

TECH TALK ADVENTURE JOURNAL

TAKING ON THE
WORLD, ONE
ENGINEERING
CHALLENGE AT A TIME

PROPERTY OF THE FUTURE ENGINEER,

Tech Talk



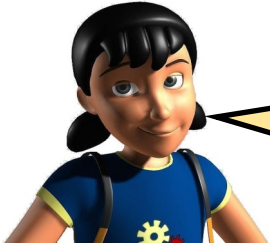
Hello, GEERlings! I'm writing to you from Nigeria in western Africa. My parents came here to work with local engineers on finding alternative energy sources that will help solve the problem of deforestation. I'm having lots of fun here and making new friends! Unfortunately, my friends don't speak English very well, and I don't speak their language at all, so we can't understand each other. I have an electronic translation device with me, but it isn't working right. Instead of displaying the translated message to me in English, it displays it in binary code! I can't understand binary code, so I need some help decoding the message to English. Do you think you can help me do that? Along the way I bet you'll learn a lot about how binary code works. I posted some videos that explain my situation a little better, so make sure you watch them! Thanks for helping me out, GEERlings!

Good luck,

Flynn

Instructions for GEERlings

Segment 1 - Tech Talk



Over 400 languages are spoken in Nigeria! The official language is English, but not everyone speaks it, especially in rural areas.

This key only includes capital letters, but there are different binary codes for letters in lower case. For this exercise, the entire message should be translated in all capital letters.

Binary	Letter	ASCII Code	Binary	Letter	ASCII Code
00100000	[SPACE]	032	01001101	M	077
00111111	?	063	01001110	N	078
01000001	A	065	01001111	O	079
01000010	B	066	01010000	P	080
01000011	C	067	01010001	Q	081
01000100	D	068	01010010	R	082
01000101	E	069	01010011	S	083
01000110	F	070	01010100	T	084
01000111	G	071	01010101	U	085
01001000	H	072	01010110	V	086
01001001	I	073	01010111	W	087
01001010	J	074	01011000	X	088
01001011	K	075	01011001	Y	089
01001100	L	076	01011010	Z	090

Materials Needed:

Piece of paper

A pen or pencil

The key above

The message on the next page

Use this key to decode the message on the next page to be successful!

Instructions for GEERlings

Segment 1 - Tech Talk



Translate the secret message below from binary to letters!

01010111 01001001 01001100 01001100 00100000 01011001 01001111

— — — — — — —

01010101 00100000 01000011 01001111 01001101 01000101 00100000

— — — — — — —

01010100 01001111 00100000 01000001 00100000 01001110 01000001

— — — — — — —

01001101 01001001 01001110 01000111 00100000 01000011 01000101

— — — — — — —

01010010 01000101 01001101 01001111 01001110 01011001 00100000

— — — — — — —

01000110 01001111 01010010 00100000 01001101 01011001 00100000

— — — — — — —

01001100 01001001 01010100 01010100 01001100 01000101 00100000

— — — — — — —

01000010 01010010 01001111 01010100 01001000 01000101 01010010

— — — — — — —

00100000 01010100 01001111 01001101 01001111 01010010 01010010

— — — — — — —

01001111 01010111 00111111

— — —

Let's Engineer It!

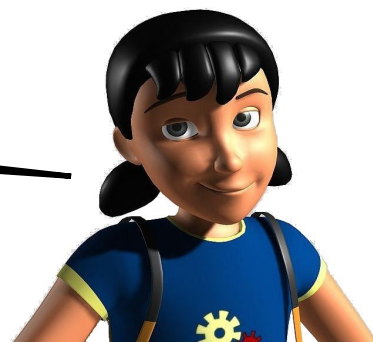
Segment 2—Tech Talk



Flynn needs to translate a message from English to binary code, and she thinks you can encode her message without using a key. Your job today is to answer the questions below. Thinking about these questions will help you understand the process of coding in binary.

You can use the resource links online to find out more about binary code.

Here's a fun fact: Nigeria has the highest rate of twin births in the whole world!



Take notes while you research, but only write notes that make sense to you. Don't write something that you don't understand or can't explain in your own words. If it helps you, you can also draw pictures about the things you learn.

1. What does "binary" mean?

2. What is binary code?



3. How do we use binary code? What is it for?

4. What characters do we use in binary code?



5. What do those characters stand for?

6. How many digits are in each binary segment?



7. How can we "read" binary code?

8. What does ASCII stand for? What does it do?



9. Why is ASCII important for solving Flynn's coding problem?

10. How do we find the ASCII code for each letter of the alphabet?

11. How do we convert ASCII to binary? What are the basic steps?

12. Did you learn about any other computer codes in your research? What other types of codes are there?



Now that you've researched and learned more about binary code, try to use your new knowledge to encode Flynn's message.



