The Middle Ear - eardrum, ossicles, transfer, pressure
The Ear and Sound Unit

Imagine you are a sound wave. You are born when a finger plucks a guitar string. The energy from that string hits the air, and the next thing you know, you are flying. You fly fast, moving from one molecule to the next. You have no idea where your trip will take you. Suddenly, you go this way and change and go that way. You are speeding down a funnel; at the bottom of the funnel, there is a small dark tunnel. You keep moving through the tunnel, but then you see there is something in front of you. You are going to hit it. You cannot stop. You are flying too fast. Bang! You hit something and everything changes.

The job of our outer ear is to catch the energy of sound waves and bring those waves closer to our brains. We have now reached the next part of how we hear: the middle ear. The middle ear starts at the eardrum. The eardrum is the very thin skin at the end of the ear canal that takes sound from the air and uses it to move parts inside of our ear. It is stretched very tightly over the opening to the middle ear. We call it a drum because that is exactly what it is. Just like a real drum, it vibrates when it gets hit, but instead of a drumstick hitting it, it gets hit with sound waves. From there, those sound waves move to the middle ear.

Sound waves do not move from outside our body into our middle ear by chance. There are parts of our ear that need to take the sound and turn it into something our brain will understand. When energy changes from one kind to another it is called a transfer. You see changes like this around you every day. If a book falls off a table, there is energy in how fast it's going while it falls. It quickly changes to sound energy when the book hits the ground with a "WHAM!" Just like the book hitting the ground changes motion into a sound wave, our ear needs to change sound into something that our brain can understand. In this case, the eardrum transfers sound in our middle ear.
You also have tiny bones that help make the sound energy change. In your middle ear, **ossicles** are three tiny bones that move when sound hits our eardrum. These bones are joined together like a chain and they form a tiny sound highway, moving sound further into our ears, just like when you are standing in line at school. If one person bumps into you, you might bump into the next person, and so on, causing a lot of bumping to happen. This is how it is for ossicles all the time, but this bumping is part of their job. That's how they change sound into a form that our brains can understand. When the eardrum is hit by a sound wave, it starts to move back and forth very fast. The movement is then passed on to these little bones. Now the sound wave has turned into a vibration in our bones!

Something else happens when a sound wave hits our eardrum. Not all the energy is used by the ossicles. There is also air inside our middle ear. The air inside the middle ear gets pushed on by the ear drum just like the bones do. Because this air does not have anywhere to go, it gets squeezed, and we might feel pressure in our ears. **Pressure** is the force of one thing pushing on another. Most of the time, it's so small that we do not notice it, but sometimes, something happens and we do feel it.

Have you ever had a funny feeling in your ears when you are driving up a mountain or swimming to the bottom of a pool? This feeling is caused by a change in how much the air on the outside of your ear is pushing on your eardrum. When you're under water, the air in your ear gets pushed a lot more than a sound wave would. When you're driving up a mountain, the air outside pushes a lot less, and the air inside your ear starts to push out! This could get very painful if your body did not have a way to deal with it. At the back of your middle ear is a small hole. When the air pressure in your ear builds up too much, it will pop open and let some of the air out. If you have ever heard a popping sound in your ears, that is the squeezed air escaping!

So now that we have the ossicles in our middle ear carrying sound, where does it go next? From these bones the sound will now be transferred on to our inner ear. It may seem like the trip through our middle ear was a short one, but do not think it was not important. In fact, the middle ear is where the sound was changed from a wave in the air to a vibration in our bodies. Now that the sound has changed, it is ready to move deeper through our ear and into the brain.