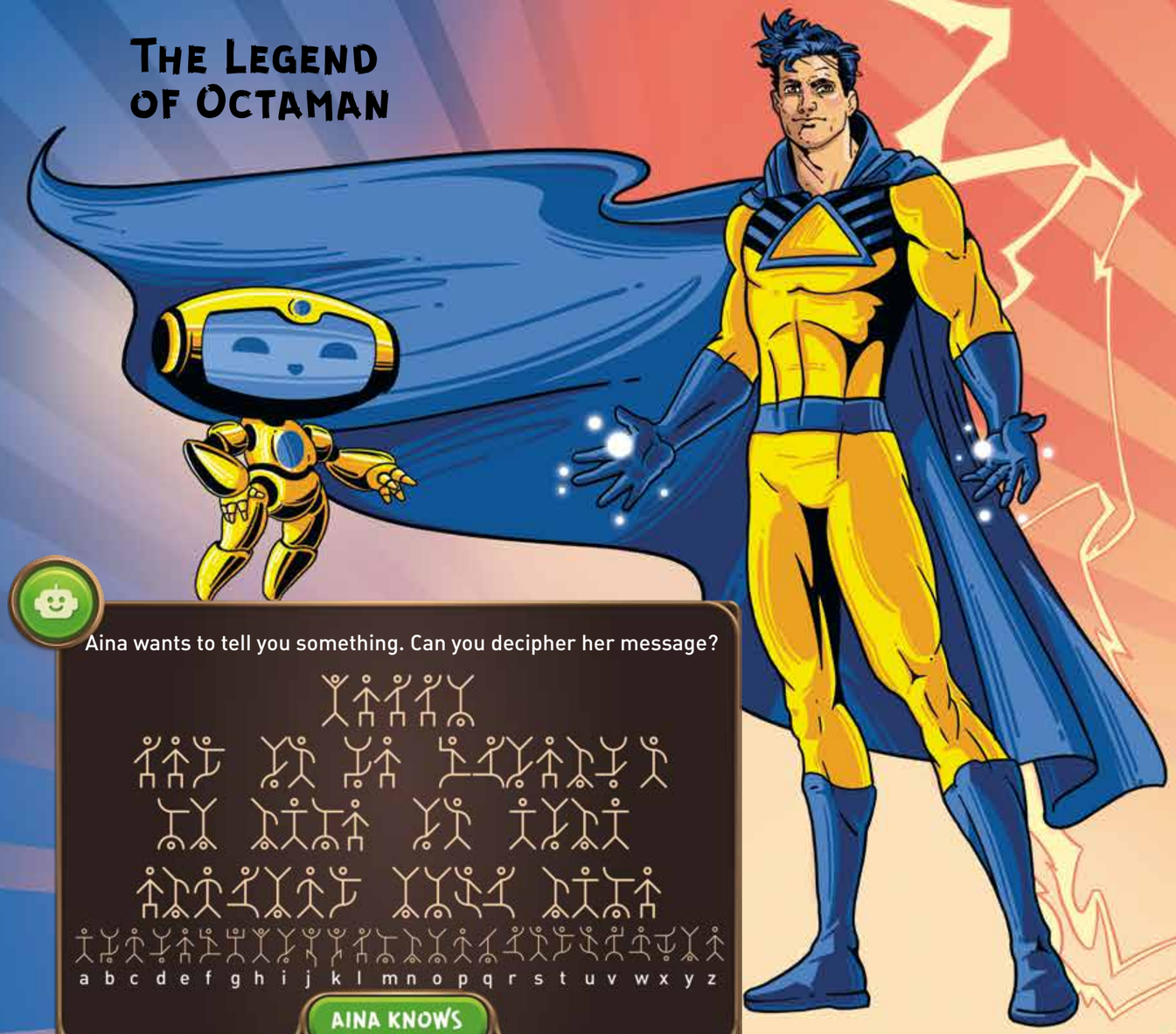

Adventures of Octaman
Energy conquerors

Dear friend!

The book you are holding in your hands is no ordinary one. It is an exciting game in which you have an important mission: help the brave superhero Octaman and the transformer robot Aina, his little companion, to avoid the traps and overcome the obstacles set by the wily Destroil on the way to developing our favourite Sakhalin Island.

You will make an exciting journey into the world of the oil and gas industry and learn about different occupations. This book will help you to get to know yourself, understand what you can do in the future, reveal your 'superpowers' and learn how to use them in your studies and everyday life. Along with this book you will also find an amazing adventure game that you can play with your friends. Come on, let's set out on an adventure!

The Legend of Octaman



OCTAMAN

He is an ancient powerful creature made of carbon and hydrogen. Octaman has several superpowers. The most important of them is the ability to generate energy. He can change colour and even become invisible, turn into gas and take off high into the sky, and control fire. Octaman is fond of science, inventions, and new technologies.

AINA

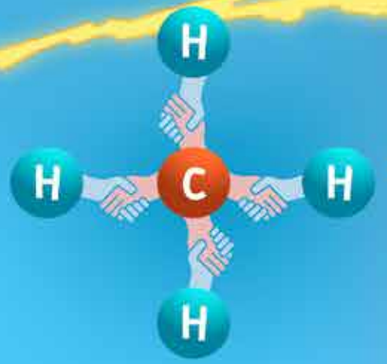
She is a transformer and Octaman's smart little assistant. No task is impossible or too difficult for Aina. She can fly and swim underwater. Even though she is a robot, Aina can experience emotions such as curiosity and joy. Aina communicates through emoticons and symbols.

DESTROIL

His name means 'destroyer of oil'. And this is really so: he is a villain who destroys oil and gas fields. He dreams of destroying all oil and gas on our planet to stop progress and wipe out civilisation. Destroil has long held a grudge against Octaman, so he does everything possible to do harm to the superhero and his friends, to throw obstacles in their path. Why? This is precisely what we need to find out!

OCTAMAN:

— Hi there! Let me introduce myself. My name is Octaman. I was born in the depths of the Earth millions of years ago. My body consists of two substances: carbon and hydrogen, combined into small particles. You may ask, “How do they stick together?” Let me explain. Each carbon has four ‘hands’, with which it firmly holds four ‘one-hand’ hydrogens. The total number of such ‘hands’ is eight. This is exactly what the Latin word ‘octo’ means. The word ‘man’, as you know, comes from English, where it means ‘a person’. That is why I was given the name ‘Octaman’.



Subsurface — is an underground layer of the Earth, containing treasures – natural resources, including oil and gas.

GLOSSARY

For many years, I slept in the depths of the earth, storing up energy and power. Finally, I was strong enough to go up onto the surface. How disappointed I was – I saw dinosaurs and other ancient animals on the Earth, but there were no people. How empty and boring the land seemed without them. Then I went back to the **subsurface (look this word up in the glossary).**

As time went on, people appeared on the planet. They progressed, built towns and cities, paved roads. The cities grew larger and larger and needed more and more energy for life and development. People built windmills, river dams, cut down forests to heat stoves, learnt how to mine coal. However, the energy they got was not enough.

One day they found my traces. It was then that people first learnt about oil and gas and were amazed at the boundless opportunities these minerals could provide.

It was time for me to go onto the surface again. “This is truly a superhero,” people thought, “even a slight trace of his breath turns into tremendous power!” They set out on expeditions to search for me. It was clear that people needed me badly, so I decided to make friends with them. There was one problem, though: my long-time enemy, Destroil, who had been waging war on me for millions of years, had followed me to the surface of the earth to continue his evil deeds. Only now his intentions included hurting people.

Treasure Island

Sakhalin, the largest island in Russia, is a real treasure island. It has unique nature with plants that do not grow anywhere else in the world. The island is home to more than 400 species of animals and birds. What is more, there are over 50 various kinds of natural resources in its depths. Oil and gas are the most important of them. These natural riches are of great benefit to people. We use them to get light and heat.

Oil is used to set vehicles, airplanes and ships into motion. It is a raw material for making paraffin wax for candles and crayons. Even asphalt, which covers the surface of roads, is made of oil. Gas is used to cook food, heat water, and keep our homes comfortably warm. More recently, people have learnt to convert gas into plastic and make fabrics, glass, paints, oils, materials for decorating apartments such as wallpaper, linoleum, and plastic windows from it.

In ancient times, oil was used as a medicine, for making torches to illuminate castles, and also for military purposes.

AINA KNOWS

If you shine special rays called ‘ultraviolet rays’ on oil, it starts to glow. This property makes it much easier for people to find oil underground. It is like looking for something with an electric torch in a dark place.

DID YOU KNOW

Oil is a thick greasy liquid. In many languages this mineral is called ‘rock oil’. Normally, it is black or dark brown, but it can sometimes have a red, blue, yellow or greenish tint. Natural gas, by contrast, is colourless and odourless. You already know that oil and gas lie deep in special places in the bowels of the earth. These places are called fields or deposits. Scientists believe that oil and gas were formed from plants and animals that once inhabited our planet and died many centuries ago, long before man appeared on Earth. People whose work is associated with the extraction of oil and gas are called oil and gas workers. By using special devices, they extract these minerals from the subsurface day and night.

Oil and Gas Around Us. Help Octaman!

Destroil exposed Octaman to ultraviolet rays, affecting his memory, and our superhero forgot why people need him! Help Octaman to remember which of these items are made from oil and gas, and which are made from other raw materials.

Energy of Sakhalin

Octaman

On the **sea shelf (see glossary)** not far from the north-eastern coast of Sakhalin Island, there are two oil and gas fields called Piltun-Astokhskoye and Lunskoye. These are developed by a company that has three offshore platforms extracting oil and gas from under the bottom of the sea. The company's name is Sakhalin Energy; the oil and gas production project is called Sakhalin-2.

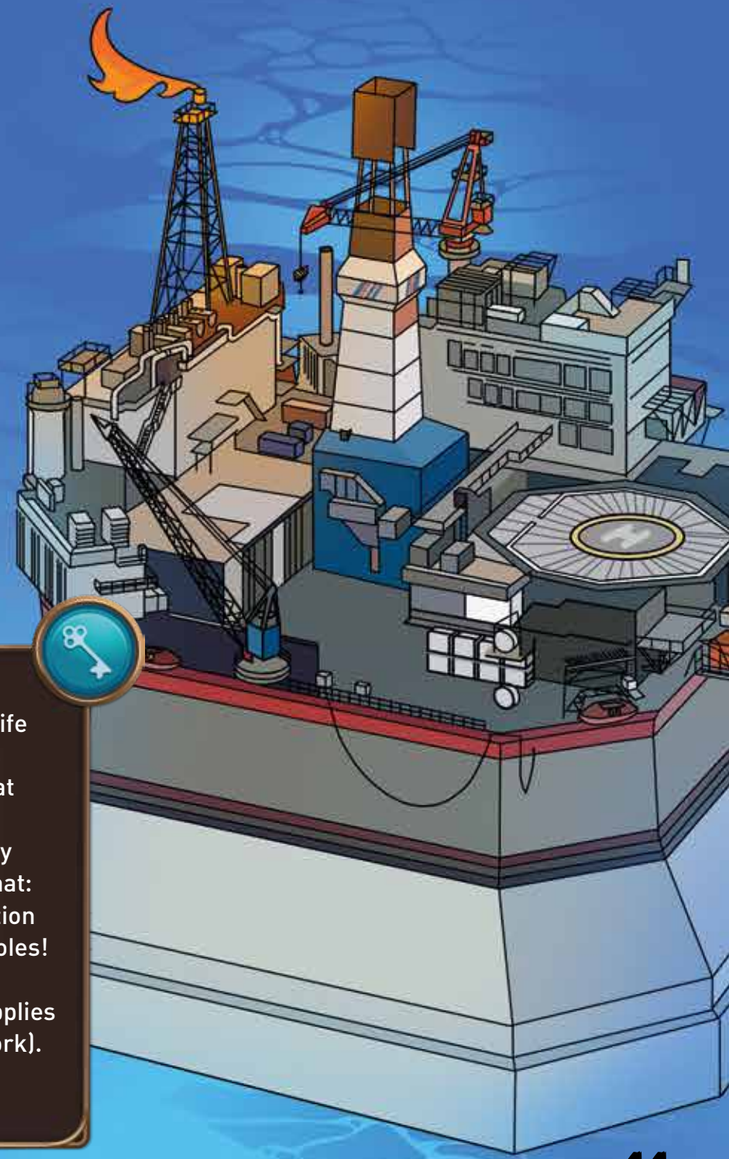
A sea shelf is very much like a shelf on which we keep books, toys or ornaments. It is a shallow place on the bottom of the sea, stretching along the coast for many kilometres.

GLOSSARY

The word 'energy' has the same meaning in many languages, including English and Russian. Sakhalin Energy has an important task to do – provide much-needed energy to people living in the vast Asia-Pacific region, which comprises numerous countries and island states located on the shores of the Pacific Ocean.

AINA KNOWS

The platforms are installed on the seabed off the island. They are in fact huge artificial islands made of steel and concrete. The platforms are equipped with an immense number of complex devices and mechanisms. The heart of each of the platforms is the drilling rig. It has very strong drills that make deep holes in the seabed, just like fishermen drill ice on a winter fishing trip to reach the water. People lower pipes into these holes, called wells, which are soon filled with oil and gas rising to the surface. Let's take a closer look at the platforms!



Oil workers live on platforms for long periods lasting several months. Their life is like the life of an astronaut, only it is not outer space, but an endless sea that surrounds them. On the platform, like on a spaceship, there is everything they need to survive, and even more than that: delicious food, cosy bedrooms, recreation equipment, and even video game consoles! People get to the platforms by ship or helicopter (which also transport supplies and whatever is necessary for their work).

DID YOU KNOW

LUNSKOYE-A PLATFORM

This was the first offshore gas-producing platform in the country. The platform is a gigantic and complex structure. Just imagine: the height from the seabed to the highest point of the platform is 152 metres! Simply put, the platform is taller than a 50-storey building! Gas production on this platform began in 2009 and continues to this day. The abbreviated name of the platform is LUN-A. The oil workers affectionately call it Luna, which is the Latin name for the Moon, and joke that they regularly fly to the Moon to work. Remember how we compared oil workers with astronauts? This is another reason for the comparison.

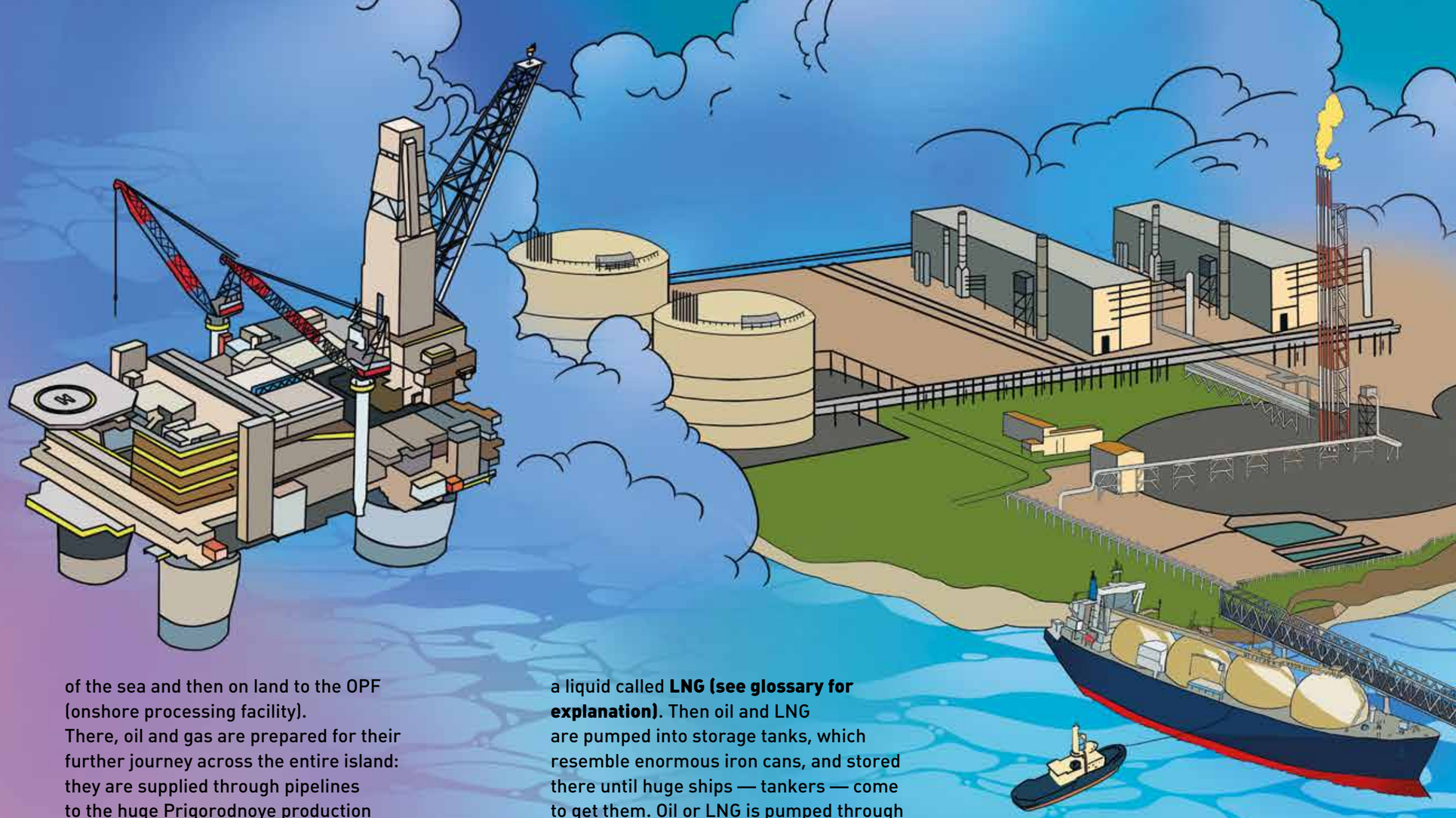
PILTUN-ASTOKHSKOYE-A PLATFORM

This was Russia's first offshore platform for producing oil from under the sea. It is also called Molikpaq, which means «big wave» in the language of the Inuit people. This platform has been producing oil since 1999 — for over 20 years already.

PILTUN-ASTOKHSKOYE-B PLATFORM

This is Sakhalin Energy's third platform. The height from the seabed to the highest point of the platform is 142 metres.