Let's Put It All Together!

Segment 3—Tech Talk



With your new knowledge of binary coding, help Flynn encode her message so that she can use her translation device to write a message in her new friend's language. On this page, there is a key that shows you the ASCII code for each letter of the alphabet and for the punctuation marks you need to use.

As you're working on this coding problem, you can use this key, a pencil and paper, the worksheet on the next page, and maybe a calculator if one is available. Good luck!



English	ASCII Code
[SPACE]	032
! [exclamation point]	033
. [period]	046
A	065
B	066
C	067
D	068
E	069
F	070
G	071
H	072
I	073
J	074
K	075
L	076

English	ASCII Code
M	077
N	078
O	079
P	080
Q	081
R	082
S	083
T	084
U	085
V	086
W	087
X	088
Y	089
Z	090

Encoding Worksheet

Segment 3—Tech Talk



Change Flynn's message into binary code! You can use the ASCII key for help, but you'll need to convert ASCII to binary on your own.

CONGRATULATIONS ON YOUR NEW BABY! HE WILL BRING YOU JOY.

English	ASCII	Binary
C		
O		
N		
G		
R		
A		
T		
U		
L		
A		
T		
I		
O		
N		
S		
[SPACE]		

Encoding Worksheet

Segment 3—Tech Talk



English	ASCII	Binary
O		
N		
[SPACE]		

English	ASCII	Binary
Y		
O		
U		
R		
[SPACE]		

English	ASCII	Binary
N		
E		
W		
[SPACE]		

English	ASCII	Binary
B		
A		
B		
Y		
!		
[SPACE]		

Encoding Worksheet

Segment 3—Tech Talk



English	ASCII	Binary
H		
E		
[SPACE]		

English	ASCII	Binary
W		
I		
L		
L		
[SPACE]		

English	ASCII	Binary
B		
R		
I		
N		
G		
[SPACE]		

English	ASCII	Binary
Y		
O		
U		
[SPACE]		

Encoding Worksheet

Segment 3—Tech Talk



English	ASCII	Binary
J		
O		
Y		
.		
[SPACE]		



There are about 250 different ethnic groups in Nigeria! The country is very diverse in its languages, religions, and customs.

GEERling Vocabulary List

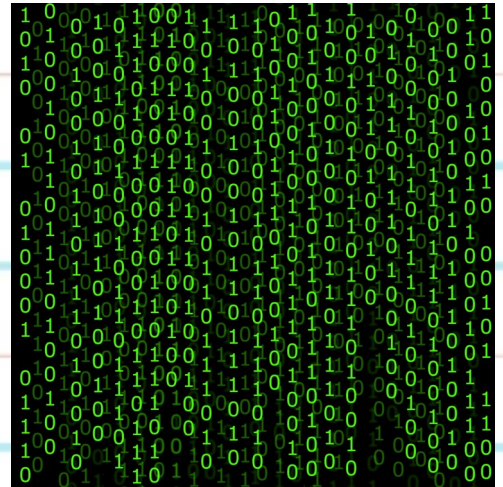
Tech Talk



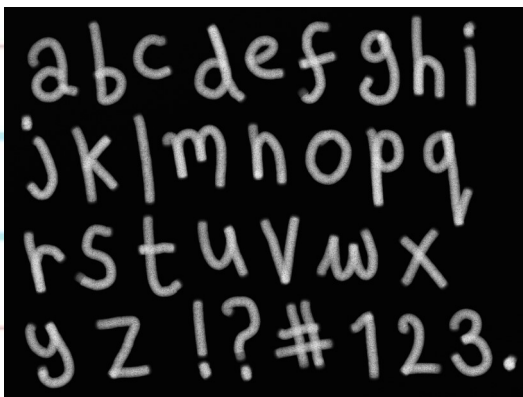
Nigeria is sometimes called the "Giant of Africa" because it is the most populous country on the continent.



Malfunction: To stop working the right way; to fail to function



Binary: something that has two parts; a code that uses only 0's and 1's



Character: a written symbol or letter

Decode: To change a code to a language people can understand

010010000100100100100001 → HI!

Encode: To change language into a code

HI! → 010010000100100100100001

ASCII: American Standard Code for Information Interchange — a standard code for representing letters, numbers, and punctuation marks in computers and electronics

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