

CODE QUEST

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## A DESCRIPTION OF CODE QUEST

In CODE QUEST, students try to decode six different clues in order to identify the mystery object in each game. For example, students might have to decode these six clues written in the backwards code:

- 1) Y V A E HD N A G IBS Y A W L A
- 2) SY EK T H G IE Y TH G IES A H
- 3) TN E M U RTSNI L A C ISU MA
- 4) TFO S RO DU OL EB N AC S E N O T
- 5) ERIW L EET S FO S GN I RTS
- 6) ETIHW D NA KCAL BER A SY E K

After decoding the clues, students try to guess the mystery object. (In this case, the mystery object is PIANO.) Each clue is presented one at a time in a coded form. Students may choose to have the clues appear in any of the following types of codes:

- 1) a code with clues written backwards and with the letters spaced differently
- 2) a code with numbers substituted for letters
- 3) a code using the alphabet but with the letters in a shifted order
- 4) a code substituting one word for a letter
- 5) a code written with letters in a box grid and decoded by following a maze-like path through the grid
- 6) a code using only pictures to represent letters
- 7) Super Sleuth where the computer picks a code at random from any of the previous six codes

Students can choose a different type of code for each clue, if they wish. If students get stuck, special "help" and "test" screens are available. After each clue is decoded, students can choose to get the next clue or try to guess the mystery object. Students get one chance to guess the mystery object. (Caution students to guess only if they are certain of the mystery object. If a wrong guess is made, the identity of the mystery object is revealed and the game ends.) If the mystery object is not correctly identified after six clues have been solved, the program will reveal the name of the object.

Students may work at their own pace since there are no time limits. If they have not decoded a clue in their time at the computer in a certain day, students may save their game to use on another day.

Once they have correctly guessed a mystery object, students may enter their own mystery object and six clues for a classmate to decode (unless this option has been turned off by the teacher by using the Change Option).



The following Help screens are from the code "UIJT POF":

- 1) This is an alphabet shift code.
- 2) The alphabet has been shifted over one letter.
- 3) B=A, C=B, D=C, E=D, F=E

#### Test Option

Students may press "T" to use the Test option. Then they may type in a series of letters which the computer will arrange in the same code format as the original clue. If the students' selection of letters is systematic, their use of this option will provide them with great help in decoding the clue. The students are restricted to typing in no more than 15 letters. Therefore, all letter combinations cannot be revealed.

#### Save Game Option

Students may save a game at any time during the program by:

- pressing the ESC key (Apple II, Atari, IBM PC/PCjr, Tandy 1000)
- pressing the ← key (Commodore 64)
- pressing the CLEAR key (TRS-80, TRS-80 Color)

The game will then be saved under the student's name. The number of games that can be saved are:

- 80 games (Apple II, Commodore 64, IBM PC/PCjr, Tandy 1000, TRS-80)
- 30 games (Atari, TRS-80 Color)

A student can return to a saved game at another time by typing in his or her name when the question "What is Your Name?" appears at the beginning of the program. The program will check to see if the student has saved a game under that name. If so, the following choices will be available to the student:

- 1) Continue
- 2) Start a new game and delete the saved game
- 3) Save the old game and enter a different name to begin a new game

The first choice on the screen will return the students to their exact places in the program with the clue as it was and with Help and Test screens available.

The second choice permits students to start a new game and delete the game that they have saved.

The third choice allows students to save an old game and also to begin a new game. If they begin a new game, the students must type in a different name. (The old game is being saved under their name now.)

