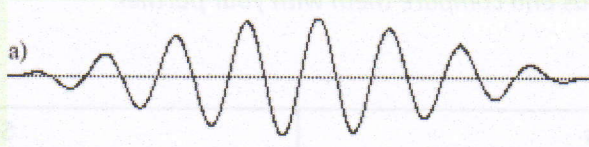


LESSON 1.- WHAT IS THE SOUND?

1.- THE SOUND

Every sound is a vibration.

That vibration travels as a wave through the air, water and solids. The sound doesn't exist in the vacuum because the waves don't have a medium to pass through.



The speed of the sound through the air is around 340 m/s. It's faster through the water and the fastest through the solids.

Activity 1.- Work in groups. Pick up one of the instruments below and explain to the rest of the class if you can see or/and feel with your fingers the vibration when you:

- Pluck the strings of a guitar.
- Hit a cymbal.
- Hit a tambourine.
- Play a xylophone.

Activity 2.- What happens when you stop the vibration?

Activity 3.- Where is the sound travelling through when...

- ...you hear while diving?
- ...you hear your neighbour through the wall?
- ...you feel and hear the tuning fork when it vibrates against your elbow?
- ...the Indians in the films lean their ears on the floor to hear the enemies coming?
- ...you can hear your friend with two plastic glasses joined by a tense string?
- ...you watch TV?

Activity 4.- What is the speed of the sound through the air?

Activity 5.- What is the medium through which the speed of the sound is the fastest?

Activity 6.- Where isn't there any sound and why?

2.- SOUND AND NOISE

A sound and a noise are physically the same. The only difference is that a noise bothers us or we just don't like it. So the classification depends on our opinion.

Activity 7.- Classify in noises or sounds:

A dog barking, the waves at the beach, the wind moving the leaves of a tree, a bird singing, an alarm, the school bell.

Add more noises or sounds and compare them with your partner.

Noises	Sounds

Activity 8.- We are always hearing something. It's impossible to be in total silence although we think we are. Check it:

Be quiet. Close your eyes for a minute and focus on the sounds or noises that you can hear.

List everything that you heard. Compare with the things that your partners heard.

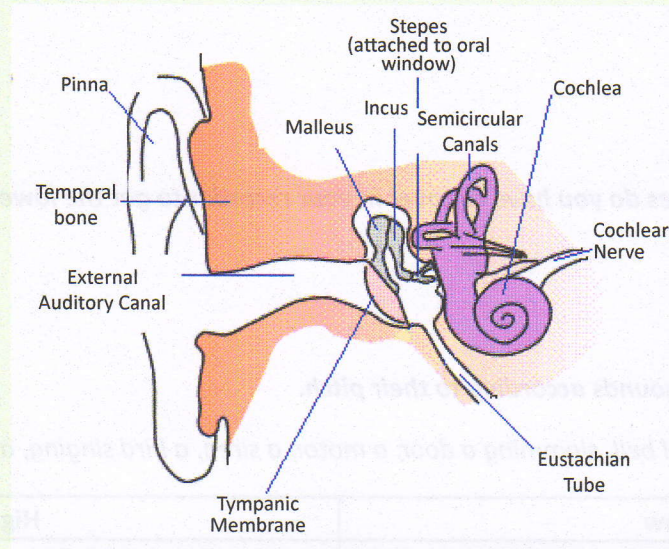
Activity 9.- Listen to this excerpt and answer:

Do you think this piece consists of sounds or noises?

Why?

3.- THE AUDITORY SYSTEM

This is the way that the sound waves follow from the ear: auditory canal-tympanic membrane-bony labyrinth-semicircular canals-cochlea-cochlear nerve-brain, which interprets the electrical signals.



4.- THE PROPERTIES OF THE SOUND

The sound has four properties: **pitch, duration, intensity and timbre.**

A) **The pitch** means **high or low**. It depends on the number of vibrations per second.

Human beings can't hear all the pitches. We can't hear lower than 20 vibrations per second nor higher than 20.000 vibrations per second. Some animals can hear lower than those vibrations (infrasound) or higher (ultrasounds).

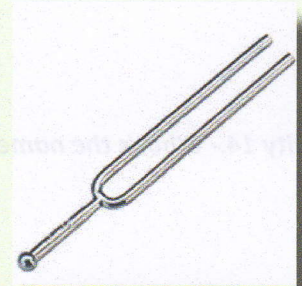
The tuning fork is made of metal. When it vibrates it always produces 440 vibrations per second. We call that sound **La**. It's like a compass in music. The instruments can be tuned from that note and it's useful for the choirs, too. The smaller the instruments are the higher its pitch is.

