

A New Resource for Describing and Understanding Hearing Loss

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CEO Hearing First



Familiar Sounds Audiogram

Understanding Your
Child's Hearing



Disclosures

- **Terry Zwolan**

- *Financial -*

- Receives Salary for Employment from Hearing First.
- Receives Honoraria excluding diversified mutual funds for Teaching and speaking from Institute for Cochlear Implant Training.
- Receives Other financial benefit for Teaching and speaking from Wayne State University.

- *Nonfinancial -*

- Has a Professional (Unpaid advisory board member) relationship for Board membership.
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- **Teresa Caraway**

- *Financial -*

- Receives Salary for Employment from Hearing First.

- *Nonfinancial -*

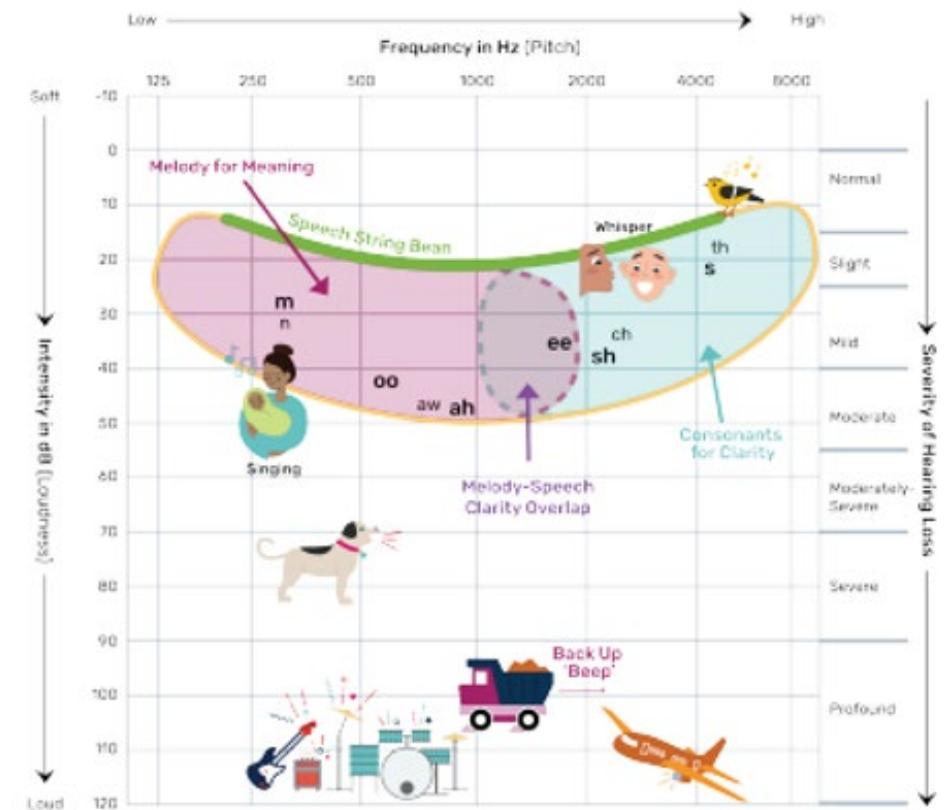
- Has a Professional (Certified LSLS Cert. AVT) (Founding President) relationship for Other volunteer activities.
- Has a Professional (Founding Board Member; Member) relationship for Other volunteer activities.
- Has a Professional (Certified SLP; Member) relationship for Other volunteer activities.



Introduction

- Understanding your child's hearing loss is an essential part of partnering with professionals to maximize your child's success on their hearing journey.
- The audiogram is an important tool, yet it's full of numbers, lines, and symbols that make it difficult to understand.
- Hearing First partnered with Carol Flexer, Ph.D. to create an updated and simplified **Familiar Sounds Audiogram** for parents to use in partnership with professionals to better describe and understand a child's hearing loss.

Familiar Sounds Audiogram



Why do we test hearing?

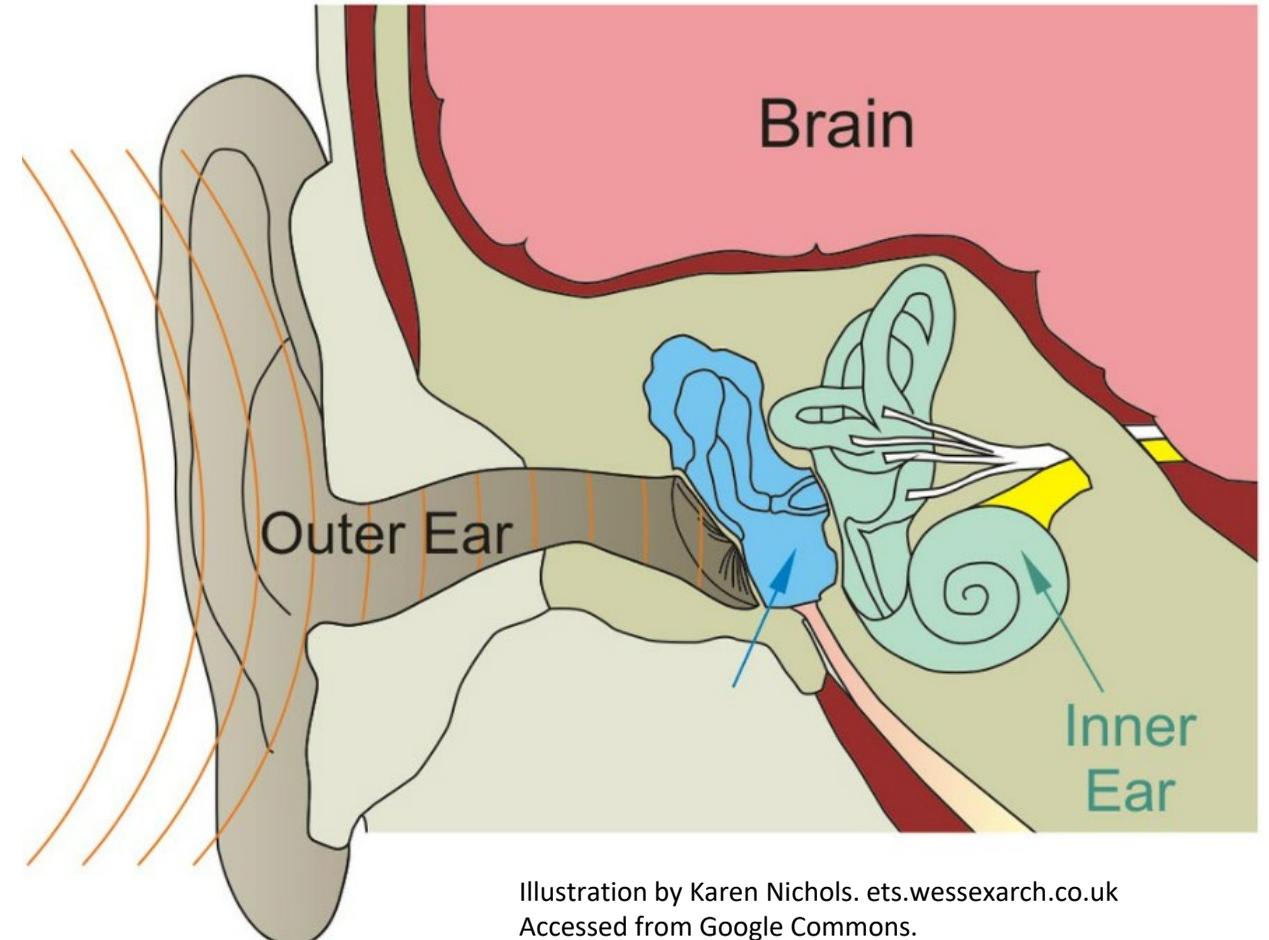
Audiometric testing

- Involves a complete evaluation of the hearing system, from the outer ear to the brain.
- Testing performed by the audiologist helps determine
 - IF there is a problem with hearing
 - WHERE the problem is occurring
 - How SEVERE the problem is
 - If it is TEMPORARY or PERMANENT
- All of this helps determine TREATMENT OPTIONS
 - Medical (i.e. antibiotics, wax removal)
 - Surgical (tubes, eardrum repair, placement of a cochlear implant)
 - Hearing technology (hearing aids, cochlear implants)
 - (Re)Habilitation



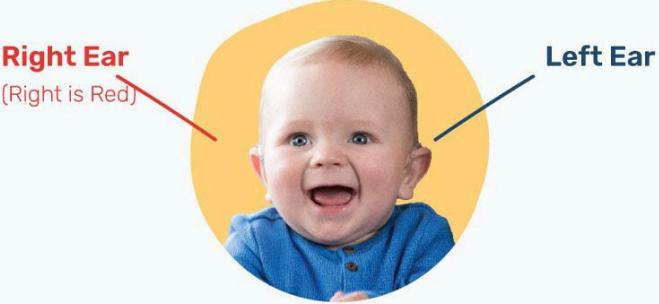
Let's first review how we hear

- Sound travels from the outer ear, passes through the middle ear, and reaches the inner ear. From there, it travels to the brain via the VIIIth nerve
- Problems with hearing can occur almost anywhere along this path.



The Familiar Sounds Audiogram

- A graph that shows the softest sounds a child can hear at several different frequencies.
- These frequencies are important because together they include the speech sounds.



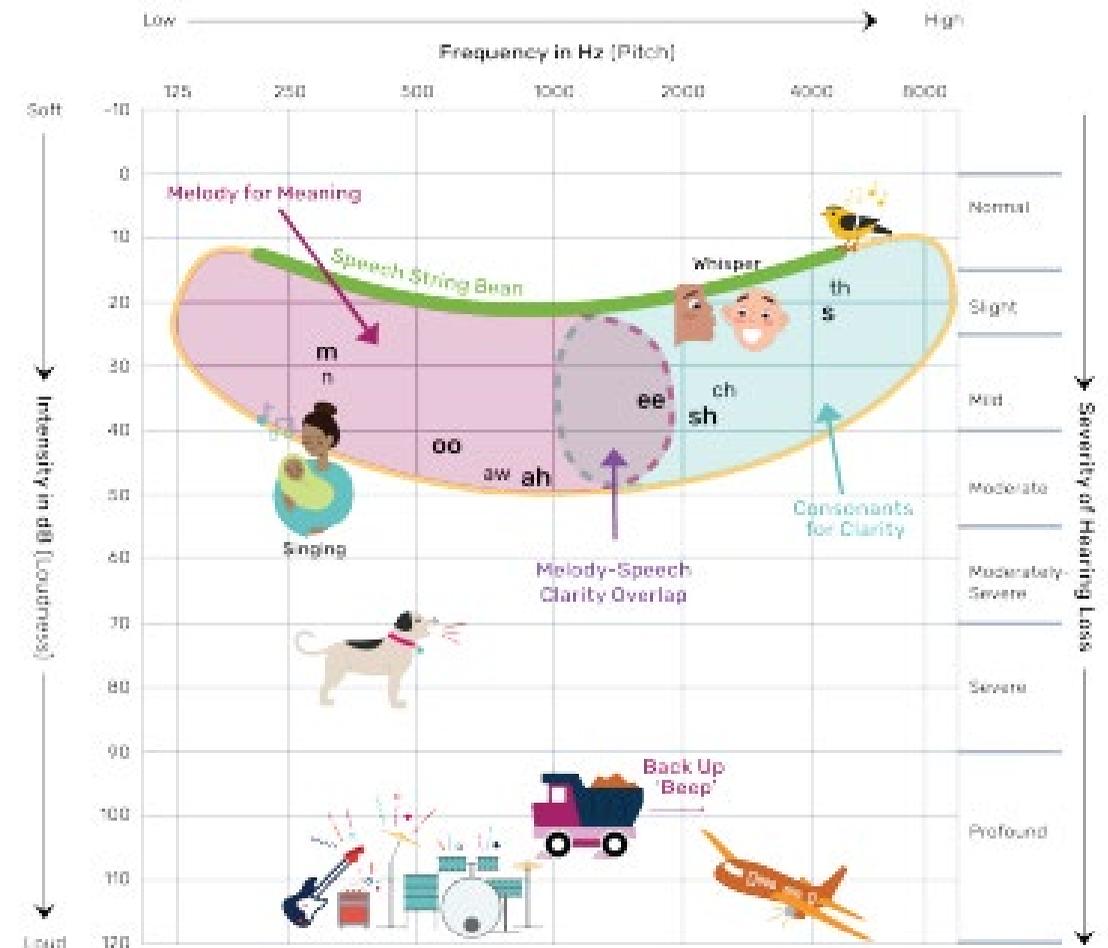
O	The softest sound your child can hear WITHOUT hearing technology using insert earphones	X
<	The softest sound your child can hear with bone conduction testing	>
⬇	An arrow pointing down indicates no response at that frequency (pitch) and intensity (loudness)	⬇
A or C	The softest sound your child can hear WITH their hearing aids (A) or cochlear implants (C)	A or C

