

# Roundy

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## Please Read This First

This story, 'Roundy', comes with a ring binder containing tactile drawings. After each chapter, there is an explanation titled 'In the drawing', followed by the number of the drawing in brackets. Each tactile drawing is numbered in the top left-hand corner. This is not in Braille because the drawings will be used in several countries. The Braille characters for capital letters, numbers, and punctuation marks are not the same in every country. That is why we are using dice instead. Just count the dots in the square(s). After number 6, there are two squares. For example, number 7 has one die with 6 dots next to another die with 1 dot.

Sometimes, there are several drawings for a chapter, and sometimes there are questions and/or assignments. So, it is not just a reading book; it's also an activity book—fun to do together! Maybe you'll need some help now and then. Your parents or teacher can find extra tips on this website: <https://tacticos.eu/books/roundy-book/>. The QR code at the top right-hand corner of each drawing will also lead you to that page on the website.

This book comes with a 3D-printed rocket. You'll need that for drawing number 2. Finally, there are three 'disappearing boards' that come with that drawing. You can read how to use these in Chapter 2.

Do you have everything?

Well, grab the book with the drawings! It starts off really well—with a tactile drawing on the front cover.

### In the drawing (front cover)

Here, there is no die at the top left-hand corner. This book was made as part of the Tacticos Project. The Tacticos logo, with its cheerful colours, has been placed there, but it's not tactile.

There is a square in the right-hand corner with the letters 'qr' next to its left side. The actual QR code is in the square. On the cover, QR is written in lower case letters. That's because the capital letter for Braille is not the same in all countries.

Below this, in the middle of the page, you will find the name of our main character in Braille. Can you read it? There's something unusual about it. No, not that his name doesn't start with a capital letter—we already know why that is. The Braille is not straight but in an arc. You don't see or feel that very often!

It reads: roundy. So, this is a joke: the name, which means a bit round, is also written in a round shape.

Directly below that, you will find his portrait. Indeed—Roundy is a circle, with a smiling mouth and two big round eyes with pupils. He has no hair, no ears, no nose, and no body. Roundy is an alien! His pupils are positioned on the left side of his eyes. It seems as if they are focused on the square floating in the lower left of Roundy's portrait. There is 1 dot in it, exactly in the middle—just like a die.

The square is tilted slightly, as if the die has just been thrown and is floating in the air.

This is the book number: Book 1. Maybe there will be more!

## Chapter 1 A special meeting

Bob sat in the garden, his fingers gliding over the rough bark of the old oak tree. He had been blind since birth, but his other senses were sharp. The sound of birdsong and the smell of blooming flowers filled his world.

Suddenly he heard a soft voice. 'Hello there,' said the voice. 'I am Roundy.'

Bob was shocked, gasped for breath and jumped up. How could this be? The garden was completely enclosed. No one could just get in.

'Who are you? What are you doing here?' asked Bob anxiously.

'Don't worry,' Roundy replied. 'I am a space creature. I come from far away and I'm not human. I have no evil intentions. Who are you?'

Bob relaxed a bit because Roundy's voice sounded friendly. 'My name is Bob. What do you look like, Roundy?' he asked. 'I can't see you because I'm blind.'

'I am round with very big eyes and a mouth, but I don't have a nose. I don't have arms and legs either. I'm floating because I'm weightless. Feel me.'

Somewhat uncertain, Bob groped in the direction from which he heard Roundy talking. He noticed how the spacecraft was getting closer and gently let his hands slide over it. Bob had forgotten his fear and had become very curious. He felt a spherical shape with a smooth surface. It felt neither hot nor cold, hard or soft. It felt ... strange. Not like anything he'd ever felt before. After some searching, his fingers felt Roundy's eyes and mouth. They also felt ... strange, smooth, and Bob couldn't detect eyelashes or lips.

'Where do you come from?' asked Bob. Roundy got excited. 'I come from the planet Verdian. It is a beautiful world with the most beautiful landscapes. Colorful flowers, floating islands and splashing waterfalls. And what's special: there is never war or hunger.'

'And how did you get here?'

'I came with my rocket. It is very similar to that of the earthlings, but my rocket has a quiet engine and uses clean energy.'

'Say Bob,' said Roundy, 'I would like to discover your world. I see unknown things in your garden and want to know what you do with them. I've seen animals I don't know. And when I entered your planet from outer space, I flew through something that looked like soft, fluffy pillows. I could fly right through them it but couldn't see anything anymore'

Bob smiled. 'Those are clouds, Roundy. I'll tell you everything I know. But can you explain things to me that I do not yet understand?'

Roundy nodded. 'I will be your eyes and you can be my guide. Together we will discover the world. What do you think?'

Bob felt the excitement in his tummy and smiled broadly. 'Let's do that,' he said.

### In the drawing (1)

This story is accompanied by drawing 1. You can find this by feeling a square with one dot at the top left of the page. This is a dice that indicates the page number.

The drawing shows Bob and Roundy. Bob is drawn but looks a bit different in real life. A photograph represents reality, whereas a drawing isn't always realistic.

Often reality is the starting point, but it is drawn slightly differently. A tactile drawing of Bob would be far too difficult. There would be too many lines. Feel if you can find Bob and Roundy. Who is on the left and who is on the right?

If you put the drawing on your table, it might seem like Roundy and Bob are lying down. If you put the book upright, they are standing upright. So, when you put the book down, you should try to imagine that they are standing upright next to each other.

Does Bob look like a drawing of a person? No ... Bob is drawn as a stick figure. That's a simple and quick way to draw a person. All details are omitted or drawn more simply. The hair, fingers, arms and legs have become sticks, hence the term stick figure or wire doll. Some parts of Bob aren't even there at all. Find out what's missing.

Can you feel that Bob doesn't have a nose? Of course he does, but to keep the drawing simple, the nose has been left out. And look at his hair. Those are strands that stick out. This is not what a hairstyle looks like in real life, of course!

Bob is shocked when he unexpectedly hears a voice in the garden. How do you know Bob is scared? He jumps, his eyes are big and his mouth opens wide.

Try to do that yourself. What sound do you make? You breathe audibly deeply.

Roundy is now easier to find because you already know him from the cover. But there's something else close to Roundy that wasn't there before. It's a speech bubble. These are often used in comics to show what a character is saying. It's got text in it. Because the dash on the speech bubble points to the character, you know who's saying it. What's Roundy saying to Bob here?

At the top right you feel a square containing a QR code and at the top left the page number. At the bottom, of course, there is a thick line. That's the ground Roundy's standing on.

## Questions and assignments

1. Pretend that you are very frightened: What does your face look like? What attitude do you take? The expression your face takes on is called facial expression. The posture your body adopts is called body language.
2. Is this, do you think, a realistic picture like in real life, showing what things look like?
3. What makes this drawing clear?
4. Roundy is a kind of emoticon; What would you say Roundy's expression is?
5. Find a dice, preferably a braille dice; How are the dots placed?
6. What is the top of a dice?
7. Is Roundy on Bob's left or right?
8. When you stand in front of a mirror, what happens when you raise your right hand?

## Answers

Question 1: Mouth open, jump up and maybe you also cry out.

Question 2: Bob is drawn like a stick figure or wire doll. It is not realistic: It's fantasy. Real people don't look like that.

Question 3: It shows what happens and how the characters in the story feel.

You could therefore say that it is a cartoon or comic strip.

Question 4: Friendly, open, in a good mood; the corners of his mouth point upwards and he has wide open eyes.

Question 5: The opposite sides always add up to 7.

Question 6: That's the side that happens to be on top. A dice doesn't have a fixed top or bottom.

Question 7: From your position, Roundy is to Bob's right. From Bob's position, Roundy is on his left.

Question 8: In the mirror it looks like you're raising your left hand!

## Chapter 2 The rocket

Bob was lost in thought. Roundy noted. 'What are you thinking, Bob?' 'You told me you came here with a rocket. I don't really know what a rocket looks like. Is it big? Can I feel it?' Bob heard Roundy whistling and soon after he heard the soft buzzing of electronics. Because of the movement of the air around him, he knew that something was approaching fast. Was it Roundy's rocket? Bob was afraid that what he heard would bump into him and he pulled back.

'Don't worry, Bob. I brought my rocket here so you could find it. He's right in front of you now. Stick out your hands so you can feel it.'

