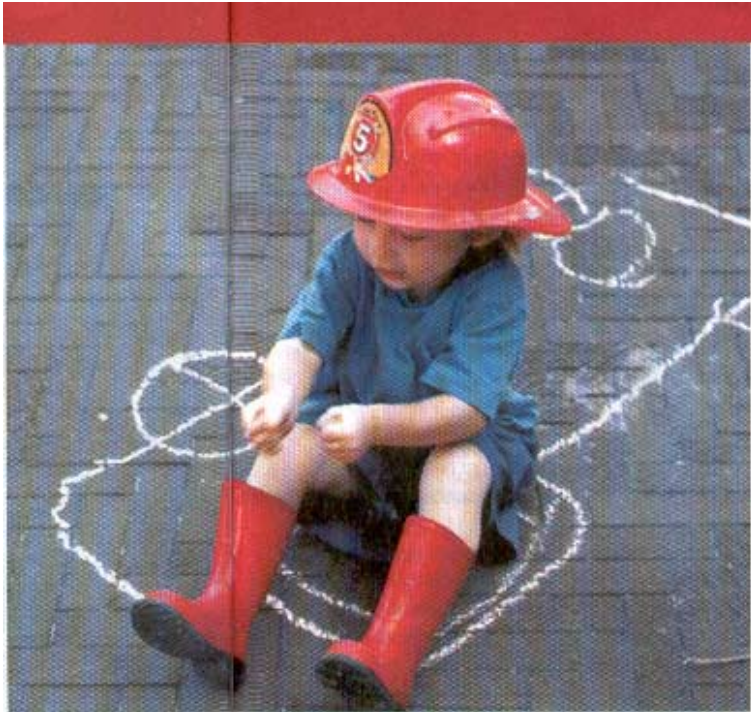


„Physics in Kindergarten and elementary schools“



Newsweek,
Aug./Sept. 2003 S. 69

Where does she drive?

Generally, many youngsters are highly interested in physics – especially up to puberty. This interest must be preserved otherwise the subject will be ignored on secondary level: *contents connected closely with the world of young people, age-specific context, new trials and experiments with their practical use in every-day-life are essentials to attract pupils.*

But there is another problem, which is not only a German one: *Many educators or teachers had just 2 physics lessons per week during 8 to 10th grade at secondary school. And often those lessons were taught quite academically. Help is needed!*

Students in class 10 attempt, under my guidance, to answer physics questions, in the area of Kindergarten, respectively, to integrate with elementary school. Besides this we have developed a total of 10 trial groups so far. Regarding our long term goal – e.g. prevention of hearing damage, danger from the socket / plug -, the available knowledge can bring in new ideas to guide the physics knowledge in this age group. We could enlighten nursery school and elementary school teachers, as they only have limited access to physics in their training.

“Physics in Kindergarten (nursery schools) and elementary schools” – Why not?

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Aim of the project:

- ✚ to motivate children and make them curious about physics,
- ✚ to establish a relationship to the everyday life of the children,
- ✚ to integrate the background knowledge of 5 to 6 year old children,
- ✚ not to strive for pure actions but for a long-lasting effect,
- ✚ to appeal to several senses at the same time:
 - listening
 - seeing
 - doing it yourself
 - learning in real situations,
- ✚ support of educators / teachers,
- ✚ **in elementary school:** to complete **General Knowledge**.