From the platforms, produced oil and gas are sent through pipes laid on the bottom of the sea and then on land to the OPF (onshore processing facility). There, oil and gas are prepared for their further journey across the entire island: they are supplied through pipelines to the huge Prigorodnoye production complex, located on the southern coast of Sakhalin. Just imagine: the total length of the pipelines is 1,600 kilometres! There is a plant that converts gas into a liquid called **LNG (see glossary for explanation)**. Then oil and LNG are pumped into storage tanks, which resemble enormous iron cans, and stored there until huge ships — tankers — come to get them. Oil or LNG is pumped through pipes and special devices into the tanks on tankers, and then the vessels take them to faraway lands, where people need them.

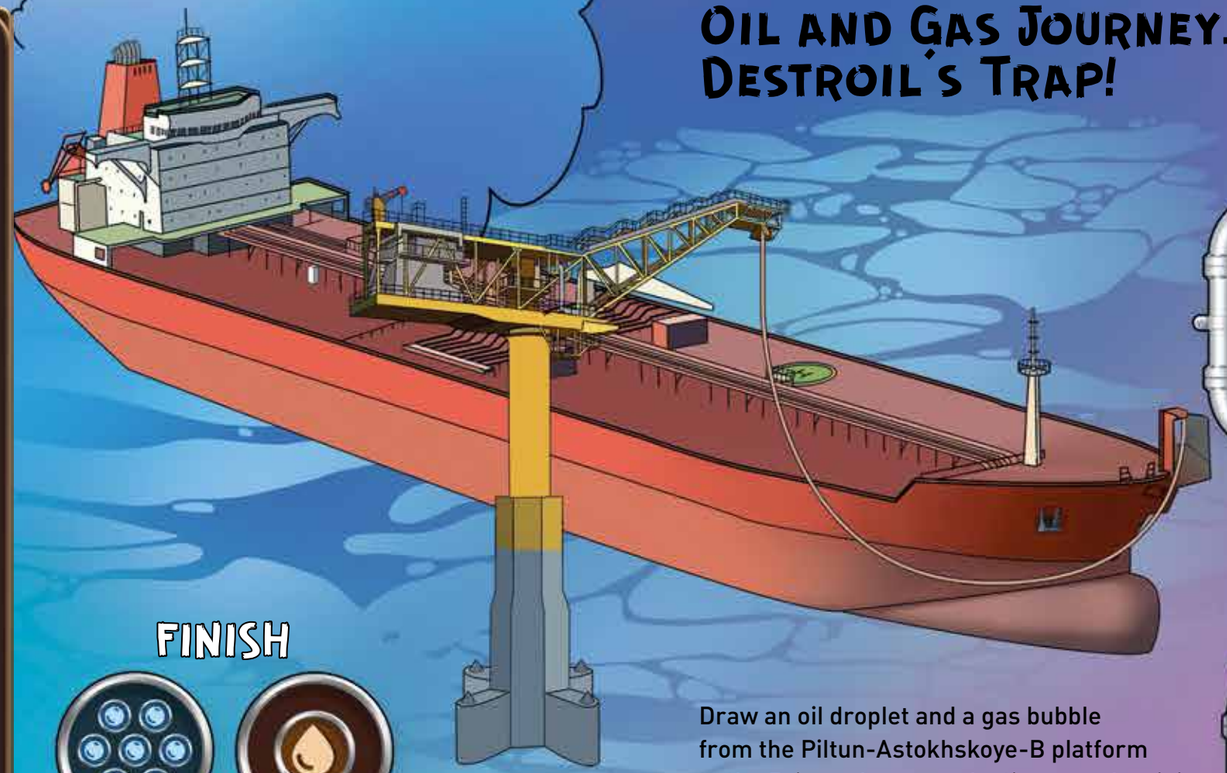


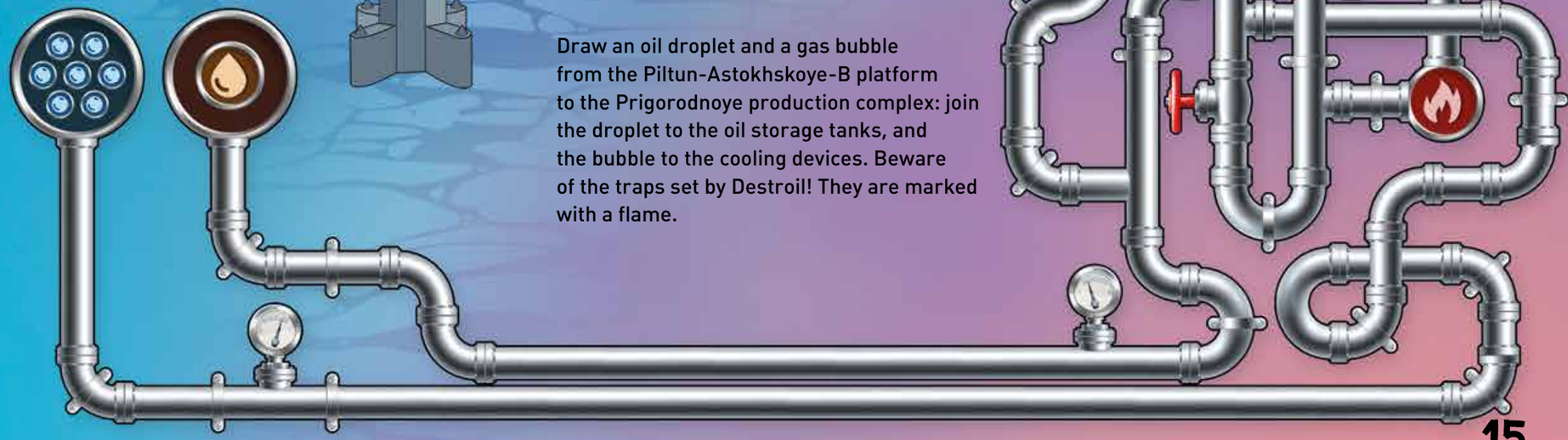
LNG is liquefied natural gas. Most often, natural gas is accumulated underground in the form of invisible volatile particles. This gas is like air, only it consists of other substances – carbon and hydrogen. Moreover, it can be turned into a liquid. Don't believe me? Think about water: it can boil, turn into steam and fly away! So can natural gas. When cooled, it becomes liquid and its volume gets 600 times smaller! It's like an elephant turning into a balloon. Now which is easier to transport – a balloon or an elephant? Of course, a balloon. That is why natural gas is transported in a refrigerated liquid state.

Tankers are huge cargo vessels that carry oil and LNG. However, oil and LNG must be transported on different types of tankers. Oil is transported in holds, while LNG is carried in large barrels located on the deck or inside the vessel. You may wonder why this is. Do not worry – when you study physics, you will understand. You will learn what gas pressure is and how it is related to temperature and volume, and many other fascinating and important things.

GLOSSARY

Oil and Gas Journey. Destroil's Trap!

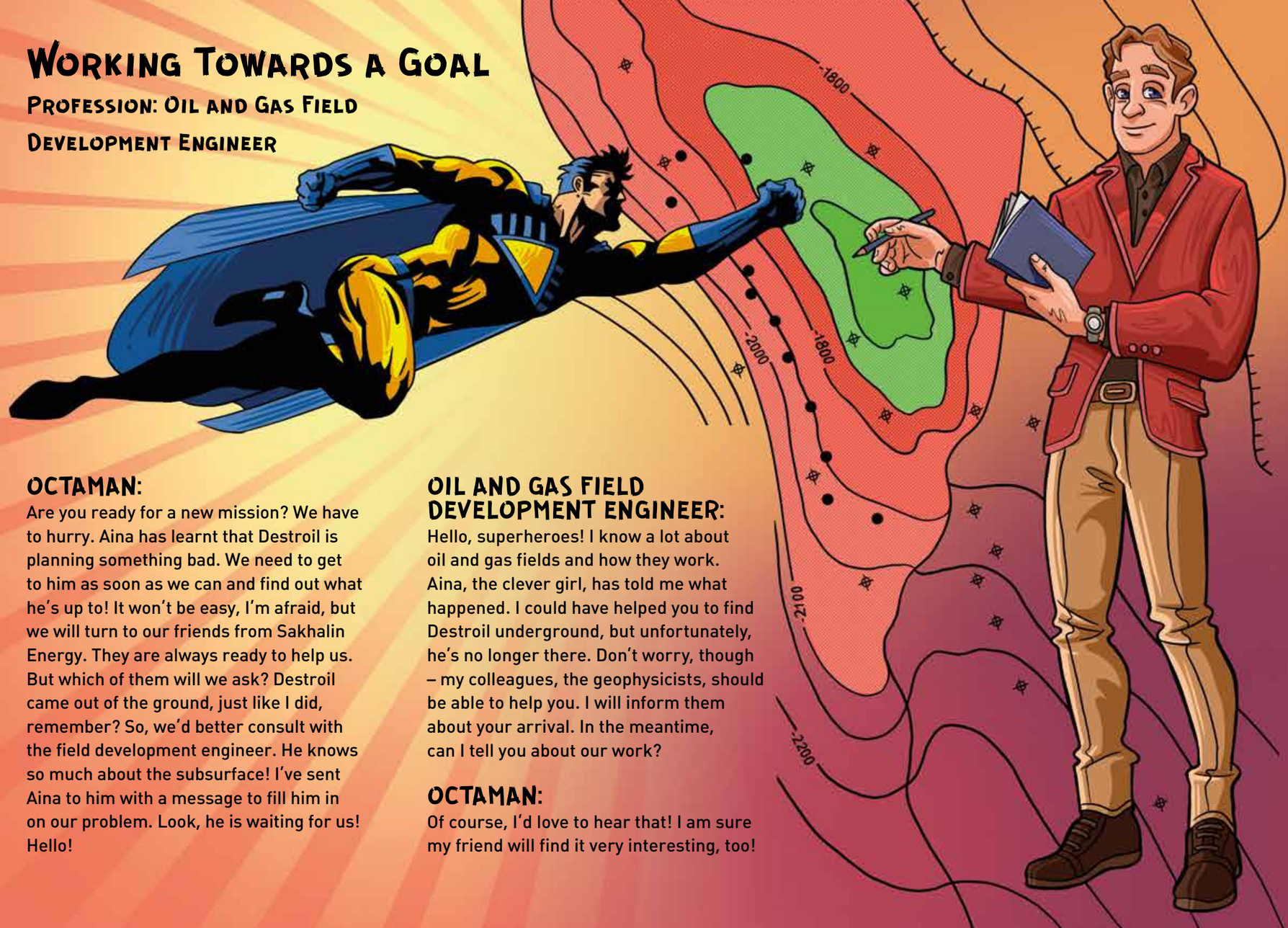




Draw an oil droplet and a gas bubble from the Piltun-Astokhskoye-B platform to the Prigorodnoye production complex: join the droplet to the oil storage tanks, and the bubble to the cooling devices. Beware of the traps set by Destroil! They are marked with a flame.

Working Towards a Goal

Profession: Oil and Gas Field Development Engineer



OCTAMAN:
Are you ready for a new mission? We have to hurry. Aina has learnt that Destroil is planning something bad. We need to get to him as soon as we can and find out what he's up to! It won't be easy, I'm afraid, but we will turn to our friends from Sakhalin Energy. They are always ready to help us. But which of them will we ask? Destroil came out of the ground, just like I did, remember? So, we'd better consult with the field development engineer. He knows so much about the subsurface! I've sent Aina to him with a message to fill him in on our problem. Look, he is waiting for us! Hello!

OIL AND GAS FIELD DEVELOPMENT ENGINEER:
Hello, superheroes! I know a lot about oil and gas fields and how they work. Aina, the clever girl, has told me what happened. I could have helped you to find Destroil underground, but unfortunately, he's no longer there. Don't worry, though – my colleagues, the geophysicists, should be able to help you. I will inform them about your arrival. In the meantime, can I tell you about our work?

OCTAMAN:
Of course, I'd love to hear that! I am sure my friend will find it very interesting, too!

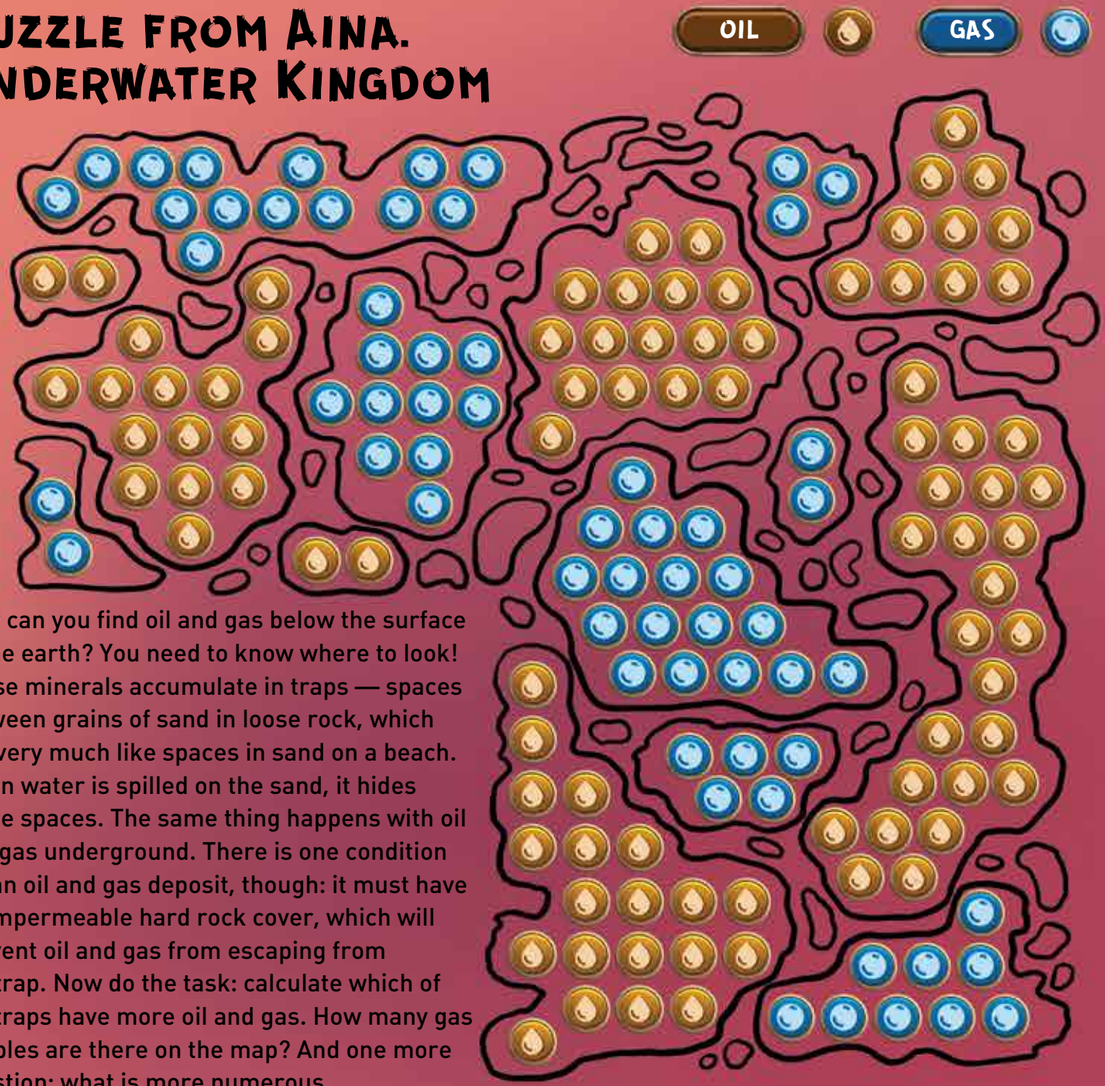
ENGINEER:
An oil and gas field development engineer must determine the amount of oil and gas in a particular field, and their natural properties. It is essential to understand exactly how oil and gas move underground, how their properties change under the influence of high temperature and pressure. We must figure out how to extract mineral resources as effectively and safely as possible. The profession of an oil and gas development engineer involves many challenging, but interesting tasks. It is just like in a computer game – from logic puzzles to turn-based strategies. Joint work with other specialists makes my profession even more gratifying. Together we are a team that carries out various missions. We have to make accurate calculations, and this requires a good knowledge of mathematics. Science – chemistry, physics and biology – help us to learn more about oil and gas fields (remember, according to one theory, oil was formed from the remains of plants and animals that died millions of years ago.). The world's demand for minerals is growing every year. The profession of a field developer is dynamic, so we are required to be open to new knowledge, be assertive, sociable and goal-driven.

Of all existing minerals, natural gas remains the cleanest source of energy. When burnt, it not only releases energy, but also carbon dioxide and steam – the same compounds which are released when we breathe. However, the amount of carbon dioxide emitted by natural gas when burning is low. That is why it is called a ‘green fuel’. For comparison: the amount of carbon dioxide emitted into atmosphere from burning coal to produce one unit of energy is greater by 67 % than that emitted from burning the same amount of natural gas.

AINA KNOWS

OCTAMAN:
Thank you for your story! It was very informative. My friend, we have already talked about what oil is and what people use it for. What about natural gas? Do you know why it is so important? Let’s ask Aina!

Puzzle from Aina. Underwater Kingdom



How can you find oil and gas below the surface of the earth? You need to know where to look! These minerals accumulate in traps — spaces between grains of sand in loose rock, which are very much like spaces in sand on a beach. When water is spilled on the sand, it hides in the spaces. The same thing happens with oil and gas underground. There is one condition for an oil and gas deposit, though: it must have an impermeable hard rock cover, which will prevent oil and gas from escaping from the trap. Now do the task: calculate which of the traps have more oil and gas. How many gas bubbles are there on the map? And one more question: what is more numerous on the map — the bubbles of gas or the droplets of oil? By how many?

