ASTRA NEWS

8th issue 2/11/2022

Hello everyone!

I am happy to announce the first public issue of the magazine *Astra News* and the 8th continuous issue!

I want to thank everyone who contributed to this issue!

The magazine was founded in late spring of 2021, soon after I was accepted into Astra Nova School. At that time, the main goal was to meet other students through the magazine and to be an active part of the school before the school year started. As time went by, I realized that there should be more to this.

Being part of Astra Nova means the whole world to me and I hope to share it. When you are in an extraordinary place and you gain so much from it, you are eager and committed to expand it further. It is now my intent to build a community of teens from all over the world around the project The Republic of Mars.

But that is not the only thing that shall unite us. The exchange of ideas, thoughts and experiences strengthens our bond.

The name for the magazine is an adapted version of my school's name, Astra Nova, and I am very thankful to the school for letting me keep it. It's a great honor for *Astra News Magazine*. I am deeply grateful to Astra Nova School for the support and inspiration that will last a lifetime.

A few brief words about the cover for the 8th issue. For each issue I strive to give as much attention to the cover as I do for what's inside of the issue. The vital part of the cover for this issue is a painting by Claude Monet called "Impression, Sunrise". For the other part of the collage, I used some of NASA's images (a view of Earth from space and a starry night sky). Why "Sunrise"? Because Monet's sun is red, because this painting symbolized something new for its time.

Today we need a new sun. We are on such an advanced level of civilization that we can and should shield ourselves from possible Earth disasters on Mars. But maybe the more important thing is that we are in need of a challenge to overcome in order to learn more about ourselves and the Universe. We need a sun that gives us light further, a sun that is for our minds and fortitude. Today, that new sun is Mars.

Enjoy the eighth issue and happy St. Valentine's Day to all of you!

Yours,
Leonid

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THE REPUBLIC OF MARS

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ABOUT THE REPUBLIC OF MARS

If you dream of us, humans, to become a multi-planetary species and see Mars as our chance to build a better world for humankind, this project is for you.

Please, see the beginning of this project in issues No. 1, 3 and 6.

