

## M9: Solar planes<sup>2</sup>

You will find the station “Solar Planes” near the big transport elevator.

Direct the light via the mirrors onto the solar modules of the aircraft and set them in motion.

**What is special about the solar plane “Solar Impulse 2”?**

**Fill in the solution emoji in the 10<sup>th</sup> position in the solution word.**

- 😊 It is the first solar plane which has circumnavigated the globe and also flies at night.
- 🧐 It is the first solar plane built.
- 😊 It is the first solar plane to reach the Antarctica.

*History: Solar planes use photovoltaics. Photovoltaic is the direct conversion of radiant energy from the sun into electrical energy. In 1954, the first silicon solar panels were produced and then used in satellites. The demand for space travel was important for the development of solar panels. The first solar plane took off in California, USA, in 1974 – the “Solar Impulse 2” took off in Abu Dhabi in 2016.*

**SOLUTION WORD: What do all explorers have?**

1	2	3	4	5	6	7	8	9	10
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**Made it! Now you can take a rest or burn off your energy at the exhibit “Dance Power Station”. And if you are still “infected” by the solution word, keep on exploring!**



*“Now I say goodbye.  
It was great to travel with you  
in the history of science.  
Bye, bye!”*



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# MILESTONES IN THE HISTORY OF SCIENCE

Name: .....

Date: .....

Hi, I am **Professor Energy**, an enthusiastic explorer.

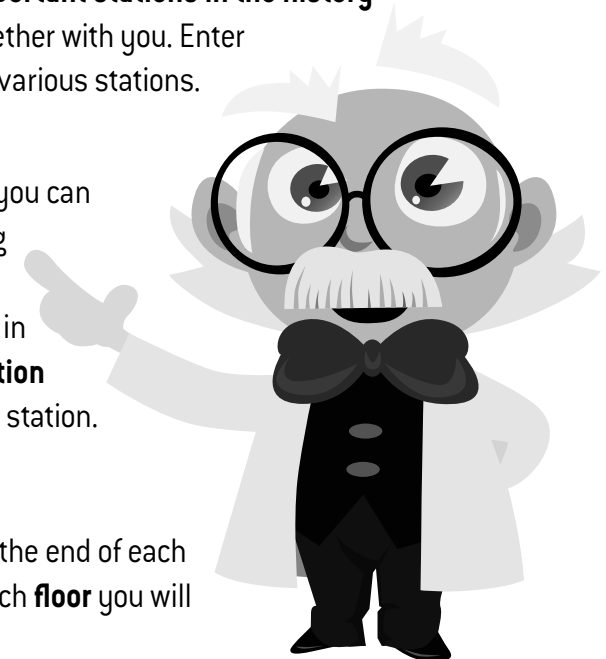
Today I would like to **explore important stations in the history of physics and technology** together with you. Enter my time machine and go to the various stations.

**The order is irrelevant.**

Try to stay at each station until you can answer the question. After doing so, pick the letter of the answer which seems correct to you. Fill in this letter in the grid of the **solution word**. Afterwards, go to the next station.

And now let's go! Get in! Start!!!

PS.: The **superscript number** at the end of each station name shows you on which **floor** you will find the specific exhibit



## Mill wheel<sup>1</sup>

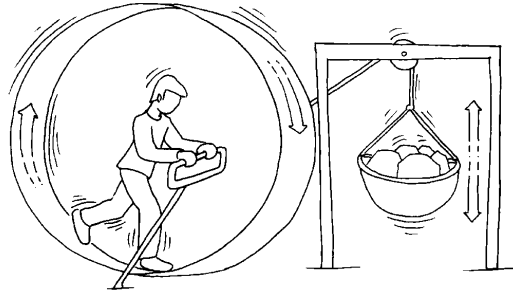
Go to the big wheel near the water landscape. Get in, release the brake and start running!