Child's Name: _____

Date of Birth: _____

Date of Hearing Evaluation: _____

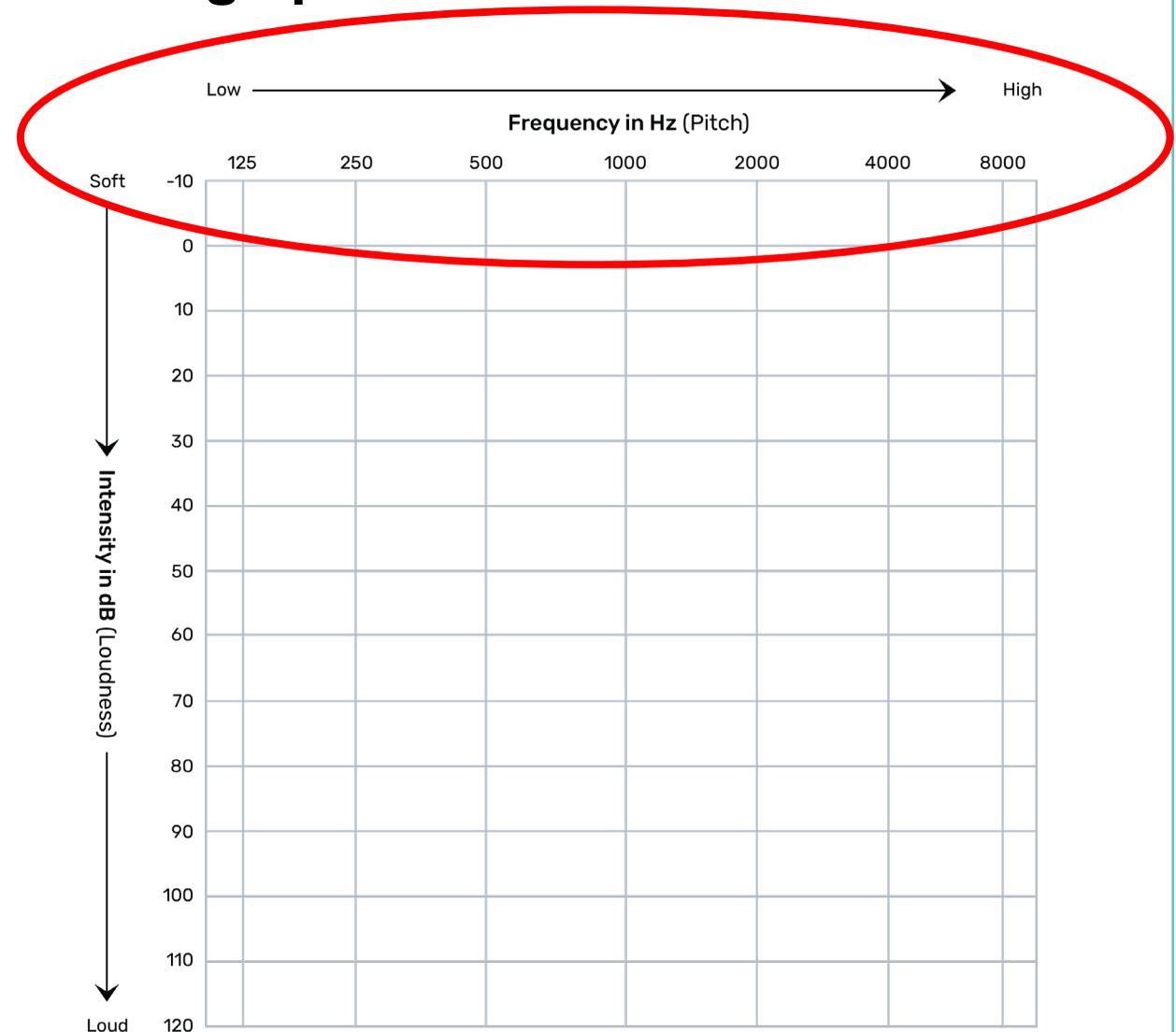
Familiar Sounds Audiogram



Let's break the audiogram down

Frequency/pitches important for understanding speech

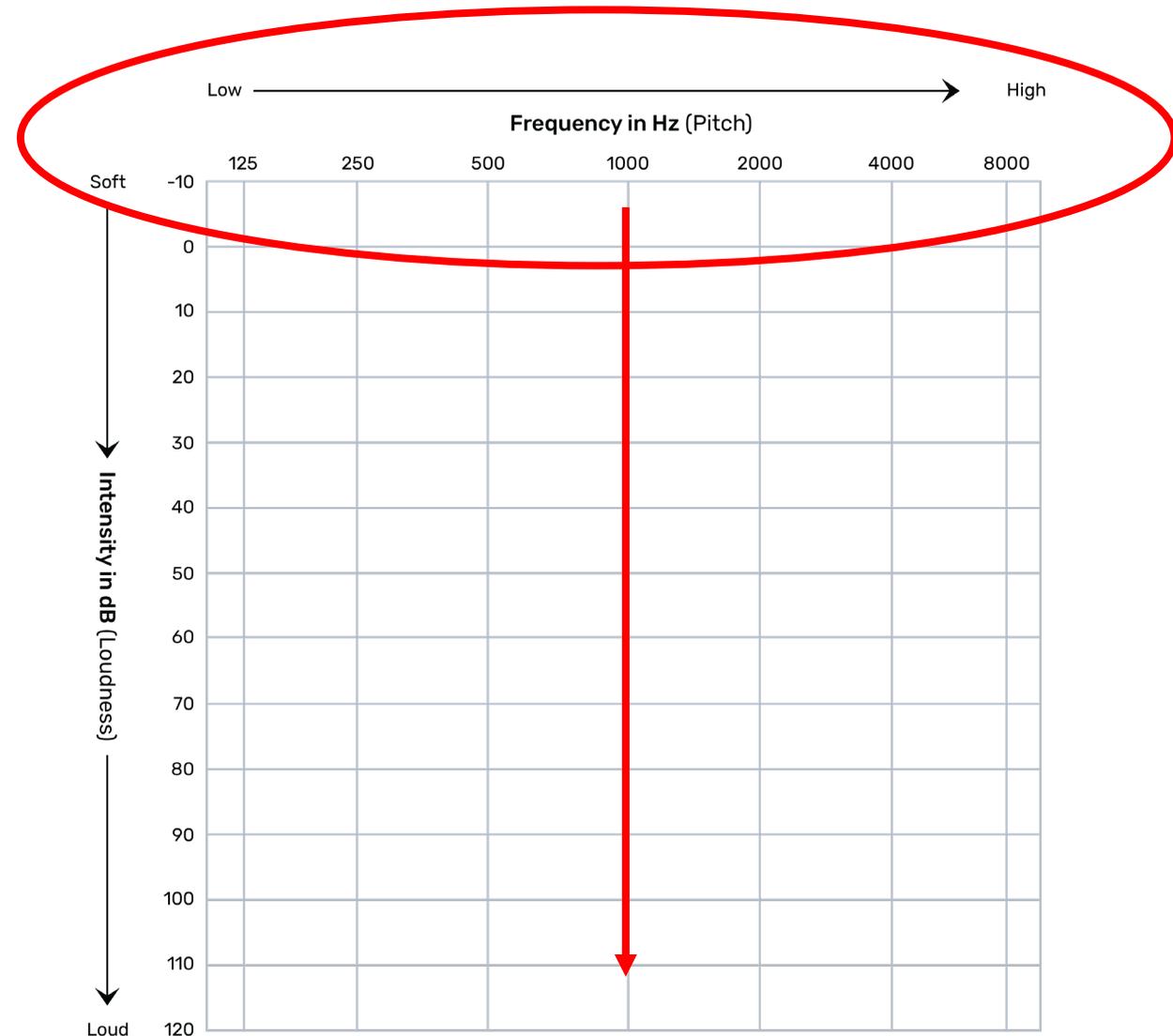
- Frequencies are displayed along the top, and go from low pitches (125 Hz) to high pitches (8000 Hz).



Let's break the audiogram down

Frequency/pitch

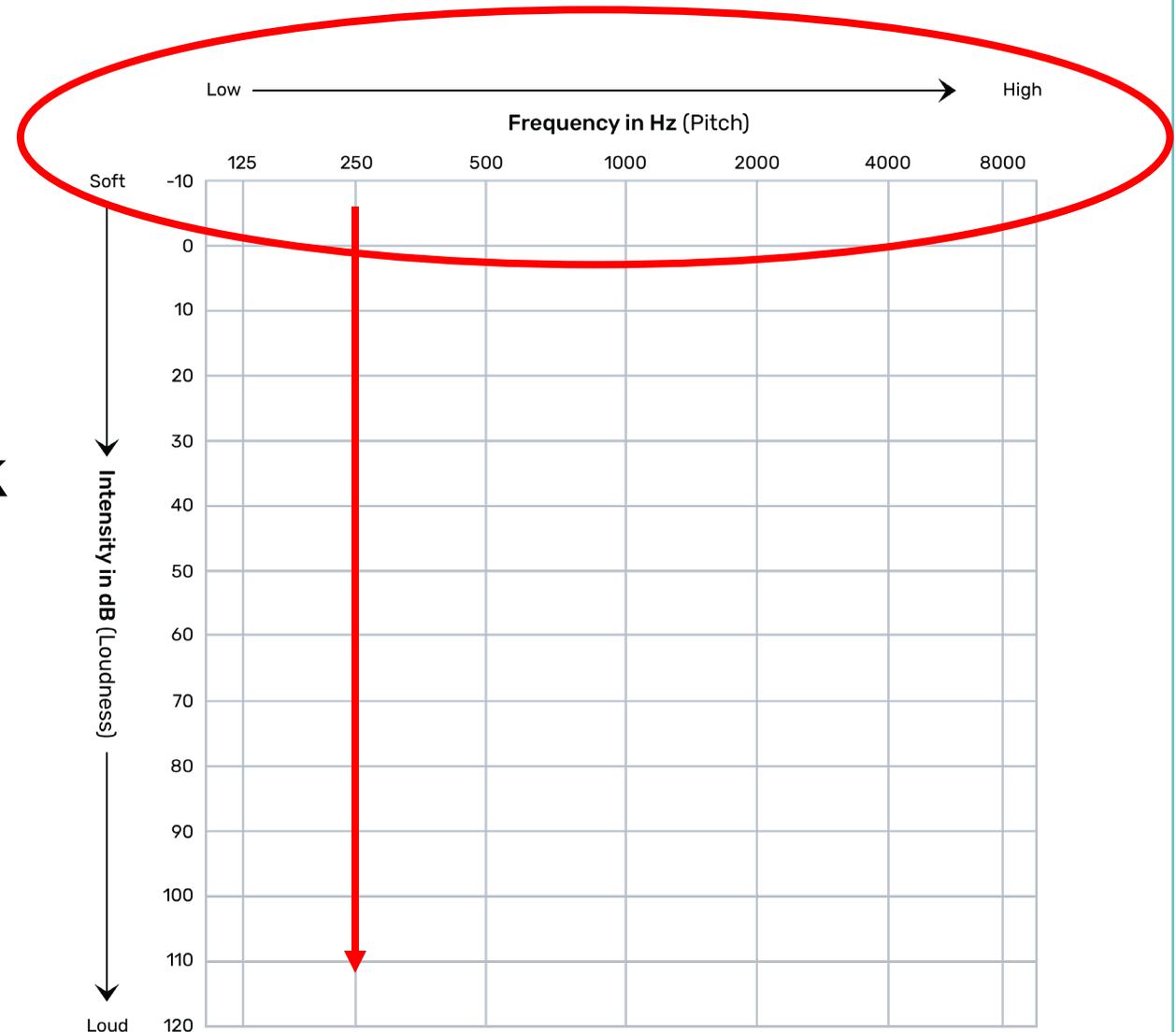
- Frequencies are displayed along the top, and go from low pitches (125 Hz) to high pitches (8000 Hz).
- If we're testing 1000 Hz, we will mark their response here:



Let's break the audiogram down

Frequency/pitch

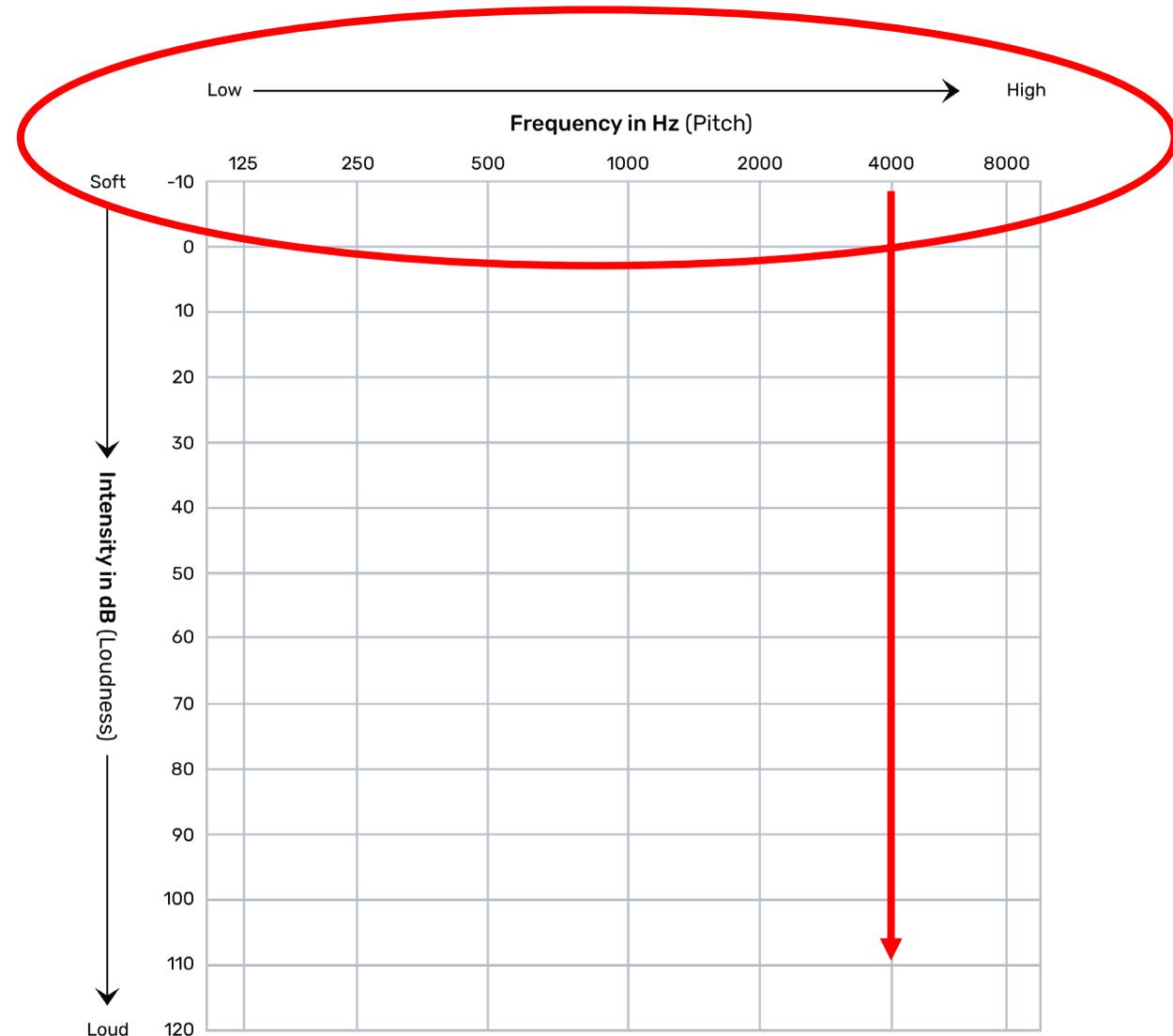
- Frequencies are displayed along the top, and go from low pitches (125 Hz) to high pitches (8000 Hz).
- If we're testing 250 Hz, we'll mark their response along here:



Let's break the audiogram down

Frequency/pitch

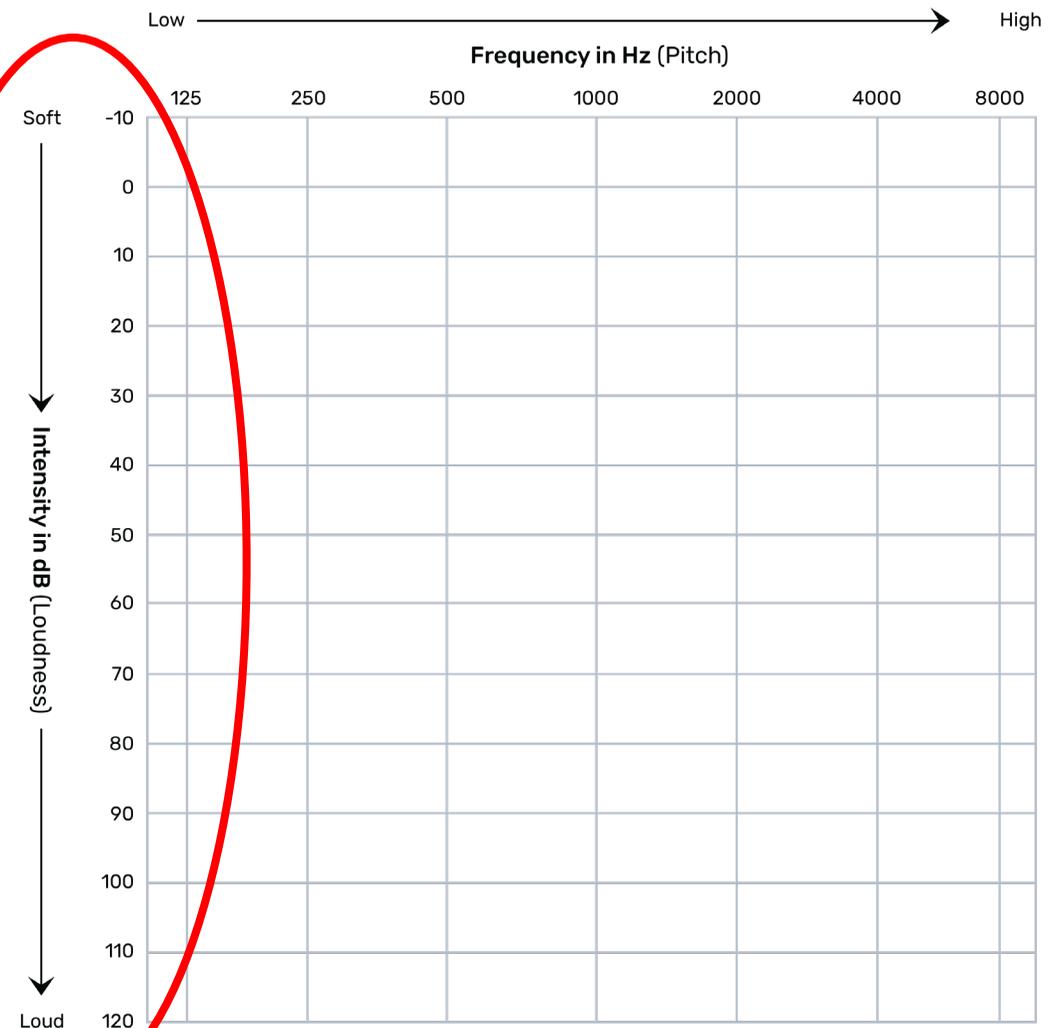
- Frequencies are displayed along the top, and go from low pitches (125 Hz) to high pitches (8000 Hz).
- If we're testing 4000 Hz, we will mark their response here:



Let's break the audiogram down

Loudness (decibels)

- Loudness is displayed along the side, and goes from soft at the top (-10 dB) to very loud (120 dB) at the bottom.



Threshold symbols

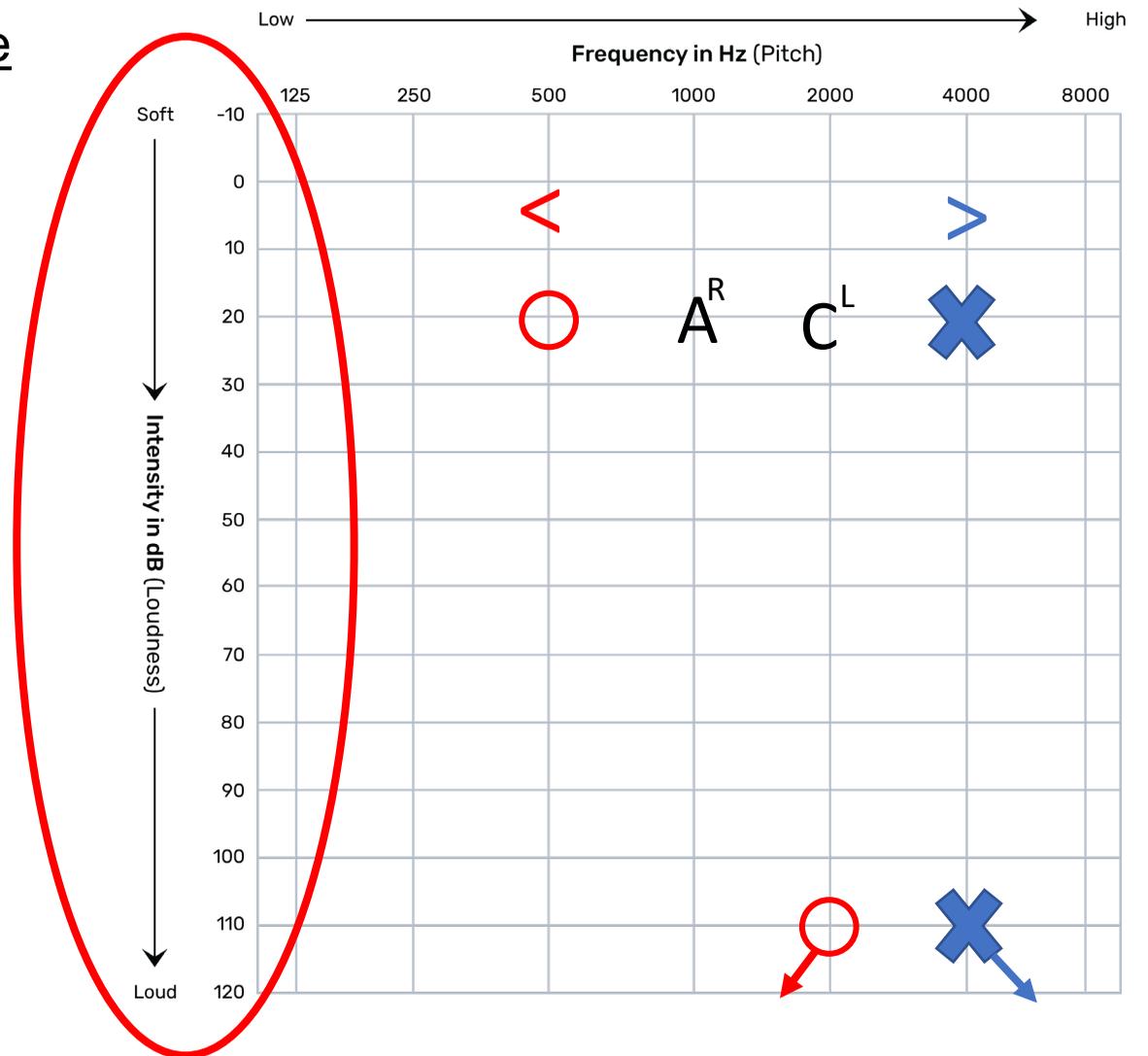
- The audiogram measures the loudness of the softest sound a child can hear at several different frequencies. This = THRESHOLD
- Symbols for threshold:

