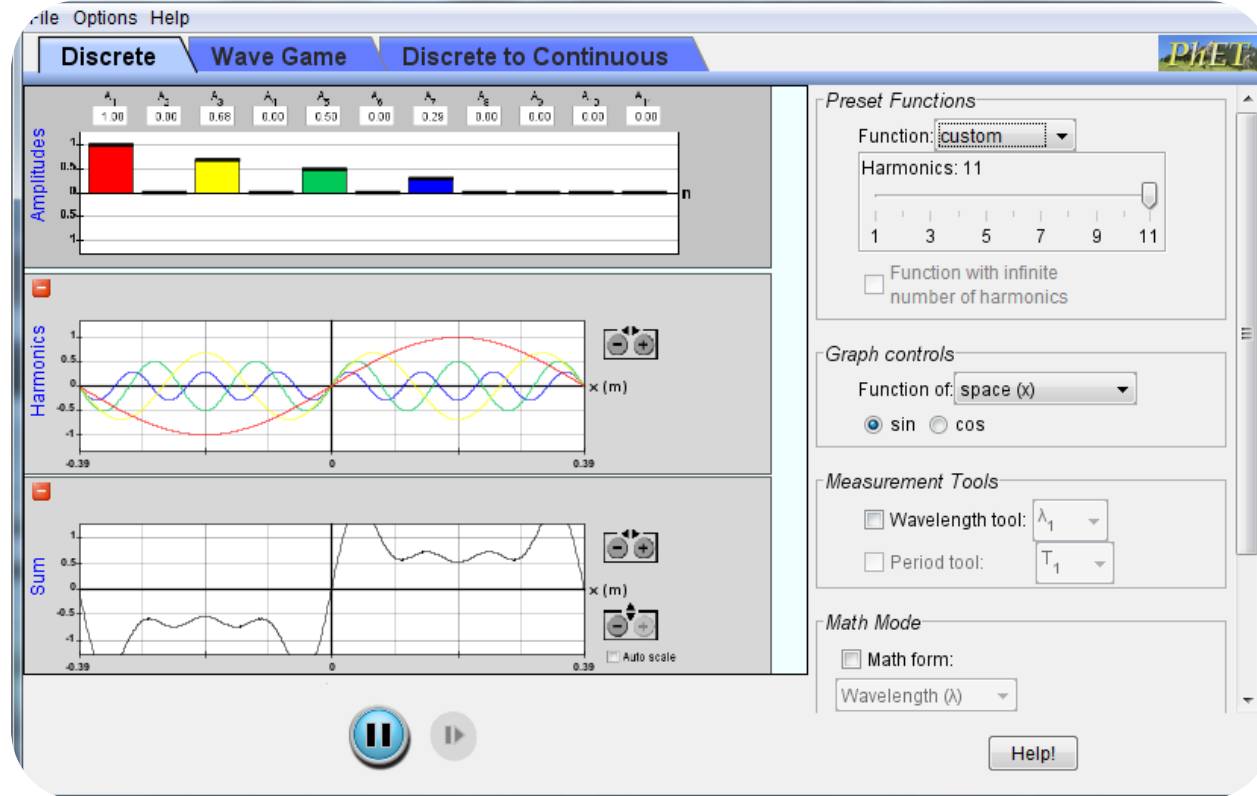


# MIT Museum





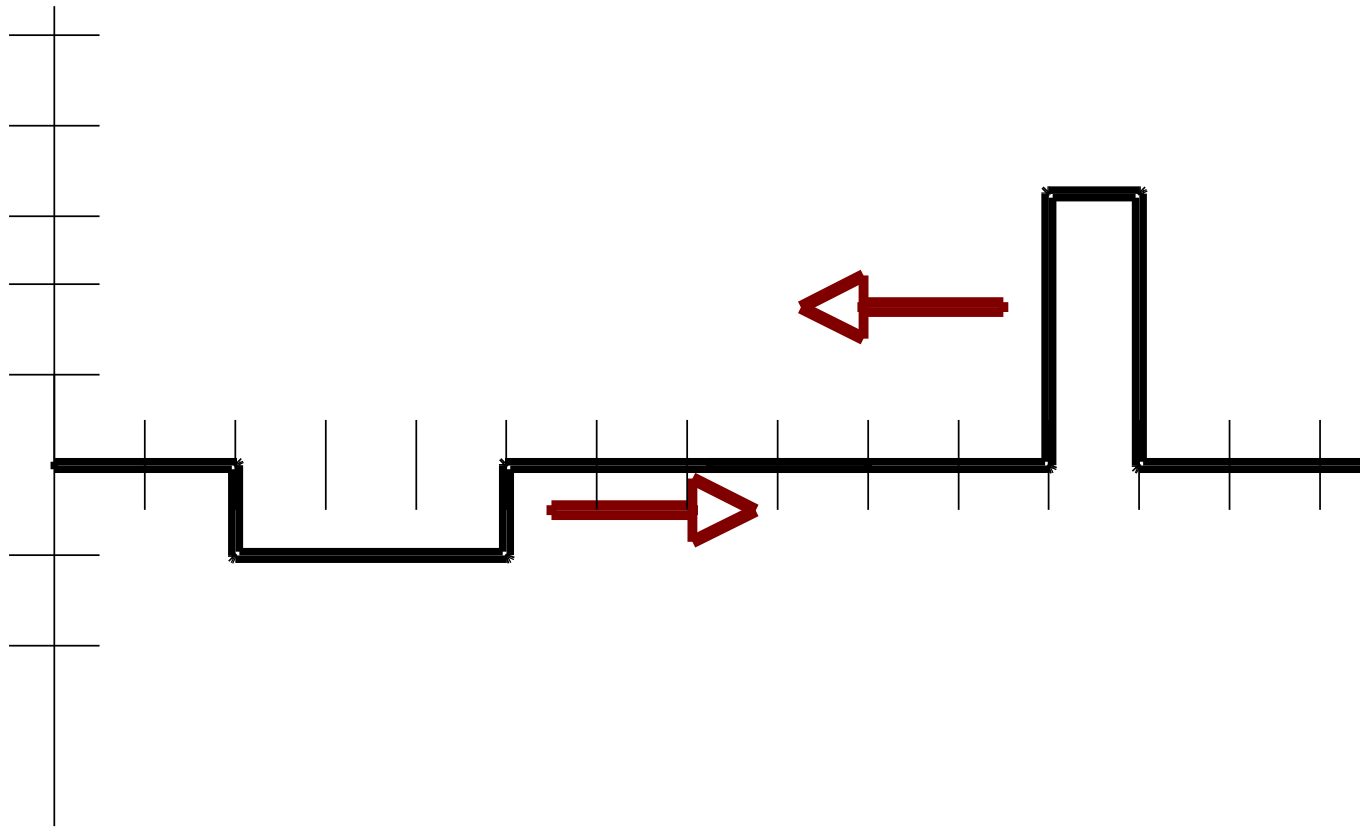
# Fourier

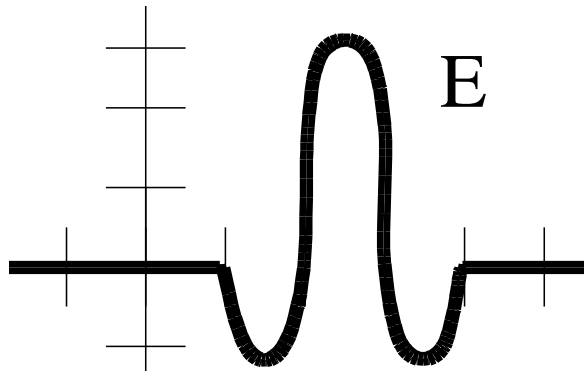
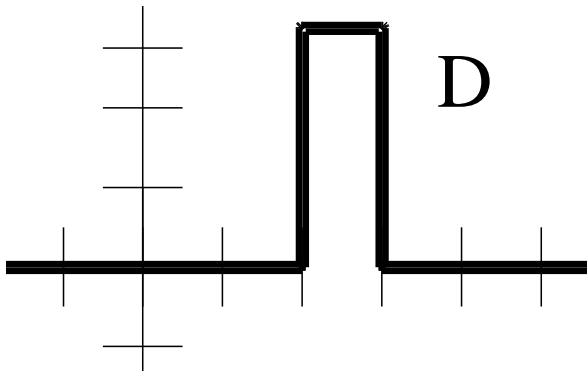