Curiosity

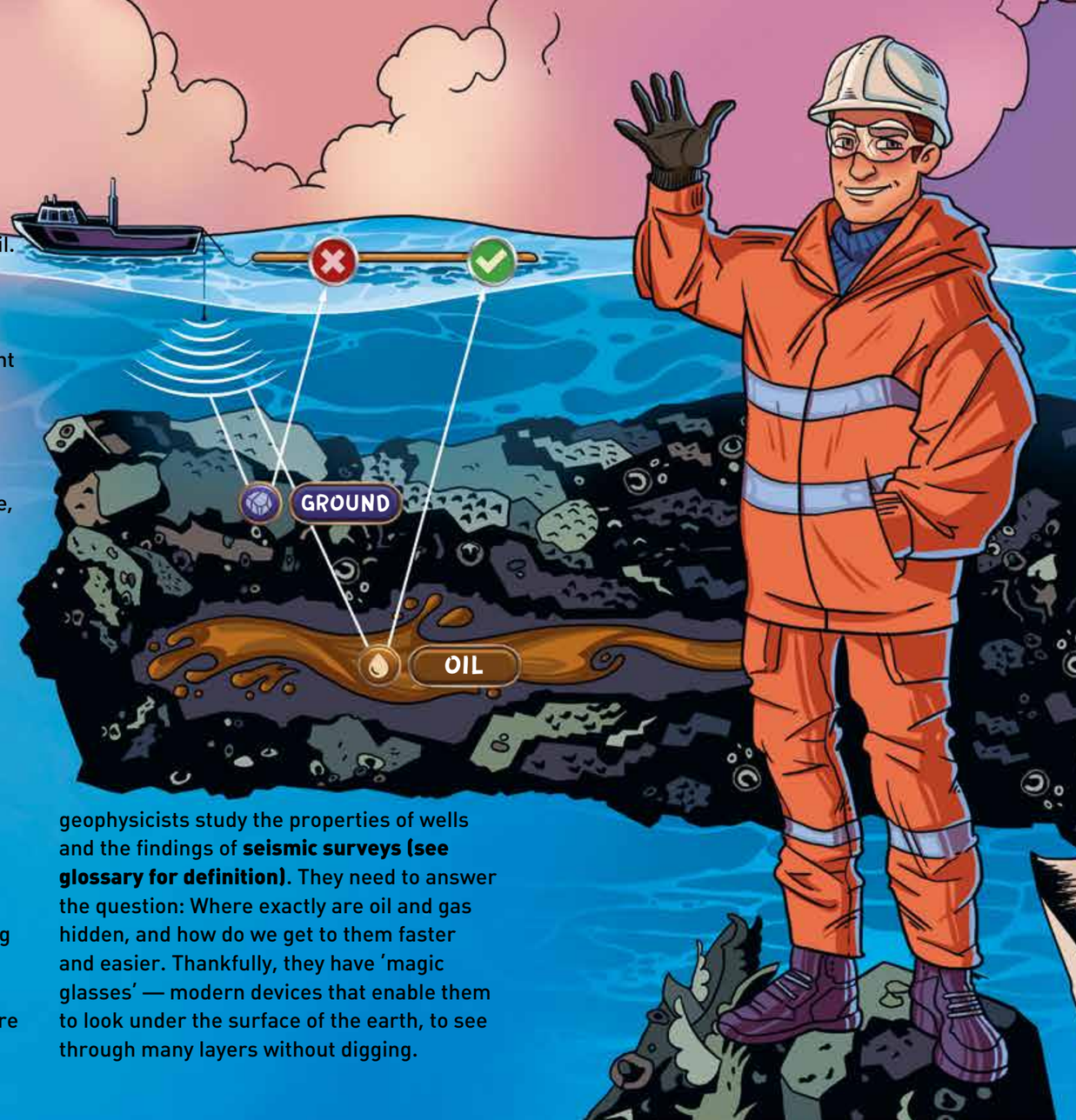
Profession: Geophysicist

OCTAMAN:
Geophysicists have smart accurate instruments. They are sure to find Destroil. Let's go ask them!

GEOPHYSICIST:
Good afternoon, friends! What did you want to ask me?

OCTAMAN:
Hello! We're looking for Destroil, my old enemy. He has come out of the subsurface, found his bearings in the modern world, but he is still as evil as before. We need to stop him before he harms someone! But we don't know where he is at the moment. They say geophysicists can see on the ground, under the ground, and even under water. Is this true?

GEOPHYSICIST:
Geophysics is a science that studies the properties of the earth and rocks. This information is necessary to know if you want to build something on a plot of land or extract some minerals in a field. You wouldn't camp in a swamp or try to dig a hole in a rock with a shovel, would you? Before you start work, you need to determine the properties of what you are going to work with. In an oil or gas field, geophysicists study the properties of wells and the findings of **seismic surveys (see glossary for definition)**. They need to answer the question: Where exactly are oil and gas hidden, and how do we get to them faster and easier. Thankfully, they have 'magic glasses' — modern devices that enable them to look under the surface of the earth, to see through many layers without digging.



A seismic survey is the study of subsoil by means of artificially created sound waves, which reflect from different obstacles underground in different ways. The devices capture and decode these reflections, and draw maps based on the obtained data. This way they find out what there is underground and whether there are any minerals there.

DID YOU KNOW

'Seismic' means associated with vibrations of the earth's surface, including earthquakes.

GLOSSARY

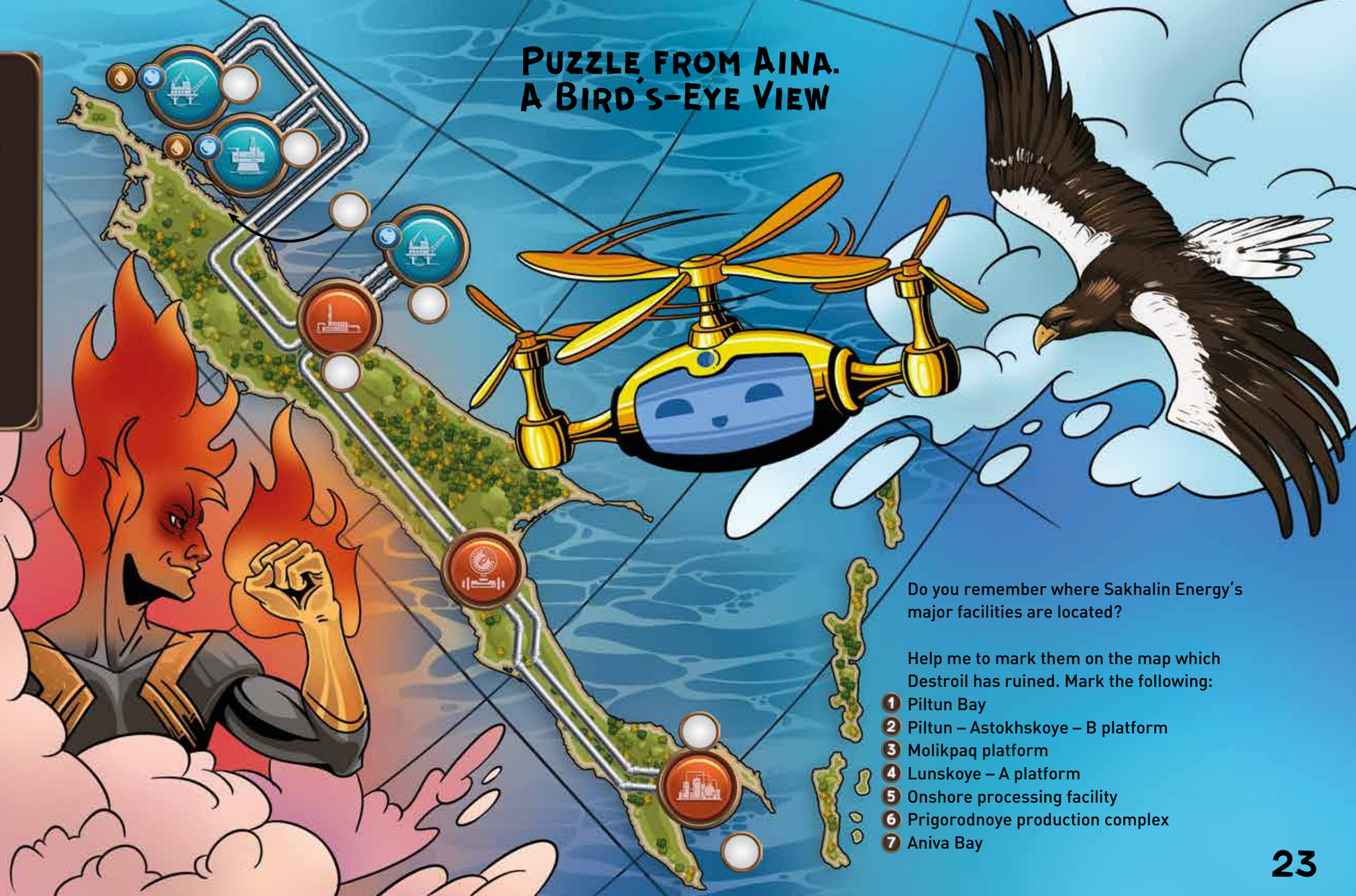
Once upon a time, the profession of geophysicist involved constant expeditions. Geophysicists were engaged in difficult research ‘in the field’, that is, in an uninhabited and unstudied area, in rain or snow, in heat or severe frost. Back then, there were no mobile phones, no Internet, no tablet computers or laptops. Geophysicists had to rely only on their knowledge, experience and ingenuity. And make all notes by hand.

AINA KNOWS

OCTAMAN:
Thank you! Now we know what your job is about and how important it is! But what about Destroil? Where is he?

GEOPHYSICIST:
Okay, let’s get to the point. We recently installed seismic sensors near the river to study the likelihood of an earthquake in the area, and the sensors have just detected ground vibrations in the bridge area! What if the bridge has collapsed, and it was all Destroil’s doing?
The GIS specialist will tell you the exact coordinates. You need to hurry! But first, fill in the map that Destroil has managed to spoil. I’m sure it will help you find him.

Puzzle from Aina. A Bird’s-Eye View



Do you remember where Sakhalin Energy’s major facilities are located?

Help me to mark them on the map which Destroil has ruined. Mark the following:

1. Piltun Bay
2. Piltun – Astokhskoye – B platform
3. Molikpaq platform
4. Lunskoye – A platform
5. Onshore processing facility
6. Prigorodnoye production complex
7. Aniva Bay

Responsibility

Profession: Geographic Information Systems (GIS) Specialist

A geographic information system is a system that presents information about the surrounding environment in the form of a visual picture. One of the best-known geographic information systems in the world is GLONASS. Aina will tell you about it in more detail. A GIS specialist collects data, analyses and creates visual maps. The word 'geo' in Greek means 'land'. You can see this stem in the words 'GEOgraphy' (the science of the Earth), 'GEOlogy' (the science of minerals found on the Earth), and many others.

GLOSSARY

OCTAMAN:
Shh! I think the GIS specialist is busy right now: look, he's working on a seabed elevation map.

GIS SPECIALIST:
I'm just finishing up. In our work, we inspect (check) and carry out the maintenance of underwater structures, using unmanned remotely operated vehicles. They allow the operator to work at great depths, while remaining on the vessel. Such devices have special manipulator arms, which they use to repair subsea structures, do research, and perform many other tasks carefully and accurately.

OCTAMAN:
Wow! I love smart machines and robots, too. Aina is my best invention. I named her after the Ainu people, who lived on Sakhalin a long time ago.

GIS SPECIALIST:
We use many smart devices and systems which help us to extract oil and gas. They are **GLONASS (see glossary)**, satellites, drones, and underwater remotely operated vehicles with high-precision instruments. We send a robot to places that people cannot access themselves. The profession of a **Geographic Information Systems (GIS) Specialist (see glossary)** is one of the most modern. GIS specialists are in high demand. We collect, process and study space data, decrypt images from space, draw and fill in maps, build terrain models, translate numbers and facts into visual pictures, store information and provide quick access to it. If you enjoy making blueprints, drawing maps and terrain plans, scrutinising 3D models, thinking up and inventing things, and like geography lessons, then the profession of a GIS specialist is perfect for you! Do you have any questions?

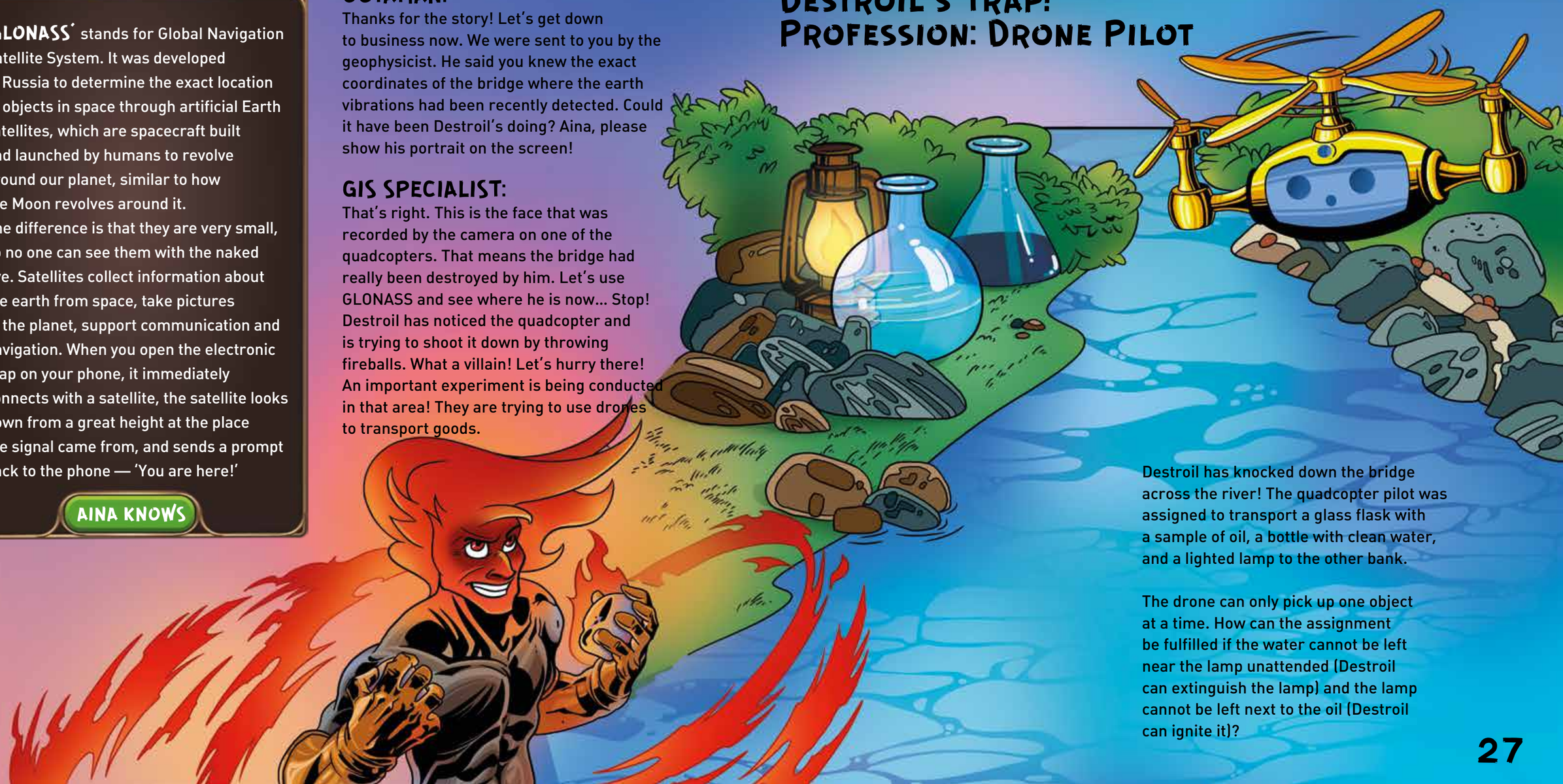
'GLONASS' stands for Global Navigation Satellite System. It was developed in Russia to determine the exact location of objects in space through artificial Earth satellites, which are spacecraft built and launched by humans to revolve around our planet, similar to how the Moon revolves around it.
The difference is that they are very small, so no one can see them with the naked eye. Satellites collect information about the earth from space, take pictures of the planet, support communication and navigation. When you open the electronic map on your phone, it immediately connects with a satellite, the satellite looks down from a great height at the place the signal came from, and sends a prompt back to the phone — 'You are here!'

AINA KNOWS

OCTAMAN:
Thanks for the story! Let's get down to business now. We were sent to you by the geophysicist. He said you knew the exact coordinates of the bridge where the earth vibrations had been recently detected. Could it have been Destroil's doing? Aina, please show his portrait on the screen!

GIS SPECIALIST:
That's right. This is the face that was recorded by the camera on one of the quadcopters. That means the bridge had really been destroyed by him. Let's use GLONASS and see where he is now... Stop! Destroil has noticed the quadcopter and is trying to shoot it down by throwing fireballs. What a villain! Let's hurry there! An important experiment is being conducted in that area! They are trying to use drones to transport goods.

DESTROIL'S TRAP! PROFESSION: DRONE PILOT



Destroil has knocked down the bridge across the river! The quadcopter pilot was assigned to transport a glass flask with a sample of oil, a bottle with clean water, and a lighted lamp to the other bank.

The drone can only pick up one object at a time. How can the assignment be fulfilled if the water cannot be left near the lamp unattended (Destroil can extinguish the lamp) and the lamp cannot be left next to the oil (Destroil can ignite it)?

Attentiveness

Profession: Construction Engineer

OCTAMAN:
The bridge must be rebuilt. Let's ask the construction engineers for help! They are the people who come to the field long before the start of oil and gas production. They design and build offshore platforms, onshore facilities, plants, jetties, and also residential buildings for oil and gas workers. All these facilities need to be periodically repaired and extended even after mining operations have already begun. This way, construction engineers 'watch over' the built structures.

CONSTRUCTION ENGINEER:
That's right. My work is fascinating, but the responsibility is huge. This profession is one of the most ancient occupations on earth. When you were a little child and could still barely walk, you used to build towers from building blocks. Just like you, our ancestors, having practically no knowledge about anything, built hearths and shelters from tree branches and animal skins. Gradually, they learnt how to work and use stones. Now, thanks largely to their knowledge and experience, we can build huge structures. Do you remember the height of the highest platform of our company? Builders have worked with full dedication and attention since time immemorial. Indeed, the lives of the future inhabitants of a building directly depend on how careful our attitude to our work is.

When building facilities in an oil or gas field, an engineer must know the properties and characteristics of materials, be able to make correct calculations and draw accurate blueprints. All production facilities must be strong and stable enough to withstand the Sakhalin weather conditions – you have no idea how harsh they can be! All our buildings meet special requirements – they are fire-proof, earthquake-resistant, and safe in all other respects. After all, oil and gas are exceedingly flammable and explosive substances! A construction engineer makes sure that structures are built strictly according to the drawings. Some elements and details are essential for the safety of the entire facility. This means that no deviations from the calculations are allowed. Sometimes it is necessary to change an already built structure, for example, to install new equipment on an offshore platform. In this case, construction engineers make estimates to decide whether the task is possible to fulfil, whether the structure is strong enough to withstand additional weight. Moreover, they have to support their conclusion with justifications, calculations and drawings.

