students. These pages are numbered sequentially in the upper right corner, for example, handout #1 - Name of Handout.

INDEX TO PROGRAMS ON DISKETTE

EARTHQUAKES
simulates locating the epicenter of an earthquake.

MINERALS
identifies 29 minerals commonly studied in earth science.

SOLAR DISTANCE
develops a concept of distance in space by having students make "trips" to planets.

URSA LESSON
identifies and displays the star patterns in the five major constellations.

URSA ROTATION
simulates the patterns and rotation of the five major northern hemisphere constellations.

HOW TO LOCATE AN EARTHQUAKE

Specific Topic: Earthquakes

Type: Simulation

Reading Level: 7-8 (Dale-Chall)

Grade Level: 7-12

DESCRIPTION...

This simulation guides students through the calculations necessary to locate an earthquake. They learn how seismologists examine information obtained from measurements of seismographs, including the type of wave, arrival time of the wave, and intensity or strength of the earthquake. From this information, seismologists can locate an earthquake's origin just minutes after it happens.

OBJECTIVES...

1. to calculate the epicenter of an earthquake given lag-time information from three reporting stations.

2. to define the following: seismographs, Richter scale, epicenter, shock waves, primary and secondary waves, lag-time.

BACKGROUND INFORMATION...

Late in the 19th century it was discovered that earthquakes release energy in the form of waves called seismic waves. Different types of seismic waves are generated by an earthquake. Two types of waves are:

1) **Primary waves (P-waves)**
Primary waves, similar to sound waves in the way they are transmitted, result from a back and forth vibration of rock. They can travel fastest of all the waves and are the first to be received by an earthquake recording instrument called a **seismograph.**

2) **Secondary waves (S-waves)**
Secondary waves are similar to water waves and are caused by the up and down motion of rock. Secondary waves cannot travel through liquids or gases, are slower moving than primary waves, and arrive at the seismograph some time after the P-waves.

Since primary and secondary waves travel at different speeds, there is a difference in their arrival times. The time between the arrival of the P-waves and the arrival of the S-waves is called the **lag-time.** Lag-time depends primarily on the distance from the earthquake's starting place to the seismographic station. In general, the longer the lag-time the more distant the earthquake.

Usually the location of the earthquake is described by giving its epicenter The actual location of the earthquake is underground at a point called the **focus.** The **epicenter** is the place on the earth's surface directly above the focus.

USE IN AN INSTRUCTIONAL SETTING...

Preparation

Earthquakes have been felt or recorded all over the world. If you live in a region where earthquakes are rare, you could find newspaper stories of a recent earthquake. To introduce EARTHQUAKES you might also use descriptions of famous earthquakes of the past, such as the San Francisco earthquake of 1906 or the Tokyo earthquake of 1923.

Before individuals or small groups of students run EARTHQUAKES, have them study the student reading in Handout 1 - Locating the Epicenter. Use an overhead projector and compass to demonstrate the procedure from Handout 1.

Have students complete Handout 2 - Earthquake Terms and share the Answer Key with the class. Students should now be prepared to use the program. Give each student a copy of Handout 3 - Earthquakes Calculation and a compass before they run the program.

Using the Program

After going through the lesson and receiving the seismic graphs, each student should calculate each city's distance from the epicenter and draw distance circles on their maps. Reach a group consensus on the epicenter location, and position the epicenter box at that location.

Following the group demonstration, have each student or small group of students use several copies of Handout 3 - Earthquakes Calculation while running the program two or three times.

Follow-up

Show a film on earthquakes.

Discuss the following topics:

1. causes of earthquakes. Read an article on continental drift or sea floor spreading.

2. methods by which earthquakes tell us about the interior structure of the earth.

3. modern engineering in earthquake regions—how it has saved property and lives since the time of the San Francisco earthquake.

4. past distribution of earthquakes. Plot the locations on a map.

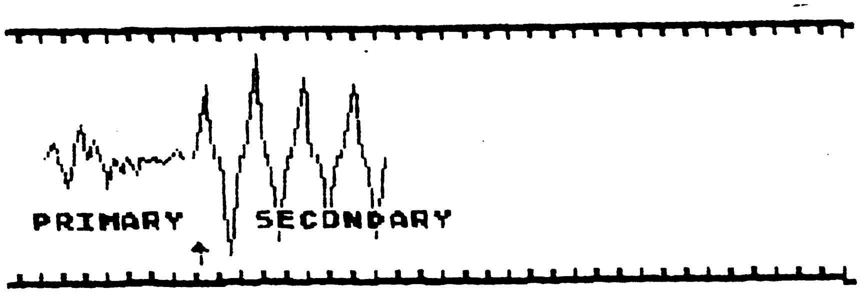
LOCATING THE EPICENTER

Student Reading

Late in the 19th century it was discovered that earthquakes release energy in the form of waves called seismic waves. Two types of waves are generated by earthquakes:

1) **Primary waves (P-waves)**
Primary waves, similar to sound waves in the way they are transmitted, result from a back and forth vibration of rock. They can travel fastest of all the waves and are the first to be received by an earthquake recording instrument called a **seismograph.**

2) **Secondary waves (S-waves)**
Secondary waves are similar to water waves and are caused by the up and down motion of rock. Secondary waves cannot travel through liquids or gases, move more slowly than primary waves, and arrive at the seismograph some time after the P-waves.



LOCATING THE EPICENTER

Student Reading (Page 2)

Since primary and secondary waves travel at different rates of speed, there is a difference in their arrival times. The time between the arrival of the P-waves and the arrival of the S-waves is called the **lag-time.** Lag-time depends primarily on the distance from the starting place of the earthquake's starting place to the seismographic station. In general, the longer the lag-time the more distant the earthquake.

Usually the location of the earthquake refers to its epicenter. The actual location of the earthquake is underground at a point called the **focus.** The **epicenter** is the place on the earth's surface directly above the focus.

If you know the speed of travel for each type of earthquake wave and the lag-time for the two waves, it is possible to calculate the distance from a seismographic station to the epicenter of an earthquake. For example, if the P-wave travels at an average rate of 6.1 kilometers per second, it would travel a distance of 100 kilometers in 16.4 seconds.

<u>P-wave</u>

rate 6.1 km/sec.
time to travel 100 km. $\frac{\text{100 km.}}{\text{6.1 km./sec.}}$ = 16.4 sec.

The S-waves travel at only about 4.1 kilometers per second and would travel 100 kilometers in 24.4 seconds.

<u>S-wave</u>

rate 4.1 km./sec.
time to travel 100 km. $\frac{\text{100 km}}{\text{4.1 km./sec.}}$ = 24.4 sec.

The lag-time for 100 kilometers would be 24.4-16.4 or 8.0 seconds. This means that for every additional 100 kilometers the earthquake epicenter is from the station, the lag time will be an additional 8.0 seconds.

<u>Lag-time for 100 km.</u>

24.4 sec. - 16.4 sec. = 8.0 sec.

If you know the lag-time you can calculate the distance to an epicenter by dividing the lag-time by 8.0 and then multiplying the result by 100.

<u>Distance to Epicenter</u>

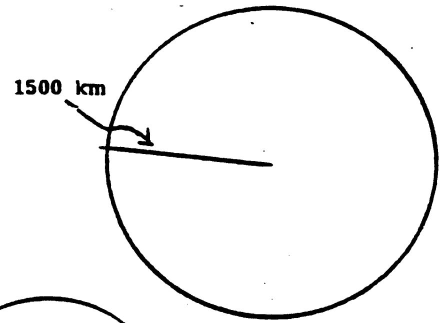
$\frac{\text{lag-time}}{\text{8.0 sec.}}$ x 100 = distance to epicenter

LOCATING THE EPICENTER

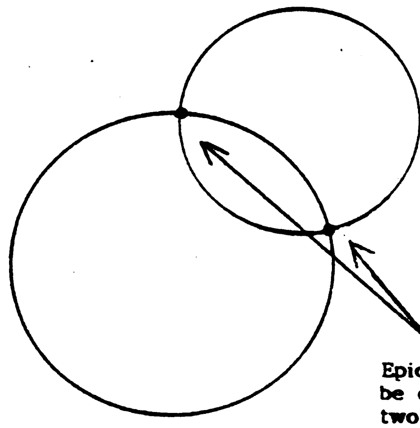
Student Reading (Page 3)

CALCULATING THE DISTANCE FROM A SEISMOGRAPHIC STATION TO THE EPICENTER OF AN EARTHQUAKE

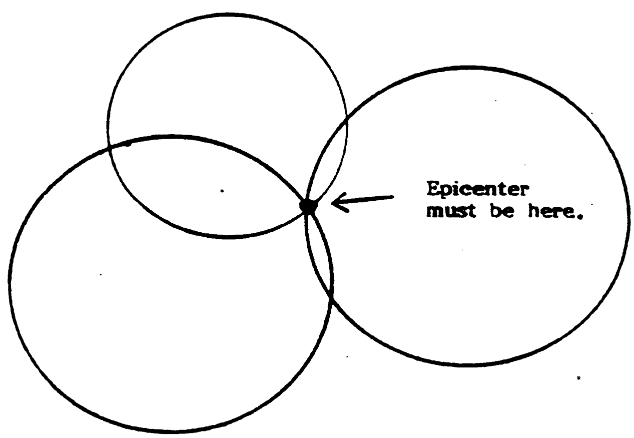
One Station—One Circle With a lag-time of 120 seconds, divide 120 by 8 and then multiply by 100. This calculation tells that the earthquake is 1500 kilometers away. But in which direction is it? All the possible places 1500 kilometers away from a point give a circle with a radius of 1500 kilometers. The location of the earthquake lies somewhere on the circle.



Two Stations—Problem Still Not Solved Information from two stations gives two intersecting circles. The location of the earthquake must be at one of the intersection points because it must lie on both circles. But which one?



It Takes Three Stations A third station with its information of lag-time is needed to solve the problem. The intersection of three circles, one for each seismographic station, pinpoints the location of the earthquake.



EARTHQUAKE TERMS

Name: ______________________ Class: ___________ Date: ______

Match the following terms on locating an epicenter:

1. Fastest traveling earthquake wave. _____
2. Difference in arrival time of waves. _____
3. Waves similar to water waves. _____
4. The location of an earthquake on earth's surface. _____
5. Where measurements of earthquake waves are made. _____
6. For every additional 100 kilometers the earthquake is away from the epicenter there is a lag-time increase of _____.
7. With information from only one station you know the earthquake's location is on a _____.
8. For every additional 8 seconds of lag-time the earthquake is another _____ kilometers away.
9. Lag-time if earthquake is 200 kilometers away. _____
10. Distance to epicenter if lag-time is 16 seconds. _____
11. Complete the tables below.

A. Secondary wave
B. Seismographic station
C. 100
D. 200
E. 8 seconds
F. Primary wave
G. Circle
H. Epicenter
I. 16 seconds
J. Lag-time

Lag-time is:	Distance to epicenter is:
8 seconds	________
16 seconds	________
128 seconds	________
424 seconds	________
296 seconds	________

Distance to epicenter is:	Lag-time is:
120 kilometers	________
800 kilometers	________
7700 kilometers	________
3250 kilometers	________
1500 kilometers	________

EARTHQUAKE TERMS (Page 2)

Circle the correct answer.

12. Earthquake waves that are similar to sound waves are the

    A. Secondary waves

    B. Primary waves

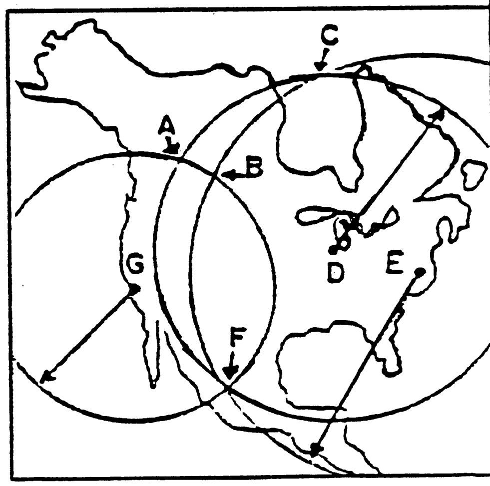
13. As the distance between a seismographic station and an earthquake increases, the difference in arrival time of P and S waves will

    A. Increase

    B. Decrease

    C. Remain the same

    D. Double



The diagram illustrates how to locate the epicenter of an earthquake using information from stations in California, Illinois, and Washington, D.C. Use the diagram to answer the next question.