In this issue

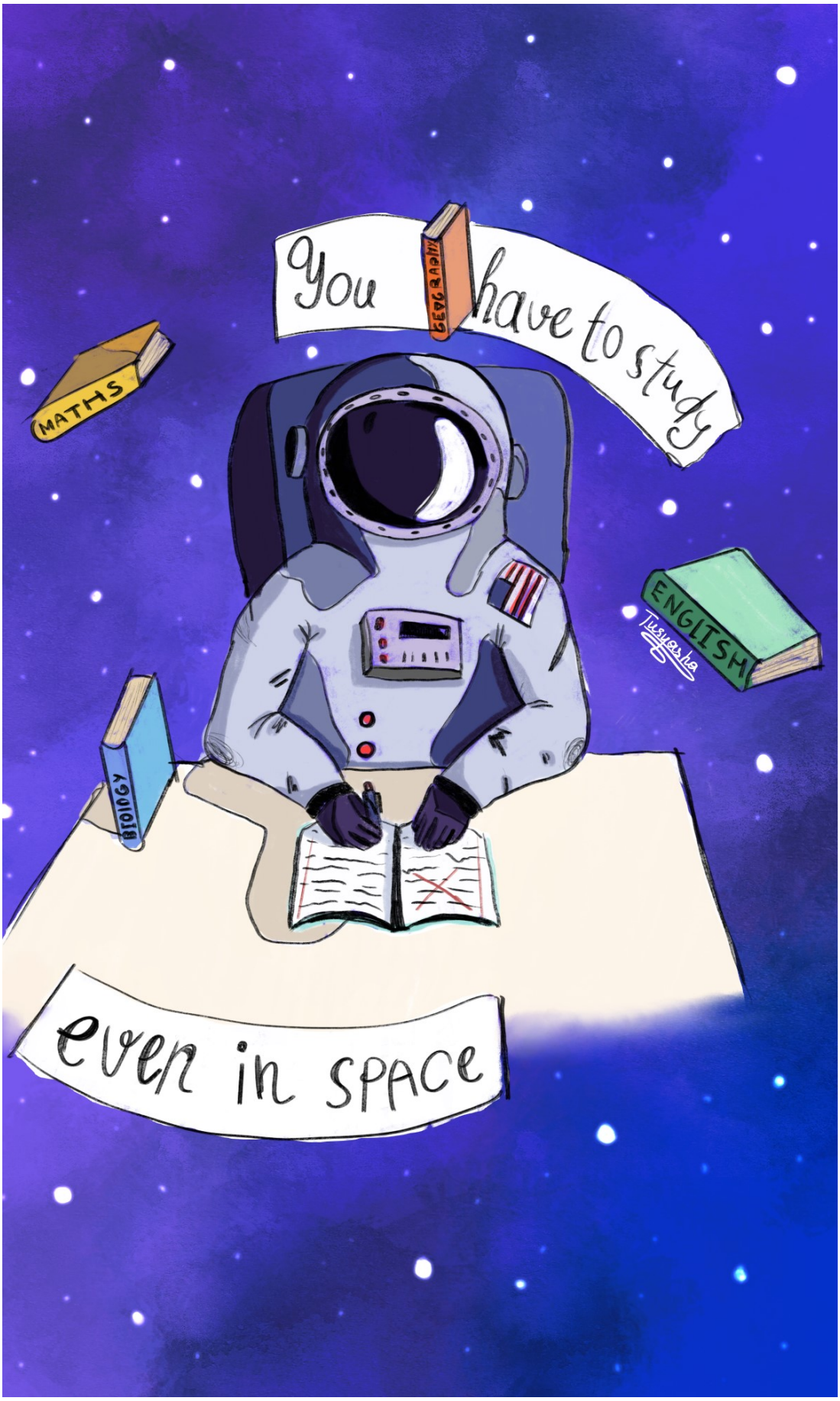
What was sci-fi yesterday becomes reality today, however some things will always remain the same. Vlada's drawing reminds us about that. If someone thinks that there will be no homework in space, they are wrong!

And Ettore's article not only introduces us to MARS#17 Base in Toruń, Poland, but would also be very helpful to those who are at the beginning of their journey on Mars. For a novice it would be not easy to orient themselves in the vast amount of information needed to survive on Mars. By reading Ettore's article, you will get the knowledge that will allow you to quickly adapt to Martian life.

A child waving from lower Mount Sharp, Mars.
Collage by Leonid Vishnevskiy.
More about Mount Sharp.

You Have to Study Even in Space

By Vlada Pilkevich, 12 years old. Drawn on a graphics tablet in Sketchbook



By EttoCraft.IT, full video presentation here

Intro

My travel experiences and ideas visiting the Mars Base, like in the movie "The Martian" (2015), in the city of Copernicus, Toruń, Poland. The base has some of the possible problems and solutions for water supply, growing food out of the soil, energy, air, dust, gravity.

Establishing a Moon Base and a self-sustaining human presence on Mars is key to developing humanity into a multi-planetary species where civilization extends beyond planet Earth. A critical component to enabling humans on Mars to both establish long-term outposts and become self-reliant is the In Situ Resource Utilization (ISRU).

MARS#17 Base

MARS#17 Base is a new interactive and futuristic space laboratory replica in Toruń. The visitors (crew members) complete the tasks that are required for extraterrestrial survival. Their mission includes not only monitoring the base's condition, but also repairing some small defects, analyzing the Martian soil, proper administration of energy. Apart from giving shelter and food, it will be the strategic factor for human survival on Mars.