### To Stop a Game

A student may stop a game at any time during the program by doing the following:

- holding down the CONTROL (CTRL) key and pressing the "E" key (Apple II, Atari, Commodore 64, IBM PC/PCjr, Tandy 1000).
- holding down the SHIFT and down arrow keys, and pressing the "E" key. (TRS-80/TRS-80 Color)

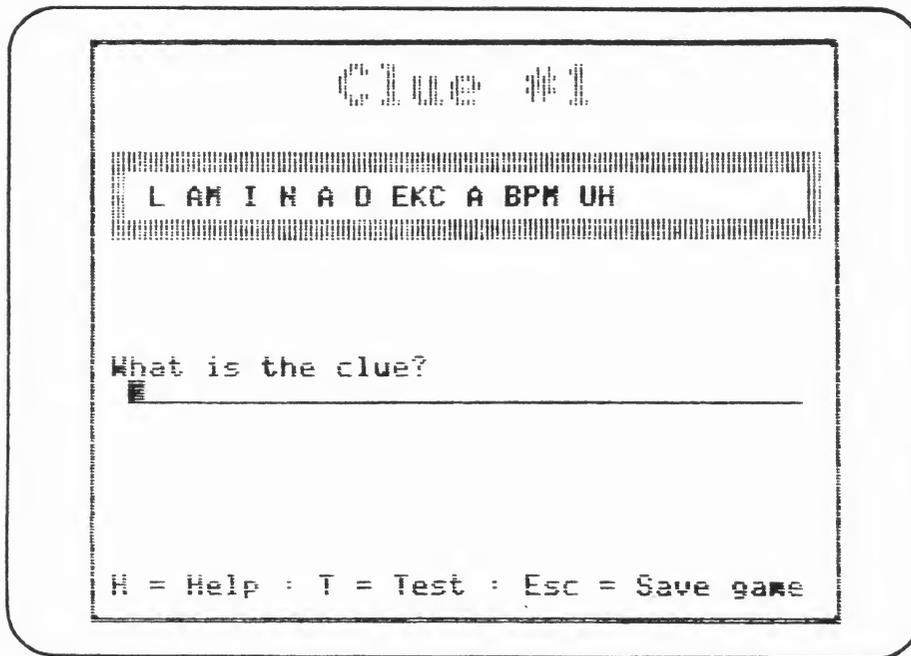
The program will return to the screen asking "Would you like to try again?"

After the first clue has been successfully solved, the student will be asked:

Do you want to

1. Get the next clue?
2. Guess the mystery object?

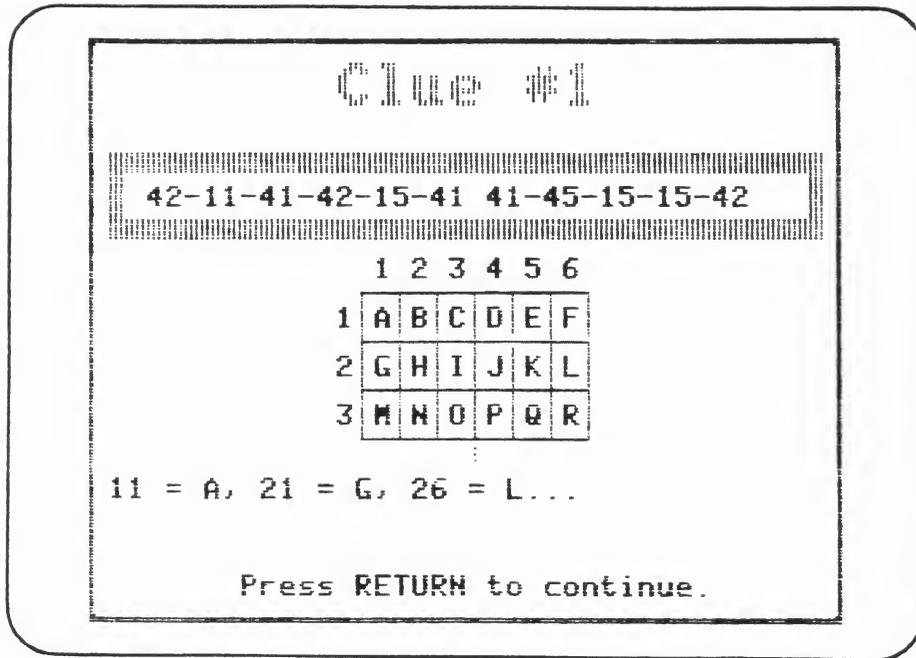
If the student chooses to get the next clue, the program returns to the main menu where the student can choose to stay with the same type of code or try a more challenging one for Clue #2. If the student chooses to guess the mystery object, the next screen will ask the student to enter the name of the mystery object. If the mystery object is correctly guessed, the student will be given the opportunity to enter a mystery object of his or her own (unless this option has been turned off by the teacher). If the wrong guess is made, the program will reveal the identity of the mystery object. The student will then be given the option of playing another game or ending the program.



