EXPERIMENT MANUAL

# GECKO RUN

## MARBLE RUN STARTER SET

DELUXE

Nano-ADHESIVE PADS


STARTER SET

+

TRAMPOLINE EXPANSION

+

LOOP EXPANSION

+

ADDITIONAL FUNNEL & LEVEL

THAMES & KOSMOS

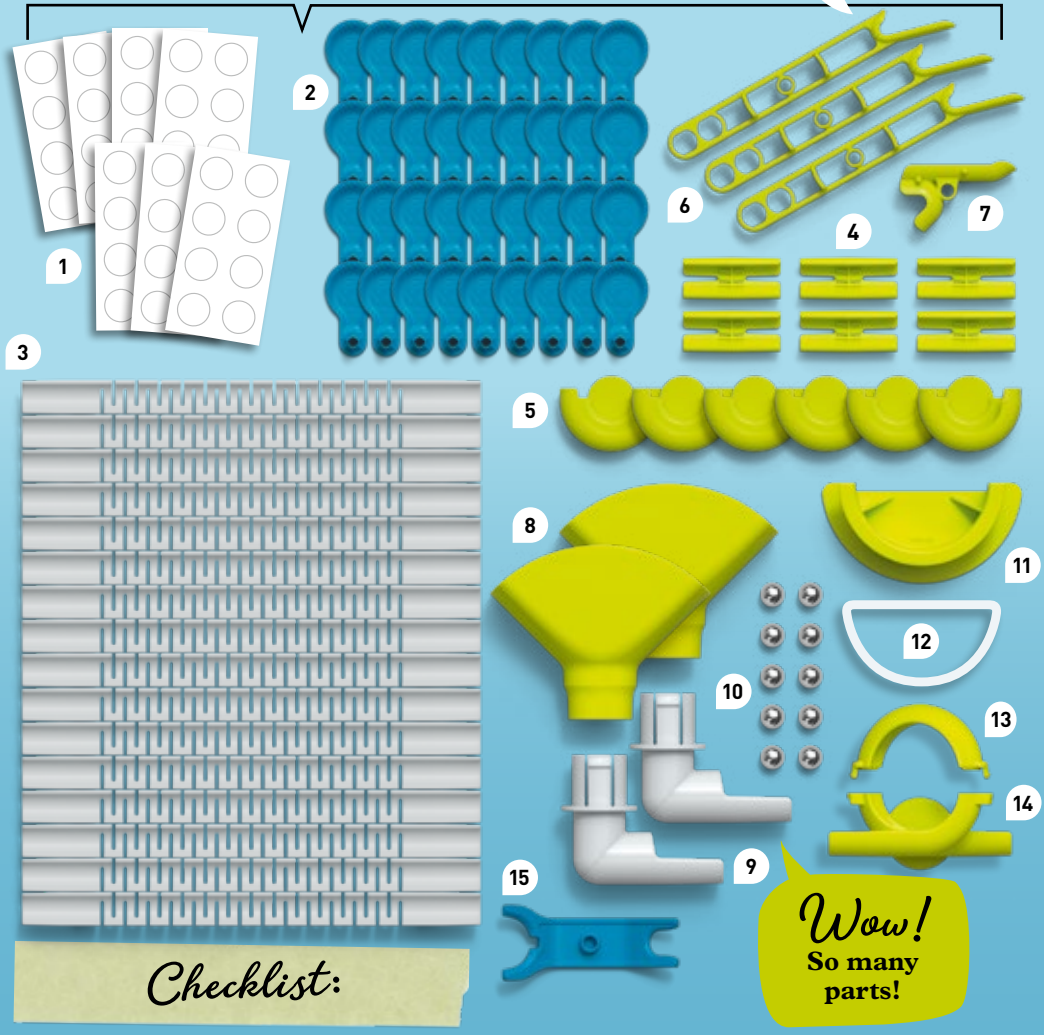
Franckh-Kosmos Verlags-GmbH & Co. KG, Pfizerstr. 5-7, 70184 Stuttgart, Germany | +49 (0) 711 2191-0 | www.kosmos.de
Thames & Kosmos, 89 Ship St., Providence, RI, 02903, USA | 1-800-587-2872 | www.thamesandkosmos.com
Thames & Kosmos UK LP, Cranbrook, Kent, TN17 3HE, United Kingdom | 01580 713000 | thamesandkosmos.co.uk

## KIT CONTENTS

*Good to know!*

**You can reorder extra nano-adhesive pads and metal marbles from our website.**

### What's inside your experiment kit:




*Checklist:*

| ✓ | No. | Description | Quantity | Item No. |
|---|---|---|---|---|
| ○ | 1 | Sheet with nano-adhesive pads | 7 | 726192 |
| ○ | 2 | Adapter | 36 | 726603 |
| ○ | 3 | Track | 16 | 726605 |
| ○ | 4 | Track bridge | 6 | 726606 |
| ○ | 5 | Track turn | 6 | 726607 |
| ○ | 6 | Lever | 3 | 726608 |
| ○ | 7 | Switch | 1 | 726609 |

| ✓ | No. | Description | Quantity | Item No. |
|---|---|---|---|---|
| ○ | 8 | Funnel | 2 | 726610 |
| ○ | 9 | Funnel outlet | 2 | 728311 |
| ○ | 10 | Marble | 10 | 726604 |
| ○ | 11 | Trampoline frame | 1 | 726643 |
| ○ | 12 | Trampoline band | 1 | 726644 |
| ○ | 13 | Loop top | 1 | 726660 |
| ○ | 14 | Loop bottom | 1 | 726647 |
| ○ | 15 | Gecko Tool | 1 | 728205 |