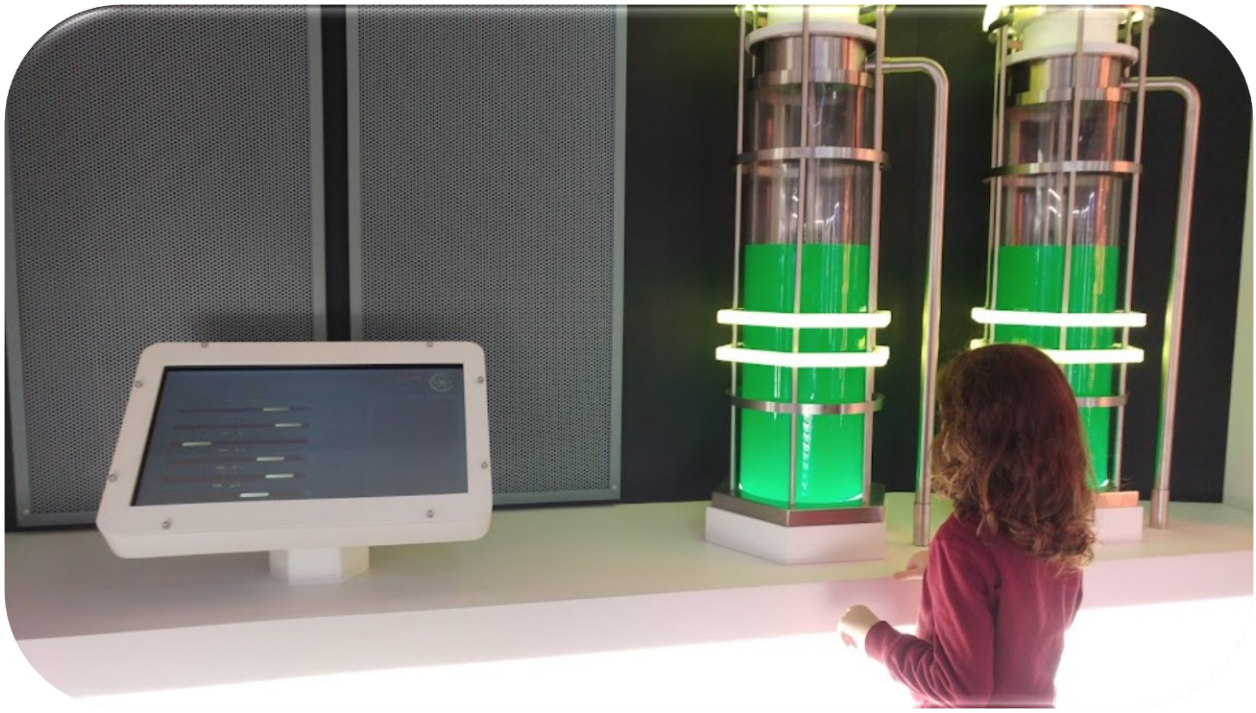
My Mission: Living and Working on Mars as an astronaut

I took the role of an astronaut living and working on Mars, performing scientific operations at key locations on the planet. I used two specially designed rovers. One of the missions was to clean the solar panels from Martian durst with a rover, which was hard to do since rovers aren't easy to control.

The Command Center and Food Supply

Water on Mars and the Algae Bioreactor

On Mars, we have polar ice caps and big valleys. Because there is water there, at first glance it seems to be a place where humans can live easily. However, in reality, Mars is an extremely cold desert where radiation falls. The ground is toxic and humans cannot breathe.



The Algae Bioreactor is used for cultivating microalgae or macroalgae using just water, light, carbon dioxide and some minerals. The carbon dioxide is dispersed into the reactor fluid to make it accessible for the algae. The bioreactor is made out of transparent materials. The algae are organisms that perform photosynthesis to produce carbohydrates while releasing oxygen.

