

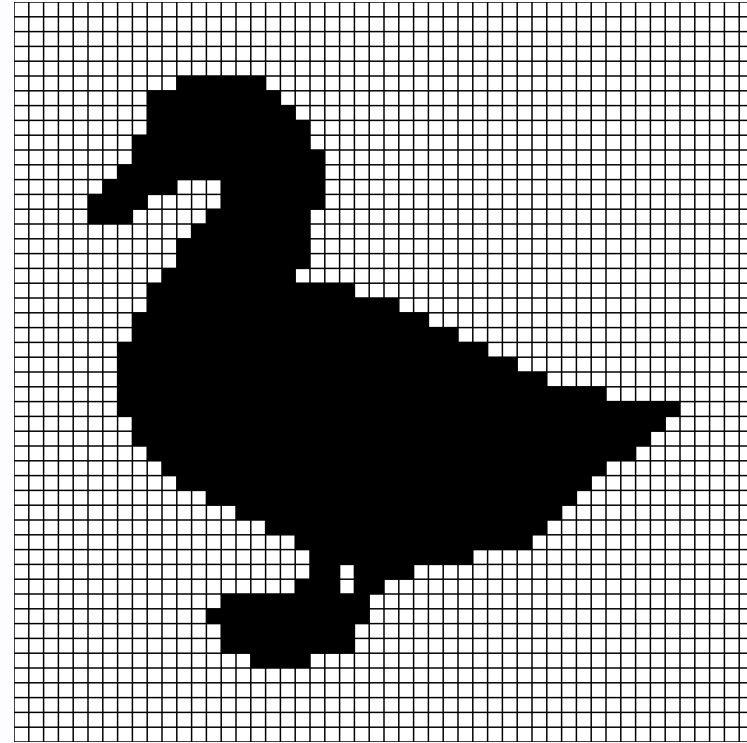
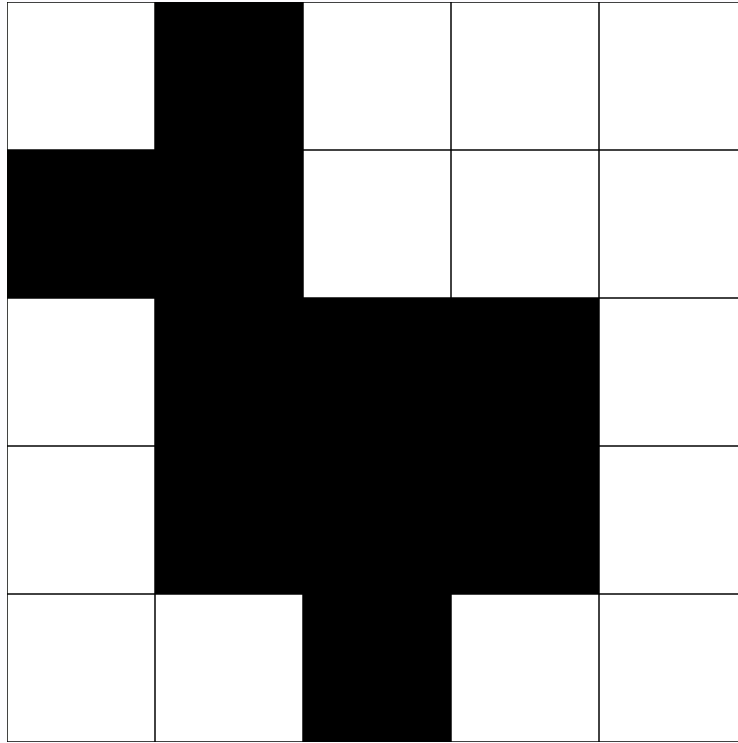
Information Layer