Builders are a well-organised team, where everyone performs their particular task. They can be divided into two categories. The first includes design engineers, designers, surveyors – specialists who design future buildings and structures, make estimates and calculations. The second group includes trade professionals – all those who bring to life the designs created by engineers. This group comprises most of the construction occupations: construction electrician, welder, interior decorator, and other specialists.

AINA KNOWS

The profession of a construction engineer goes back to the time when people built ancient mausoleums, temples and palaces. There is no doubt that the seven wonders of the world were created by talented people with a thorough technical knowledge and extensive experience.

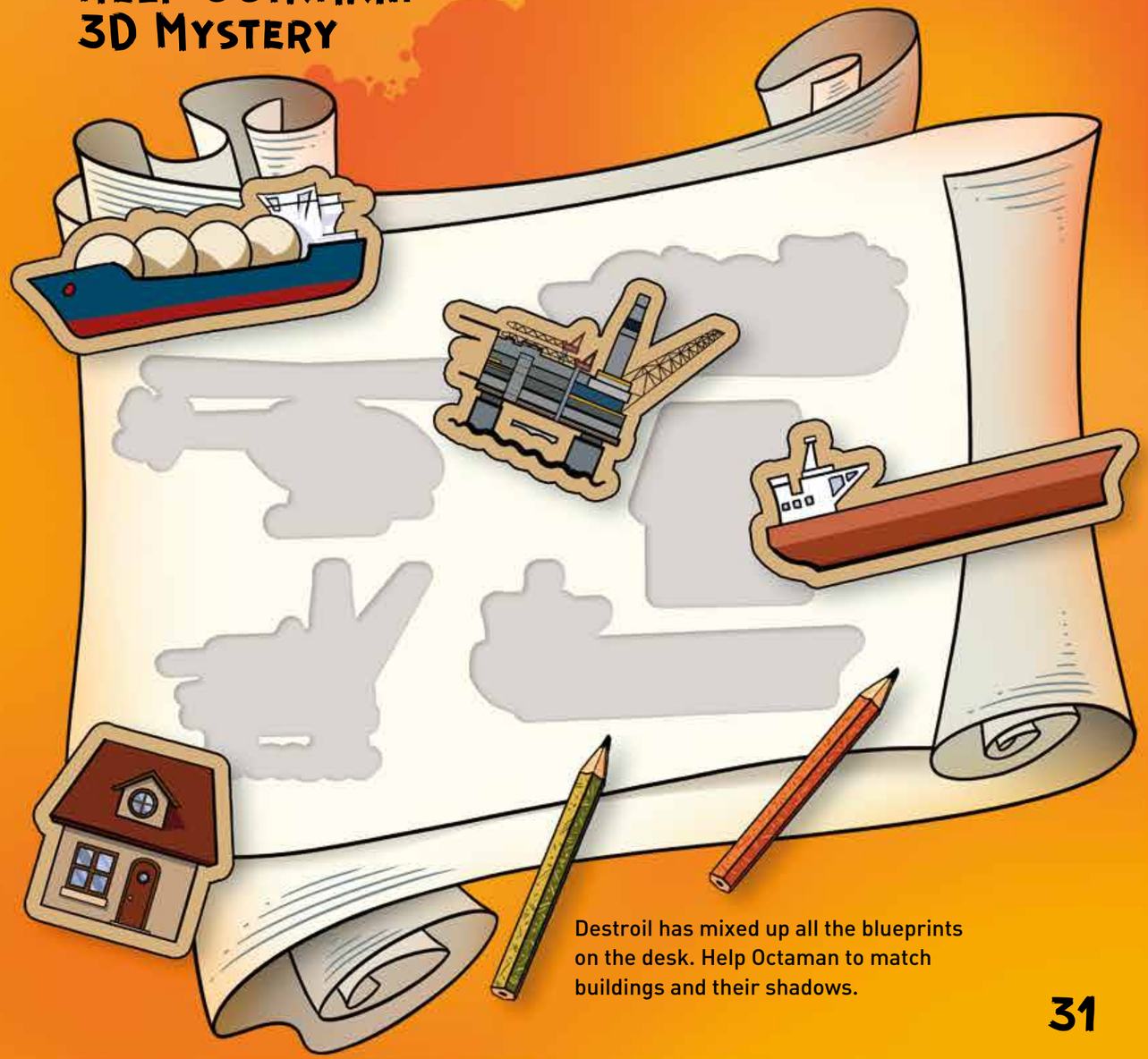
DID YOU KNOW

Field construction engineers must be in good shape physically and be exceptionally attentive. Construction engineers working in an office need a good knowledge of special computer programmes and be capable of working scrupulously at a desk for hours on end. Building games, modelling computer programmes, physics and geometry, draughtsmanship and technical drawing will help future builders develop their memory, attention and imagination.
We have already started work to restore the bridge. Sorry, but I have to go!
See you! Try to find Destroil before he destroys something else.

OCTAMAN:

Destroil tried to confuse the team of construction engineers, but they were on their guard and promptly responded to his tricks. Will we be able to do likewise?

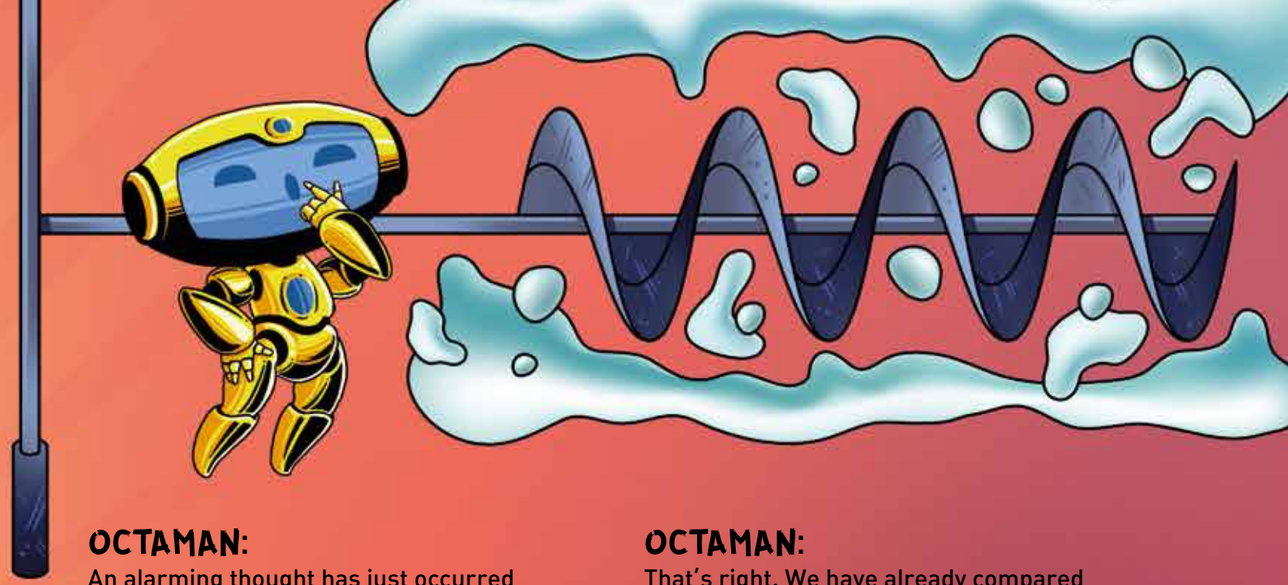
Help Octaman! 3D Mystery



Destroil has mixed up all the blueprints on the desk. Help Octaman to match buildings and their shadows.

Strength

Profession: Drilling Technician



OCTAMAN:
An alarming thought has just occurred to me. What if Destroil hides underground again? How will we get him out of there? We must think of a plan in advance, just in case. Let's go to the drilling technician. Mineral resources are found at great depths, up to several kilometres. We already know that oil and gas are produced from deep wells. Such wells are drilled by strong, hardy men – drilling technicians, or drillers. Let's ask the driller what secret technologies they use in their work.

DRILLER:
Hi, Octaman! Glad to see you, young explorer! Well, our secret is a special drill.

OCTAMAN:
That's right. We have already compared drilling wells with drilling ice for fishing in winter, remember?

DRILLER:
Exactly. We do practically the same thing, only in our case the drill is longer. The soil or rocks are raised to the surface by a special fluid called 'drilling mud'. Just imagine: it's summer, the sun is hot; you are watering the garden. Then you stick the garden hose into a hole, just for a lark. What a fountain of water and soil will gush out of the ground! This is what happens during well drilling. To make sure that the walls of the well do not crumble or collapse, an iron pipe called casing is gradually lowered into the wellbore. And so we drill and drill until we get to oil and gas.

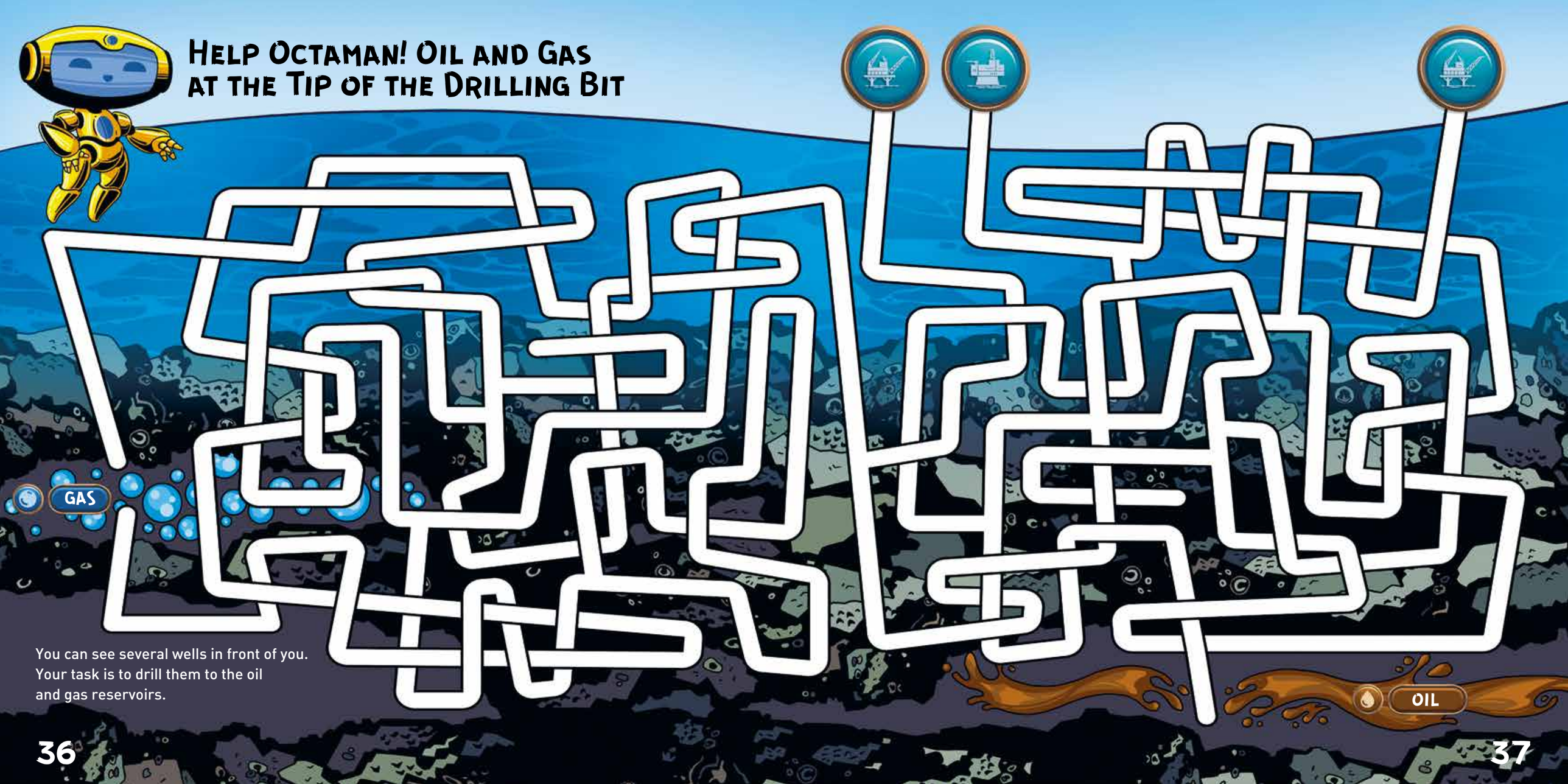
The work of a driller is truly a man's occupation: a driller has to work with large, heavy machines and installations in difficult conditions: in freezing cold, in boiling heat, in rain and sleet.
There are situations when drillers have to brace their mind and body, muster up their strength, and do their best. Just like in sport. After all, drillers are at the forefront of oil and gas production, 'going into battle' before everyone else.
Well drilling is a challenging, but exciting process. This work is for physically fit, courageous, strong-willed and smart people. Do you think you could do it?
Drillers engaged in planning perform a task that is no less important, even though they mostly sit in front of their computers in an office, making complex calculations. They study all available data about the field, draw up drilling schedules, and forecast work results.

Thanks to modern equipment, everything that happens underground can be seen on a computer screen. This helps us to direct the drill exactly into the oil reservoir. Why don't you try it yourself?

Wells are not only drilled vertically downwards, but also horizontally. In other words, a well can be drilled in different directions. At the Sakhalin-2 project, there are wells that extend underground horizontally for several kilometres.

AINA KNOWS

Help Octaman! Oil and Gas at the Tip of the Drilling Bit



You can see several wells in front of you. Your task is to drill them to the oil and gas reservoirs.

Industriousness

Profession: Lifting Equipment Engineer

OCTAMAN:
How cunning Destroil is! While we were trying to figure out how best to drive him out of the ground, he went the other way and got to the top of the platform. We must chase him out of there before he makes trouble. Let's go to the lifting equipment engineer.

Hello! Could you please tell me if there are any devices that will help us to get to Destroil? Do you see him? There he is, sitting on the roof.

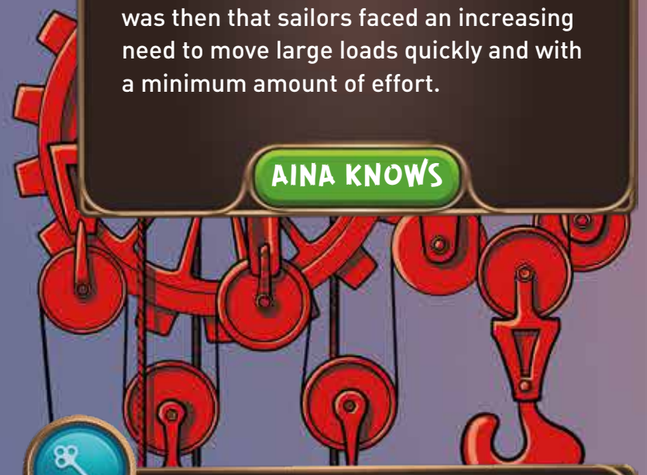
LIFTING EQUIPMENT ENGINEER:
Of course! Back in the olden days, people used primitive mechanisms for lifting and moving a variety of loads, such as a fallen tree or a stone block. The ancient Greeks invented a lifting device with a long lever, resembling a stork, or a crane. That is what they called it. The German word for this device is 'Kranich'. This is where the familiar word 'crane' comes from. People also used leather buckets, levers, screws, water wheels, and ropes to help them to lift heavy objects. Then people went further: with the invention of motors, they began to manufacture power-driven lifting machines. Thus, aerial work platforms, excavators, loaders, cranes, escalators and lifts came into existence. One of these – a crane – will help us to get Destroil. I'm sending it after that mischief-maker. The crane will reach out and catch him with the hook.

OCTAMAN:
That's great! In the meantime, can you tell us about your work?

ENGINEER:
The work of a lifting equipment engineer is essential at all stages of mining minerals. Our work is indispensable when it's necessary to build and repair facilities, transport people and cargoes from vessels to platforms, and install equipment. Every day we move tonnes of various cargoes – from small ones, weighing several dozens of kilogrammes, to huge ones, weighing several tonnes. Today, lifting equipment is not only used in oil and gas production; we actually live side by side with hoisting machines that impress and amaze us with their power and capabilities. Even so, they are still man-operated. A lifting equipment engineer needs to carefully plan how to handle each particular cargo, how to fix the load correctly so that it does not drop on anyone. He must know how to determine the centre of gravity of a load so that it does not roll over in the air, calculate the maximum lifting capacity of the crane, choose safe methods and techniques for performing all operations.

A breakthrough in the development of lifting mechanisms occurred during the period of the remarkable geographical discoveries of the 13th–15th centuries. It was then that sailors faced an increasing need to move large loads quickly and with a minimum amount of effort.

AINA KNOWS



Historians estimated that the construction of the Egyptian pyramids required between 20,000 and 50,000 men and several decades of hard labour. Nowadays, such structures could be built by just a few people in a couple of years thanks to the use of modern lifting equipment.

