



# Living Room Marvels

### Conceptual introduction

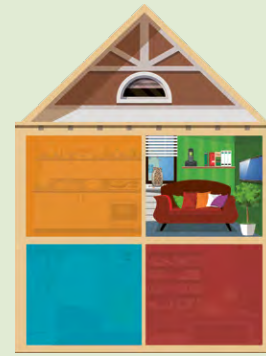
The chapter 'Living Room Marvels' is roughly divided into three parts, which can be done all together or separately.

In the first story, 'Lilu, Alina and the beans', Lilu and Alina discover how beans can jump out of a glass by themselves and other characteristics of legumes (→ page 56). There is also the possibility to cook bean soup with children. This can serve as a transition to the kitchen unit (→ page 36).

In 'Lilu, Alina and the sofa' (→ page 58) a leg of Lilu's favourite sofa breaks. The children can discuss what could make the sofa so comfortable and what would happen if someone sits on the broken sofa. In addition, the children can think about solutions to get Lilu a great sofa again. When Lilu and Alina decide to bring the sofa to a carpenter, they first need to move it out of the living room and through the house. This story is about pushing and pulling the sofa over different surfaces. The children explore the phenomenon of friction and how different conditions – i.e. the type of floor, if the sofa has legs or not, etc. – influence how difficult it is to push or pull the sofa (→ page 59).

In the last part of the chapter, Lilu and Alina want to rearrange the living room but some of the furniture is too heavy for them to move. They decide to make a drawing of what the room should look like. Following the story, children learn how to draw a floor plan of the living room to scale (→ page 60). As plants are often also part of the living room furniture, children discover experiments on requirements for plant growth (→ page 62).

► You can find the plain texts and dialogues as well as the room outline in a printer-friendly version online.<sup>[1]</sup>



# Lilu, Alina and the beans

## SUMMARY

By doing an experiment, the children help Lilu and Alina to find out why the beans suddenly start falling off the windowsill. Furthermore, the children have to find a way to sort different types of beans.

## LEVEL

●○○ easy

## DURATION

4 × 45 minutes (observation time: 1 day)

## VOCABULARY

adjectives to describe beans, food items, utensils, numbers

## MATERIAL

worksheet A – The swollen beans<sup>[1]</sup>

- ▶ glass jar of different dried beans (e.g. red kidney beans, pinto beans, cannellini beans, borlotti beans)
- ▶ water

worksheet B – Bean soup<sup>[1]</sup>

- ▶ computer with Internet connection
- ▶ cooking equipment (e.g. knife, cutting board, pot, spoon for cooking, blender, sieve)
- ▶ ingredients for bean soup (e.g. butter beans, radish, carrots, onions, garlic, butter, tomatoes, broth, water, salt, pepper)

**⚠ Safety!** Be careful not to cut yourself or get burnt while cooking!

worksheet C – Different sorts of beans<sup>[1]</sup>

- ▶ pouch of different kinds of beans
- ▶ sieve

Lilu is sleeping on his sofa. He is dreaming about a nasty, green monster. He is hunting it. He follows the monster into the dark cellar. Then he hears a noise: 'PLOP.' And again: 'PLOP.'

## ! Stop and jot down!

What might Lilu have heard?





Suddenly, Lilo wakes up. He listens. There it is again: 'PLOP. PLOP.' Is the monster here in the room? 'Nonsense,' Lilo thinks. 'I only dreamed about the monster.' 'PLOP.' Lilo turns on the light. He looks around. 'Why are the beans on the ground? They were in a glass on the windowsill.'

Quickly he calls for Alina to come. Together they watch one bean after another drop out of the glass to the ground. Carefully, Alina reaches for the glass. 'The glass is damp!' Alina says. Lilo comes closer and looks at the glass. How has the water come in? Alina wipes her hand over the windowsill. It is also damp. 'It has probably rained through the gap, and the rain has collected in the glass with the beans.'