14. The epicenter of the earthquake in the diagram above is located nearest which letter?

EARTHQUAKE TERMS

ANSWER KEY

Locating An Epicenter

1. F
2. J
3. A
4. H
5. B
6. E
7. G
8. C
9. I
10. D
11. Distance to Epicenter is: / Lag-time is:

Distance to Epicenter is:	Lag-time is:
100 kilometers	9.6 seconds
200 kilometers	64.0 seconds
1600 kilometers	616.0 seconds
5300 kilometers	260.0 seconds
3700 kilometers	120.0 seconds

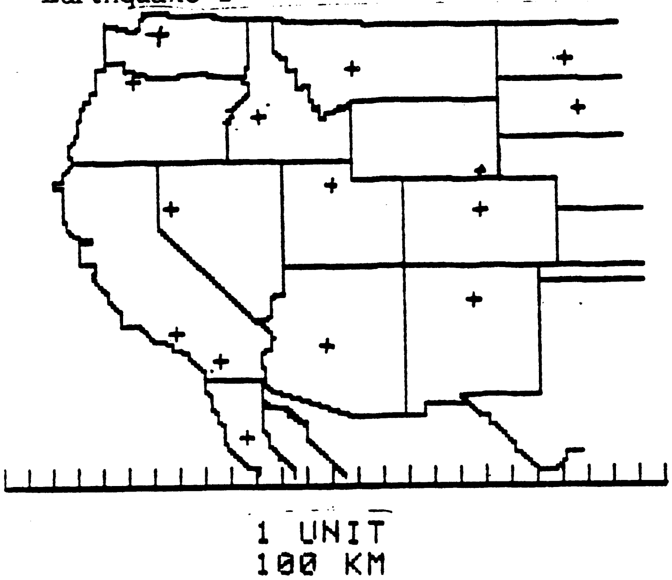
12. B
13. A
14. F

EARTHQUAKES CALCULATION

Name: ______________________ Class: ______________ Date: ______

As you run EARTHQUAKES, use a compass to draw the circles locating the epicenter. Draw an x on the epicenter.

Earthquake 1



Station: ______________________

Lag-time: ______________________

Distance: ______________________

Station: ______________________

Lag-time: ______________________

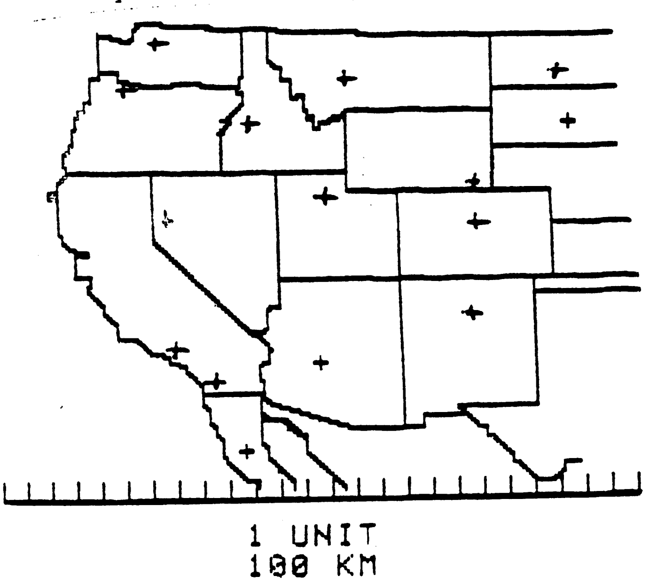
Distance: ______________________

Station: ______________________

Lag-time: ______________________

Distance: ______________________

Earthquake 2



Station: ______________________

Lag-time: ______________________

Distance: ______________________

Station: ______________________

Lag-time: ______________________

Distance: ______________________

Station: ______________________

Lag-time: ______________________

Distance: ______________________

SAMPLE RUNS

Explanation

Earthquakes are a fairly common occurence in the western part of the United States, even though we only read about the very severe ones in the papers. People who study and record these earthquakes are called seismologists.

Press RETURN to continue.

The program provides three options:

1. an explanation
2. a lesson
3. a "quake"

This frame is from option 1.

EXAMPLES OF SCREEN OUTPUT

P-WAVES

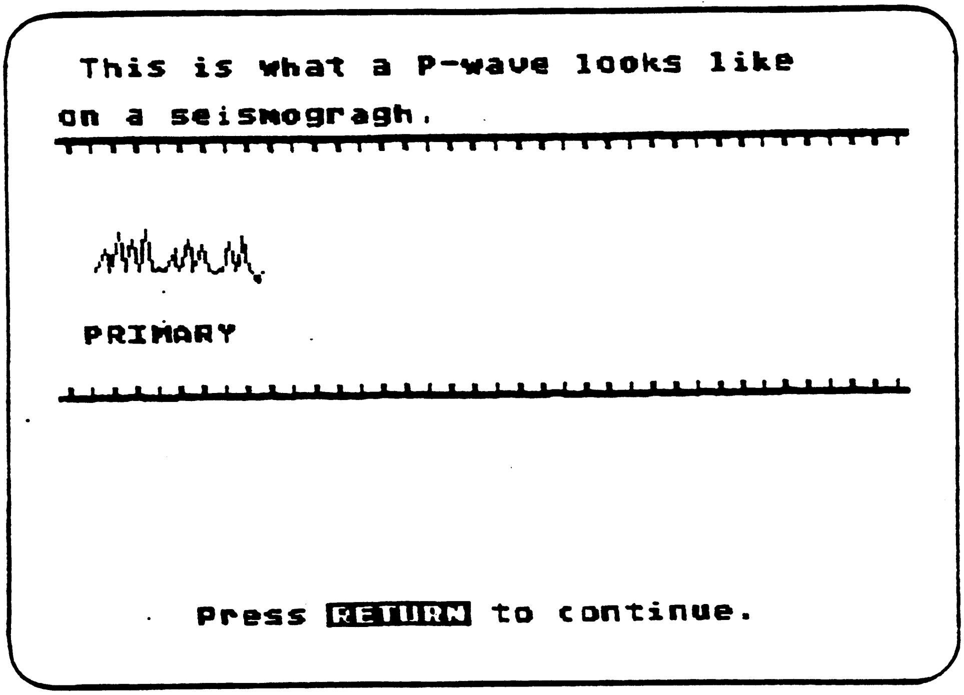
P-waves are Primary waves. These waves are like sound waves. They vibrate back and forth. P-waves travel faster than S-waves.

S-WAVES

The second type of wave is called the S or 'Secondary Wave'. These waves are like water waves, they vibrate up and down.

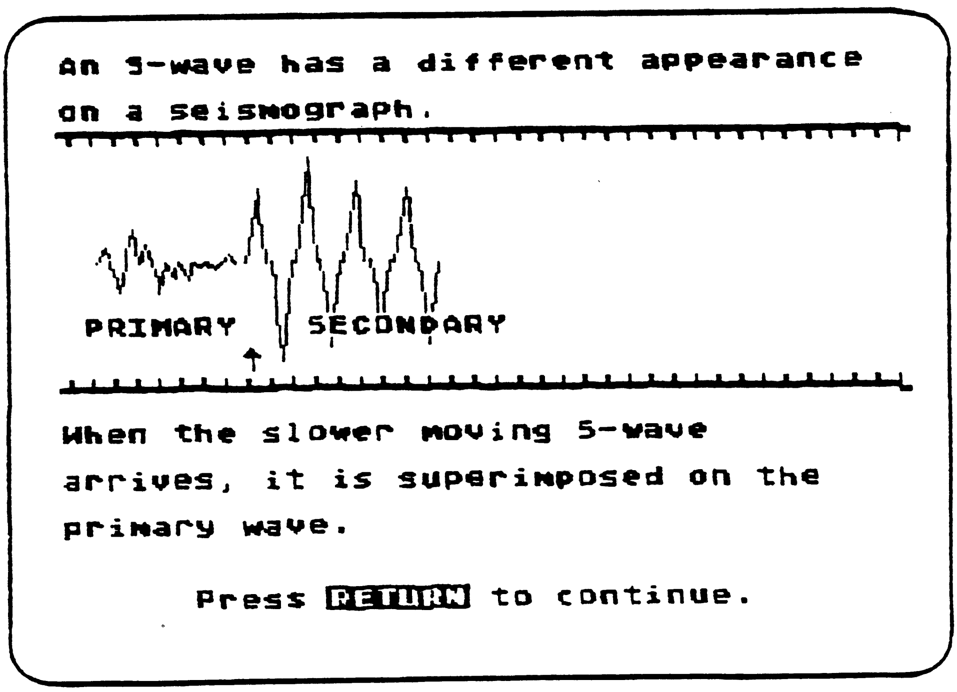
Press RETURN to continue.

If students choose option 2, they receive a lesson on finding the epicenter of an earthquake.



Computer graphics diagram a primary wave . . .

EXAMPLES OF SCREEN OUTPUT



and a secondary wave.

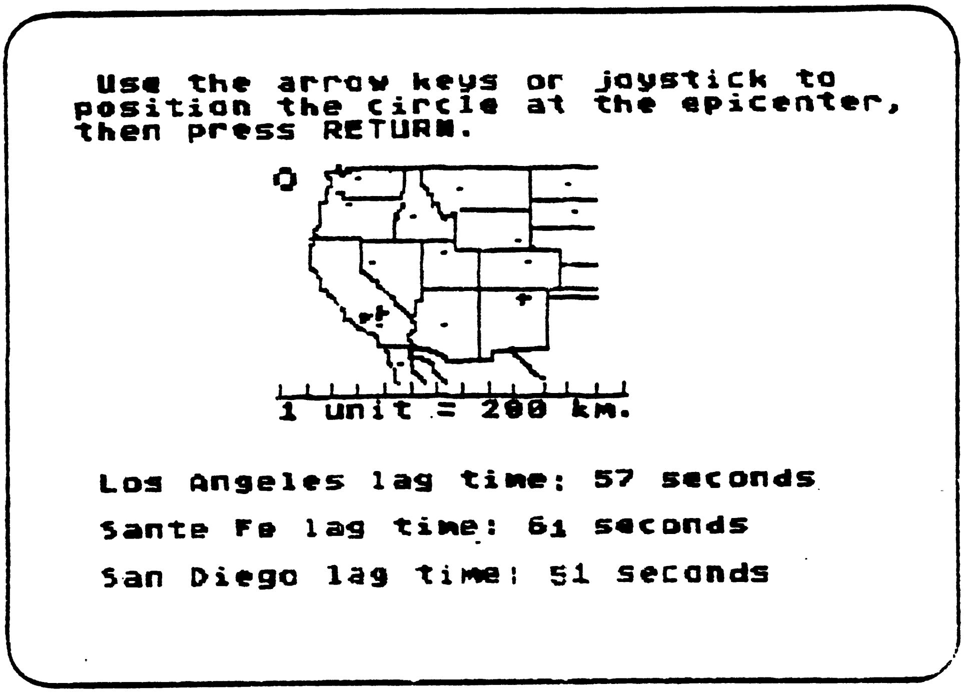
```
The amount of time from recording the
P-wave until the S-wave is encountered
is known as the lag time.

If you know the speed of travel of
each type of the two waves, it is
possible to calculate the distance
from a seismographic station to the
epicenter of an earthquake.


        Press RETURN to continue.
```

The lesson explains lag-time . . .