*Wow!*
**So many parts!**

## CONTENTS



**TIP**

YOU WILL FIND ADDITIONAL INFO IN THE CHECK IT OUT SECTIONS ON PAGES 13 – 16.


**WARNING!**
Not suitable for children under 3 years. Choking hazard — small parts and small balls may be swallowed or inhaled. Keep the packaging and instructions as they contain important information.

## Instructions for using Gecko Run and the nano-adhesive pads

What makes your new marble run special are the innovative **nano-adhesive pads** that stick to surfaces like the feet of a gecko. The pads are covered on one side with microscopic suction cups that allow the Gecko Run parts to be securely attached to vertical surfaces. Just like large suction cups, the nano-adhesive pads adhere to smooth surfaces only, leave no traces when removed, and can be used over and over.

Gecko Run's nano-adhesive pads adhere best to **glass surfaces** such as **glass doors and windows,** but you can also attach the pads to other surfaces, as long as they are **smooth enough (tiles, plastics, wood and imitation wood, glossy painted surfaces, metal, etc.).** Experiment with different surfaces around your house!

Before you use Gecko Run for the first time, you will need to attach the nano-adhesive pads to the adapters and some of the tricks. You can find out how to do this on pages 4 and 5.

Before you start building a run, make sure that your installation surface is clean, dry, and free of grease. This will ensure that the pads can develop their full adhesive power.

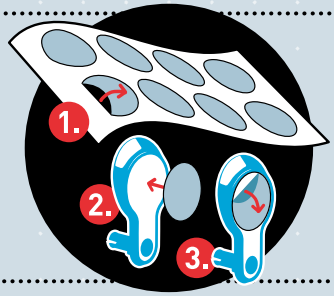
**Dismantle the marble run after use and store it in its packaging to ensure the pads remain clean and retain their stickiness, and to prevent damage to the surfaces.**

The longer the pads remain on a surface, the greater their adhesion. Always use the included Gecko Tool to remove the adapter from the play surface.

If the nano-surface of a nano-adhesive pad gets dirty or dusty, you can clean it with a dry, lint-free cloth. If a nano-adhesive pad suffers major damage, you can remove it and stick a new one on the same spot.

# Important

Pay close attention to the orientation of the pads when attaching them to the adapters and tricks. Peel them starting from the corner, and attach the sticky side to the adapter or trick. Then, remove the thin film from the other side. Now your nano-adhesive pads are ready to use!



# Dear Parents and Supervising Adults,

**Children want to be amazed, understand, and create new things. They want to try everything out and do it for themselves. They want to know! The Gecko Run marble run system is ideal for this, as it can be set up and altered quickly and easily. Before using it for the first time, you should discuss the following points with your child.**

## Important information for adults

The Gecko Run parts can be attached to virtually any smooth vertical surface; glass surfaces work particularly well. Together with your child, discover which surfaces the nano-adhesive pads adhere to best — and agree upon which surfaces in your home are best for setting up your Gecko Run. When making your selection, bear in mind that hazards can arise due to open windows or doors, sliding doors that slide over each other, surfaces that are susceptible to breakage or are not securely fastened, and surfaces that are high up.

Only use the Gecko Run on closed windows and doors; all glass surfaces must be made of safety glass.

All playing surfaces must be firmly attached to the wall and stable when pulling on the pads to remove them. Be careful with mirrors — these can be loosened from their mounts when removing the nano-adhesive pads.

Only build runs within the child's reach; never climb on furniture to build the run.

The playing surface should be clean, dry, and free of grease. This will ensure that the nano-adhesive pads can develop their full adhesive power.

The tracks must always be built and set up so that the metal marbles do not hit breakable objects, dent surfaces, or cause defects.

The flooring and surrounding furnishings must be able to withstand impacts from falling marbles. If necessary, place a rug, blanket, or towel underneath the track — this will also prevent the marbles from rolling away.

Set up the run away from pets, babies, and toddlers.

Before playing and experimenting for the first time, the nano-adhesive pads must be affixed to the adapters and some of the tricks (see pages 4 and 5). Help your child apply the pads cleanly and with the nano-adhesive side facing out.

If you build your Gecko Run on doors that slide over each other (e.g., cupboards or patio doors), make sure that the parts are attached to the outer door so that they are not damaged when the doors are moved.

