

With support from Google

Cypher breaking grid 1

Crack the cipher by completing the crossword-style grid, to reveal one of the greatest movie messages of all time. In a cypher individual symbols are replaced by new symbols. Here letters have been replaced by numbers. We've given you a few letters to start. Use the box at the top to record the key to the cypher. All letters of the alphabet appear in both the key and grid ... but which number is which letter? The great Arab scholar Al-kindi pointed out in the 9th century that you could use frequency analysis to crack simple cyphers. The most common symbols in the cypher are likely to be the most common letters in English and the least common ones the least common letters. Use the table provided to work out the frequency of letters in English and in the cypher. Also create a representation of the letters you have used: cross off letters as you find them.

1	2	3	4	5	6	7	8	9	10	A ¹¹	12	13
14	L ¹⁵	16	17	R ¹⁸	19	20	21	22	23	24	25	26

	22		11			11	24	11		8		14	
12	10	14	7	19	8	18		5	16	8	8	7	22
	4		14			8		16			15	10	2
11	19	10	3	14	20		6	11	13	11		19	24
	1		11		10	18		9		18	25	8	17
24	A ¹¹	R ¹⁸	L ¹⁵	8	3		9	16	22	19		22	18
	18			3	8			20			3		19
21	8	25	22			22	11	19	16	18	11	19	8
				14		11					19	10	18
	12	11	1	22		15	10	10	12		18	10	3
	25		11		22	8	23				14		14
22	19	11	22	24		22	10	20	21		23		7
	24		19	8	11	3		10					11
26	10	15	8	3		11		3	11	26	7	8	19
	7		9			7	14	17			10		8

A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
S
T
U
V
W
X
Y
Z

14	7	22	12	11	20	8	7	10	10	7	8
20	11	7	24	8	11	18	25	10	16		
22	20	18	8	11	3						

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Ada Cryptogram

The following message about Ada Lovelace as a child is in code. Crack the cypher and decode the message. Each letter of the alphabet is given a distinct number. Not all letters appear in the message.

HINT: Count the number of times each number appears. With educated guesses you may only need to know what the most common numbers are.

The Allies won World War II through computational thinking - they cracked Hitler's cyphers. That meant the Allies' generals often knew what the Germans would do. One way was by looking for 'cribs': words or phrases that would appear in the messages and looking for a corresponding pattern in the cyphertext. 'Heil Hitler' was often used as a crib as it appeared all the time in Nazi messages. What might be a crib to use in a message about Ada Lovelace?

6	25	24							
20	8	9	5	21					
7	2	7							
2	23	24	7	3	6				
8	19								
10	24	12	5	21					
7	10	16	24						
6	8								
19	16	20							
7	5	2							
7	22	22	23	8	7	17	25	24	2
6	25	24							
22	23	8	10	16	24	3			
8	19								
25	24	23							
24	7	23	6	25					
10	8	9	5	2					
13	6	7	6	24					
18	12	6	25						
6	20	22	12	17	7	16			
21	9	13	6	8					
7	5	2							
7									
13	17	12	24	5	6	12	19	12	17
24	20	24							

**Message
Key**

1	2	3	4	5	6	7	8	9	10	11	12	13
14	15	16	17	18	19	20	21	22	23	24	25	26

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

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Cyphertext Frequency Analysis Tally Table

Use this table to count the number of times each number appears in the cypher text (the coded message), keeping a tally of each. Then work out the percentage of the total each is.

	Tally	Count	%
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			
26			

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English Frequency Analysis Tally Table

Use this table to count the number of times each letter appears in a normal sample of English (eg a short book or chapter of a longer book), keeping a tally of each. Then work out the percentage of the total each is.

	Tally	Count	%
A			
B			
C			
D			
E			
F			
G			
H			
I			
J			
K			
L			
M			
N			
O			
P			
Q			
R			
S			
T			
U			
V			
W			
X			
Y			
Z			