AP CSP @ SouthLake Christian Academy

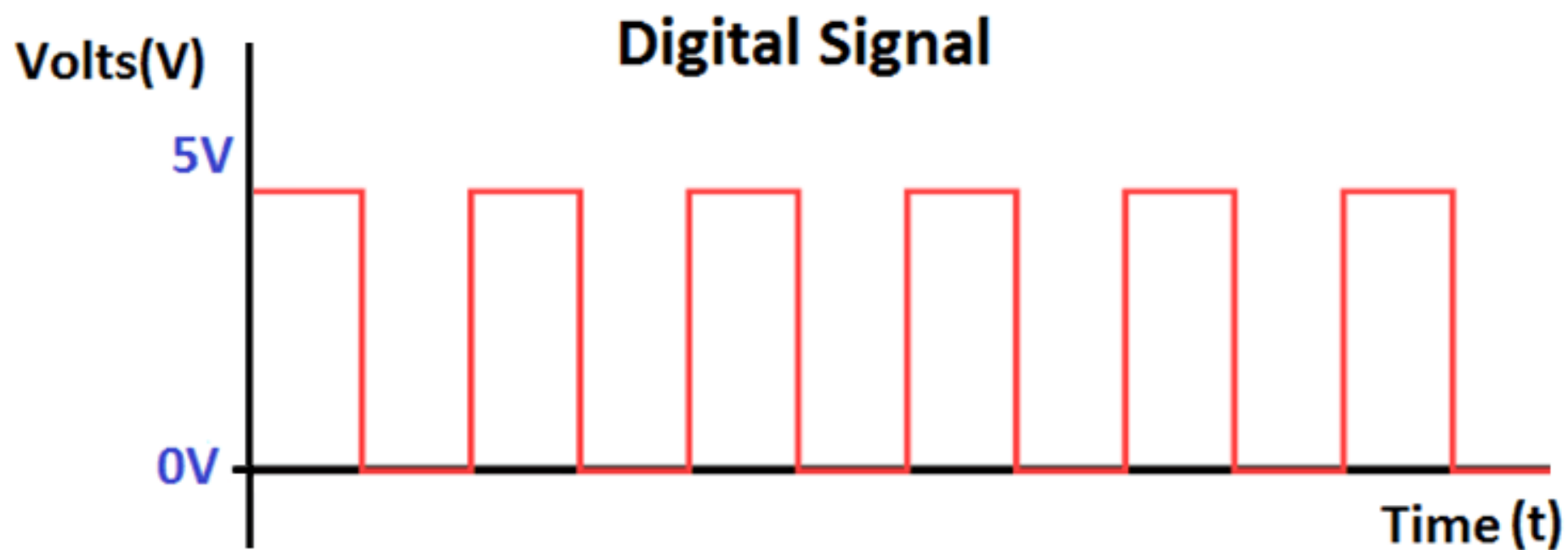
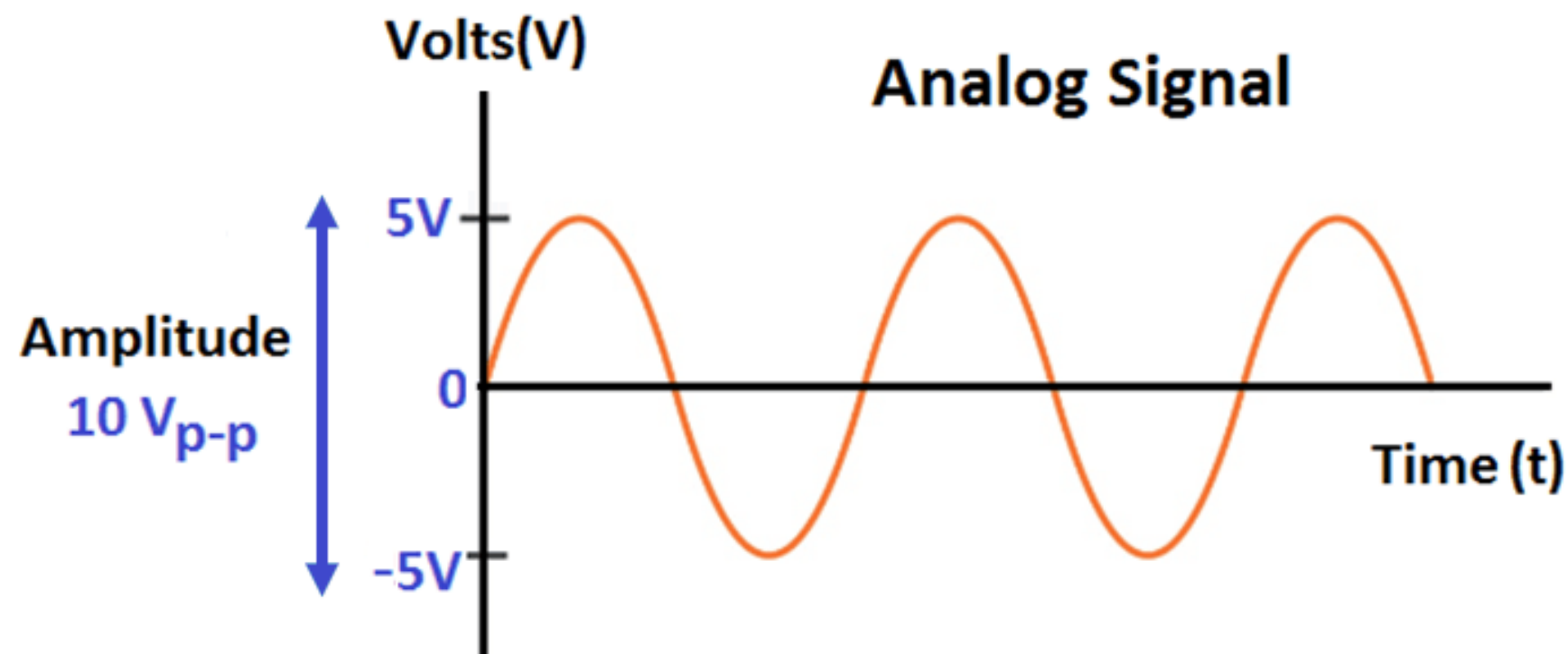
Analog and Digital Data