Right Ear
(Right is Red)



Left Ear

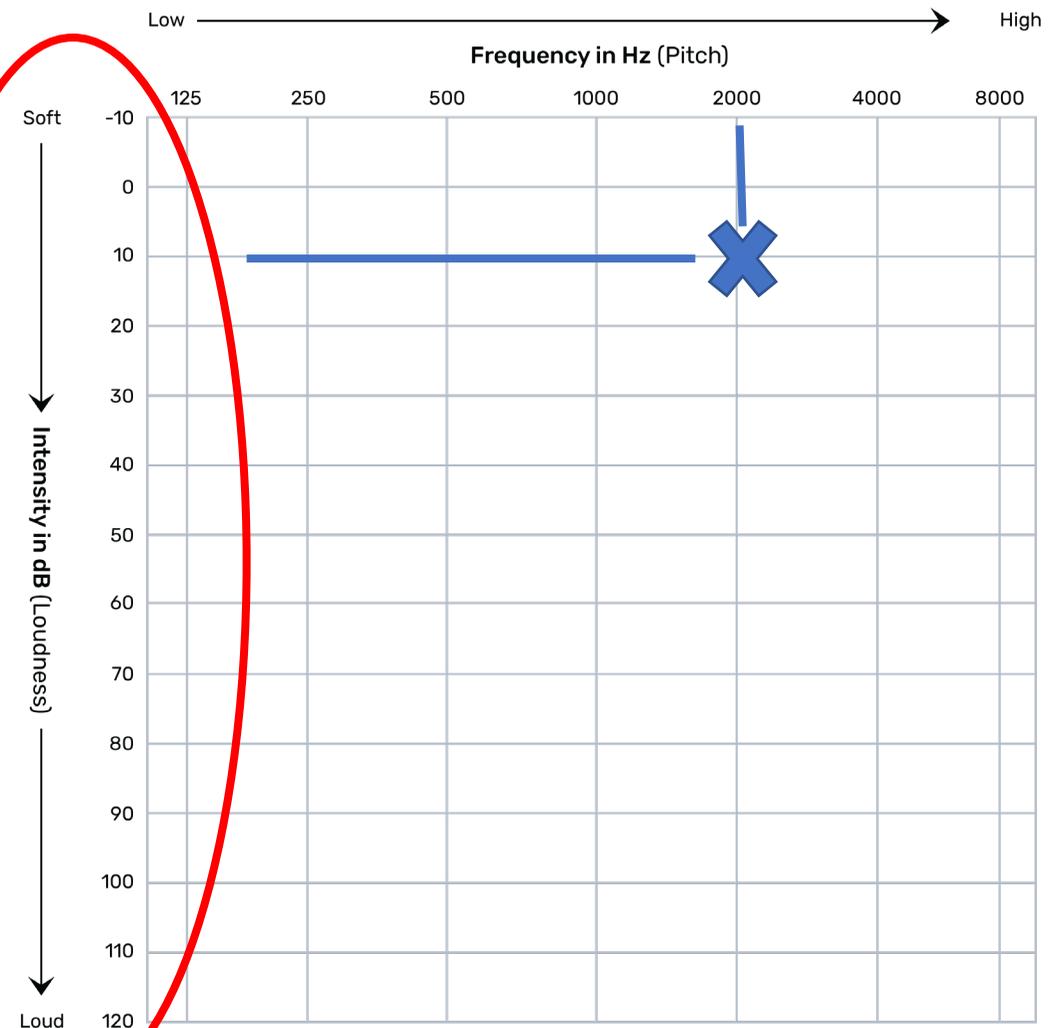
○	The softest sound your child can hear WITHOUT hearing technology using insert earphones	×
<	The softest sound your child can hear with bone conduction testing	>
↙	An arrow pointing down indicates no response at that frequency (pitch) and intensity (loudness)	↘
A or C	The softest sound your child can hear WITH their hearing aids (A) or cochlear implants (C)	A or C



Let's break the audiogram down

Loudness

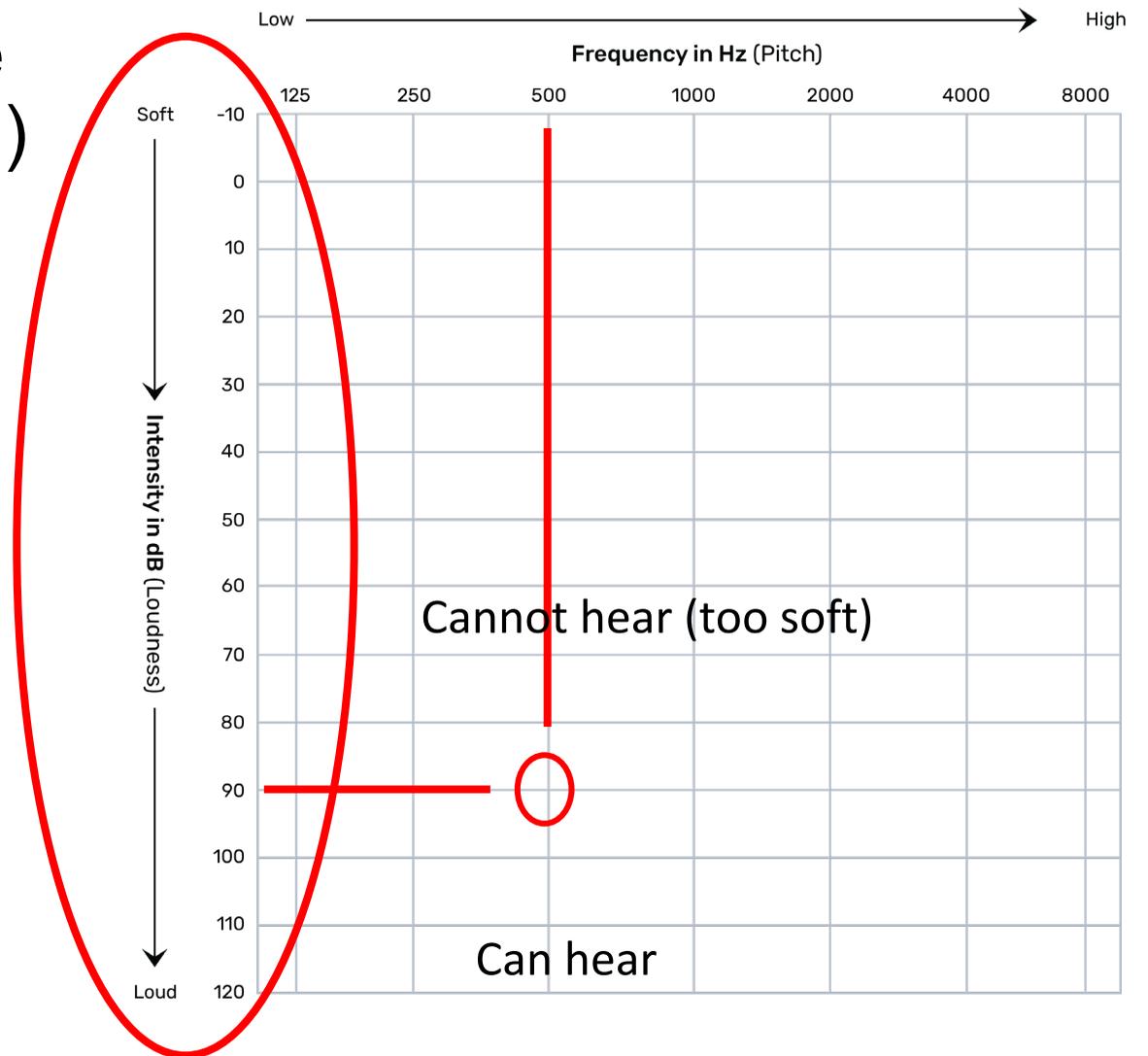
- Loudness is displayed along the side, and goes from soft (-10 dB) to very loud (120 dB).
- If the softest sound a child can hear at 2000 Hz is 10 dB, their threshold will be plotted here.
- This child can hear all sounds that are louder than 10 dB, but cannot hear sounds that are softer than 10 dB



Let's break the audiogram down

Loudness

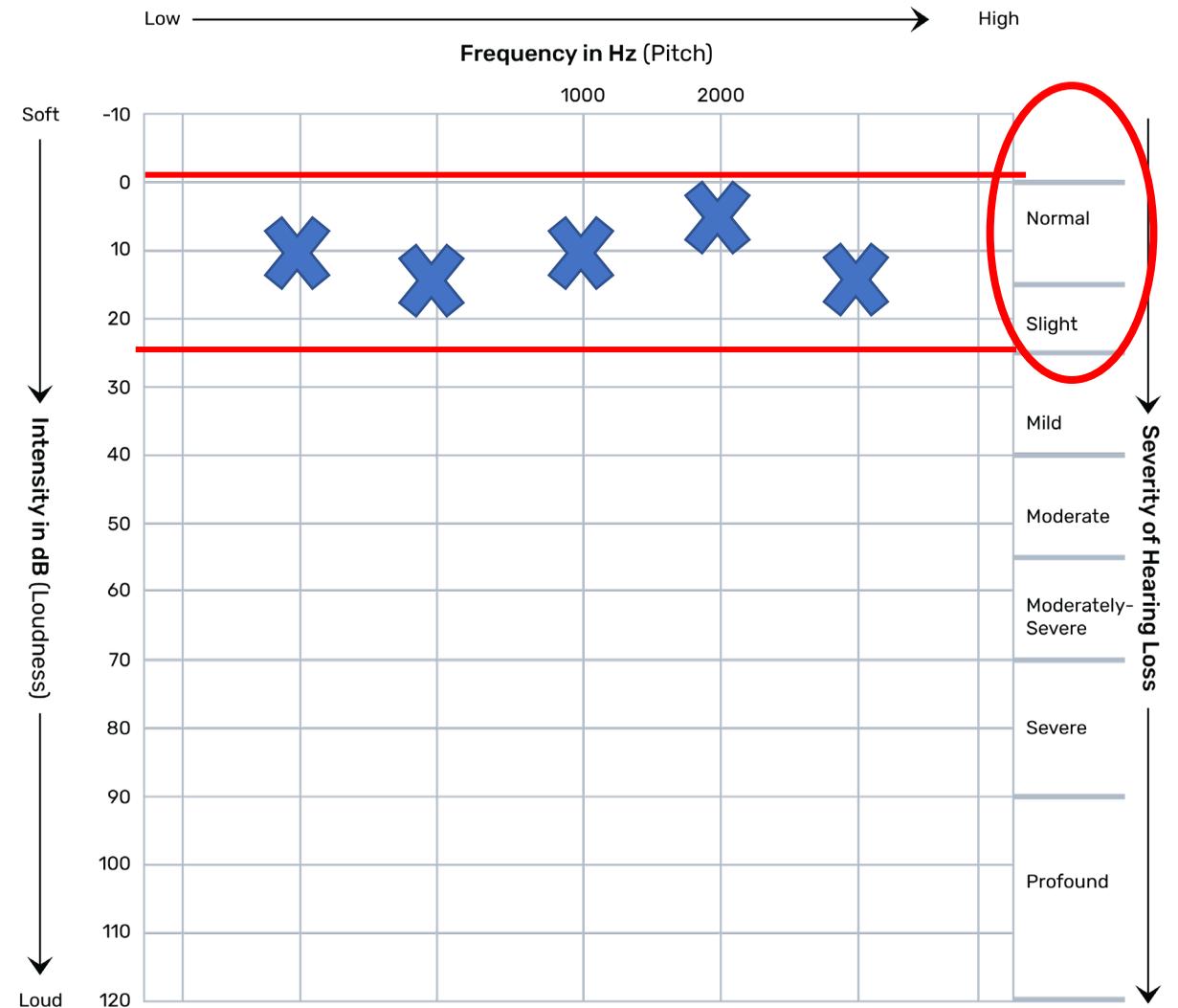
- Loudness is displayed along the side, and goes from soft (-10 dB) to very loud (120 dB).
- If the softest sound a child can hear at 500 Hz is at 90 dB, their threshold will be plotted here
- This child can hear all sounds louder than 90 dB, but cannot hear sounds that are softer than 90 dB



Severity of hearing loss

Threshold location on the graph determines the severity

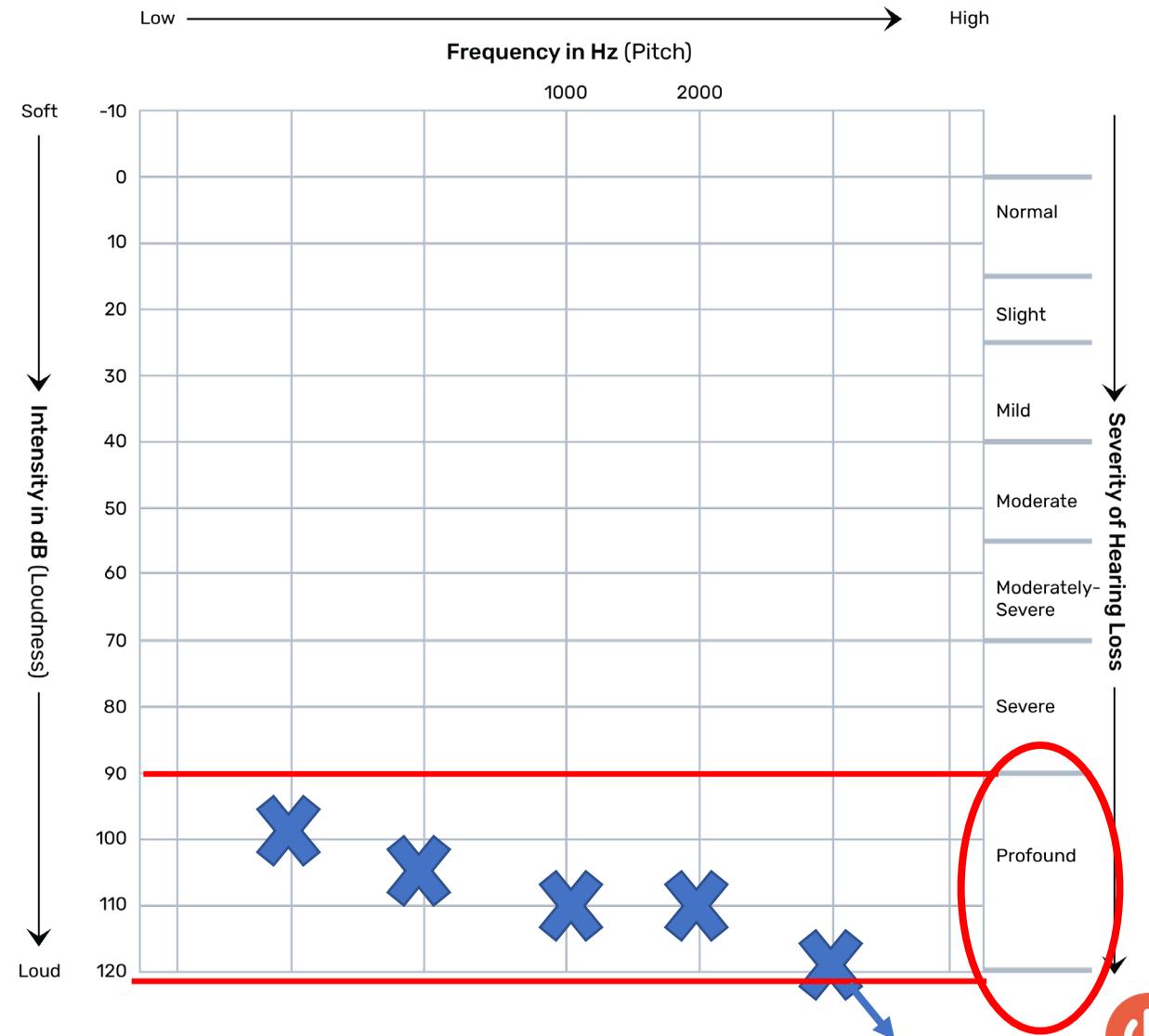
- If all thresholds fall 25 dB or lower, the hearing loss is considered to be slight or within normal limits