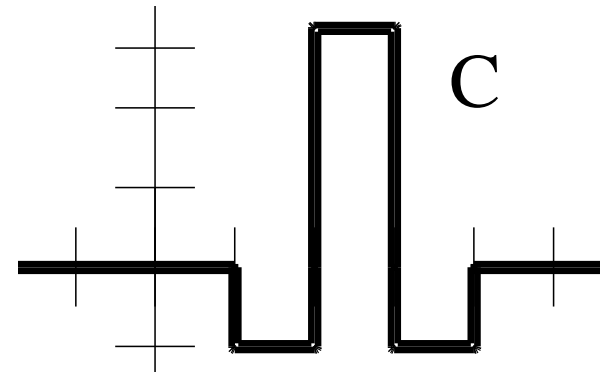
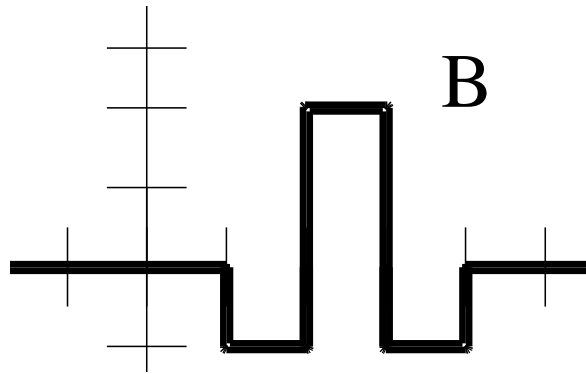
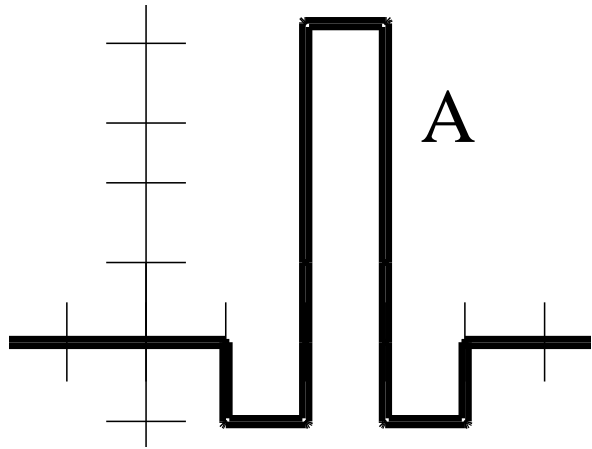
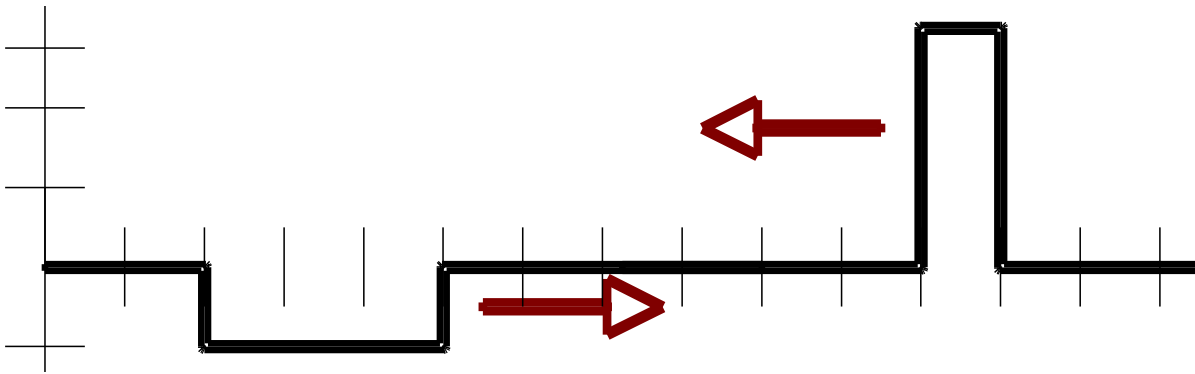
What did you learn??