EXAMPLES OF SCREEN OUTPUT

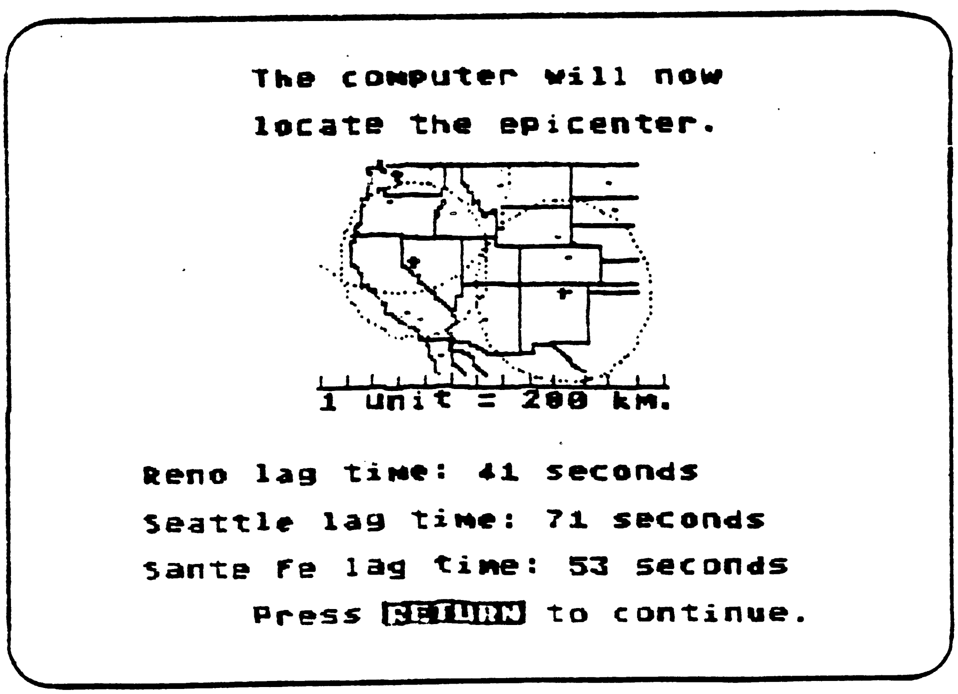
```
If the lag time was 64 seconds,
how far from the epicenter would
you be ? █
```

followed by a problem that brings together what has been taught about primary waves, secondary waves, and lag-time.



A map shows three randomly selected seismograph stations with the lag-time measurement for each.

EXAMPLES OF SCREEN OUTPUT



Using option 3—a "quake," students try to pinpoint the epicenter of an earthquake with the locator. The computer then shows its exact location at the point where the three circles converge. After pressing the return key, students see the distance, in kilometers, they were from locating the epicenter.

IDENTIFICATION OF MINERALS

Specific Topic: Minerals

Type: Problem Solving

Reading Level: 5-6 (Dale-Chall)

Grade Level: 6-9

DESCRIPTION...

The MINERALS program works as a mineral identification key to isolate distinguishing characteristics for the 29 minerals most commonly studied in earth science classes. The program assumes that a student has an unknown mineral to identify and asks the student to examine the mineral and perform tests on it. If these examinations and tests are correctly interpreted by the student, the unknown mineral will be identified by the computer.

OBJECTIVES...

1. to recognize those characteristics of minerals that identify a unique mineral.
2. to examine or perform tests on a specific mineral in response to computer prompts.
3. to classify minerals by the criteria each meets or fails.
4. to experience a systematized laboratory process of examining and testing objects for classification.

BACKGROUND INFORMATION...

A student must learn to follow a procedure for examining and performing tests to identify a mineral correctly. MINERALS takes a student one step at a time through an identification procedure. The computer assumes that a student has an unknown mineral. After listing the equipment needed, it directs the student to perform various tests and make observations to determine the characteristics of the mineral. After enough distinguishing characteristics are identified, the program responds with the name of the mineral.

The capability of the computer to identify a mineral correctly depends on the student's ability to interpret tests and observations correctly. If a mineral sample is not a true representation of the mineral, or if the student incorrectly interprets the test, an incorrect identification will take place, and the computer will ask the student to try again.

The primary benefit of this program is not in the mineral identification but in guiding students through a <u>process</u> of identification. After several trials a student should be able to use the flowchart (like the one on Handout 4) of a similar model to identify any mineral.

Minerals used in the program are listed below:

Apatite	Hornblende
Azurite	Kaolinite
Beryl	Limonite
Calcite	Magnetite
Chalcopyrite	Malachite
Cinnabar	Mica
Copper	Olivine
Corundum	Pyrite
Feldspar	Quartz
Fluorite	Sphalerite
Galena	Sulfur
Graphite	Talc
Gypsum	Topaz
Halite	Tourmaline
Hematite	

<u>Mineral Properties</u>

Properties of minerals that are easily observed or tested are used to form the key upon which MINERALS operates. One of the most easily seen properties is the way in which a mineral separates or breaks. This is called cleavage. A few minerals, such as mica, separate into thin sheets. Halite breaks into square corners, while calcite breaks into angular ones.

BACKGROUND INFORMATION (continued)

Another property used to identify minerals is their hardness. Diamond is one of the hardest minerals, and graphite is one of the softest. Hardness and cleavage are the most useful properties in identifying minerals.

A few minerals can be identified by their reaction to acid solutions. When a dilute acid such as hydrochloric is placed on their surface, bubbles of carbon dioxide gas are released. Calcite reacts in this way.

USE IN AN INSTRUCTIONAL SETTING...

Preparation

Students should know that rocks are made up of chemical elements and compounds. The geologists who study the earth and the rocks from which the earth is made call these elements and compounds **minerals.**

A study of the properties of minerals would be valuable preparation for use of the MINERALS program. (See Background Information).

Students should understand the difference between minerals and rocks. Most of the rocks they find outside are combinations of minerals.

Before running the program students should be familiar with the following terms describing mineral characteristics. They should know how to determine whether or not a mineral exhibits each characteristic.

1. Cleavage—Is there cleavage in the mineral structure?
2. Breaking into transparent sheets—How does "breaking" occur?
3. Leaving a mark on a streak plate—Do all minerals of the same color have the same streak?
4. Hardness—Can the mineral be scratched by a nail, glass, fingernail or copper coin?
5. Color—How is the predominant color determined?

The following material should be available for students to use in performing tests:

A piece of glass
A piece of quartz
A piece of white paper
A nail
A copper penny
A streak plate
Hydrochloric acid (only for calcite and halite tests)

Using The Program

Have students begin using the program with known samples before attempting to test unknown specimens.

The computer program can be used as a supplementary activity during a study of minerals with three work stations set up in the classroom:

Station One:	Work at computer
Station Two:	Use the flowchart (Handout 4)
Station Three:	Check identification wheel (if available)

USE IN AN INSTRUCTIONAL SETTING (continued)

Given several unknown minerals to identify, students will use each of the three stations to identify at least one of them. Record all results on Handout 5 - Mineral Identity. Each student will need a separate copy of Handout 5 for each station.

Handout 4 - Minerals Flowchart can be cut out and posted on one sheet of poster board for display at station two.

Follow-up

Study the rocks that are most common in the earth's crust by using Handout 6 - Common Rocks in the Earth's Crust. Students can find information on these rocks in the library and also use characteristics they discovered while running MINERALS. The questions on the handout can also be answered in the library.

Some minerals are important because they supply metals. Have students find out how metals are obtained from minerals.

Have students look up the names of very rare mineral stones, research how they are used, and learn how scientists make artificial gems in a laboratory.

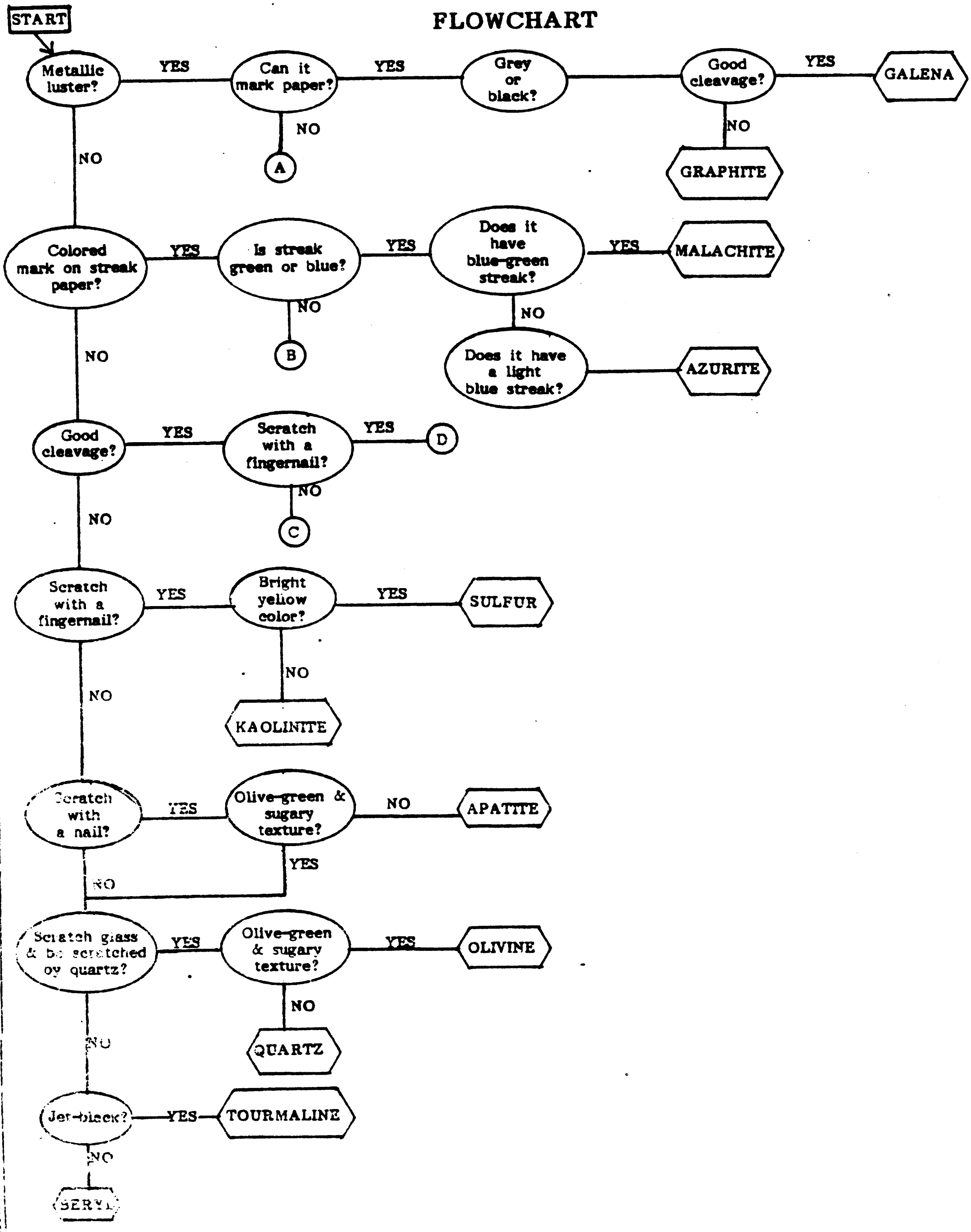
Have students make reports on precious and common metals. They could also make a display of their uses.

Have students experiment with growing crystals.

Students could collect rock specimens from driveways, ornamental landscape coverings, gravel pits and other accessible areas. They could examine, test and attempt to identify these minerals. This will be more difficult than working with known pure specimens since many rocks are mixtures of minerals. In some igneous rocks, the minerals are clearly visible because of color differences, such as in granitic gneisses where pink feldspar stands out from the white or gray quartz. In still other rocks, the mineral particles are so small that their identification requires microscopic or qualitative analysis and the knowledge of physical chemistry.

