# UNIVERSE OF CODE

## HOW TO TALK TO A SPACECRAFT

**Many electronic devices use binary code, which is a system that uses two digits to represent information.**

Binary code is a simple, effective way to talk to machines because it uses only two digits: ones and zeroes. You can think of each 1 and 0 like the“on” and “off” positions of a switch. Our cell phones, computers, spacecraft and other digital equipment use binary code.

Individual characters (numbers and letters) are each assigned an 8-character binary equivalent, or stand-in. The letter “A,” for example, is written as “01000001”. In this way, binary code is like a foreign dialect that needs to be translated into a language that you can understand. If you know the code, you (or a computer) can “read” or understand what the binary language is saying. For example, here is “Chandra” written in binary code: 01000011 | 01001000 | 01000001 | 01001110 | 01000100 | 01010010 | 01000001

### TRY WRITING YOUR OWN NAME IN BINARY CODE!

| | | | |
|---|---|---|---|
| A | 01000001 | N | 01001110 |
| B | 01000010 | O | 01001111 |
| C | 01000011 | P | 01010000 |
| D | 01000100 | Q | 01010001 |
| E | 01000101 | R | 01010010 |
| F | 01000110 | S | 01010011 |
| G | 01000111 | T | 01010100 |
| H | 01001000 | U | 01010101 |
| I | 01001001 | V | 01010110 |
| J | 01001010 | W | 01010111 |
| K | 01001011 | X | 01011000 |
| L | 01001100 | Y | 01011001 |
| M | 01001101 | Z | 01011010 |





For a telescope like NASA’s Chandra X-ray Observatory, the digital pipeline of data starts with the spacecraft that travels around Earth in an oval that takes Chandra about a third of the way to the Moon at its farthest point. During this 40,000-mile (64,000-km) journey through space, Chandra sends the data to one of NASA’s Deep Space Network antennas in Australia, Spain, or California (USA), where they are downloaded.

**Scan the code to learn more!**