### ! Stop and experiment!

Is it possible that the rain has something to do with the beans dropping from the glass? Help Lilo and Alina to investigate. Use worksheet A – The swollen beans.<sup>[1]</sup>

### Background information: Dried legumes

Dried legumes can absorb water equivalent to 2.5 times of their own weight while soaking and boiling. This means, if you fill a glass with beans and let them absorb water, the beans will swell up, pushing the beans on the top out of the glass.

Alina and Lilo bring the soaked beans into the kitchen. They have the idea to make a tasty bean soup.

### ! Stop and cook!

Make a bean soup. You can use the recipe on worksheet B – Bean soup<sup>[1]</sup> or you can search for a recipe online. You could also ask a grown-up to teach you about healthy food and good meals. If you want to eat bread with your soup, have a look at the kitchen unit (→ page 43).

Alina pokes around in the closet to find something for dessert. 'Oh, look here!' Alina says enthusiastically. 'Here are lots more beans. Let's see how many types of beans are in this pouch.' 'Could you hand me a sieve please? Then we can tip the beans in it. Maybe we can separate the different varieties like this.'

### ! Stop and discuss!

Is it a good idea? Do you have another idea?

### ! Stop and investigate!

Help Lilo and Alina find out how many kinds of beans are in the pouch. Use worksheet C – Different sorts of beans.<sup>[1]</sup>

Further ideas for finding out how many types of beans are in the pouch could be to sort them according to their size, colour, shape and feel.

# Lilu, Alina and the sofa

## SUMMARY

In this chapter, Alina jumps on the sofa, whereupon one leg of the sofa breaks and Alina and Lilu fall down. Afterwards, they try to push and pull the sofa out of the house to a carpenter. In relation to this, the children investigate the effect of friction on different surfaces.

## LEVEL

● ● ● medium

## DURATION

4 × 45 minutes

## VOCABULARY

different surfaces and materials, adjectives to describe the look and comfortability of sofas

## MATERIAL

worksheet D – The broken sofa <sup>[1]</sup>

- ▶ counter/game piece
- ▶ doll's house sofas with short and long legs or alternatively build your own sofa with a piece of wood and e.g. matches or bottle corks as sofa legs
- ▶ glue

worksheet E – Push or pull on different surfaces <sup>[1]</sup>

- ▶ different furniture that can be pushed and pulled on different surfaces (e.g. chairs, tables)

worksheet F – Friction <sup>[1]</sup>

- ▶ wooden board
- ▶ ruler
- ▶ block (e.g. eraser)
- ▶ pen
- ▶ strips of different materials (e.g. tissue paper, tracing paper, leather, sandpaper, plastic)

Lilu is sitting on his favourite sofa. It is wonderfully comfortable. Lilu likes to sit there and read his books all day long.

## Stepping

What makes the sofa so comfortable? What do you think?



**Word cards**

Gather adjectives to describe materials and properties, nouns for components and construction.

Then Alina rushes in. Enthusiastically, she jumps on the sofa, all in a hurry to tell Lilu about her adventures on the playground. Bang! A leg of the sofa breaks. Lilu and Alina tumble to the ground.

**Stop and jot down!**

Why did Alina and Lilu fall off the sofa? What do you think will happen when Lilu sits on the sofa again? Use worksheet D – The broken sofa.<sup>[1]</sup>

Alina looks guiltily down at the ground. Lilu weeps bitterly. His favourite sofa is broken. Where is he going to read now? He wants his super sofa back.

**Stop and talk!**

What do you think Alina and Lilu can do? Make a drawing and discuss your solution with the rest of the class.

Lilu and Alina decide to take the sofa to the carpenter. He should repair it, so that Lilu can have his favourite sofa back again. Together they try to push the sofa to the door. 'That's so hard! Perhaps we should try to pull it,' Alina says.

**Stop and jot down!**

What is more difficult: pushing or pulling? Try it out and write down your answer.