Carefully Bob's fingers touched the smooth surface of the rocket. 'Hey, your rocket is small!', Bob remarked. 'How is it possible for you to fit in?' 'The rockets on my planet can change size,' Roundy explained to him. 'At the moment, it's as big as you are, so you can feel it. But I can also make it as big as I want.' Bob was surprised. 'This is magic!' he exclaimed. 'No,' Roundy laughed, 'it has something to do with atoms and molecules. Hard to explain. You will not be able to do this yet on planet Earth, but in the future the scientists here will also have this knowledge.'

Bob put his hands back on the rocket, this time without hesitation. He let them go all the way around and felt that the rocket was round. Not like a ball, but like a cylinder. His hands now slid up until he reached the tip of the rocket. 'You can now feel the nose of the rocket,' Roundy explained. Bob nodded. He understood what Roundy meant. A little bit under the nose was a round recess that felt cool and smooth. 'A window!', Bob exclaimed proudly, glad to recognise something. 'Very good', Roundy confirmed. 'But it's also a door at the same time.' 'Oh, so you can get into the rocket through here?' 'Exactly, and we'll do that in a moment. But first look at the bottom.' Bob bent down and felt three protrusions. They looked like wings or maybe the fins of a fish. 'What are they?' he asked Roundy.

'These are the legs of the rocket that ensure that it stays firmly upright when launching and landing.' 'Legs?', Bob asked with a frown. 'Not legs like those of a frog or a cow, of course, that would be quite a crazy sight!' Roundy rolled over because he laughed so much at Bob's surprised expression.

Then Roundy asked: 'Are you ready to see the rocket from the inside?' A big smile appeared on Bob's face. Bob heard the whistle again but this time it sounded different. 'With the whistling I give instructions to the rocket,' Roundy explained. 'Now I'm making the rocket bigger so we can get in.' Bob heard the door open. The hinges squeaked a bit. 'There's a staircase now sliding out, Bob,' said Roundy. The extending staircase made a buzzing sound and with a soft pop it landed on the ground. 'It's your honor,' Roundy said. Bob searched and found the railings. Feeling carefully with his feet, Bob climbed the steps. He counted fifteen and noticed that he had arrived at the edge of the round door. How exciting this was! A little hesitantly, he walked in.

He stood for a moment and absorbed the atmosphere. It was pleasant in the rocket. Not too hot and not too cold. The air inside felt very pure and it smelled fresh. 'Look around,' he heard Roundy say behind him. Bob extended his arms and his fingers touched the walls of the rocket. They felt different than expected. No cold metal walls, but velvety soft and you could press them like a cushion. Also under his feet the floor was soft, yet different from the walls. 'The floor is very special', said Roundy, who saw Bob trying to guess with his feet what he was standing on. 'It is made of lunar dust and therefore very soft. You can't see it, but it sparkles very nicely when the moon shines on it. It's like having hundreds of little lights in it.'

'Bob, if you want, we can fly my rocket.' Bob's heart skipped a beat. Would he dare? Is it safe? And besides, he doesn't know this strange creature very well. Mom often tells him that he should never go with strangers. What if Roundy actually comes to kidnap him? His breath stuck in his throat at that last thought. Roundy, seeing the tension on Bob's face and body, tries to reassure him. 'I understand very well that you hesitate and think about everything that can go wrong, but you can trust me. I

would never hurt you. We Verdians have never hurt anyone. But maybe it's better if you get to know me a little better before we go up in the air.'

## In the drawing (2)

A real rocket is of course far too big to feel all around. That's why we made a toy rocket, a model. When you look at something, it's different than when you feel something in your hands. You can only see one side of the rocket. While you can already probe all sides. On a drawing there is only one side of an object. You'll often find yourself hearing a description of something you can't feel in reality. For example, because it is very large, small or far away. You won't usually have a model to feel. So, how can you learn to understand how something works?

This drawing of the rocket is special. It can help you to really understand how the rocket is put together and how it looks spatially. There are three drawings of the rocket. In each of these drawings there is a different view of the rocket. The model fits exactly on the drawings. This way you can compare the rocket that you can feel in your hands with the drawings.

We are now going to explain how you can draw the different views of the rocket. The top right represents the top view. It's like taking a picture right from the top of the rocket. Go over with your flat hand the top of the rocket. First you feel the nose. We draw the nose as a point. As you go further down the rocket you feel it getting bigger and bigger. The circumference is what you can feel with your fingers going around the rocket. At the widest point we draw the circumference of the rocket as seen from above. You can also feel where the window is. We've marked that, too. And you'll find the protrusions (legs). Again, we draw the outline only at the widest point. That's our top view. It's flat. You will only know how high it is, or what shape it has, if you also have a front or side view.

Now let's see how you draw a front view like the bottom right (directly below the top view). Put the rocket down with the window facing you. Raise your flat hand as if you want to push something away from you, with your fingers pointing upwards. Go towards the standing rocket. First you feel two of the protrusions (legs). Now imagine that you could push them back and flatten them. When you get to the tube of the rocket, you feel a vertical line. If you go further, if you could, it would become wider and longer. You'd feel where the window is. At the highest and widest point, in the middle of the rocket, you will find the maximum circumference. What is on the other side is hidden; you can't feel it or see it.

A side view has also been drawn. It is important to keep the rocket in the same position. Now push with your flat left hand from the left side to flatten the rocket in that direction. Proceed in the same way as in the front view. This time you feel the window very well because it is a little deeper. You can also check that by circling the perimeter of the rocket with your finger.

Once you understand this way of drawing, you can create a precise three-dimensional (a beautiful word for spatial) representation of an object based on tactile drawings, and its position in space. How is it standing or lying in front of you? We are talking about objects, but we can also draw animals, plants and people. Anything that is three-dimensional. If you also know what kind of material it is made of and, for example, how parts can move relative to each other, or how it smells or sounds, you can form a very good 'mental representation'. So a kind of spatial image in your head that you can rotate, hear, smell, and so on in order to gain more understanding of what it is.

This types of images with a top view, side view and front view help you to imagine in your head what position an object occupies in the space relative to you. You can make a spatial representation of it.

Finally: Sometimes you only need two views, and sometimes you need more views. For example: If our rocket had another window at the back, you'd need the rear view to know exactly where and how it was placed.

## Questions and assignments

1. There is a word for something that converts a real object (which you can feel on all sides) into something flat like a drawing: projection. The drawing of the rocket is a projection of a real rocket. Can you think of other ways to make a projection, besides a drawing, if you want to render an object flat?
2. Have you ever felt a real elephant? Probably not. Still, you may have a good representation of an elephant with all the trimmings. How did you learn what an elephant is and what it looks like?

## Answers

Question 1: photo, painting, video

Question 2: think of a feel book, a toy elephant, how an elephant sounds and smells in the zoo.

- Make models of clay or other material that you can easily cut. Or take a fruit. Cut it straight in half and draw the outline. Now you are making your own views.
- But beware: If you push on a clay model, the model becomes thicker, wider; The volume can't just disappear like in Roundy's 'magic' rocket!
- If you cut an apple, you get a cross-section; you see what's inside. A cross-section is something other than a projection. A projection shows the outside when you flatten it.
- There is a cutting sheet to make a half box. If someone helps you, they can cut around the three drawings. Then ask them to cut out the circumference of the rocket within the three drawings. Set the front view upright. The side view is folded backwards. Fold the top view flat. Stick them together. Now you have half a box that is not very sturdy. You can stick it on cardboard first to make it stronger. If you rotate the rocket in the right way, it fits exactly through the holes (the shape which has been cut out). If the rocket is almost completely through the hole, it is equal to the paper. It's as if the view has been drawn.

## Chapter 3 The bee (another special meeting)

Now that they have gotten to know each other better, Roundy is more interested in the environment. 'Bob, I told you that my planet has colorful flowers, but your planet earth has them too, I see.' 'Yes' says Bob. 'And you know what's so good Roundy? There are flowers that smell great. I can't see, but I do have a nose that I can use to smell things. When I stand here, I can smell the intoxicating scent of lavender and there is a sweet-smelling rose further on.' 'That's beautiful' says Roundy 'I have eyes with which I can see but no nose with which I can smell. Together we can discover things even better!' Bob and Roundy explore the garden together. Bob explains which plants smell good and Roundy describes how beautiful the colors are.

Bob yells 'Ow!' and now it's Roundy who's scared. He bounces on the ground and back up again. 'What's up, Bob?' he asks, still bouncing a little. 'Do you hear that? That buzz? There's a bee here! Bees can sting, he'll prick you! If you get punctured you'll collapse.' Then Roundy also hears a soft buzz: 'bzzzzz', 'bzzzzz' Roundy floats closer to Bob, his voice is soothing: 'Don't be afraid, Bob. I'll stay close to you. Together we are safe.'

