**Question:** How do waves change their behavior as they travel through different types of materials or media?

Use the link to watch a short video of music at the Grand Canyon: <https://www.youtube.com/watch?v=HTZi1MzHSac>

Answer the following questions after you have watched the video.

1. Why do we still hear music after the person stops playing the trumpet?
2. How did the energy of the wave change after it reflected back off the canyon wall?
3. Do you think the sound wave in the video would have behaved the same, if the solid rock cliff was covered in green moss? Explain your thoughts.
4. What do you think affects the speed at which a wave bounces off a surface?

**Investigation: Observing Mechanical Waves Through Different Media**

In this activity you will see a metal slinky taped to a plastic slinky. The slinky’s are being moved back and forth across the floor to model a transverse wave. Notice how the wave moves through the plastic and metal slinky differently. [Click here](https://rcschools.zoom.us/rec/share/nZ6Wqk_Eq95YDOvi_9k4ZY55yn3X4UBB1y5CusoDuyL1SrkbASwkbTAsb-BF4Mxr.S4oh13ORBO0446RO?startTime=1599771300000) to watch a video demonstration of the activity.

After watching the video complete the chart and questions below.

**Observations of Mechanical Waves Through Different Media**

|  |  |  |  |
| --- | --- | --- | --- |
| Initial medium | Change in medium | How did wave amplitude and wavelength change as it moved from one material to the next? | Diagram of wave and changes it made |
| Plastic (move this end of the slinky) | Metal (This end of the slinky stays still) |  |  |
| Metal (move this end of the slinky) | Plastic (This end of the slinky stays still) |  |  |

Data analysis:

1. Based on your data and the changes you saw, as well as what you know about wave properties, for the speed of a wave to change, what also must change? What must stay constant?
2. What other observations did you make about how the wave traveled? Did it change direction in anyway? Explain what you think caused these changes.

**Assessment of Quantitative Data of Sound Waves**

Data Table 3

|  |  |
| --- | --- |
| **Medium** | **Average Speed of Sound** |
| air | 343 m/s |
| water | 1482 m/s |
| hard wood | 3960 m/s |
| copper | 5010 m/s |
| granite | 5950 m/s |

1. What conclusions can you come to from analyzing the quantitative data above about the speed of sound waves in relation to the density of the medium? What might explain this?
2. Do your qualitative data (the information you gained from the demonstration video) and your quantitative data (information in the chart above) agree? Why or why not?
3. From what you have learned, explain the following real-world phenomena.
   1. How do bats use sound to locate objects due to their lack of vision?
   2. Why would Native Americans, when preparing to hunt, put their ear to the ground to determine if there was a buffalo herd nearby?