THE ADVENTURES OF FOFI

Discover your inner scientist
Children's Activity Book

MARIANA ANASTÁCIO

The Adventures of Fofi

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There lives in AHHAA Science Centre a friendly creature named Fofi. Covered with long fluffy orange fur and complimented with big kind eyes reflecting wander that surrounds him, Fofi is distinctly the face of AHHAA. He has been living there for as long as he can remember – the centre is his home. He has done everything there is to do and see there: the exhibitions and countless science theatre shows; he has seen all the stars in the planetarium; taken a ride on a bicycle across the ceiling. He knows each and every corner of the building by heart. Although he already knows everything there is to know about all the experiments and exhibits, he is still amused by them. Being so experienced and having learnt so much, he feels like he has become like a true scientist.

Although Fofi feels lucky to be living in AHHAA, there is still something that makes him sad. He clearly remembers the first time when he looked at the distorting mirrors of the centre. He was very surprised to find out that he couldn't see his reflection at all no matter how close or far he gazed. He went to another mirror, hoping that the last one was just not working, then to another one, and another one until he checked all the mirrors. The result was the same every time: he just couldn't see his reflection. This was the moment when he realized he was invisible to everyone else, making him very disappointed. Despite being surrounded by people most of the time, he still feels lonely because he has no one to share his thoughts and adventures with.

One morning, Fofi woke up and took a short walk, like he always did, to observe the daily routine of the centre. The guides were preparing ingredients for the lemonade and chocolate workshops, little chicks were being fed grains, and ants got some sweet honey flavoured water – it looked like it was going to be a regular day. However, something very special, that would change his life forever, was about to happen.

A small boy named Juku came to visit AHHAA with his family. He was feeling down because he hated science and he would rather have been somewhere else. Unlike him, his family was very excited about visiting AHHAA. It was their first time there and they had been looking forward to it for a long time. Right away they took a chance to make fresh lemonade in a workshop, but Juku didn't feel like it and stayed in the exhibition halls by himself. He was looking at the fish in the aquarium, in the Nature Hall, without any real interest. At the same time, Fofi was also next to the Fish Aquarium. He was counting the different species of fish, hoping this time he would get a different number.

Suddenly, he saw a ball escaping from the nearby ball pool in the Water World. The ball rolled right in front of Fofi's feet. Fofi hesitated to pick it up – he thought it might be scary for children to see a ball move through air by itself. After all, he was invisible!

While Fofi was standing there, very quiet and still, waiting for someone to pick up the ball, he heard someone asking, "Why don't you pick up the ball? Are you that lazy?"

Fofi looked up and saw a boy staring straight at him. He froze and couldn't get a word out! He was confused and very surprised. What was happening? The boy must have been talking to someone else. Finally, Fofi remembered to move. He ran away, not stopping before he reached the top of the Bird Tower, where he felt safer.

Juku was very confused. What kind of creature was that? Some kind of huge teddy bear? A mutant monster with orange hair? A lab experiment gone wrong? And why was he so rude, run ning away like that and not picking up the ball? He took the ball himself and put it back to where it belonged.

Juku didn't have much time to think about what had happened because his family had finished with the lemonade workshop and they wanted to move along to the next hall.

In the meantime after calming himself down, Fofi came down from the Bird Tower. Some other families with their kids were passing by the hall, but Fofi seemed to remain unnoticed. Just to be completely sure, Fofi went to a mirror to see if, by some kind of magic, his reflection would be there. It wasn't.

He was walking to Technology Hall when he saw the little boy again with his family. They were trying to expand the Hoberman Sphere to its maximum, but they were lacking people for that. Fofi observed them from a distance. He was too scared to go and try to talk to the boy. Maybe he just had imagined the

chance meeting after all. Not before long, Juku noticed the orange creature, who was carefully looking at them. Juku quickly went to him and asked, "Hey, do you work here? Can you help us with the attraction?" Fofi was paralyzed again, he couldn't talk, move, or even blink! Juku was starting to get annoyed. "Hello! Do you hear me? Are you ignoring me again? Can't you understand me?" insisted Juku. By then Fofi was sure the little boy could see him. "Come with me", he said. They left Juku's family to figure out how the Hoberman Sphere works and rushed to the roof where no one could see them talking to each other.