**TIP**

### WHERE TO STICK THE NANO-ADHESIVE PADS:

**DO STICK ON:**

- GLASS DOORS AND WINDOWS
- SMOOTH CERAMIC TILES
- SMOOTH WOOD
- SMOOTH LAMINATE
- SMOOTH, HARD PLASTIC
- SMOOTH METAL
- SMOOTH, GLOSSY PAINTED SURFACES
- SMOOTH, POLISHED STONE

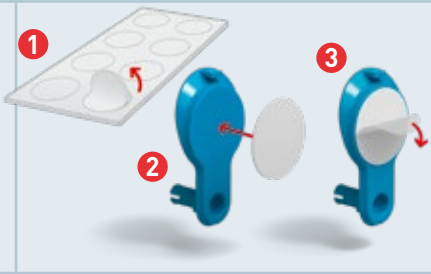
**DO NOT STICK ON:**

- ROUGH SURFACES
- WALLPAPER
- DRYWALL AND PLASTER
- BRICK AND CONCRETE
- FABRIC AND UPHOLSTERY

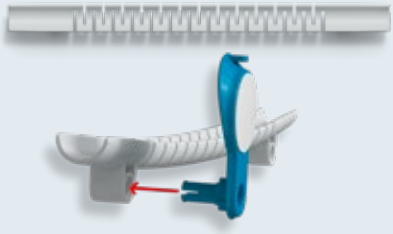
**Adapter**
Use this to attach the tracks and some of the tricks to your vertical playing surface. You can see how to prepare the adapters below.

**Nano-adhesive pad**
The pads have a normal sticky side and a nano-adhesive side (see p. 2). To prepare the adapters for use, you must stick a pad onto each adapter.

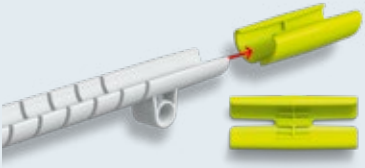
1. Pull a pad off of the sheet.
2. Stick the sticky side onto the back of the adapter.
3. Remove the thin foil from the pad to reveal the nano-adhesive side.




**Track**
The special design of the tracks makes them bendable, giving you lots of freedom when building a run. They are attached to your playing surface using the adapters. Be sure to push the adapters all the way into the holes on the tracks.

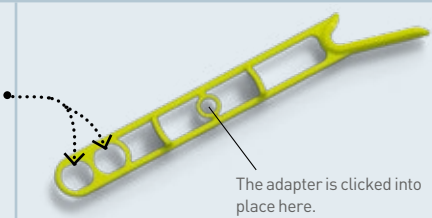


**Track Bridge**
This component allows you to connect two tracks together to create a longer one. You can also use it to connect some tricks to the track.



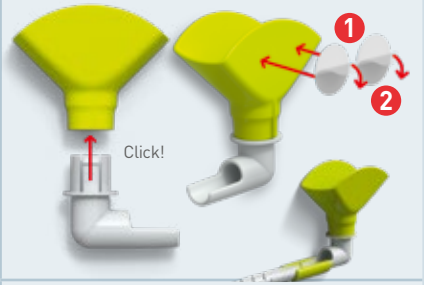
**Track Turn**
This element serves as a 180-degree bend, a marble store, and a marble catcher at the end of your run. Stick a nano-adhesive pad on the back of the track turn to prepare it. For more tips and tricks on how to use track turns, see pages 7, 8, and 12.

**Lever**
This trick can catch a marble and pass it to a lower track. Press a marble into one of the rear slots on the lever as a counterweight. If you add two marbles as counterweights, the lever will collect two marbles before tipping and passing them both on. For more information on using the lever, see page 8.

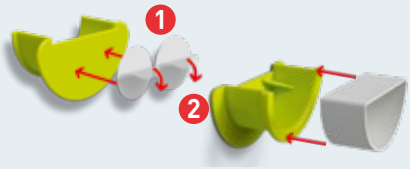


**Switch**
The switch is a kind of rocker that alternates the direction the marble travels in. See pages 9 and 13 for information on using the switch.

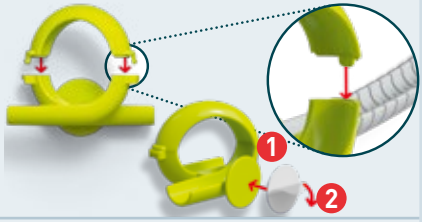

**Funnel**
This element lets you recapture marbles that you have really let fly. It consists of two parts that you will need to click together the first time you use it. The outlet of the funnel can be rotated freely so that it can move the marbles in different directions. The back of the funnel is secured to the playing surface with **two** nano-adhesive pads so that it can safely catch flying marbles.




**Trampoline**
The trampoline makes your marbles bounce and fly. To prepare, stick two nano-adhesive pads to the back of the trampoline, then stretch the trampoline band around the frame. See page 13 for more information.

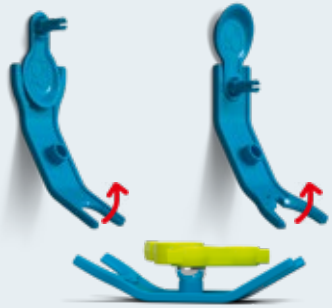



**Loop**
The loop adds even more action to your Gecko Run marble run. Connect the top and bottom loop parts as shown and stick a nano-adhesive pad to the back of the loop. See page 9 for more information.




