THAMES & KOSMOS

GECKO RUN

Gecko Run

STEM EDITION

Marble Run

Experiment Manual



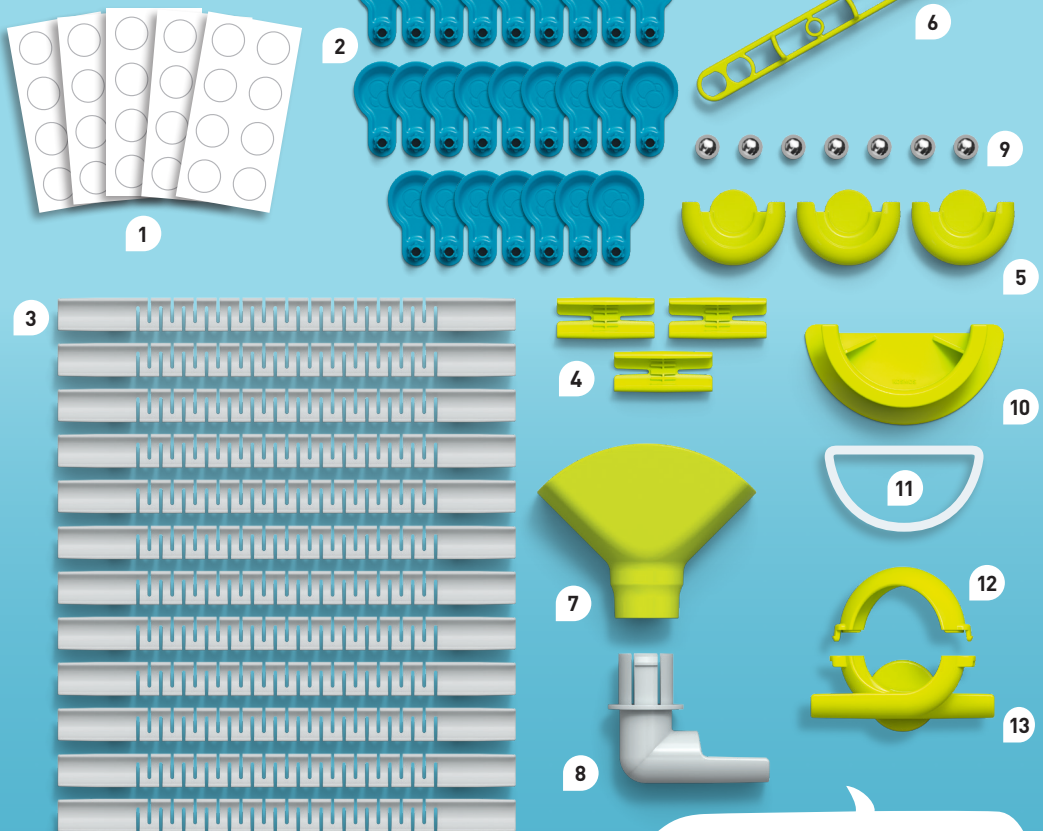
SCAN FOR A QUICK-START VIDEO

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

What's inside your experiment kit:

Wow! So many parts!



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

Checklist:

✓	No.	Description	Quantity	Item No.
○	1	Sheet with nano-adhesive pads	5	726192
○	2	Adapter	25	726603
○	3	Track	12	726605
○	4	Track bridge	3	726606
○	5	Track turn	3	726607
○	6	Lever	1	726608

✓	No.	Description	Quantity	Item No.
○	7	Funnel	1	726610
○	8	Funnel outlet	1	728311
○	9	Metal marble	7	726604
○	10	Trampoline frame	1	726643
○	11	Trampoline band	1	726644
○	12	Loop top	1	726660
○	13	Loop bottom	1	726647

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SCAN FOR A QUICK-START VIDEO:

TIP

YOU WILL FIND ADDITIONAL INFO IN THE CHECK IT OUT SECTION ON PAGE 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.