➤ Ear drum attack

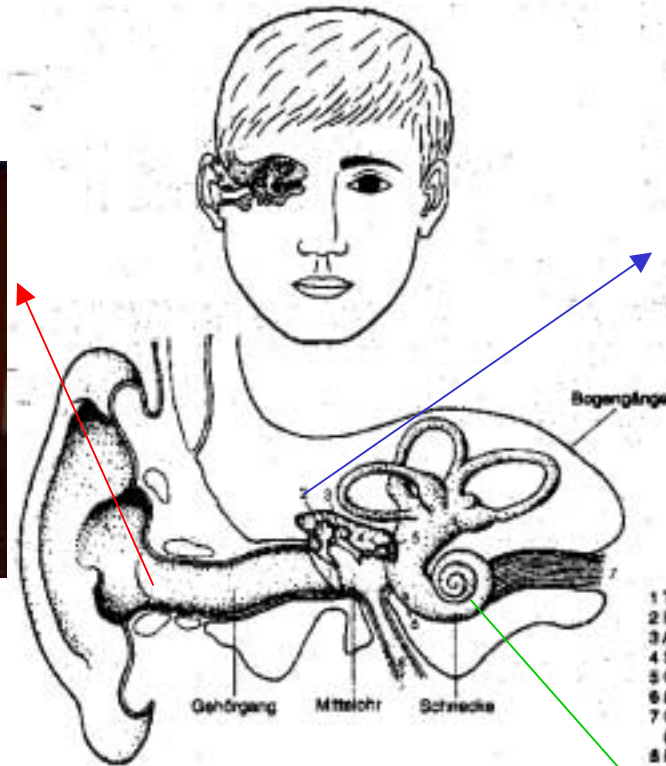
Object: *Prevention of damages to hearing – turn down your Disc man*



<i>Problem</i>	<i>Experiment</i>
<ul style="list-style-type: none"> • test your hearing • sound moves air • sound hammers • what happens to the auditory channel? • “joghurt-cup”-phone 	<p>determining hearing frequency</p> <p>distort flame / blow –</p> <p>dancing gum bears on a speaker</p> <p>sound waves in a tube with sand</p> <p>primitive self-made rope telefon</p>

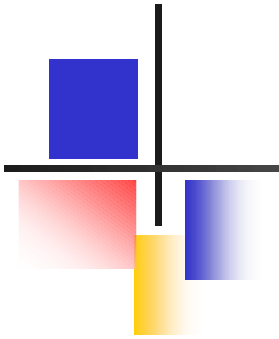


What happens to the auditory channel?



- 1 Trommelfell
- 2 Hammer
- 3 Amboss
- 4 Steigbügel
- 5 Ovalis Fenster
- 6 Rundes Fenster
- 7 Cochleapete (Eustachische Röhre)
- 8 Hörnerv





➤ **How does lightning originate?**
Object: Understanding of nature



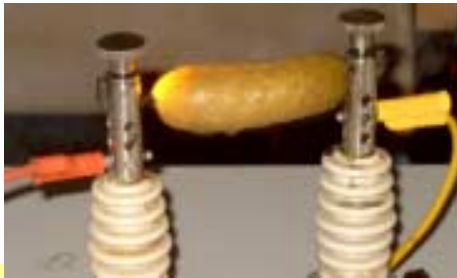
Ein Foto mit Seitenblitzwert in diesem Jahrhundertzimmer 2003: Gewitter über dem Pfälzerwald – fotografiert im Juli. ...Foto: 1998

<i>Problem</i>	<i>Experiment</i>
<ul style="list-style-type: none"> • production of charge 	<ul style="list-style-type: none"> • rubbing a PVC comb / rod with fur, flash-bulb
<ul style="list-style-type: none"> • „Struwwelpeter“ • Van der Graaff Generator 	<ul style="list-style-type: none"> • rubbing a comb/ rod, hairs • paper strips on a conductive sphere, kids with long hairs on a insulating chair (board)
<ul style="list-style-type: none"> • lightning stroke 	<ul style="list-style-type: none"> • flash of lightning between two conductive spheres, set a piece of cotton on fire