Description: The clues in this cipher are written backwards and the letters in the words may be spaced differently. This is the easiest code for students to decipher. For example: the coded words "ENO S I H T" can be decoded "THIS ONE."

Background: This cipher is known as a transposition cipher. No letters in the message have been altered, but their position has changed. (They are now backwards.) This type of cipher was originally developed by the Greeks.

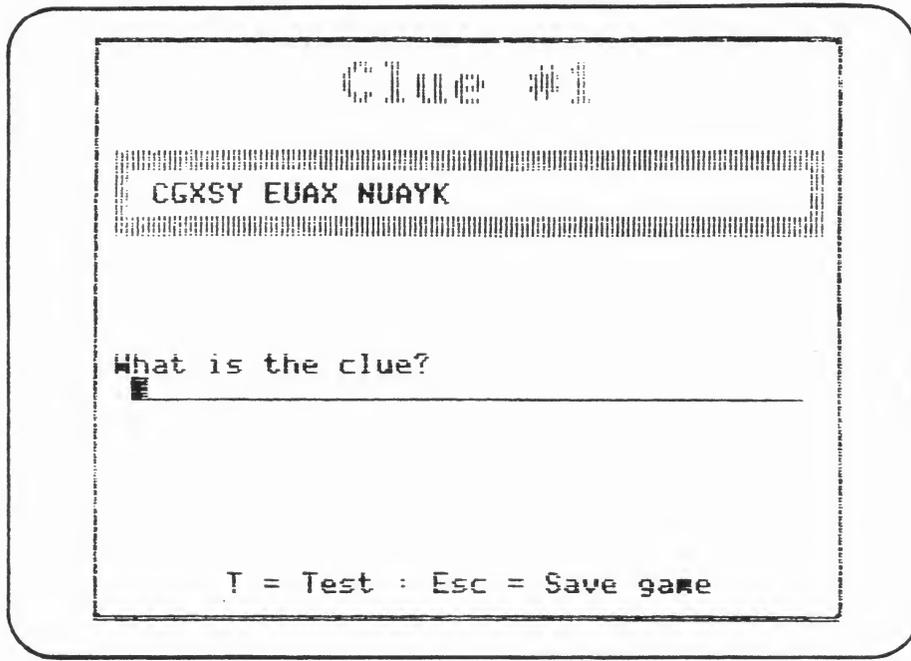
Objective: To develop sequencing skills



Description: This is a number substitution cipher. It may simply substitute numbers for letters or it may use a grid of boxes. In each box is a letter of the alphabet. Numbers substitute for the letters in the box. (See the sample screen above.) For example: 11 = A, 21 = G, 36 = R.

Background: The box substitution code is called a Polybius checkerboard after the ancient Greek writer who first invented it.

Objectives: To develop sequencing skills  
To use trial and error in decoding clues



Description: This is a substitution cipher using the letters of the alphabet but shifting the original letters.