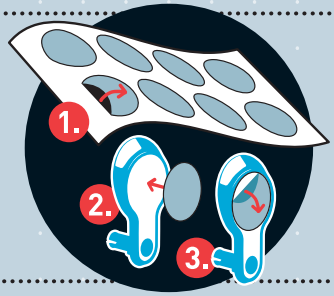
Before you start building a run, make sure that your installation surface is clean, dry, and free of grease. This will ensure that the pads can develop their full adhesive power.

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.

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:

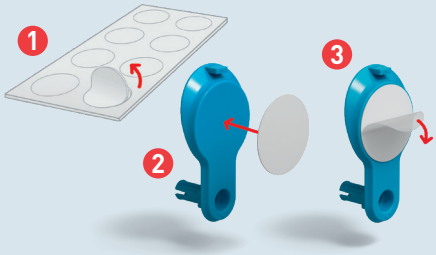
- ROUGH SURFACES
- WALLPAPER
- DRYWALL AND PLASTER
- BRICK AND CONCRETE
- FABRIC AND UPHOLSTERY

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.

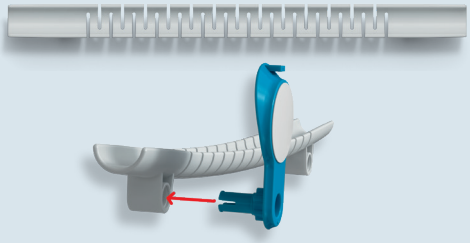


Nano-adhesive pad
The pads have a permanent sticky side and a nano-adhesive side (see page 2 and the back of the manual). To prepare the adapters for use, you must stick a pad onto each adapter.

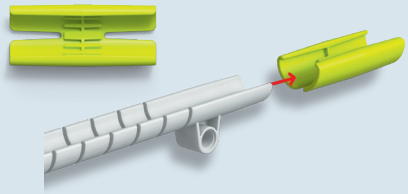
1. Pull a pad off of the sheet.
2. Stick the permanent sticky side onto the back of the adapter.
3. Remove the thin plastic film from the other side of the pad to reveal the nano-adhesive side.



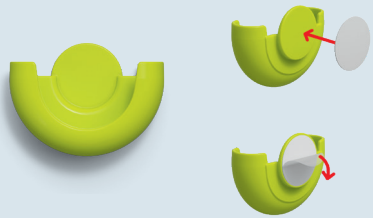
Track
The special design of the tracks makes them bendable, giving you lots of freedom when building a run. They are attached to your playing surface using the adapters. Be sure to push the adapters all the way into the holes on the tracks.



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.

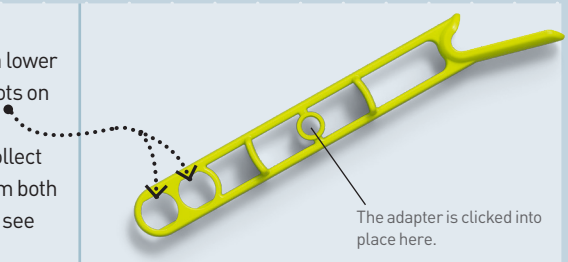


Track turn
This element serves as a 180-degree bend, a marble store, and a marble catcher at the end of your run. Stick a nano-adhesive pad on the back of the track turn to prepare it. For more tips and tricks on how to use track turns, see pages 8 and 11.



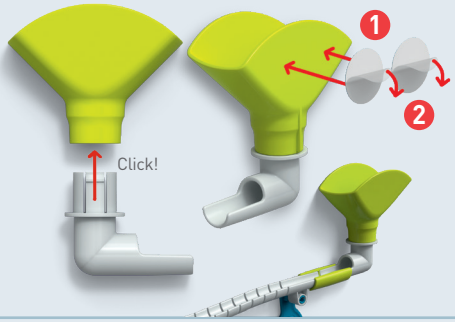
Lever

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 9.