So... you can see me?" asked Fofi slowly. "What do you mean? Of course I can see you!", Juku answered being confused by the question. Fofi started to jump and to run around in circles out of happiness. He couldn't believe what was happening! Finally he had found someone with whom he could talk and play with and go on different adventures around the science centre. "What's going on?" asked Juku, even more puzzled. He was starting to be a bit afraid of that strange creature. "Okay, I'll tell you something. But you have to promise me to keep it a secret!" said Fofi who had calmed down a bit. "Okay, I promise, just tell me." replied Juku. Fofi continued, "My name is Fofi. I have spent my entire life here. AHHAA is all I know and I love this place. This is my home. But even though hundreds of people visit this place every day, I still feel all alone. You see, every time I tried to talk to someone, they just ignored me. Then I realized they wouldn't answer me because they can't see or hear me. Even I cannot see my own reflection! This is why I was so terrified when you talked to me – that was the very first time it happened to me." "So you are saying that I'm the first person who has ever talked to you? And no one else in here can see you? This is crazy!" answered Juku.

Then Fofi told Juku about his life in AHHAA – how every day is special when it's filled with science. He described to him how wonderful it is

to fall asleep in the planetarium under the stars after a long busy day. Fofi explained that he tries to do his best to help around the science centre, but if only people could see him – he wished – he could do so much more to help around the centre. After hearing all this, Juku wasn't afraid of Fofi anymore. He got an idea. "My name is Juku", he said, "and I came here with my family. What do you say if we go find them and see if they can see you? If I can, maybe they can too."

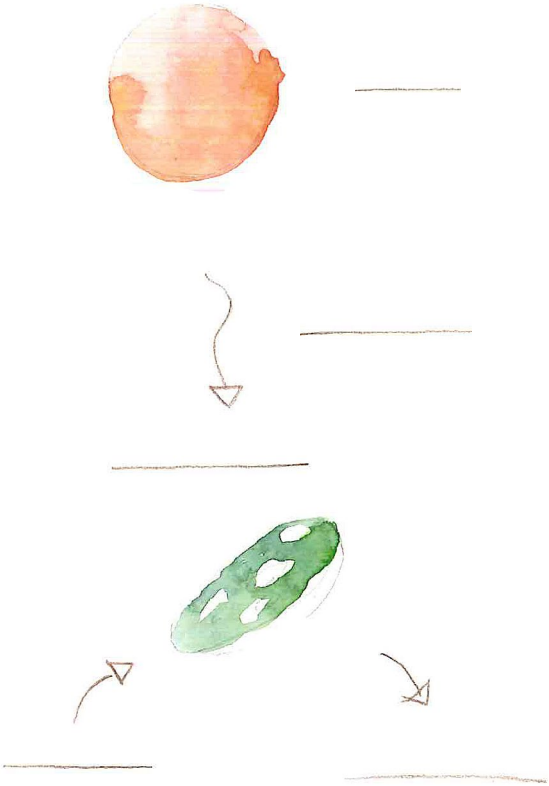
Juku and Fofi found Juku's family near the Newton's Apple Tree. "There you are!" said Juku's mother, "We are about to watch the science theatre show. Are you coming?" Fofi said, "Hello, my name is Fofi. How do you like Ahhaa?" Nobody answered. Juku's family looked right through Fofi. So it was true! Juku was really the only one who could see Fofi. "I think I'll skip the show, I want to go take another look at the Homerban Sphere" said Juku to his family. And to avoid more questions, he quickly went in the direction of the Technology Hall, making Fofi a sign to follow him. Although he knew he shouldn't lie, it was a little and insignificant one that was needed to spend more time with Fofi.

You were right, no one else can see you! How is this possible?" asked Juku after they got to the Hoberman Sphere. "I don't know... But I'm very happy that I met you! Now I have someone with whom I can talk to, have fun, discuss science..." replied Fofi. "Science!? No way, I hate science!" interrupted Juku. "What do you mean you hate science? Science is so much fun! It's impossible not to like it!" replied Fofi. "Well, I've always been bad at science in school... I don't understand anything. And my grades are really bad..." said Juku. "Come with me! Let me show you how science can be the most fun of all subjects!" replied Fofi.