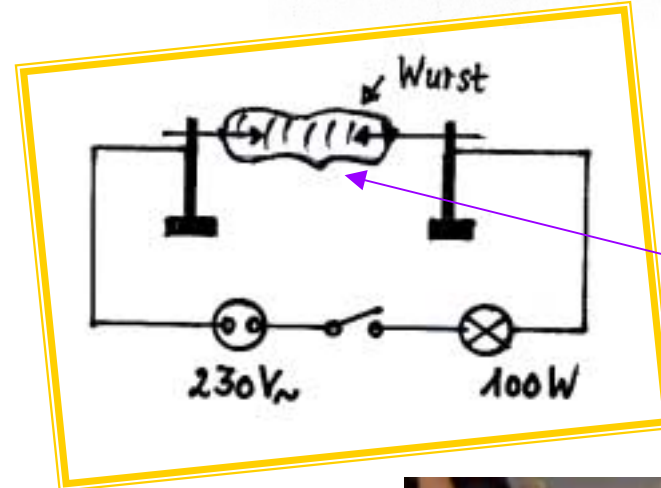
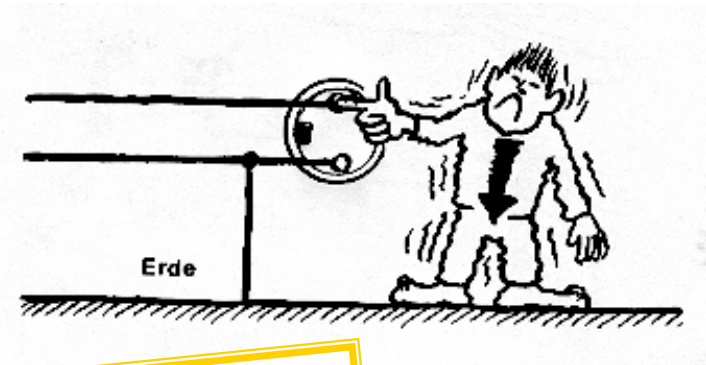




Electricity.

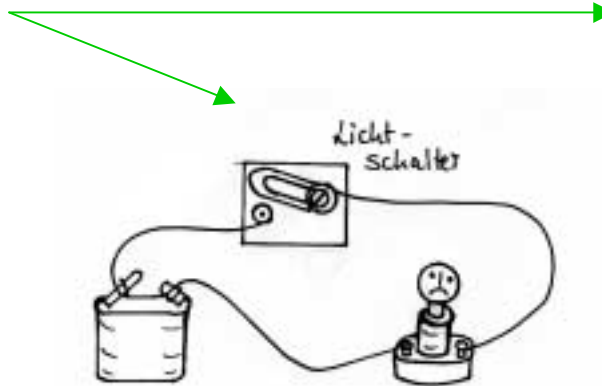
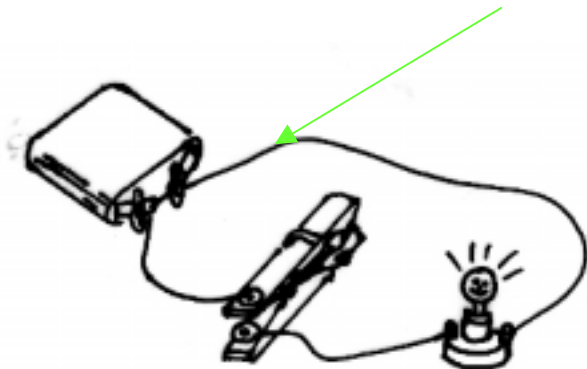


Object: Danger from the socket / plug
 • *sizzling sausage or pickled gherkin as a part of a circuit*



Object: experimental work

- „little electrician“ illuminate a selfmade house
- „snap your Finger“ – powered by electricity



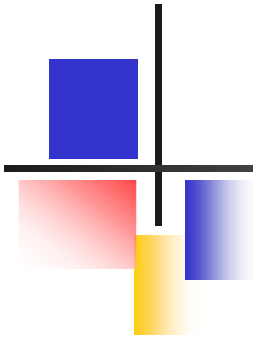
➤ We "play" power station

Object: Conservation of energy

Experiment:

- illumination of a dark room by self-induced electrical energy, mini generator
- you get tired