**Gecko Tool**
Use this tool to remove the adapters from your playing surface. You can also use it to easily press marbles into the lever and remove them again.

If you want to, you can also attach the Gecko Tool to your playing surface with a nano-adhesive pad.



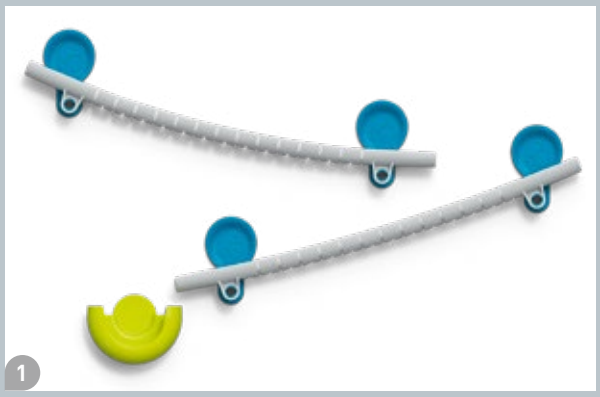
**Metal Marble**
In your set you will find ten precision steel marbles with a diameter of 12.7 mm.


# YOUR first RUNS!

Your Gecko Run is now ready to go! The following pages will guide you through the first runs to build so that you can learn how the individual elements of the Gecko Run system work.

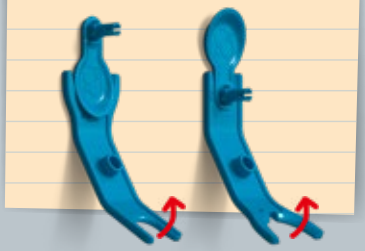
## BUILDING YOUR FIRST RUNS

1. We will start very simply with two pieces of track and a track turn as a marble catcher.

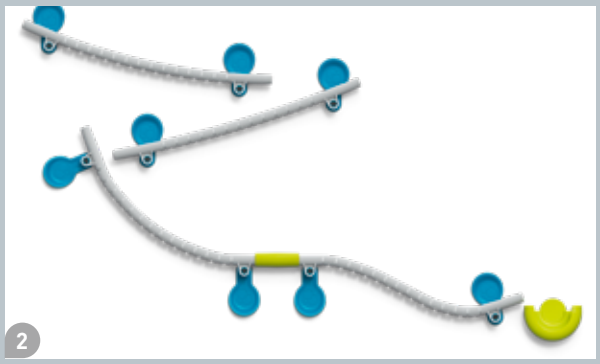



**TIP**

ALWAYS USE THE GECKO TOOL TO REMOVE THE ADAPTERS FROM THE PLAYING SURFACE.



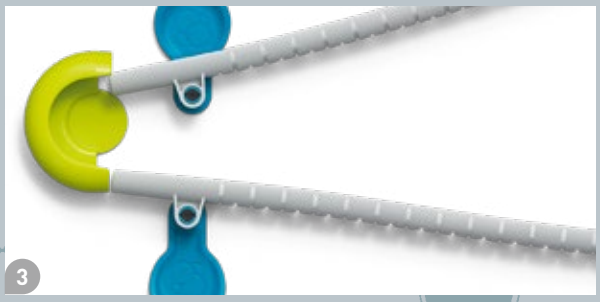
2. Now add two tracks connected with a track bridge to your setup. Take advantage of the flexibility of the track and create some bends and curves.



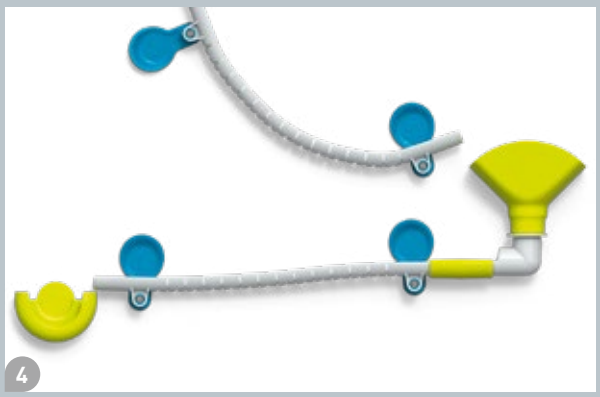

**TIP**

ALWAYS BUILD YOUR TRACKS FROM THE TOP DOWN AND TEST EACH NEW ELEMENT AS YOU GO. CHECK WHETHER THE MARBLE MOVES PROPERLY ALONG THE TRACK FROM THE VERY TOP.

