

Content package for interactive whiteboards – Sound and types of sound

This guideline provides an overview of the content and didactic context of the media in the content package for interactive whiteboards entitled “Sound and types of sound.”

General information on the use and teaching concept of the content packages for interactive whiteboards is provided in the teaching method “Working with a content package for interactive whiteboards,” which is also included in the media package.

1 Introduction to teaching this topic

1.1 Motivation for the topic

Our ears take in the sounds of our surroundings as sound waves. But what exactly is sound? This question is covered in lessons on the ear, in some cases as early as elementary school, where the main emphasis is on the phenomenon of sound. In secondary schools (especially in grades 7 to 9), acoustics is an important part of physics class, when the basics of sound production and propagation are taught. Important concepts are explained, and the topic also overlaps with biology (hearing process).

The media in the content package provide a suitable way of acquainting students with the principle of sound and the types of sound. The 29 individual media can be used in physics and technology classes starting from grade 5. The content package is designed for a period of about 1 lesson, but may take up a little more time if the experiments are carried out.

1.2 Media selection

The content package for interactive whiteboards entitled “Sound and types of sound” contains 29 individual media.

- **Five photos** of oscillograms of different types of sound
- **Three interactive graphics** on the basics of sound, oscillations, and types of sound
- **Five video clips** of oscillograms of different types of sound
- **Five sample audio clips** of different types of sound
- **Three text documents:** Sound – basics (guideline), Sound signals and sound curves (information sheet), What is sound? (information sheet)
- **Three interactive exercises:** Cloze test, recognizing types of sound based on sample audio clips and images, test related to oscillation
- **One set of experimentation instructions:** Sound propagation experiments
- **One worksheet:** What determines the shape of the sound curve? (with answer sheet)
- **One link list:** Links to interesting websites about sound

1.3 Background information for teachers

The media can be combined in various ways in terms of content and teaching method, depending on the focus of the class.

It is recommended that teachers work through the topic in the following steps:

- **Introduction/motivation: What is sound?**
- **Sound and types of sound**
How is sound produced? – What is an oscillation? – What types of sound are possible?
- **Further study phase**
Theory – exercises – worksheet – experiments

Note: The button for calling up each medium is also indicated in the following list of media.

2 Introduction/motivation: What is sound?

Why do we hear a balloon bursting? What about water waves? Does a loudspeaker diaphragm make oscillations visible? These questions are useful discussion starters for an introduction to sound. The answers can be worked through together during class or students can find the answers themselves using the information sheet.

Medium  "What is sound?"

3 Sound and types of sound

An interactive graphic created in presentation style has three questions on sound and the corresponding answers:

- How is sound produced?
- What is an oscillation?
- What types of sound are possible?

Teachers may choose the questions they would like to work out the answers to during class and the order in which the questions should be answered.

3.1 How is sound produced?

Based on the example of an oscillating loudspeaker diaphragm, the path from the sound source via the sound medium to the sound receiver is illustrated graphically.

Medium  "How is sound produced?"

3.2 What is an oscillation?

Using a graph of an oscillation, teachers can work through the most important terms related to oscillation interactively with students.

Medium  "What is an oscillation?"

3.3 What types of sound are possible?

At first, only the column listing the individual types of sound is filled in. For each type of sound, a sample image, audio clip, and video clip of an oscilloscope recording of the respective type of sound can be called up. An explanation of the type of oscillation produced by the sound generator can also be shown. Then the completed table can be printed, for example, as an overview for the students.

Medium  "What types of sound are possible?"

Note: As an alternative to the table mentioned above, the individual image, audio, and video files can each be called up via the corresponding buttons on the menu bar of the content package.

Photos

Media  "Sound as aperiodic signal"
 "Bang as aperiodic sound impulse"
 "Test tone as the purest sound signal"
 "Tuning fork as a 'simple' sound"
 "Violins as a complex sound signal"

Audio clips

Note: When the audio clip is played, the page currently displayed in the content package remains visible. This means the audio clip of a specific type of sound can be used, for example, to accompany a photo. To this end, the photo should be called up first and then the corresponding audio clip played.

Media  "Sound as an aperiodic signal"
 "Bang as an aperiodic sound impulse"
 "Test tone as the purest sound signal"
 "Tuning fork as a 'simple' sound"
 "Violins as a complex sound signal"

Video clips

The video recordings of the sound curves in the oscilloscope combine sound with a moving image.

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| Media |  | “Sound as an aperiodic signal” |
| |  | “Bang as an aperiodic sound impulse” |
| |  | “Test tone as the purest sound signal” |
| |  | “Tuning fork as a ‘simple’ sound” |
| |  | “Violins as a complex sound signal” |

4 Further study phase

4.1 Theory

Teachers can use the guideline on the basics of sound – such as definition, types of sound, properties, and speed of sound – for preparation.

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| Medium |  | “Sound – basics” |
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The information sheet explains what periodic and aperiodic sound signals are. It can be printed and distributed to the students.

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| Medium |  | “Sound signals and sound curves” |
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The link list for “sound” supports the further study of the topic during homework or can be given to students as a basis for a presentation.

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| Medium |  | “Link list: Sound” |
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4.2 Exercises

The three interactive exercises are suitable for testing students’ level of knowledge. They can be used at the end of the lesson as an aid to memorization of the material that has just been learned, or for review at the beginning of the next lesson. Students can work through the exercise themselves on the interactive whiteboard.

The cloze test with statements on the various types of sound can be filled in by hand or by dragging and dropping.

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| Medium |  | “Types of sound (cloze test)” |
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Students listen to the sample audio clips and match the appropriate sound curves to them. Then they label them either by using the specified word cards or by hand.

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| Medium |  | “Types of sound (matching exercise)” |
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An interactive multiple-choice test asks five questions about oscillation.

Medium



“What is an oscillation? (test)”

4.3 Worksheet

With the printable worksheet, students work with the different shapes of the sound curves. The worksheet can be either worked through in class, used as a test, or completed by students as homework.

Medium



“What determines the shape of the sound curve?” (with answer sheet)

4.4 Experiments

The experimentation instructions describe sound propagation experiments in solid, liquid, and gaseous bodies.

Medium



“Sound propagation experiments”

Note: Most media in the content package for interactive whiteboards entitled “Sound and types of sound” also exist as individual media on the the Siemens Stiftung Media Portal.