# Perception

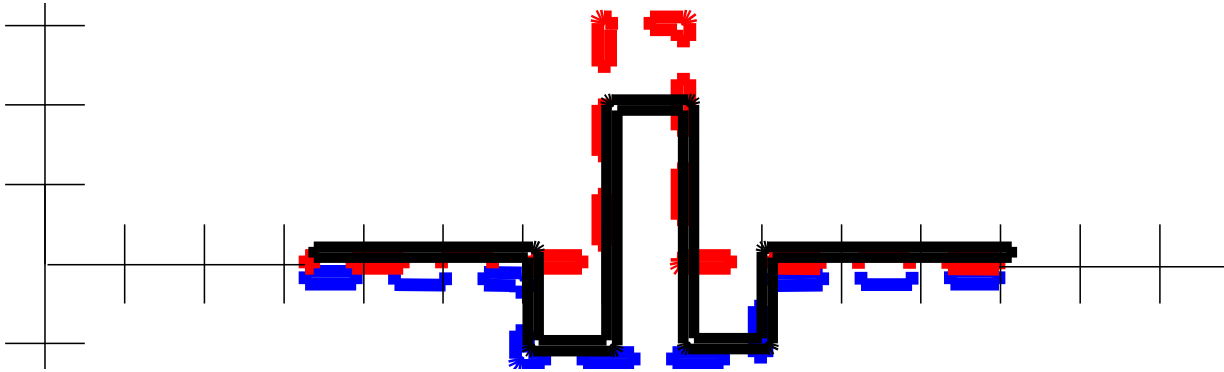
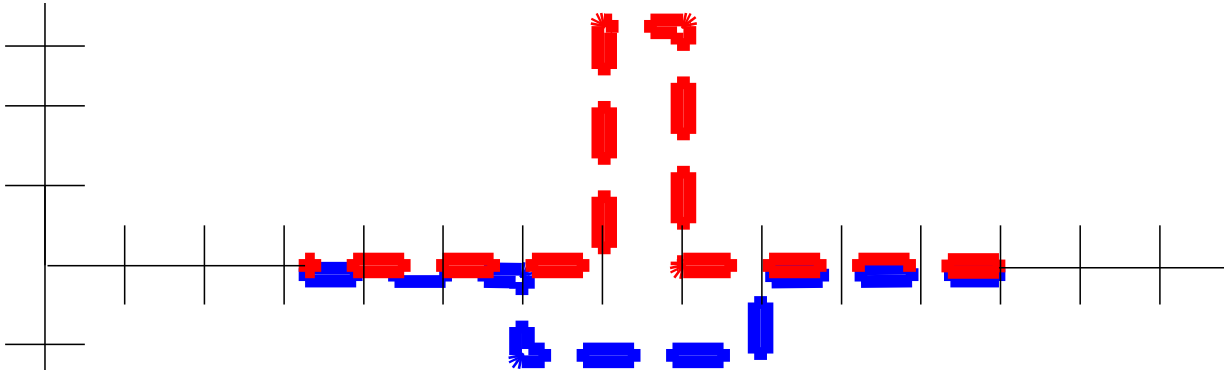
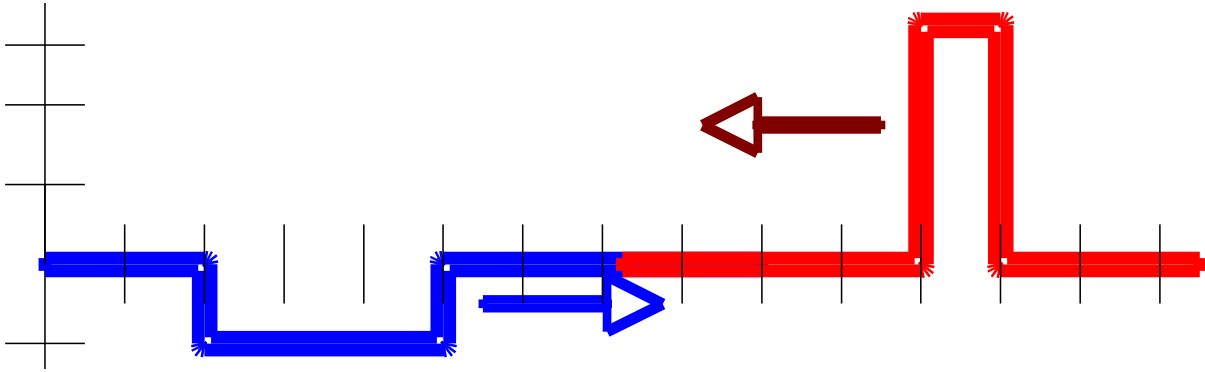
- Can pick out one frequency