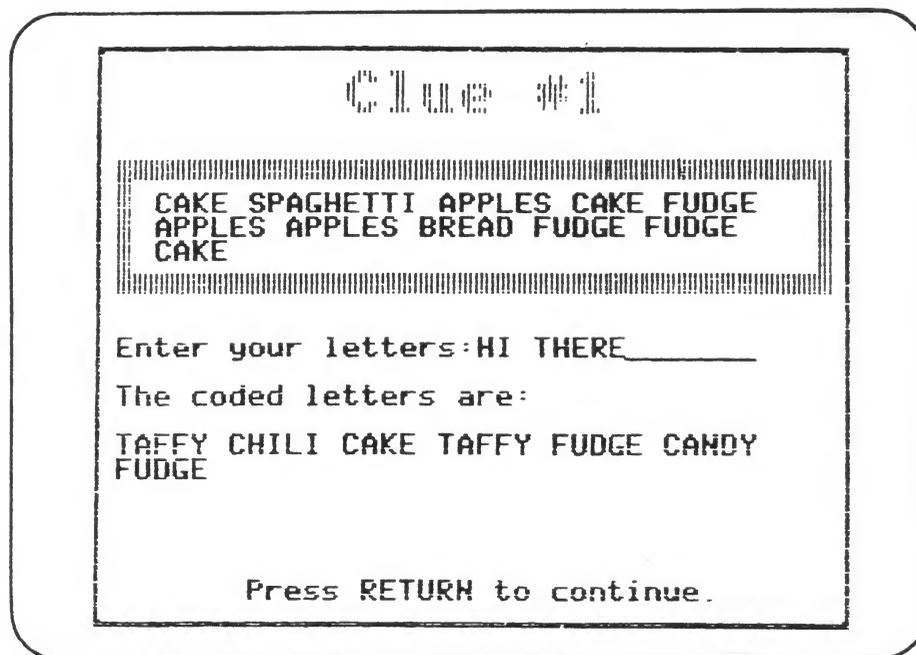
Example: A B C D E F  
New code: A B C

Using this example, the code letters E D G would spell out BAD.

Background: This kind of cipher is known as a Caesar Cipher named after Julius Caesar who invented it to use with his armies.

Objectives: To develop skills in flexibility  
To develop skills in sequencing

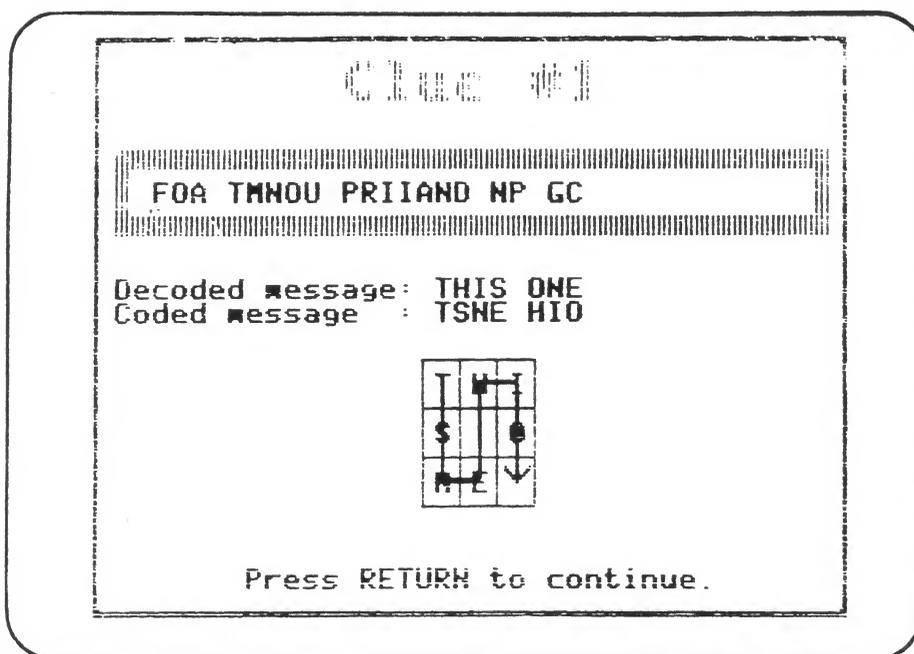
CAKE TAFFY CHILI APPLES PIZZA PRUNES FUDGE



Description: This code substitutes a code word for a letter in the original message. For example: cake = T, taffy = H, chili = I, and apples = S. The screen above shows a test screen being used.

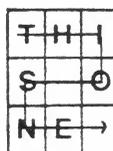
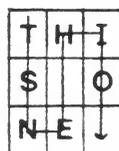
Background: Code words are often used by military intelligence. In order to solve a code, a code book is often necessary.

Objectives: To develop skills in analyzing a clue  
To develop skills in pattern identification



Description: This is a transposition cipher that uses a box grid. (The grid can vary in size from three boxes high by three boxes across to four boxes high by nine boxes across.) Each coded letter in the clue is placed in a box by following one of three maze-like patterns. (See the examples below.)

