7 Muffling sound

You can MUFFLE, or reduce, sound by using soft materials with lots of air spaces.

So far in this book we have seen that sound needs a material to move in, and that it cannot travel through empty space. It can be bounced easily off hard, smooth surfaces, but not rough ones; it can travel through air, water and solids; it can be made louder by using a hollow box. We need to know all of these things because **SOUNDPROOFING** is about trying to cut down unwanted sounds, or **NOISE**.

Double glazing

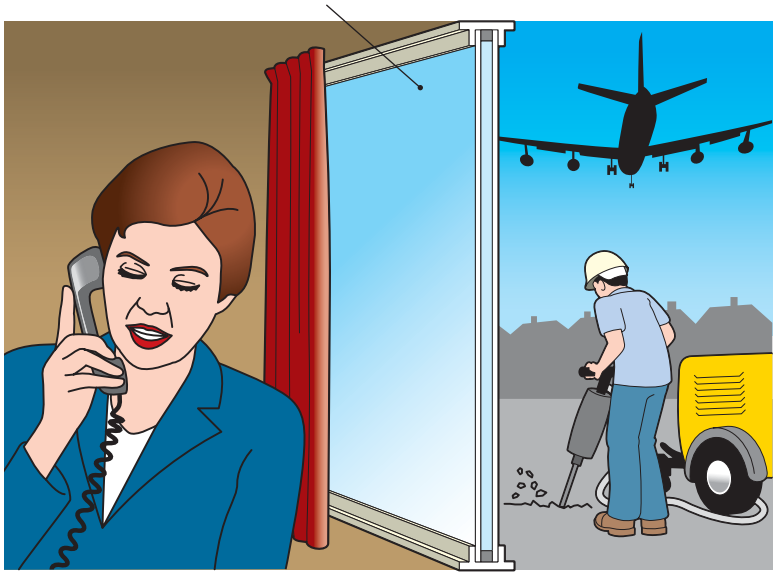
There is no air in space. This is called a **VACUUM**. Sound cannot travel through a vacuum.

Even taking out some air will help soundproofing. The most common example of this is double glazing (Picture 1). In double glazing, two sheets of glass are sealed together, leaving just a small gap between them. Some air is then removed from the gap, making double-glazed windows very soundproof.

Materials that soak up vibrations

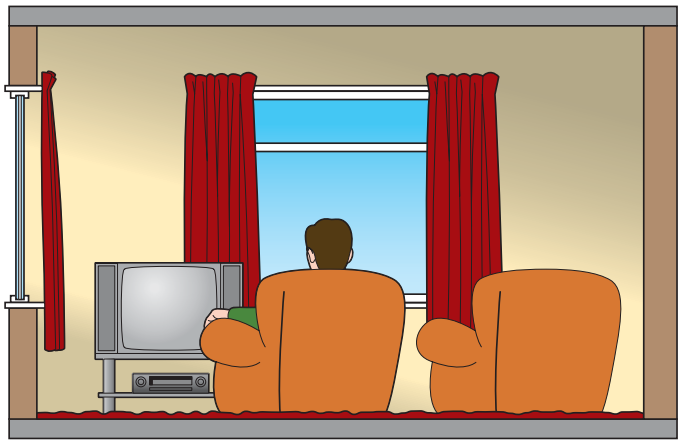
The best material to soak up sounds is soft, spongy or porous – something with lots of holes in. The sound goes into the holes, bounces around inside and never comes out. Curtains, carpets and other fabrics in a room are all good soundproofing, or muffling, materials (Picture 2). This is why a room that is empty echoes, but a room full of furniture, carpet and curtains does not.

Most of the air between the sheets of glass is taken out to make double glazing.



▲ **(Picture 1) Double glazing is a good muffler of sound.**

▼ **(Picture 2) Curtains are made of many fibres. They muffle sounds well.**



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Plastic foam works the same way. It is sometimes placed inside walls to deaden sound.

Stopping sound from travelling

Sound travels much faster, and for longer distances, through solids than through the air. This means that if you make a noise in one room, it will travel through the solid walls and floors to rooms quite a long way away.

When buildings are made, strips of rubber or other soundproofing materials are often laid between walls and floor, to stop sound travelling easily through the building.