1. The pulse on the left is moving right, the pulse on the right is moving left. What do you see when the pulses overlap?

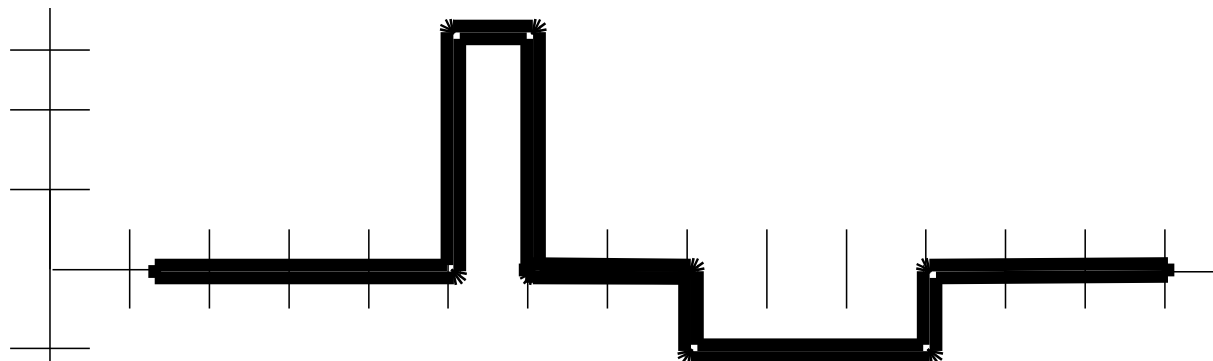
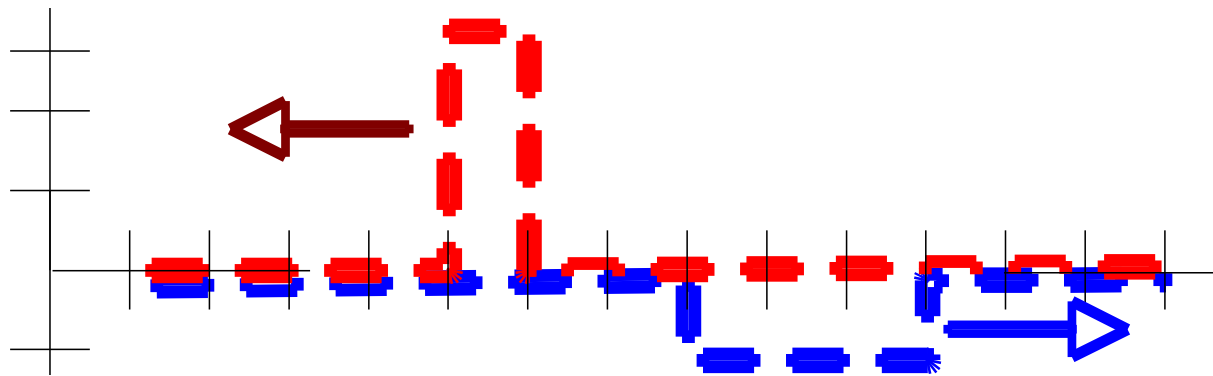
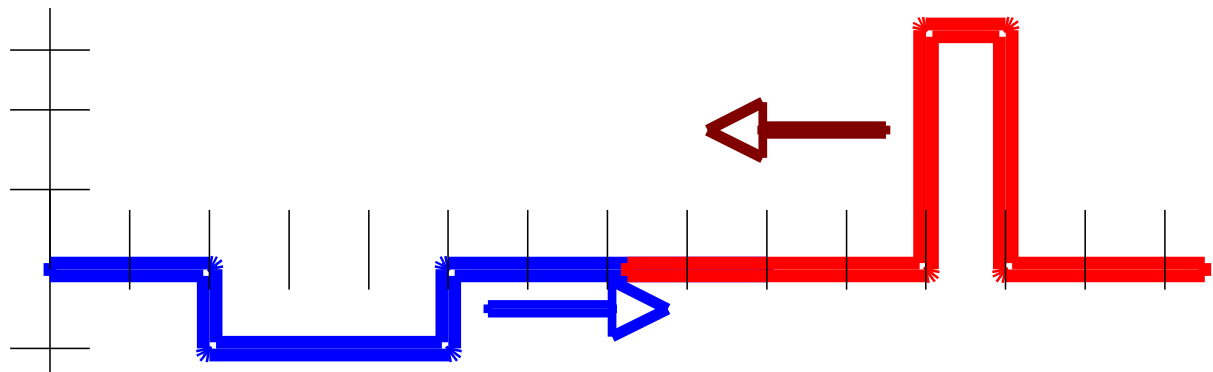