For example, the violin is higher than the bass.

Women have higher voices than men because their vocal cords are smaller.

*Remember: high

LOW



Activity 10.- Where are the high sounds in a xylophone, on your right or on your left?

Why?

Activity 11.- How many holes do you have to cover in your recorder to get the lowest sound?

Activity 12.- Classify these sounds according to their pitch.

A little bell, the school bell, slamming a door, a motor, a siren, a bird singing, a thunder.

Low	High

Activity 13.- Are women's voices higher or lower than men's voices? Why?

Activity 14.- What's the name of the sounds higher than the sounds that we can hear?

- Above how many vibrations per second does that happen?

- What's the name of the sounds lower than the sounds that we can hear?

- Below how many vibrations per second does that happen?

B) **The duration** is the **length** of a sound from the moment it starts until it ends.

There are **short** and **long** sounds. Short Looooooooooooooooooooooooong

C) **The intensity** means **loud or soft**. **LOUD!!!!!!!!!!** SSSSSSSSSSOFT

Be careful with the pitch:

A sound can be high and soft or high and loud; low and soft or low and loud.

The unit of the intensity is the decibel: dB. More than 120 decibels can hurt our auditory system.

D) **The timbre** is the property that allows us to **differentiate** what is producing a particular sound: which object, which instrument, which voice...

Although two sounds have the same pitch, intensity and duration, we can differentiate them thanks to their timbre.

Activity 15.- Listen and answer:

Which duration is longer: a cymbal's sound or a xylophone's sound?

Activity 16.- Classify the following sounds:

A bird singing, a cat purring, a thunder, the school bell.

Add other four sounds and share them with your partner.

<i>Low and soft</i>	<i>Low and loud</i>	<i>High and soft</i>	<i>High and loud</i>

Activity 17.- If two sounds are high, long and loud, how can we distinguish them?

Activity 18.- Ask a partner to play a sound with a particular pitch, duration and intensity.

He has to play it choosing the timbre.

Example: "Play a high, long and loud sound". Then the partner plays a cymbal.

Activity 19.- Play the sound that you want with any object in the class and the rest of the class has to write a cross in the chart below depending on the properties of your sound:

	Pitch		Duration		Intensity		Timbre
	High	Low	Long	Short	Strong	Soft	What is it?
1							
2							
3							
4							
5							

Activity 21.- Listen to these two musical portraits of two animals from the work "The carnival of the animals" by Camille Saint-Saëns and fill in the chart.

	1st Hens and roosters	2nd The elephant
Pitch: Which one is high and which one is low?		
Duration: Which one has long sounds and which one short sounds?		
Intensity: Which one is soft and which one is loud?		
Timbre: Which one is a flute and which one is a bass with a piano?		

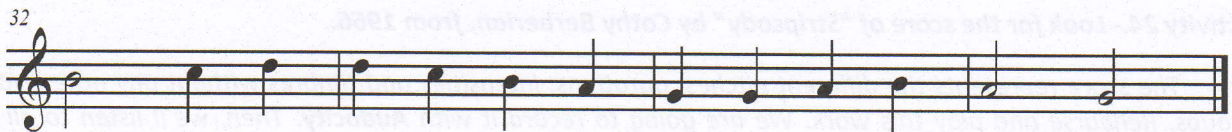
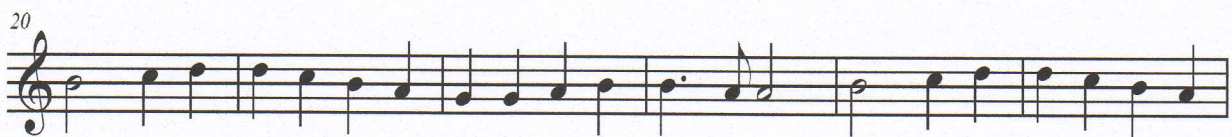
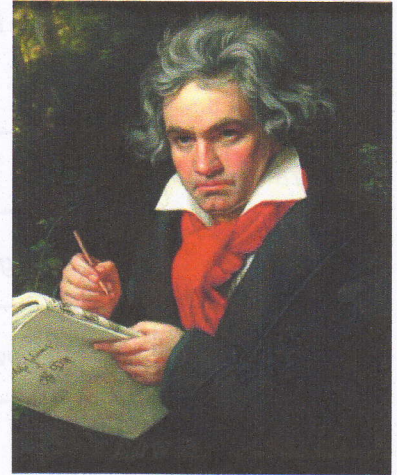
Activity 22.- Play the melody from Beethoven's "Ode to joy" changing the properties of the sound:

The pitch: first low and then high.