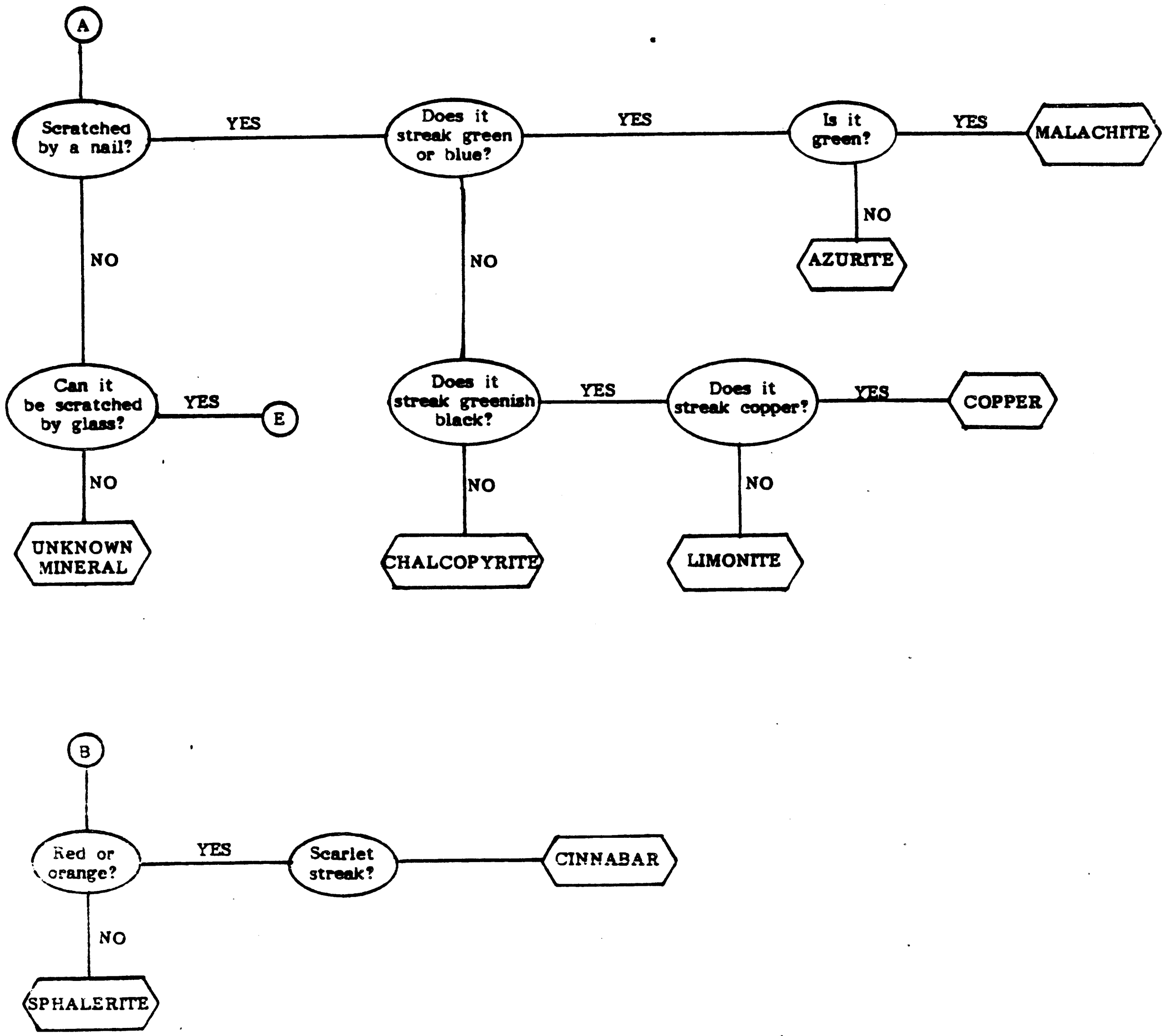
MINERALS

FLOWCHART



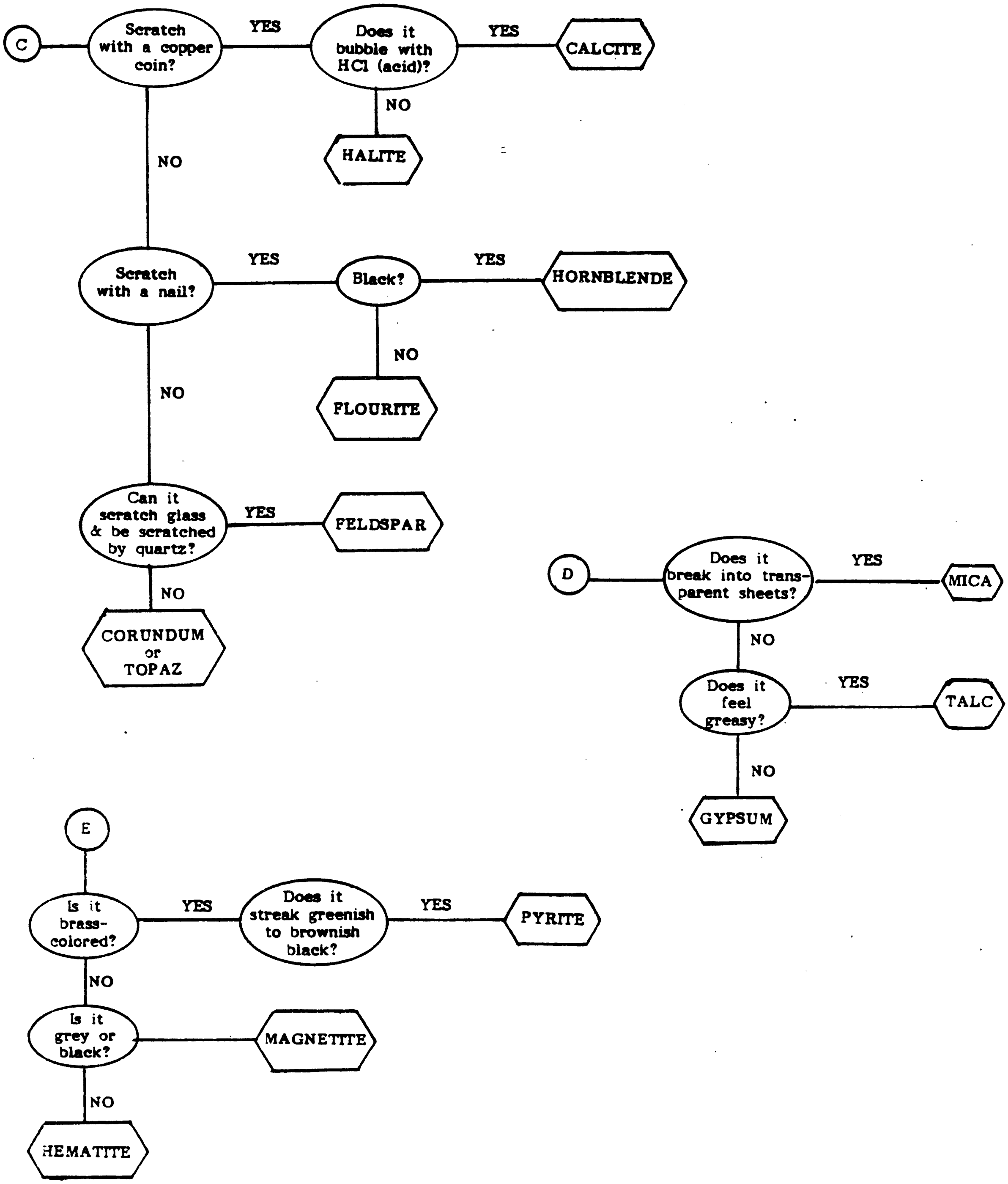
MINERALS

FLOWCHART (Page 2)



M I N E R A L S

FLOWCHART (Page 3)



MINERAL IDENTITY

Name: ______________________ Class: ______ Date: __________

Circle the station you are working at:

COMPUTER **FLOWCHART** **IDENTIFICATION WHEEL**

Answer YES or NO for the tests and observations you make for your sample:

______ Does it have metallic luster?

______ Can it mark paper?
______ Can it be scratched with a fingernail?
______ Can it be scratched with a nail?
______ Can it scratch glass and be scratched by quartz?
______ Can it be scratched with a copper coin?
______ Can it be scratched by glass?

______ Is it grey or black?
______ Is it jet-black?
______ Is it a bright yellow color?
______ Is it olive-green and sugary in texture?
______ Is it brass-colored?
______ Is it red or orange?
______ Is it green?
______ Is it black?

______ Does it feel greasy?
______ Does it have good cleavage?
______ Does it have cubic cleavage?

______ Does it leave a colored mark on a streak plate?
______ Does it streak green or blue?
______ Does it have a blue-green streak?
______ Does it have a light blue streak?
______ Does it streak greenish or brownish black?
______ Does it have a scarlet streak?
______ Does it streak greenish black?
______ Does it streak copper?
______ Does it bubble with HCl (acid)?

______ Does it break into transparent sheets?

COMMON ROCKS IN THE EARTH'S CRUST

Name:____________________ Class:______ Date:______________

There are over 2000 minerals in the earth's crust. Rocks are made up of combinations of these minerals. Most of the rocks found on or near the surface are made up of the minerals below. The two most common of these rocks are basalt and granite. This is not true, however, in southeastern Minnesota and many other areas of the world, where the surface rocks are sedimentary: usually lime/dolomites, sandstones and shales. Here, quartz is found only as sand particles in sandstone, and feldspars are rare. Calcites and magnesium carbonate minerals make up the common surface rocks to the exclusion of other kinds in such areas. Look up the minerals below in the library, and fill in the information asked for.

Quartz

Three characteristics of quartz are:

1._______________ 2._______________ 3._______________

Quartz is formed by:____

____

Quartz is commonly found:____________________________________

____

Feldspar

Three characteristics of feldspar are:

1._______________ 2._______________ 3._______________

Feldspar is formed by:______________________________________

____

Feldspar is commonly found:__________________________________

____

COMMON ROCKS IN THE EARTH'S CRUST (Page 2)

Pyrite

Three characteristics of pyrite are:

1. ________________ 2. ________________ 3. ________________

Pyrite is formed by: ____

____

Pyrite is commonly found: ___________________________________

____

Mica

Three characteristics of mica are:

1. ________________ 2. ________________ 3. ________________

Mica is formed by: ____

____

Mica is commonly found: _____________________________________

____

Sand (made up of pieces of quartz)

Three characteristics of sand are:

1. ________________ 2. ________________ 3. ________________

Sand is formed by: ____

____

Sand is commonly found: _____________________________________

____

COMMON ROCKS IN THE EARTH'S CRUST (Page 3)

Calcite

Three characteristics of calcite are:

1.________________ 2.________________ 3.________________

Calcite is formed by:____

____

Calcite is commonly found:____________________________________

____

Clay

Three characteristics of clay are:

1.________________ 2.________________ 3.________________

Clay is formed by:____

____

Clay is commonly found:____________________________________

____

SAMPLE RUNS

```
This program will help you determine
which mineral you are examining. You
will be asked questions about your
mineral. To answer the questions
you will make some observations of
the mineral or do some simple tests.



        Press RETURN to continue.
```

MINERALS is used to identify mineral samples.

EXAMPLES OF SCREEN OUTPUT

```
You will be using the following items:

PAPER                 FINGERNAIL
STEEL NAIL            GLASS
QUARTZ                STREAK PLATE
COPPER COIN           HYDROCHLORIC ACID



        Press RETURN to continue.
```

The computer instructs students on how to answer and what equipment they will need to test their minerals.

```
Apatite          Hornblende
Azurite          Kaolinite
Beryl            Limonite
Calcite          Magnetite
Chalcopyrite     Malachite
Cinnabar         Mica
Copper           Olivine
Corundum         Pyrite
Feldspar         Quartz
Fluorite         Sphalerite
Galena           Sulfur
Graphite         Talc
Gypsum           Topaz
Halite           Tourmaline
Hematite

Does your mineral have a

metallic luster? █
```

The question on the left is the first in a series of questions the computer asks the students to answer.

EXAMPLES OF SCREEN OUTPUT

```
Apatite          Hornblende
Azurite          Kaolinite
Beryl            Limonite
Calcite          Magnetite
Chalcopyrite     Malachite
Cinnabar         Mica
Copper           Olivine
Corundum         Pyrite
Feldspar         Quartz
Fluorite         Sphalerite
Galena           Sulfur
Graphite         Talc
Gypsum           Topaz
Halite           Tourmaline
Hematite

Based on the computer analyses of

your answers, the mineral is

Cinnabar.

     Press RETURN to continue.
```

After enough characteristics have been identified, the computer will tell students the name of the mineral being investigated.

DISTANCES IN OUR SOLAR SYSTEM

Specific Topic: Astronomy

Type: Simulation

Reading Level: 3.0 (Spache)

Grade Level: 3-6

DESCRIPTION...