Severity of hearing loss

Threshold location on the graph determines severity

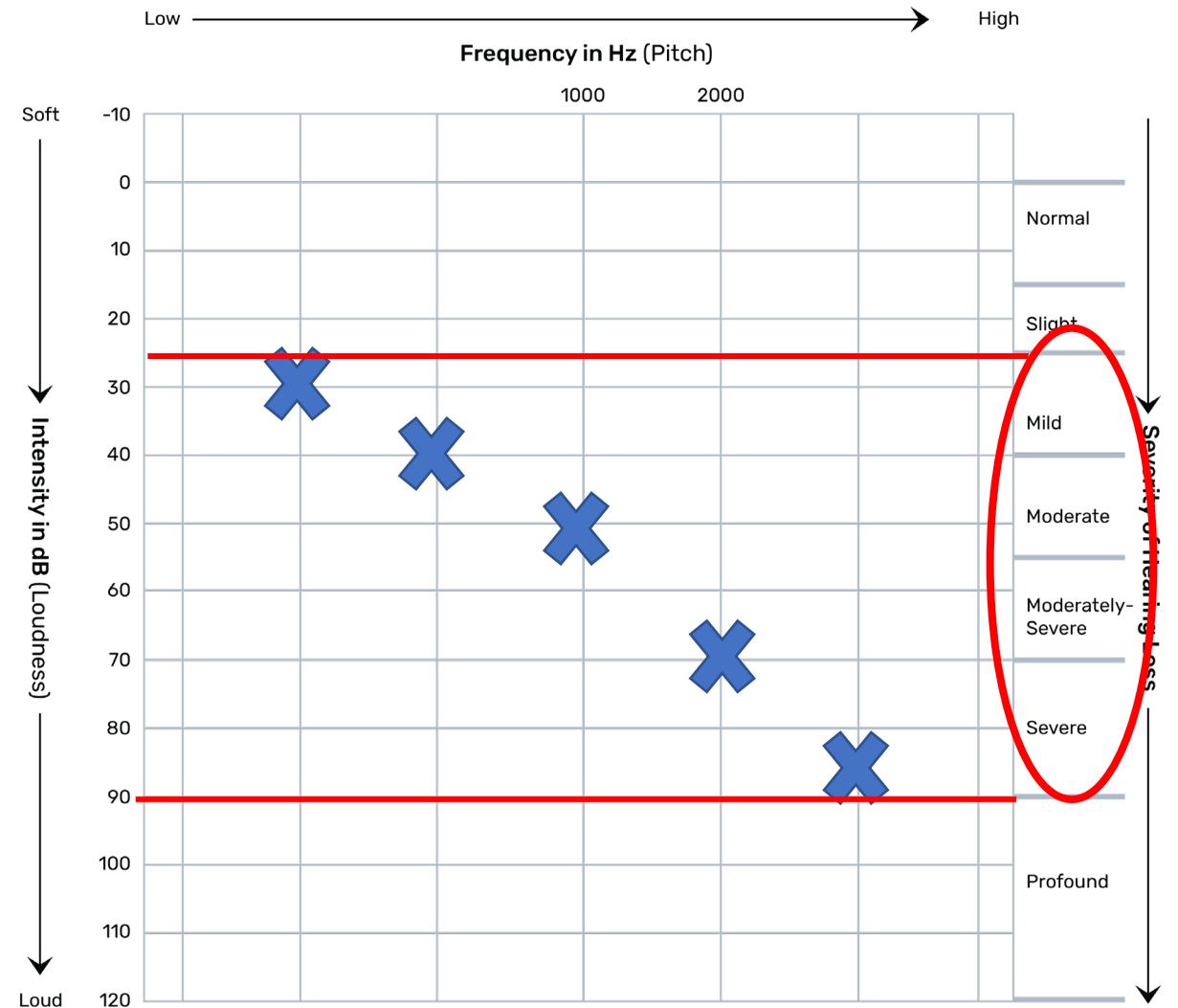
- If all thresholds fall at 90 dB or greater, the hearing loss is considered to be in the profound range.
- This child can only hear sounds that are 100 dB or louder



Severity of hearing loss

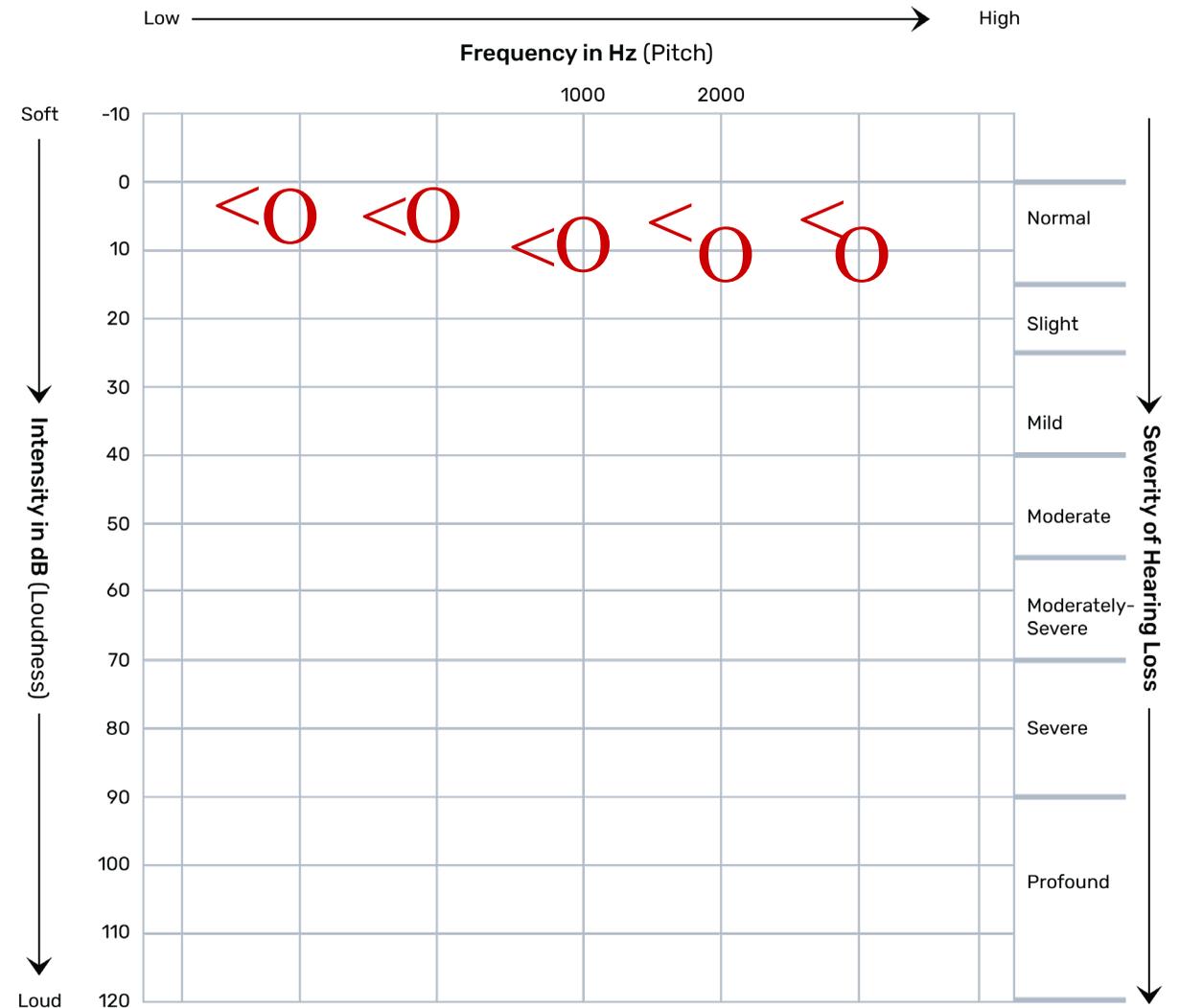
Threshold location on the graph determines severity

- Often, thresholds will cross several different areas of severity.
- This example = a mild to severe hearing loss



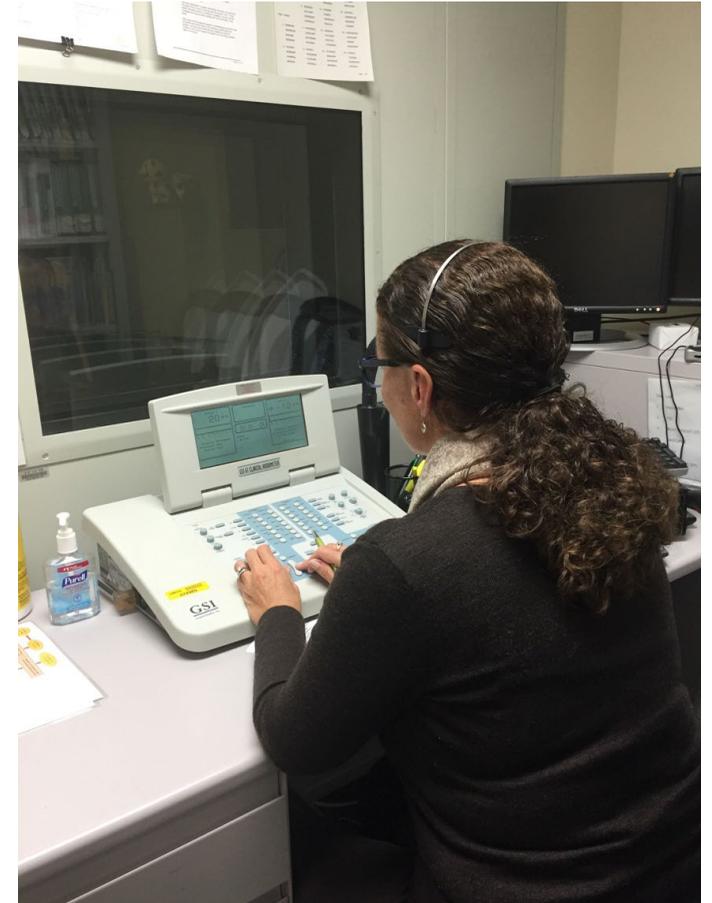
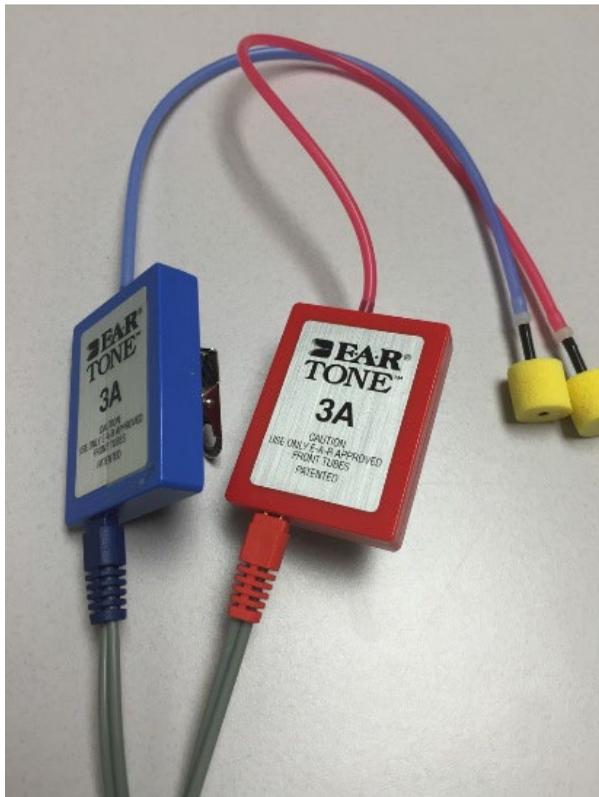
Types of Hearing Loss

- Determined by comparing air and bone conduction thresholds.
- In a normal system, both air and bone thresholds will fall within normal range.



Two ways to test hearing for an audiogram:

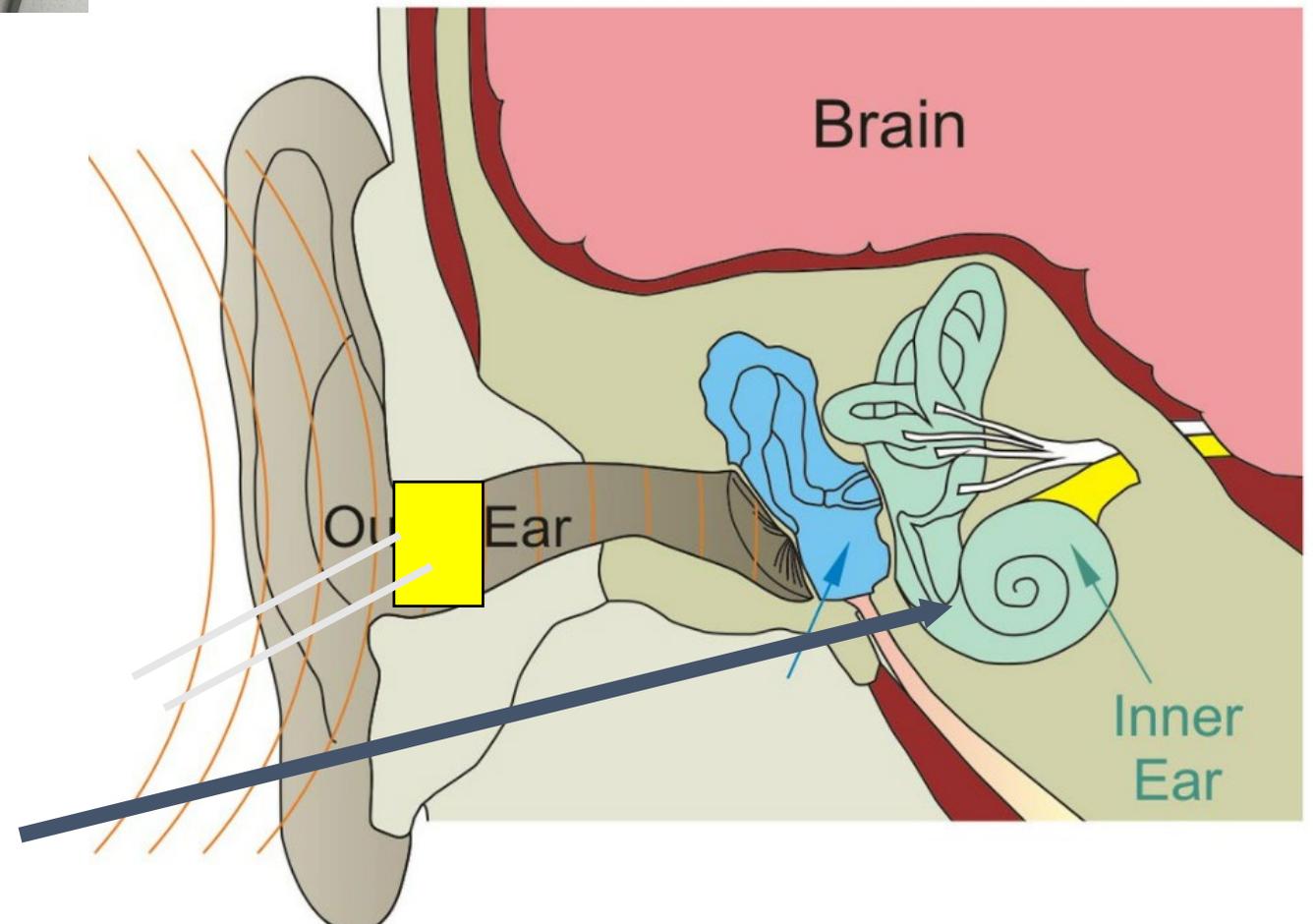
- Air conduction (0 X)
- Bone conduction (< >)



Air conduction testing

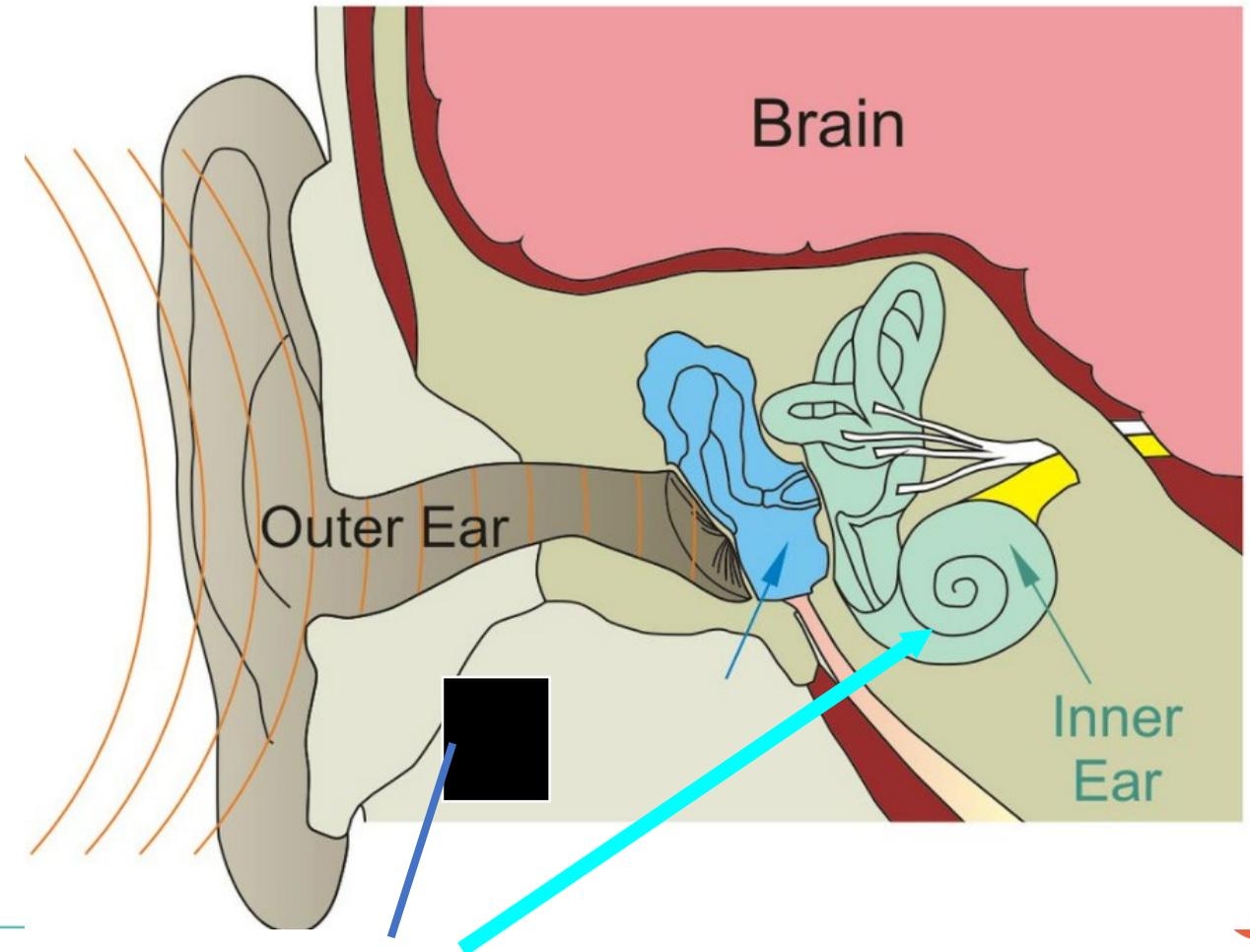


- A pure tone is presented thru the outer ear via insert earphones, sending the signal through the outer ear, the middle ear to reach the inner ear.
- Such testing provides information regarding the conductive and sensory neural systems.