3. Use another track turn as a fast 180-degree turn.



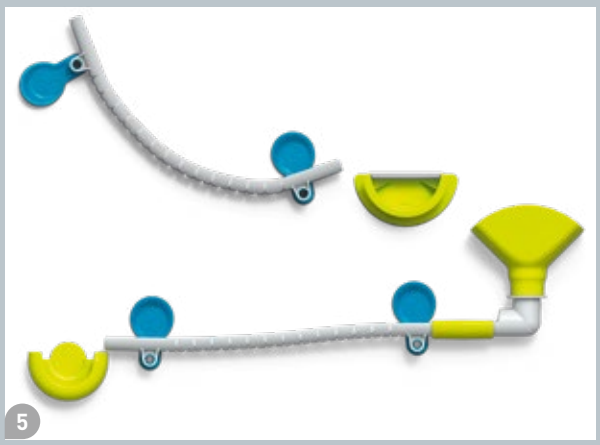
4. Next, test the funnel, which lets you catch flying marbles.



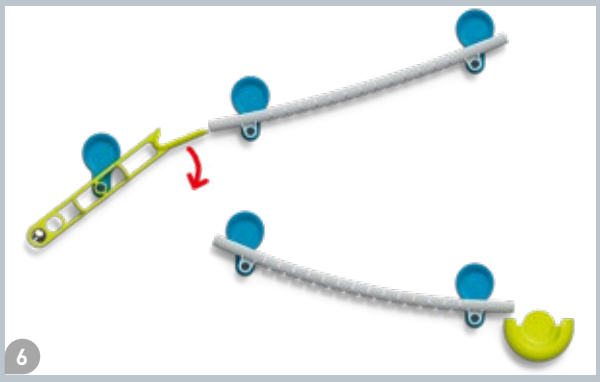

**TIP**

PRESS THE FUNNEL FIRMLY AGAINST YOUR PLAYING SURFACE AND ATTACH THE OUTLET TO A TRACK WITH A TRACK BRIDGE AS SHOWN – THIS WILL ENSURE IT CAN WITHSTAND HARDER IMPACTS FROM THE MARBLES.

5. It's especially fun to combine the funnel with a trampoline.



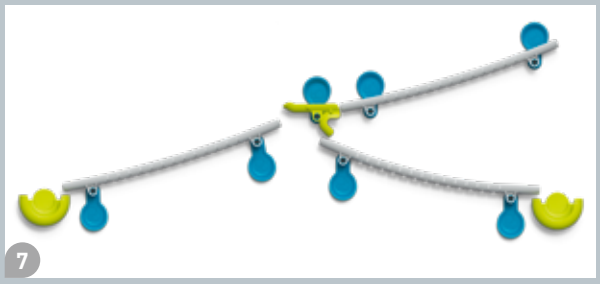

6. Now it's time to use the lever. Remember to insert at least one marble into a slot at the end of the lever as a counterweight.




**TIP**

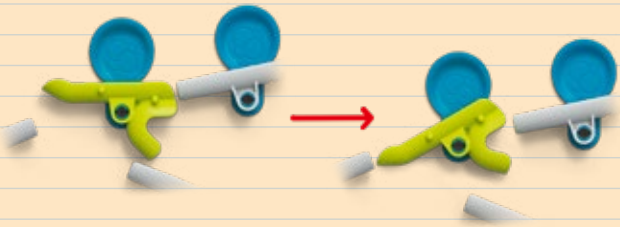
TO USE THE LEVER AS SHOWN, THE ADAPTER MUST BE MOUNTED AS VERTICALLY AS POSSIBLE.

7. The switch makes your track much more complex, because it allows you to have two branches. The switch alternates the path that the marbles will travel. The marble may behave differently when it hits the switch, depending on its speed. Therefore, familiarize yourself with the characteristics of the switch before using this trick in a larger run.

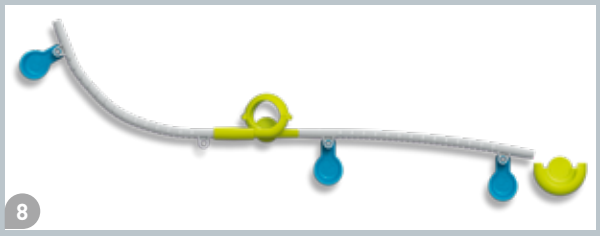



## TIP

WITH THE SWITCH, YOU WILL ALSO NEED TO HANG THE ADAPTER SO THAT THE PART WITH THE NANO-ADHESIVE PAD IS ABOVE THE SWITCH. ALSO, MAKE SURE THAT THE SWITCH IS TILTED ALL THE WAY TOWARD THE LOWER TRACK WHEN ATTACHING IT.

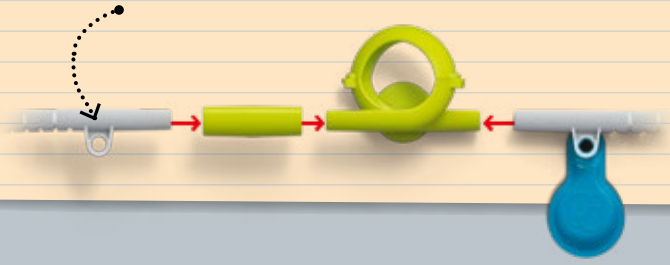


8. Build a test track to get a feel for the loop's properties and find out how much momentum your marble needs to make it all the way around.