DID YOU KNOW

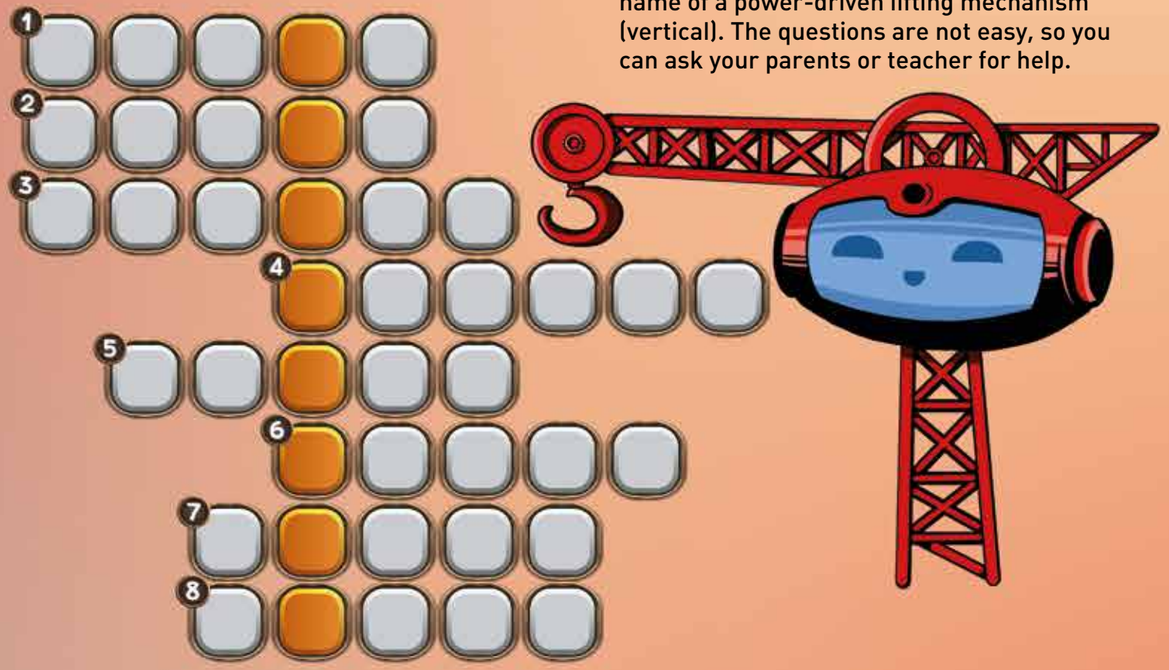
We have to do these tasks daily. If you dream of becoming a lifting equipment engineer, you should develop qualities such as perseverance, accuracy, responsibility, and powers of observation.

You can do this by doing jigsaw puzzles, colouring pictures by number, even by playing games. Choose those that train your brain: games, where you have to find an equilibrium point, map the optimal route, come up with an action plan. When I was a schoolboy, I used to imagine that the floor was lava and you couldn't step on it, and plan how to get from one room to another. We also built towers from stones or building blocks to see whose structure would be higher. We walked along narrow planks, along a rope lying on the floor, carried cups of water on our heads, trying not to spill it. And, of course, we invented various systems to lift loads.

I can't believe it – Destroil managed to escape before the boom of the crane approached him. He must have got really scared. It looks like he's heading for the booster station. We need to warn the mechanical engineer. That's what you will do after you solve the crossword puzzle that I have made together with Aina specially for you. It will help you find out what devices you can use in pursuit of your enemy in case you have to handle loads. Good luck to you!

Puzzle from Aina. Important Cargoes

Solve the crossword puzzle and learn the name of a power-driven lifting mechanism (vertical). The questions are not easy, so you can ask your parents or teacher for help.



1. A circular object that rotates on an axle that moves a cart, a car, or a bicycle.
2. A twisted rope-like product which is the main part of hoisting machines and mechanisms.
3. What process, opposite to 'descent', follows the construction command 'heave up'?
4. A means of transport for the transportation of people or cargoes by sea.
5. A construction of connected metal rings which is used for lifting loads.
6. The part of the body an elephant uses to lift things.
7. To lift a cargo.
8. Machine designed for lifting and moving loads.

Logic

Profession: Mechanical Engineer

OCTAMAN:

The Greek word **'mechanics' (see glossary)** means 'the art of building machines'. It looks like the first mechanics specialists appeared at the same time when people learnt to think. They had many problems to solve: to manufacture or repair a tool, to make a trap for a beast, to figure out how to move a heavy load from one place to another. Over time, the tasks grew more and more complicated. So who are present-day mechanical engineers?

MECHANICAL ENGINEER:

They are people who take care of mechanisms. Hello! Has anything happened?

OCTAMAN:

We're looking for Destroil. In the course of our search, we are also getting to know people engaged in the production of oil and gas. As far as we know, Destroil is plotting to shut down some critical equipment.

ENGINEER:

Don't worry, that's not going to happen. We mechanical engineers know what to do to keep mechanical equipment, such as pumps or motors, from breaking and to ensure a long service life. Mechanical engineers work both in offices and at oil and gas facilities. We often visit production sites to inspect, diagnose or repair mechanical equipment. We have learnt not only to fix malfunctions and breakdowns, but also look into the future and predict them. We thoroughly study the structure of various materials that our mechanisms are made of, comprehend the essence of things and events in order to understand what happens, how and why...

In the past, people used to move large and heavy loads by putting logs under them. When the load was pulled, the log rolled. The logs that remained behind after the load had already moved along them were placed in front of the load again. Thus, it was a continuously rolling road. At some point, people guessed that they did not need to use a whole log and only a short part of it would be enough. This is how they invented the wheel.

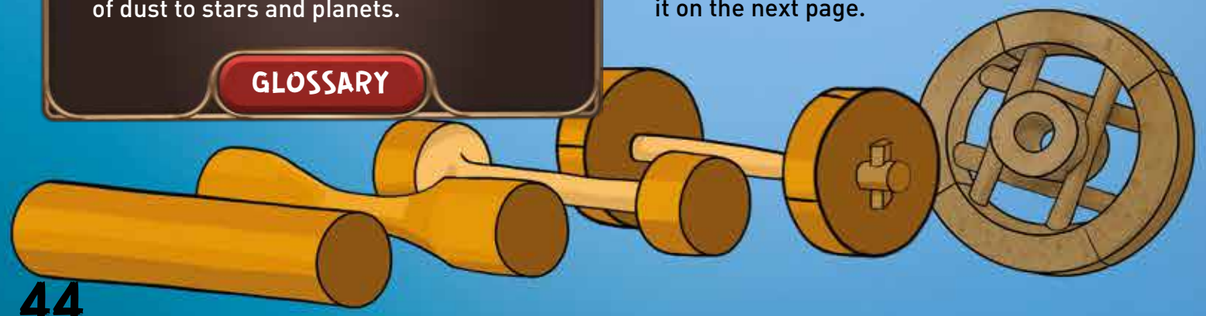
AINA KNOWS

Mechanics (science) is a branch of physics that studies the motion of bodies under the action of forces and their interaction with other bodies. Classical mechanics studies the movement of any object – from a sled to a rocket, a speck of dust to stars and planets.

GLOSSARY

The most important thing in the profession of a mechanic is to love machines and mechanisms, and to be interested in their design. Of course, a good mechanic must be attentive, observant, and be able to analyse things. The powers of observation, logic, and awareness of the laws of nature make a solid foundation upon which the knowledge of engineering disciplines can grow. Do you remember Bendum and Twistum, the jack-of-all-trade characters from the fairy tale about Dunno? Or Simka and Nolik from the Fixies cartoon? We mechanics are as ingenious, skilful, dexterous and quick-witted as them! But we were not born like this. To become a mechanic, you must study diligently and use the theoretical knowledge you've gained in practice. Someone who can tighten a loose screw in a chair, lubricate his bicycle, and fix a toy when he is still a schoolboy will definitely become a good mechanic.

What about you? Are you resourceful? You can test yourself by doing the task we have prepared together with Aina. You can find it on the next page.



Puzzle from Aina. Assistant Devices

Solve the pictorial puzzles and find out what devices a mechanical engineer works with. Do you know all the items? If not, be sure to ask your teacher or parents. Together, you can find these objects on the Internet, see what they look like and find out what they are used for.

Confidence

Profession: Electrical Engineer

Octaman:

Aina said that the electrical engineer was looking for us; he has some information about Destroil. An electrician is a very important occupation. Imagine a massive failure of electricity around the world. No electricity – no lights; TV sets and computers are dead; Wi-Fi does not connect to the Internet. Phones and tablet computers have run out of charge and switched off. Refrigerators have stopped running. Electric stoves and microwave ovens do not work. Pumps no longer pump water into buildings. Production has shut down at industrial enterprises; shops and supermarkets are closed; traffic lights do not regulate the traffic. The world has plunged into primeval darkness. Happily, we have saviours who will always come to our rescue – electricians.

Electrical Engineer:

Hello! Glad to see you! You're exaggerating, Octaman.
But I will tell you what is important to know about my profession. Electricity is generated and transmitted by many machines and devices: from powerful power plants, high voltage lines that transmit electricity over a distance, to tiny chargers for mobile phones. The profession of electrical engineer is designed to operate all this complex equipment. They are specialists who know the specifics of electrical engineering, mathematics and physics. Hobbies such as radio electronics, chess, intellectual games, and sports will certainly help one to become a good specialist in electrical engineering. People working as electrical engineers are composed and disciplined. They are highly responsible, accurate, attentive; they make decisions quickly and confidently on the basis of solid knowledge.

At Sakhalin Energy, all facilities have independent sources of electricity. It takes numerous electrical engineers to ensure their efficient and failure-free operation. Some of these specialists work on-site – on the offshore production platforms, at the onshore processing facility and the booster stations. There is another group of electrical engineers who work in the office, creating electrical maintenance programmes. These programmes are subsequently introduced at production facilities to guide electricians in their work. This group of electrical engineers do critical work: the safety and reliability of equipment on site directly depends on their decisions.

The word **'ELECTRICITY'** is related to the word 'electron', which, translated from ancient Greek, means 'amber'. Electricity is the name of the phenomenon associated with the existence of electrical charges. **ELECTRICAL CHARGE** is the capability of objects to create special electromagnetic fields around them and participate in electromagnetic interaction. You will learn this in detail during physics lessons in high school.

AINA KNOWS

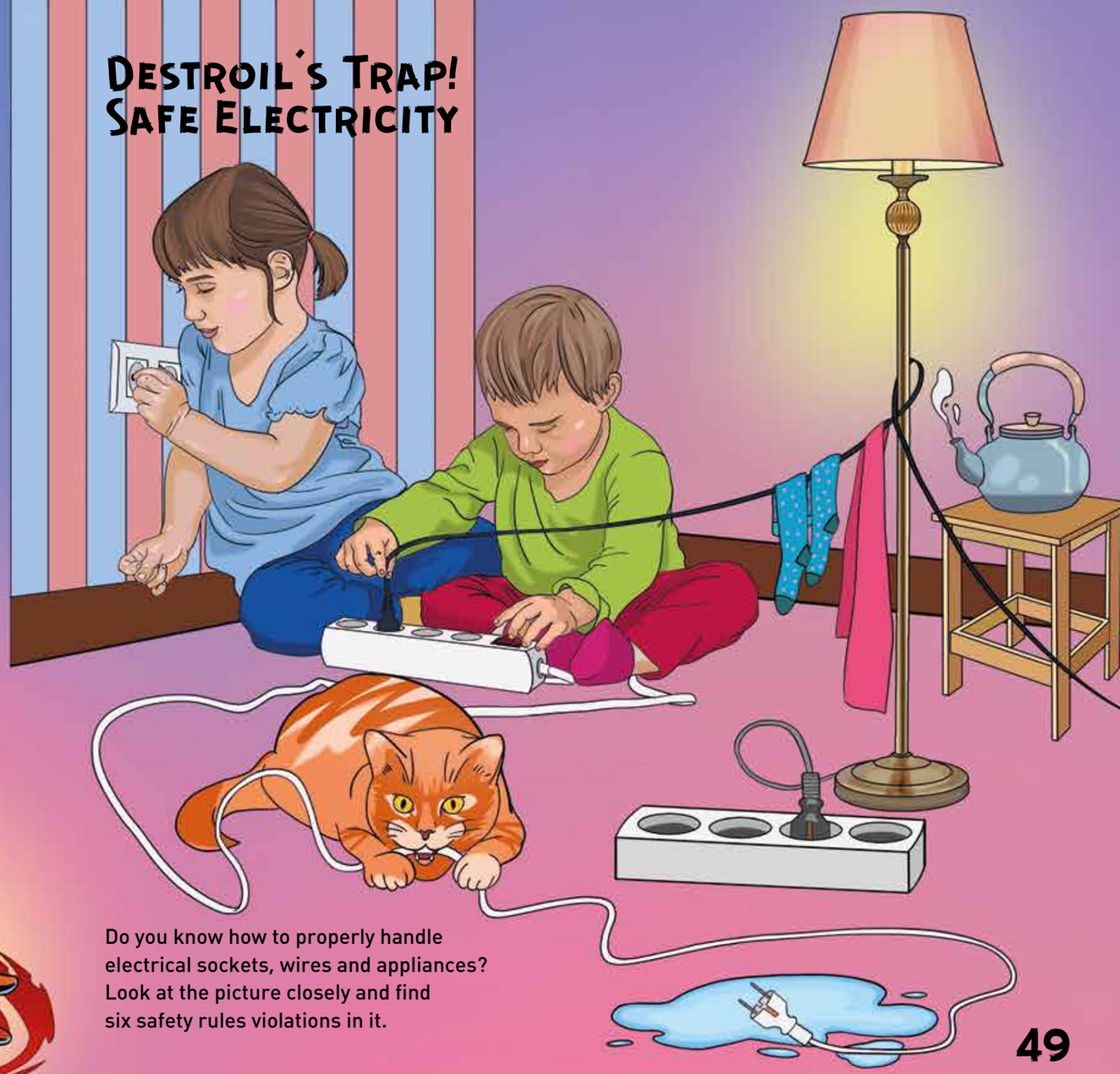
For centuries, mysterious natural phenomena caused by electricity – lightning, static electricity – frightened people, and sometimes even killed them. Only a scattering of brave men, true scientists and engineers, studied and gained an insight into the nature of these phenomena. The names of Lomonosov, Faraday, Volta, Ampere, Edison went down in history for studying and taming the great power – electricity.

DID YOU KNOW

It is important to know that the profession of an electrical engineer is not only associated with high responsibility, but also with high risk. Everyone knows that electric current is dangerous, but not everyone understands why. The problem is that its presence cannot be determined without special instruments. Think for yourself: you can smell smoke, see fire, feel high or low temperatures, notice moving objects, but how can you possibly determine the presence of electric current? This is exactly why this profession requires thorough knowledge of theory, practical experience, understanding and unconditional implementation of safety rules, ability to use protective equipment and measuring instruments. This reminds me why I was looking for you.

Destroil has set up electricity traps. Help me find them!

DESTROIL'S TRAP! SAFE ELECTRICITY



Do you know how to properly handle electrical sockets, wires and appliances? Look at the picture closely and find six safety rules violations in it.

Attention to Detail

Profession: Processing Unit Operator

DESTROIL:

Here you are! At last we have met! You think you have escaped my traps and everything is over? Not a chance! Well, I haven't managed to stop oil and gas production on your beloved Sakhalin Island, but I am not going to let you turn them into energy, that's for sure! The only thing I need to do is capture the equipment.

OCTAMAN:

Stop, Destroil, don't even try to do it! The equipment is controlled by an experienced operator, so the chance that you will get it is very slim – he will not let you come near it.

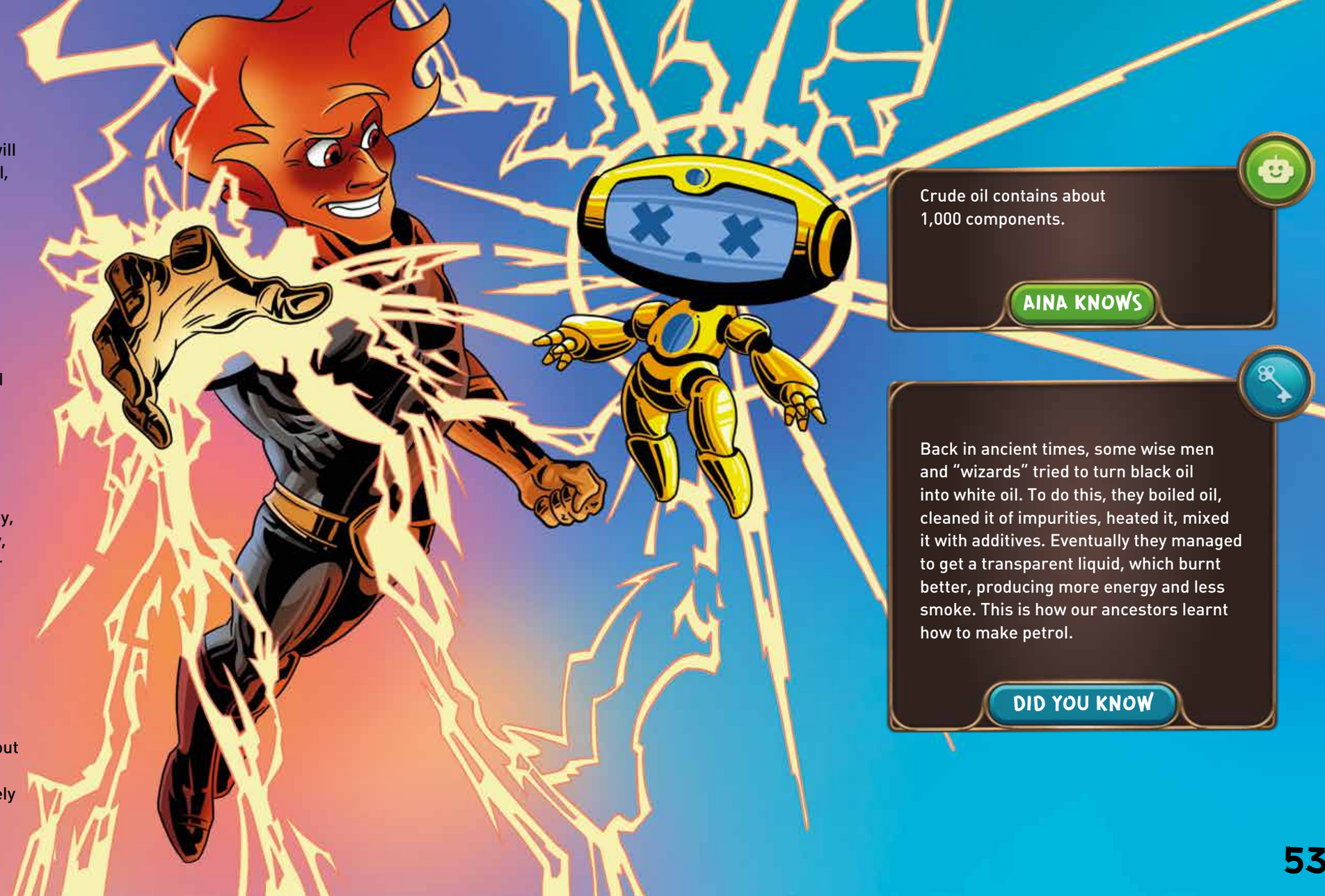
PROCESSING UNIT OPERATOR:

Rest assured! The science fiction writer Arthur Clarke once said that any sufficiently advanced technology is indistinguishable from magic. In this respect, I am a powerful wizard! I will tell you more about my work so that you will understand why this is so. From the wells, we extract crude oil mixed with water, impurities, and dissolved gas. Crude oil, just like water from a lake, cannot be consumed without treatment. To make lake water drinkable, we purify it by removing the smallest particles of sand, harmful substances and bacteria from it through filtration, by boiling it, or with the help of some other methods. Oil must be treated in the same way: it is necessary to separate the water and gas from it, remove salts dissolved in it. Only then do we get refined oil. Oil and gas are treated in special devices which are assembled into single processing units. The processing unit operator monitors the quality of incoming crude oil and finished products (oil and gas), sets the processing units' operating mode in the control room and ensures they are operation properly without deviations, monitors the instrumentation readings, and takes samples of finished products for analysis. Oil treatment is a continuous process, so operators normally work in shifts, 12 hours a day.