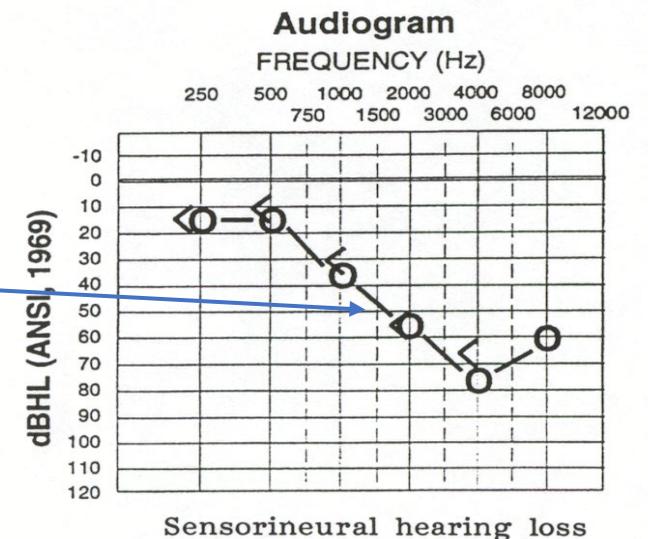
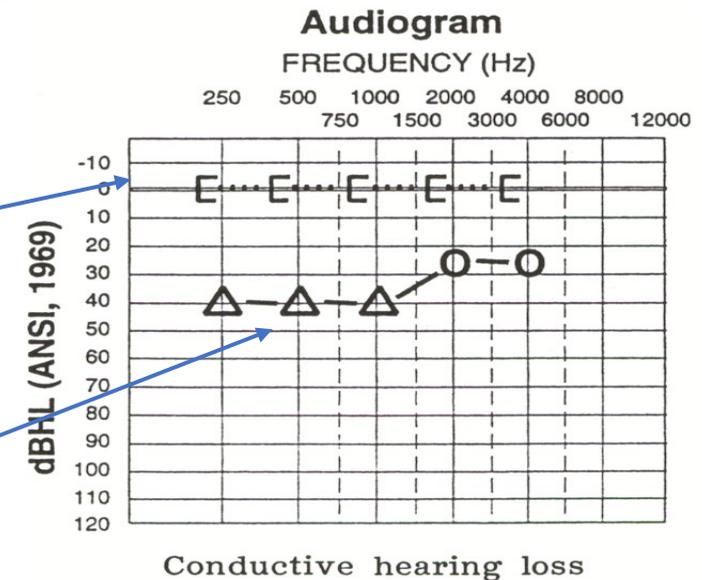
Bone Conduction testing

- Small oscillator is placed behind the ear over the mastoid bone.
- Presentation of the pure tone results in stimulation of the inner ear, bypassing the outer and middle ear.
- BC testing measures the integrity of the sensory neural system (inner ear).
- Outer and middle ear have little impact on bone conduction thresholds.



Comparing air and bone conduction thresholds helps us determine where the problem is

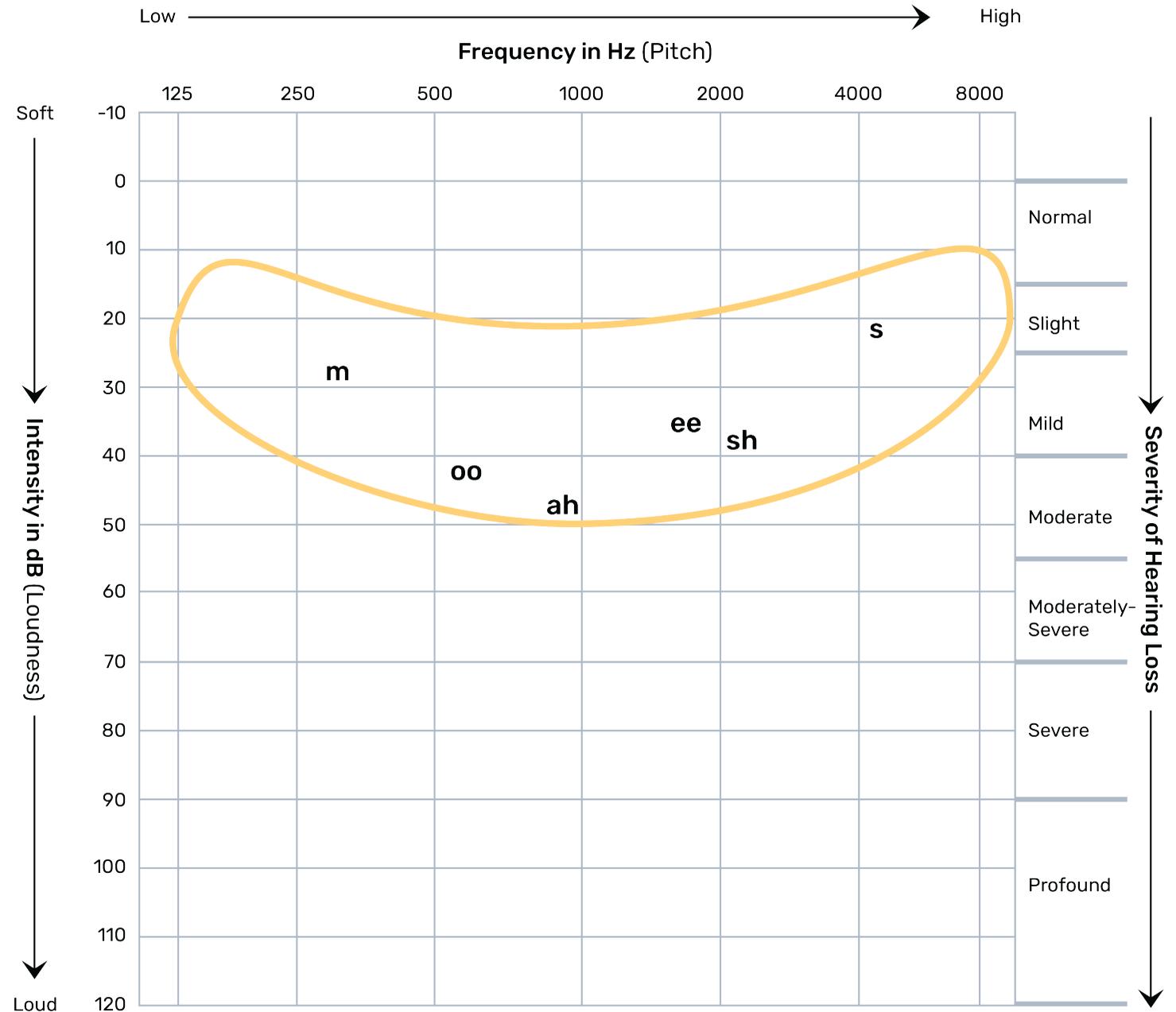
- Helps determine the type of hearing loss.
- In a conductive loss, the inner ear (bone thresholds) will hear tones at softer levels than when the sound travels through the outer and middle ear (air thresholds):
- In a sensorineural loss, the sound will be transmitted properly to the inner ear but there is a problem in the inner ear so both air and bone thresholds will be elevated



Other features of the Familiar Sounds Audiogram

Speech Sounds

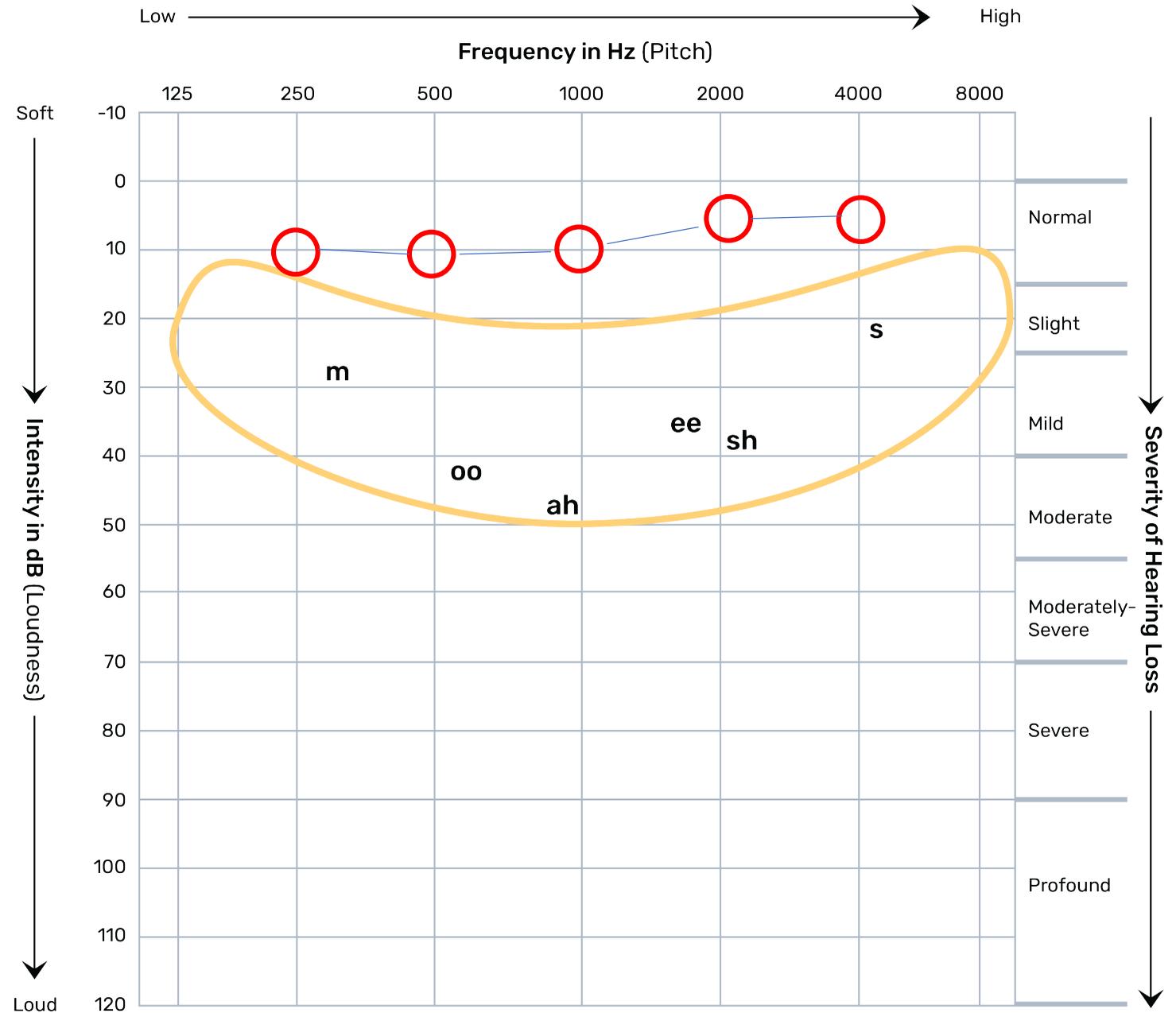
- The speech banana is highlighted to indicate where most speech sounds fall during typical conversations
- These sounds vary in regards to their frequency and loudness during normal conversation



Familiar Sounds Audiogram

Speech Sounds

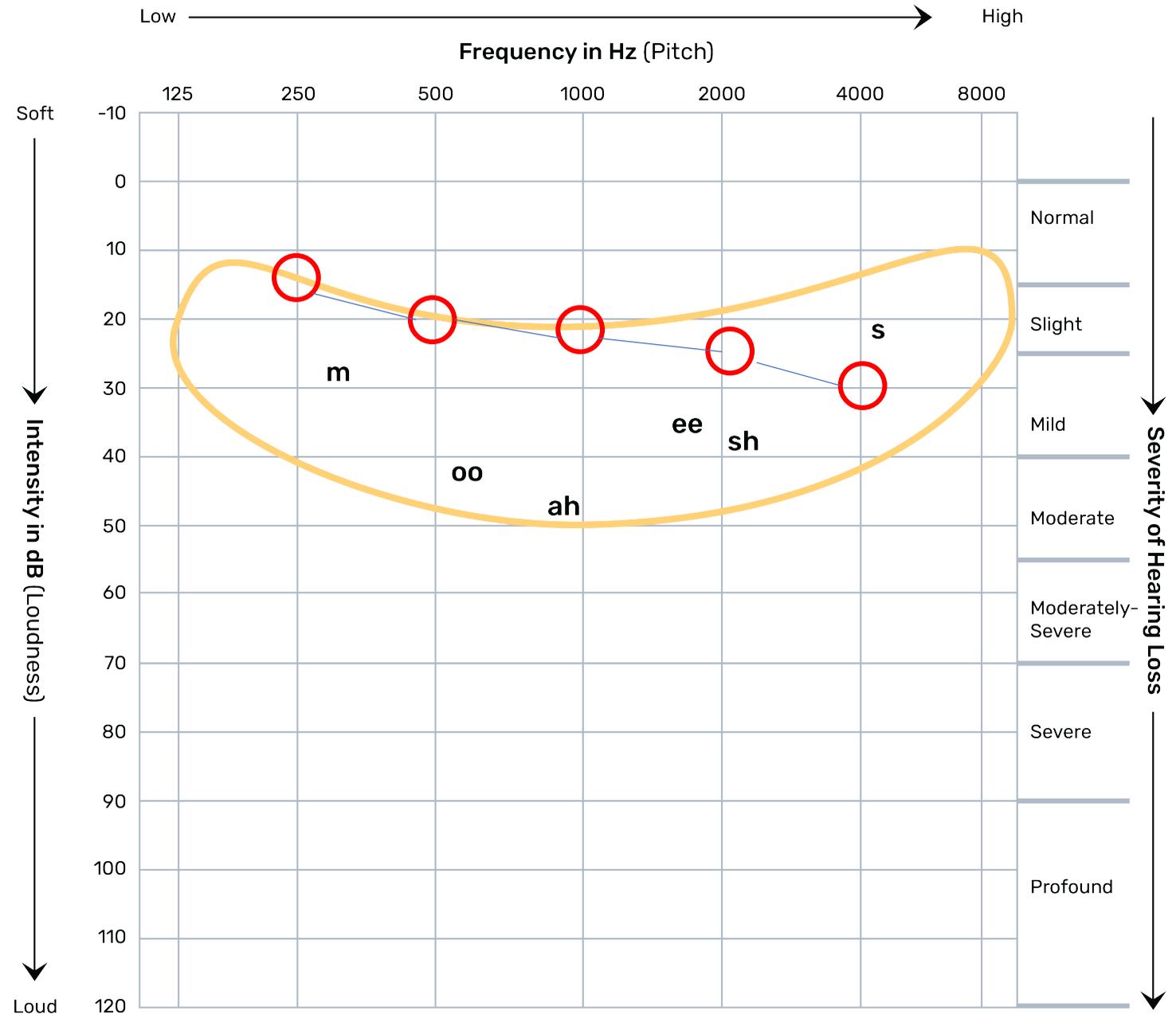
- The speech banana is where most speech sounds fall during typical conversations
- A child whose hearing falls within the normal range will be able to hear all of these sounds



Familiar Sounds Audiogram

Minimal Hearing Loss

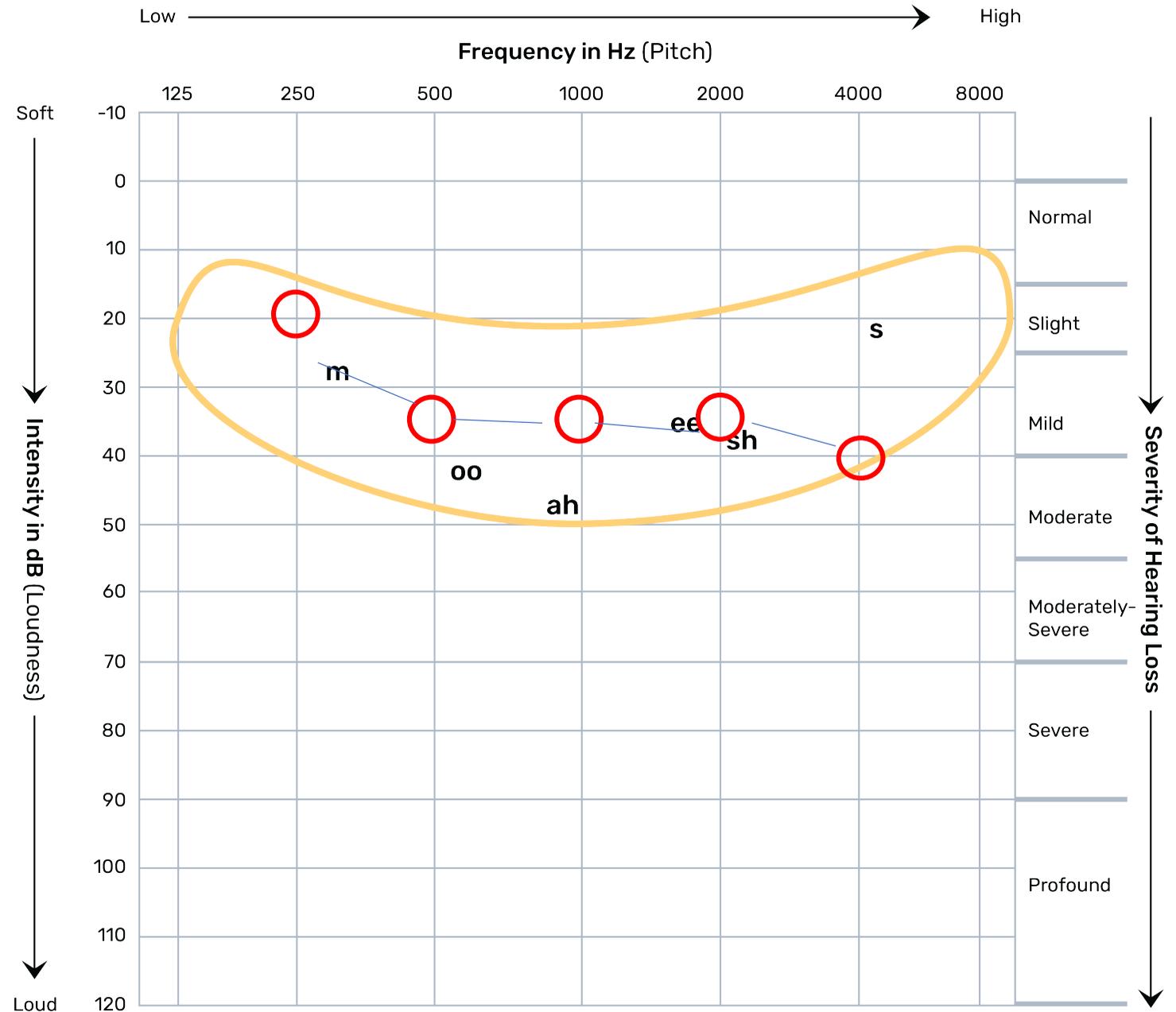
- A child with a minimal hearing loss will have difficulties hearing distant or soft speech
- They may miss subtle conversational cues
- Important speech sounds will be missed (i.e. /s/)