Just as Bob wants to propose to go inside, someone walks up to him. It looks like a space creature, just like Roundy. He's wearing a white suit and a strange gauze hat in front of his face. It's a beekeeper. 'Hello there', the beekeeper greets them kindly. Then he looks again and sees Roundy. His eyes are as big as saucers. 'I know a lot of flying animals' he stammers 'But this one is very strange!' Then Bob hears Roundy making a soft whistling sound and suddenly the beekeeper calms down. It seems like Roundy's hypnotizing him.

'I heard you talking about the bee' says the beekeeper, who is suddenly completely at ease. 'Do you want to know more about bees? I am a beekeeper and I keep bees.' Bob nods gently, still a little anxious about the buzzing insect. 'I'm blind,' he explains. 'I can hear bees but I can't see them. I know they can sting. That's why I'm a little scared when I hear buzzing.' The beekeeper laughs understandingly. 'Bees may seem scary, but they are special creatures. And yes, bees can sting. But they only do that when they feel threatened. If you stay calm and don't bother them, they won't hurt you.' The beekeeper continues: 'They pollinate plants so that these plants can grow vegetables and fruits. Without bees, we wouldn't have so much good food. And there would be far fewer flowers and trees. Bees also make delicious honey.' Bob listens attentively. He had never thought of bees that way. Now he had become very curious what a bee looks like. He can't find this out by feeling it because then he'll be stung. 'Maybe I can ask Mommy to draw me a bee.' he thinks. And then he runs in to ask her this.

Roundy hums softly as he absorbs the information. 'Thank you for the explanation, Mr. Beekeeper. I didn't know bees are so important on earth!'

### In the drawing (3)

Here you can see the drawing that Bob's mother made.

At the top, next to the dice, you can feel the three parts of a bee's body. It's just a little drawing. That's because this is a full-size drawing. The way you see them when you look at the bee from above. A top view. Together these parts are the size of a real bee. If you feel from left to right you can find: the small head, the thorax and the back of the body.

Below that is a much larger drawing of a bee, 10 times its real size! This is a front view of the bee with its legs and wings. Imagine that the drawing is upright. Remember how we explained the front view drawing of the rocket; it's as if you were pushing something away from you, with your fingers pointing upwards. The bee is positioned in front of you and you can feel the side of its body. From left to right: the head, the thorax and the abdomen. On the head you feel a large surface with a

texture. That's the eye. A bee has a very large eye that we call a facet eye. It actually consists of thousands of small eyes with which the bee can look in all directions very well. With the antenna on its head, (the stripe from the head to the top left) the bee can smell and taste.

The wing is attached to the round thorax. You can only see one from the side. But the bee also has a wing on the other side. The wing of a bee is almost transparent. The legs are also on the thorax, 3 on our side, 3 on the other side. So 6 legs in total.

Then you feel a narrow waist and then the back of the body. A bee doesn't have bones like you do, but a skeleton on the outside. That's very light. It consists of parts, segments, that can move a little over each other. As a result, the abdomen is flexible. On the drawing you feel the segments as different textures.

Below the dotted line is another large drawing of a bee, this time from above, so a top view. Now with all the trimmings. Even though? Something is missing! Can you feel what? Yes, that's right! only one wing has been drawn. That is so that you can feel what is hidden under the wing, when you look at the bee from above.

On the head you now feel two round facet eyes and two antennae. On the side view you already felt one. The other cannot be seen from the side, as with the wing.

The sting, with which the bee can sting, is in the abdomen. It only comes out when the bee feels threatened. The abdomen of a bee is very flexible. That's useful if he wants to sting.

What is also not drawn are the small hairs that are on the legs of the bee. Pollen sticks to these little hairs. If the bee flies to another flower, the pollen ends up there. This is how the bee can pollinate the flower. Once this is done, the plant can produce fruits and seeds. Pollen is a yellow powder. It looks a bit like flour and it helps with pollination.

There are 20,000 species of bees in the world. The drawing shows a honey bee, a species that can be found in Western Europe.

## Questions and assignments

1. Are you afraid of bees? If so, what are you afraid of?
2. A bee is an insect. Can you name any other insects?
3. Can all insects fly?
4. All insects have six legs. Is a spider an insect?

## Answers

Question 2: fly, wasp, butterfly, beetle, ant, cockroach

Question 3: No, it's not. There are millions of insect species. Most of them have wings. Sometimes they are no longer functional. For example, most cockroaches cannot fly. And also ants apart from the beginning of summer when fertile queens and males get temporary wings to be able to reproduce.

Question 4: No, a spider has 8 legs and is therefore not an insect.

## Chapter 4 An acquaintance

Bob and Roundy are tired after walking through the garden. Bob is sitting on a bench and Roundy is floating next to it. Then all of a sudden Bob hears that Roundy is floating away. 'Wait for me Roundy' he says. 'Where are you going?' 'Wait a minute Bob' he hears Roundy say from afar. 'I want to take a look, I'll be right back.' A little later he hears the soft buzz of Roundy floating next to him. 'What were you doing?' he asks curiously.

'I thought I saw an acquaintance' says Roundy. 'By the pond under the tree. 'Acquaintance?' asks Bob 'The beekeeper?' 'No' says Roundy 'A round creature just like me! Not silvery, but red. Come on, let's go there! Feel it, there it is, at your feet' What does Roundy mean? Bob shuffles gently and suddenly feels something near his foot that he accidentally kicks. He bends down and using his hands looks for the thing he'd kicked. After looking around for a moment, he feels it. A deep frown appears on his forehead. Then he starts laughing really hard. Roundy doesn't understand. Bob can hardly talk, he laughs so hard. 'That's a b ... hahaha, that's a ba ..., that's a b b ball!'

'I'm a ball too,' says Roundy. 'That's right, Roundy. But you're alive. You're a space creature. The ball in the garden is a toy. That ball can't think, float, see, or talk. You can play with it. Come with me and I'll show it to you'.

Carefully Bob feels under the tree where the ball had rolled to. His hands are groping around. He doesn't want to fall into the water. Roundy's helping him. 'Good, Bob a little bit to the left, there lies my acquaintance.' he laughs. Bob grabs the ball and walks to the terrace next to the house. 'Here I can show what you can do with a ball' he says. 'When you freaked out Roundy, you bounced up and down a bit. The ball can do that too. But only if I help it. Look at it:' And Bob bounces the ball on the ground and catches it again. If you can do this several times in succession, it is called dribbling. But I usually can't. The ball bounces in all directions.' sighs Bob 'I can dribble' says Roundy and screaming with laughter he imitates the ball. Bob hears him laughing and bouncing.

'During the gym class, I am often allowed to practice throwing a ball with a bell inside, letting it bounce against the wall. The bell helps me because then I can hear where the ball is going. And the gym teacher explained how it works. And look: when I throw the ball right against the wall, it comes back and I can catch it.' Roundy looks on with interest. 'If I throw the ball in an arc, it will bounce back from the wall! And if I throw it diagonally against the wall from here .... then I can't catch it because then it's going in a different direction!' When Bob demonstrates this, he loses the ball. Roundy quickly floats towards him. 'That may not be a space creature, but a ball. I'm a space creature and I can be a ball! A ball you can always catch. Because I'm just floating towards you again!' And with Roundy as a ball, they'll have fun for a long time to come until Bob puffs and says, 'I feel hot now. Let's go find something to drink.'

### In drawing (4)

At the top, you can see the path the ball takes when Bob throws it in an arc against the side of the barn. It's a top view. So leave it flat on the table. On the bottom half of the page you will find a front view. You have to imagine this is upright.

Let's start with the front view, at the bottom of the page. On the left is the barn. It has a pointed roof. In the top view you see the barn as a square with a line that corresponds to the ridge (highest point) of the roof in the front view.

Back to the top view. The barn is at the bottom left. If you follow the perimeter of the terrace clockwise, you will find some gaps in the line. That's a fence. The horizontal line at the top has thick

and thin parts. That's the facade of the house. The thick parts are the walls, the thin parts show where the garden door and the window are. Then down and to the left: the same broken line as between the shed and the house; this is another fence.

There's nothing on the terrace. All you feel is a circle and a dotted line between the circle and the shed.

The circle is the starting and ending point of the ball. The dotted line indicates the path the ball travels as seen from above. Bob hasn't been drawn. This isn't necessary because you know that he's behind the ball, throwing it. It's what is known as a 'schematic drawing'.