Their work requires attentiveness, a responsible attitude, the ability to make quick decisions, knowledge of the technologies applied and the design of the equipment used.

If you dream of becoming a processing unit operator, you must realise that it will take many years of study: first at school, then at a college, technical school or another secondary vocational education institution, with a focus on science. When you get a job, you will be expected to continuously improve your qualifications: after all, everything changes, technologies are further developed, equipment is constantly improved. Gradually, you will gain experience and become a highly demanded specialist. You can make the first steps towards your dream today: find out what technical clubs and societies there are in your school, in extracurricular activities centres nearby, such as centres for arts and technology, community centres, and so on. Try your hand at something new, like robotics, radio electronics, aircraft modelling – anything that will develop your creative and technical abilities.

DESTROIL:
Ha-ha, I uploaded a viral code to Aina while you were talking! Try to figure it out on the next page! But remember: if you make a mistake, the virus will completely erase her memory!



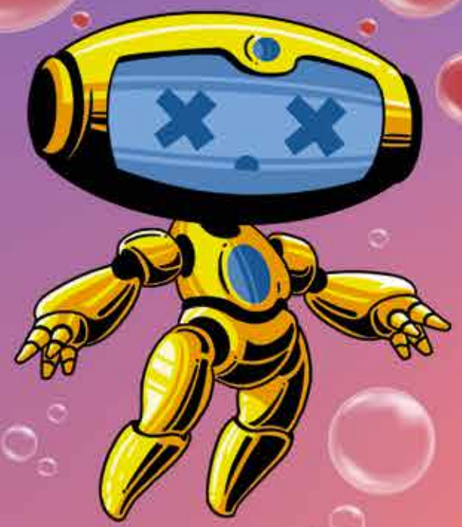
Crude oil contains about 1,000 components.

AINA KNOWS

Back in ancient times, some wise men and “wizards” tried to turn black oil into white oil. To do this, they boiled oil, cleaned it of impurities, heated it, mixed it with additives. Eventually they managed to get a transparent liquid, which burnt better, producing more energy and less smoke. This is how our ancestors learnt how to make petrol.

DID YOU KNOW

Help Octaman. Fact or Fiction?



Natural gas is a mineral that is widely used for energy production. There are many stories about gas. Some of them are true; others were made up. Can you tell the truth from fiction? Click on the right button to help Aina get out of the trap programme.

1. When liquefied, natural gas becomes 600 times smaller.

YES NO

2. Treated natural gas has no odour. Before using it in everyday life, an odorous substance is specially added to natural gas so that people can smell it in the event of a leak.

YES NO

3. The total length of gas pipes laid in Russia is enough to reach the Moon and back.

YES NO

4. Deposits of gas can be located at a very shallow depth underground, even a few metres from the surface.

YES NO

5. The word 'GAS' means Global Active Stock.

YES NO

6. There is a chronicled case of an ancient king who learnt about a place where gas came out of the ground that could be burnt, and ordered a kitchen to be built there to cook food for his palace.

YES NO

7. Methane, which is the main component of natural gas, is the third most abundant substance in the known universe.

YES NO

8. It has been found that there is ice on other planets and asteroids, which contains huge amounts of methane. Perhaps people flying into space will be able to get to these deposits someday.

YES NO

9. Natural gas cannot be either liquid or solid.

YES NO

Accuracy

Profession: Instrumentation Engineer

Octaman:

Look, Aina is feeling unwell... She's hot and flashing red lights. It's an alarm. Destroil must have done some harm to her. She clearly needs help! I can fix Aina, but I need measuring instruments to diagnose the problem. Who should we turn to for help?

Instrumentation engineer:

— To me. Now let me connect the sensors to Aina and take measurements. I am an instrumentation engineer **(see glossary for the definition of instrumentation and automation devices)**. My profession is actually a combination of three separate occupations: engineer, locksmith and set-up technician. Such specialists are in demand at all enterprises that use modern technologies supported by automated systems. Sakhalin Energy is one of such enterprise. Instrumentation engineers work at all production facilities of the company. They ensure the uninterrupted operation of equipment and mechanisms of any complexity, debug automatic lines, adjust communications with the operator, alarm and automated control systems. This equipment is critical to safety: should something go wrong, it will help to avoid disaster. If Destroil decides to spoil something, the sensor will immediately be triggered. No one will be hurt and nothing will be damaged.

Our goal is to ensure that all instrumentation and automatic systems work reliably and safely. By the way, modern systems are able to control the operation of equipment themselves. That is why they are called 'automatic' (it comes from the word 'auto' – by oneself). A simple example of an automatic system is traffic lights. Of course, an automatic system at an oil and gas field or a plant is much more complicated. But there is no reason to worry: just like two centuries ago, instrumentation engineers control of all their devices and know the basic laws of physics and mathematics by heart. If an engineer wants to build a successful career, he or she must have a technical mindset, good memory, and also develop other useful skills and abilities, such as attention to detail and quick reaction. There are a lot of leisure activities that will be of great use to an aspiring instrumentation engineer: radio electronics, electrical engineering; application programming, network administration (including wireless solutions); smart home systems and the Internet of Things; computer-aided design systems; foreign languages; any sports aimed at increasing physical endurance, developing powers of observation, improving memory and ability to focus. Technology is transforming the world around us, and the profession of

Instrumentation and automation devices are sensors and equipment that monitor and control all sorts of parameters – temperature, pressure, flow rate, liquid level, humidity, etc.

GLOSSARY

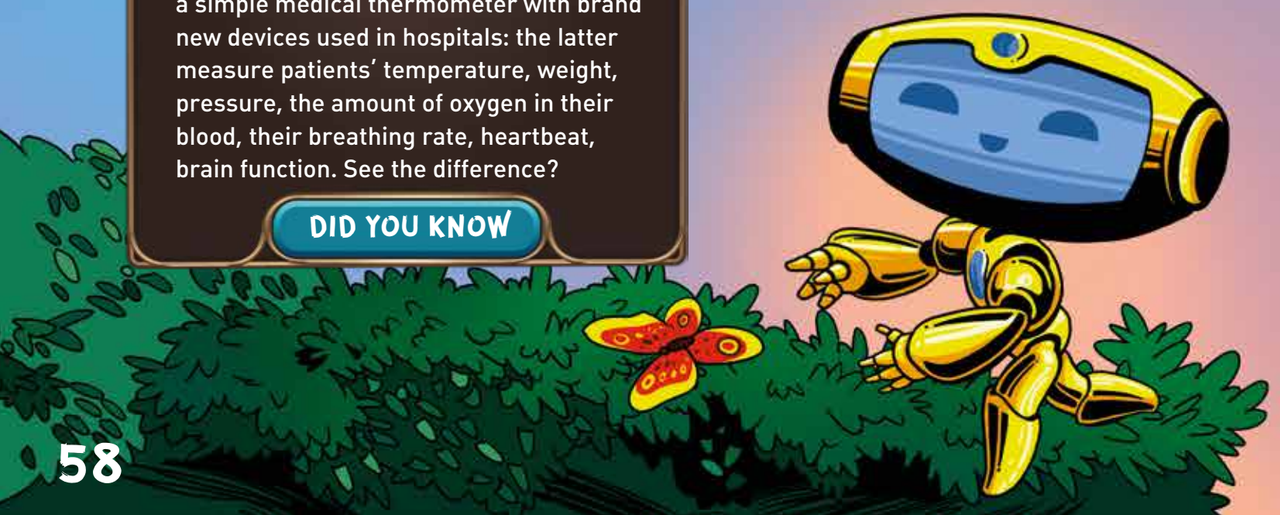
The number of devices used at Sakhalin Energy's production facilities is in the tens of thousands of units. They were made by hundreds of different manufacturers. As regards instrumentation engineers and technicians, they use more than a hundred different instruments in their work. During the 20th century, the profession of instrumentation engineer changed significantly. A simple device with an arrow-pointer turned into a complex system with a liquid crystal screen, its own microcomputer and software inside. It learnt to make the most accurate measurements and translate them from the language of machines into the human language. A multitude of instrumentation and automation devices were united into an industrial network. Compare, for example, a simple medical thermometer with brand new devices used in hospitals: the latter measure patients' temperature, weight, pressure, the amount of oxygen in their blood, their breathing rate, heartbeat, brain function. See the difference?

DID YOU KNOW

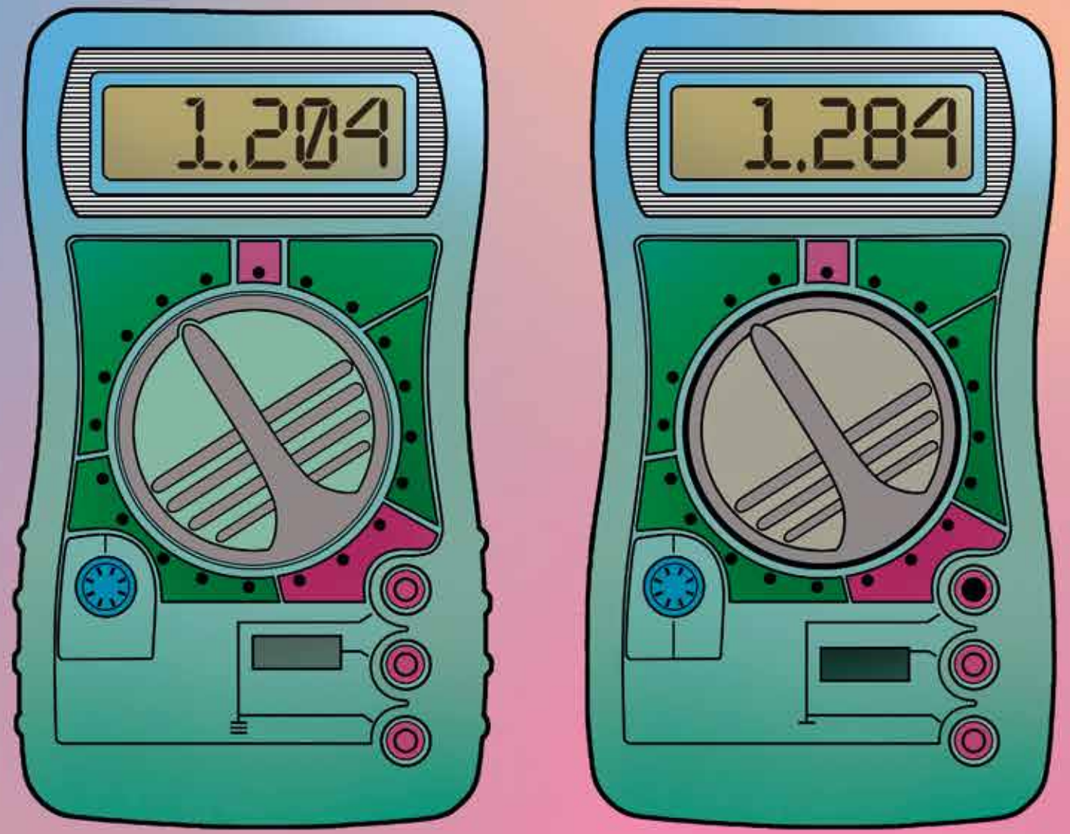
instrumentation engineer is growing more and more relevant. Progress requires higher precision and complete control by measuring instruments and automated control systems.

Look! The instruments show that Aina has run out of energy. Everything is clear now: Destroil smeared her solar panels with black paint so that she could not be charged by the rays of the Sun. The problem is solved, everything is okay now.

OCTAMAN:
Aina is happy to be back on deck, so to say. See, she has prepared an interesting task for us! You have to solve it, and then we will set out on the chase again to stop Destroil from harming somebody else!



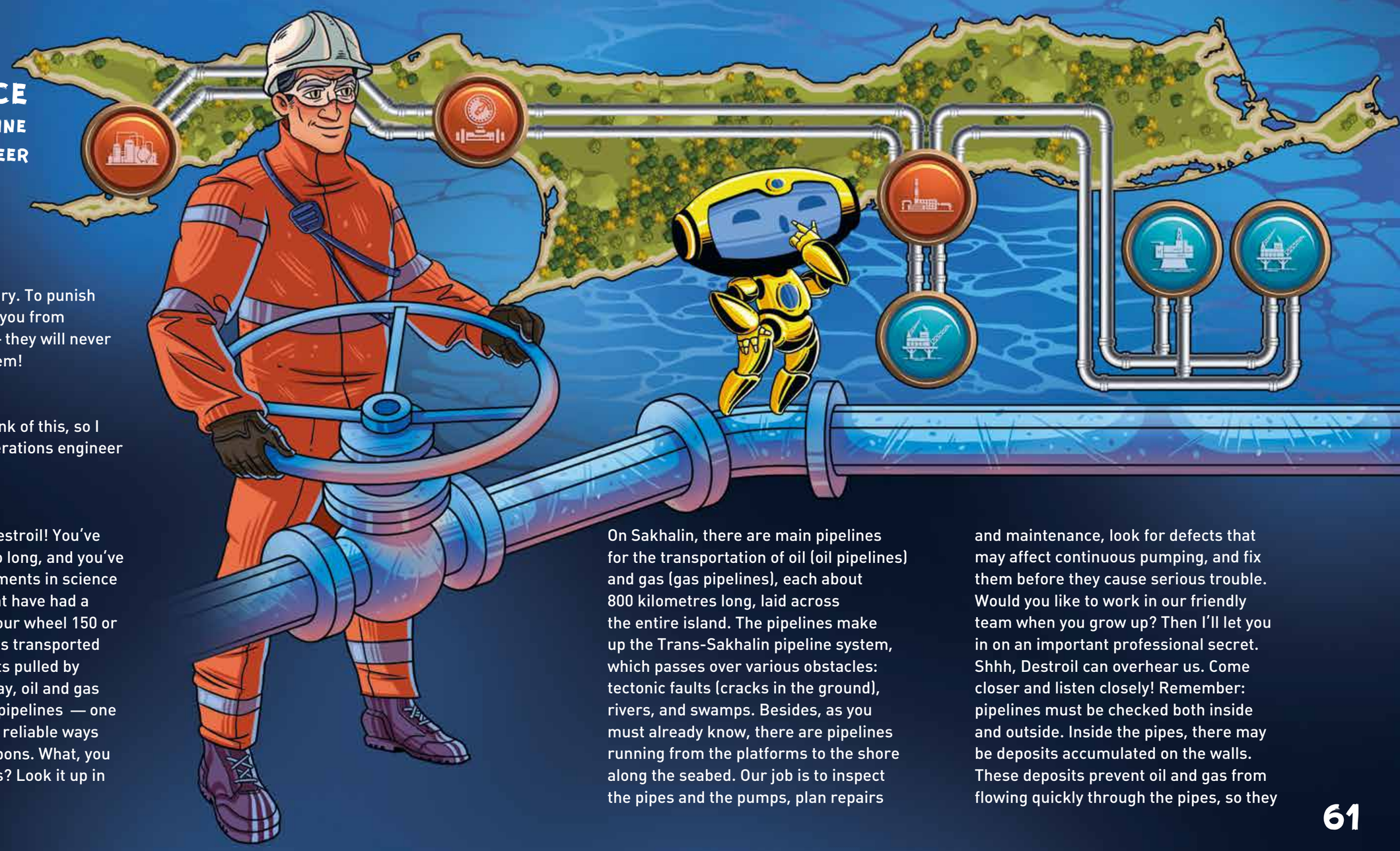
Puzzle from Aina. Eagle Eye



Find ten differences between the measuring instruments.

Practical Intelligence

Profession: Pipeline Operations Engineer



DESTROIL:
Now you've made me angry. To punish you, I'm going to prevent you from transporting oil and gas – they will never reach those who need them!

OCTAMAN:
I suspected you might think of this, so I have called a pipeline operations engineer to help me.

ENGINEER:
— Don't be ridiculous, Destroil! You've been underground far too long, and you've missed all latest developments in science and technology. You might have had a chance to put a spoke in our wheel 150 or so years ago, when oil was transported in wooden barrels on carts pulled by horses and donkeys. Today, oil and gas are transported through pipelines — one of the cheapest and most reliable ways of transporting hydrocarbons. What, you don't even know what it is? Look it up in the glossary!

On Sakhalin, there are main pipelines for the transportation of oil (oil pipelines) and gas (gas pipelines), each about 800 kilometres long, laid across the entire island. The pipelines make up the Trans-Sakhalin pipeline system, which passes over various obstacles: tectonic faults (cracks in the ground), rivers, and swamps. Besides, as you must already know, there are pipelines running from the platforms to the shore along the seabed. Our job is to inspect the pipes and the pumps, plan repairs and maintenance, look for defects that may affect continuous pumping, and fix them before they cause serious trouble. Would you like to work in our friendly team when you grow up? Then I'll let you in on an important professional secret. Shhh, Destroil can overhear us. Come closer and listen closely! Remember: pipelines must be checked both inside and outside. Inside the pipes, there may be deposits accumulated on the walls. These deposits prevent oil and gas from flowing quickly through the pipes, so they

need to be promptly removed. It's just like the drain and pipes under the sink in your kitchen. On the outside, the pipeline may be damaged or rusty.

This is just a short list of tasks we deal with in our work. The primary and most important task of a pipeline operations engineer is to prevent oil leaks and spills. To this end, we are constantly working to increase the strength and reliability of the pipelines and equipment, and monitor their technical state.