Their journey started in the Nature Hall, where Fofi showed Juku the different organisms he could observe. Although they look different from each other, all living beings have something in common: the cell, which is the basic structural, functional, and biological unit of all known living organisms. Fofi started by explaining how there are two different types of cells: animal cell and plant cell.

EXERCISE 1

Search for the two types of cells in this hall. Can you spot the differences? Which one is the animal cell and which one is the plant cell? Complete the following scheme regarding the process of photosynthesis that occurs in plant cells:



LEARN MORE

All bodies are made up of cells: humans, animals, plants. Cells can only be seen under a microscope. So how do cells form a body? Many cells joined together form a tissue, then many tissues joined together form an organ. Organs joined together form an organ system. And all organ systems combined together form a body.

Most of the components of both animal and plant cells are the same, except for some differences. Plant cells have chloroplast, a larger vacuole and a cell wall. Chloroplast is a disc shaped organelle containing chlorophyll, a green pigment used in the process of photosynthesis, in which the energy absorbed by the sunlight converts water and CO2 in sugar (glucose) and oxygen. The bigger vacuole helps the cell to storage water and maintain its shape. The cell wall, made of cellulose (sugar), is needed to provide protection and support. In turn, animal cells have centrioles responsible to help in the cell division process.

It was time to move to one of Fofi's favourite places: where the Chickville and Ant nest are. The ants were very active in the moment Juku and Fofi reached the arena. Fresh food and honey flavoured water had just been put there, so they were busy with it. It was amazing just to watch them moving like crazy from one place to another.

EXERCISE 2

Say if the following sentences are true or false

1. The weight of all the ants in the world is about the same as the combined weight of all human beings

. . . . . .

2. There are 34 ant species in Estonia

. . . . . .

3. As a species, ants are about 50 times older than humans

. . . . . .

4. Ants communicate most with the help of smells

. . . . . .

5. Ants are not able to carry a load exceeding their weight

. . . . . .

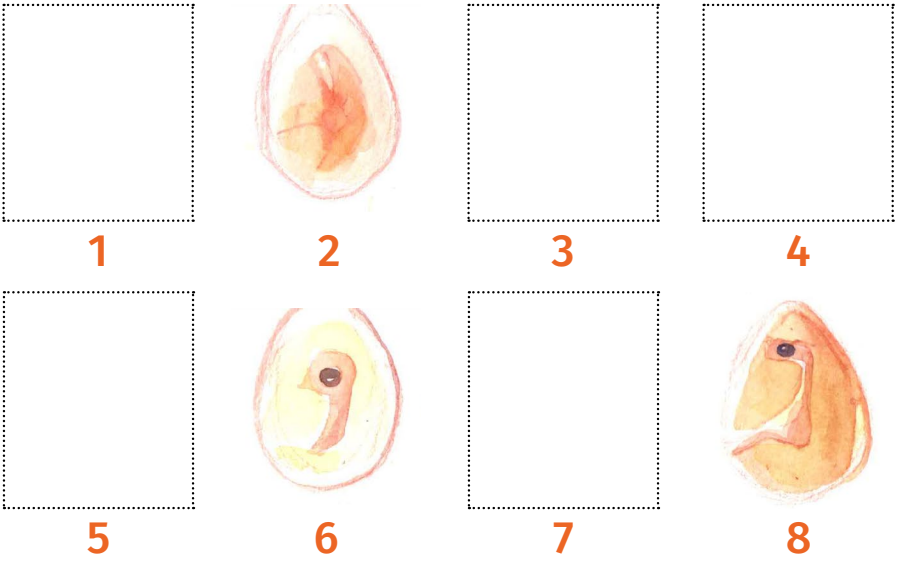
LEARN MORE

Ants are insects and they have lived on Earth for about 100 million years. There are 15 000 species in the world, representing 15-25% of the terrestrial animal biomass. They can form colonies where it is possible to observe similarities with human society since they have division of work and they are able to communicate with each other.

In the incubator, there was a little chick that just hatched, looking tiny and vulnerable. Soon, he would be transferred to the other side and join his mates, who were looking so cute and curious about everything.

EXERCISE 3

Look for the images of the missing stages at the end of this book. Cut and place them in the correct order according to the incubation period.