This simulation teaches the names of the planets and the distances between the planets and the earth. By riding a familiar vehicle such as a bicycle or train to the different planets, students can better comprehend distances in space.

OBJECTIVES...

1. to learn the names of the planets.
2. to learn the distances between earth and the planets.
3. to compare distances and various modes and speeds of travel.
4. to compare body weight as measured on the planets, moon and sun.

BACKGROUND INFORMATION...

It is difficult to comprehend the tremendous distances in space. When measuring the distances between planets, students sometimes are unable to compare numbers because they are so large. The purpose of this program is to have students comprehend the great distances between the planets through using familiar means of transportation for their space travel. Students may choose to take a bicycle trip to the moon, and because the bicycle is a familiar vehicle, they can better comprehend the time and distance involved in making the trip. All years are calculated on a 24-hour day. Thus riding a bicycle to the moon would take 3 years of peddling 24 hours a day, or converting to an 8-hour day would make the figure three times greater, or 9 years.

The calculations are based on the following speeds of vehicles:

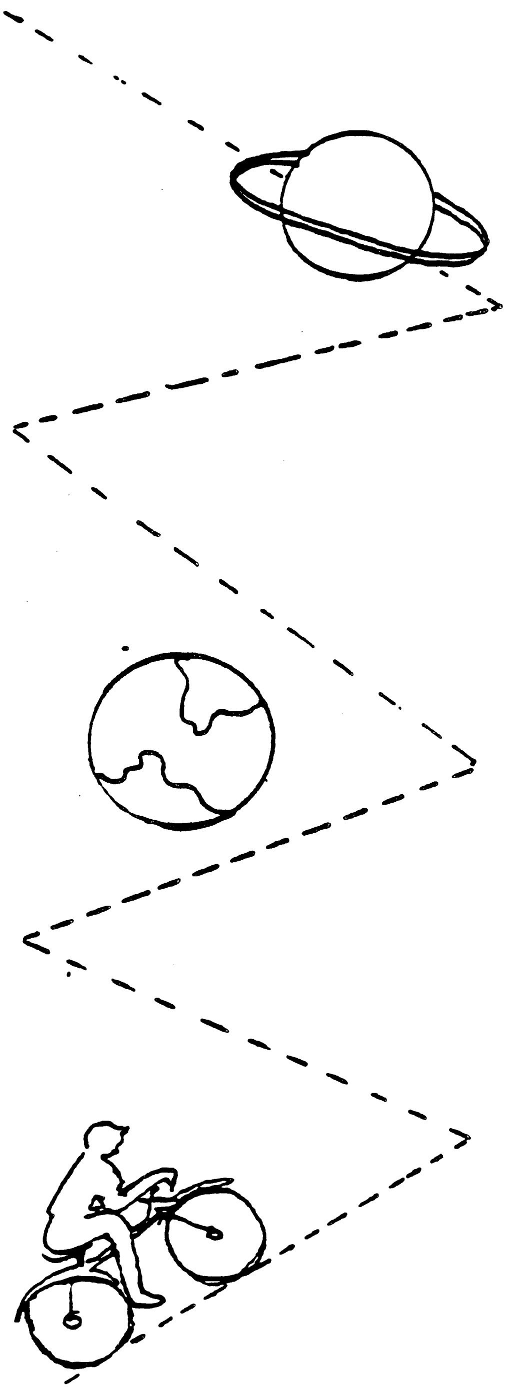
WALK	2.5/miles per hour
TRICYCLE	3/mph
BICYCLE	9/mph
MOTORCYCLE	50/mph
CAR	55/mph
TRAIN	90/mph
PROPELLER PLANE	420/mph
JET PLANE	990/mph
SPACE TRANSPORT (at speed of light)	186,000/miles per second

USE IN AN INSTRUCTIONAL SETTING...

Preparation

Students should be familiar with our solar system and with the concept of "speed of light" before running the program. Use Handout 7 - About our Solar System to help develop these understandings.

Using the Program



Next divide the class into small groups to run the program. Each group picks one vehicle for traveling to different planets. Fill in the chart on Handout 8 - Travel to Different Planets to compare time required. In a fifth- or sixth-grade classroom, students might graph the results. Devise a scale for the number of miles depending on which vehicle is chosen.

The groups can next use the second option. In this option, students choose a planet and are given the time it takes to travel to that planet using the various types of transportation. Have students guess how long it would take to get to the chosen planet before they run the program. Then run the program and record the actual length of time on Handout 9 - Travel by Different Kinds of Transportation.

Compare the length of time to events in the past, for example, to a time in the last century before students' grandparents were born, or to a century earlier during the Revolutionary War. Write some of the distances on the board, and discuss the comparative distances between the earth and other planets such as Mars or Jupiter.

USE IN AN INSTRUCTIONAL SETTING (continued)

Prepare scale models, and suspend them from the ceiling to get a feeling for relative sizes and distances of the planets.

Planet	Size of Figure	Distance from Earth (in millions of miles)	Distance between planet models
SUN	"window" *	93	window
MERCURY	1 inch	57	2" from sun
VENUS	2¼ inches	26	2" from Mercury
EARTH	3 inches	0	1½" from Venus
MARS	1½ inches	49	2½" from Earth
JUPITER	33 inches	370	1½ feet from Mars
SATURN	37 inches	693	1½ feet from Jupiter
URANUS	12 inches	1,590	4½ feet from Saturn
NEPTUNE	14 inches	2,700	5½ feet from Uranus
PLUTO	1-1¼ inches	3,473	4 feet from Neptune

* A familiar classroom object, such as a window, is suggested to convey the relative size of the sun in comparison with the size of the planets. In fact, a three-story building would be more accurate.

USE IN AN INSTRUCTIONAL SETTING (continued)

Follow-up

Comparisons of body weight on the various planets could make a good follow-up study. Students could research the gravitational pull on the planets and study how this relates to their body weights on the planet.

Other follow-up activities could be:

Develop notebooks on the planets.

Keep a list of new words in the notebooks or on the bulletin board.

Have students give short reports on planets of their choice, or group students with similar interests together and have each group make a report.

Write a science fiction story about a space adventure.

Take a field trip to a planetarium or plan an evening to observe the stars.

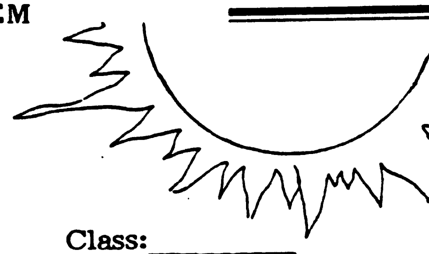
Invite local astronomy club speakers to address the students.

Investigate how astronomers measure distance using the speed of light.

Research Ole Roemer, a Danish astronomer who first estimated the speed of light.

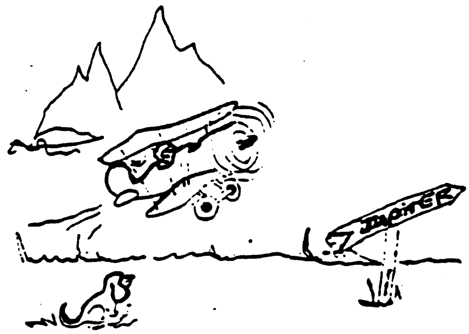
Write a story about what the world might be like if people could travel at the speed of light.

ABOUT OUR SOLAR SYSTEM



Name:______________________ Date:_________ Class:_________

1. How long does it take light from the sun to reach the earth?



2. How many planets are there?

3. What is the 4th planet from the sun?

4. Jupiter is the _______________ planet from the sun.

5. Which planet is closest to the earth?

6. Which planet would it take the longest to walk to?

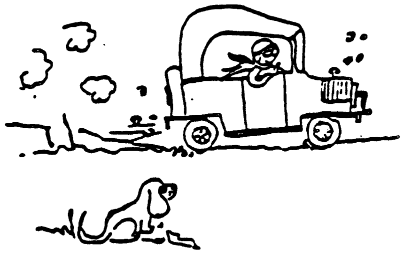
7. Guess how long would it take to bicycle to Saturn.

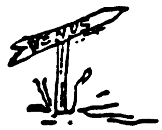
8. What is our nearest neighbor in space?

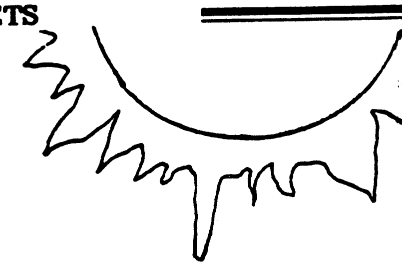
9. Which would take longer: to ride a bicycle to Mars, or to ride a bicycle to Venus?

10. Guess how long would it take to go by car to Pluto.

TRAVEL TO DIFFERENT PLANETS







Name:____________________ Date:_________ Class:_________

You may travel to a planet, the moon or the sun by means of one of the following:

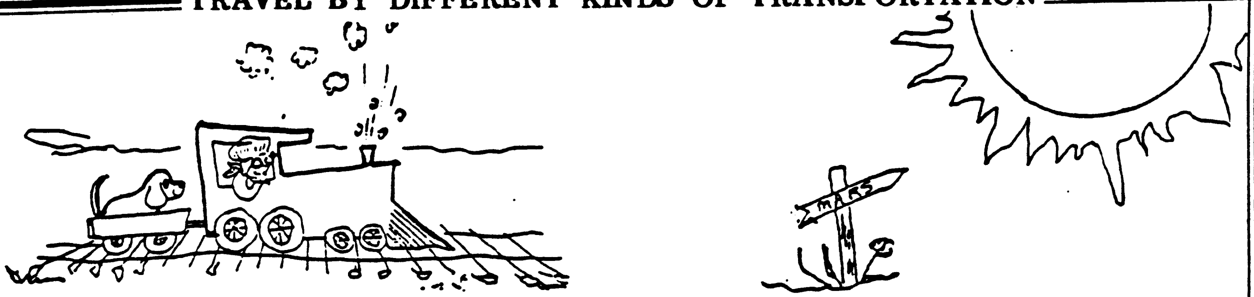
walk	bicycle	car	propeller plane	truck
tricycle	motorcycle	train	jet plane	speed of light

Run the program twice, and record your data in the columns below:

I choose to travel by ____________ I choose to travel by ____________

	TIME REQUIRED		TIME REQUIRED
SUN	________	SUN	________
MERCURY	________	MERCURY	________
VENUS	________	VENUS	________
EARTH	________	EARTH	________
MOON	________	MOON	________
MARS	________	MARS	________
JUPITER	________	JUPITER	________
SATURN	________	SATURN	________
URANUS	________	URANUS	________
NEPTUNE	________	NEPTUNE	________
PLUTO	________	PLUTO	________

TRAVEL BY DIFFERENT KINDS OF TRANSPORTATION



Name ______________________ Date ________ Class ______________

You may travel to one of the following:

Mercury	Mars	Saturn	Neptune	Moon
Venus	Jupiter	Uranus	Pluto	Sun

____

Run the program twice, and record your data in the columns below:

I choose to travel to ____________	TIME REQUIRED	I choose to travel to ____________	TIME REQUIRED
WALK	____________	WALK	____________
TRICYCLE	____________	TRICYCLE	____________
BICYCLE	____________	BICYCLE	____________
MOTORCYCLE	____________	MOTORCYCLE	____________
CAR	____________	CAR	____________
TRAIN	____________	TRAIN	____________
JET PLANE	____________	JET PLANE	____________
TRUCK	____________	TRUCK	____________
SPEED OF LIGHT	____________	SPEED OF LIGHT	____________
PROPELLER PLANE	____________	PROPELLER PLANE	____________