Now the rest of the front view is easy to understand. You already know the shed, the ball, the fence and the dotted line, but this time they are meant to be viewed upright (vertically). You may want to cut and fold the tactile image, setting the front view upright on the top view plan of the shed and terrace. This can help to create a spatial representation.

Now the path the ball follows is different. Bob throws the ball with a bow against the wall at the side of barn. That's the top dotted line from the ball. Maybe you can feel the arrow in the middle of the line indicating the direction. Then the ball bounces down from the barn. If you throw the ball in an arc, it bounces back in an arc. The arc makes the ball bounce on the ground and then bounce up again in an arc. Now, it's in Bob's hands. Back to where the ball started.

## In drawing (5)

Here is another drawing of the terrace, Is it a top or a side view? It's a top view! How do you know this? It is a slightly larger drawing than the top view from the previous drawing.

Again you can feel the path the ball takes when Bob throws it. Feel if you understand what's going on there. It has to do with a collision law from physics that goes as follows:

The angle of incidence is equal to the angle of reflection. Actually, it means something like what you put in you get out. That's quite a complicated thing, maybe it helps if we try to explain it a bit.

In the previous drawing you could already feel that if Bob throws the ball in an arc, the ball also bounces back in an arc. And when it touches the ground, it also bounces up again in an arc. You throw in an arc, you get an arc back! Only in the opposite direction.

Something similar happens in this drawing. Bob throws the ball diagonally against the barn. The ball then bounces just as obliquely, towards another wall. The angle remains the same. The ball hits the wall diagonally. (Fortunately, not in the window ... Can you feel that?). The ball then bounces just as obliquely, but in another direction, back again.

That's why dribbling is so hard. If you angle a ball a little, or if the ground isn't completely flat, the will no longer go bounce straight up to your hands but bounce diagonally, causing you to lose it.

Can you use your finger to make the path the ball will follow if it would go further? You'd think the ball would fall right back into Bob's hands. Unfortunately, the ball also weighs something. And things in the air that weigh something go to? Right downwards. So the ball will always go down a little bit and not end up in Bob's hands.

The ball will also move a little slower. The ball gains speed when Bob throws it. But after that it always loses speed because it has to go through the air. The air slows it down, that's called 'air resistance'. That's why we can't throw a ball that keeps flying through the air indefinitely. And you have to have a lot of strength to be able to throw a ball far away.

## Assignment

Get a ball and find a place where you can throw it against a wall. It's nice to have someone with you who can see. You also have balls with a bell inside or balls on elastic which can be very handy! Try to see if you notice the difference when you throw the ball straight ahead one time and with a bow the other time. You can also try throwing the ball at an angle. If someone is with you, you can ask what happens if you haven't been able to notice it yet yourself.

## Chapter 5 The fish

'Bob' says Roundy. 'Can I ask you a question?' 'Of course' says Bob. 'When you went to get the ball under the tree, I saw that you were moving very carefully. Why was that?' 'That's because the tree is close to the pond. I didn't want to fall into that.' 'I don't understand Bob,' says Roundy. 'I will explain it to you.' Bob replies. 'The pond is a large pool of water. Water is not solid like the ground here. It's a liquid. A substance that can flow in all directions and in which you can disappear. People shouldn't be underwater for too long, Roundy. They can't stand that.' 'Oh, you make me curious! I want to investigate that' says Roundy. 'Come on, I'll make sure you don't get lost in it!'

As they approach the waterfront, Roundy starts to hum. 'mmm mmm' 'What is it Roundy?' asks Bob. 'I see the water Bob! It moves!' 'Haha, those are waves, Roundy.' Bob laughs. The wind blows the water away a little. 'I can see through the water!' Roundy shouts enthusiastically. 'Yes' explains Bob 'Water is transparent. I cannot see that, but it has been explained to me.'

'I see plants underwater.' notes Roundy. 'But there is something else underwater. It's orange, it's shimmering and it moves all the way through the pond!' Roundy bounces back with excitement. 'That's a fish!' says Bob. 'Fish live in the pond. We breathe oxygen from the air. But fish breathe oxygen from the water! They can stay under water for a long time.' Bob gets an idea: 'A fisherman lives on the other side of the pond. He knows a lot about fish. Shall we see if he is there?' Together they go across the street. Hidden among the bushes, a man sits on a stool. Roundy sees that he's holding a long stick. With a rope hanging in the water. At the end of the rope something floats. It looks like a feather. The fisherman sees Bob and greets him: 'Hey Bob, it's nice to see you.' Then he falls off his stool in fright. 'What kind of ball are you carrying?' Bob says goodbye and hears Roundy whistling softly again, and sees how the fisherman stands up quietly and straightens his stool, without even looking at Roundy.

Suddenly the feather starts to move wildly. The fisherman braces himself and starts turning the handle on the rod. The rope is getting shorter and shorter and suddenly they see a fish struggling above the water. Roundy is scared and shouts: 'But that fish has to breathe water, right? That's not going well!' Now it's Bob who reassures Roundy: 'The fisherman looks at the fish and then throws it back into the water.' 'Yes' says the fisherman. 'Without water, fish die. So I throw them back. Sometimes people eat fish. Fish are tasty and healthy!' The fisherman goes on to say: 'Here the water is clean and there are many fish. Sometimes people make the water on earth dirty. They catch too many fish. That is why there are fewer and fewer fish in some seas and rivers. Or you can't eat the fish because they contain dangerous substances.' 'Yes' says Bob. 'We need to be careful and not throw or discharge things that don't belong in the water. And we shouldn't eat too much fish.'

Roundy is allowed to take a good look at the struggling fish before the fisherman throws it back into the pond. The water splashes on Bob and Roundy. Roundy's has to to laugh about it. 'It feels cold!' They thanked the fisherman and walked home. As the droplets on his body reflect the light coming from the sun, Roundy says: 'I made even more friends and learned a lot about the earth, Bob.'

### In the drawing (6)

In the drawing you can feel two different views of a fish.

Can you recognize which views? And explain how you know this?

The fish has round eyes. And different fins: a dorsal fin, pelvic fins and a caudal fin. By moving the fins, the fish can move itself. The fins are very flexible. The fins also help the fish to swim stably in the water.

On the top drawing you can feel the gills next to the eye. This allows a fish to breathe. A fish doesn't have lungs to do that, but gills. Water flows into the mouth of the fish, along the gills. There, the oxygen is filtered out of the water and enters the blood of the fish. Through the gill openings, the oxygen-poor water flows out of the fish again.

The texture you feel on the body of the fish are the scales. Scales are small pieces of skin that lie over each other like roof tiles. There is a slimy layer over these scales. This layer protects fish from bacteria and other hazards. The scales also make the fish flexible.

On the bottom drawing, the eyes are not round when you feel them. That is because they are for a large part on the side of the body and not at the front (as with the bee, you felt large round eyes at the front!).

From the dorsal and tail fin, seen from above, only a stripe remains in this view. Can you find them?

Changes in the climate have major consequences for the world's fish. The water in which they live is also getting warmer. And sometimes they can't stand it at all. They are more likely to get sick or die. Fish in the sea can move to an area where it is colder. But they may not be able to find suitable food there. Or there are other enemies (predators) that eat them.

Waste water from people and factories contains substances that contaminate the water. There are substances and bacteria that can make fish sick. However, algae in the water sometimes like these types of substances. This can help the algae grow much faster. These growing algae then use all the oxygen from the water so there is nothing left for the fish.

Waste water also contains solid materials like plastic, which doesn't decay. It breaks down into very small pieces of plastic. This is called microplastics. If fish and other animals eat this, they can also get sick from it. Large pieces of waste, such as an old fishing net or a piece of fabric or rope in the water, can entangle marine animals.

## Questions and assignments

1. The fish in the pond is a freshwater fish. What do we mean with the term freshwater fish?
2. There are also saltwater fish. Can you name one?

## Answers

Question 1: freshwater here means that there's no salt in it. It doesn't mean that the water in the pond is fresher. Freshwater fish cannot survive in saltwater, like in the sea.

Question 2: Shark, tuna, cod, plaice. In addition to saltwater fish, there are also fish that can survive in brackish water. That's salt water and fresh water mixed together. You can find this, for example, in estuaries where rivers meet the sea. Migratory fish such as salmon are also adapted to survive in both fresh water and salt water.

## Chapter 6 Dollar Signs

The encounters with the beekeeper and the fisherman made Roundy think. When Bob sits down on the bench for a moment, he bursts out: 'Bob, you have to explain something to me: The beekeeper says we have to take good care of the bees. The fisherman says the same thing about the fish and the water. Why do they have to make a point of saying this out loud? That goes without saying, doesn't it? If animals and the environment are so important to the earth, surely it makes sense for you to take good care of them?'