13

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21

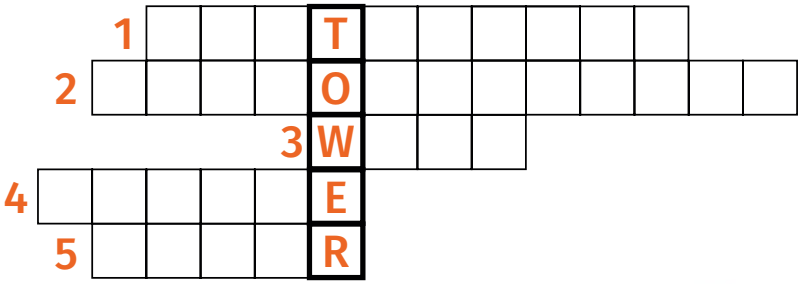
LEARN MORE

During the incubation period, the embryo develops inside the egg for 21 days until a chick pecks its way out of its eggshell and is hatched. The hen sits on the eggs until they hatch, only leaving them in short periods of time to eat or drink, in order to keep them warm. Chicken eggs require 21 days to hatch, but the incubation period for the eggs of other poultry species varies.

They moved then to the Technology Hall, where they started by trying the Munchausen Tower. This is one of Fofi's favourite exhibits because he loves being up in the air and watching everyone from there.

EXERCISE 4

Complete the following crossword according to the images regarding alternative sources of energy



1 2 3 4 5

LEARN MORE

An electrical motor hidden in the Munchausen Tower is triggered when the rope is pulled, which help us to rise up. In other words, there is an external energy source besides our muscles.

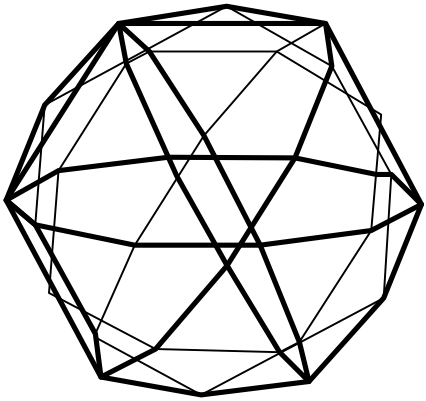
Fossil fuels (such as coal, natural gas and petroleum) are currently used as the primary energy source for the world. They are used to produce electricity, for heating and transportation and in industry. However, their use causes carbon dioxide emissions, which are responsible for the global warming.

There are other sources of energy: marine energy, hydroelectric, wind, geothermal and solar power. These are called alternative energy because they are alternative to fossil fuel, not being as harmful for the environment.

Also in the Technolog Hall there is the Homerban Sphere, which is geometrically a half-regular polyhedron, also called icosidodecahedron. Fofi and Juku were having tons of fun just trying to say this name. (Can you say it? It's not that easy, right?) When it is fully opened, its diameter is nearly 6 meters, being the largest one in the world. And, of course, Fofi is really proud about this fact.

EXERCISE 5

Colour the triangles in yellow and the pentagons in red.



If an adult of 67kg and a child of 23kg are stepping on the platform, how many kg are they missing for the sphere to expand?

. . . . . .

LEARN MORE

Geometrically, the Hoberman sphere is an icosidodecahedron, which is formed by 20 equilateral triangles and 12 equilateral pentagons so that each edge of the pentagons facet is also the edge of the adjoining triangles facet. It has a total of 32 facets, 30 identical peaks, and 60 edges of the same length. The Hoberman Sphere, patented by Chuck Hoberman, is a foldable construction in which each edge is built from scissor-like joints so it is capable of compressing.

Do you like music? – Asked Fofi. Yes, I do! I play the piano. – Answered Juku. Oh really? That's amazing! Here in Ahaa we have a Giant Pan Flute and I like to play it at night when no one's around. Would you like to try it? – Replied Fofi.

EXERCISE 6

Match the colours on the pipes with the different musical notes.

LEARN MORE

To each musical note there is a duration associated as well as a frequency, usually in hertz (Hz), which describes if the sound is higher or lower.