**What can you observe?**

**Fill in the solution letter in**

**the 2<sup>nd</sup> position in the solution word.**

- U) The basket moves up and down.
- C) I slow down the basket by running.
- I) The faster I run, the slower the basket moves.



*History: Before the age of electrification, wheels were used for lifting up stones when people were building churches. Dog wheels were also used to drive spits over ovens or butter churns.*

## Docking simulator<sup>2</sup>

Search for the “Docking Simulator” in the astronomy area and try to dock with the ISS (International Space Station).

**What is NOT done at the ISS?**

**Fill in the solution letter in the 6<sup>th</sup> position in the solution word.**

- S) Experiments for observing Mars men
- R) Experiments on cosmic radiation
- M) Experiments on weightlessness

*History: The ISS is an international community project. Its construction at an altitude of around 400 km began in 1998. Since 2000, it has constantly been inhabited by astronauts, who conduct research projects there.*

## Old sailors: Rotatable star map<sup>2</sup>

A huge star map is located near the LEGO® studio.

Star maps show important and clearly visible stars. Early cultures already used these maps as calendars. Which stars you can see on the night sky, depends on your location and the date. Our star map is valid for Wels.

You can set the starry sky of today by e. g. 10 p.m. (inner ring) with today's date (outer ring). In the oval you can see the visible stars.

**Which constellations are visible the whole year? Turn the date ring and observe! Fill in the solution letter in the 9<sup>th</sup> position in the solution word**

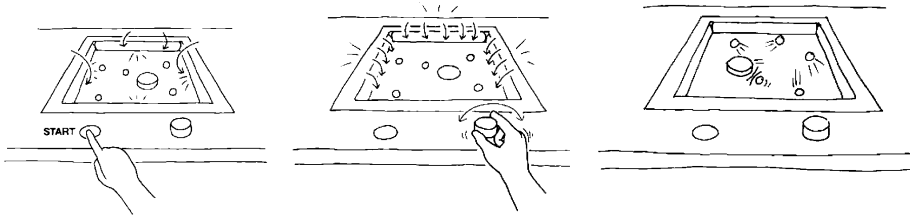
- T) Virgo and Libra
- Y) Big Dipper in Great Bear
- V) Pegasus and Andromeda

*History: The zodiac with its 12 zodiac signs was set 2000 years ago in the orient – in those days the settlement in the South and East of Austria started.*



### C3: Brownian (Molecular-)Motion<sup>1</sup>

Go to the exhibit “Brownian Motion”. You will find it behind the math area. Start moving the small balls and change their speed.



**What is the physical meaning of a stronger motion of the particles?**

**Fill in the solution letter in the 8<sup>th</sup> position in the solution word.**

- A) The particles move more strongly due to the higher magnetic field.
- T) The particles move more strongly due to the higher temperature.
- E) The particles move more strongly due to the charge.

*History: In 1827, the Scottish Botanist Robert Brown discovered the irregular and jerky movement of small particles of pollen in water under the microscope. Further experiments showed that this movement was a generally valid phenomenon of small liquid particles and represents their thermal movement.*



### Time pendulum<sup>1</sup>

Go to the exhibit “Time Pendulum” behind the math area..

You will see 3 pendulums of different lengths. Now become an explorer yourself. Deflect the pendulums and start swinging them at the same time from the same angle of deflection.

**Which pendulum swings the fastest?**

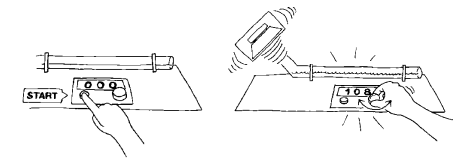
**Fill in the solution letter in the 5<sup>th</sup> position in the solution word.**

- Y) The longest pendulum swings the fastest.
- O) The shortest pendulum swings the fastest.
- I) All pendulums swing at the same speed.

