MORSE CODE

Samuel Finley Breese Morse[1] conceived the telegraph system, an early communications network. Messages were transmitted through this system using Morse code, an alphabet of electronic marks in which each English letter is represented by some sequence of dashes and dots. For a more complete explanation of Morse code, see

The encoding of English letters is shown in this table:

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

Morse transmitted the first telegraphic message over an experimental line from Washington D.C. to Baltimore on May 24, 1844. The message, "WHAT HATH GOD WROUGHT," a quote from Numbers 23:23, was suggested Annie Ellsworth, the young daughter of a friend of Morse.

Timing

International Morse code is composed of five elements:

- dot — one unit long
- dash — three units long
- intra-character gap between the dots and dashes within a letter — one unit long
- short gap (between letters) — three units long
- medium gap (between words) — seven units long

To illustrate, the phrase "MORSE CODE," written in Morse code format could look something like:
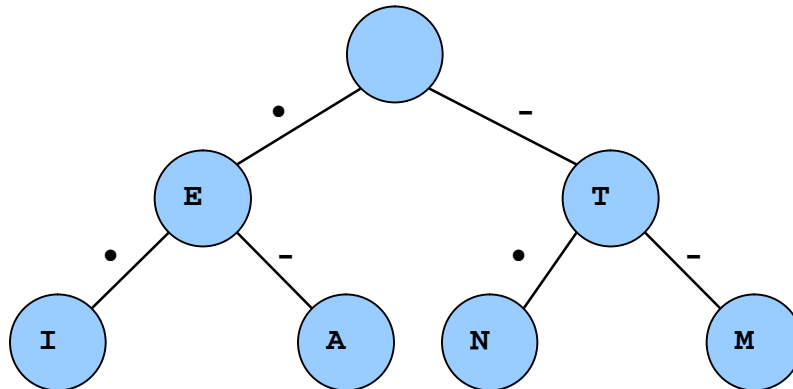
Having one space between each letter and seven spaces between the words.

Decoding

Morse code can be decoded with the help of a *dichotomic search tree* as shown below. Each node contains a single letter; each left child corresponds to a dot and each right child to a dash. Part of the dichotomic search tree for Morse code is:

The Assignment

Write a Java application that reads a line of Morse Code and converts it to English characters. You may assume that the input has only the codes of the English letters 'A' to 'Z'. You may also assume that one space separates letters and more than one space separate words. For example:

Input:
```
-- --- .-. ... .       -.-. --- -.. .
```
Output:
```
MORSE CODE
```

Input:
```
.-- .... .- -       .... .- - ....       --. --- -..       .-- .-. --- ..- --. . .... -
```
Output:
```
WHAT HATH GOD WROUGHT
```

LEARN MORSE CODE in one minute !

This is a code listening tool. Print it on your printer.

Place your pencil where it says START and listen to morse code.
Move down and to the right every time you hear a DIT (a dot).
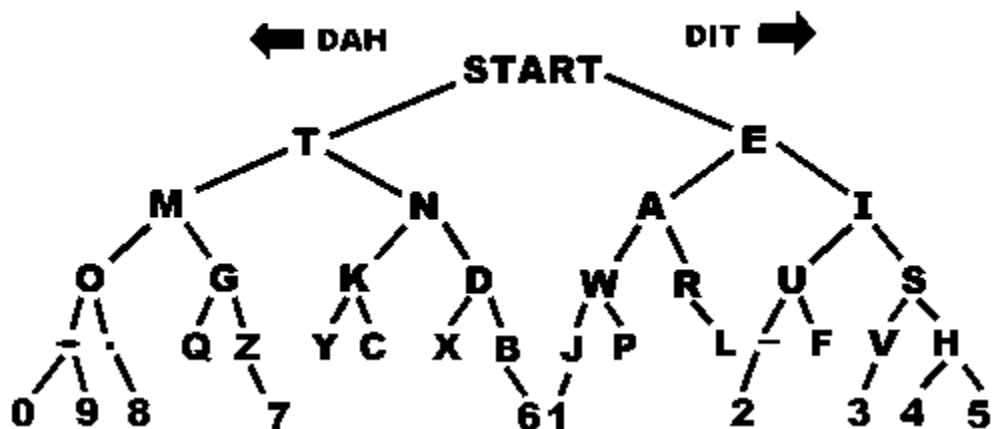**Move down and to the left every time you hear a DAH (a dash).**

Here's an example:

You hear DAH DIT DIT which is a dash then dot then dot.
You start at START and hear a DAH then move down and left to the T and then you hear a DIT so you move down and RIGHT to the N and then you hear another DIT so you move DOWN and RIGHT again and land on the D
You then write down the letter D on your code copy paper and jump back to START waiting for your next letter.