SAMPLE RUNS

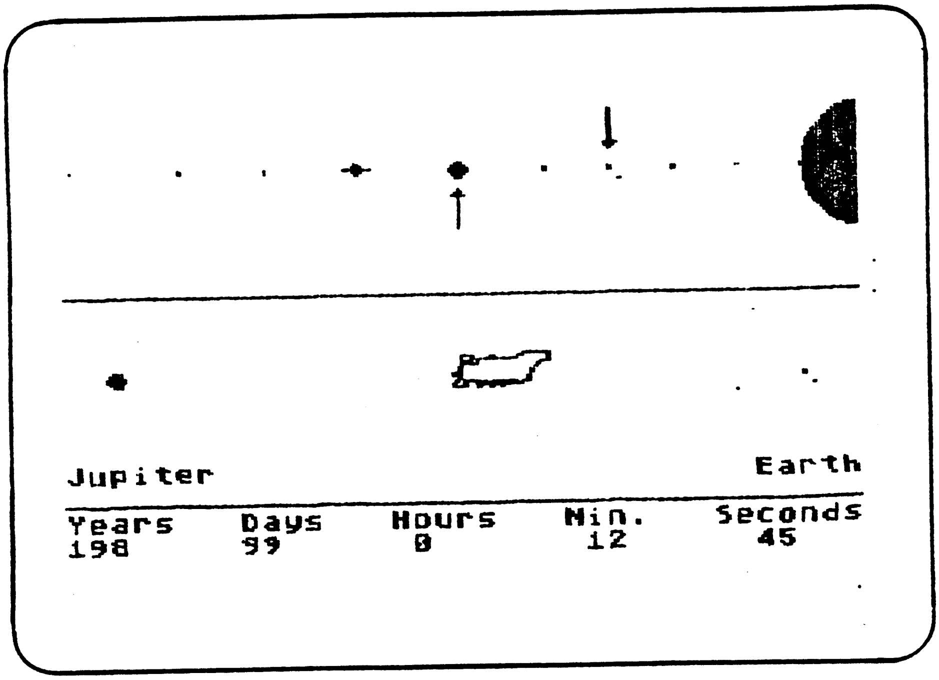
```
Where would you like to go?

            1. Mercury
            2. Venus
            3. Mars
            4. Jupiter
            5. Saturn
            6. Uranus
            7. Neptune
            8. Pluto
            9. Sun
           10. Moon
```

Students can travel to any planet, the sun or the moon.

EXAMPLES OF SCREEN OUTPUT

```
How would you like to get there?

        1. Walk
        2. Tricycle
        3. Bicycle
        4. Motocycle
        5. Car
        6. Train
        7. Plane
        8. Jet
        9. Speed of Light
```

Students choose the kind of transportation they wish to use for travel.



In this frame the student chose to take a train to Jupiter. The amount of time it takes to get there is calculated and displayed while the train moves across the screen.

EXAMPLES OF SCREEN OUTPUT

Trips by Train

Planet	Transport Time	Your Weight
Jupiter	495 Years	373 Lbs.
Pluto	4517 Years	13 Lbs.
Moon	115 Days	20 Lbs.

Press RETURN to continue.

At the end of the trip a summary table is presented showing the results of the students' choices.

LEARNING ABOUT THE NORTHERN CONSTELLATIONS

Specific Topic:	Astronomy
Type:	Simulation
Reading Level:	2.9 (Spache)
Grade Level:	5-6

DESCRIPTION...

Students are introduced to five of the major constellations around the North Star; the computer simulates their positions at any time of the day or year. The process of keeping time by the stars is also explained.

OBJECTIVES...

1. to correctly use terminology associated with astronomy.
2. to identify the five major constellations around the North Star.
3. to observe the apparent rotation of the stars by viewing the sky at different time periods.

BACKGROUND INFORMATION...

URSA demonstrates the positions and names the northern constellations, Cassiopeia, Cepheus, Ursa Major (the Big Dipper), Ursa Minor (the Little Dipper), and Draco.

The word "constellation" comes to us from the Latin constellatio constellatus, to be "set with stars." A constellation, a number of fixed stars arbitrarily considered as a group, is usually named after some object, animal or mythological creature supposedly suggested by its outlines: Cassiopeia, in Greek mythology, was the wife of Cepheus and the mother of Andromeda. Draco, Latin for dragon, is the large northern constellation containing the north pole of the ecliptic—the apparent annual path of the celestial sun. The Big Dipper consists of seven stars. The two stars in the front of the cup point to the North Star (Polaris). One of these pointers is the star Dubhe. The other is the star Merak. The Big Dipper forms a part of a larger constellation, Ursa Major or the Great Bear. The tail of the Great Bear, outlined by the bright stars of the Big Dipper's handle, is the most clearly marked position of his body.

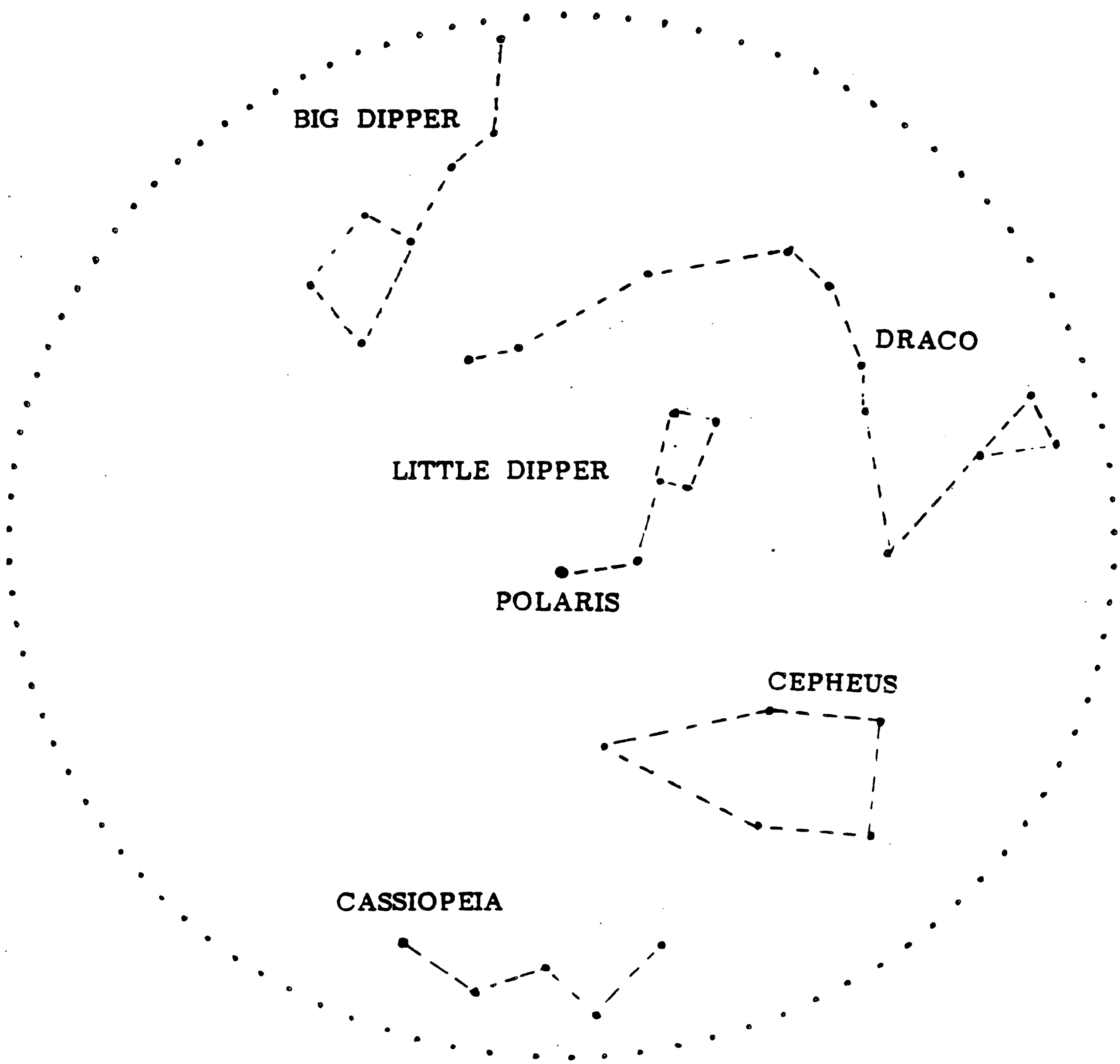
Students may choose from two options on the menu frame: URSA LESSON and URSA ROTATION.

URSA LESSON. Students learn about the five constellations Big Dipper, Draco, Little Dipper, Cepheus and Cassiopeia by seeing them printed on the screen.

URSA ROTATION. In this option, students can choose any time of the day for any day of the year to see what the stars will look like. Times and days can be either predetermined by the teacher by assigning them on Handout 12 - Rotation of Constellations, or chosen by the students.

BACKGROUND INFORMATION (continued)

The pattern of constellations simulated by the computer is depicted below:



USE IN AN INSTRUCTIONAL SETTING...

Preparation

Discuss the importance people have attached to the study of the stars throughout history as aids for navigating and telling time. Just as the position of the sun guided the hunter, the herdsman, and the farmer, the nighttime sky guided our ancestors before there were clocks and compasses. From observation they knew that the Big Dipper turns slowly through the sky from the east to west and that it travels a certain distance during the night. If the Big Dipper can be considered the clock in the sky, then Polaris (the North Star) can be considered the compass in the sky, since it remains almost exactly at due north.

The mythology connected with astronomy can make interesting lead-in discussions. The student reading Handout 10 - The Great Bear can be used at this time.

Using the Program

URSA may be used as a part of a general unit on astronomy. Reinforce what students have been taught about constellations by running URSA LESSON.

Discuss how the constellations seem to rotate around the pole star (Polaris). Divide the students into groups, and have each group use URSA ROTATION and complete Handout 11 - Rotation of Constellations. They should decide upon some problem to investigate such as: 1) the positions of the constellations three months apart but at the same time of the day, or 2) the position of the constellations on the same day but at different hours. Have the groups draw conclusions and report to the class.

Discuss telling time by use of the stars, and have the students run URSA ROTATION. Handout 12 - Telling Time by the Stars will help the students learn how to do this.

Follow-up

Help students appreciate the tremendous impact the idea of "star" has had. Ask students to bring examples of the star as motif in poetry, music, art, literature, or drama. Have students check the daily newspaper and take a count of the many different uses for the word "star," i.e., astrology, sports, entertainment.

Handout 13 - What Have you Learned? can be used as an evaluation form.

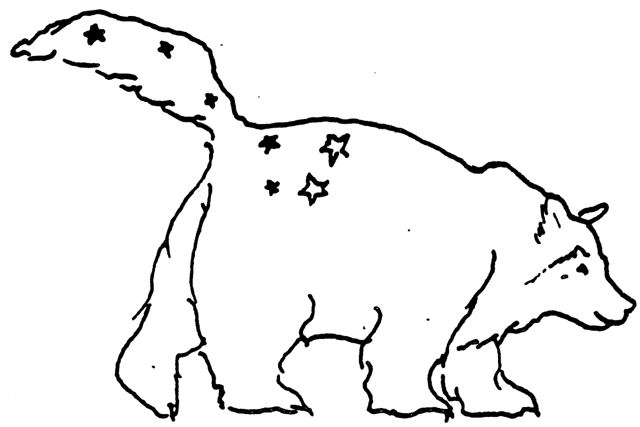
THE GREAT BEAR

Student Reading

The Big Dipper consists of seven stars. The two stars in the front of the cup point to the North Star. One of these pointers is the star Dubhe. The other is the star Merak. The Big Dipper forms a part of a larger constellation, Ursa Major or the Great Bear. The tail of the Great Bear, outlined by the bright stars of the Big Dipper's handle, is the most clearly marked position of his body. An old legend says that the Great Bear is so proud of its tail that he gazes jealously at the lone bright star in the Little Bear's tail (Little Dipper) in hope that some day he may gain possession of it. The gods have placed two "guard" stars between the Great Bear and the Little Bear to protect it.

The Great Bear has various legends based on folklore from the Romans, Greeks, Indians and others. The following is a Greek legend:

Juno, Queen of the Immortals, was jealous of Callisto because of her association with Jupiter. Juno changed Callisto into a great shaggy bear. Years later, Callisto's son, Arcas, met a bear on a lonely path in the mountains. Arcas pulled out his bow and arrow and shot at the creature. Just then Jupiter happened to look down from the sky and stopped the arrow in flight. Jupiter changed the boy into a bear and raised both bears into the sky. As he was raising the bears into the sky, their tails were stretched, which is why they now appear in the sky with long tails.