There's a deep wrinkle in Bob's forehead. Roundy sees it and asks: 'What's happening now with your head Bob? There's a groove appearing!' 'I'm thinking Roundy, that groove is a thought wrinkle.' Bob replies. 'Do you know what it is Roundy? Humans are crazy creatures. They live on a beautiful planet. A planet that gives people everything they need. But they are not always satisfied with that. They want more food, nice things and money. To get those things, they use a lot of raw materials that come from the earth. And when producing food and stuff, waste is released. These are substances that are not good for the environment and the living beings.' He sighs deeply.

'Mom was reading the newspaper this morning. It usually doesn't make her happy because the news is often about less fun things that have happened. This morning, she suddenly laughed. 'Bob' she shouted 'Do you know what a cartoon is? That is a funny drawing, which makes fun of something or someone in the news.'

'Oh,' I said. Why are you telling me that?' 'Because now there is a funny drawing in the newspaper of the President of the United States. He doesn't have eyes, he has dollar signs. Do you understand why that is funny Bob?' 'I too had to think deeply at first and got a groove in my forehead Roundy' Bob laughs. 'It was about putting money first before the well-being of his country, the people and animals who live there.'

'You could cry about it, couldn't you Bob?' asks Roundy. 'You're right about that Roundy,' admits Bob.

'Fortunately, there are also things in the newspaper about people who think differently. People who want to take good care of the earth and its inhabitants. They understand that we need to take good care of this beautiful planet together.'

'That's good to hear Bob. Maybe I should scare that president a little bit. So he bounces through the room just like me! And tell him to take more care of the earth!' laughs Roundy. 'Well' says Bob 'Maybe that's not a bad idea at all! That you cause all world leaders to get a deep groove in their foreheads!' laughs Bob.

### In the drawing (7)

The drawing for this chapter is one of the president of the United States of America. As you can read in the story, it is not a realistic drawing in which the president looks exactly like the drawing.

Sometimes a drawing is very realistic, almost like a photograph.

This is a cartoon. A funny drawing where you make a fool of something or someone, or change reality a little, to make something clear. Often it is used to make you think about something that is happening in the world and in the news.

If you feel the drawing you can find the following things:

A round head with ears on the sides. In the face a few big eyes. These are egg-shaped circles with a dollar sign in them. A dollar sign looks like a snake with two stripes (lines) through it from top to bottom. In this cartoon we have drawn only one line because this is easier to feel.

Currencies have their own symbols. Also our euro. This way you always know which currency is involved. Not every coin with a 1 on it is worth the same amount of money. 1 euro doesn't have the same value as 1 dollar. What a coin is worth compared to another coin is something that can change. This has to do with what is happening in the world.

Because this cartoon concerns the president of the United States, he has dollar signs in his eyes. Our character has a rather unpleasant mouth. It is open with the corners of the mouth facing down, as if he is saying or shouting unkind things.

The message with this drawing is that the president only thinks about making money. And not about the environment. This way of depicting someone who only thinks about money and power is very common in comic books.

## Questions and assignments

1. The United States and France have a president. The Netherlands, the United Kingdom and Belgium do not have a president. They have a Prime Minister. Can you imagine why there is a difference?
2. In much of Europe, the currency is the euro. Do you know any other currencies?

## Answers

Question 1: Countries usually have a head of state and a head of government. Often they are both the same person. In the Netherlands, Belgium and the United Kingdom, the king is the head of state. The Prime Minister is the head of the Government. Heads of state and government are therefore different persons in these countries. The United States and France have no king or emperor as head of state. There's the president, the head of state and the head of government.

Question 2: Pound (United Kingdom) ruble (Russia) crown (Sweden, Denmark, Iceland, Norway). But there are many other currencies in the world with nice names like: pula (Botswana) nafka (Eritrea) and lari (Georgia).

Maybe you'd like to draw a cartoon yourself about something that's in the news.

## Chapter 7 A very nice big bee, don't you think?

Roundy suddenly starts buzzing excitedly again 'Bob, Bob, I see a very beautiful bee! I'm sure it's the queen. She is very big and has very nice wings. Red and yellow with eyes on it.' Bob doesn't understand this. 'A bee is yellow with black. Even the queen bee. Insects do not have eyes on their wings. Come on, we'll ask Mom.' Bob shouts very loudly: 'Mommy! Mommy!' A little later, Mommy comes running. She suddenly stands still when she sees Roundy. It's like she's frozen and her eyes widen in fear. 'Get out of here, you creep!' she shouts, 'Leave Bob alone!'

Bob starts laughing. 'Don't be scared Mom, this is Roundy. He's my friend. He's from outer space. He's sweet. Don't whistle Roundy! I want Mommy to really get to know you' Without Roundy whistling to reassure her, Mommy comes closer. She reached out to greet Roundy. But Roundy doesn't have a hand. Mom laughs 'Oh, that's not going to work. Haha, I'm Dorien, Bob's mother.' 'Hi' says Roundy 'I'm Roundy. What is a mother?' Bob laughs 'I'll tell you later. First we're going to ask Mom what's going on with that special bee.'

Roundy tells us what he saw and shines a ray of light from his eyes on a butterfly in the garden. 'Oh' Mom laughs 'That's not a bee, that's a butterfly!' Now Bob has to laugh too. And Roundy happily bounces up and down from all that fun. Mom says butterflies are insects, just like bees. That they are first a caterpillar and then pupate into a beautiful butterfly. She explains that flowers are so beautifully colored and fragrant because that attracts insects. There is also a sweet substance in the flowers: nectar. Insects like it very much. When they take nectar out of the flower, yellow powder sticks to their legs and body. That powder is called pollen. They take the pollen to the next flower. If that happens, the plant can make new seeds again. New plants can grow out of the seeds. 'This is how nature takes good care of itself,' says Mom.

'Unfortunately, I have heard that people do not always take good care of nature,' says Roundy. 'You're right about that,' says Mom. 'Insects are not doing so well. Some people use poison to make plants grow faster. The insects can't stand that. And people take away a lot of plants and trees because they want to use the land for something else. Some plants also flower earlier than normal due to global warming. And then they're not in bloom when the butterfly is looking for them. Fortunately, there are also many people who take good care of the plants and insects. As we do here in the garden!' Roundy is reassured. He is happy that he has learned even more about the earth. And he has a new friend, Dorien, Bob's mom. Let's find out what a mother is!

### In the drawing (8)

The layout of the page is the same as the drawings of the bee: above the dotted line a front view (showing one side of the butterfly), below a top view (showing the whole butterfly). The body of the butterfly is different from that of the bee. The antennas have small thicker parts on top. The wings are very large compared to the body. Part of the wings has a texture; this butterfly has a reddish color. The edge of the wings has a brownish color. You will find four circles on the wings in the top view (and two in front view). They have bright blue and yellow colors with black; They look like eyes - so predators are deterred!

In the front view: between the antenna and the legs you will find a curled line; that's a tongue. This butterfly can completely hide its tongue and roll it out if it wants to suck nectar out of a flower.

More information about butterflies:

A butterfly is also an insect. Actually, it has 4 wings, even though it looks like it has 2 wings. There are 165.000 species of butterflies, each with their own particularities, colors, design and dimensions. The

smallest butterfly is about 3 millimeters wide, the largest 30 centimeters. Each species of butterfly has a very strong preference for certain flowers. A butterfly with a long rolling tongue, like this one, specializes in flowers with deep calyxes.

## Questions and assignments

1. Each butterfly species has a very strong preference for a certain flower. Why might this be a problem?
2. Cut the top view of a butterfly. You can skip the body, just do the wings. If you fold them lengthwise, both wings are identical. A butterfly is symmetrical.
3. Make air by fluttering with a small piece of paper and with a large sheet. Can you feel the difference? A large wing moves much more and will give more lift than a small folded one. You'll learn more about the movement of air later.

## Answers

Question 1: If such a flower no longer blooms, the butterfly will be hungry. It may be that all the flowers are cut away. Or that too much poison (pesticide) is sprayed, causing the flowers to disappear. It's also possible that a flower blooms at a different time or in a different place because of climate changes. Then it may be that the butterfly doesn't have the flower anymore.

## Chapter 8 A gift for Bob

Bob is sitting on the bench by the house, Roundy is on the ground next to him. The drawing of the bee, which Bob's mother made, lies between them. Roundy's curious. 'I see that your mother has made a good drawing of the bee. I recognize right away what it is. But what is a mother? You ran inside the other day just as I was about to ask you.'