The key to learning the code is hearing it and comprehending it while you hear it. The only way to get there is to practice 10 minutes a day.

Listen to code tapes or computer practice code while tracing out this chart and you will find yourself writing down the letters in no time at all without the aid of the chart.

The chart brings repetition together with recognition, which you don't get from any other type of code practice aid.

HEAR slow morse code This code speed is slow enough to follow the chart above.

Morse Code Alphabet

The International morse code characters are:

A	.-	N	-.	Ø	-----
B	-...	O	---	1	.----
C	-.-.	P	.--.	2	..---
D	-..	Q	--.-	3	...--
E	.	R	.-.	4	....-
F	..-.	S	...	5	.....
G	--.	T	-	6	-....
H	....	U	..-	7	--...
I	..	V	...-	8	---..
J	.---	W	.--	9	----.
K	-.-	X	-..-	Fullstop	.-.-.-
L	.-..	Y	-.--	Comma	--..--
M	--	Z	--..	Question	..--..

Morse Code Worksheet

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

Instructions: Use the table of Morse code translations to fill in either the dots and dashes or the letters that are missing from the problems below. Example: The correct Morse code translation for Cat is -.-. .- -

Word(s)	Morse Code		Word(s)	Morse Code
Cat	-.-. .- -		Hello	
	.... .- -		SOS	
Buzz				-.- -. --- - - -.--
	--. . -			... - --- .--.
Jump				--.- ..- .. --..
Wave				-..- .- .- -.--

Instructions: Match the messages with the Morse code. Write the letter of the matching code on the blank by the message that it is. Example: The Morse code translation of 1 is e.

__e_ 1. This is an example.

_____ 2. SOS

_____ 3. This is cool

_____ 4. Hi.

_____ 5. The boat is sinking.

_____ 6. Boat

_____ 7. Ship

_____ 8. Razorback Whale

_____ 9. Make a whole

_____ 10. Direct hit on the port side.

_____ 11. I went for a swim.

_____ 12. The sharks were everywhere

_____ 13. But I out swam them.

_____ 14. They could not catch me

_____ 15. Go to North Little Rock.

_____ 16. Grounded

_____ 17. Attack

_____ 18. Submarine

_____ 19. Crew member overboard

_____ 20. Just think quick

a) ... --- ...

b) --. .-. --- ..- -. -.. . -..

c) - ....- .-. -.- ...   .-- . .-.
. . ..- . .-. -.-- .-- .- .... . .-. .

d) .. .-- . -.- ..-. --- .- -. ... .-- ..
-- .-.-.-

e) - ....- -.   . -..- .- -- .--.
.-.. . .-.-.-

f) -.... ..-- -   .. --- ..- -   ... .-- .- --   -
.... . -- .-.-.-

g) -... .. -. . .-.-. - .... .. - --- -. - .... . .-
-. --- .-. - .... .. - - .-. . .-.-.-

h) ... ..- -... -- .- .-. .. -. .

i) ....-.-.-

j) .-- ..- ... - - .... .. -. -.- --.- ..- .. -
.-. -.-

k) --. --- - --- -. --- .-. - .... .-.. .. - - -.-
.. . .-. --- -.-. -.- .-.-.-

l) - .... . -... --- .- - .. .. -. -. -.-
.. -. --. .-.-.-

m) -- .- -.- . .- .... --- .-.. .

n) -... --- .- -

o) - .... . -.-- -.-. --- ..- .-.. -.. -. --- -
.-. .- - -.-. .... -- .

p) - ....   -.-. --- --- .-..

q) -.-. .-. . .-- -- . -- -... . .-. --- ...- . .-
. -... --- .- .-. -..

r) ... .--.

s) .- - - .- -.-. -.-

t) -. --- .-. - .... .-.. .. - - .-.. . .-. --- -.-. -.-
.- .-... .