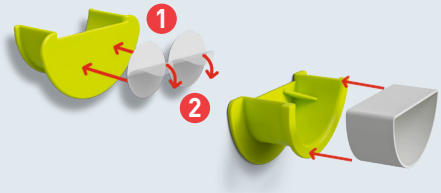
Funnel

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.



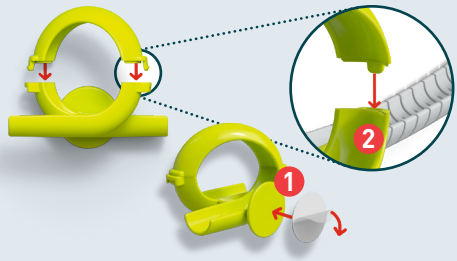
Trampoline

The trampoline makes your marbles bounce and fly. To prepare, stick **two** nano-adhesive pads to the back of the trampoline frame, then stretch the trampoline band around the frame. See pages 8 and 11 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.



Metal marble

In your set you will find seven precision steel marbles with a diameter of 12.7 mm.



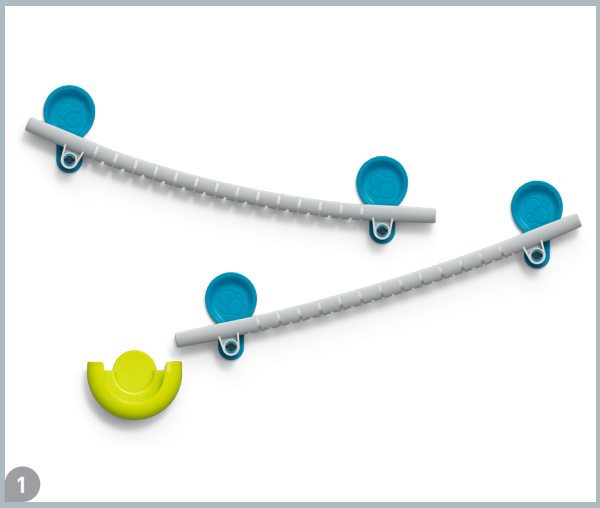


YOUR first RUNS!

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.

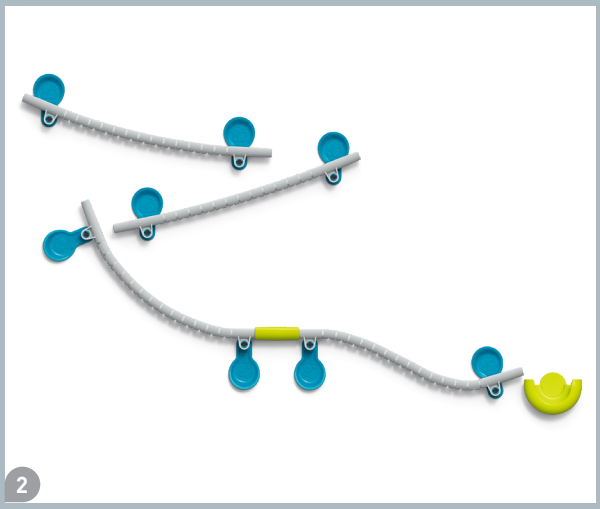


TIP

TO MAKE IT EASY TO REMOVE THE ADAPTERS FROM THE PLAYING SURFACE, THEY HAVE A SMALL LIP – PUSH ON IT WITH A FINGER OR THUMB IN ORDER TO DETACH THE ADAPTER.



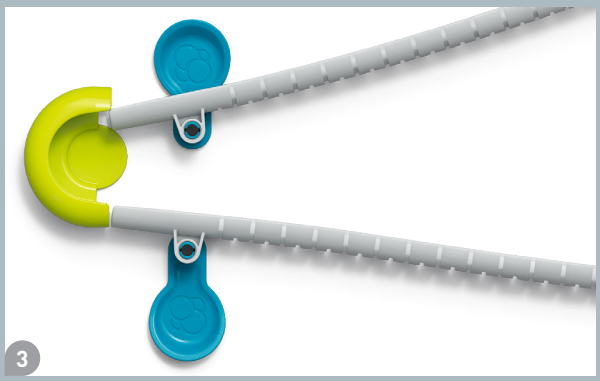
2. Now add two tracks connected with a track bridge to your setup. Take advantage of the flexibility of the track and create some bends and curves.