Right next to the Giant Pan Flute is the Art Machine! Fofi loves to stand there watching the amazing and colourful paintings made by the most artistic and creative visitors. Did you know there are only 3 primary colours – yellow, red and blue - and they are the basis of all the colours we know? – Asked Fofi. No way! How is that possible? – Replied Juku.

EXERCISE 7

Guess which secondary colour results from the combination of the following primary colours:

YELLOW ● **+ RED** ● .....

YELLOW ● **+ BLUE** ● .....

RED ● **+ BLUE** ● .....

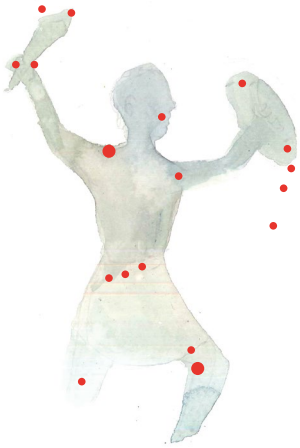
LEARN MORE

Primary colours (yellow, red and blue) are sets of colours that can be combined to make a useful range of colors. These colours can't be created by mixing other colours. A secondary colour is made by mixing two primary colours.

It was time to move to Fofi's favourite and most magical place in Ahhaa: the Planetarium. There it is possible to see more than 10 million stars, watch our planet Earth from a different perspective and fly through the whole known Universe.

EXERCISE 8

Draw a line between the points in order to form a constellation and name them after that.



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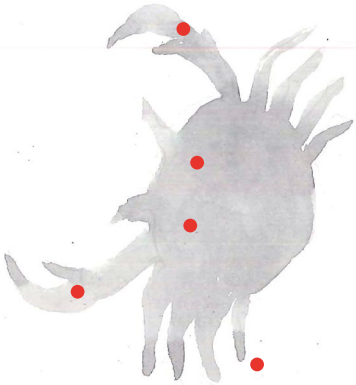

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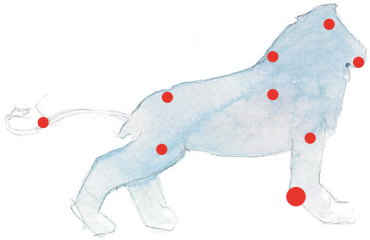

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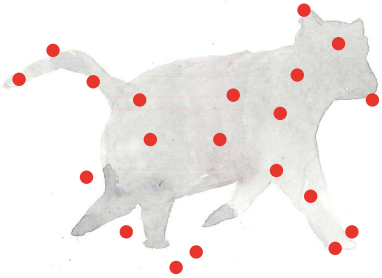


. . . . . .

. . . . . .

LEARN MORE

A constellation is a group of stars that form a pattern when viewed from Earth, typically representing animals, mythological creatures, or other objects.

There are 88 constellations dividing the night sky, but not all of them are visible from any place on Earth. Usually, the star maps are divided into maps for the northern hemisphere and maps for the southern hemisphere. Besides, the season of the year can also affect which constellations are visible.

Finally, they got to the lobby, where the huge Newton's Apple Tree is. Sir Isaac Newton is one of Fofi's idol. He was a great scientist, who wrote down 3 laws of motion and the law of universal gravity based on mathematical formulas.

EXERCISE 9

Help Fofi telling the story behind Newton's Apple Tree by completing the gaps with the words corresponding to the images.

1. . . . . was a passionate about how things work.

He was a great  2. . . . . and inventor.

He was determined to solve the mystery why do  3. . . . . stay in orbit?

What is  4. . . . . them from flying off into space?

One day, Newton was sitting under an  5. . . . . and thinking about the planets.

Suddenly, one apple fell on his  6. . . . . which gave him his big  7. . . . . .

Newton thought about the force pulling the apple  8. . . . . to the ground.

And then, because he was a genius, he realized it's also gravity that pull on the  9. . . . . around the  10. . . . . .

Right next to Newton's Apple Tree, there is Louri, the dinosaur. Fofi heard she's about to move to Portugal, to a small town near the sea, where they have a new dinosaur park. – Will you miss her? – Asked Juku. – Yes, but I think she will be better there, surrounded by other specimens like her.And at least it's sunny there most of the year! – Answered Fofi.