Coded Message:	TSNE HIO	THIO SNE	TH OISNIHASE RD
Decoded Message:	THIS ONE	THIS ONE	THIS ONE IS HARD



The message is read from left to right across the rows of the grid, beginning with the top row.

The Help screens for each clue in this cipher will indicate:

- 1) That this is a maze code.
- 2) The size of the box grid for that particular clue (for example: three boxes high by three boxes across).
- 3) The pattern used to place the letters in the boxes. (For example: The zigzag pattern will be shown on the screen.)

Background: This cipher is known as the Twisted Path Cipher. It can be very difficult to break since the paths can vary in direction.

Objective: To develop skills in pattern identification.



Clue #1

What is the clue?

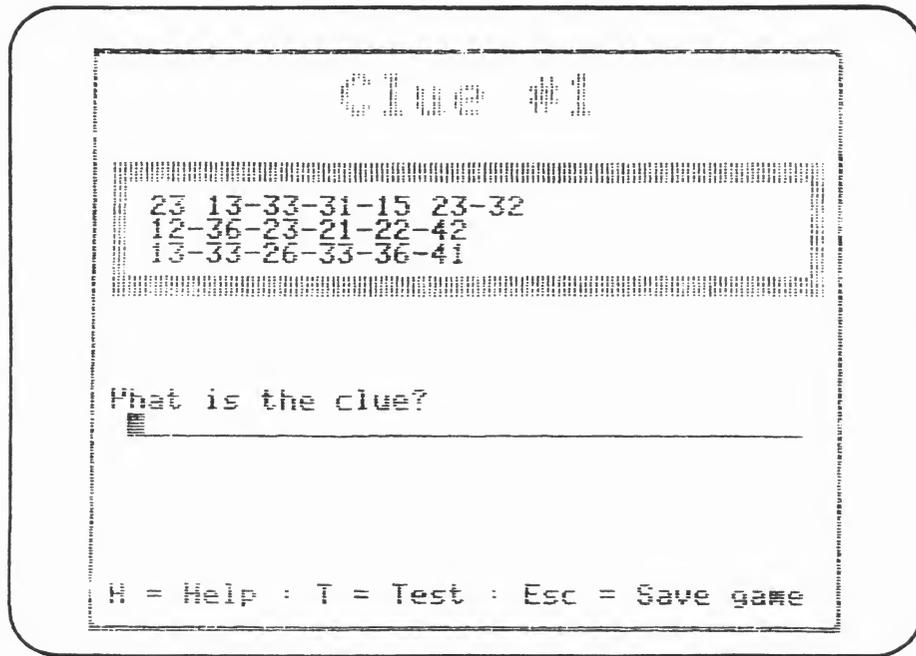
Esc = Save game : Control-E = Quit

Description: This cipher substitutes pictures for letters. The first letter in the name of each picture is a letter in the alphabet. For example: a tree = T, a star = S, a heart = H.

Background: Picture ciphers have been used throughout history, but especially in earlier times when people were unable to read. Some of the more famous picture codes include the Zodiac Alphabet and the Dancing Men Cipher.

Objectives: To develop skills in classification  
To use trial and error in decoding clues

SUPER SLEUTH



Description: In SUPER SLEUTH, the computer picks one of the six types of code in CODE QUEST, at random, and presents the clue in that format.

Objectives: To use skills in discrimination  
To use skills in classification

## CHANGE OPTION

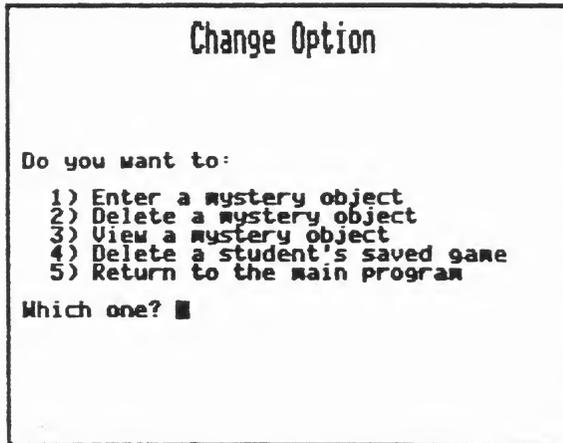
### How to Use the Change Option

The Change Option allows teachers to enter mystery objects and clues of their own. It can be accessed when the words "What Is Your Name?" appear on the screen at the beginning of the program. To use the Change Option:

