

# What is gravity?

## Description of the activity

The experiment took place in Tallinn's "Asunduse" kindergarten of pre-schoolers, where the age ranged from 5-7 years.

The conductors of the test were the teachers Eneli & Kristel. In total there were 10 children, 6 of them being girls and 4 boys.

Means used on the research experiment: paper, magnets, toys that children took from home to the kindergarten, pencil, feather, paperclip

Used literatura:

Nelson, K.; Physics for Kids: Gravity; [2018]; *Ducksters*.

Available online: <https://www.ducksters.com/science/gravity.php>

All discussions during the project were based on using Socratic method. Socratic method means Teachers asked children a progression of seemingly innocent questions that ultimately led the respondent to a logical conclusion that was incompatible with that children's originally stated belief.

In total it took 24 hours including: preparation, acquiring the supplies, research, executing the experiment, children drawing pictures regarding the experiment, conclusion.

## Purpose of the research

Purpose of the research project was to get to know what is gravity and on what it depends.

## Elaboration and preparation of the research activities

First teachers studied the topic. Teachers made notes, consulted with each other, planned activities, looked for the necessary means and made the order to go through the planned activities.



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One day before the experiment, the teachers asked the children what is gravity in their opinion. Teachers asked children to draw a picture of that.

On the experiment day teachers went to the classroom of the group earlier to put out all the needed means and to awaken an interest in starting activities with children.

Most of the children knew before the experiment that gravity pulls things back down.

### **Description of the methodology used**

*Beginning in the 1970s, Novak and his research team at Cornell developed the technique of concept mapping as a means of representing the emerging science knowledge of students. It has subsequently been used as a tool to increase meaningful learning in the sciences and other subjects as well as to represent the expert knowledge of individuals and teams in education, government and business.*



*Ausubel's believed that learning of new knowledge relies on what is already known. That is, construction of knowledge begins with our observation and recognition of events and objects through concepts we already have. We learn by constructing a*



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*network of concepts and adding to them. Ausubel also stresses the importance of reception rather than discovery learning, and meaningful rather than rote learning.*

## **The Nature of Scientific Inquiry (NOSI)**

1. Observation. Discussion on the topic “What do we know about gravity?”

Children: “Gravity brings everything down again.” , “It is only on Earth.” , “When we jump, we fall down again because of that.” , “On the moon we could jump much higher.”



2. Experimentation.

Children let to fall down their toys they took from home.



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Children: “ It was not fair, her hands were lower.”, “ They all fell down with same time.”. “No, they did not!” , “Cat fall faster than others.”



We also tried to let fall down two toys that were same size, but one was lower and other was higher.

All children thought that the one that is lower, will fall down faster, but they fell down on the same time.

### 3. Summarization of the results as laws

Discussion on the topic “What is gravity?”

- Gravity is the mysterious force that makes everything fall down towards the Earth.
- How much gravity an object has depends on how big it is.
- The closer you are, the stronger the gravity.
- Objects of different masses will fall to the Earth at the same speed. If you take two balls of different masses to the top of a building and drop them, they will hit the ground at the same time.
- Sir Isaac Newton discovered gravity about 300 years ago. The story is that Newton saw an apple fall out of a tree. When this happened he realized there was a force that made it occur, and he called it gravity.
- We don't actually "feel" gravity. We only feel the effects of trying to overcome it by jumping or when we fall.



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- Gravity always pulls, it never pushes.

#### 4. Hypothesis

Children: “Lighter things fall down slower than heavier things.”

#### 5. Testing the hypothesis in the lab

We let to drop down paper, pencil, paperclip, car and a feather.



Children: “Wow, look how slow paper is.”, “Car just crashed.”, “It is because paper is so light.”, “Pencil was also falling down so fast.”

One boy took a magnet to test paperclip falling down again. He found out that magnet is holding paperclip from falling down.

#### 6. Explanation provided by the hypothesis

Children: “Car and pencil are almost in the same weight.”, “They fell down so fast, I did not see anything.”, “Paper and feather are so light.”, “They just float in the air.”



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## **Final assessment of the activity**

Children were asked to do an experiment- to find different things in the kindergarten or at home and let two things fall in down from the same place. Children were asked to watch which things fall faster- bigger things or smaller things, heavier things or lighter things. One day after we made the experiment, the teachers asked children to draw a picture about what they get to know about gravity.

All together there were 6 children who were in the kindergarten all 3 days (on 1. day children draw a picture before they knew anything, on the 2. day children took part of the experiment, on the 3. day children draw a picture with new knowledge of the topic).

All 6 children understood, that gravity makes things fall back down when they are thrown to there air. 1 girl knew before the experiment that things that do not fly on earth are floating in space and later she draw that if people use magnets, gravity does not work normally, because magnets make gravity weaker. 2 boys and 1 girl knew at the end of the experiment that if things are at the same distance from the ground, heavier thing will fall back to the ground faster than lighter thing. 1 boy draw a paper that fell down really slow because of its light weight.



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