LEARN MORE

There are different types of dinosaurs. Scientisits classified them according to what they ate, when they lived or their size. For example, T. Rex, Spinosaurus, Velociraptor and Allosaurus were Therapods (meat eaters, powerful legs and short arms). Ankylosaurus was part of the Ankylosauria type, characterizied by having a bony armour. Stegosaurus belonged to the Stegosaurs type – slow, with bony plates or spikes. Triceratops was a Cerapod (4 legged body, 3 horns and bony frill).

Dinosaurs became extint approximately 66 million years ago. There are several theories about why it happened, but the most accepted one is the Asteroid impact theory. It says a large asteroid or comet impacted on Earth, causing a giant cloud of dust and climate changes. Several forms of plant life were destroyed, leading to the death by hunger of herbivorous dinosaurs and, consequently, of carnivorous dinosaurs as well.

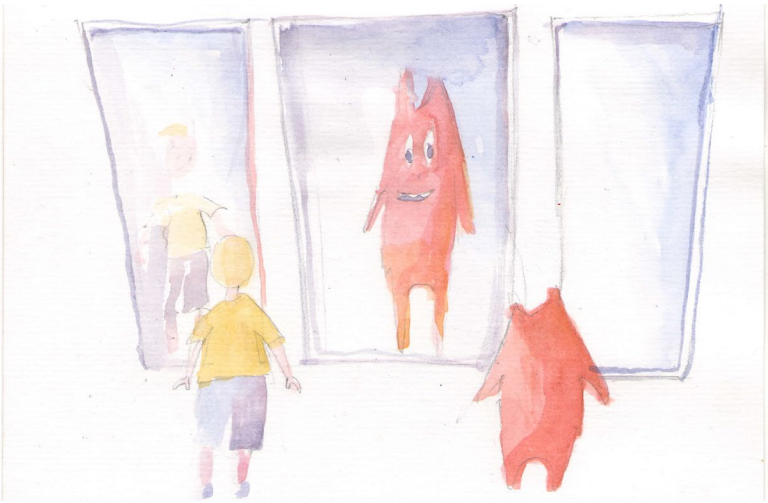
EXERCISE 10

Find in this letter soup the name of 10 famous dinosaurs:
Allosaurus, Ankylosaurus, Brontosaurus, Utahraptor, Hadrosaurus, Spinosaurus, Stegosaurus, Triceratops, Tyrannosaurus rex, Velociraptor.

T	Y	R	A	N	N	O	S	A	U	R	U	S	-	R	E	X
A	P	I	L	T	V	O	A	Q	Y	A	D	R	I	A	H	S
I	A	V	L	A	I	C	I	A	U	B	O	P	L	Z	B	A
A	V	U	O	G	M	L	A	L	S	T	E	A	U	N	A	I
U	Z	J	S	R	Y	D	U	K	P	D	V	H	J	A	G	C
R	A	H	A	D	R	O	S	A	U	R	U	S	W	T	K	A
F	Q	C	U	A	I	T	R	S	E	G	I	N	R	J	R	X
A	I	A	R	L	N	I	A	U	S	M	J	A	I	A	P	E
B	U	Y	U	C	C	E	K	R	U	A	U	C	W	K	A	U
L	A	N	S	O	B	O	A	U	R	W	B	A	U	I	N	F
O	Z	P	L	E	I	M	U	A	U	A	I	E	A	R	K	N
A	T	E	O	A	S	J	M	S	A	S	G	T	W	P	Y	A
S	V	I	E	V	T	N	A	O	S	N	A	L	M	E	L	E
I	U	T	A	H	R	A	P	T	O	R	U	C	I	R	O	V
A	P	D	U	R	I	W	T	N	N	R	V	A	U	A	S	U
V	A	Q	R	A	C	M	A	O	I	A	E	D	V	X	A	R
G	I	T	I	E	G	V	X	R	P	O	A	B	Y	N	U	A
F	A	P	S	U	S	M	I	B	S	T	U	P	G	A	R	J
A	O	L	U	A	F	H	A	D	N	A	I	A	V	U	U	T
A	C	X	I	P	S	U	R	U	A	S	O	G	E	T	S	N
I	A	T	R	I	C	E	R	A	T	O	P	S	D	I	F	A

