

Bad Vibes

Sound Insulation Enquiry



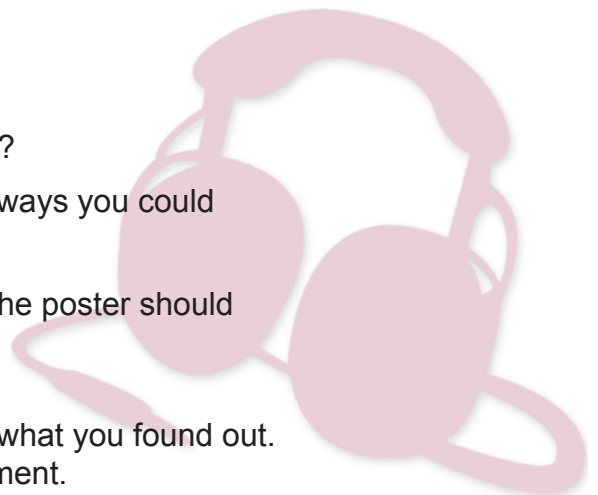
Investigating sound insulation

We live in a noisy world. Drummers practising. Traffic noise. People chatting on mobile phones. Machines make a lot of noise too. How can we cut down these annoying noises?

Some materials work well as sound insulation. They help to deaden the sound and stop it spreading. In this enquiry you will be looking at a range of different materials to insulate sounds.

Questions

1. List some materials you think would be good at deadening sounds.
2. Suggest three places where this sound insulation would be useful.
3. Plan and carry out an enquiry into the best materials for soundproofing. In your enquiry, how did you make sure the sound source was the same for each test material?
4. How did you measure the level of the sound?
5. Which materials were the best sound insulators?
6. How much better were they than no sound insulation?
7. How reliable do you think your data is? Suggest two ways you could improve its reliability.
8. Present your findings as a poster for a conference. The poster should include:
 - Title
 - Abstract – a short summary of the enquiry and what you found out.
 - Method with a diagram or photograph of equipment.
 - Results – tables and graphs.
 - Discussion – interpretation and evaluation of the results.





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Results

You can note down lots of data points in the second column. Separate them with a comma or a forward slash. An example is done for you.

Sound insulation	Loudness	Total	Average
Example: Paper	3, 4, 3, 6, 4, 5, 3, 5, 4, 3	40	4
My results			
No insulation			
1:			
2:			
3:			
4:			
5:			



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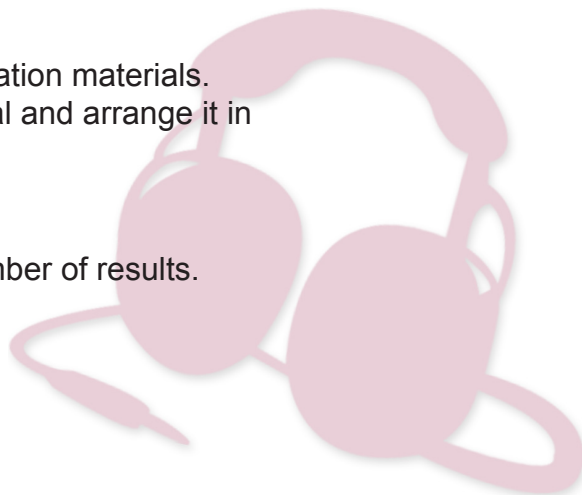
Method 1: Using a sound meter

1. Set up a sound meter that gives you a reading in deciBels.
2. Use a loudspeakers or computer to play a prerecorded sound. Measure the sound level. Note down the value in your table of results. Repeat this test until you think that you have enough reliable data.
3. Now put some sound insulation around the microphone on the sound meter. Play the same sound again, at the same volume, and note down the new reading from the soundmeter. Repeat this test until you think that you have enough reliable data.
4. Repeat the test with a variety of different sound insulation materials. Be careful to always use the same amount of material and arrange it in the same way.
5. Add up the total for the sounds. Add it to your table.
6. Work out the average by dividing the total by the number of results.

Method 2: Estimating sounds by ear

If you do not have a sound meter you will have to use your ears to work out how loud the sound is.

1. Set up a microphone and an amplifier. The output should go to a set of headphones.
2. Play a sound as in Method 1. Give the sound a score from zero to ten. zero is silence, ten is loud. Repeat this test until you think that you have enough reliable data.
3. Now test the sound insulation materials as in Method 1 but give each one a score out of ten by listening through headphones. Repeat this test until you think that you have enough reliable data.
4. Repeat the test with a variety of different sound insulation materials. Be careful to always use the same amount of material and arrange it in the same way.
5. Add up the total for each sound.
6. Work out the average by dividing the total by the number of results.



Science Facts

Some people are more sensitive to sound than others. They hear sounds louder than other people.

Sound level is measured in deciBels.

A sound that is 20 deciBels is ten times louder than one of 10 deciBels.

Every increase in 10 deciBels increases the loudness by ten times so a sound of 30 deciBels is 100 times louder than the 20 deciBel one! 40 deciBels is 1000 times louder!

Need a Clue?

Draw up a good data table before you start. This makes it easier to collect evidence and makes you less likely to miss important things while you are doing the enquiry.

Headphones may be useful to help people to concentrate on the sounds you are testing.

The variable you are changing is the type of insulation material. How will you control other variables?

Glossary

Data

Pieces of information.

DeciBel

A measurement of the loudness of a sound.

Variable

A variable can change in an enquiry and have different values - in this enquiry loudness is one variable.

Reliable

If repeated measurements of the same thing are close together, then the data is reliable. You can have more confidence in conclusions that are based on reliable data.

More Clues

Your data will be more reliable if you control other variables.

How can you make sure the sounds are equally loud for all of your tests?

When you wrap sound insulation around the microphone make sure you always use the same thickness and wrap it in the same way.