Rest of question

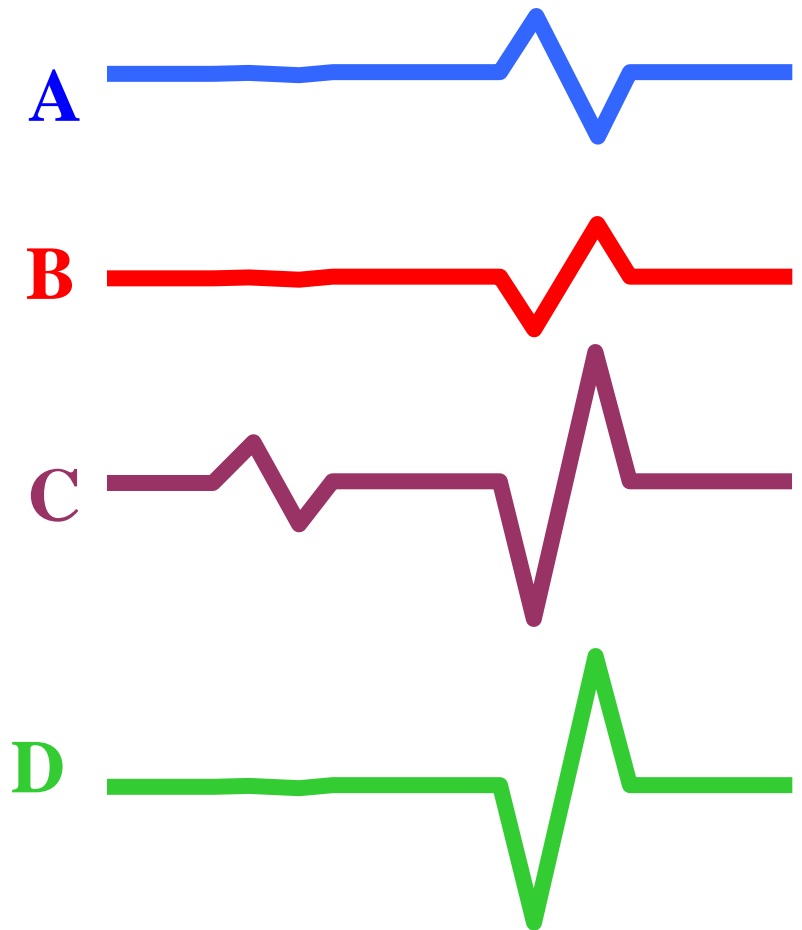
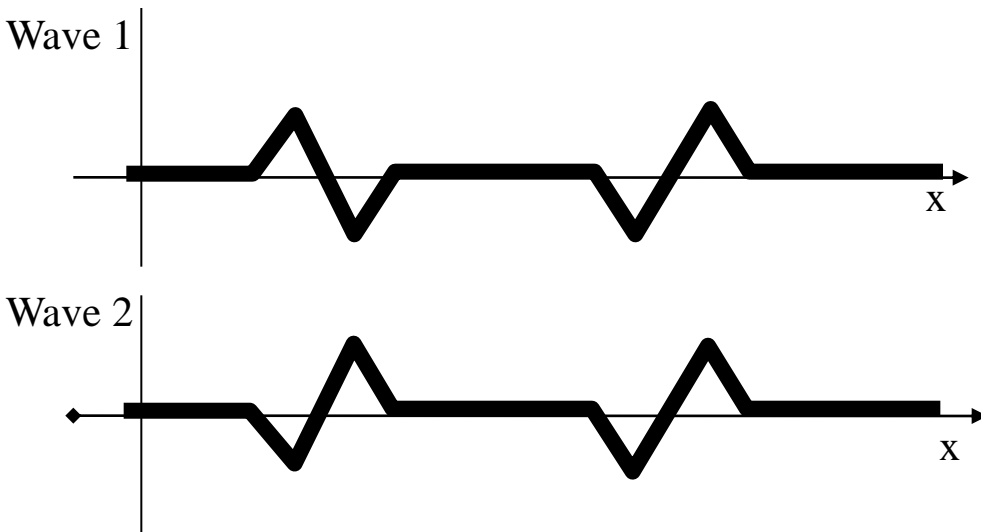