*History: Galileo Galilei (1564 – 1642) had already investigated the dependence of oscillation period on various parameters. The Dutch Christiaan Huygens (1625 – 1695) constructed the first pendulum clock in 1656. He is considered one of the leading Dutch mathematicians and physicists of the 17th century. He is also the founder of the wave theory of light.*

### K1: Kundt's tube<sup>2</sup>

Search for the exhibit “Kundt's Tube” in front of the dance power station, start it and observe the inside while changing the pitch!



**What do you notice?**

**Fill in the solution letter in the 1<sup>st</sup> position in the solution word.**

- S) At some pitches the colour of the cork flour suddenly changes.
- H) At some pitches gaps occur in the cork flour.
- C) At some pitches pretty patterns appear in the cork flour.

*History: In those days when Austria and Hungary still formed a huge empire, the German physicist August Kundt (1839-1894) succeeded in making standing sound waves visible in a tube. One of his later assistants was Wilhelm Conrad Röntgen who discovered X-rays widely used in today's medicine.*

## Wind turbine pitch control<sup>2</sup>

Go to the exhibit "Pitch Control" in the electricity area and set the wind generator in motion. You can also change the angle of inclination of the rotor blades, depending on the strength of the wind.

**What happens at a wind force of 2 - 3, which is 2.5 - 4 m/s wind speed (e.g. 9 - 14.4 km/h)?**

**Fill in the solution letter in the 4<sup>th</sup> position in the solution word.**

- U) The wind turbine is switched off to avoid damage.
- P) The maximum power of the electricity generator of the turbine is reached.
- I) The wind turbine starts the production of electricity.

*History: The use of wind power goes back to windmills in the Arab world more than 3000 years ago. Later they were used in many places for grinding. The first electricity generators powered by wind were launched in the late 19th century. Only 100 years later, in 1994, a support programme for wind power was introduced in Austria and subsequently the first larger wind power plant was erected in the Marchfeld, east of Vienna.*

## L9: Horn lightning conductor<sup>2</sup>

Search the exhibit "Horn Lightning Conductor" in the electricity area and let the lightning rise. Look at the notes on the wall.

**If you can hear the thunder 3 seconds after the lightning, how far away is the thunderstorm?**

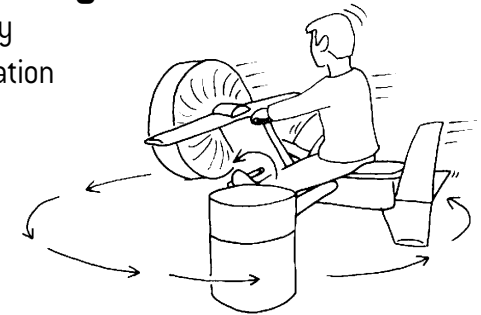
**Fill in the solution letter in the 3<sup>rd</sup> position in the solution word.**

- R) Approx. 1 km
- E) Approx. 3 km
- S) Approx. 10 km

*History: During the 18th century, at about the same time that Maria Theresia introduced compulsory schooling in Austria, the American Benjamin Franklin had the idea for the first lightning conductor – a long iron rod on the roof of a house. Through this, thunderstorm electricity is discharged.*

## N5: Plane bike & the brothers Wright<sup>2</sup>

Search the exhibit "Plane Bike" and try to move it. After that, read the information on the walls.



**What was special about the flight of the brothers Wright?**

**Fill in the solution letter in**

**the 7<sup>th</sup> position in the solution word.**

- A) It was the first flight with more than one person on board.
- I) It was the first powered flight in history, which started from the ground.
- U) It was the first flight with a successful water landing.

*History: The American brothers Wilbur and Orville Wright were pioneers of aeronautics at the beginning of the 20<sup>th</sup> century. They earned money by operating a bicycle shop, where they acquired a lot of knowledge about mechanics. Impressed by Otto Lilienthal's glider flights, they studied all books and publications about the subject of flying and designed and built model planes. You can learn from them that it is important to gain knowledge to achieve great things!*