Juno was angry when she found out what Jupiter had done. Immediately she wanted to punish the bears, especially the Great Bear, Callisto. It seems that the Greeks believed that the stars enjoy a dip in the waves of the ocean before they disappear below the horizon. After the long journey across the sky, the stars look forward to the dip before they disappear. Seeing this as a chance for revenge, Juno harnessed her peacocks and drove to the palace of Oceanus, the ancient god of the Ocean Stream. Juno called him up from the depths of the ocean and made him swear to drive the Great Bear away from the water, and therefore the Great Bear never has the chance to wade in the western ocean. While the other constellations have a chance to immerse their stars in the waves, the Great Bear and Little Bear must ascend the steep slope of the sky never to rest or bathe.

ROTATION OF CONSTELLATIONS

Name: ____________________ Class: ____________ Date: ____________

Copy the position of the stars on this worksheet.

DAY ___ TIME ___ *Polaris	DAY ___ TIME ___ *Polaris
DAY ___ TIME ___ *Polaris	DAY ___ TIME ___ *Polaris

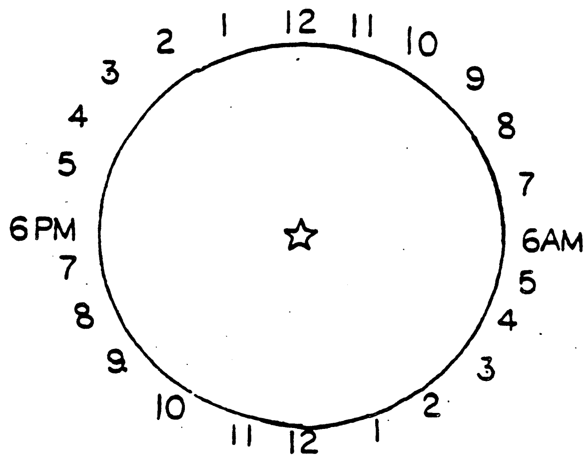
TELLING TIME BY THE STARS

Name:________________________ Class:____________ Date:____________

Run URSA ROTATION. Mask out or ignore the hour information at the bottom of the screen. Follow the procedure described below, and see if you arrive at the same time the computer shows for this rotation.

The method for telling time by the stars is as follows:

First locate the Big Dipper. Now look for the two end stars in the cup of the dipper. Imagine a line drawn through these two stars (sometimes called the pointer stars) extending above the dipper. This line will pass through the bright star, Polaris or the North Star. Now imagine that Polaris is the center of a giant clock, a clock that instead of having 12 hours has 24 hours and runs backwards. This clock has a 12 in the regular 6 o'clock position. Six p.m. is at the normal 9 o'clock spot, and 6 a.m. is where 3 o'clock is located.



The pointer stars on the Big Dipper are the hour hand of the clock. Using the clock as described above, you will use the position of the pointer stars to determine the time of day by the following method:

1. What month is it? Using the numbers 1-12, the number of the month is __________.

2. Multiply the number of the month by 2. _____ x 2 = _____.

3. If the day is in the first half of the month, add 6; otherwise add 7 to the answer in #2.

   Day ________ First half ______ + 6 = __

   Second half ______ + 7 = __

4. If the result is more than 24, subtract 24.

   ________ - 24 = ________

5. Look at the pointer stars. What hour do they indicate? ________

6. From the position determined in Step 5, move clockwise on the above clock the number of units determined in Step 4. The result is the time of day: ______.

WHAT HAVE YOU LEARNED?

Name:______________________ Class:______ Date:____________

1. Explain why constellations seem to change positions during the night.
2. Describe how you can locate constellations.
3. Where must you be on earth to see the North Star and the Big Dipper?
4. What does the constellation Cassiopeia look like?
5. The Big Dipper is part of what larger constellation?
6. Which two stars of the Big Dipper are called pointer stars?
7. Why does the North Star appear to be stationary?
8. What does the constellation Cepheus look like?

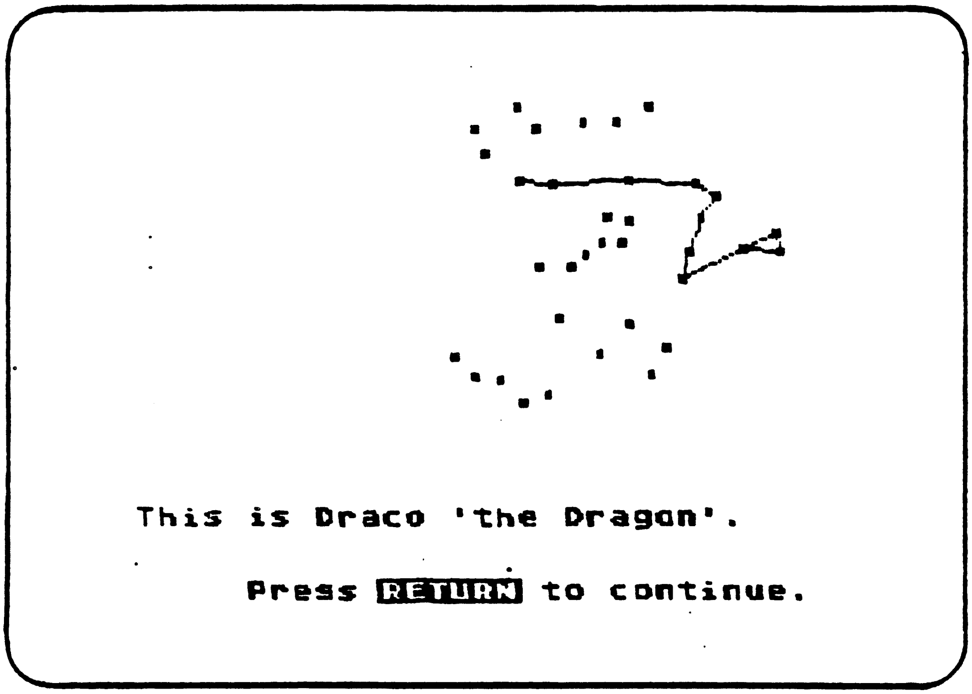
```
           Physical Science


        1. EARTHQUAKES
        2. MINERALS
        3. SOLAR DISTANCE
        4. URSA LESSON
        5. URSA ROTATION

        6. Program Descriptions
        7. End

   Which number?
```

URSA is two separate programs found on the main menu.

EXAMPLES OF SCREEN OUTPUT

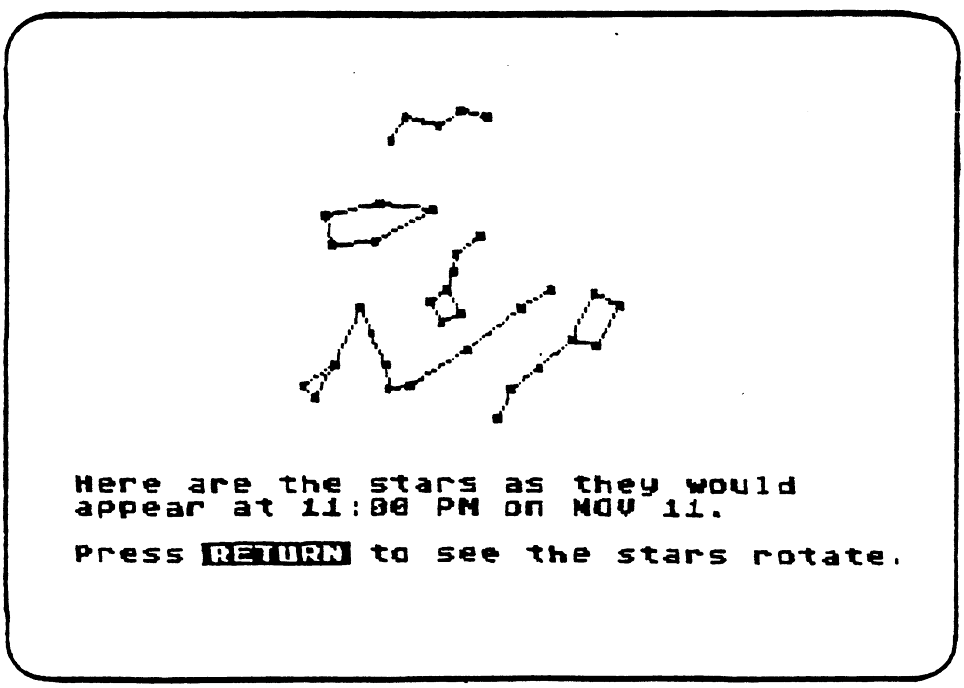
```
  Very long ago, ancient astronomers
identified groups of stars which
formed shapes or pictures.
These groups of stars were called
  ** C O N S T E L L A T I O N S **
  You may be familiar with some
constellations such as the
'Big Dipper' and the 'Little Dipper'.
  The computer will now display
the pattern of these and other
constellations.
     Press RETURN to continue.
```

In URSA LESSON students will learn about the constellations.



The computer draws the constellations one at a time and names them.

EXAMPLES OF SCREEN OUTPUT



In URSA ROTATION the students can choose the date and time, and the computer will show the position of the constellations.

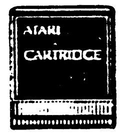
APPENDICES

GETTING TO KNOW YOUR ATARI COMPUTER

Equipment

ATARI COMPUTER CONSOLE: The computer and keyboard.

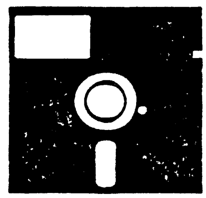
BASIC LANGUAGE CARTRIDGE: A cartridge (containing the BASIC computer language) that is inserted into the console above the keyboard.



TELEVISION: A television set used to display information.

DISK DRIVE: A unit that holds and reads the diskette.

DISKETTE: A $5\frac{1}{4}$ inch "record" that contains a series of computer programs.



ATARI Computer Keyboard

The ATARI Computer keyboard looks much like the keyboard of a typewriter. Some special keys are noted below:

RETURN Key—When you are finished typing either a response to a question or a line in a program, you send the information to the computer by pressing the **RETURN** key.

BACK S (Backspace) Key—Each time you press the **BACK S** key, the cursor backs up one space and erases each letter it passes over. This feature allows you to correct typographical errors easily.

BREAK Key—Press this key to stop the execution of a program. The program will remain in the computer memory and may be run again. If **BREAK** doesn't work to stop the program, try the **RESET** key.

SYSTEM
RESET

RESET Key—Like the **BREAK** key, the **RESET** key stops program execution. It also clears the screen. To restart, type RUN"D:HELLO".

ESC (Escape) Key—While you are using MECC diskettes, press the **ESCAPE** key in response to a question to stop program execution. The computer will ask whether you wish to run the program again. If you do not, the computer will display the diskette menu, and you may choose another program.

SHIFT Key—Use the computer SHIFT key like that of a typewriter. If a key displays two characters, you may hold down the **SHIFT** key while typing to print the upper character. For example, holding down the **SHIFT** key and typing  will print !.

CAPS/LOWR (Capitals/Lower case) Key—When you press this key, the computer begins typing in lower-case letters. To capitalize individual letters, you must hold down the **SHIFT** key as with a typewriter. To switch back to all capitals, hold down the **SHIFT** key, and press the **CAPS/LOWR** key again.

CTRL (Control) Key—Hold down the **CONTROL** key while pressing another key if indicated by the computer instructions.

Keys That Can Cause Confusion

0 (Zero)—The zero is on the top row of keys. Do not use the letter O interchangeably with this number key.

1 (One)—The number one is on the top row of keys. Do not use it interchangeably with a lower-case L (l).

USING A MECC DISKETTE

Using the Computer

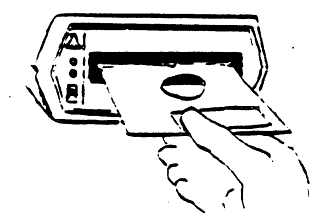
1. Make certain that the ATARI Computer, BASIC language cartridge, disk drive and television are plugged in and connected to each other properly. (See the ATARI Computer New User's Guide by MECC for detailed instructions.)