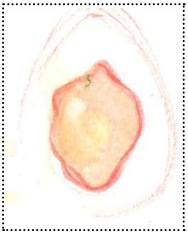
Juku's family just came to the lobby in this moment. They had finished the visit and wanted to go home. Juku had had so much fun with Fofi, he didn't even realize how much time had passed! "Who is your new friend, Juku?" asked Juku's father. Fofi and Juku looked at each other, both very surprised. At once they ran together to the nearest mirror. It had finally happened! Fofi's image was reflected in the mirror, he had become visible! Fofi was so excited and started to gaze at his newfound image and Juku realized he also found something new – he understood how much he actually had learned throughout the day with Fofi. Funny enough – science didn't seem that scary anymore. All he needed was to see it from a different, playful perspective.

"It was very nice to meet you" said Juku, "Thank you for showing me how much fun science can be! I'll be sure to come and visit you as often as I can." "And thank you for helping me to become visible to everyone!" answered Fofi, "By the way, I forgot to ask you: What do want to be when you grow up?" "A scientist!" replied Juku with a big smile. From that day on, Fofi's life in AHHAA changed a lot too. He could now help around the centre, spend time playing with children, and teaching them all the interesting facts he knows about science – just what he always had wished for.



EXERCISE 3

Cut and place them in the correct order according to the incubation period.

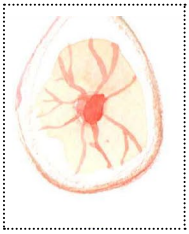








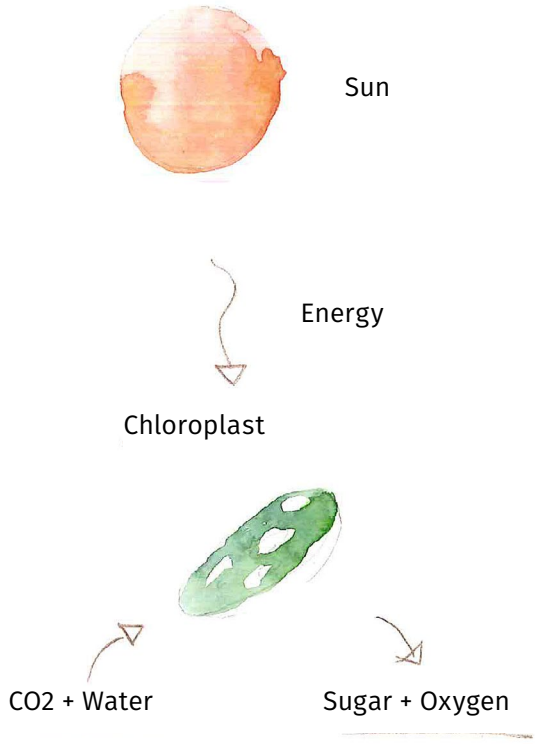





PERHAPS YOU WOULD LIKE TO DRAW YOUR FAVORITE EXHIBIT OR WRITE A LETTER TO FOFI. THIS SPACE IS YOURS, BE CREATIVE!

SOLUTIONS

EXERCISE 1



EXERCISE 2

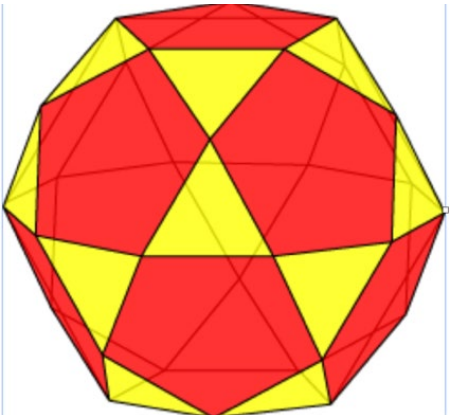
1. True
2. False (There are 54 ant species in Estonia.)
3. False (As a species, ants are about 100 times older than humans.)
4. True
5. False (Ants are able to carry a load exceeding their weight up to 20 times.)