## TIP

YOU WILL HAVE TO ATTACH THE LEFT OUTLET OF THE LOOP TO THE TRACK WITH THE HELP OF A BRIDGE. THE ADJACENT ADAPTER HOLE OF THIS TRACK CANNOT BE ATTACHED TO AN ADAPTER.

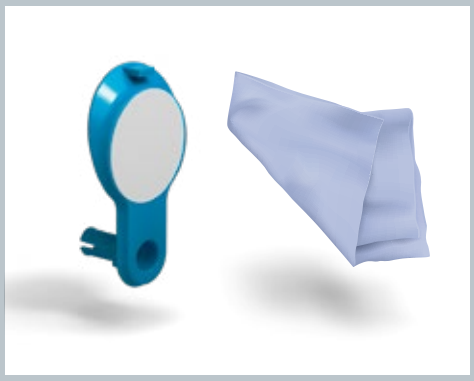



# Tips and tricks

Now that you are familiar with all the Gecko Run parts, you can build your very own runs. On the following pages you will find more tips and exciting challenges for you to complete on your way to becoming a Gecko Run pro.

## The playing surface

The nano-adhesive pads can hold your parts on many **materials** as long as they have a smooth surface. So explore your home with your parents and find out where you can put your run.



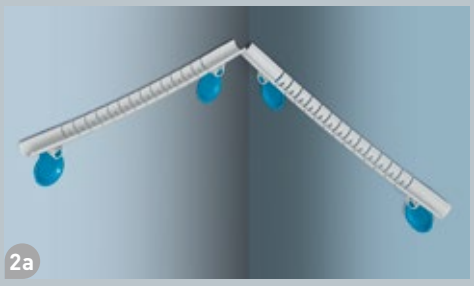
## The nano-adhesive pads

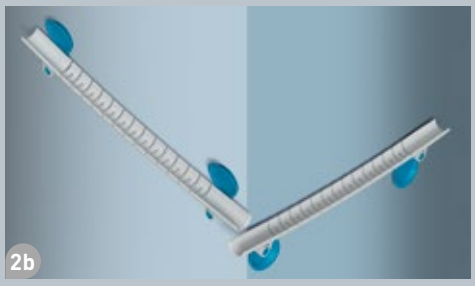
If your pads are no longer sticking very well, check whether dust has settled on them. If this is the case, you should clean them with a dry, **lint-free cloth** (e.g., a microfiber cloth). If a pad has lost its adhesion, you can remove it from the adapter and attach a new one.

## The track

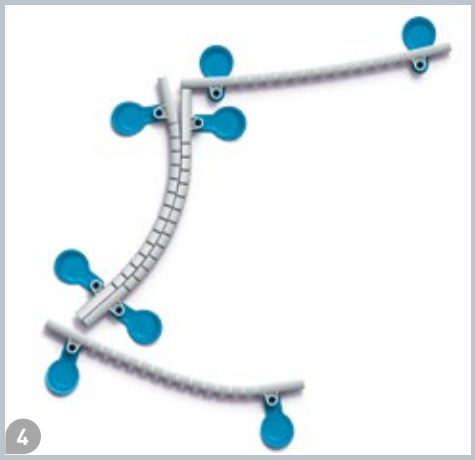
1. Since the tracks are so bendable, you can easily turn a section of track into **a bend**. This is always very useful if you need a lot of **speed** for your marble — this is the best way to get the marble around the bend without losing its momentum.

2. You can bridge corners to get from one level to another. Position the tracks as shown below. Make sure the marble doesn't have much momentum so that it falls into the second track.



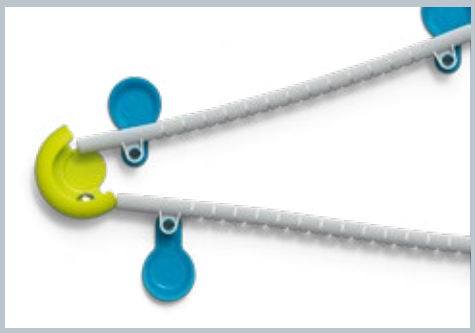




3. By mirroring two tracks as shown in the illustration, you can form a tube that ensures the marble falls safely to a lower level without jumping off the track.



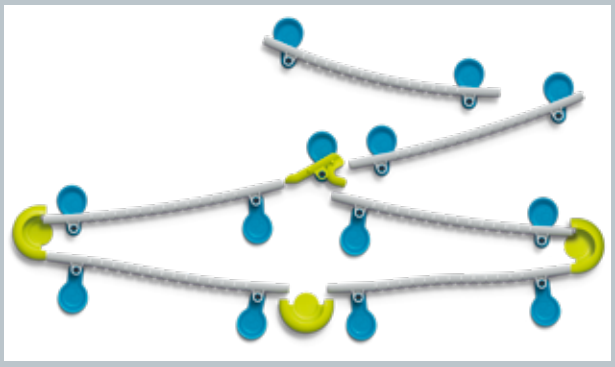

## The track turn

You have already discovered that the track turn can change the direction of the marble and also catch it. But that's not all! If you set up the track turn as shown, it will collect a few marbles before releasing them one at a time. See conservation of momentum at work!



