

MORE Reading Comprehension in Varied Subject Matter

ANSWER KEY

LEVEL 1 - LESSON 17

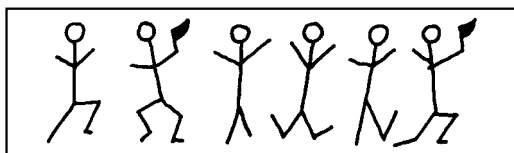
Selection 17—Subject: Philosophy, Logic, and Math
 Theme: How about That?

SECRET CODES: PLAYING WITH MATH

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| ABOUT THE PASSAGE | When you read a detective story, do you usually solve the mystery before you finish the book? If so, perhaps you would also be good at cracking secret codes. |
| REASON FOR READING | Read to discover two ways of making secret codes. Watch for the use of math in these methods. |

READ THE PASSAGE

Sherlock Holmes is probably the most famous detective in fiction. He regularly puts Scotland Yard to **shame** with his brilliant **analysis** of clues. He is also an expert at **cracking** secret codes. For example, he solved a case by realizing that a piece of paper covered with stick figures was an important clue. Part of the first line looked like the drawing below. Holmes cracked this code in “The Adventure of the Dancing Men.”



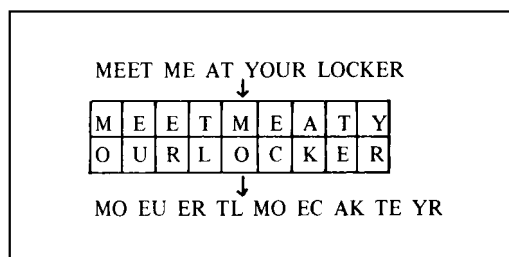
Perhaps you have read some mystery stories and have tried to write a secret code with a friend. You knew that the secret to the code was in the key, and unless you and your friend possessed the key, you could not read each other’s messages. Did you know what detectives know—that the key to most secret codes can be found mathematically?

Most secret codes, no matter how **complicated**, use **substitution** and/or **transposition**. In the basic substitution method, you simply substitute one thing for another. For the letter A you could use Z, for B you could use Y, and so on, if your code is based on a backward alphabet; or you could use a 1 for A, 2 for B, if your code is substituting the numbers 1–26 for letters.

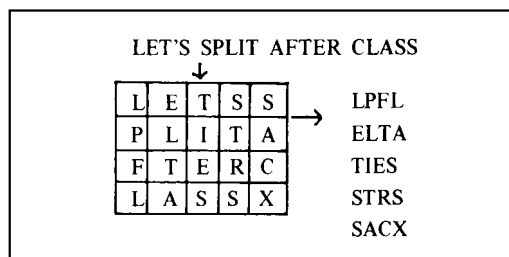
A sign substitution code is difficult to crack, because, unlike numbers and letters, signs do not come in a known, established progression or order. For example, the letter A could be a , B could be , C could be , and so on.

Knowing the meaning of a few of the signs would not give you a simple rule for unlocking the rest of the alphabet.

Transposition is a better way to make up a secret code than simply substituting something else for letters. In the transposition method, the letters of the message change places; the key is knowing the orderly way in which the letters are transposed. Watch how this is done.

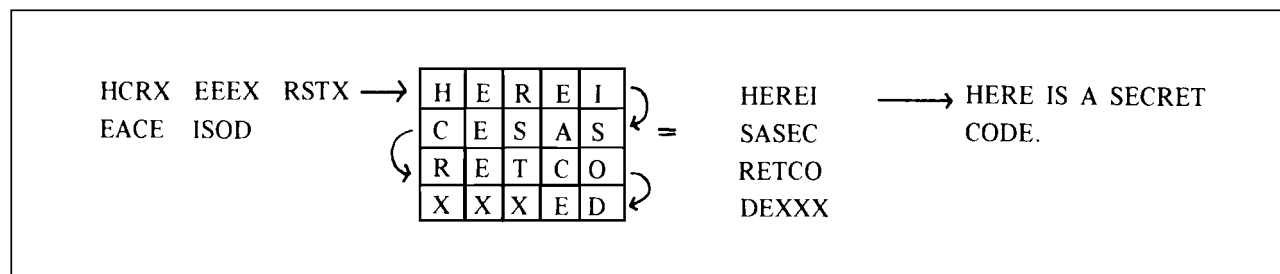


If you do not have an equal number of letters, you can simply add Xs or any other letter you decide upon to fill the blanks. Your message can be divided into as many lines as you wish, but it is best to try to make a square. That way, the correct order of the message could be up, down, or across the rows, however you choose. Watch!