Familiar Sounds Audiogram

Mild Hearing Loss

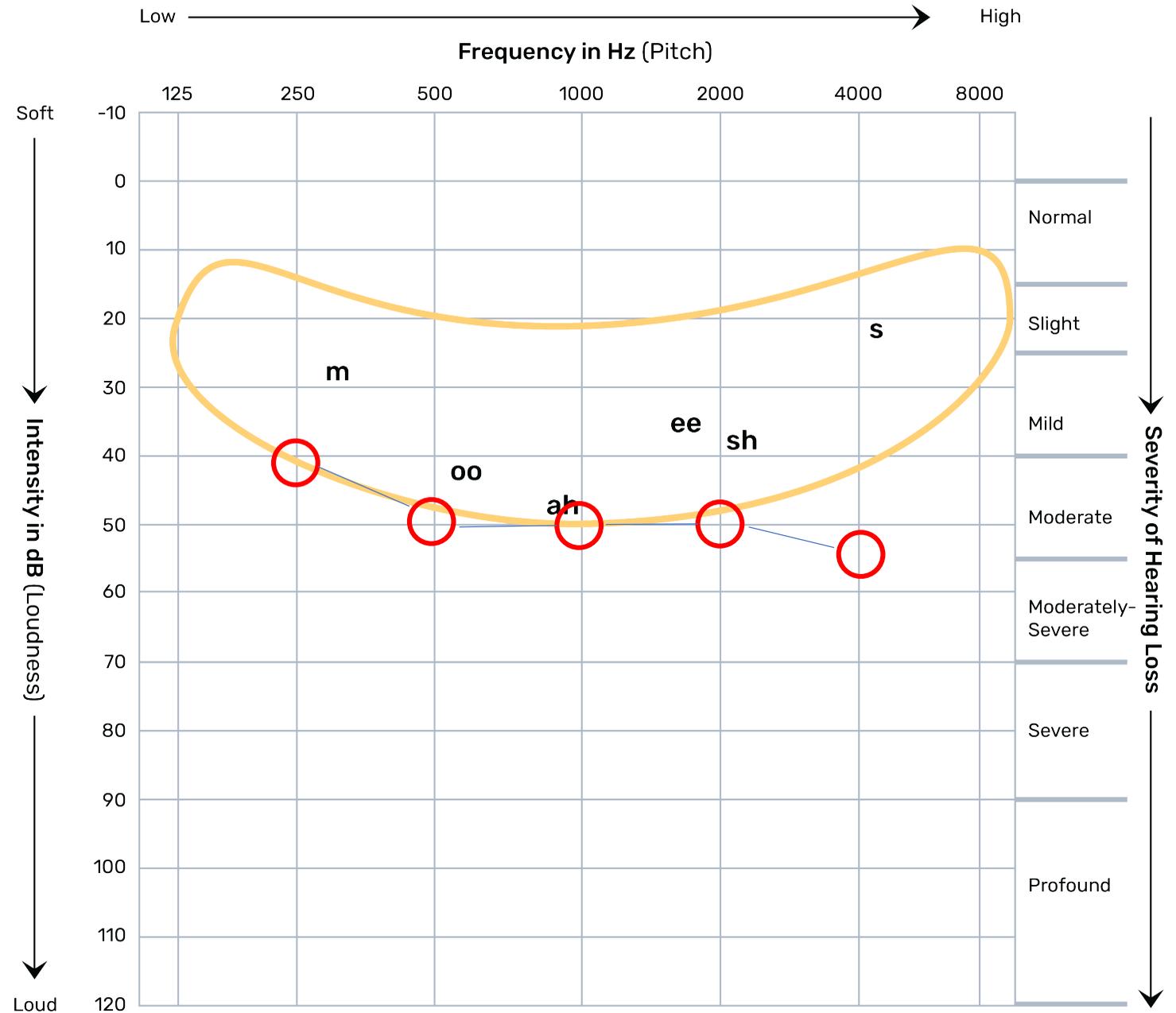
- A child with a mild hearing loss (conductive or sensorineural) will miss 25-40% of speech around them without audiological management
- They may miss soft speech, word endings, and unstressed words
- Background noise, distance and pattern of the hearing loss will determine how much they can hear



Familiar Sounds Audiogram

Moderate Hearing Loss

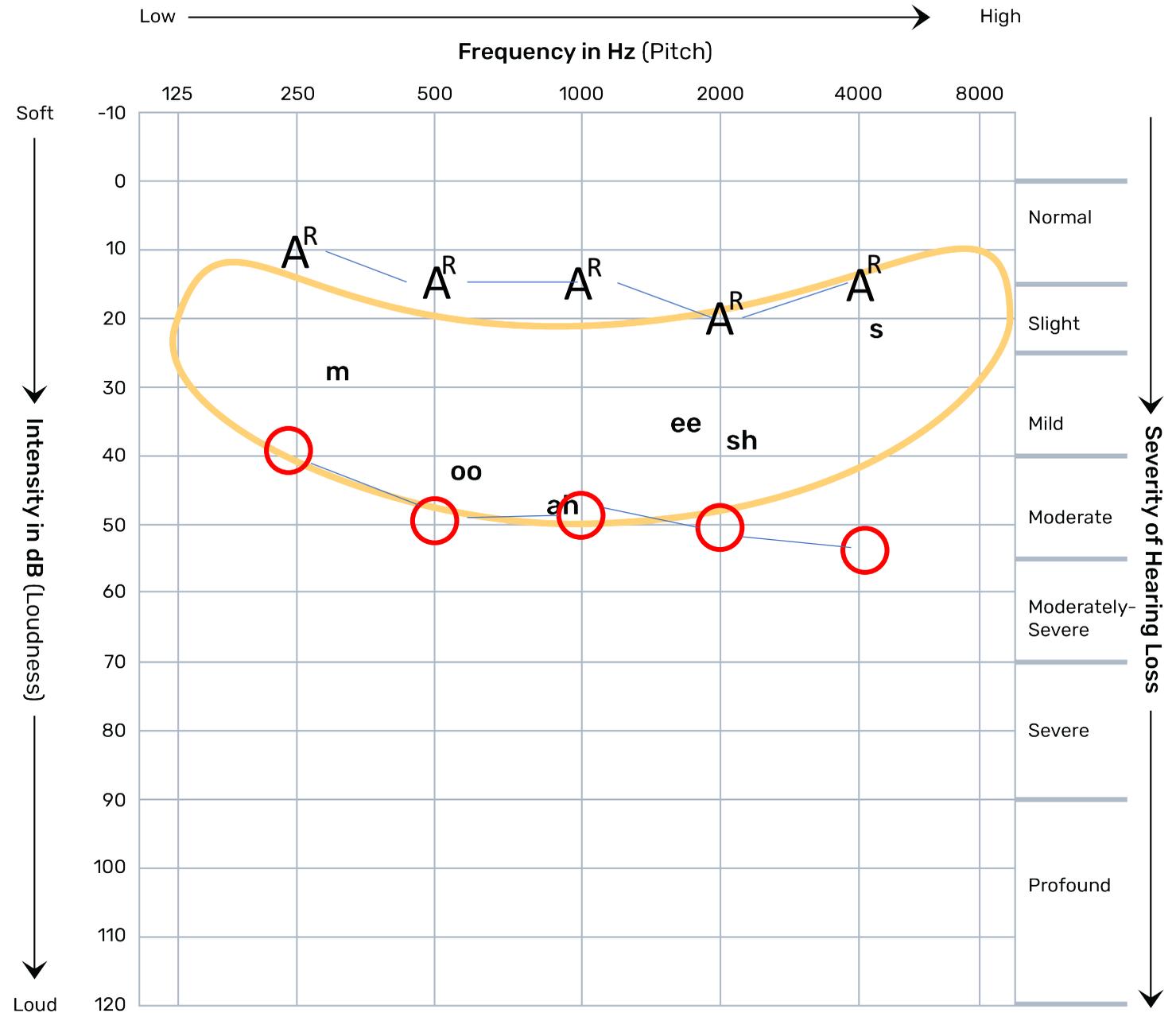
- A child with a moderate unmanaged hearing loss will miss about 50-80% of speech information



Familiar Sounds Audiogram

Moderate hearing loss

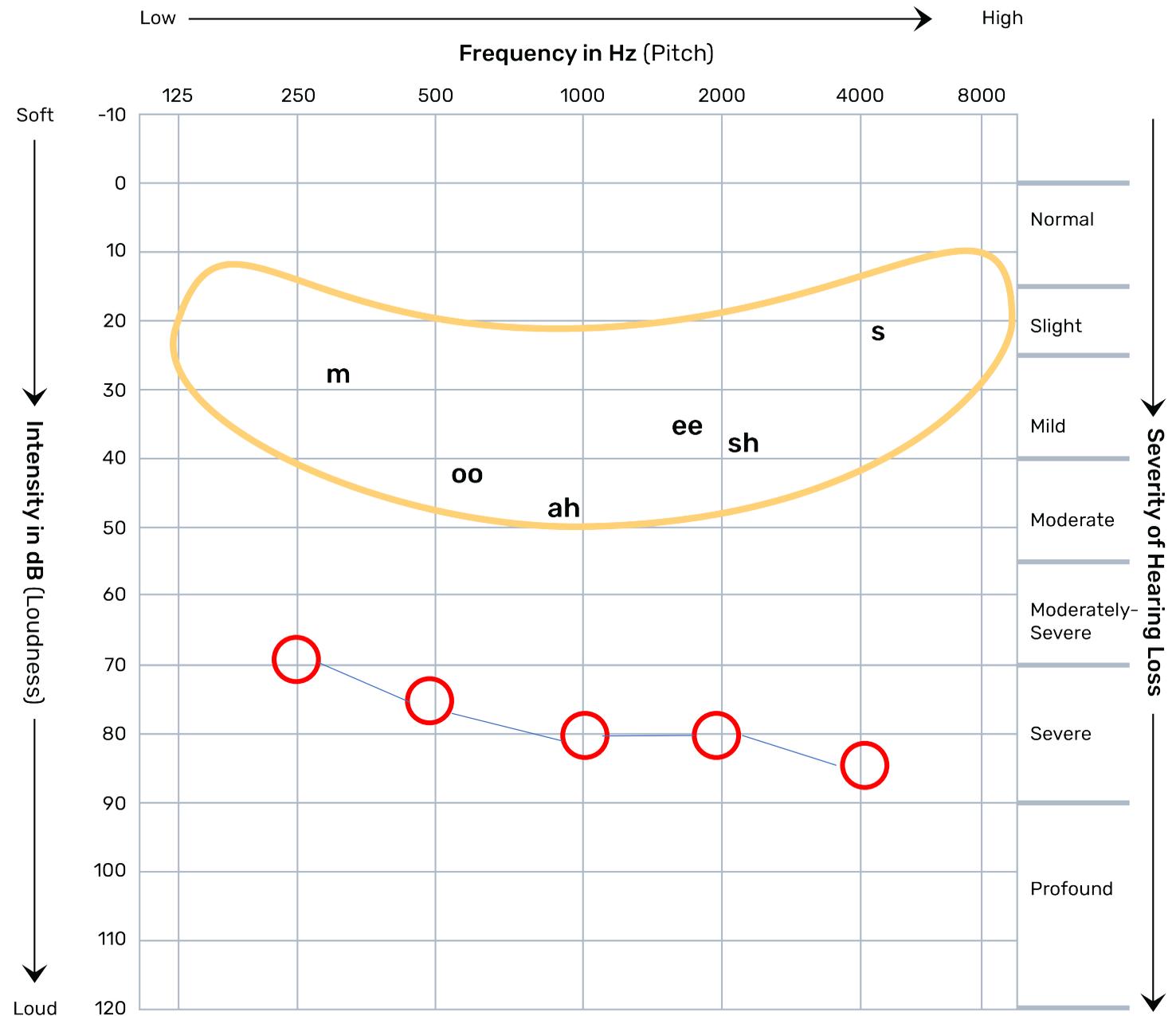
- For this child, hearing technology makes all sounds audible – what a difference!



Familiar Sounds Audiogram

Severe Hearing Loss

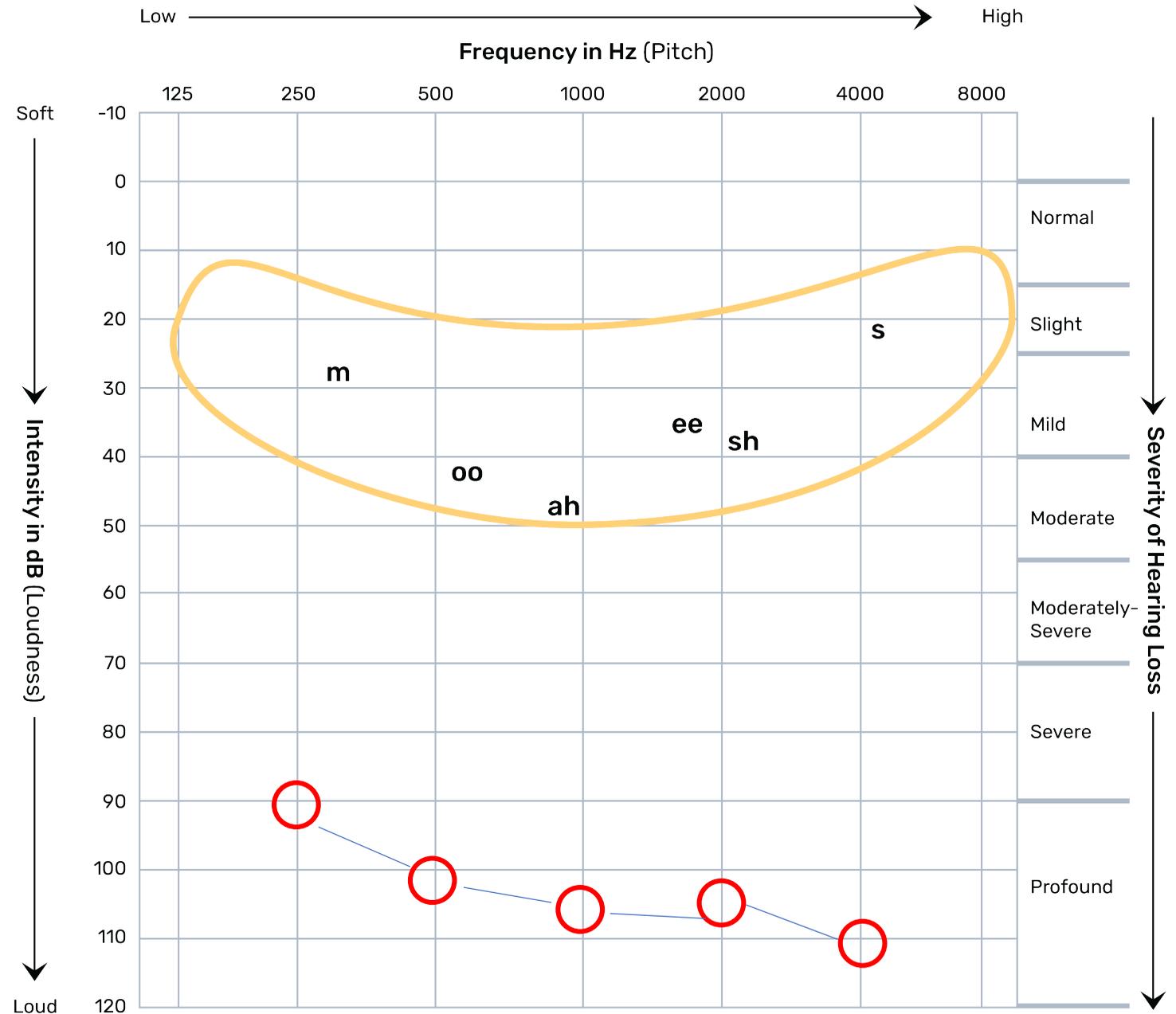
- With a severe hearing loss, spoken language will not develop without appropriate early use of technology and auditory language enrichment – they are not able to hear conversational speech without hearing technology (hearing aids or cochlear implants)