B



After interacting

2. If these two waves were moving through water at the same time, what would the water look like?

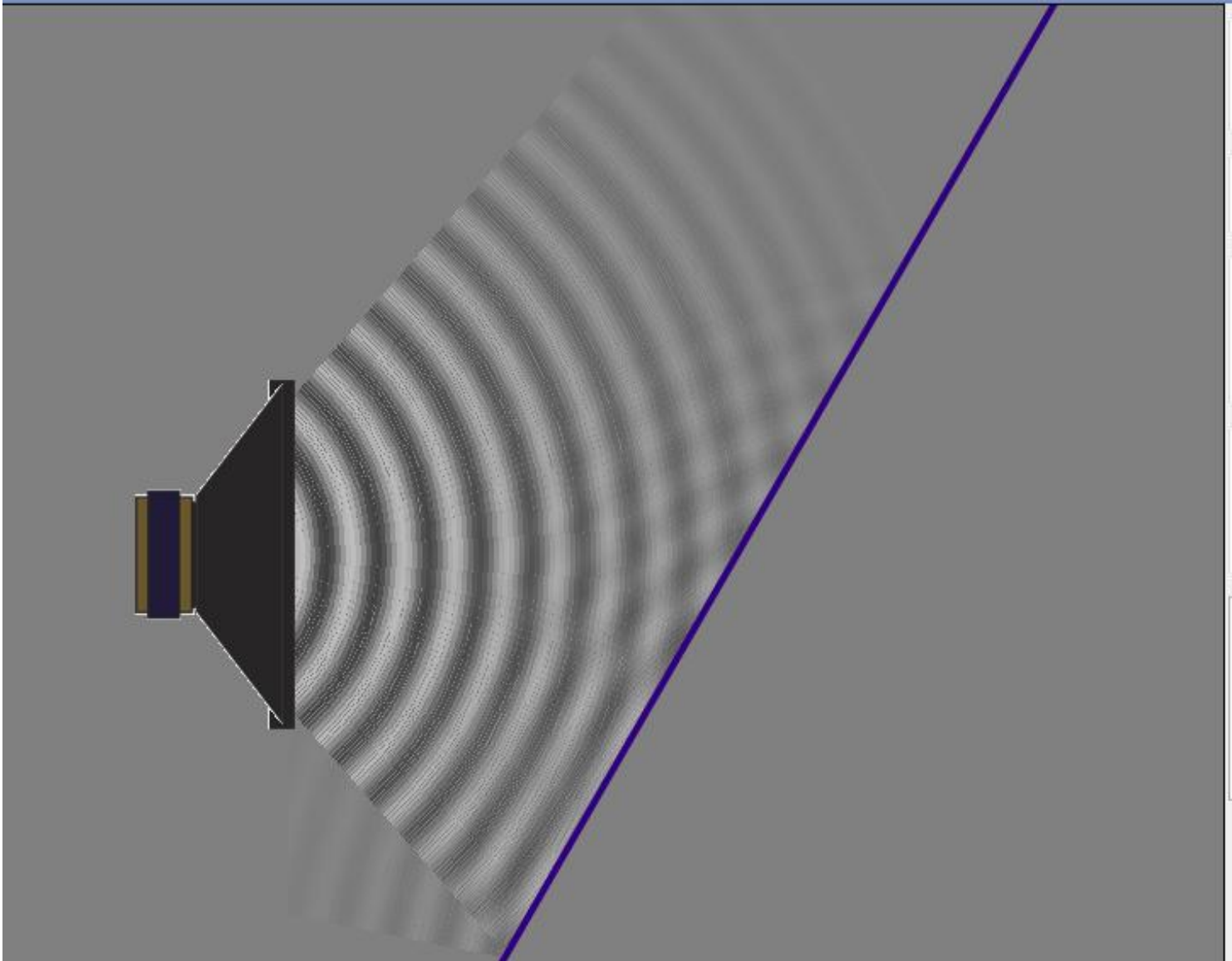




# Echolocation



# Sound bounces off of different materials



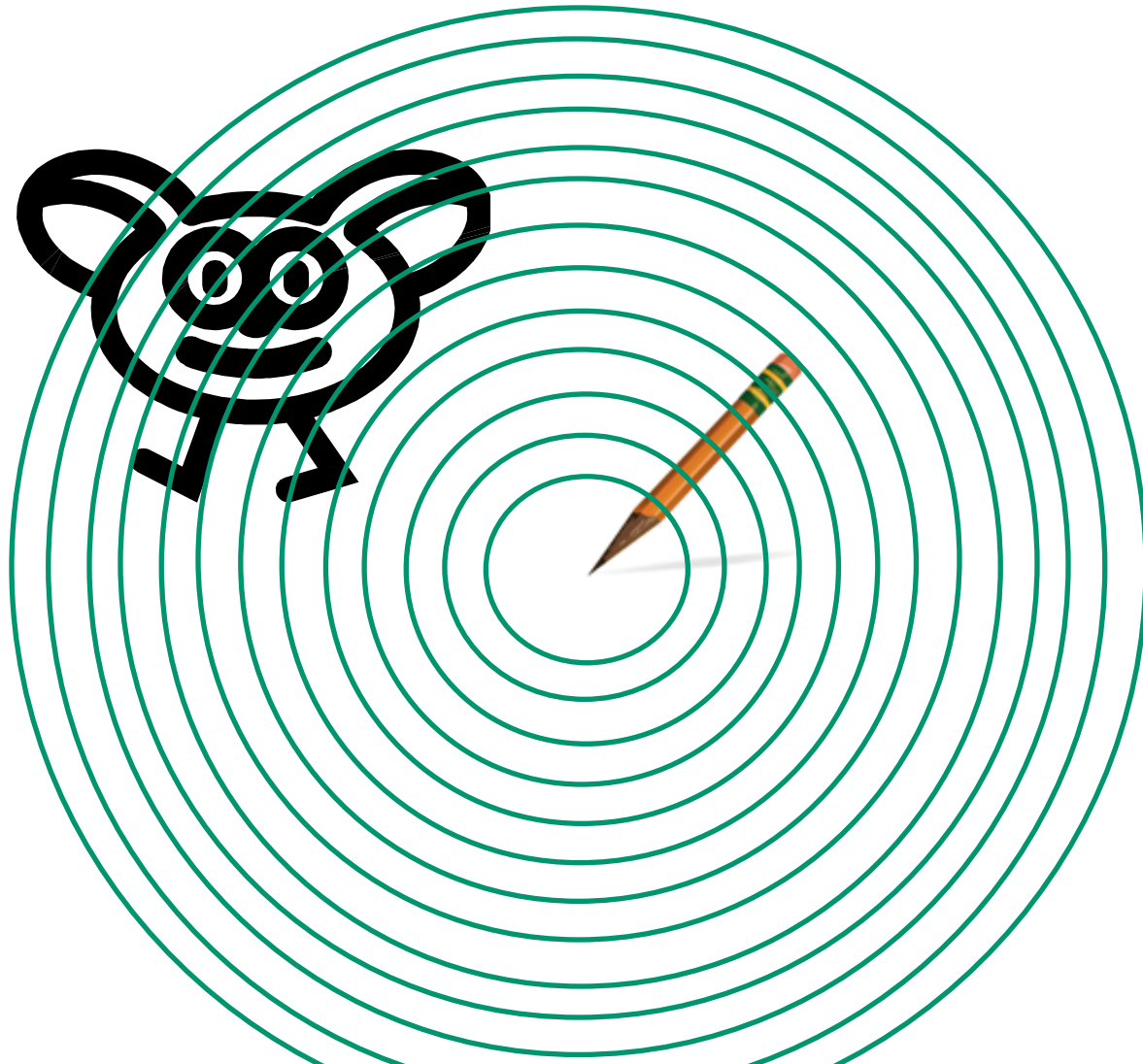
# Listen for echoes

- Echolocators listen for the sounds bouncing back
- Most produce their own sounds (such as clicks) and listen for them to come back.
- People do this subconsciously

# **Results of Wednesday's Project:**

- How many times did someone grab an object successfully?