Bob starts talking about people. Children are born as tiny human beings who can't talk or sit or walk yet. They keep on growing until they are adults, learning more and more every day. . Once they are adults, they don't grow anymore. 'Well, they might get broader but they don't get taller', Bob laughs. 'That's why the beekeeper and fisherman are bigger than me, Roundy. They're adults. I also have a little sister. Her name is Ann. She's smaller than me. And just at that moment, a little girl comes hopping by. She stands still in front of the bench and is not at all surprised when she sees Roundy. Bob laughs about it. 'Small children find the whole world astonishing. They believe in fairy tales and do not easily surprised by an alien', he thinks.

Ann says: 'I made you a drawing, Bob! I worked with wool, wood, glue and cardboard so you can feel everything. The horizontal line at the bottom is the ground. And the line in the middle is the horizon, and above that the blue sky with clouds and the sun. The ground is covered in green grass and there is a wooden fence so the sheep can't run away. The sheep walk on one side and I walk on the other side! I made the clouds and the sheep with cotton wool balls. The sun is smiling, it's happy!' 'Thank you Ann, it's beautiful! You make me feel happy too!' says Bob and gives her a hug. Ann laughs and happily hops away. Bob runs his fingers over the drawing to discover everything Ann has told him.

Roundy looks at the drawing and asks Bob 'Would you like to explain a few things to me Bob? Does the sun really have a face? I don't see that when I look at the sun. Does the sun have such rays? Do clouds and a sheep really look like each other? And does Ann only have one eye? Can she hide it? Just like the bee can hide her stinger? What is a horizon?' 'Hold on a minute Roundy' Bob laughs. 'So many questions. Come on, we'll take a look at the drawing together and I'll explain some things to you.' They lay the drawing flat and start talking about it together.

This chapter is accompanied by two drawings:  
Ann's drawing and an explanation of the horizon.

### Ann's drawing (9)

The hard thing about drawing is that you have to display things flat. A sheep is not flat, but on a drawing it suddenly is. You only draw one side of something that has more sides in real life. There are drawing tricks to give the impression that something has more sides. This is called drawing in perspective. But that's kind of tricky. You have to change the form of things which may make it harder to recognise if you're blind and feeling a drawing with your fingers.

Ann has tried to draw everything the way she sees it. But she draws the sun with a face. That's not what you see, but it's something that a lot of kids do. The sun becomes a kind of emoticon. With a happy face and rays. In reality, you can't even look at the sun. Its light is too bright. Ann draws herself as a stick figure. She has drawn her face from the side, with one eye and a nose sticking out. Her other eye is on the side of her face that you can't see in the drawing. On her arms and legs you can feel that she is walking. One leg is forward with her knee slightly bent and the other leg is behind her. Her hair is in a pony tail on the back of her head.

Ann draws a side view of the sheep with four legs. When a sheep walks, that's what you can see from the side. Two legs move forward and two legs remain standing for a while. Ann didn't draw any ears on the sheep, and only one eye. This is also a side view. Sometimes you don't see all the legs in a side view. For example, if the sheep stands still with its front and hind legs neatly next to each other. Then you only see two legs from the side.

A sheep has wool growing on its body and a cloud consists of water droplets. Two very different materials. Still, clouds look a bit woolly from afar, and in this case we are talking about 'sheep clouds' (altocumulus) to indicate a certain type of clouds.

The horizon is actually an imaginary line. It is the line where the earth's surface and the sky seem to touch. You can't see beyond the horizon, making it look like the Earth's surface isn't going any further.

## Drawing of the horizon (10)

It's difficult for Bob to explain the horizon. If you find the story that accompanies this drawing complicated, it doesn't matter. Maybe it's nice to read it and discuss it with someone just like Bob does with Roundy.

If you want to understand this drawing, there are quite a few things you should already know:

- The Earth is Round
- Air is transparent, you can see through it.
- To see, you need light.
- Objects reflect light.
- Sighted people can see when rays of light reflected in their eyes fall on their retina.
- Light rays go straight ahead.
- Such a straight beam of light that reflects back from an object to your eyes can be called a line of sight.
- In a drawing, we can use lines and arrows to show the trajectory of a ball, beam of light or line of sight.

Now you can take the drawing. This is a schematic drawing. On the left you feel a small stick with a ball on it. This represents a person. The person stands on a thick, curved line, that goes downwards. That's the Earth's surface. At the bottom right, at the end of that thick line is a pointed shape that represents a house. You can feel the sloping roof.

Can the person see the house? To find out, a straight dotted line has been drawn. It starts at the person's eye level, touches the earth's surface and then goes straight ahead. This dotted line represents a line of sight.

The horizon is where the line of sight touches the curvature of the earth's surface. The house is hidden beyond the horizon. The line of sight goes over it. The house is there but the person can't see it. There is no light that reflects from the house back to the person's eyes. However, if the person walks forward a long way (in the drawing they would move towards the right), their line of sight will change and they will be able to see the house.

The drawing also shows a cloud in the sky. Can the person see it? Two lines of sight have been drawn from the person to the cloud. Once again these lines are straight. One line goes to the highest point that the person can see. The other line goes to the farthest point. Do you know which one belongs to which?

The part of the cloud that can be felt between the sight lines, that is what the person can see. That's a big part of the front and the bottom of the cloud. The person probably sees something from the side of the cloud. This is a bit like feeling an object where you can scan multiple sides of an object with your fingers.

## Chapter 9 Clouds, fog, thunder and lightning

Bob and Roundy are in Bob's room. Roundy's rocket is on Bob's desk.

'Roundy' says Bob 'Because you ask me so many questions about the earth, I think a lot about our planet. And frankly, I'm worried. We should take better care of the earth.' I think you're right Bob. Remember when I said I wanted to scare that president? Maybe I should just do that. Come on, let's take the rocket and find him!

Bob hears Roundy hovering and whistling near the rocket. 'Come on, Bob, let's get in,' he says. Bob continues to think it's crazy that the rocket fits on the desk one moment and is big enough to get into a moment later. The rocket's technology is very clever. There is no such thing on earth. It reminds him of an exciting book about wizards that he has read, he tells Roundy. In the book a whole tent fits in a handbag. Then Bob hears the rocket landing on the ground again. He carefully goes up the stairs and into the rocket.

The rocket starts to vibrate and Bob feels that he is moving. He thinks it's kind of scary. Roundy reassures him: 'My rocket is safe Bob. I'll tell you what I see. First we flew out in the rocket through your bedroom window. We're flying through the clouds now. You told me that clouds are made up of water droplets. The pond was also filled with water. I could see through that. But the cloud, I can't see through it!' 'Yes', says Bob, I recently learned something about it at school. I got a pretty complicated tactile drawing from the teacher. It has to do with the reflection of sunlight shining from above onto those drops. When we get home, I'll show you the drawing and explain it. Then I can also tell you about mist' 'Mist?' Roundy asks 'What is that?'

'Actually this is also water droplets in the air Roundy. Like a cloud on the ground. So people who can see, suddenly can't see anymore. Haha. That they suddenly miss everything in the mist.'

While Bob is still laughing, he suddenly hears a loud bang and the rocket starts shaking terribly. Bob crashes into something and makes a cry. He rubs the sore spot on his arm. That's gonna be a big bruise.

And he hears Roundy crashing into the walls of the rocket. Fortunately, the walls are soft, so this sounds like soft knocking, from one side to the other side. Roundy emits a nervous whistle and his eyes start blinking in all colors: 'Uh-oh!' 'What's going on?' they shout in chorus. 'I also saw a flash of light' says Roundy in a trembling voice. 'Help!'

'I think we're flying through a thunderstorm Roundy.' says Bob. 'Another thing to explain!' 'But first, let's hope my smart rocket knows what to do' says Roundy. 'There are no thunderstorms on my planet!'

This story is accompanied by three drawings

### In the drawing (11) – waterdroplets and reflection

Here you will find the drawing that Bob got from the teacher, and that he found difficult. The small circles you can feel are water droplets. The dotted lines with arrows are rays of light coming from the sun. As you have already learned, light rays travel in a straight line until they hit something. Then they bounce back and continue in a straight line. But here too, the collision law that you learned when bouncing the ball applies.

Because the water droplets are round, the light rays are not all reflected in the same direction. If the ray hits the centre of the droplet exactly, it will bounce back in the direction it came from. But if it lands at a slight angle on the curve, it will bounce back at an angle.