In the 21st century, the operation of oil and gas pipelines has become unthinkable without automated leak detection, remote control of pumping modes, flaw detection (that is, identification of various defects), and satellite maps. We work hand in hand with our colleagues, who you have already met. So, if you are responsible, confident, attentive, like mathematics and robotics, enjoy designing, modelling and drawing, and, most importantly, if you want to get an interesting and essential job, come back to work with us. I will be happy to welcome you to our team! Together we will fight off Destroil!

DESTROIL:
Don't be so sure! First, you will have to solve the problem I have prepared for you!

A PIPELINE is a structure made of pipes tightly connected to one another, serving to transfer liquids or gases over a distance.

GLOSSARY

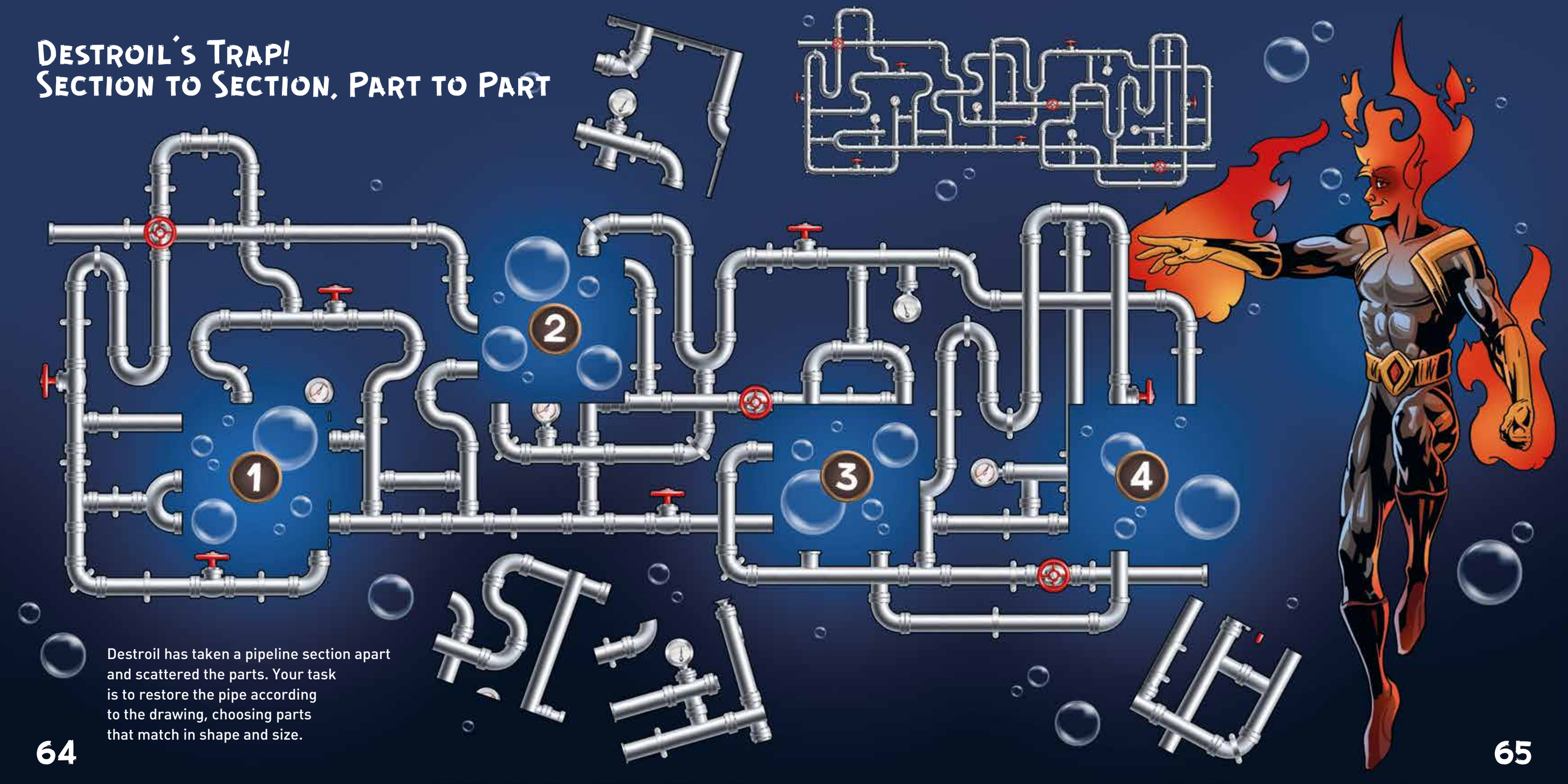
In Russia, the total length of oil and gas pipelines is more than 300,000 kilometres.

DID YOU KNOW

The world's first oil pipeline was built in the United States in 1865. It was six kilometres long. Russia's first main pipeline, with a length of 813 kilometres, was built in 1907 according to a design developed by Vladimir Shukhov. The pipeline connected the cities of Baku and Batumi.

AINA KNOWS

Destroil's Trap! Section to Section, Part to Part



Destroil has taken a pipeline section apart and scattered the parts. Your task is to restore the pipe according to the drawing, choosing parts that match in shape and size.

Observation Skills

Oilfield Chemistry

OCTAMAN:

We managed to distract Destroil, and Aina was able to take samples of the substance that he is made of. I'm going to chase him; you and Aina run to the laboratory. Find out what this substance is. I think I understand why he is set on destroying oil and gas.

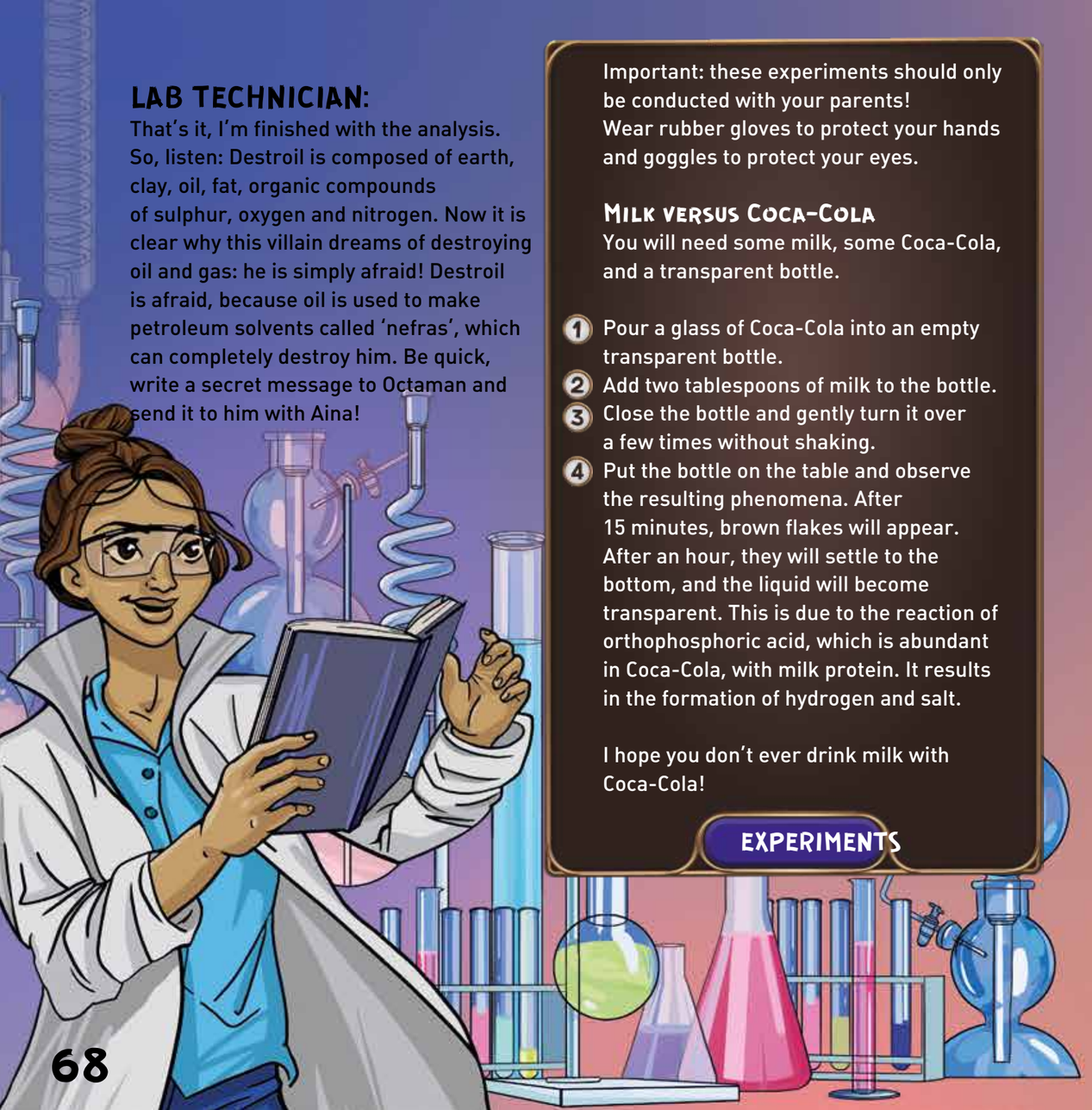
LAB TECHNICIAN:

Hi! Aina told me about you. A friend of Octaman's is a friend of mine. Of course, I will help you. After all, we chemists are almost magicians. We study the properties and transformations of substances, and we can even change their composition and structure. Oilfield chemistry is a science that deals with various **reagents (see glossary)**, and is of great help in the construction and workover of wells, the production, transportation and treatment of oil and gas. Issues addressed by oilfield chemistry are on the cusp between chemistry and engineering. For example, at the very beginning of oil or gas production, wells are treated with special compounds. This is necessary for cleaning the well and protecting the equipment from rust and heat. We chemists improve drilling muds (remember, we talked about them before) – we modify them to ensure that they have the required properties: a certain density, viscosity, and so on. We know what methods and substances to choose in order to influence the well so that it will give people as much oil and gas as possible – down to the very last drop. We also use special chemical formulas that prevent substances such as resin, paraffin, and salts contained in oil from depositing on equipment and disabling it, and also sticking to pipes. What about you? Do you like mixing and transforming substances, inventing and improving things, experimenting? Do you know how to make crystal soap bubbles, gems from ice, 'dancing' colours, a chalk eater? How to make a home-made volcano erupt, and how to launch a real-fuel rocket to the ceiling? Look at you, I see interest in your eyes! You are definitely one of us! You will no doubt be good at chemistry at school. Make sure that you study it diligently. But you needn't wait until then – many interesting experiments can be done at home.

Reagents are substances that take part in a chemical reaction.
A chemical reaction is the transformation of one or more original substances (reagents) into other substances.

GLOSSARY

LAB TECHNICIAN:
That's it, I'm finished with the analysis. So, listen: Destroil is composed of earth, clay, oil, fat, organic compounds of sulphur, oxygen and nitrogen. Now it is clear why this villain dreams of destroying oil and gas: he is simply afraid! Destroil is afraid, because oil is used to make petroleum solvents called 'nefras', which can completely destroy him. Be quick, write a secret message to Octaman and send it to him with Aina!



Important: these experiments should only be conducted with your parents!
Wear rubber gloves to protect your hands and goggles to protect your eyes.

Milk versus Coca-Cola

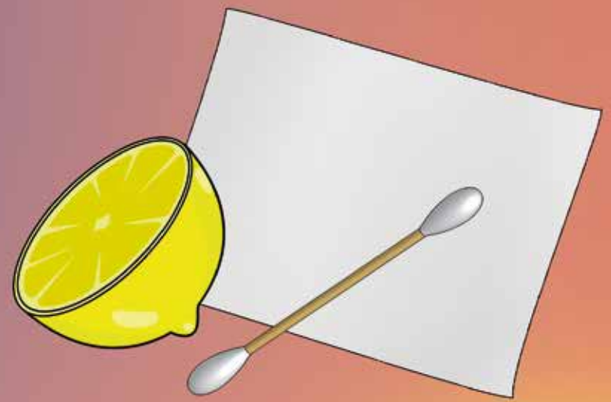
You will need some milk, some Coca-Cola, and a transparent bottle.

1. Pour a glass of Coca-Cola into an empty transparent bottle.
2. Add two tablespoons of milk to the bottle.
3. Close the bottle and gently turn it over a few times without shaking.
4. Put the bottle on the table and observe the resulting phenomena. After 15 minutes, brown flakes will appear. After an hour, they will settle to the bottom, and the liquid will become transparent. This is due to the reaction of orthophosphoric acid, which is abundant in Coca-Cola, with milk protein. It results in the formation of hydrogen and salt.

I hope you don't ever drink milk with Coca-Cola!

EXPERIMENTS

Help Octaman. Chemical Laboratory



Send Octaman a secret message so that Destroil will not be able to read it. Make invisible ink!

Take half a lemon, a cotton swab, a cup of water, and a piece of paper.

1. Squeeze the lemon juice into the water.
2. Dip the cotton swab in the water and write something down on the paper.
3. When the juice dries up, the text will become invisible.
4. To read the message, switch on a desk lamp and hold the paper close to it. Be careful – do not burn your fingers! When the paper heats up, you will see the words in black come out on it.

Caution

Profession: Labour Safety Specialist

Octaman:

Stop, Destroil! I know what you are afraid of. Let's talk this over! I want to help you! You are causing damage to yourself!

Labour Safety Specialist:

Poor Destroil! How does he not understand that safety must come first — anytime and anywhere. I am almost a superhero myself, like you, Octaman. My superpower is preventing accidents and occupational diseases. Each enterprise, be it a clothes factory, a confectionery shop, or a shopping centre, has a specialist responsible for labour safety. We train staff how to do their jobs so as not to harm themselves and others. We make sure that working conditions at the enterprise are properly arranged: workplaces are adequately lit, ventilated, free of noise and health hazards.

Gas and oil are hazardous substances, so they must be extracted, stored and transported strictly in compliance with all safety rules. In this industry, the work of a labour safety specialist is of paramount importance.

It is we who make sure that people know how to prevent a fire or explosion, how to properly organise dangerous work, what to do if someone is injured.

To be able do this well, we must study all the basic safety rules, understand how the equipment works and know its specific features. It is equally important to use all tools safely.

Children who decide to devote themselves to this important occupation should develop their skills of persuasion and their ability to explain complicated things in simple words. They also have to learn how to work with documents.

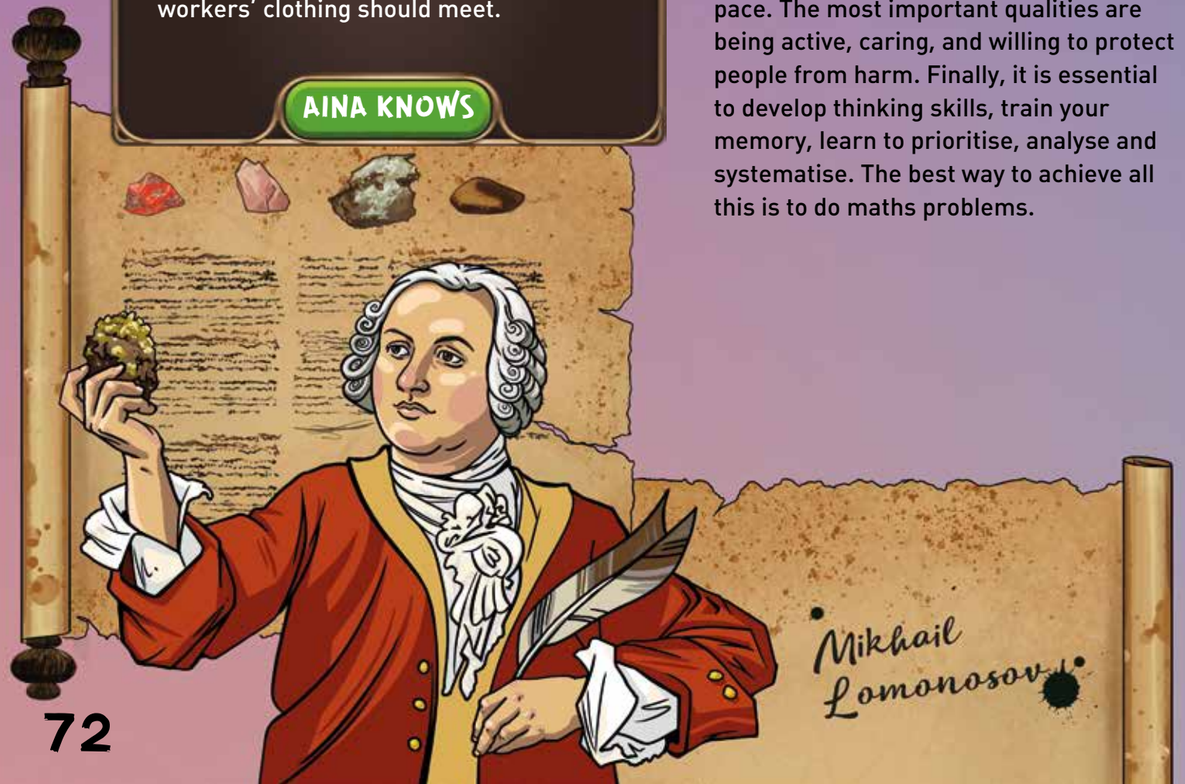
- Before doing anything, always read the manual!
- Don't forget about safety rules, and remember that they may differ from case to case, so don't mix things up!
- Be attentive and careful at all times! Double check everything! Remember the expression: measure twice, cut once.
- Think about your well-being. If you are feeling bad, put off what you have planned to do.
- You mustn't break the rules, even if you want to very much. Don't even bend them a little. Have you noticed that you are doing something unsafe? Stop doing it immediately!
- Always act safely, no matter what activity you are engaged in. No exceptions!
- If you do not know how to act correctly in a dangerous situation, find out how. Knowledge is power.