- hold down the CONTROL (CTRL) key and press the "T" key (Apple II, Atari, IBM PC/PCjr, Tandy 1000).
- hold down the **C** key and press the "T" key (Commodore 64).
- hold down the SHIFT and down arrow keys, and press the "T" key (TRS-80, TRS-80 Color).

The first screen in the Change Option asks: "Do you want to allow students to enter their own mystery objects?" If the answer is yes, the program will allow students to enter their own mystery objects and clues after they have correctly identified one mystery object. If the answer is no, students will not be permitted to enter their own mystery objects. (The write-protection sticker must be removed from the edge of the diskette in order to make changes.)

The second screen in the Change Option lists five choices. (See the sample screen below.)



## 1. To Enter a Mystery Object

Number 1 in the Change Option allows teachers to enter mystery objects for the students to guess. To do this, type in the name of a mystery object. Then type the six clues. The maximum number of characters (letters and spaces) per line depends upon the machine type:

- 33 characters (Apple II, IBM PC/PCjr, Tandy 1000, TRS-80)
- 36 characters (Atari, Commodore)
- 29 characters (TRS-80 Color)

No less than six clues should be typed in. If a mistake is made in typing, the DELETE or back-arrow key may be used to "erase" the incorrect letter. After entering each clue, press the RETURN key (Apple II, Atari, Commodore 64), the  key (IBM PC/PCjr) or the ENTER key (Tandy 1000, TRS-80/TRS-80 Color). The program does not allow for punctuation (commas, colons, etc.) of any kind, nor the use of numbers in the clues. (Help for writing clues for mystery objects are listed in the "Teaching Suggestions" section of this booklet.)

The diskette now contains 20 mystery objects. The number of additional mystery objects the diskette has room for depends upon the machine types:

- 80 additional objects (Apple II, Commodore 64, IBM PC/PCjr, Tandy 1000)
- 70 additional objects (Atari)
- 60 additional objects (TRS-80, TRS-80 Color)

Once the diskette is full, a message will appear on the screen saying, "I'm sorry but there is no more room on the disk for mystery objects." The program will return to the Change Option menu screen. Then the teacher may choose the option "To Delete a Mystery Object" in order to remove mystery objects on the diskette and add new ones.

## 2. To Delete a Mystery Object

If this option is chosen, the teacher will be asked to select the mystery object that is to be deleted from the list of objects in the program. Each object can be deleted, one at a time. Remember once your choice is made and you have pressed the RETURN key (Apple II, Atari, Commodore 64), the  key (IBM PC/PCjr), or the ENTER key (Tandy 1000, TRS-80, TRS-80 Color), the object has been erased from the diskette.

It is possible to delete every object in the program including the ones on the diskette now and new ones added by teachers or students. Always leave at least one mystery object in the program so the Change Option will work. If all of the objects should accidentally be deleted, the program will prompt the teacher to type in a new mystery object and six clues.

Note: If the teacher should delete a mystery object involved in a game that a student has saved, the student's saved game will also be deleted. Thus, the student will not be able to go back to the saved game.

3. To View an Object

With this choice, a list of all the mystery objects on the diskette will be shown. After the teacher selects the object to be viewed, the next screen will show the six clues for that object. Then the program will return to a list of the remaining objects. More objects can be viewed or the teacher may return to the main program.

4. To Delete a Student's Saved Game

If a teacher chooses this option, a list of the names of students who have games in progress will appear and the game to be deleted can be chosen. (A teacher may want to use this option if a student has transferred from the class or will not be returning to use the diskette.)