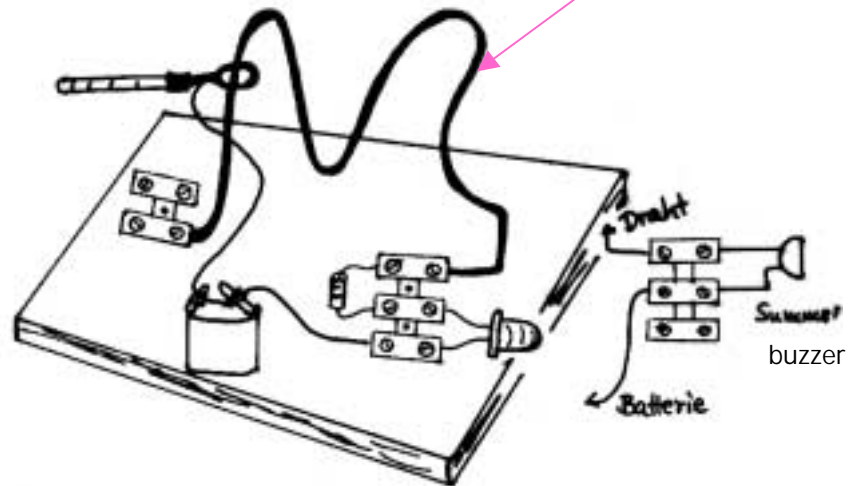


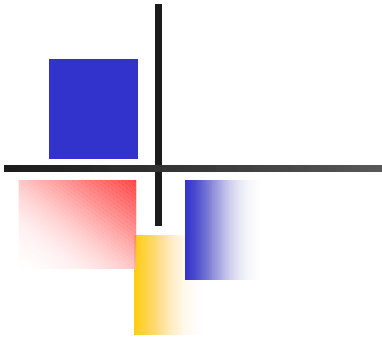


“Hot Wire“.

Object: Patience and coordination exercise

- „Hot Wire“:
are you clever with your hands?
- a homemade „Hot Wire“





➤ “Why do ice bears never freeze?”

Object: Learning from nature



model (*high tech thermal insulation*)



ice bear hairs human



➤ **“Why does an astronaut wear protective clothes“?**

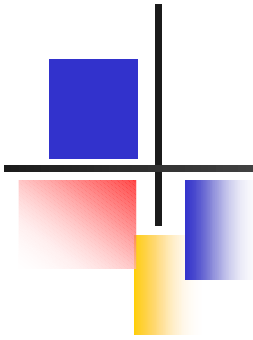
Object: Distant view. The earth a unique planet – you must protect him. Science-Fiction and reality.

➤ **Road safety.**

Object: Obligatory wearing of seat belts! Wearing a bicycle helmet!
„Blind spot“!

➤ **Separation of Refuse.**

Object: Environmental protection



● Experiences and perspectives

“Is the lesson already over? Are we not going to do anything more? When are we allowed to come again?” these are comments of the enthusiastic children. Their first homework was to draw a picture of their favourite project.

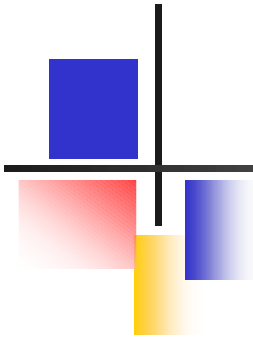
The enhancement of natural sciences as mere entertainment to a more valuable sphere of interaction made it necessary that topics of preschool (kindergarten) and elementary school had to be discussed with educators and teachers. In cooperation with elementary school, we emphasized the experimental character of General Knowledge in order to illustrate it more vividly to the children. As a result of our agreements with these teachers and the experience we have had with the children you can find detailed plans in the annex.

We think that the concept we presented makes it possible to motivate juveniles more intensively for physical questions, at least more than in former projects with this group of children. Physical knowledge is no longer boring for children because it gives explanations and solutions to everyday problems.

● and more experiences

In this case the group consisted only of female pupils who have had experience with physics for three years. Our aim was to get rid of the prejudice that girls don't know anything about physics. In addition to that, the kindergarten children quickly trusted their older partners who learned to speak freely, to argue convincingly, to organize their group work independently and to make experiments at the same time.

As a side effect, they were trained in social learning and cooperation without being consistently supervised and judged by their teacher as in the classroom situation which might be helpful for their future careers.



Students