2. Turn on the television.

3. Turn on the disk drive. The PWR ON and BUSY lights will come on. After about 10 seconds the BUSY light will go off, and the whirling sound will stop.

   Turn on the disk drive before you turn on the computer.

4. Press the rectangular release button below the disk drive to open the door. Insert a diskette into the disk drive, exposed oval part first, with the diskette label up. Diskettes are sensitive to dust, heat, cold and magnetic fields, so handle them with care. (See the User's Guide for information on diskette care.)



5. Close the door on the disk drive.

6. Turn on the ATARI Computer. The power switch is located on the right side near the power cord. The disk BUSY light will turn on, and you will hear a whirling sound from the disk drive.

   If the disk BUSY light does not go off in about 10 seconds, turn the computer off, and make sure that the diskette is placed correctly in the disk drive. Then turn the computer on.

   If no display appears on your television screen at this point, and the television is set at channel 2 or 3, the computer may be set for the wrong channel. The channel select switch is on the back of the ATARI 400 Computer. Switch it to the opposite position.

7. A MECC logo will appear on the screen with the diskette name. Then a "menu" will appear. The menu gives a list of programs on the diskette. To run a program, type the number shown in front of the program name, then press the **RETURN** key. To access any available teacher options on the diskette, hold down the **CTRL** key and type A.

8. Follow the directions given in the program. Remember to press the **RETURN** key after each answer.

9. To return to the menu while running a program, press the **ESC** (Escape) key in response to any question.

   The screen will then ask whether the current program is to be run again or not. If not, the menu is automatically displayed.

10. To use a different diskette, select the END option from the menu, and follow the directions on the screen.

Turning Off The Computer

1. Take the diskette out of the disk drive, and store it in its protective envelope.

2. Turn off the ATARI Computer, the disk drive and the television.

DEFINITIONS OF TERMS

BACKGROUND INFORMATION—The information that explains or enriches program content or provides technical information on the program.

COURSEWARE—A collection of computer programs together with accompanying support materials.

DOCUMENTATION—The written material for the teacher to use with the computer program (also called a support booklet or support materials).

DRILL AND PRACTICE—A computer program that provides repetitive practice on a skill or a set of facts.

EDUCATIONAL GAME—A computer program that presents an instructional purpose in a game format.

GRADE LEVEL—The range of grades for which the program was designed.

HANDOUTS—The pages of the support booklet that may be duplicated for student or teacher use.

MODULE—The package containing the computer program(s) and the support booklet.

OBJECTIVES—The results to be achieved by using the program and support materials.

PROBLEM SOLVING—A computer program that processes data for a problem defined by the student.

PROGRAM—The routines and operations that instruct the computer.

READING LEVEL—The readability of the text that appears on the computer screen.

SAMPLE RUNS—The pages of the support booklet that show examples of computer screen output and accompanying explanations to outline the program flow.

SELO—Some Essential Learner Outcomes prepared by the Minnesota State Department of Education. When applicable these are included with the objectives in MECC support booklets.

SIMULATION—A computer program that approximates a real-world environment for examination.

SUPPORT BOOKLET—The written material (also called documentation) that provides the information a teacher may need to use the program in a classroom.

TEACHER AID—A computer program designed to assist a teacher with classroom management tasks.

TUTORIAL—A computer program that provides new information to teach a concept and may include drill and practice.

CREDITS

EARTH SCIENCE

The ATARI Computer programs contained in the Earth Science module had their origin in MECC programs for the Apple II computer. Some authors and programmers involved in the development and conversion of these programs are noted below.

EARTHQUAKES

Originally called QUAKES, the program was developed under a MECC Mini-Grant Project by Curt Hoppe and John Lillifors, East Grand Forks School District. It was adapted for the Apple II computer by MECC staff and converted to the ATARI Computer by Bret Indrelee, MECC.

MINERALS

The original program was written by Steve Woodward, Alexandria, Minnesota, and contributed to the MECC Timeshare System library. It was rewritten for the Apple II microcomputer by MECC staff and converted to the ATARI Computer by Mike Boucher, MECC.

SOLAR DISTANCE

Marge Kosel and Peter Burbulas developed the SOLAR DISTANCE program. MECC staff added graphics and converted the program to run on the Apple II. Lance Allred, MECC, converted the program to the ATARI Computer.

URSA LESSON and URSA ROTATION

These programs were originally designed by Hugh Collet at a National Science Foundation Institute in Michigan. MECC staff rewrote the program in conversion for the Apple II and added a tutorial section. Tony Prokott, MECC, converted the program to the ATARI Computer.

EARTH SCIENCE SUPPORT BOOKLET

The content of this support booklet is in large part a revision of materials written and designed for the Apple versions of these programs by Shirley Keran, MECC. The Apple support booklet, in turn, included material from the book Elementary . . . My Dear Computer, developed by Marge Kosel and Geraldine Carlstrom for timeshare computing. Teachers from throughout the state of Minnesota contributed ideas to that effort.

Karen Jostad, MECC, prepared the ATARI Computer Earth Science support booklet.

TECHNICAL INFORMATION

EARTH SCIENCE

EARTHQUAKES	
Main Program:	QUAKE1
Chains to:	QUAKE2
	QUAKE2P2
	QUAKE2P3
	QUAKE3
Binary Files:	QUAKEDSP.BIN
	QUAKESUB.BIN
	QUAKEMAP.BIN
	QUAKES.FNT
Text File:	QUAKE3.TXT
MINERALS	
Main Program:	MINERALS
SOLAR DISTANCES	
Main Program:	SOLDIST1
Chains to:	SOLDIST2
Binary Files:	SOLDIST.FNT
URSA LESSON	
Main Program:	URSAL
Chains to:	URSAL
URSA ROTATION	
Main Program:	URSAR
Chains to:	URSA3

MECC INSTRUCTIONAL SERVICES ACTIVITIES

PURPOSE: The primary purpose of the Minnesota Educational Computing Consortium (MECC) is to assist users and educational member systems in coordinating and using computing resources through cooperative planning and decision making. MECC also provides current computing methods and materials.

SERVICES: All MECC activities in instructional computing are the responsibility of the Director of Instructional Services (Telephone: **612/376-1105**). Direct any questions related to MECC policy, procedures, or regulations to this office. The MECC Instructional Services Division is organized as follows:

Instructional Systems Development—This group is responsible for the production, coordination, and refinement of MECC instructional computing courseware products, computer programs, and their related user support material. Direct any questions on operations within this area to the Manager, Instructional Systems Development (Telephone: **612/376-1103**).

Technical Services—This group is responsible for operation and operating systems maintenance of the MECC Timeshare System (MTS), a 400+ port, all-purpose, multiple language computer, which serves all Minnesota public higher education institutions and 300 school districts. Technical Services also establishes and maintains the MTS telecommunications network. Direct any questions on operations within this area to the Manager, Technical Services (Telephone: **612/376-1141**).

User Services—This group is responsible for timeshare and microcomputer user communications and training and the distribution of computing equipment and MECC courseware products. A staff of instructional computing coordinators is located throughout Minnesota to promote and facilitate computer usage. Direct all questions on operations in this area to the Manager, User Services (Telephone: **612/376-1101**).

GENERAL INFORMATION: MECC provides the above information to assist individuals who wish to contact the MECC office with specific questions. Direct all written requests for information to the appropriate office at MECC, 2520 Broadway Drive, St. Paul, MN 55113. The following two items address many routine questions:

MECC Publications and Programs Price List
MECC distributes this free list upon request and suggests that you obtain it quarterly. Contact the MECC Publications Office (Telephone: **612/376-1118**).

MECC USERS Newsletter
MECC distributes this free newsletter regularly during the school year to individuals on the mailing list. Contact the User Services Office (Telephone: **612/376-1117**).

All requests for visits to MECC must be scheduled in advance by calling **612/376-1130.**

Limited Warranty on Media and Hardware Accessories. Atari, Inc. ("Atari") warrants to the original consumer purchaser that the media on which APX Computer Programs are recorded and any hardware accessories sold by APX shall be free from defects in material or workmanship for a period of thirty (30) days from the date of purchase. If you discover such a defect within the 30-day period, call APX for a return authorization number, and then return the product to APX along with proof of purchase date. We will repair or replace the product at our option. If you ship an APX product for in-warranty service, we suggest you package it securely with the problem indicated in writing and insure it for value, as Atari assumes no liability for loss or damage incurred during shipment.

This warranty shall not apply if the APX product has been damaged by accident, unreasonable use, use with any non-ATARI products, unauthorized service, or by other causes unrelated to defective materials or workmanship.

Any applicable implied warranties, including warranties of merchantability and fitness for a particular purpose, are also limited to thirty (30) days from the date of purchase. Consequential or incidental damages resulting from a breach of any applicable express or implied warranties are hereby excluded.

The provisions of the foregoing warranty are valid in the U.S. only. This warranty gives you specific legal rights and you may also have other rights which vary from state to state. Some states do not allow limitations on how long an implied warranty lasts, and/or do not allow the exclusion of incidental or consequential damages, so the above limitations and exclusions may not apply to you.

Disclaimer of Warranty on APX Computer Programs. Most APX Computer Programs have been written by people not employed by Atari. The programs we select for APX offer something of value that we want to make available to ATARI Home Computer owners. In order to economically offer these programs to the widest number of people, APX Computer Programs are not rigorously tested by Atari and are sold on an "as is" basis without warranty of any kind. Any statements concerning the capabilities or utility of APX Computer Programs are not to be construed as express or implied warranties.

Atari shall have no liability or responsibility to the original consumer purchaser or any other person or entity with respect to any claim, loss, liability, or damage caused or alleged to be caused directly or indirectly by APX Computer Programs. This disclaimer includes, but is not limited to, any interruption of services, loss of business or anticipatory profits, and/or incidental or consequential damages resulting from the purchase, use, or operation of APX Computer Programs.

Some states do not allow the limitation or exclusion of implied warranties or of incidental or consequential damages, so the above limitations or exclusions concerning APX Computer Programs may not apply to you.

For the complete list of current APX programs, ask your ATARI retailer for the APX Product Catalog

EVALUATION SHEET

Please comment on this manual and the accompanying diskette. MECC will carefully consider user suggestions and incorporate them into future documentation whenever practical.

COMMENTS ON COMPUTER PROGRAM

Diskette Name ____________________ Vol. No. ________ Version ________
Program Name ____________________

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COMMENTS ON MANUAL

Title of Manual ____________________
Program Name ____________________
Page No. ________

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From: Name ____________________
Institution ____________________
Address ____________________
ZIP ____________________

Please detach and mail to MECC.

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Minnesota Educational Computing Consortium
Manager, Instructional Systems Development
2520 Broadway Drive
St. Paul, Minnesota 55113

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P.O. Box 3705
Santa Clara, CA 95055

Review Form

We're interested in your experiences with APX programs and documentation, both favorable and unfavorable. Many of our authors are eager to improve their programs if they know what you want. And, of course, we want to know about any bugs that slipped by us, so that the author can fix them. We also want to know whether our instructions are meeting your needs. You are our best source for suggesting improvements! Please help us by taking a moment to fill in this review sheet. Fold the sheet in thirds and seal it so that the address on the bottom of the back becomes the envelope front. Thank you for helping us!

1. Name and APX number of program.

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2. If you have problems using the program, please describe them here.

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3. What do you especially like about this program?

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4. What do you think the program's weaknesses are?

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5. How can the catalog description be more accurate or comprehensive?

____

____

6. On a scale of 1 to 10, 1 being "poor" and 10 being "excellent", please rate the following aspects of this program:

_______ Easy to use
_______ User-oriented (e.g., menus, prompts, clear language)
_______ Enjoyable
_______ Self-instructive
_______ Useful (non-game programs)
_______ Imaginative graphics and sound

7. Describe any technical errors you found in the user instructions (please give page numbers).

8. What did you especially like about the user instructions?

9. What revisions or additions would improve these instructions?

10. On a scale of 1 to 10, 1 representing "poor" and 10 representing "excellent", how would you rate the user instructions and why?

11. Other comments about the program or user instructions:

From

STAMP

ATARI Program Exchange
P.O. Box 3705
Santa Clara, CA 95055

[seal here]