EXERCISE 3

EXERCISE 4

1. Geothermal
2. Hydroelectric
3. Wind
4. Marine
5. Solar

EXERCISE 5



96kg. (67+23=90
186-90=96)

EXERCISE 6

Red: do / c

Brown: re / d

Grey: mi / e

Blue: fa / f

Black: sol / g

Yellow: la / a

Green: si / b

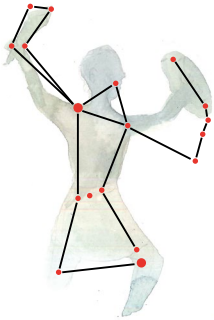
EXERCISE 7

Yellow + Red = Orange

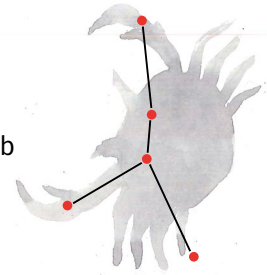
Yellow + Blue = Green

Red + Blue = Violet

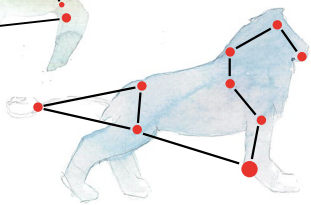
EXERCISE 8



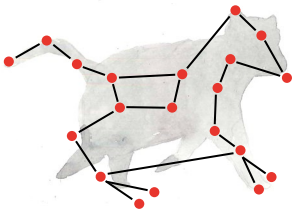
Orion,
The Hunter



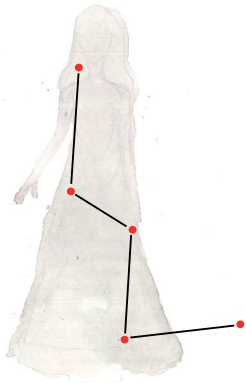
Cancer,
The Crab



Leo,
The Lion



Ursa Major,
The Great Bear



Cassiopeia,
The Queen

EXERCISE 9

1 – Sir Isaac Newton

2 – mathematician

3 – planets

4 – stopping

5 – apple tree

6 – head

7 – idea

8 – down

9 – Earth

10 – sun

EXERCISE 10

T	Y	R	A	N	N	O	S	A	U	R	U	S	-	R	E	X
A	P	I	L	T	V	O	A	Q	Y	A	D	R	I	A	H	S
I	A	V	L	A	I	C	I	A	U	B	O	P	L	Z	B	A
A	V	U	O	G	M	L	A	L	S	T	E	A	U	N	A	I
U	Z	J	S	R	Y	D	U	K	P	D	V	H	J	A	G	C
R	A	H	A	D	R	O	S	A	U	R	U	S	W	T	K	A
F	Q	C	U	A	I	T	R	S	E	G	I	N	R	J	R	X
A	I	A	R	L	N	I	A	U	S	M	J	A	I	A	P	E
B	U	Y	U	C	C	E	K	R	U	A	U	C	W	K	A	U
L	A	N	S	O	B	O	A	U	R	W	B	A	U	I	N	F
O	Z	P	L	E	I	M	U	A	U	A	I	E	A	R	K	N
A	T	E	O	A	S	J	M	S	A	S	G	T	W	P	Y	A
S	V	I	E	V	T	N	A	O	S	N	A	L	M	E	L	E
I	U	T	A	H	R	A	P	T	O	R	U	C	I	R	O	V
A	P	D	U	R	I	W	T	N	N	R	V	A	U	A	S	U
V	A	Q	R	A	C	M	A	O	I	A	E	D	V	X	A	R
G	I	T	I	E	G	V	X	R	P	O	A	B	Y	N	U	A
F	A	P	S	U	S	M	I	B	S	T	U	P	G	A	R	J
A	O	L	U	A	F	H	A	D	N	A	I	A	V	U	U	T
A	C	X	I	P	S	U	R	U	A	S	O	G	E	T	S	N
I	A	T	R	I	C	E	R	A	T	O	P	S	D	I	F	A

Let us introduce Fofi - a peculiar orange creature that has been living in AHHAA Science Centre for as long as he could remember. He's passionate about science and enjoys going for daily fun learning adventures in the centre. Unfortunately there is a tiny detail that makes him sad and he doesn't know what to do about it. One day, a visit from a boy named Juku was about to change both of their lives forever.

Within this book, you will be able to discover the story behind Fofi and Juku and solve exercises about 10 different AHHAA exhibits while learning more about science yourself!