

- MS. SCHLAU:** Dear students, today you're going to need good nerves, because we're going to discuss why you get butterflies in your stomach when you ride a roller coaster.
- PROFESSOR EINSTEIN:** Ugh, ugh. I'm so stressed! Ugh, Ms. Schlau, the life of a world-famous Nobel Prize winner isn't easy, let me tell you.
- MS. SCHLAU:** Professor, why are you wearing a tattered paper bag on your head?
- PROFESSOR EINSTEIN:** I'm sick and tired of being recognized everywhere I go. I have to give autographs all the time. People always want to take selfies with me. My scientific work is suffering!
- MS. SCHLAU:** But the paper bag is very noticeable.
- Why don't you do what famous movie actors in Hollywood do?
- PROFESSOR EINSTEIN:** What? Movie actors? Why, what do they do?
- MS. SCHLAU:** Well, they wear sunglasses and headphones. Then people don't dare to talk to them.
- PROFESSOR EINSTEIN:** That is magnificent! Ha! I have to try this right away. Bye bye!
- MS. SCHLAU:** And we will start with the "Roller Coaster" film.
- Guess what Johannes is about to do. He still has a bit of a wait but now he's allowed in and has to sit down... then strap himself in and pull down this bar. And he's off!
- That's right, today he's riding on a **roller coaster (ACHTERBAHN)**. And on a roller coaster, of course the first thing you have to do is go up. And it's actually pretty high up. And even a little more. And now we go straight down. That's so exciting that suddenly everyone begins to **scream (SCHREIEN)**. Riding a roller coaster **is so much fun (SPASS MACHEN)**.
- But why? What exactly happens to him in the roller coaster?
- Dr. Schoene helps him to figure it out. She's a doctor, and the first thing she does is to stick these blue pieces with a cable on him. Alright, they're not going anywhere. And now Johannes has to go back to the roller coaster. The bandages under his **t-shirt (T-SHIRT)** are connected to a little computer.
- This computer will now measure his heartbeat. Can you see? It's this spike here. And now he's about to be off. Quick, say goodbye to Dr. Schoene. In the upper right you can see his heartbeat. 68 beats per minute. And now the roller coaster is going up a bit, and he feels like his heart is beating faster. 90 beats per minute. He looks down. He gets even more excited. Does that also do something to his heart? How does it look?

**MS. SCHLAU:**

It's about to start! How many beats? 125 **beats per minute (SCHLÄGE PRO MINUTE)**, and that although it hasn't really begun yet. But now...down quickly. And what does his heart say? How many beats per minute? 131. Wait, that's not that much more than the 125. And the rest of the ride? Back there it's only 118, and now he's getting less and less excited. Only 108 beats per minute. That means he was already more excited during the ride up than during the rest of the ride.

Yes, but then what makes the rest of the ride so much fun? Perhaps it's the speed. Whoosh! 120 **kilometers per hour (KILOMETER PRO STUNDE)**. Wait a minute – a fast train is more than twice that fast. Let's be honest, it's not more exciting than the roller coaster. No. The opposite. It's fairly relaxing.

So what is the difference? Perhaps this: while riding a roller coaster, Johannes plummets almost straight down. He has the feeling that he's about to crash. Everything's going by at lightning speed. In addition, the roller coaster is shaking him back and forth. That's quite a bit different than riding a train.

And something else happens on the roller coaster. In every turn he's pushed back into the **seat (SITZ)** with a lot of force. It makes him feel like **salad (SALAT)**. Yes, like salad in a salad spinner. Watch: when he turns the salad spinner, the salad is also pressed to the outside. If you have a strong friend, you can do that as well. He just has to turn him fast enough and he'll be pressed to the outside. And this is exactly what happens on a roller coaster, but with a lot more force.

Wow, what all happens on a roller coaster. But that's still not all of it. That's why he goes up again. And now we're talking about a certain place on the roller coaster. Precisely this one. Every time Johannes goes over a crest, something happens to him. Exactly here. This is the spot where his **stomach (MAGEN)** tingles - a lot. It's kind of like jumping on a **trampoline (TRAMPOLIN)**. With that, too, there's a specific place – and it's here – where the stomach tingles. You have to imagine that this red balloon is his stomach. And at every summit on the roller coaster, here is what happens: The balloon hits the top. In the body, it hits the peritoneum. And whenever the stomach does that, it begins to tickle – an awful lot. There's quite a lot happening here on the roller coaster, so let's review, step by step:

Before the ride really begins he's already quite excited just from going up. His heart's beating 125 times a minute. Then he falls almost straight down and it looks like everything's coming at him. Everything to the left and the right passes him quickly.

- MS. SCHLAU:** He's being thoroughly shaken. The direction keeps changing. And he is pushed outward in every curve. Just like here, except stronger. At every summit, his stomach is jumping against his peritoneum like on a trampoline. That tickles a lot.  
And in order to figure all of this out, he rode the roller coaster 30 times today. Because this was so exciting and lasted the whole day, the best thing for Johannes now might be if nothing else happens for a while. Whooo! That was awesome! Did this make you want to ride the roller coaster? Well then, off to the nearest amusement park...
- PROFESSOR EINSTEIN:** Ms. Schlauuuu! Ms. Schlau, Ms. Schlau, that worked wonderfully. Yup. Nobody recognized me on the street. Oh, I'm free at last.
- MS. SCHLAU** I'm happy to hear that.
- PROFESSOR EINSTEIN:** Although...perhaps everyone has... has forgotten about me?
- MS. SCHLAU:** Certainly not.
- PROFESSOR EINSTEIN:** Perhaps no one will ever want my autograph again?  
Oh, hello dear students, it's me. Professor Einstein. Does no one remember me? Oh... no one wants my autograph.  
But the lecture is already over!
- MS. SCHLAU:** Oh! I see. What about you then?
- MS. SCHLAU:** Me?
- PROFESSOR EINSTEIN:** Yes, you. Have you gotten my autograph yet?
- MS. SCHLAU:** Me? Oh, no.
- PROFESSOR EINSTEIN:** I'll sign a big one on your T-shirt, OK?
- MS. SCHLAU:** No way! My nice T-shirt. Somebody help me! I'm warning you - one stroke and you're buying me a new T-shirt.
- PROFESSOR EINSTEIN:** Wait, Ms. Schlau, it's just a tiny autograph...!!!