**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Session: \_\_\_\_\_\_\_\_\_\_**

**Programming I**

**Lab Exercise 12.19.2022**

**Communicating with ET**

In 1974, Carl Sagan and Frank Drake sent a message into space aimed at star cluster M13 ass an attempt to communicate with extraterrestrial intelligence. The message contained basic information about humanity and the Earth. The message was sent into space a single time via Frequency Modulated radio waves. When correctly translated into graphics, characters, and spaces, the 1,679 bits of data contained within the message form the image shown here.

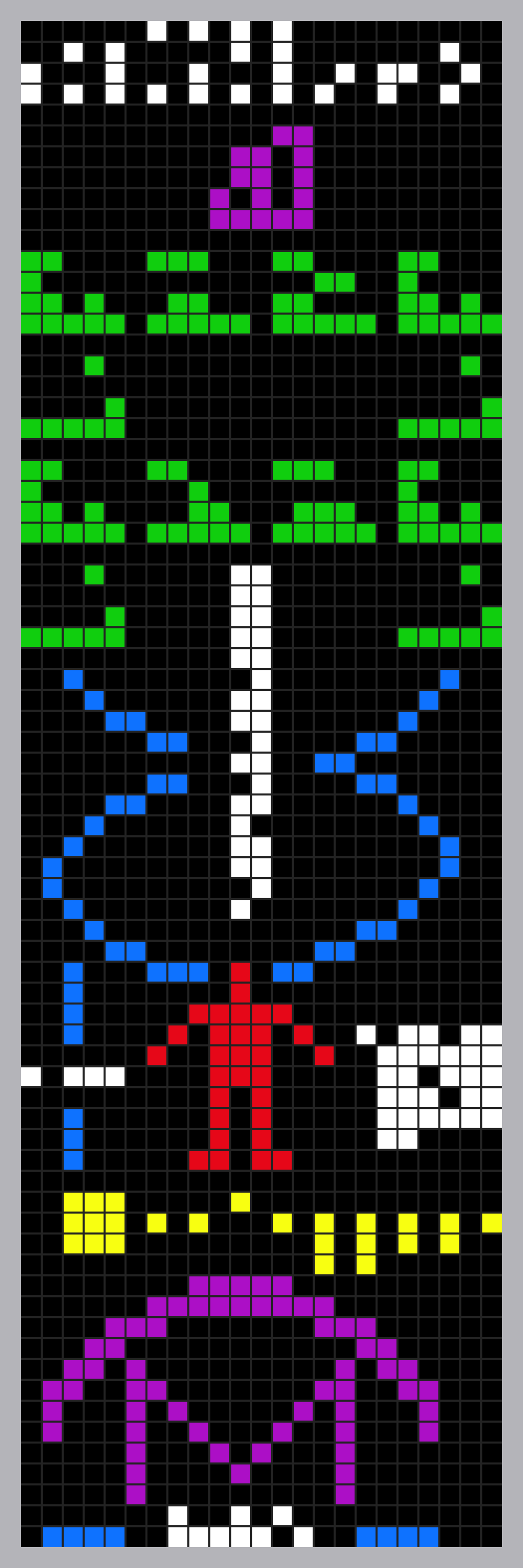
Qr code

Description automatically generated

The message consists of seven parts that encode the following (from the top down in the image):[[5]](https://en.wikipedia.org/wiki/Arecibo_message#cite_note-cassiday-5)

* The numbers one to ten (white)
* The atomic numbers of the elements hydrogen, carbon, nitrogen, oxygen, and phosphorus, which make up deoxyribonucleic acid (DNA) (purple)
* The formulas for the chemical compounds that make up the nucleotides of DNA (green)
* The estimated number of DNA nucleotides in the human genome, and a graphic of the double helix structure of DNA (white and blue, respectively)
* The dimension (physical height) of an average man (blue/white), a graphic figure of a human being (red), and the human population of Earth (white)
* A graphic of the Solar System, indicating which of the planets the message is coming from (yellow)
* A graphic of the Arecibo radio telescope and the dimension (the physical diameter) of the transmitting antenna dish (purple, white, and blue)

Note: Colors are only for explainational purposes only.



The number 1,679 was chosen because it is a semiprime (the product of two prime numbers), to be arranged rectangularly as 73 rows by 23 columns.

00000010101010000000000

00101000001010000000100

10001000100010010110010

10101010101010100100100

00000000000000000000000

00000000000011000000000

00000000001101000000000

00000000001101000000000

00000000010101000000000

00000000011111000000000

00000000000000000000000

11000011100011000011000

10000000000000110010000

11010001100011000011010

11111011111011111011111

00000000000000000000000

00010000000000000000010

00000000000000000000000

00001000000000000000001

11111000000000000011111

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11000011000011100011000

10000000100000000010000

11010000110001110011010

11111011111011111011111

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00011000000000001100000

00110100000000010110000

01100110000000110011000

01000101000001010001000

01000100100010010001000

00000100010100010000000

00000100001000010000000

00000100000000010000000

00000001001010000000000

01111001111101001111000

Our first task is to write a program that reads this message and translates it into a graphic image,

Here is some code:

##Aricebo Message Decoder

##Author: nmessa

##Date: 11/2/2022

##This utilizes the Rance Necaise graphics library

from graphics import \*

#Create Graphic Window and Canvas to draw on

win = GraphicsWindow(800, 800)

canvas = win.canvas()

#Define start position of graphic

x = 300

y = 25

#Define "pixel" size

height = 10

width = 10

#define colors

colors = ['black', 'white']

#Open message file and read in all lines

myFile = open("message.dat", "r")

lines = myFile.readlines()

myFile.close()

#Draw the graphic

for line in lines:

for col in range(len(line)-1):

if line[col] != '\n':

canvas.setColor(colors[int(line[col])])

canvas.drawRect(x, y, width, height)

x += width

y += height

x = 300

win.wait()

**Be sure to use the message.dat file.**

Our next task is to compose your own message to ET. Use graph paper to create your graphic. Be sure to use 73 rows and 23 columns format. Once your graphic is complete, write a description of the meaning of your graphic and build your message that we will send to ET.

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