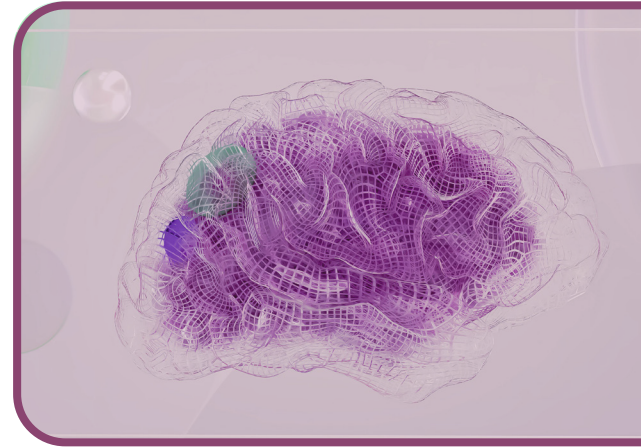
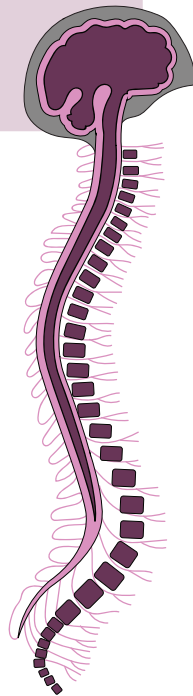
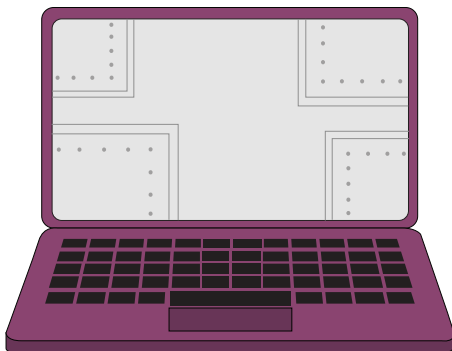


**CONCEPT** Bits are binary digits that are either a 0 or a 1 which can be put in groups such as 8 bits called a byte or  $2^{20}$  bits called a megabyte.



## BACKGROUND

Information Theory is the study of how information can be coded into symbols and how the information can be transferred like in a computer or network or animal brain and nervous system.

## REAL WORLD CONNECTIONS

Ever wonder why we stream video instead of downloading the entire video? Using the speed of data transmission, the amount of data sent can be related to time. If the transmission rate is 450 Mbps, that is in megabits per second, first convert to megabytes by dividing by 8 bits per byte. There would be some additional bits for communication and error checking, but disregard those. The transmission rate becomes 56.5 MBps. So each second, about 50 megabytes could be sent. Now what about a high-definition video that plays at 34 MBps. Since the viewing rate is almost equal to the transmission rate, it would take almost as long to download as it does to watch the video. You might as well watch as the video downloads.