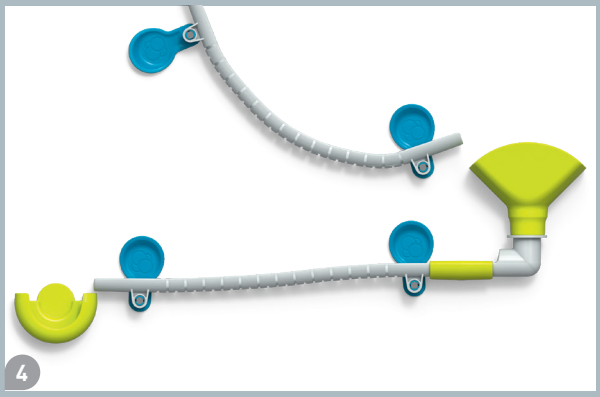
TIP

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.



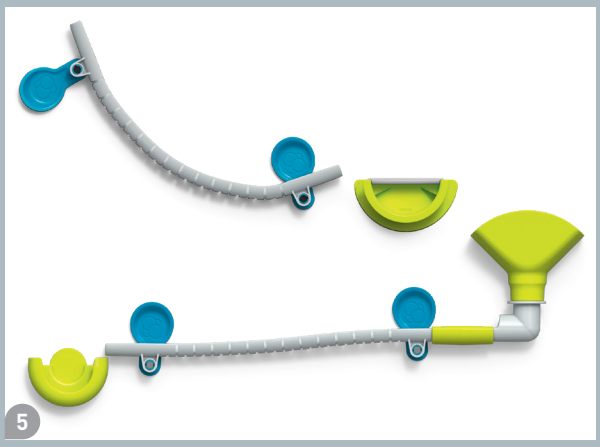
4. Next, test the funnel, which lets you catch flying marbles.



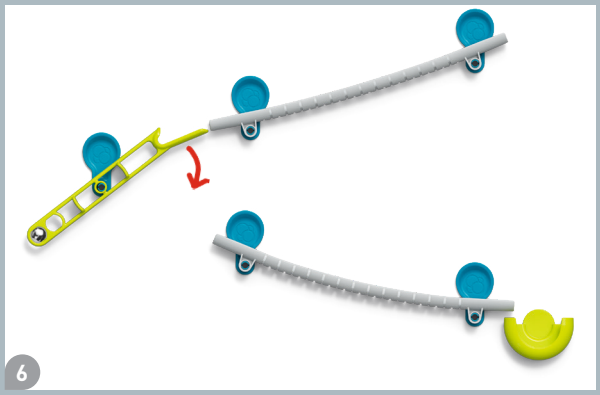
TIP

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.



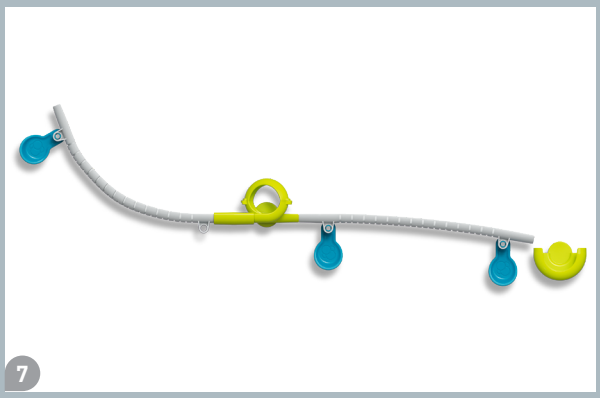
6. Now it's time to use the lever. Remember to insert at least one marble into a slot at the end of the lever as a counterweight.



