Advantages of Digital Communication Transmission

A Carolina Essentials[™] Activity

Student Worksheet

Overview

Our methods of communication and information transfer have advanced rapidly over the past 100 years. In the recent past, telegraph messages were sent long distances over wires, got translated on paper, and hand delivered to the recipient. Phone operators had to connect the sender and receiver to complete conversations. Now cell phones send images, videos, and audio through digital codes for transmission to the person sitting next to you or to someone on the opposite side of the globe. Wires are no longer needed to communicate. The ability to digitize information has changed information technology.

Phenomenon

What makes these phones different from each other?



Both types of information transmission make use of electromagnetic waves. The waves on the longer end, (red side), of the electromagnetic spectrum are often referred to as the communication band. Within that range, short waves, microwaves, radio waves, and TV broadcast waves exist. Analog and digital information transmission rely on these waves.

So, what is the difference between the two transmission techniques? It's the way information is coded. Look closely at the graphic below. Analog input is a sine wave with crests and troughs while digital information is coded as series of 1s and 0s.



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SAFETY REQUIREMENTS -

No PPE is required for the activity.

MATERIALS ·

Handouts



And converting digital to analog would look like this:



In this activity, you'll compare the two types of information transmission and storage and complete a simple digital information coding exercise.

Essential Question

What are the advantages of using digital information transmission?

Activity Objectives

- 1. Prepare a graphic organizer detailing the benefits and drawbacks of analog and digital information transmission and storage.
- 2. Construct an argument for the use of one method of transmission and storage of information.
- 3. Simulate digital information transmission by translating information into binary code.

Activity Procedures

- 1. Complete your assigned research. Use the graphic organizer below for note taking.
- 2. As a group, share research and fill in the graphic organizer completely.
- 3. Use the information you found to prepare a written argument convincing a large business which data storage and transmission method is best for the company.
- 4. Use the binary alphabet to translate your name into binary code.

Data and Observations

Analog Transmission Benefits	Digital Transmission Benefits	
	Digital Transmission Drawbacks	
Analog Transmission Drawbacks	Digital Transmission Drawbacks	
Analog Transmission Drawbacks	Digital Transmission Drawbacks	
Analog Transmission Drawbacks	Digital Transmission Drawbacks	
Analog Transmission Drawbacks	Digital Transmission Drawbacks	



Analog Storage Benefits	Digital Storage Benefits		
	Digital Storage Drawbacks		
Analog Storage Drawbacks	Digital Storage Drawbacks		
Analog Storage Drawbacks	Digital Storage Drawbacks		
Analog Storage Drawbacks	Digital Storage Drawbacks		
Analog Storage Drawbacks	Digital Storage Drawbacks		

Analysis and Discussion

- 1. Construct an argument, citing evidence, that a large corporation should use either analog or digital information storage and transmission.
- 2. Look at the uppercase binary alphabet. What patterns can you identify?
- 3. Look at the lowercase binary alphabet. What patterns can you identify?
- 4. Write your name in binary code.
- 5. Write a short sentence in binary code and give it to a classmate for translation. Check it for correctness.
- 6. Look at the phones in the phenomenon again. Based on what you have learned, determine the information transmission and storage method for each phone. Include your reasoning.



Binary Code Alphabet

Capital Letter	Binary Code	Lowercase Letter	Binary Code	
А	01000001	а	01100001	
В	01000010	b 01100010		
С	01000011	с	c 01100011	
D	01000100	d	01100100	
E	01000101	е	01100101	
F	01000110	f	01100110	
G	01000111	g	01100111	
н	01001000	h	01101000	
I	01001001	i	01101001	
J	01001010	j	01101010	
к	01001011	k	01101011	
L	01001100	I	01101100	
М	01001101	m	01101101	
N	01001110	n	01101110	
0	01001111	0	01101111	
Р	01010000	р	01110000	
Q	01010001	q	01110001	
R	01010010	r	01110010	
S	01010011	S	01110011	
т	01010100	t	01110100	
U	01010101	u 01110101		
V	01010110	v	01110110	
w	01010111	w	01110111	
x	01011000	x	01111000	
Y	01011001	У	01111001	
Z	01011010	z	01111010	

Binary Code Punctuation		
Punctuation Mark	Binary Code	
	101110	
?	111111	
,	101100	

Analog vs. Digital Argument Rubric

Feature	Achieved	Attempted	Absent
Clear thesis statement for choice of transmission and storage (analog or digital)			
Reasons supporting the choice (3 to 5)			
Reasons supported with evidence			
Sources cited where appropriate			
Mechanics (sentence structure, grammar, spelling, punctuation, and convincing style)			