You can make the code harder to crack by putting the message in an **irregular** order in the square. Instead of writing the columns 1, 2, 3, 4, 5; 1, 2, 3, 4, 5 as we did in the last example, you could

write them as 1, 2, 3, 4, 5; 5, 4, 3, 2, 1; 1, 2, 3, 4, 5; 5, 4, 3, 2, 1 so that your eye would **unscramble** the message like this:



Or, you could use downward columns 1, 3, 5, 2, 4 to get the code: HCRX RSTX ISOD EEEX EACE.

code is in the key to reading it. No matter how complicated the code is, it usually makes use of substitution and transposition.

Whatever method you choose for writing the code, you must know that the secret to your secret

THINKING IT OVER

- (1) Who was Sherlock Holmes? A famous detective.
- (2) What is the “secret” in a secret code? The key that tells how to unscramble the message.
- (3) What are the two ways to make or to crack a secret code? Substitution and transposition.

STUDYING THE PASSAGE

- (1) Find the Main Idea: Choose one.

(a) Sherlock Holmes regularly puts Scotland Yard to shame. (b) A secret code uses either substitution or transposition. (c) The sender and the receiver of the coded message must both possess the key to the code. (d) Many secret codes are cracked mathematically.	<u>B</u>
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- (2) Find the Facts: Mark each one *true* or *false*.

(a) A sign substitution code is easy to crack. (b) In a backward-alphabet code, Z stands for A. (c) The secret to a code is in the key to the code. (d) A sign code uses substitution. (e) Substitution is one way to make a secret code. (f) Secret codes can only be made from letters. (g) In transposition, letters change places. (h) Putting the message in an irregular order makes a code harder to crack.	(a) <u>F</u> (b) <u>T</u> (c) <u>T</u> (d) <u>T</u> (e) <u>T</u> (f) <u>F</u> (g) <u>T</u> (h) <u>T</u>
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- (3) Find the Order: Number the following in the order in which they appear in the passage.

(a) Unless you and your friend had the key, you could not read each other’s messages. (b) Often he put Scotland Yard to shame with his brilliant analyses of clues. (c) Putting letters in the square according to an irregular pattern makes a code harder to crack.	(a) <u>2</u> (b) <u>1</u> (c) <u>7</u>
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| (d) Transposition makes a better code than substitution does. | (d) <u>4</u> |
| (e) In a transposition code, letters of the message change places according to a pattern. | (e) <u>5</u> |
| (f) In the basic substitution method one simply substitutes one thing for another. | (f) <u>3</u> |
| (g) If the letters of your message don't fill up the square you can add X's. | (g) <u>6</u> |

(4) Go beyond the Facts: Choose one answer.

- (a) Only a spy can write a secret code and only a smart detective can break the code.
- (b) The use of computers in solving a secret code seems logical because computers are mathematically based.
- (c) Secret codes are found only in mystery stories.
- (d) Secret codes can be made only from numbers and letters.

B

(5) Determine the Writer's Style and Technique: Choose one answer.

- (a) Uses facts to show cause and effect.
- (b) Uses examples to show what something is.
- (c) Tells a story to illustrate fact.
- (d) Uses comparison and contrast to define something.

B

USING THE WORDS

(1) Words and Their Meanings: Find the boldfaced word for these definitions.

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| <u>analysis</u> | (a) a separation of anything into the parts that make it up; the examination of something complex, its elements, and their relationships to each other |
| <u>complicated</u> | (b) complex, difficult to analyze |
| <u>cracking</u> | (c) puzzling out and solving the mystery of |
| <u>irregular</u> | (d) not in natural sequence; not done according to custom |
| <u>shame</u> | (e) a painful emotion caused by awareness of guilt or of some shortcoming |
| <u>substitution</u> | (f) an exchange or replacement of one thing with another |
| <u>transposition</u> | (g) a change in the normal order, a change of sequence |
| <u>unscramble</u> | (h) to put back into proper order; to untangle; to make clear |
| <u>cracking</u> | (i) splitting open; breaking |

(2) Write a paragraph using three of the words. Use a separate piece of paper.

WRITING ABOUT IT

Use a separate piece of paper.

- (1) Make up a secret code. Use it to write a letter to a friend. Give the letter to your friend to see if he or she can decipher it.
- (2) Write a short mystery story that begins with: "Ramon opened the box. Inside was an old piece of paper with writing on it, but it did not make sense."