- What was hardest location?
- Was everyone equally as good?
  
- Could you tell the short side of the room?

# Locating sounds



# **Listen for the delay**

- The delay tells the brain how far away an object is.
- If one ear hears it first, then it knows the object is on that side.

# Acousticians

- Animal bioacousticians
- Underwater acousticians
- P & P : Physical and Psychological
- Audiologists



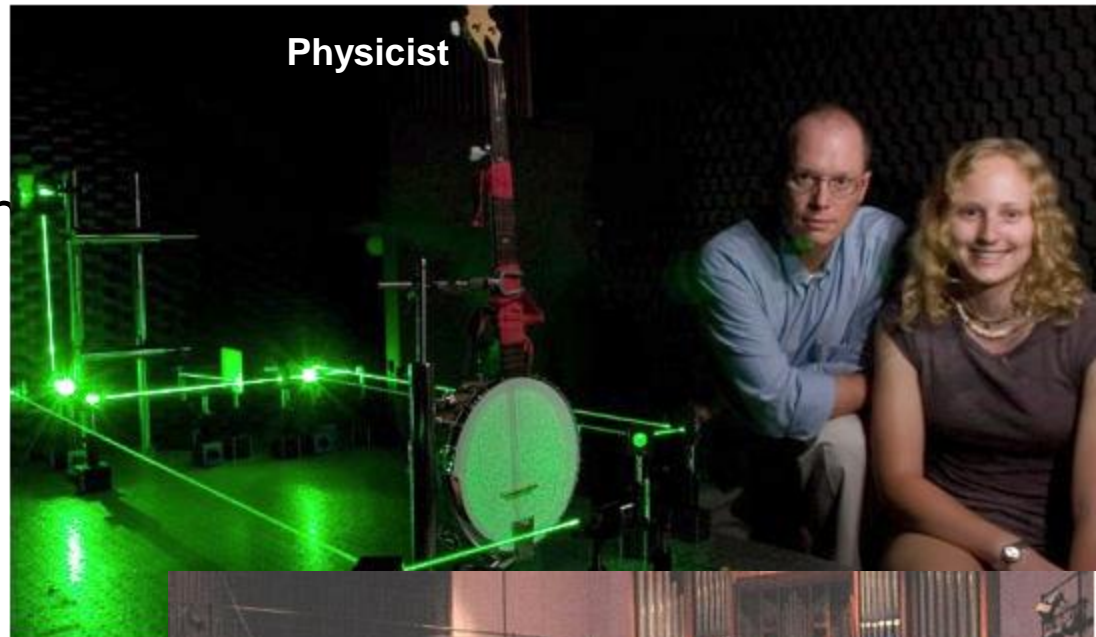
Psychology



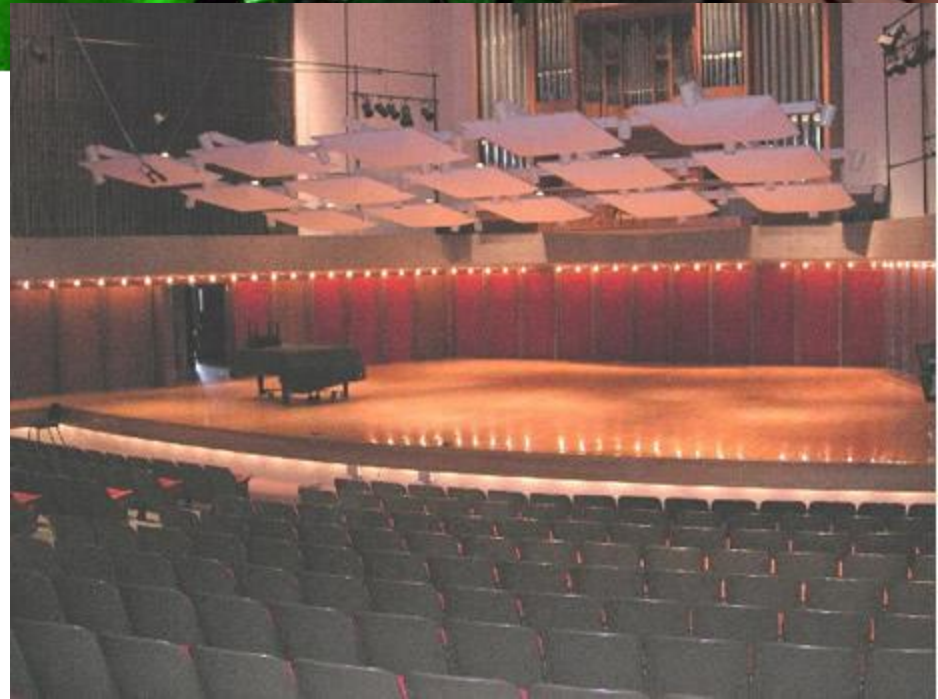
Electrical Engineering and Marine Biology