The Problem with Soil on Mars

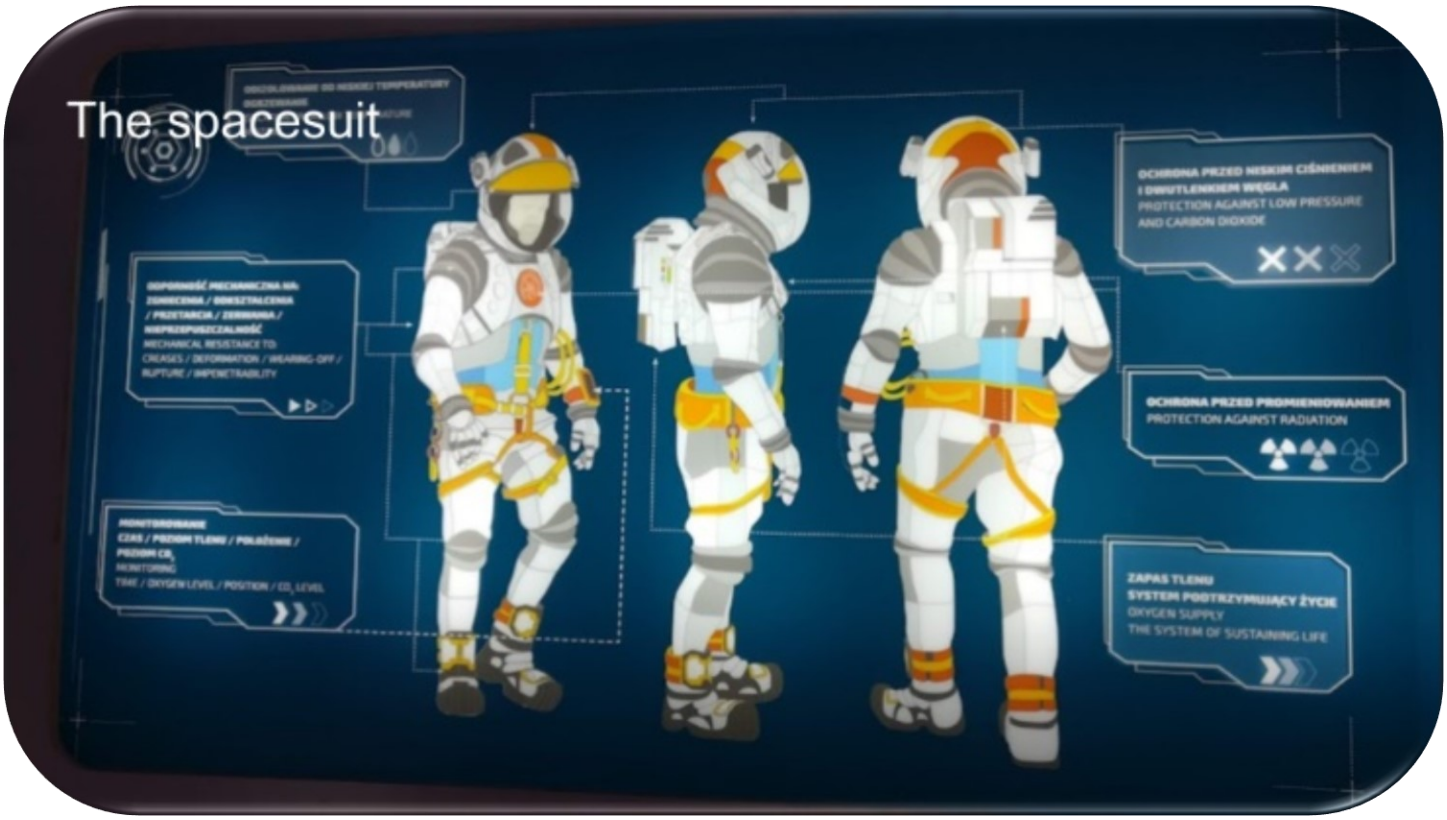
The toxic Martian soil isn't good for growing plants, as it is very hard to purify, it is alkaline and it doesn't have enough nitrogen for plants. Most of it contains perchlorates. To grow plants without soil, the best solution is to use hydroponics.