5. To Return to the Game

If this option is taken, the program will leave the Change Option and return to the first screen in the game which says: "What is Your Name?"

## TEACHING SUGGESTIONS

### How to Fit CODE QUEST into the Curriculum

CODE QUEST can be adapted to any subject in the curriculum. Here are some examples:

#### Social Studies

1. Play a game called "Who Is It?" by entering the names and six clues for famous people in history. (Use the Change Option in CODE QUEST to do this.) In order to ensure that the computer will randomly select only those relative objects entered, all other objects must be deleted. So be careful to make note of those objects and clues so you can re-enter them in the future.
2. Students should be encouraged to research the role codes have played in history. (They will find the stories connected with codes to be mysterious and exciting.) Have them discuss how codes have influenced the outcome of important historical events.
3. Challenge the students to find examples of codes in everyday life. Examples: codes on cans in grocery stores, codes on road signs, the coded telephone dial, codes on a computer program and so on. Examples of these codes could be made into a bulletin board display entitled, "CODE QUEST."

#### English

1. Have the students take a theme they have written and analyze it to determine the frequency of letter use. (How many A's, B's, C's and so on appeared in the theme?) Have the students compare their findings and draw conclusions.
2. Have students create mystery objects and clues. Discuss the critical and variable attributes of the objects.
3. Students may want to investigate some of the many other types of codes not used in CODE QUEST. The classic book on codes is called The Codebreakers by David Kahn. It is the "handbook" used by cryptanalysts. Your students may enjoy reading the following books:

Codes and Secret Writing by Herbert S. Zim  
Codes and Ciphers by John Laffin  
Codes, Ciphers and Secret Writing by George Beal  
Codes, Ciphers and Secret Writing by Martin Garden  
The Kids' Code and Cipher Book by Nancy Garden

## Science

1. Students can learn the Morse Code and practice it on "homemade" telegraphs constructed by the class.
2. Write clues about mystery objects from the science curriculum. Have students decipher the clues and guess the mystery objects.

## Mathematics

1. Analyze the number of times each letter appears in a passage. Make a graph of the most often used letters.
2. Write clues about mathematical mystery objects (triangles, prime numbers, etc.).
3. Have students devise grid codes of different sizes. How does the size of the grid affect the code?
4. Invent a code that is based on a mathematical scheme.

## Hints for Breaking a Code

It will take patience, persistence, and practice for students to break the codes in CODE QUEST. They will need to use many problem-solving skills to decode each clue. Some of the following hints might be helpful for them:

1. A system is always used for writing a code or a cipher.
2. The clues in CODE QUEST were written in English originally. This means 26 letters were used, but some letters were used much more frequently than others. The letter E is used two hundred times more often than the letter Z in the English language. In fact, the letters most commonly used, in order, are E T A O N R I S H D L F C. (Tables of the most frequently used letters and words in English can be found in most code books.) Students will notice that the double letter combinations like ll, ee, ss, and oo are used the most often. If a single letter appears, it will most likely be "A" or "I." The most common three letter word is "the."
3. Noting the number of times each letter is used in the message will help the student decide if the code is a substitution code or a transposition code. If it is a substitution code, many of the vowels may be missing in the clue, since they were substituted with other letters or symbols.
4. Trial and error must be used to discover some of the letters in the word. As each part of the cipher is solved, more parts of the puzzle will begin to fall into place.

## Help for Writing Clues for Mystery Objects

The following ideas may be helpful for writing clues for mystery objects:

1. Choose an object that can be easily described and identified. For example, a porcupine is easier to describe than a table.
2. Write some general clues on the list. For example, for a porcupine, one clue might be: "It is an animal."
3. Write clues giving specific details. For example, another clue for a porcupine might read: "It has sharp quills."
4. Remember that, for each clue, you cannot use more than 33 characters (letters and spaces) on the Apple II, IBM PC/PCjr, Tandy 1000, and TRS-80, or 36 characters on the Atari and Commodore 64, and 29 characters on the TRS-80 Color. Remember the program does not allow for punctuation or numbers. (So in place of writing the numeral "8," write the word "eight" instead.)