Car silencers

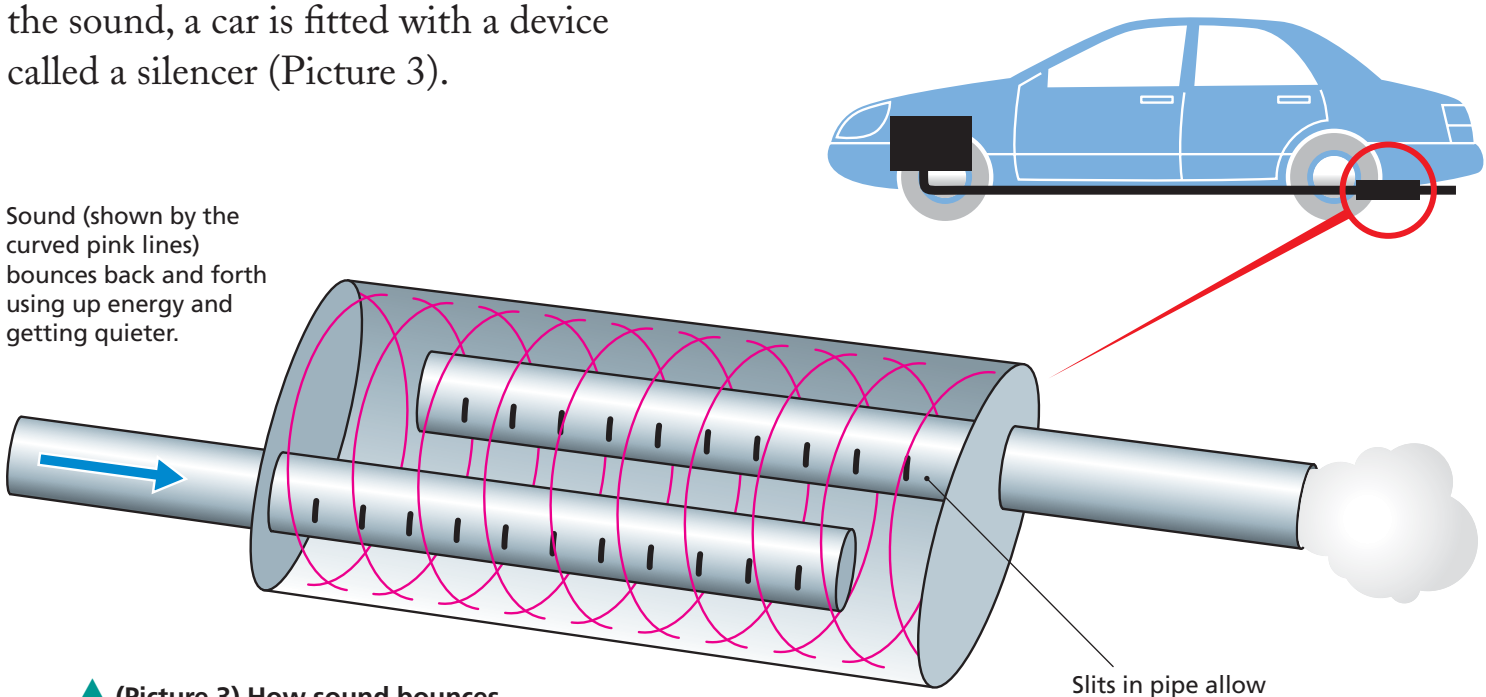
If you heard a car without a silencer, it would be painfully noisy and sound like a cannon being fired very fast. To muffle the sound, a car is fitted with a device called a silencer (Picture 3).

Some silencers are filled with wadding made of fine fibres. The sound coming from the engine makes all of these fibres vibrate. This changes sound energy to heat energy.

In other silencers the sound is also bounced between the two ends of the silencer. The length of the silencer is arranged so that when the bounced sounds meet they mostly cancel each other out. This is exactly the opposite of what happens in a musical instrument (page 19), where the aim is to make the sound louder.

Summary

- **Muffling aims to stop sound from travelling.**
- **Soundproofing materials are usually soft or loose, and have many holes or gaps in them.**
- **Double glazing can also reduce noise.**



▲ **(Picture 3) How sound bounces about inside a car silencer.**

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