Familiar Sounds Audiogram

Profound hearing loss

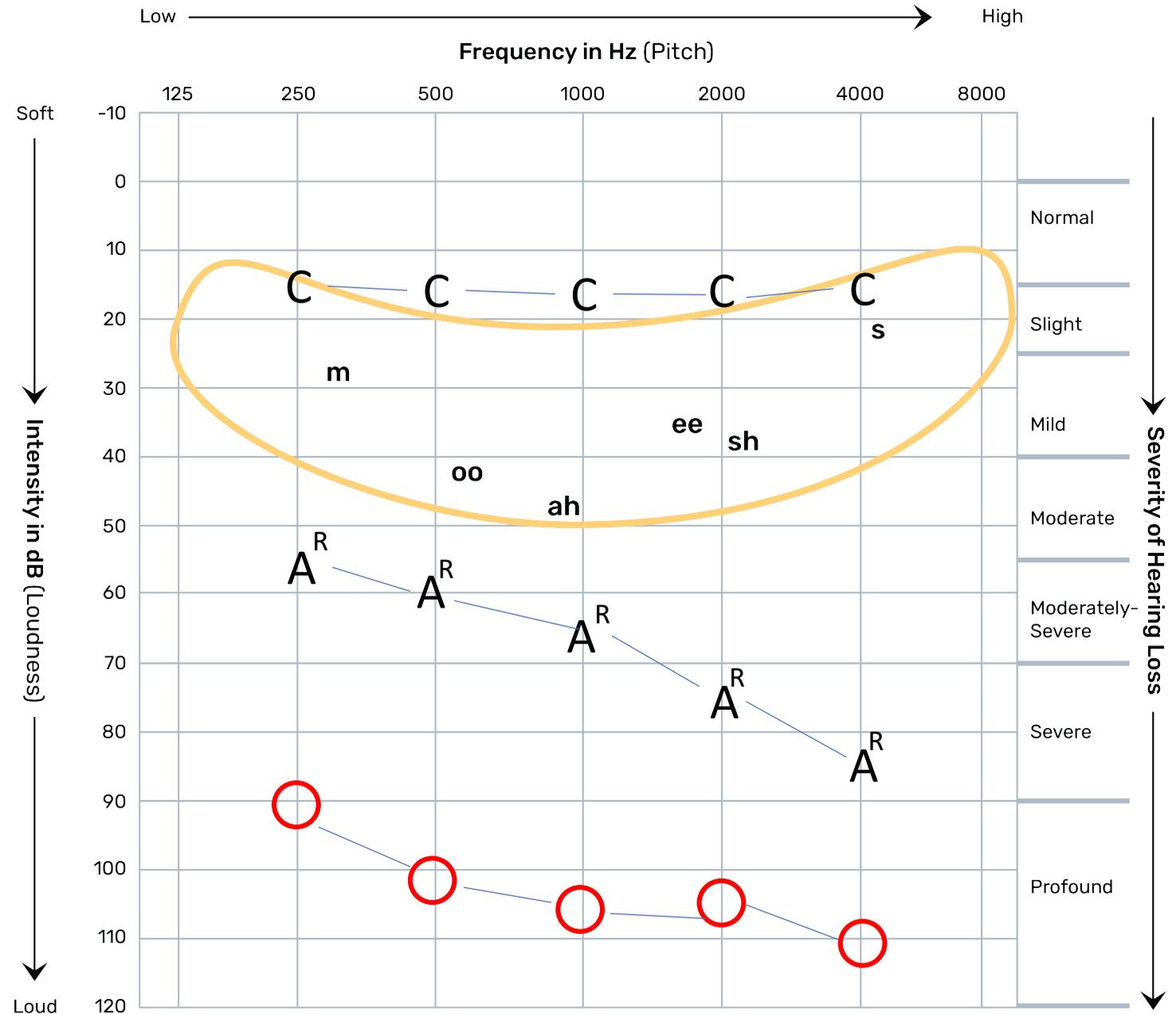
- The speech banana is where most speech sounds fall during typical conversations
- A child with a profound loss will miss all speech sounds when not using hearing technology



Familiar Sounds Audiogram

Profound hearing loss

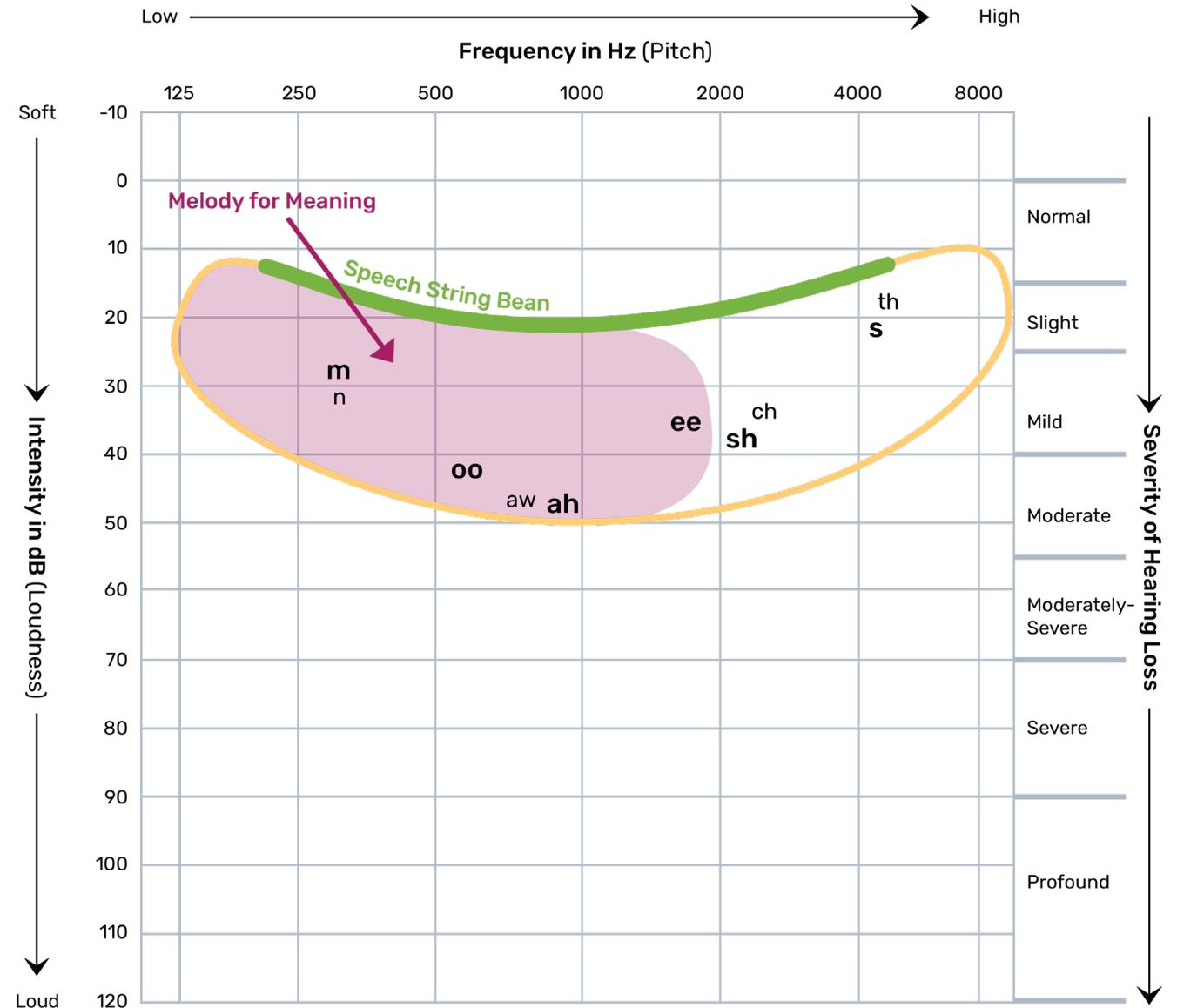
- A child with a profound loss will miss all speech sounds when not using hearing technology
- And often, powerful hearing aids (A) do not provide access to speech sounds. This child will likely need a cochlear implant to hear speech sounds (C).



Melody for Meaning

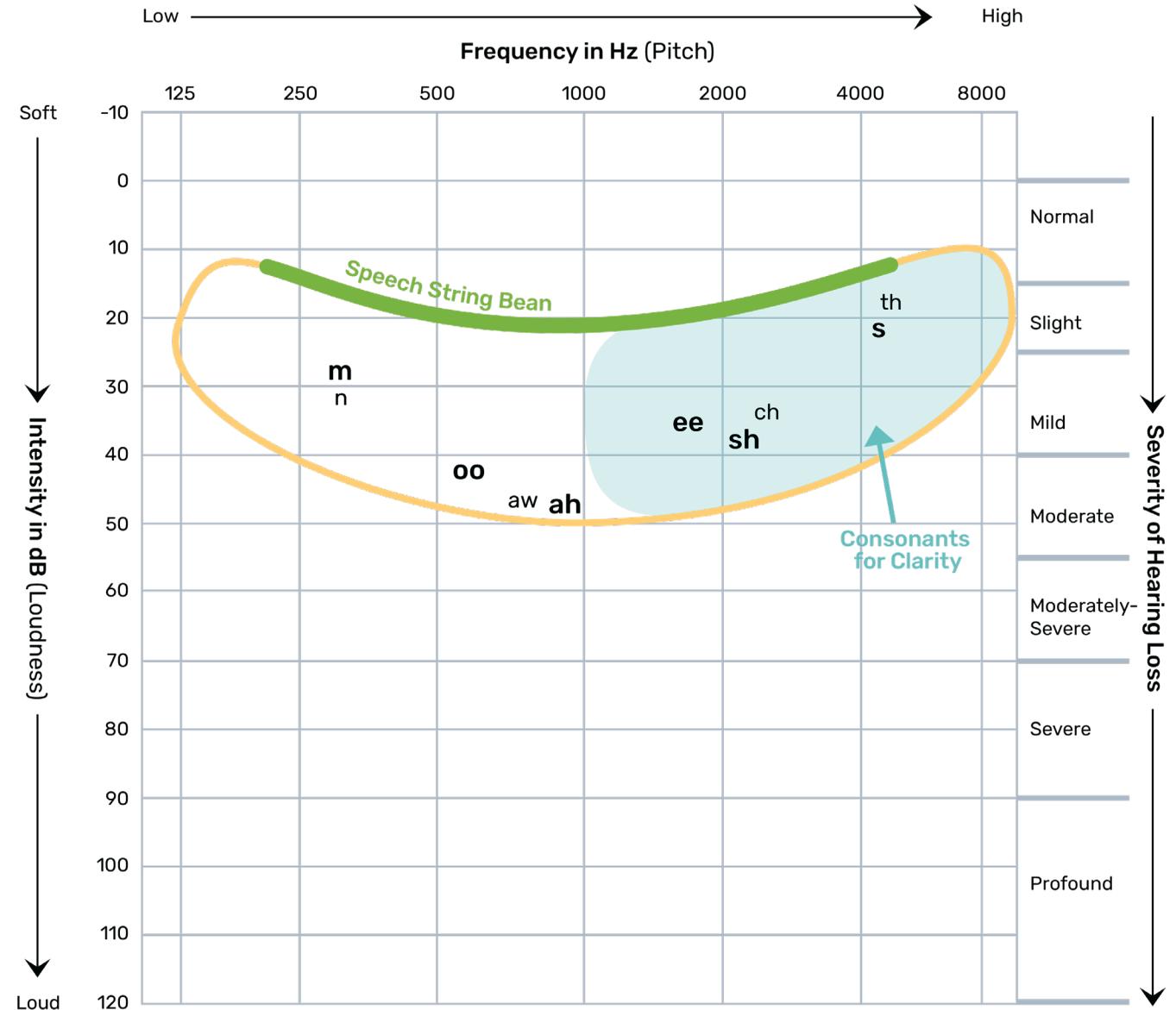
Every language has its own melody

- Children use melody (rise and fall in pitch) to help them understand speech.
- Melody for meaning displays the low frequency area the contains important vowel sounds that convey duration (short versus long words), intensity (helps your child recognize emotion) and pitch (male versus female speaker)



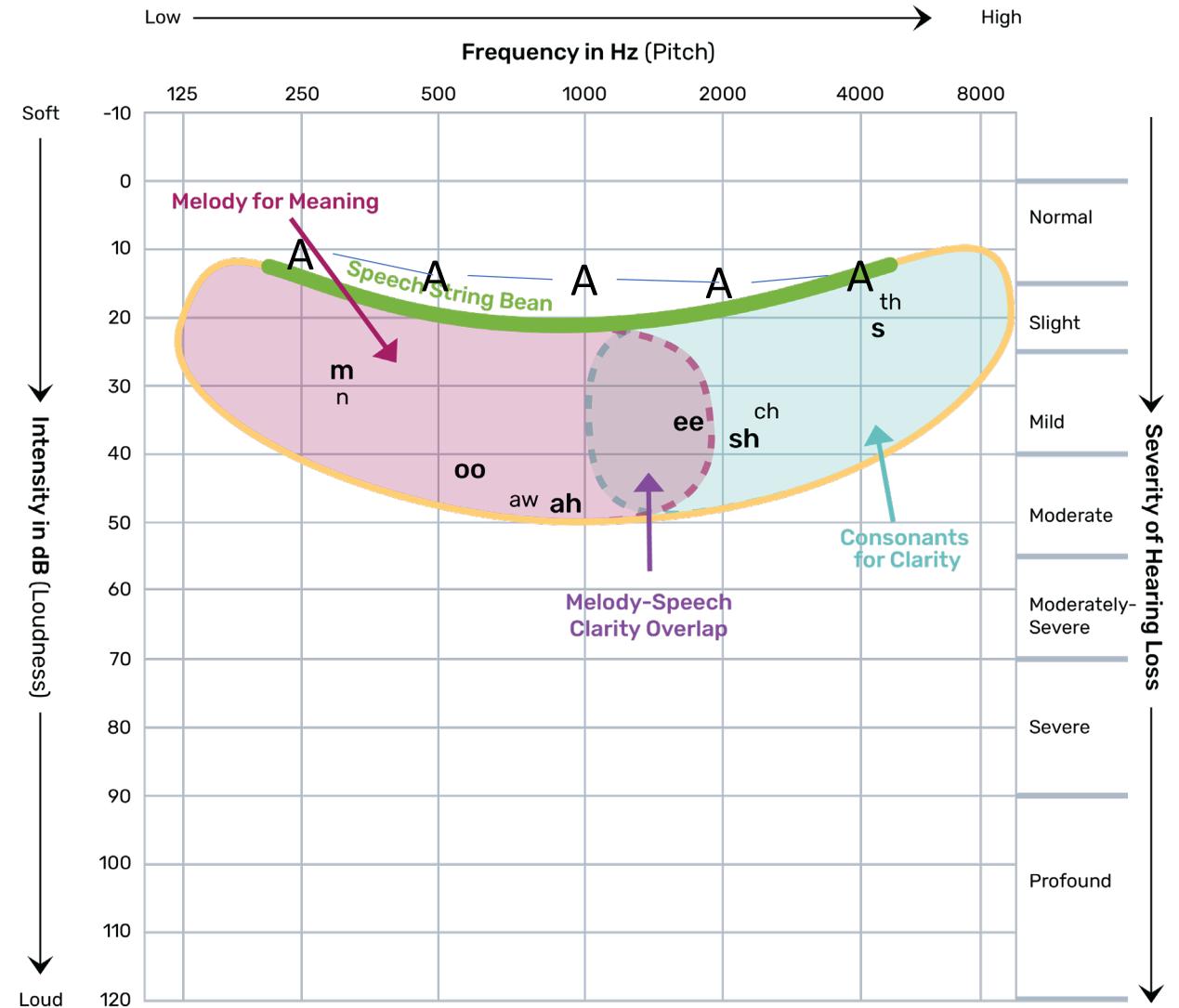
Consonants for Clarity

- The light blue area contains important consonant sounds that help distinguish words (i.e. cup versus cut, cat versus cats).
- These sounds are so important for understanding speech!



Speech String Bean

- A term coined by Jane Madell, Ph.D, this refers to the target area on the audiogram for a child's aided responses – to ensure they have access to all speech sounds



Environmental Sounds are important too!

