Read About Information Transfer

INFORMATION TRANSFER DEFINITION

Information transfer is the way information is turned into a code and transferred from one place to another. Computers and other electronic devices transfer information in the form of patterns containing 1's and 0's.

To better understand information transfer and how computers work...

LET'S BREAK IT DOWN!

Patterns are used to send and receive information.

Before electricity was invented, there wasn't a quick and easy way to send messages over long distances.

People communicated using written letters. After electricity was invented, people started using electronic patterns to communicate.

In 1944, the first Morse code machine was invented. This machine sent the earliest text messages through a pattern of long and short beeps that correspond to letters and numbers. One person would send the message using the Morse code machine, and then another person would decode the message into letters and numbers. The information traveled as electrical signals across telegraph lines.

Text and images are transferred through a pattern of 1's and 0's.

Today, microchips in our electronics create patterns of information that are sent to other devices. The receiving device decodes the information into something you can understand. Instead of dots and dashes, our devices use patterns of 1's and 0's, which are translated into letters and numbers.

Digital pictures also use electronic patterns. The patterns are used to turn pixels on or off. Pixels are simply tiny lights.

By sending a pattern of information telling a device which pixels to turn on and off, an image can be made. Images with more pixels have more detail.

Music can be stored and transferred as patterns of 1's and 0's.

Even though music is not text or images, it is also converted to a pattern of 1's and 0's.

CDs store music as microscopic patterns of holes in the surface of the disc. A hole represents a 1 and no hole represents a 0.

Digital music in your phone is also stored in patterns of 1's and 0's. One song can have over ten million 1's and 0's, which computers can read very quickly, sometimes at a rate of over a billion numbers in one second.

# Computer programming gives instructions to electronic devices.

Once a text, image, or song is on your device, you can do something with it through computer programming.

Computer programming, sometimes called *coding*, is the process of giving instructions to a computer in a language it can understand. The computer is then able to perform an action, such as sending a text message or playing a song.
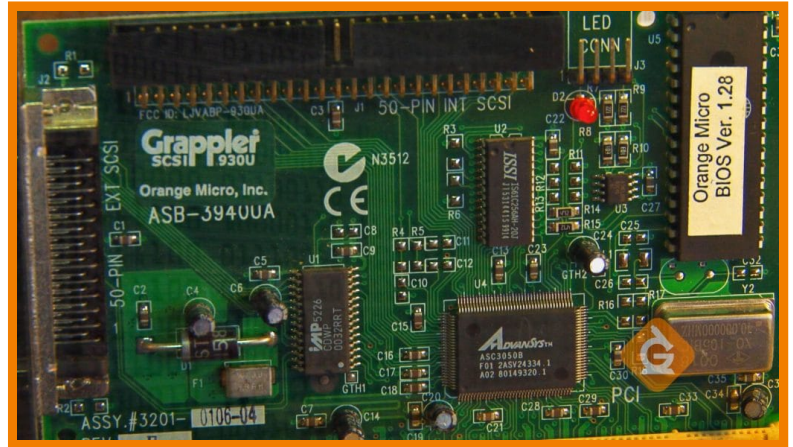
Computer programming involves writing *computer code,* a series of instructions which are translated to 1's and 0's so that a computer can understand it.

EXAMPLES OF INFORMATION TRANSFER
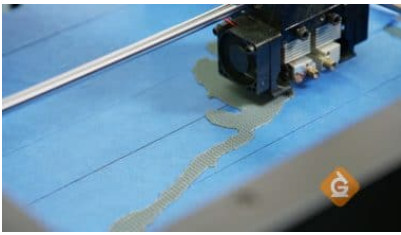
Computers transmit images through a pattern of 1's and 0's to 3D printers. The printer uses instructions in the form of 1's and 0's in order to print.

TV remotes send information as patterns of light pulses. The pulses tell the TV when to change the channel, increase or decrease volume, or when to turn the power on and off.

Cell phones send signals to and from cellular towers. It's common to think that your phone is directly sending a signal to someone else's phone. In reality, both phones are sending patterns of electronic pulses to a cell phone tower.

INFORMATION TRANSFER VOCABULARY

Morse Code	One of the earliest ways to send messages using a pattern of short and long beeps or a pattern of dots and dashes.
Decode	To convert a code into something people can understand.
Radio Waves	A signal that can be sent through the air to send and receive information.
Microchip	The brains of electronic devices. They are often about the size of a coin and located deep inside our phones and computers. Microchips send and receive patterns that help our electronics work.

Pixels	Tiny lights that make up the screens of our devices which can be turned on and off to form an image.
Computer Programming	The process of giving a computer instructions in a language it can understand. Also called "coding."

INFORMATION TRANSFER DISCUSSION QUESTIONS

How does Morse code work to send and receive information? Explain.

Using Morse code, words from messages are translated to a pattern of dots and dashes representing letters and numbers. These patterns of dots and dashes are sent over long distances as pulses of electricity. On the receiving end, the dots and dashes have to be translated back into words so the message can be decoded.

How are Morse code and our current system of 1's and 0's similar?

Both Morse code and our current system use patterns made up of only two things to transfer complex information—Morse code uses dots and dashes and our current system uses 1's and 0's.

How are 1's and 0's used to create the smiley face on Dr. Jeff's pixel grid?

Patterns of 1's and 0's are sent from the microchip to the lights, telling them which ones should turn on. Those that turn on are the ones that create the smiley face.

When Dr. Jeff shows the three images with different numbers of pixels, which is the clearest and why?

The image that uses 1,000,000 pixels to create the image is the clearest because it has the most pixels. The greater the number of pixels, the clearer the image.

How do pixels work to show a colored picture?

Pixels can be different colors. Instructions for the color of each pixel are provided in the patterns of 1's and 0's.

How is music played from a CD similar to music played from a phone? How is it different?

Both CDs and phones use patterns of 1's and 0's to play music. However, CDs actually store music as a pattern of holes (1s) and no holes (0s) on the disc. A CD player reads these patterns and converts them back into sound. Phones are more high-tech and store music as patterns of 1's and 0's on microchips.