Energy on Mars

Any activity on Mars, all the electronics and everything we need requires electricity. Well, that's a problem since Mars is farther away from the Sun than Earth is, so it only has access to about 40% of sunlight for solar panels when compared to Earth, and the little sunlight it has is sometimes entirely obscured by dust storms which can cover almost the entire planet. There's wind, but unfortunately, the atmospheric pressure is about 1% of what we have here on Earth, so that is also not an option. Maybe with a vertical wind turbine, we could obtain some energy. From what we know, geothermic power is not possible because Mar's core is not hot enough to heat it. Probably the first small bases are going to run on fission nuclear power, but it looks like there are no nuclear elements on Mars, so they would be carried from Earth. When the technology for fusion, a new energy source, will be mature and affordable, it will be a game-changer.

The Spacesuit for Mars

If something goes wrong outside and it is necessary to go out or maybe you just want to get a nice walk, a great spacesuit is essential. The biggest problem with a spacesuit is that it is hard to make. It not only needs to hold pressure and good temperature levels but it also has to be made in such a way that it doesn't take a lot of dust into your base, since the dust is electrically statically charged and it's very dry and so sticks to everything. It's bad to breathe and it also contains toxic perchlorates.



Problems with Gravity on Mars

Even if we solve all the previous problems, there's the problem of gravity on Mars, which is only about 38% of Earth's gravity. In the future, we might use artificial gravity. But for now, that's not a viable option, so we probably will make the astronauts exercise a lot, like in the ISS.

IMPRESSIONS

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ABOUT IMPRESSIONS

A review suggests an objective view aiming to be impersonal to a certain degree, meant not to share your favorite movie or book (in fact the reviewer could dislike the movie/book he is writing about), but rather to rate the movie/book. *Astra News* suggests to you a free hand of writing reviews, meant to share what you like, in which you set your criteria. From here comes the name "Impressions". I purposely omitted the word "text", because why limit ourselves to text? And why limit ourselves to movies and books?

In this issue

Impression of the movie "Picnic at Hanging Rock" (1975) set on a misty St. Valentine's Day.

Movie still from a 45-second-long recording of a train's arrival in the station of the French town of La Ciotat by the Lumière brothers. (1896)

Picnic at Hanging Rock (1975) by Peter Weir

Movie impression by Leonid Vishnevskiy

First, I want to say that Hanging Rock, the very one that we find out about from the opening scene, does in fact exist. Being convinced in this, I was tempted to presume that February 14th was Saturday. Though when I looked in the 1900 calendar, I learned that St. Valentine's Day was a Wednesday that year.

How important is it for us to direct attention to this? That is what I tried to answer.

From first glance it may seem that the director (Peter Weir) changed Wednesday to Saturday so that he could send the girls to a picnic on the 14th of February, as usually on Wednesdays there aren't picnics. But then we find out that near Hanging Rock, watches stop, and that one of the main characters, Miranda, "*couldn't stand the ticking of her watch above her heart*", and, as she says, *"everything begins and ends at the exactly right time and place"*.

However, the reason is unlikely to be that Saturday is the right day or time, that would be too bland. Maybe it's that neither the day of the week, nor even the year 1900 have any relation to what happens at Hanging Rock? And that's why the director not only so freely changes the day of the week to a more suitable one, but directs our attention to this, one of the ways being through the opening scene. What if the most important thing is just that it was St. Valentine's Day?

And so, the place around which the movie is built – Hanging Rock. And the time, day of the week and even the year – all that is St. Valentine's Day. I think that that is important. Because the time itself never stopped (like the watches), never changed its path (like the calendar), and what happens at Hanging Rock most likely happens within this frame, and we should interpret it this way so that we can experience the film.

In this movie there will be many questions and secrets left without answer, except for one:

- Is all that we see or seem but a dream within a dream?[1]

- What we see and what we seem are but a dream, a dream within a dream (Miranda).

By the calendar, in three days St. Valentine's Day will come. No matter when that day comes for you, you should "Picnic at Hanging Rock".