TIP

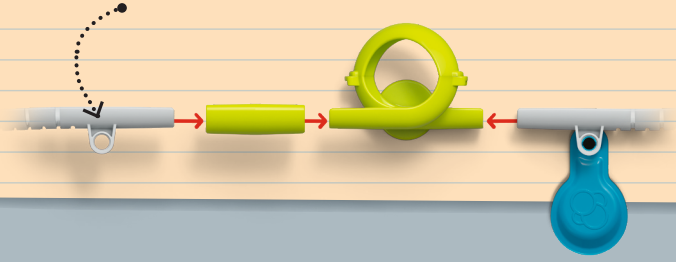
TO USE THE LEVER AS SHOWN, THE ADAPTER MUST BE MOUNTED AS VERTICALLY AS POSSIBLE.

7. 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 TRACK BRIDGE. THE ADJACENT ADAPTER HOLE OF THIS TRACK CANNOT BE ATTACHED TO AN ADAPTER.



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

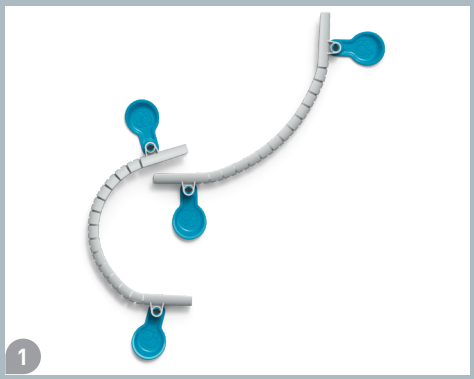
If your pads are no longer sticking very well, check whether dust has settled on them. If this is the case, you should clean them with a dry, **lint-free cloth** (e.g., a microfiber cloth). If a pad has lost its adhesion, you can remove it from the adapter and attach a new one.

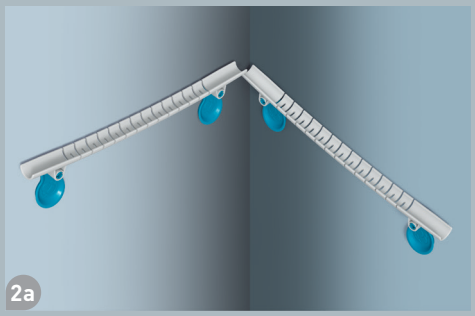


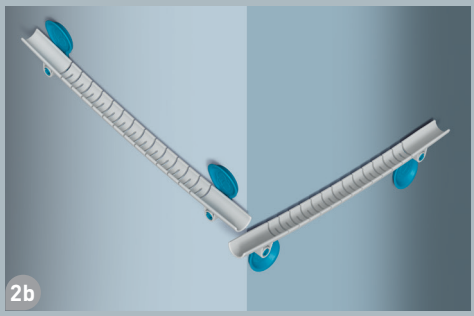
The tracks

1. Since the tracks are so flexible, you can easily turn a section of track into **a bend**.

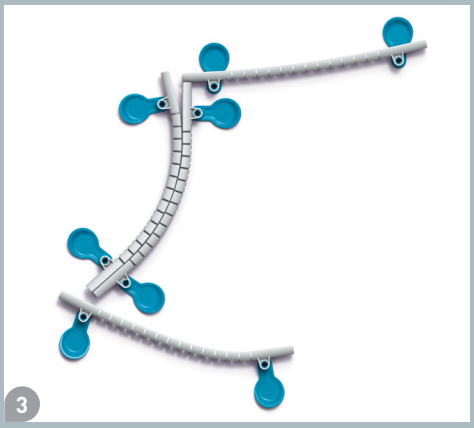
2. You can bridge corners to get from one level to another. Position the tracks as shown below. Make sure the marble doesn't have too much momentum so that it falls into the second track rather than jumping over it.





