

Activity 6 - Analog & Digital Technologies

Guiding Question: *What is the difference between digital and analog transmission*

Key Words:

Attenuation - The gradual loss of intensity as a wave travels

Sampling Rate - The number of measurements taken per second

Get Started:

<i>Is speech an analog or digital signal? Record all your ideas...</i>	<i>Brainstorm a list of technologies that send or receive digital signals</i>
<i>Speech is an analog signal since it is a continuous stream</i>	<i>Iphone, headphones, computers, TV, gaming consoles, pacemakers, radios, amazon Alexa, car FOBs, bluetooth anything, all cool things in 2018</i>

Directions: Listen or read each section in Activity 6. For each section, you should write 3-4 complete sentences that capture the main idea of what you just heard/read.

SECTION	3-4 COMPLETE SENTENCE MAIN IDEA OF SECTION
Communication Waves	<i>Communication waves are made up of two different types of signal one more reliable than the other</i> <i>Analog- a stream of information that varies continuously when converted</i> <i>Digital- a series of number before transmitted often made up of 1s and 0s</i>
Sample Rate	<i>Sampling rate is the number of measurements taken per second (FPS)</i> <i>Sampling rate varies depending on use, mostly taken in Hertz (Hz)</i> <i>Wireless headphones and telephone are typically 8,000 Hz and digital video can be 192,000 (Hz)</i>

Attenuation	<i>Attenuation is the gradual loss of intensity of a wave as it travels</i> <i>When a wave reaches its destination the signal needs a boost to return to its original strength</i> <i>An Amplifier does this by using energy from a power supply to increase amplitude of the wave</i>
Advantages to Digital	<i>Digital can be sampled frequently enough for extreme accuracy</i> <i>Main advantages of digital is that over long distances it has more of an impact than analog</i> <i>Digital uses electrical parts like lasers so it won't degrade over time</i>
Noise and Clarity	<i>Most people are tempted to turn up the volume up in noisy places so they can but don't know the dangers that comes with it</i> <i>Listening to the same sound for a long period time can hurt your ears especially when you put the volume up</i>
Hearing Aid Technology	<i>The first hearing aid was made in the 1950s used analog technology</i> <i>Over the next 20 years various advantages reduce the size and improved performance of hearing aids</i> <i>People who have severe hearing loss not helped by hearing aids may consider a cochlear implant this implant gets its name because its snail shaped organ filled with fluid in the inner ear.</i>

Activity 6 - Digital and Analog Technology | Post Reading Questions:

Directions: Use your new knowledge of Analog and Digital technology to answer all of the questions below:

1. Explain the difference between analog and digital sound transmission.

Analog sound transmission is a continuous wave of sound. Digital transmission is a code or an "off and on signal"

2. Use what you learned from your hands-on investigation in Activity 5, "Telephone Model," and from the text and diagrams in this activity to explain:

- Why noise is more of a problem for long-distance analog signals than for digital ones.

It is a problem long range for analog because it has other noise that might interfere and mess up the message unlike digital you can still hear the message with interference.

- Why digital signals are a more reliable way to encode and transmit information than analog signals

Noise has less impact on digital transmission - so it will be easier to decode

3. What are the advantages of digital hearing aids over analog ones? Explain how the structures of the hearing aids contribute to how they function.

Digital are more accurate than analog - it decreases the noise in the background. The structure puts the machine next to the actual ear canal.

4. What two numbers usually represent information in a digital signal?

It's made up of Zeros (0) and Ones(1)

5. How does a higher sampling rate create a more accurate signal?

When the sampling rate increases, the digital signal is CLOSER to the real analog signal.

6. What is the main advantage of using digital signals instead of analog signals over long distances?

Noise has less impact on digital signals so it is easier to decode. Also, they last longer.

7. What might be a reason why it is dangerous to use low quality headphones in crowded areas?

It can affect one ear or both and lose hearing. Also turning up the volume puts too much energy into the ears and causes damage.

8. How does a hearing aid work?

New ones convert sound from analog into digital format

Older ones actually had a microphone and amplifier.

9. Examine the two methods below for storing and reproducing music: **Explain why the CD is a more reliable way to encode and transmit the information than the record player.**

- A record player has a sensitive reed that vibrates directly in a groove on a spinning vinyl disc. The vibration that travels through the neele is amplified to produce the sound.



- A CD has a continuous track of microscopic bumps in a plastic disc that is read by a laser, which uses a small computer to reconstruct the sound from coded bumps.



CDs are more reliable because noise can't interfere AND they do not degrade over time