[1] A Dream Within a Dream, by Edgar Allan Poe

NONFICTION

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ABOUT NONFICTION

What do you think you see on the picture to the left? Three boys playing with snow on a snowy evening? Not exactly. This is a collage I made, for the background of which I used an image of Jupiter's Ring by NASA. Never stop questioning and experimenting. That's what defines nonfiction within Astra News.

In this issue

If you have memories but no pictures or videos of them that you wished that you had, you might find the article "pixelated memories" useful.

pixelated memories[1]
by Leonid Vishnevskiy

[1] This work was an assignment in my Art Criticism class at Astra Nova School.

People were puzzled. They watched me, photographed me, took videos of me. And there I sat, in a slightly unrealistic pose for a person to sit in for a long time, for a child especially, staring at a tree. Pretending to be a statue. It was a game I made to play in Grounds for Sculptures. People were often tricked by it, but not so many people at once and not for as long as on that day.

I sat with an unwilling smirk on my face, while a respectably-sized group of people (they probably came on a bus together) had noticed me, and one of them said that I looked like a real boy. One by one the whole group started looking at me, discussing whether I was a boy or a statue. If you've never been to Grounds for Sculptures, I have to mention that some statutes in the park were made to look like real people.

My parents had a camera, but they were hesitating to film what was happening, because eventually the group would find out that they were tricked.

As I become aware that someone was coming closer to me, I stood up and walked, followed by lots of cheers and applause. I stopped and bowed. That was one of the most memorable moments of my life. But that was it.

All I have left is one photograph. And by looking at the photograph, you can't tell what was happening, because it's just me sitting on a bench. This is where I remembered "Rainy Taxi" by Salvador Dali and decided to turn it on its head, making the audience, photos of whom I do not have, be statues to reconstruct my memory and make it alive each time someone looks at the collage.

The pixelated background is made out of the same photograph, on which a cut-out of it is placed on top. On the background you cannot see, recognize, the image, while I know what was in it. In this way, it represents all the photographs, videos that we wished we had made of memories that we still have, of ones that are clear only to us and precious but slip away with time.

Also, as you understand, I never actually saw anything more than a tree, and so the purpose of this collage is also to turn this memory into a more "speaking" photograph.

The collage is as square as is possible to embody a pixel. And there are at least two reasons for that. The first one is that all of our memories inevitably condense down to one pixel with the flow of time. However, when we don't have a photograph or a video of a memory, we can create a pixilated memory out of a pixel, figuratively speaking, and let it live while this memory is dear, until time compresses it back.

Thank you for looking, and come to play at Grounds for Sculptures!

I hope that my experience will help you to restore your sacred memories.

SCIENTISTS WATCH MOVIES

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ABOUT SCIENTISTS WATCH MOVIES

Create a science problem(s) based on your favorite movie or on a cult movie. In one magazine issue define the problem, and in the next issue publish the solution. It can be any science-related problem, not only physics. The first such problem can be found in the fifth issue of *Astra News*, under the name "When Light Leaves Us in the Darkness".

You can also write an article discussing movie bloopers that aren't correct from the science perspective.

In this issue

In this issue there will be three physics problems that you can solve, dedicated to the movies "The Red Balloon" and "Back to the Future". In the 10th issue, coming out on March 18, I will publish the solutions. You don't need to send the answers, however, if you have questions, email me.

On the picture you see Doc Brown as he says "If my calculations are correct." Let us prove that to be true!

Physics Problem Solving

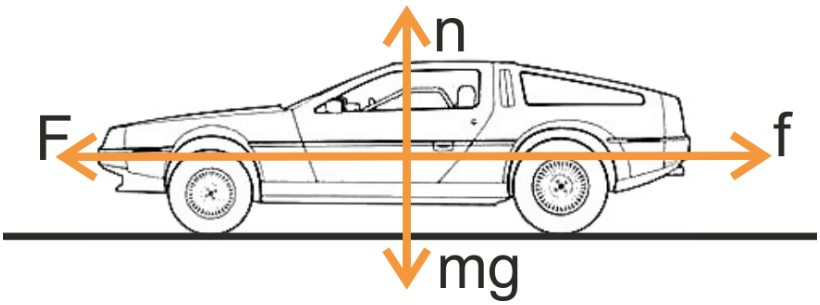
By Leonid Vishnevskiy

Two problems to solve on kinematics and dynamics.
Level of difficulty: easy ★

Problem 1. **"If my calculations are correct…"** Dr. Emmett Brown.