Safety Rules

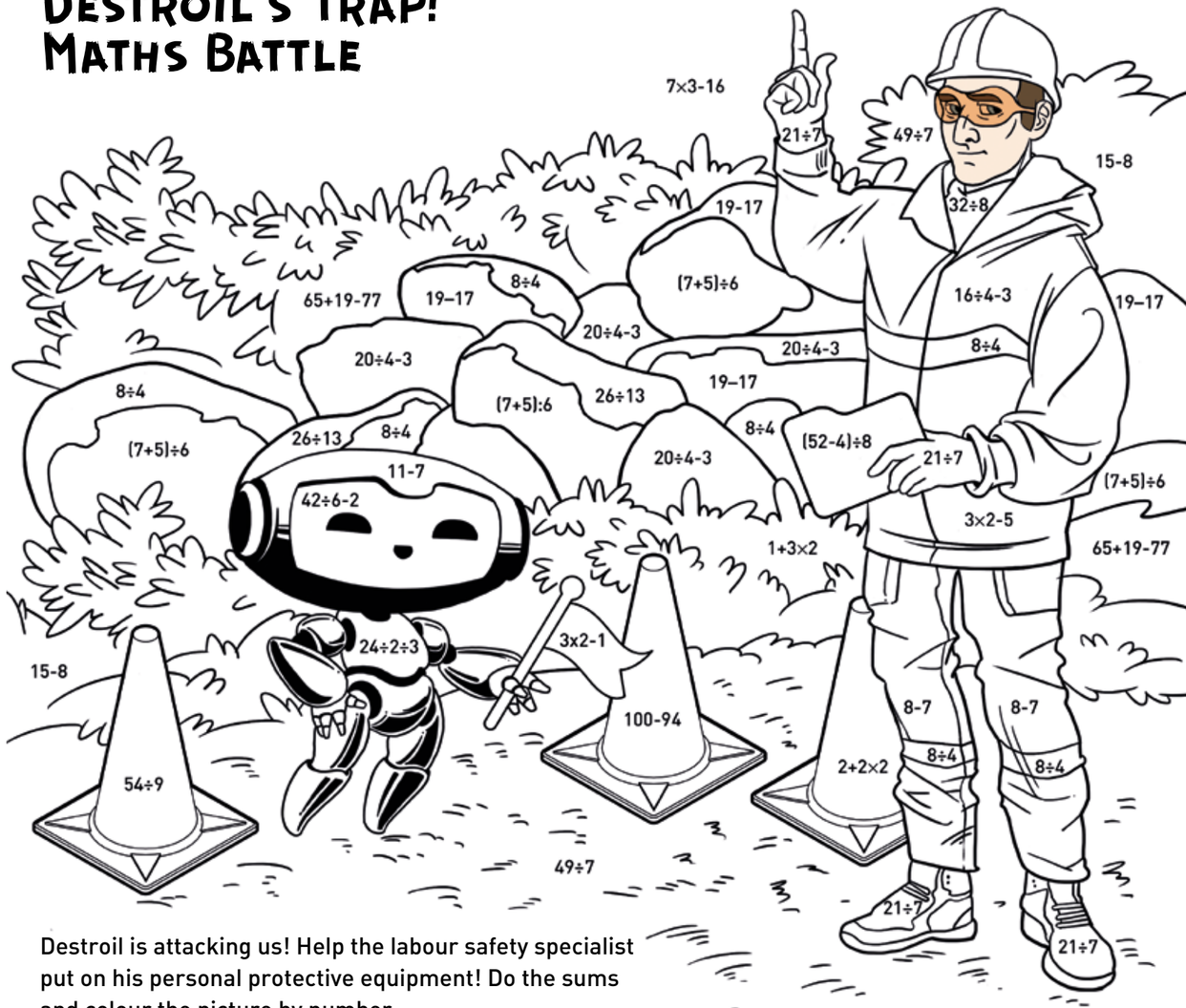
In Russia, labour safety was first mentioned at the state level by Mikhail Lomonosov, the great scientist and researcher. In his First Foundations of Metallurgy, or Ore Business, published in 1763, he drew attention to the work of miners, described how to properly organise underground work to ensure its safety, how to build protective structures to prevent rocks from collapsing into the mine, and what requirements workers' clothing should meet.

AINA KNOWS

At school, it is necessary to focus on science (primarily, physics and chemistry) in order to know the properties of raw and other materials, and their effect on the human body. Studying the arts – Russian and foreign languages, sociology, law and life safety basics – is also useful for the work of a labour safety specialist. It is also important to have good communication and organisation skills, enjoy and be good at speaking in public. Your future work will require responsibility, resistance to stress, readiness to work at a fast pace. The most important qualities are being active, caring, and willing to protect people from harm. Finally, it is essential to develop thinking skills, train your memory, learn to prioritise, analyse and systematise. The best way to achieve all this is to do maths problems.



Destroil's Trap! Maths Battle



Destroil is attacking us! Help the labour safety specialist put on his personal protective equipment! Do the sums and colour the picture by number.

1 2 3 4 5 6 7

Carefulness

Profession – environmental protection specialist

Octaman:

You know, I didn't sleep a wink last night. I looked at the stars and thought, "How beautiful the Earth is! How rich and varied our planet is! How unique and picturesque Sakhalin Island is!" Aina says that Destroil is desperate. No wonder – that villain was counting on an easy victory, but was rebuffed by our friends from Sakhalin Energy, totally unexpectedly for him! Instead of making peace with people, helping them and being helped in return, foolish Destroil hid somewhere on the island in a panic and is trembling with fear. So what shall we do with him now? Banish him underground or forgive him? Take your time. Before you give your answer, I will introduce you to one more person.

Ecologist:

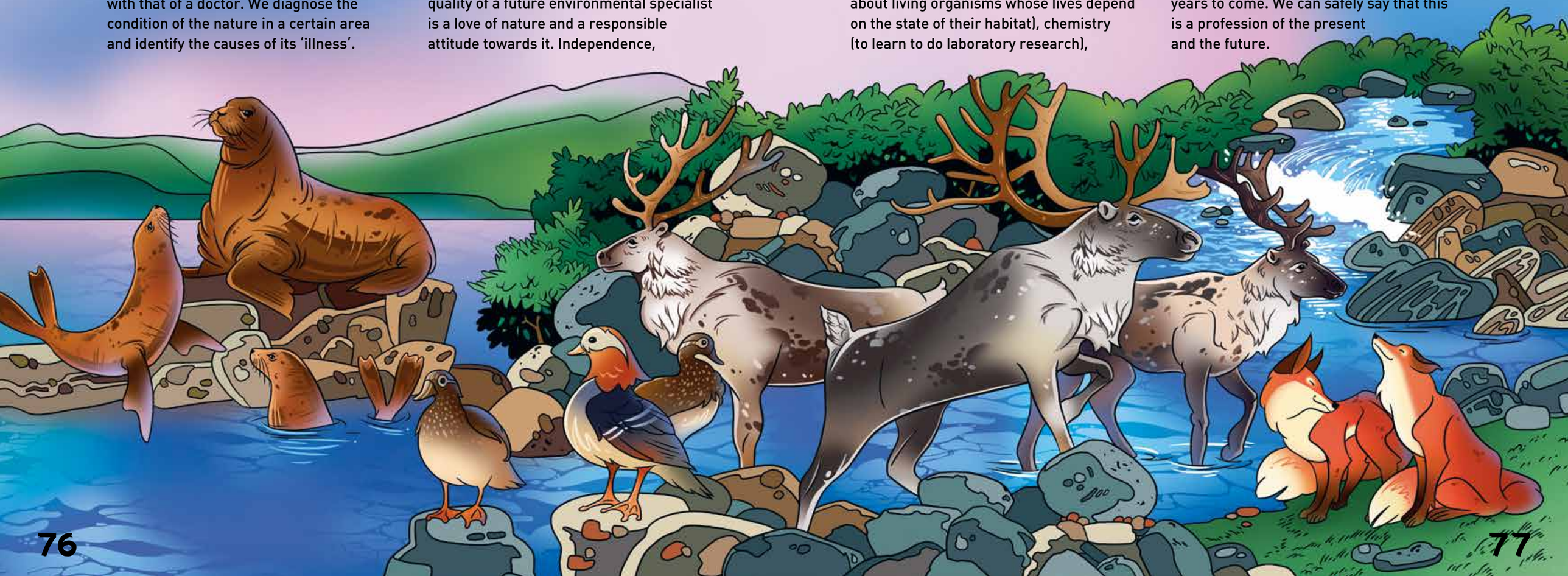
Hi! You're quite right, Octaman. The world is beautiful and amazing. Just look around and you will see that Sakhalin is a wonderful island, different from the rest of Russia and incredibly rich in a variety of natural resources. Indeed, in outline, the island bears a striking resemblance to a giant fish swiftly swimming to the north. There is no other island like this on the whole planet. It seems to be saying, "I am a unique island, so take good care of me!" This is exactly what my profession consists of – protecting nature. There is no manufacturing plant or factory that does not affect the environment. For this reason, all enterprises do their best to organise their operations so that their impact on the environment will be minimal and will not exceed permissible limits. This work is done by environmental specialists (we are also called **'ecologists' — see glossary for the definition).**

Ecology is the science of the interaction of living organisms with one another and with their environment. This word was coined by combining two Greek words – 'oikos' (meaning 'dwelling place' or 'house'), and 'logos' (meaning 'the study of' or 'science').

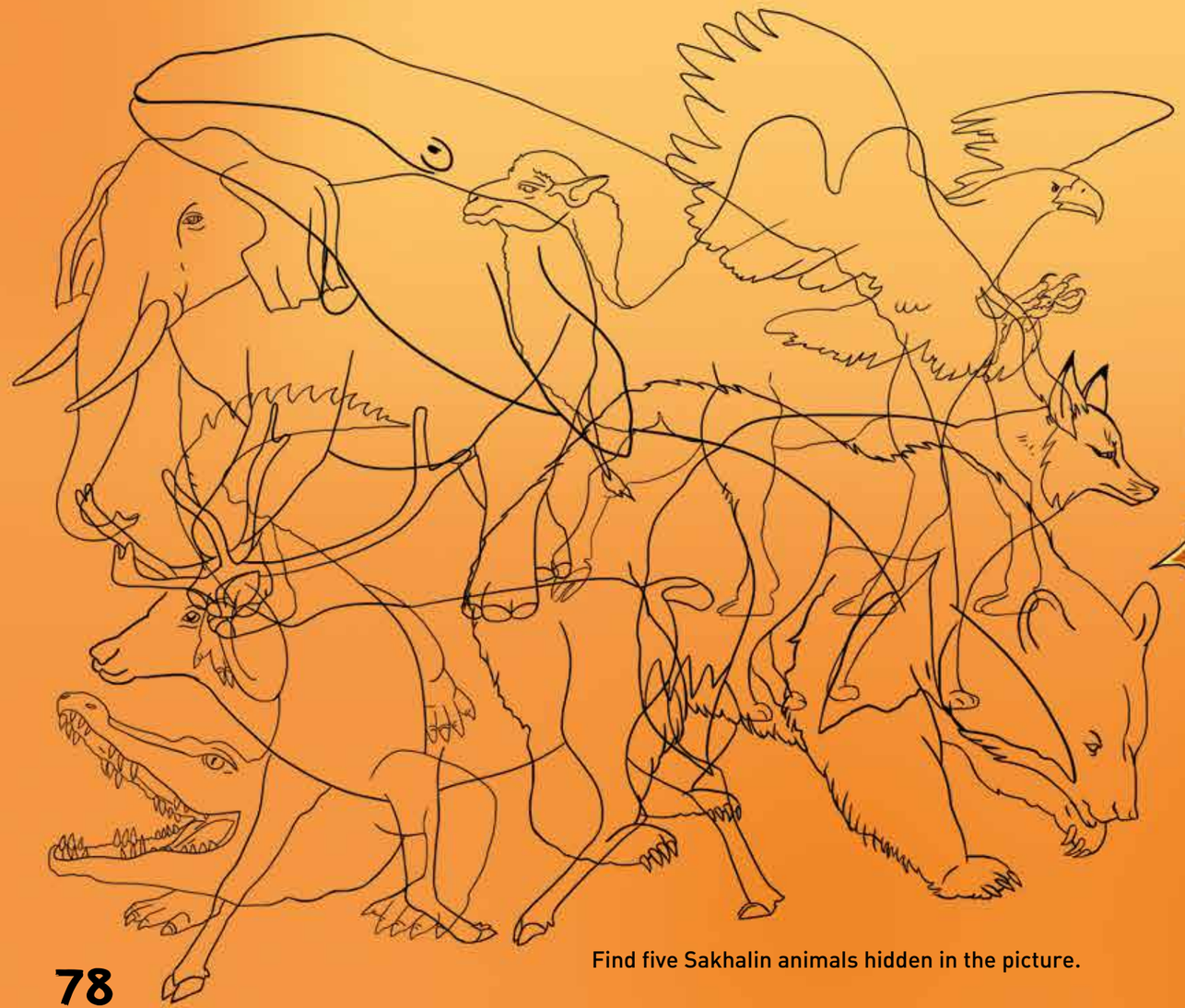
GLOSSARY

We study the state of air, water, soil, flora and fauna in the areas where our production facilities are located. Then we make conclusions about the impact the operations of the enterprise have on nature, and think about how to minimise this impact. The profession of environmental specialist can be compared with that of a doctor. We diagnose the condition of the nature in a certain area and identify the causes of its 'illness'.

Then we suggest measures (that is, prescribe medications) that help maintain a balance between human activity and the environment. Ecologists also convince those which the health of nature depends on to use these medications, that is, to take all necessary measures to minimise the negative impact of their activities. The main quality of a future environmental specialist is a love of nature and a responsible attitude towards it. Independence, scrupulousness, attentiveness, an analytical mindset, diplomacy, resistance to stress, optimism, flexibility and courage in communication and decision making continue the list of characteristics important for this profession. At schools, future ecologists should pay particular attention to biology (to know everything about living organisms whose lives depend on the state of their habitat), chemistry (to learn to do laboratory research), geography and physics (to understand how our planet is made up). Our civilisation continues to develop, and the requirements for environmental protection are steadily increasing. This means that professional environmental specialists will be in demand in all industries – from ice cream production to space exploration – for many years to come. We can safely say that this is a profession of the present and the future.



Puzzle from Aina. Wildlife of Sakhalin



Find five Sakhalin animals hidden in the picture.

Did you know that rubbish can be turned into useful items? This way, it will not pollute the planet. Moreover, it will help conserve useful resources. For this purpose, rubbish is first separated into plastic, glass, paper and metals. Then these materials are recycled.

Put the pieces of rubbish in the right bins!

Ecology.
Taking Care of Nature

It is practically impossible to extract oil and gas without affecting nature. At the same time, it is just as impossible to do without these valuable resources that give us energy. Giving up using oil and gas means giving up more than 600 familiar objects and activities that make up the modern world, from heating our homes to flying on airplanes. Sakhalin Energy, an oil and gas company, is environmentally responsible: we do our best to reduce our impact on the environment, estimate the implications of each step before taking it, develop and implement environmental programmes to minimise the impact of our operations and protect the environment. We reduce emissions of pollutants into the atmosphere, purify the water we have used, monitor the state of the Sea of Okhotsk and other water bodies where we work. We make every effort to protect rare species of animals and birds, such as Gray Whales, Steller's sea eagles, and many others.

Conclusion

DESTROIL:

I have just realised what a terrible mistake I almost made. When I first came out onto the surface of the earth, I was shocked to see how rapidly people were developing, how quickly they learnt everything. I was terrified. I thought I had to do everything I could to prevent you from making friends with Octaman, from getting access to oil and gas, and becoming even more powerful. I was afraid that human civilisation would destroy nature and, consequently, me in the pursuit of progress. After all, new discoveries and developments, while often leading to good results, can also bring destruction! Then I decided to take action, to stop Octaman at any cost, to destroy oil, gas and civilisation. Sakhalin, the island I love so much, was the first thing I wanted to save from you. However, what I saw here pulled the rug from under my feet: it was the same magnificent island with the same clear waters of the Pacific Ocean as hundreds of years before. I was startled to see the oil and gas production platforms in the sea, but the Gray Whales swimming past them seemed to be perfectly accustomed to them and not in the least afraid! People have developed absolutely safe technologies and systems for oil and gas extraction.

Even nefras, the petroleum solvents that I was so scared of in the beginning, are used for good purposes: cleaning and rinsing tools and parts of equipment, dissolving varnishes and paints. I am sure that even I can work with them if I observe safety precautions, and I will be none the worse for it. When I saw and learnt all that, a dream took root in me. So, now I wish to become an environmental specialist and help nature wisely – by creating rather than destroying.

OCTAMAN:

It's a good dream. What about you, boys and girls? What do you want to be when you finish school? Whatever profession you choose, remember that you must be kind, honest, decent people and love your work. Our journey has come to an end, but yours is just beginning. Let it be long, interesting and happy. We will meet again, I promise! Before we say goodbye and part ways for now, we invite you to play a fascinating adventure game based on this book.

Correct Answers

Page 2

Hello! Let's be friends. My name is Aina.
Encrypt your name.

Page 9

All items listed below are made from oil and gas: computer disks, paraffin candles, tyres, plastic window frames, paint, glue, varnish, fertiliser, wallpaper, a baby's dummy.

Page 19

The largest number of oil drops is in the trap in the right corner at the bottom of the page (24 drops). The largest number of gas bubbles is in the trap in the middle of the page (17 bubbles). In total, there are 88 oil drops and 63 gas bubbles in all the traps.

Page 27

1. Carry the lamp across the river.
2. Return. 3. Take the water (or oil) to the other bank. 4. Return with the lamp and leave it there. 5. Take the oil (or water) to the other bank. 6. Return for the lamp.
7. Take the lamp across the river.

Page 41

1. Wheel 2. Cable 3. Ascent 4. Vessel
5. Chain 6. Trunk 7. Hoist 8. Crane
Down: ELEVATOR.

Page 45

1. Pipe. 2. Valve. 3. Pump. 4. Crane.
5. Tank. 6. Filter. 7. Spanner. 8. Vessel.

Page 49

1. The kitten is chewing on the wire.
2. The girl is touching the socket with her finger.
3. The boy is repairing the socket without removing power to it.
4. The plug and the wire are in the water.
5. The laundry is drying on the wire.
6. The wire is twisted around the lamp.

Page 55

YES: 1, 2, 3, 6, 7, 8.
NO: 4, 5, 9.

Page 78

Fox, Gray Whale, Steller's sea eagle, bear, deer.

Page 79

Black — the apples and leaves.
Yellow — the metal cans.
Blue — the newspapers.
Green — the glass bottles.
Orange — the plastic bottles.

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The publication was prepared and published by Sakhalin Energy. The book is intended for 1-4 grade students. It tells about professions at the Sakhalin-2 oil and gas project, introduces the reader to the process of extraction and transportation of hydrocarbons, as well as the production of liquefied natural gas, talks about the unique nature of Sakhalin Island.

ADVENTURES OF OCTAMAN. ENERGY CONQUERORS.

Under the general editorship of Natalia Gonchar.

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