You can feel this on the drawing:

- As a result, the first ray on the left, hits the droplet at an angle and bends off to the left.
- The second ray in the middle doesn't collide with a droplet, so it continues in a straight path.
- The third and last ray on the right bumps into a droplet first and bends to the right. Then it bumps into another droplet and changes direction again.

It's like the rebounding ball in the garden. That's why Bob finds dribbling so difficult! If his hand does not push the ball straight down, or if the ground is not level, the ball will bounce back in a different direction.

The water droplets reflect a lot of light rays back up again. In this way, they also stop some of the heat from the sun getting to the ground. That's why they cool the land and the sea below. There are trillions of droplets in a cloud and they are all moving around constantly. So you can imagine that the rays of light from the sun go in all directions.

There are many different types of clouds. Sometimes they hang low in the air and sometimes very high. Sometimes they are very thick and sometimes very thin.

Because the clouds at the top reflect more light, they are whiter there. At the bottom there is less light, so the cloud looks a bit darker there.

If you fly a rocket or plane above the clouds, you will see a bright white landscape below you.

## In the drawing (12) - mist and fog

When you fly in a cloud, it's a bit like being in the mist or fog on Earth. Mist is actually a cloud on the ground. It feels cold and wet when you're outside, walking through it. The droplets in the mist are between someone and the things around him/her. Because all those droplets reflect light rays, there are no more light rays from the things around us to reach our eyes. Very dense mist is known as fog. In fog it's less likely that another ray of light, reflecting off objects around us, will reach our eyes. And without reflective light, we can't see an object.

Seeing is very different from feeling. With these two drawings we want to give an impression of what mist or fog means for sighted people. Roundy is drawn in the mist at the top of the page. Can you still feel him? Can you find his eyes? And his pupils? This is probably difficult to feel. All the small drops make it confusing.

In the lower drawing, Roundy is drawn in the fog which is much denser. There are many more water droplets around Roundy. Can you find him now? It's hard, isn't it?

If you can see, Roundy's face is still easy to find. To experience fog with your fingers, close your eyes when you feel this drawing!

The pond consists of much more water and yet you can see through it. That's because the water droplets have all joined together. There is no more light that is reflected in all directions as in the clouds or the fog.

## Question

Have you ever been outside in the mist or in the fog? Did you notice, for example, that the air felt different or that something was happening with the sound around you?

## In the drawing (13) - thunderstorm

You have already read that there are many different types of clouds.

In this drawing, there are two types of clouds. On the left there is a sheep cloud (Alto cumulus). This type of cloud can grow very quickly, becoming very wide and high. Sometimes up to 18 kilometers! On the right you can feel an example of a group of clouds piled on top of each other.

When a cloud grows rapidly, warm humid air rises. High up in the atmosphere it is very cold. Water droplets can grow larger all the way up in the cloud and can even freeze! The growing water droplets or ice crystals become so heavy that they can no longer stay in the air. They then fall down as rain or hail.

Because the warm air in the cloud flows past cold air, friction occurs. Friction means that two substances rub together. Because of this friction, the cloud is electrically charged, just like with a battery. The electrically charged cloud then wants to discharge again, just like a battery that runs out. The cloud then shoots a bolt of lightning out of the cloud, looking for a path to another cloud or to the earth. Because a spark has to find a path, it always looks branched and spiky. The journey from the spark to Earth takes less than half a second! It really happens in a flash! You can feel the bolt of lightning with its branching underneath the cloud.

What you hear in thunderstorms is thunder. The air around a flash suddenly becomes very hot and then expands with a loud bang. It's like an explosion in the cloud!

Because light rays travel through the air much faster than sound waves, you see the flash rather than hear the thunder. The further away the thunderstorm, the greater this difference. That's why you know that thunderstorms get closer as the time between the flash and thunder gets shorter.

## Question

Are you afraid of thunder? If so, what are you afraid of? Does it help if you understand what happens when there is thunder?

## Chapter 10 A smart rocket

Bob notices that the rocket is quite smart when he suddenly feels something slide under his bottom. 'Bob you can sit down.' says Roundy. 'Then you won't bump into anything.' Bob carefully lowers himself onto the seat. It feels nice. Soft and safe. Armrests slide under his arms, which feel as soft as his cuddly toy at home. He gently strokes it with his fingers. He is a bit startled when he suddenly feels something on his shoulders and chest and hears a click. Roundy sees it and says: 'That's the seat belt that is closing. Nothing more can happen to you!'

Then Bob senses that something is happening to the rocket. Looks like something's tipping over. 'We are now going to fly horizontally' says Roundy. 'Then we'll come out of the thundercloud and we won't go any further up into space. We'll still be in orbit. The rocket will keep you upright, tilt your seat. He's really smart!' Reassured, Bob sinks a little further into the seat.

'We're out of the cloud, Bob. We're flying above water. In it I see a yellow oval shape with figures on it. Squares and a kind of star.' Bob doesn't understand much about it. 'Raket, I want to take a closer look at that' says Roundy. Don't worry Bob, we're going to paraglide!' The rocket tilts again until it points upwards and the engine stops. The rocket starts to go down and Bob is a bit startled. Are'tnt we going to fall now that the engine has been turned off? But Roundy reassures him: 'A sail is now emerging, Bob, a parachute. The parachute folds out in the wind. It turns into an arch shape above the rocket. The rocket hangs underneath, tied with strong ropes to the sail. The parachute is divided into many compartments (parts) that look like tubes. They ensure that the parachute goes up even higher when the wind comes under it, so that the rocket does not go down but glides further. That's a nice feeling.

All of a sudden Bob senses that they're going up fast. 'We are entering an area of warm uplift' says Roundy. That moving air now comes under the parachute and makes the rocket go up again. The rocket starts to swing on the ropes and Bob gets a bit nauseous. Fortunately, it doesn't last very long before the rocket slowly goes down again.

The engine starts to hum gently to slow the speed down a bit. And then the rocket lands with a jolt in the middle of the ocean, on a yellow oval. What could that be?

### In the drawing (14)

At the top you can feel the rocket hanging from the parachute. The round shape you feel is the front view of the sail of the parachute. The stripes you can feel on it indicate the air compartments.

On the right end and left end of the parachute you can find diagonal dotted lines at the bottom of the sail. These are the ropes on which the parachute hangs. A rope often doesn't feel smooth either. This is because in order to make a rope strong, several thin ropes are often twisted around each other.

Between the ropes you can feel the rocket. What kind of view is this?

Below the dotted line you can feel a different view of the sail. Do you know what kind of view this could be? It's a top view.

What could you call this form? It's almost an oval. Almost, because? On the sides, the shape is not rounded but straight. Can you feel this?

You can also feel the compartments again. Are they all the same length now? Why or why not?

In this chapter you can read that warm air goes up. In winter, the temperature of the sea is often higher than that of the wind coming from the land. Especially when the wind comes from the north where it is very cold. Warm humid air rises from above the sea. When that air goes up, it cools down and forms water droplets. These droplets form clouds, which cause rain or snow showers over the land.

## Questions and assignments

If you could design a smart rocket, what smart thing would you want it to do? Explain why you want the rocket to be able to do that.

When you walk up the stairs in a building, have you ever felt that it was getting warmer the higher you went up? What is that an example of?

## Chapter 11 A yellow oval

Bob and Roundy go outside. Bob smells the sea and hears waves rolling. If he walks a bit, it is quite heavy because his feet are falling away. Bob bends down to feel if what he thinks is true: Yes! He is standing with his feet in the sand. He takes off his shoes because he loves to walk in the sand with his bare feet. 'That yellow oval of yours Roundy, that's an island. The sand is a bit yellowish in color I think. Is that right? But what did you say about figures?' 'Yes, from above I saw squares and a star. But now that I'm floating here, things look different. I see a house, a shed and a tree. Let's go there'. Under the palm tree is someone in a beautiful Hawaiian shirt with brightly colored flowers. Roundy starts humming softly again. Yet the man is startled when they suddenly appear before him.

'Huh!' he shouts and throws the coconut he was holding into the air. It bounces into Roundy and falls onto the sand with a dull thud and is immediately still. Roundy also shouts 'Huh!'. Then they start laughing. Bob wants to know what's going on. He has heard that someone is there and he tells them who they are and that he has not been able to see what happened. 'Pleased to meet you' says a deep voice. 'I am Kimo and I am waiting here for the boat to leave the island. It used to be a large island with a lot of inhabitants. Due to the rising sea level, the island has become smaller and smaller. It was getting warmer and there are no longer enough fish in the sea to catch. I'm the last resident. So I wasn't expecting anyone and scared your friend into headbutting a coconut.'