And just like speech, they vary in frequency and loudness

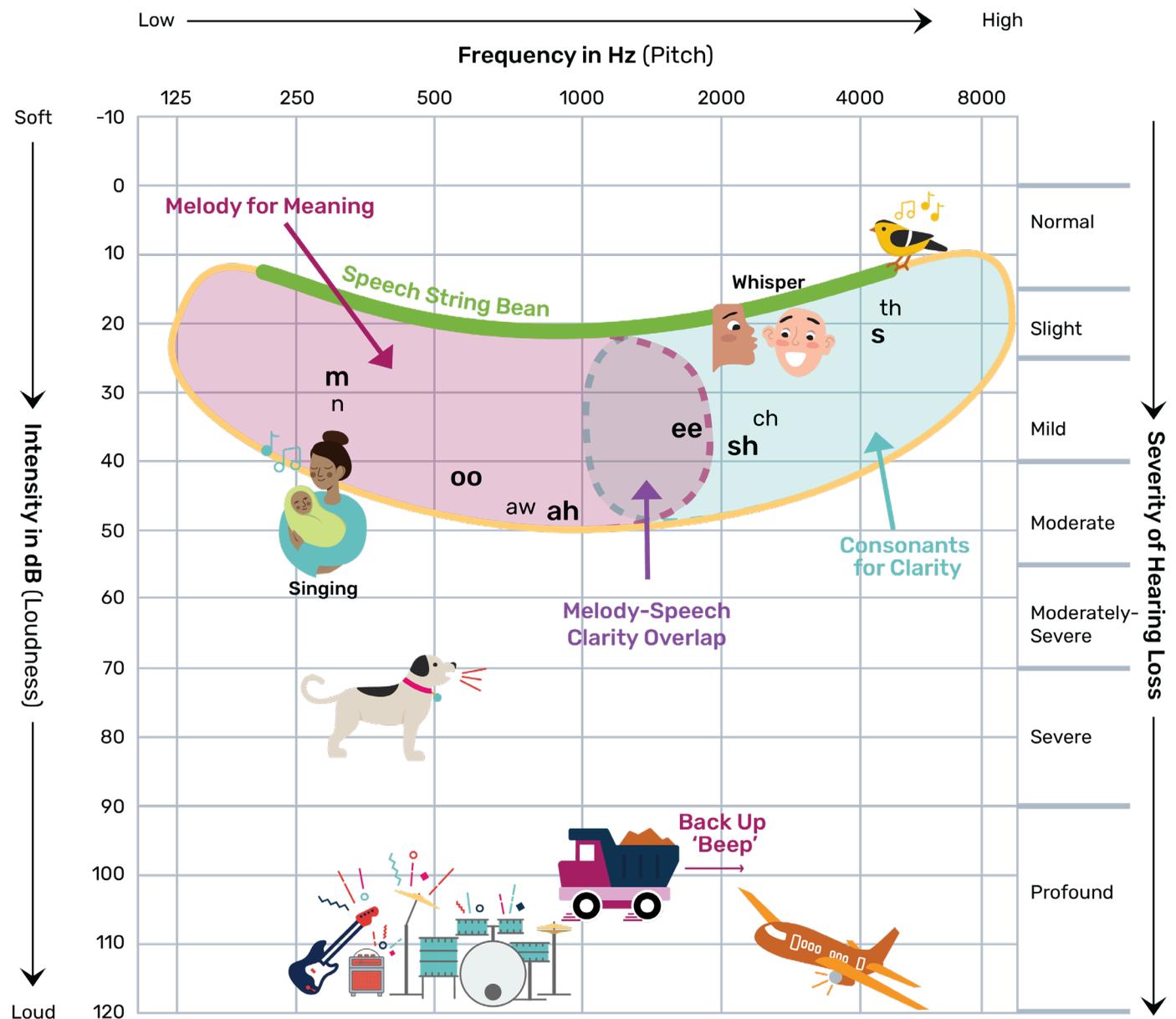
 Finch and whisper = high pitched and soft 

 Mom singing = lower pitched, mid loudness
Singing

 Dog barking = loud, low-mid pitch

 Back Up 'Beep'

  There are lots of loud sounds!



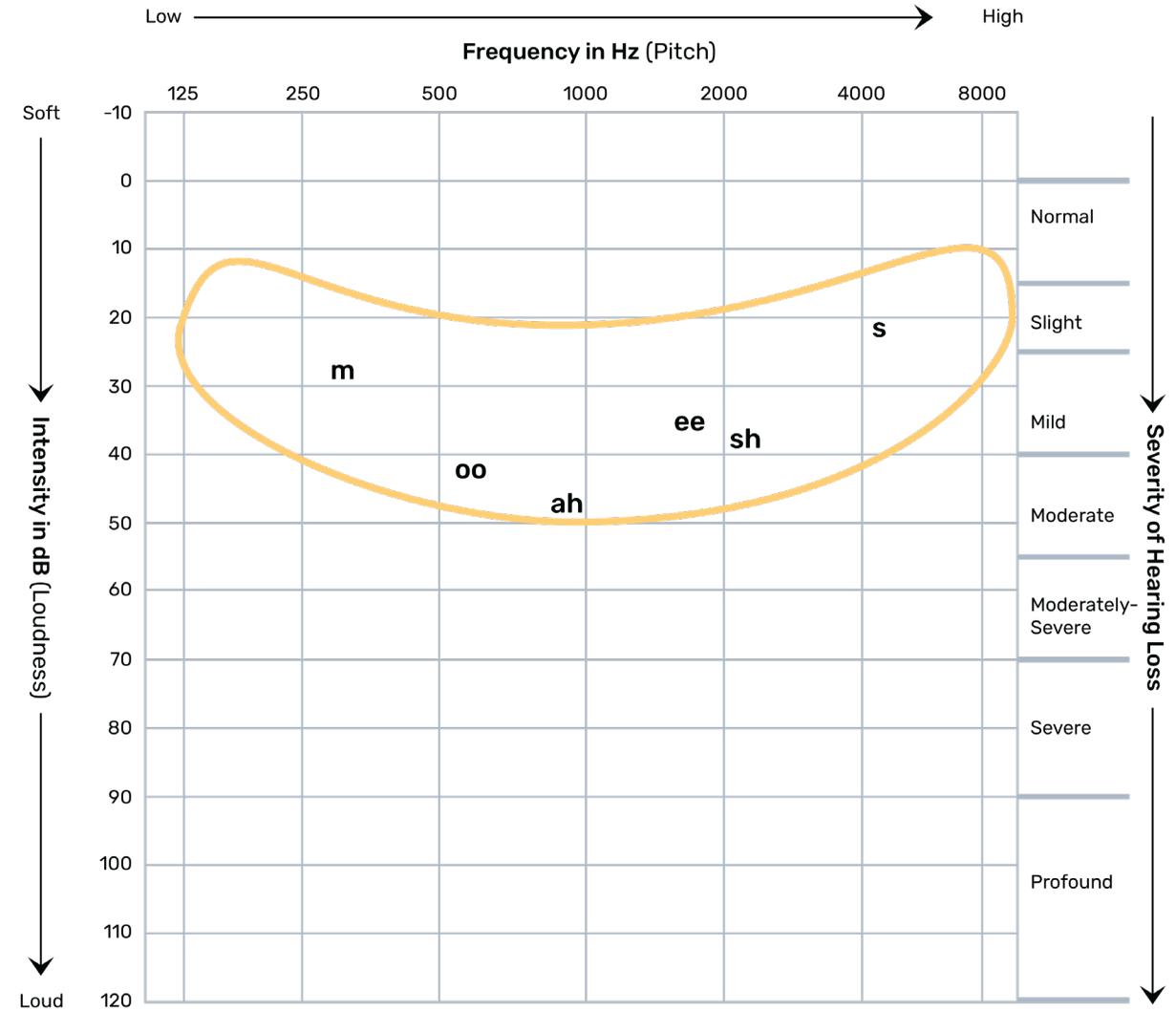


HOW TO CHECK YOUR CHILD'S HEARING AT HOME

Ling 6-Sound Test

You can check your child's hearing at home with the Ling 6-sound test. This test was developed by Dr. Daniel Ling, a key leader of the LSL approach we know today. This test is a quick and easy way to be sure your child is able to hear the vowel and consonant sounds of spoken language. The speech sounds used for this test (shown in bold on the familiar sounds audiogram) were selected because they each cover a unique area of the speech range on the audiogram as noted below:

- /m/** corresponds to a band of sound around 250 Hz
- /oo/** is like a narrow band of noise corresponding to 500 Hz
- /ah/** is like a narrow band of noise corresponding to 1,000 Hz
- /ee/** has bands of energy around 500 Hz, and also at 2,000 Hz
- /sh/** is a band of noise corresponding to 2,000 Hz and higher
- /s/** is a band of noise corresponding to 4,000 Hz and higher



We have lots of great information available for families at Hearing First!



Family Opportunities at Hearing First

Hearing First is here to support you on your journey to Listening and Spoken Language (LSL). Whether you've just received your diagnosis or are watching your child with hearing loss thrive in school, you're invited to join us for connection, community, and support.

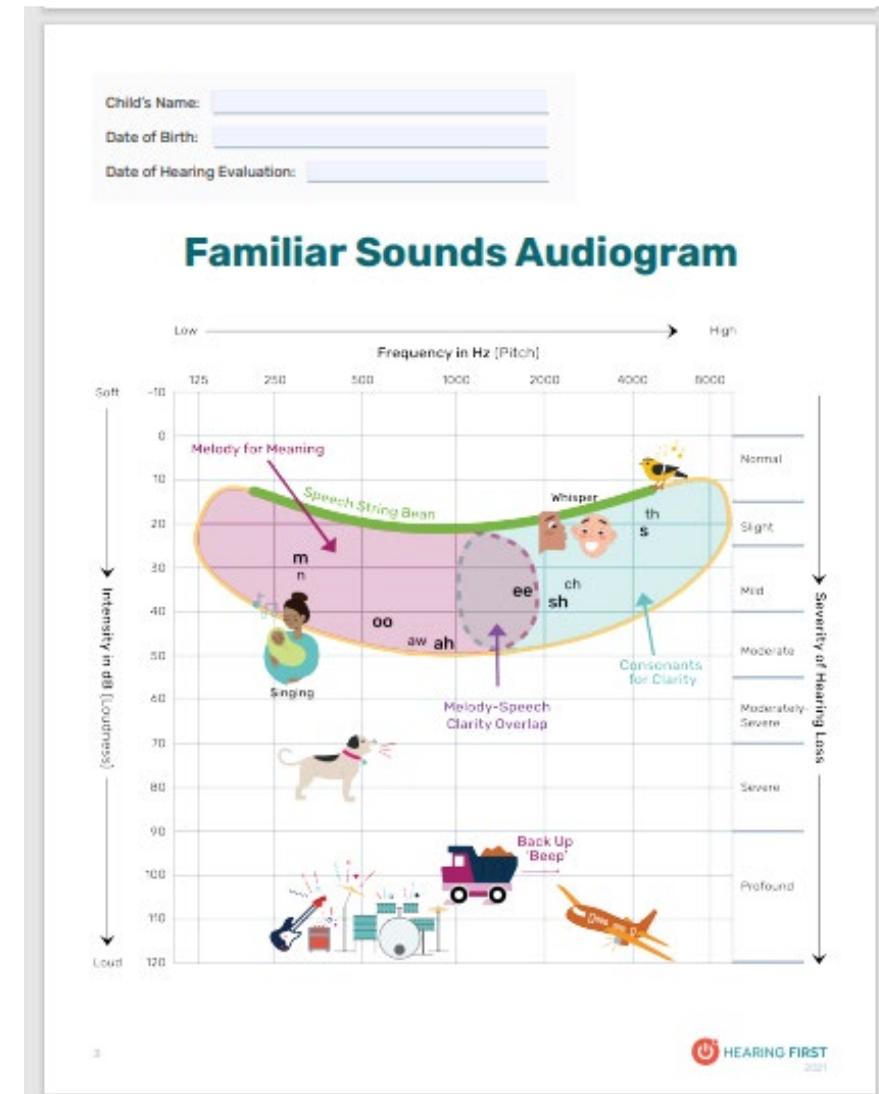
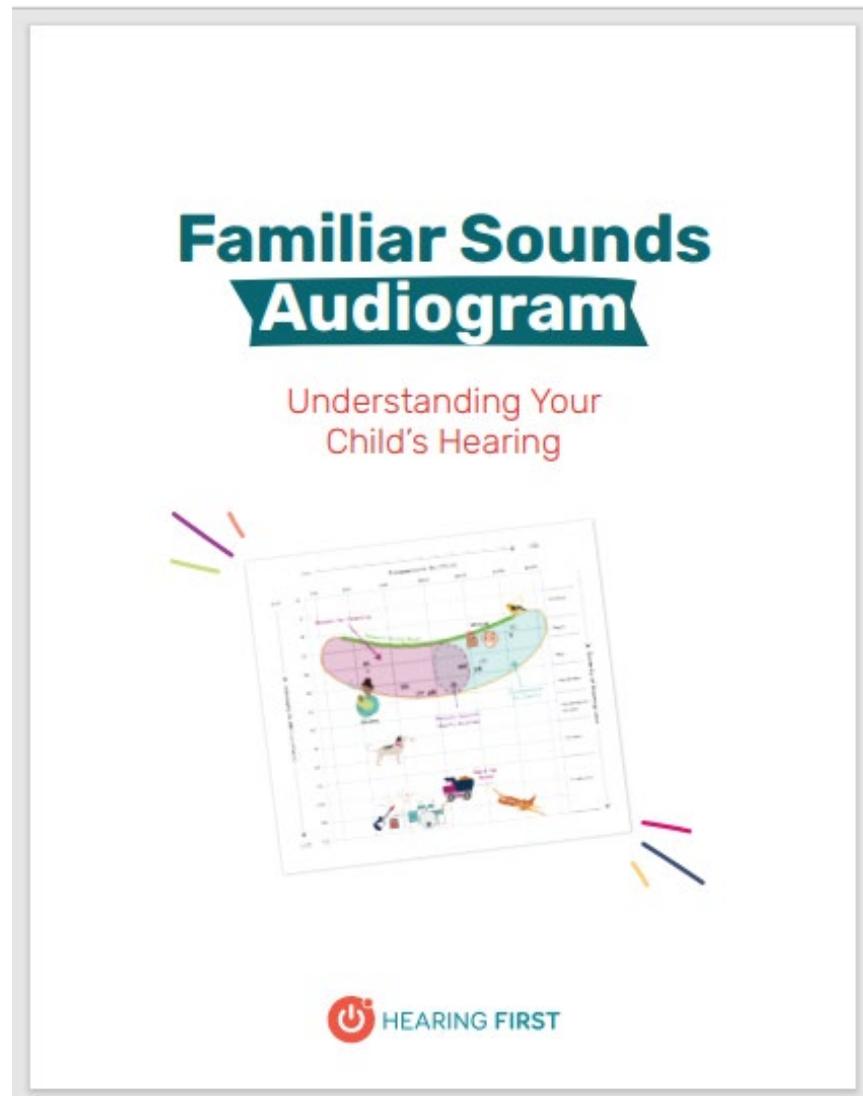
**HF Family-to-Family
Support Community**



**HF Facebook Group
Families of Children
with Hearing Loss**



Download and share the Familiar Sounds Audiogram eBook with your child's hearing professional



<https://www.hearingfirst.org/m/resources/7734>



Let's look at some audiograms and their impact on ability to hear speech sounds

- The Hearing First Familiar Sounds Audiogram was developed as part of a 5- part series titled Living LSL, led by Carol Flexer, Ph.D. All of Dr. Flexer's presentations can be accessed on the Hearing First website at www.hearingfirst.org



WEBINAR

Hearing is About Your Child's Brain

Watch Now



WEBINAR

Knowing What Your Child Can Hear

Watch Now



WEBINAR

What's Possible with Hearing Technologies Today

Watch Now



WEBINAR

How Remote Microphones Make a Difference

Watch Now



WEBINAR

Talk, Read, Sing: Grow Your Child's Brain

Watch Now



There are many other resources at Hearing First



Daily Device Check

A daily device check is completed to make sure your child's devices are in good working order. This check should be done at the beginning of each day and includes three components:

1. Visual Inspection
2. Battery Test
3. Listening Check

Your child's pediatric audiologist or the manufacturer of your child's devices can provide you with a device care kit to help complete the daily device check.

Visual Inspection

For the visual inspection component of the daily device check, you are looking to make sure that all of the parts and pieces of your child's devices are there and are connected properly; you are looking for any debris or damage; and you are looking to ensure the devices are on the correct settings if this is something your child's devices allow you to see.

Check for:

- All device parts and pieces and make sure they're correctly connected
- Correct device settings
- Functioning indicator lights
- Corrosion in the battery compartment and/or on the battery connections
- Teeth marks or cracks in the casing
- Broken or missing buttons, switches, or microphone port covers
- Wax or debris in the earmold
- Moisture in the earmold tubing or earhook
- Cracks or tears in the earmold or earmold tubing
- Working tamper-resistance features
- Exposed wires
- Appropriate connection of or to retention devices if applicable

Not all of these will apply to every device. You can consult with your child's pediatric audiologist regarding which ones apply to specific hearing technology. For some of these, you will be able to use items from your child's device care kit to fix the problem. For others, you will need to call your child's pediatric audiologist.



TIPS FOR KEEPING HEARING DEVICES ON LITTLE EARS

Wear Time

Eyes Open, Ears On!
It's vital that your child hears every moment while they're awake. They need to wear their devices all waking hours so they won't miss a single opportunity for listening and brain building.

Infants and Nap Time
Your baby is likely taking lots of naps at this age. Even if they're only awake for a few minutes between naps, make sure their devices are on!

Tips to Keep Them On

Distract
If they take their device off, draw their attention away from it and toward something fun! They'll quickly forget about pulling it off when there's something interesting to play with.

Put the Device Right Back On
If your child takes their device off, calmly put it back on. Don't make a big deal out of it, that way they won't do it for a reaction. Your persistence will pay off and they won't do this forever!

Tools and Accessories

Adhesive
Medical or wig tape will help keep the device on when used appropriately.

Caps
Special caps are made for hearing devices and can prevent your child from pulling them off.

Headbands
In a variety of shapes and sizes, headbands can also have special attachments or pockets for hearing devices.

Cords, Hooks, or Clips
These can help prevent your child's devices from becoming damaged or lost, and many attach the devices to their clothing.

Accessory to "Hug" the Ear
These attach the device to a soft rubber tube or flexible piece that snugly fits your child's ear to help keep it in place.

Find more helpful tips and resources at HearingFirst.org

Getting Started with Remote Microphones

A remote microphone (RM) can make a big difference in how much your child hears, especially at a distance or in a noisy environment. Keep reading for more about remote mics!

What is a remote mic?

A RM is a two-piece device that sends the sounds of your voice directly to your child's hearing device, so your little one can hear you even when they're not close to you or in a noisy environment.

The microphone (or transmitter)
worn by a parent or caregiver - sends the sounds to the receiver.

The receiver
located in or on your child's device - picks up the sounds so your child hears them.

Where are RMs used?

They can be used in all sorts of places! Think about:

Playground

Store

Home

Bus

Stroller

Car

Who wears the microphone?

Anyone your child needs to hear. Whoever talks to your child regularly.

Caretaker

Teacher

Parents

Grandparents

Friend

Sibling

What are some of the RM benefits?

Improved child behaviors when used at home:

- Improved attention
- Faster response when called
- Improved communication and speech
- Increased independence and confidence

5,300

more words per day!

Use of an RM at home increases the number of words your child hears. This helps with building language, vocabulary, and literacy skills!



Thank you!

tzwolan@hearingfirst.org

www.hearingfirst.org



HEARING FIRST

Powering Potential