Finally, the two decide to pull the sofa through the various rooms to the apartment door. The living room carpet is thick and fluffy, the library has only a short pile carpet. Then there is the hallway with its laminated floor and the kitchen with a tiled floor.

**Stop and ask!**

Is there something we can explore? How should we do that? Use worksheet E – Push or pull on different surfaces.<sup>[1]</sup>

The following things could be explored:

- ▶ Which room would be the most difficult to push or pull the sofa through?
- ▶ Does the manufacturer of the sofa have any influence on how difficult it is to push or pull the sofa through a room?
- ▶ Does it make any difference whether the sofa has legs or not?
- ▶ What materials could the legs of the sofa be made from and does it influence how difficult it is to push or pull the sofa through the various rooms?
- ▶ Is it harder to push a sofa when one of the legs is broken? Why?

**Stop and experiment!**

Design an experiment to compare friction on different surfaces. You could be inspired by worksheet F – Friction.<sup>[1]</sup>

**Background information: Friction**

The force due to friction between an object and the ground depends on the weight of the object and on the characteristics of the surfaces (meaning the surface texture of the object and the ground). The friction does not depend on the size of the frictional surface. Therefore, it does not make any difference if a sofa has narrow or wide, short or long legs. The friction is the same in all cases.

So which method is easier: pulling or pushing? When pushing the object you press against it – when the object is lower than you, you push downwards slightly. This vertical component of the applied force adds to the weight. When pulling, however, when the object is lower than you, some of the applied force acts upwards, thus reducing the weight. This means: pulling is easier than pushing. Exception: When the applied force acts horizontally, e.g. when you move a big closet, there is no difference between pulling and pushing.

# Lilu, Alina and the rearranging of the living room

## SUMMARY

In this chapter, the children use their own steps to measure while working with scaling. Moreover, they try to find out what plants need and what characterises them in different parts of the world.

## LEVEL

●●● difficult

## DURATION

6 × 45 minutes (observation time: 1–2 weeks)

## VOCABULARY

measurement, floor plan, furniture

## MATERIAL

worksheet G – Measuring with steps<sup>[1]</sup>

worksheet H – Furnishing<sup>[1]</sup>

- ▶ scissors
- ▶ glue

worksheet I – What do plants need?<sup>[1]</sup>

- ▶ two identical plants in two similar pots
- ▶ water
- ▶ tape
- ▶ transparent plastic bag
- ▶ black plastic bag

worksheet J – The plants of the world<sup>[1]</sup>

- ▶ copier that can enlarge
- ▶ computer with Internet connection
- ▶ printer

Lilu is looking out the window. Since it is raining, he decides to call Alina and invite her over to play indoors. About five minutes after he hangs up, the doorbell rings. It is Alina. She has been running the whole way, trying to avoid getting wet. But her clothes are so wet that she probably should have had an umbrella or worn rain clothes.

Alina and Lilu go into the living room. 'Sometimes, I just hate the rain,' Alina says, shaking her head trying to get her hair dry. 'Sometimes, I actually love rain,' Lilu says.

### ! Stop and jot down!

What can we do that is fun in the rain?



'I like to play in the mud and love to jump in puddles,' Lilu says and continues: 'But for now we can stay here and play. What do you want to do?' 'I don't know. What do you think?' Alina asks. 'When my mother gets bored she always rearranges the living room. We could do that.' 'That sounds fun and it would be a nice surprise for your mother when she comes home from work. Let's do that!' Alina says. 'I think we should start with the sofa. Let's put it under the window.' Alina and Lilu start pulling and pushing the sofa, but the sofa does not move an inch. 'Wow, it's heavier than I thought,' Lilu says. 'I don't think we'll be able to move it by ourselves.' 'What about just making a drawing of how we think the room should look like? Then your mum and dad can help us move the furniture when they come home,' Alina suggests.

Lilu finds squared paper and draws a floor plan of the living room. He marks the windows and the doors and draws a sofa in front of the window. 'No, no, it's all wrong!' Alina says.