The intensity: first soft and then loud.

The duration: first with long sounds and then short ones.

The timbre: first with the recorder and then with the xylophone.



Activity 23.- Imagine that we don't have the musical notation and we want to represent the sounds.

Here you are a way to do it.

Properties	Pitch		Duration		Intensity		Timbre	
Symbol	↑	High	_____	Long	_____	Loud		A recorder
	↓	Low	_____	Short	_____	Soft		A voice

Watch at this web page: <http://www.youtube.com/user/smalin> excerpts from musical works without notes. How are the pitches, durations, intensities and timbres represented?

- Pitch:
- Duration:
- Intensity:
- Timbre:

With the help of those ideas write some symbols to represent different sounds. Then, give it to a partner so that he can play what he can see. Listen to him and say if he has done it right.

Activity 24.- Look for the score of "Stripsody" by Cathy Berberian, from 1966.

The score represents the different pitches, durations, intensities and timbres without any note. Work in groups. Rehearse and play this work. We are going to record it with **Audacity**. Then, we'll listen to all your versions looking at the score and we will decide which version is the best.

REVIEW ACTIVITIES

Activity 25.- Look for the words that complete the statements in this word search puzzle:

- A) The sound is a _____
- B) The sound vibrations travel as a _____
- C) The sound wave travel through the air, solids and the _____
- D) We finally hear in the _____
- E) The sound can't exist in the _____
- F) We call a sound that bothers us a _____
- G) The four properties of the sound are:

V	A	C	U	U	M	Z	U	T	Y
D	I	R	S	O	H	C	T	I	P
U	T	B	I	L	E	H	J	M	O
R	A	C	R	M	W	D	C	B	N
A	D	W	O	A	A	L	V	R	I
T	F	X	V	C	T	N	K	E	A
I	G	E	S	M	E	I	F	J	R
O	H	Q	D	H	R	H	O	U	B
N	O	I	S	E	N	D	Y	N	I
K	M	U	Z	D	R	A	V	C	E
E	P	X	E	S	G	I	N	O	L
L	Y	T	I	S	N	E	T	N	I

Activity 26.- Fill in the chart about the properties of the sound:

		<u>Duration</u>				
					<u>Soft</u>	

Activity 27.- Complete the diagram of the lesson:

1. The origin and the transmission of the sound

2. _____

3. The auditory system

4. _____

A) _____: Low and high

B) Duration: _____ y _____.

C) Intensity: _____ y _____.

D) _____: it allows us to know what produces the sound.

Activity 28.- Complete the summary of the lesson:**1. The sound**

Every sound is a _____.

That vibration travels as a _____ through the air, water and solids. The sound doesn't exist in the _____ because the waves don't have a _____ to pass through.

The _____ of the sound through the air is around _____ m/s. It's faster through the water and the fastest through the _____.

2. Sound and noise

A sound and a noise are physically the _____. The only difference is that a noise _____ us or we just don't _____ it.

3. The auditory system

This is the way that the sound waves follow from the ear: auditory canal-_____ -bony labyrinth-semicircular canals-cochlea-cochlear nerve-_____, which interprets the electrical signals.

4. The properties of the sound

A) **The pitch** means _____. It depends on the number of vibrations per second.

We can't hear lower than _____ vibrations per second nor higher than _____ vibrations per second. Some animals can hear lower than those vibrations (_____) or higher (ultrasounds).

The _____ always produces 440 vibrations per second. We call that sound **la**.

The _____ the instruments are the higher its pitch is.

B) **The duration** is the _____ of a sound. There are **short** and _____ sounds.

C) **The intensity** means _____ or **soft**.

The unit of the intensity is the _____

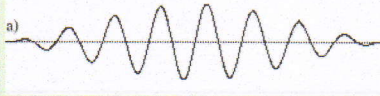
D) **The timbre** is the property that allows us to _____ what is producing a particular sound.

KEY VOCABULARY

Sound

Vibration

Wave



Solid

Liquid

Gas

Speed

Medium-vacuum

Fast-faster-the fastest

Noise-sound

Bother

Pitch: High-low

Hertz (Hz)

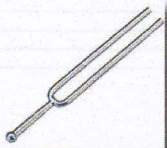
Duration: Long-short

Intensity: Loud-soft

Decibel (dB)

Infrasound-ultrasounds

Tuning fork



Auditory system

Outer ear-middle ear-inner ear

Tympanic membrane

Nerve impulses