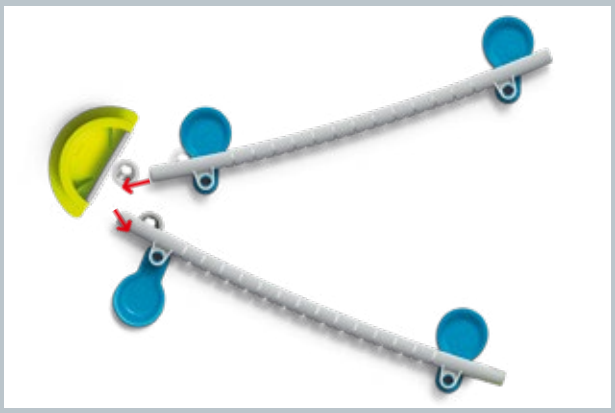
## The switch

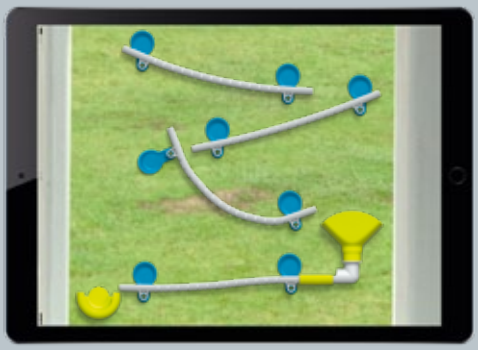
The switch splits your run into two different paths. If you don't have much space on your playing surface or if your components are running low, you can reunite the divided paths beneath the switch.



## The trampoline

You do not always have to mount your trampoline horizontally. You can hang it diagonally or upside down. If you hang it as shown, it will send the marble to the lower track.





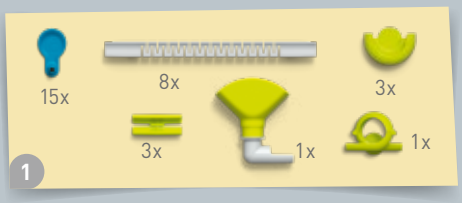
## Slow-motion videos

Perhaps you could borrow a smartphone or tablet with a slow-motion video app from your parents, or maybe you have one yourself. By filming your marble as it rolls along your track, you can make exciting, dramatic videos.
A slow-motion video can also help you spot problem areas if your marble keeps falling off track and you can't see the cause with the naked eye.

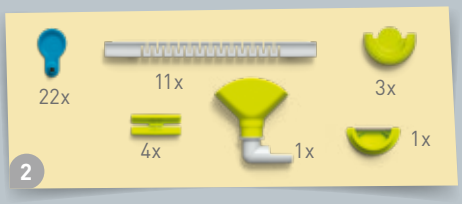
## CHALLENGES

Here you'll find a few exercises for your Gecko Run. You can use these to challenge yourself, or to compete against family and friends.

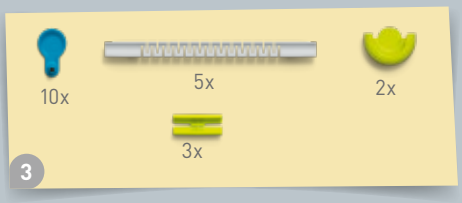
**Challenge #1:**
Use the components shown to build a run through which the marble travels **as fast as possible** and arrives at the destination — i.e., the track turn — three times in a row!



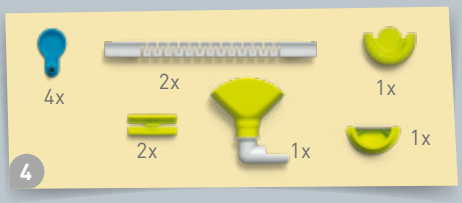

**Challenge #2:**
Use the components shown to build a run on which the marble travels for **as much time as possible.** The destination is once again the track turn used as a marble catcher.



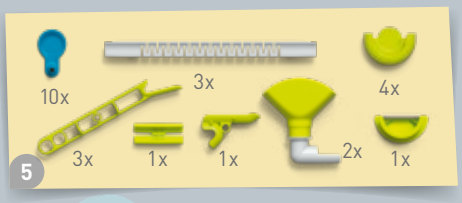

**Challenge #3:**
Use the parts shown to build a run that covers **as much height as possible** without losing the marble.




**Challenge #4:**
**Build a jump** for the marbles using the components shown. Use the funnel and track turn as a catcher. How far will your marble fly?




**Challenge #5:**
Build a run using only **three tracks** as well as the parts shown.



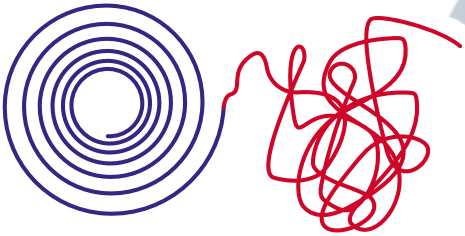

Find out more about your Gecko Run by scanning this QR code.

