

CONTENT ASSESSMENT—CER

Why are digital signals a more reliable way to send information than analog signals?

Criteria	
The continuum of incomplete understanding should be assessed based on how much of the thorough explanation they develop overall, not necessarily the inclusion of specific bullet pointed ideas.	
Thorough Understanding	Explanation addresses all the following ideas in some way: - Signal characteristics: - Signals are sent via electromagnetic waves. - Digital signals represent only 0 and 1 (discrete). - Analog signals have many possible values (continuous). - Digital signals are frequency-dependent while analog signals vary based on amplitude. - Connection between signal characteristics and reliability: - Since analog signals are continuous, they may generate meaningless signals (i.e., “static” or “noise”) through waves of the wrong amplitudes. - Digital signals are “cleaner” because there are only two possible signals and there is a brief gap between each signal sent. Even if signal amplitude varies it will still transmit the same information.
Partial Understanding	Explanation addresses some combination of ideas from the “Thorough” category. Some possible combinations: - Thorough explanation of both the signal characteristics and reliability for only one of the signal types. - Thorough explanation of both the signal characteristics and reliability for only one of the signal types and an incomplete explanation for the other. - Includes criteria of both the signal characteristics and reliability but the details for both types of signals are only partially complete.
Limited Understanding	Explanation addresses a limited number of ideas from the “Thorough” category. Some likely answers: - Thorough explanation of signal characteristics or reliability for only one signal type. - Includes an incomplete/disconnected/random combination of criteria for a thorough explanation of both the characteristics and reliability of both digital and analog signals.

Why do the video game graphics look better over time?

Criteria	
The continuum of incomplete understanding should be assessed based on how much of the thorough explanation they develop overall, not necessarily the inclusion of specific bullet pointed ideas.	
Thorough Understanding	Explanation addresses all the following ideas in some way: - The higher resolution of newer video game graphics is generated by an increased number of electromagnetic (EM) wave signals compared to the limited number of EM waves that produce graphics in older video games. - Newer video game graphics have more pixels which mean images have more details and are therefore higher resolution than older games. - Newer electronic devices have more memory and are faster than older ones. This allows them to quickly process the increased number of EM wave signals that generate high resolution images.
Partial Understanding	Explanation addresses only one of the ideas from the “Thorough” category. Either: - How resolution increases (with or without pixel details), or - How memory and processing speed allows for high resolution images, but not both.
Limited Understanding	Explanation partially addresses only one of the ideas from the “Thorough” category. Either: - How resolution increases (without pixel details), or - How memory and processing speed allows for high resolution images, but not both.