'Oh' Bob says a bit gloomy 'Sea level rise, I heard about it in school and on the children's news. On very high mountain peaks there is always snow, permanent snow. But it's declining and there is less and less of it. At the North and South Poles, snow and ice are melting. As a result, less light is reflected and it becomes warmer on earth. Also, a lot of CO<sub>2</sub> (known as greenhouse gas) escapes when the frozen earth thaws. It forms an invisible blanket around the earth, causing it to heat up further. And all that meltwater makes the sea fuller and the water levels rise.

'Yes' says Kimo. 'And because in some places it is much drier and hotter, there are large forest fires. When plants and trees burn, a lot of CO<sub>2</sub> is released, and because the plants and trees are no longer there to provide shade, it gets even warmer. People cut down a lot of forests to use the land for something else.' Kimo sighs: 'People make a mess of it. Heads of government are not doing enough to make things change.'

'That sounds familiar. I think we should give those heads of government a big scare. And to make sure that everyone takes better care of the earth' says Roundy. He starts whistling eagerly as he bounces with excitement.

'I'm curious, but first I want to put my feet in the sea' says Bob. When that's done, Bob and Roundy go into the rocket. Kimo stays in the shade, leaning against the trunk of the palm tree, his eyes closed, waiting for the boat.

### In the drawing (15)

The drawing is divided into two parts. At the top you will find a side view that shows how the seabed and the island merge. It is at the same time a kind of cross-section of the island. From left to right you can feel the thick line of the ground rise and fall again. It starts under water, rises above the water and disappears under water again. The water is indicated with a dotted texture and a small wavy line on top.

On the part that rises above the sea, the island, you will find what is probably a shed (a square), a house (with a slanted roof) and a palm tree: a tall trunk with long leaves that grow all around from the crown.

But on the left and right you will find buildings that are under water. They don't have a dotted texture, so you can feel them well.

To the right of the island, past the palm tree there is one house that is still half above and half below sea level.

Now move your hands down. Below the dotted line you will find a top view of the situation.

Roundy saw this from the rocket and described it as a yellow oval with figures. The oval is the part of the island that still rises above the sea.

The houses under water have a dotted line. This feels like a small hole. The house with the upper half above water has a solid line around it. But it's not drawn on the oval even though it is still standing.

You feel it better, just as you would see it better if you flew over it (and if you could see).

## Questions and assignments

1. How do you think the ocean floor will continue on both sides?
2. Is this a realistic drawing?
3. If you fold the drawing along the dotted line in the middle, you can leave the top view flat on the table, and put the side view upright. That's actually how you should see it spatially.

## Answers

Question 1: This is the last highest point of the island above the water. Probably the seabed goes further down on both sides or maybe the seabed changes, moving up and down so that other areas rise above the water.

Question 2: No, this is a diagram, which shows the principle of how islands come out of the water. Or disappear into it.

Mountains and islands are never really symmetrical that are exactly the same on both sides. They have odd shapes, with peaks and gorges.

The seabed has just as erratic shapes with bumps and holes.

## Chapter 12 A meeting – in the water

‘What's your plan?’ asks Bob. ‘I heard your mother talk about a meeting of ministers and presidents of the world. It is now being held in New York. My rocket will be able to find that meeting.’ says Roundy with conviction.

As soon as they get in, the rocket takes off. First straight up and then in a horizontal orbit around the earth. Then Bob feels and hears that the landing is coming. The engine goes off and they rock under the parachute again; he knows this now.

When they land and get out, Bob is startled by the noise and smells. He pauses for a moment to get used to it. He hears traffic, honking, and then someone bumps into him. Sounds come from all sides. It smells like exhaust fumes and waste. This must be New York. ‘Come on’ says Roundy ‘We have to keep going. There's no time to waste. Careful Bob, a revolving door.’ Too late: Bob wants to walk on and bumps into the door, which immediately stops moving. He has to stand still and wait before the door starts turning again. When Bob arrives, he learns that they are in a large building.

‘Listen Bob, don't be scared right away. You're going to meet another Roundy! We're gonna shake things up inside! Follow me, listen and feel.’

They go through another door and Bob hears Roundy floating away. Instead of reassuring humour, Roundy starts to roar. ‘Have you gone completely crazy? You're not world leaders, you're world destroyers. You're not taking good care of this beautiful planet! It's getting warmer all the time!’ As he hears this, Bob also strangely feels that it's getting warmer. ‘Sea level is rising!’ and Bob feels his feet getting wet. Roundy comes hovering next to him and says grinning softly: ‘Come on, Bob, you're going to hover, and Bob feels his body lifting up, next to Roundy. Bob doesn't even bother to understand how this can be possible. After all, Roundy is an alien with special abilities.

Meanwhile, the world leaders have become deathly silent and the water level in the room rises, right up to their lips. They start treading water or clinging onto floating furniture. ‘Feel what you are doing. For in your air-conditioned houses and large gardens you will not notice it! Everything here will only return to normal once you have made agreements that will really change things!’

Bob hears sloshing water, roaring, splashing and frightened cries. Then he recognizes the voice of the President of the United States. ‘Listen, all of you: We really need to take care of this. Otherwise we will disappear into the water. Just like the pieces of land.’ Bob and Roundy hear others muttering in agreement. ‘Come on, Bob, we're going to explore New York. We'll come back here when they've sorted this out.’ At the door, Roundy shouts out: ‘I will come back if you have good plans!’

They're leaving the water treading world leaders behind. Back in the hall they hear that the door of the room is being tampered with. But it won't open.

In the meeting room, now full of water, the world leaders agree much faster than usual. They have a common interest. They listen to each other and make agreements to really stop further global warming. When Roundy and Bob return, the struggling world leaders present a good plan. Slowly the water level drops. Bob is on the ground again. The world leaders are so exhausted that it is completely silent in the room. A few are shaking in their underwear because they've taken off their wet clothes. It's also getting less warm in the room.

Then Roundy says: ‘Well done! So you can do it! Now you can carry out this plan. I'm going back to my planet. But I'm watching you! If you don't take better care of the earth, I'll come back. So make sure you can swim well and always have a life jacket on your chair. Haha!’

Smiling, Bob walks out of the room next to a floating Roundy. They fly off to Bob's house. Roundy's gonna be here for a while. Dorien reads the newspaper reports every day. They are hopeful. If everyone does their best with small things, a lot can be achieved. With peace of mind, Roundy can say goodbye to Bob and to Earth. Although ... does Roundy have a heart? Will he have to come back again? Or maybe Bob's going to Verdian?

## Questions and assignments

There is no drawing in this story. You can make one yourself if you like. The chapter lends itself well to making a cartoon. You can also create a series of scenes from the story. Then you'll have a comic book.

Roundy has saved the earth from danger. I hope he doesn't have to come back. Although Bob would like that.

Of course, it is important that the governments take measures to prevent further global warming. But we can also do our best by taking small steps.

Can you name a few things that are good for our environment? Are there things you can do yourself?

## About this book and Project Tacticos

This book was developed by Project Tacticos. We hope you enjoyed it! You can find all the information about the project at <https://tacticos.eu/>. This website is intended for adults.

Many people contributed to the creation of the book Roundy. Here are some key contributors:

- Dorine in 't Veld (Dedicon) developed the first version of the drawings, along with the story and explanations.
- Robin Ottens (Dedicon) transformed them into beautiful tactile drawings.
- Brenda Zwijnenburg (Visio) crafted engaging stories from them.
- Ann Conefrey (consultant) reviewed the text and English translations.
- Lucie Lebreton and Françoise Legal (VYV3) reviewed the French translation.
- Céleste Wybaillie (De Kade, BuBaO Spermalie) made the Flemish translation.

Tacticos is an Erasmus+ project involving five organizations: VyV 3 and Les Doigts Qui Rêvent from France, Visio and Dedicon from the Netherlands, and De Kade from Belgium. The project's main goal is to develop recommendations for the ideation, production, and use of illustrated tactile books. These recommendations address the didactical, creative, technical, and financial aspects of creating tactile books and illustrations.

In addition, Tacticos has produced examples and resources for VI professionals, parents, and caregivers to guide children in reading and exploring tactile illustrations. These materials aim to help children recognize and understand illustrations through touch.

By connecting users and producers, the project strives to ensure the ongoing development and production of high-quality tactile books. Through this initiative, Tacticos aims to promote equal access to books for visually impaired children and foster inclusion.

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