- **digital data:** data represented as 0 s and 1 s
 - defined at a set time interval
- **analog data:** data represented as a continuous signal

We can represent analog data as digital data, but the computer will have to approximate.



We can get closer and closer to the real duck, but will never be able to fully and accurately represent the duck on a machine.



Audio Formats

- MIDI: **M**usical **I**nstrument **D**igital **I**nterface
 - way to describe pitch and duration of note
 - computer synthesizes these notes
 - not an actual recording
- For *recorded music*, MIDI, AAC, MP3, WAV formats
 - WAV is uncompressed → high quality
 - MP3 is compressed → lower quality
 - Which type of compression?

Audio Format Parameters

- **sampling frequency:** number of times per seconds we take a digital snapshot of what a person would hear
 - often measured in kilohertz (1000 samples a second)
- **bit depth:** number of bits used in each snapshot
- sampling frequency x bit depth = number of bits for one second of music

1-bit deep

0b0	0b1
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off

blaring

2-bit deep

0b00	0b01	0b10	0b11
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off

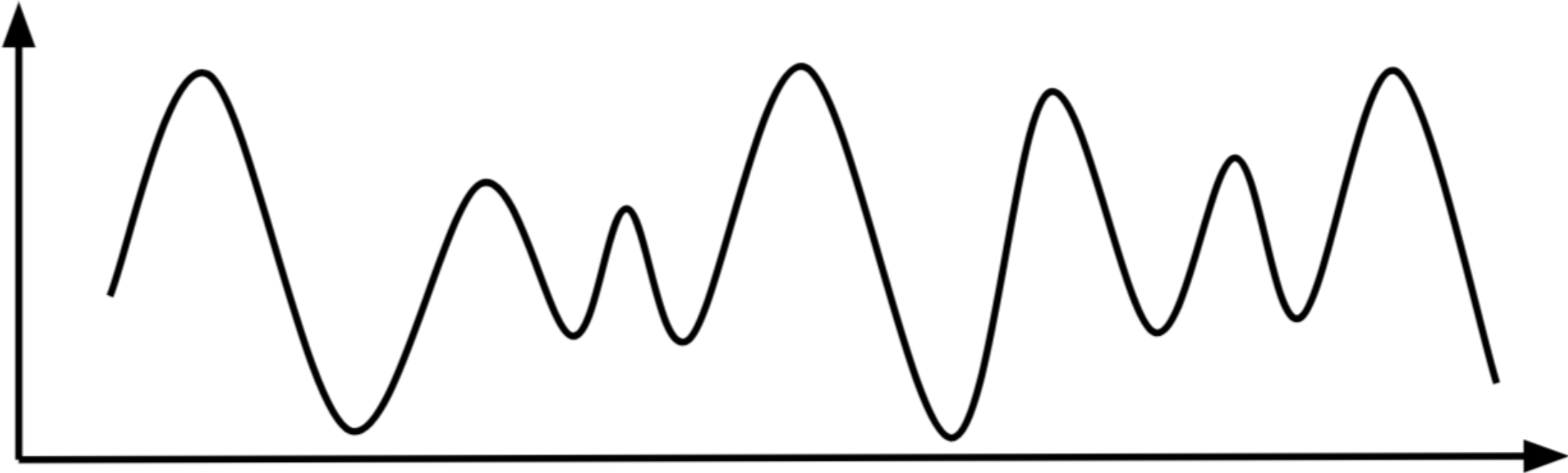
whisper

comfy

blaring

If your song is recorded in a 32-bit audio format, and your song was recorded at 44.1kHz (44100 samples a second), how many bits are required to store your 7 minute song?

Amplitude



Time

Image Formats

- GIF: **G**raphics **I**nterchange **F**ormat
 - low-quality, 8-bit color, can be animated
- JPEG → lossy compression, 24-bit color
- PNG → lossless compression, 24-bit color
- SVG describes equations