CHECK IT OUT

# The subtle difference

You may have noticed something rather odd while playing and experimenting with your Gecko Run: you have built an exciting track and the marble goes through it perfectly a few times. But on the next attempt, the marble suddenly jumps off the track or gets stuck somewhere. This strange phenomenon can be explained with the help of chaos theory.

It's not always obvious when a system enters an apparently chaotic state.



## CHAOS THEORY

Your marble follows physical laws that are identical at all times. In principle, therefore, your marble should take an identical path each time. But the reality is probably different! You may have set up your track to be dependent on ideal starting conditions — in other words, by exactly how you put the marble onto the track. Tiny differences in initial positioning can result in the marble hitting a trick slightly differently, and these deviations can then be exacerbated until the marble eventually bounces off the track.

## THE BUTTERFLY EFFECT

Have you heard of the butterfly effect? This refers to the claim that the flap of a butterfly's wings in Brazil can trigger a tornado in Texas. This is not meant to be taken literally, but rather as an example of how minute (very small) changes in a system (like a puff of air from a flap of wings) can have an enormous effect. In fact, this phenomenon is especially apparent in weather patterns, which is why it's almost impossible to reliably predict the weather more than one week into the future.

Tiny changes in a system can have a major impact on its behavior.

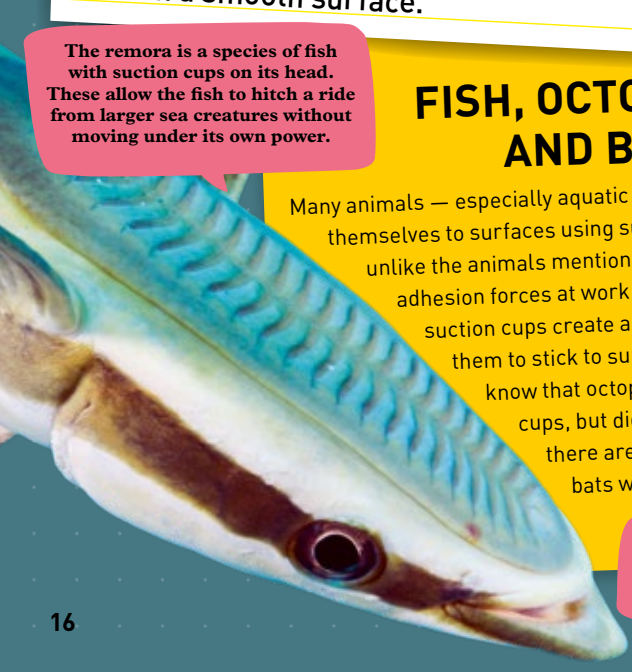
# Animals that STICK

Thanks to the ingenious pads, your marble run can hang like a gecko on vertical walls. But do you know which animals have similar sticky abilities?

The countless hairs on a gecko's foot can only be seen clearly under a microscope.

## GECKOS, INSECTS, AND SPIDERS

These animals have countless microscopic hairs on their legs that increase the contact surface with the wall many times over. This creates physical adhesive forces (referred to simply as adhesion), which ensure that the wall and the animal's feet attract each other. By the way, the same forces act when you bring plastic wrap (cling wrap) into contact with a smooth surface.



The remora is a species of fish with suction cups on its head. These allow the fish to hitch a ride from larger sea creatures without moving under its own power.

## FISH, OCTOPUSES, AND BATS

Many animals — especially aquatic ones — attach themselves to surfaces using suction cups. However, unlike the animals mentioned above, there are no adhesion forces at work here. Instead, their suction cups create a vacuum that causes them to stick to surfaces. You probably know that octopuses use suction cups, but did you know that there are also sharks and bats with suction cups?

The tentacles of the giant Pacific octopus are not only incredibly mobile, they can also hold onto pretty much anything thanks to their thousands of suction cups.

Concept: Richard Schmising
Editorial: Richard Schmising
Technical product development: Deryl Tjahja
Product design: Manuel Aydt, aydtdesign, Pforzheim
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# GECKO RUN

*Limitless fun!*

## INGENIOUS EXTENSIONS FOR YOUR GECKO RUN


### SNAKE

Will your marbles make it through the zigzag tunnel, or will the "snake" swallow them up? Your Gecko Run has a new challenge: Find out if your marbles will make it through this new trick piece.


### TWISTER

Hold your breath: The marble circles in suspense around the Twister before it drops onto the track below! Can you find the optimal spot to add this piece to your Gecko Run? Test the Twister in your next run and make your marbles dizzy!

**COOL EXTRAS** expansion packs to extend your marble run fun!

**Do you have any questions?**
Our customer service team would be glad to help you!

Thames & Kosmos US
Email: support@thamesandkosmos.com
Phone: 1-800-587-2872

Thames & Kosmos UK
Web: thamesandkosmos.co.uk
Phone: 01580 713000

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