The DMC DeLorean time machine was going down the wet Twin Pines Mall parking lot at a constant velocity of 88 miles per hour. The coefficient of kinetic friction between the rubber wheels and the wet asphalt parking lot can be said to be 0.4. The mass of the car is 1230.1 kilograms. (Figure 1)

Figure 1.



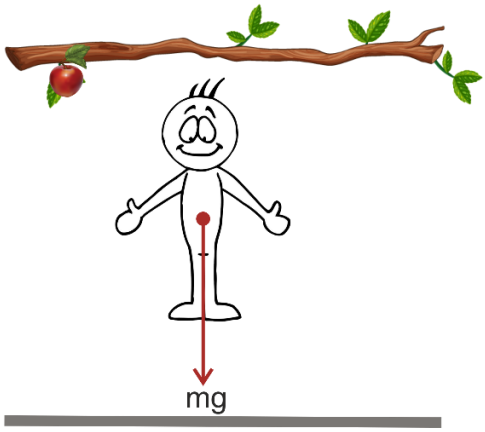
- What is the force of kinetic friction on the car?
- What is the kinetic energy of the car?
- What is the force of the engine of the car?

Problem 2. **Peeping Tom**

George McFly was lying on a tree, looking through his binoculars. His mass is 82.7 kg.

Suddenly, he loses grip and vertically falls onto the road after 0.7 seconds (happily, he makes it out fine). Neglect air resistance. (Figure 1)

Figure 1.



- With what velocity did he reach the ground?
- What was the height at which George fell from?
- How much work did the force of gravity do?

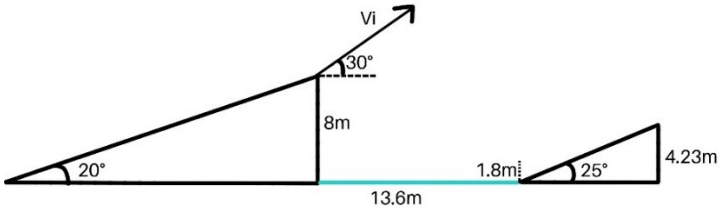
TWO BOYS AND THE BALL

Physics Problem Solving on Kinematics, by Leonid Vishnevskiy.
Level of difficulty: intermediate-hard ★
Dedicated to the movie "The Red Balloon" (1956) by Albert Lamorisse.

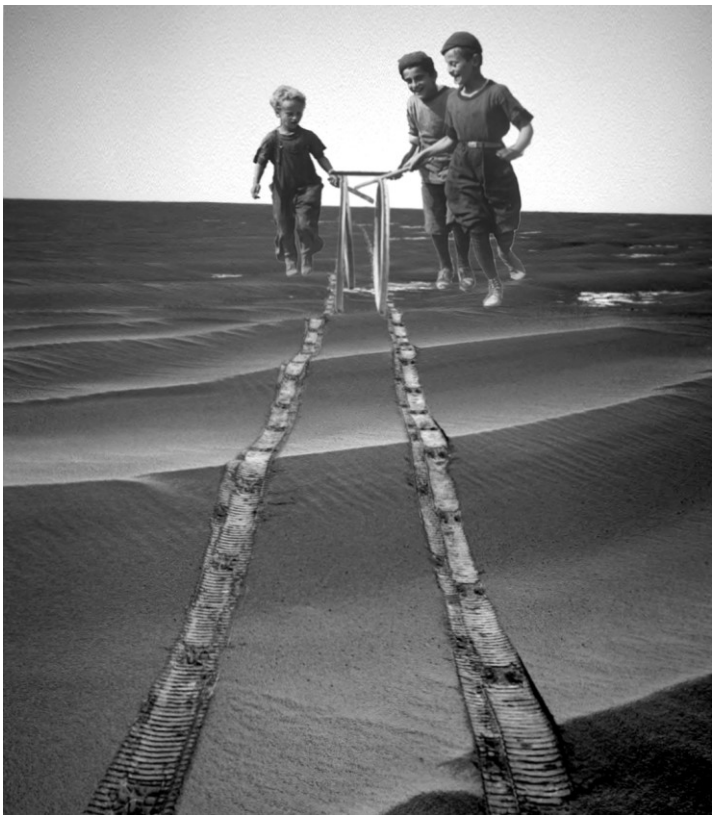
Problem:

The first boy is running up a hill to the shore of a river. The path is 20° to the horizontal. He throws a ball at an angle of 30° to the path. The height of the cliff is 8 meters above the river, the width of the river is 13.6 meters. The second boy is standing on the other side of the river. The angle of the second bay is 25° to the horizontal (it's a hill). The boy starts from a height of 4.23 meters above the river. That same boy catches the ball with his hands raised at the bottom of the hill, which gives a height of 1.8m above the river. Assume that g = 10m/s^2. (Figure 1)

Figure 1.



- For how long was the ball in the air? With what velocity was the ball thrown?
- What distance does the second boy need to run for?
- With what acceleration does he need to run at to catch the ball? Find the value and direction of the final velocity of the ball.



REMARKS

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ABOUT REMARKS

Share your opinion about life on Earth. What you like, dislike about social life here, about our society? What should be developed more? What should be changed? What should be stopped? And more questions of this type. Make a written speech, maybe record a video. Keep in mind that we are aiming to build a new society on Mars, one that will be better for everyone and that will not repeat our mistakes here on Earth.

In this issue

I'll start this chapter with "The Truck". Don't settle it as a guideline though. Remarks is whatever you make out of it.

Three boys following the tracks of the Opportunity Rover. Collage by Leonid Vishnevskiy.

THE TRUCK[1]

A speech in the defense of laboratory animals in the age of AI

by Leonid Vishnevskiy

A truck flipped over in Pennsylvania. And here starts my speech. Because in that truck, there were 100 monkeys that were being brought to a laboratory for experimentation.

Some of the monkeys were able to escape. Later, they were captured and brought to the laboratory, with the rest of them. Does this remind you of something? Captives, prisoners of war. Our war against diseases. But do we have the right for this? Are the monkeys at fault for our diseases? Are they not dying from diseases themselves?

Let's go back in time. The 19th century, for instance. Public executions. You do know what this means, right? On certain days, large crowds of people would gather to entertain themselves by watching what we today would do anything to avoid seeing. Do you think that in 100 years, we will look back with horror at using animals in research?

We won't even have to wait 100 years, as in the modern world, time and progress move much faster than before. I want you to think about this, I want your mind to flip over if you still think that it's ok to continue using animals for laboratory experiments. But then what should we do?

Will we have to start experimenting on people? No, that's not what I'm saying. I'm saying that it's time for us to acknowledge that it's not ok to use another life as a laboratory specimen, regardless of whether or not it's a human life. If we can advance enough on the development of AI, then we should be able to direct just as much attention towards the development of research simulations.

With AI, we are aiming to reproduce a human mind on the computer; with research simulations, we should aim to reproduce the body of a human on the computer … to be human.

Because in the modern world, to be human means more than what it did in the 19th century. Because what we are doing with all those animals awaiting death in laboratories is inhumane.

And here is the end of my speech, because there is nothing more to add. Simple as that. That truck, with all those monkeys, should never have flipped over. Because as advanced as we are, it should never have existed.

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[1] This speech was an assignment in the BioEthics class at Astra Nova School. It expresses my own opinion.