### ! Stop and jot down!

What is wrong with Lilu's floor plan (see picture)? Do you have any ideas for making it better?

'The sofa is way too big. If you draw all the furniture that size, there won't be room for it all,' Alina says and continues: 'We need to draw everything to the same scale.' 'How do we do that?' Lilu asks. 'We could use our steps to measure,' Alina says and takes some steps along the sofa while counting 1, 2, 3, 4, 5. 'It is five steps long and almost two steps wide. Let's say that one

step equals the side of a square on the paper. If you cut out a  $2 \times 5$  rectangle, we have a model of the sofa.' 'That makes sense,' Lilo says and continues: 'Let's use our steps to measure all the other furniture and of course the size of the room.'

### ! Stop and measure!

Use worksheet G – Measuring with steps<sup>[1]</sup> and measure your classroom and all the furniture in it with your steps. Furthermore, you could try to rearrange your classroom on paper. The best way to do this is to cut out paper models for the furniture. The worksheet H – Furnishing<sup>[1]</sup> can give you some ideas.

'Done!' Lilo happily says while placing the last chair on the outline of the living room. At the same time, Lilo and Alina hear the front door opening. Lilo's mother is home from work and both children run up to her, eager to tell her about their idea of rearranging the living room.

'Hello Lilo. Hello Alina. What have you been up to today?' Lilo's mother asks. 'We have rearranged the living room,' Lilo says proudly. 'You have what?' Lilo's mother asks, a worried look on her face. Quickly Lilo's mother goes to the living room, but when she looks inside, she seems relieved: 'I think the living

room looks like it did this morning.' 'Yes, we couldn't move the sofa on our own, so we decided to do the rearrangement on paper,' Lilo explains. 'That's a clever idea,' Lilo's mother says. 'Let me look at your ideas then.' Lilo shows his mother their drawing and explains how they made sure all the measurements were to the same scale.

### ! Science Talk Ball

Help Lilo to explain the measuring using your own words. [Detailed information on this method can be found in the library → page 68]

'What is that?' Lilo's mother asks, pointing to a circle placed behind the door. 'That's one of the plants,' Lilo says. 'That can't be put there. The plant won't get any sunlight, but you can put it here,' Lilo's mother says pointing next to the sofa and continues: 'Think about the needs of plants. If you look on the Internet, you'll find a lot of interesting experiments about the needs of plants.' 'We don't need to,' Alina says. 'I have my own idea to test how the lack of sunlight affects a plant. We only need two identical plants in two similar pots and two plastic bags – one that is transparent and one that is black.'





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**! Stop and experiment!**

What do plants need? Discuss and design one or more experiments to test your hypothesis (a hypothesis is what you expect). You could e.g. test the influence of light, temperature, water or nutrients. For inspiration, look at the experiment on worksheet I – What do plants need? <sup>[1]</sup>

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After setting up the experiment, Lilo turns on the TV. By chance, there is a show about plants around the world, which the two children decide to watch. Lilo says: 'Wow, I've never really thought how different plants are. Even though a plant can't speak, its needs actually reveal which part of the world it's from.' 'Yeah, it's so cool,' Alina says and continues: 'Wouldn't it be fun to make a poster that shows how different the plants of the world actually are?' Just at that moment, the phone rings. It is Alina's mother telling her to come home for dinner, but perhaps on another rainy day, the children can make the poster.

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**! Stop and discuss!**

Discuss why the same types of plants do not grow all over the whole world.

Use the Internet to find pictures of different plants from different parts of the world.

You could also make a poster with pictures of plants around the world by getting your teacher to make an enlarged copy of the world map on worksheet J – The plants of the world <sup>[1]</sup> and place images of different plants on the places they are from.

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**References**

**[1]** All additional materials can be downloaded at [www.science-on-stage.de/additional\\_materials\\_lilus\\_house](http://www.science-on-stage.de/additional_materials_lilus_house)

# Imprint

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Lilu's House: Language Skills through Experiments

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