# Acousticians

- Musical Instrument Design
- Speech scientist
- Medical acoustics



- Architectural acousticians
  - Concert Halls
  - Vibration (ie. Bridges)





# Audi Sound Engineers



**How many different types of acoustics jobs are included in this video?**

# MIT Museum



## How many different types of acoustics jobs are included in this video?

- Musicians
- Marketing - Sound Designers
- Mechanical Engineers
- P &P (psychological)
- ....

**Main Point:** Audi is trying to create **a distinct sound** that is associated with their brand name and the marketing which goes into their product.

Their ability to reach their goal depends on how well their audio engineers and sound design team **understand basic principles in acoustics.**

# Bob Coffeen

- 2012 Acoustics Education Prize

University of Kansas

School of Architectural

Design and Planning

- Acoustics is often not required

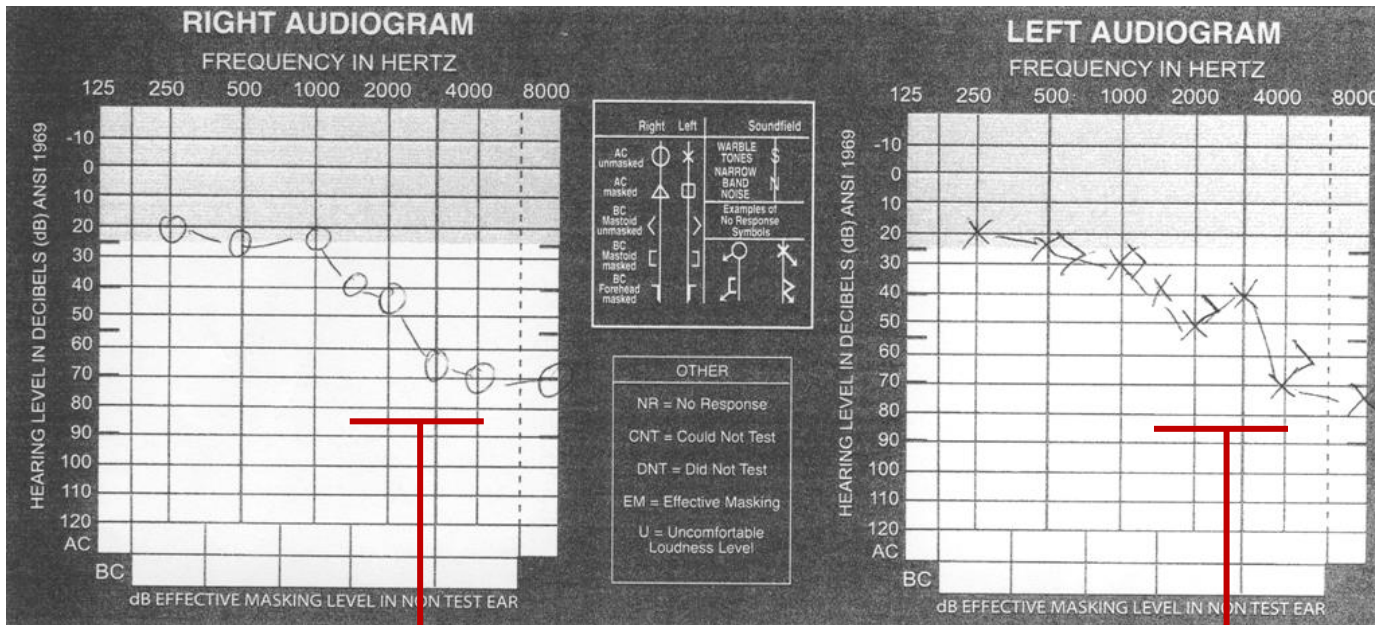


**PLEASE NOTE THAT I WEAR HEARING AIDS...  
AND SO WHAT!**



**I BEGAN USING HEARING AIDS SEVERAL YEARS AGO  
BECAUSE I WAS HAVING SOME PROBLEMS  
UNDERSTANDING STUDENTS IN MY CLASSES**

**Slides courtesy of Bob Coffeen**



**THESE AUDIOGRAMS INDICATE THAT MY HIGHER FREQUENCY HEARING IS NOT DOING TOO WELL.**

***A COMPANY BUS AND TRUCK***

**MAYBE FLYING NOISY LIGHT AIRCRAFT FOR MANY YEARS, MOST OF THE TIME WITHOUT EAR PROTECTION**



# LET'S TAKE A LOOK AT SOME FREQUENCY STUFF AND ITS RELATION TO SPEECH INTELLIGIBILITY