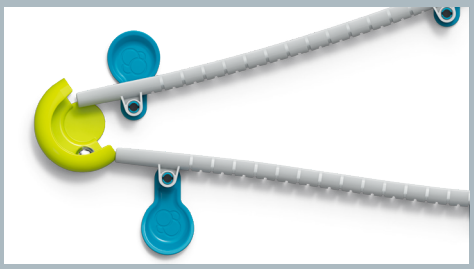


3. By mirroring two tracks as shown in the illustration, you can form a tube that ensures the marble falls safely to a lower level without jumping off the track.



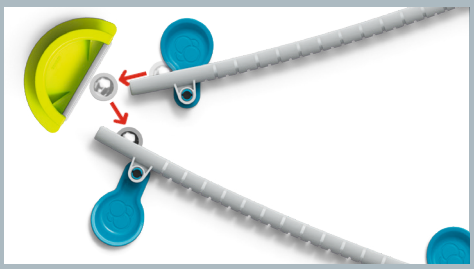
The track turn

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!



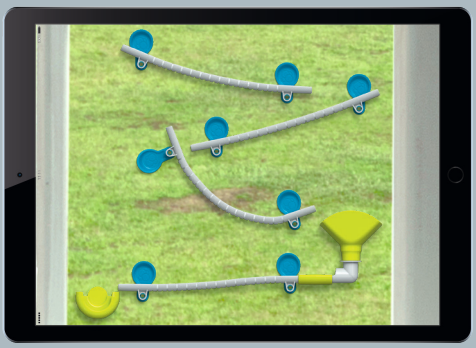
The trampoline

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

A slow-motion video can add a whole new layer of drama to your marble run. It can also help you spot problem areas if your marble keeps falling off the track and you can't figure out the cause with the naked eye.



In this section, you will find exciting experiments demonstrating energy, speed, and the other forces at work in your Gecko Run track.

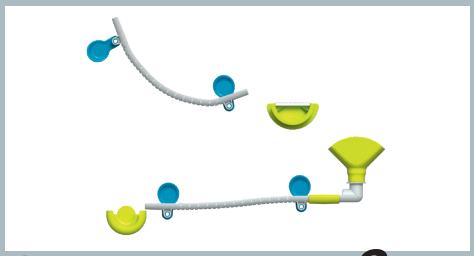
EXPERIMENT 1

You will need

– 2 tracks, trampoline, funnel, track turn, 4 adapters, track bridge, 1 metal marble
– 2 pieces of clear tape

Here's how

1. Build the run as shown.
2. Check that the marble consistently bounces off the trampoline and is caught by the funnel.
3. Use the tape to mark two starting positions: one higher on the first track and one lower.
4. Launch the marble several times from each position and compare the bounce.



WHAT'S HAPPENING?

The marble starts with **gravitational potential energy.** As it falls, the potential energy is converted into **kinetic energy.** Then, as it stretches the trampoline band, the energy is converted into **elastic potential energy.** When the band returns to its original position, it launches the marble again, and the energy is converted again to **kinetic energy.** The higher up the marble starts, the more energy it has.

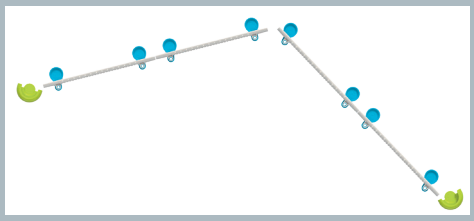
EXPERIMENT 2

You will need

– 4 tracks, 2 track turns, 8 adapters, 2 metal marbles

Here's how

1. Build two runs with the same starting height.
2. Make one run very steep, and the other almost flat, as shown below.
3. Start one marble on each run at the same time, and compare how fast they reach the bottom.



WHAT'S HAPPENING?

The force of gravity — entirely responsible for the marbles' movement — pulls all objects straight down toward the surface of Earth. On the steeper track, a larger component of the gravitational force is at work, whereas on the less steep track, a smaller component of the force is acting on the marble.

CHECK IT OUT

Everything that moves has **kinetic energy.** The faster a marble moves, the more energy it carries — and the more it will bounce.

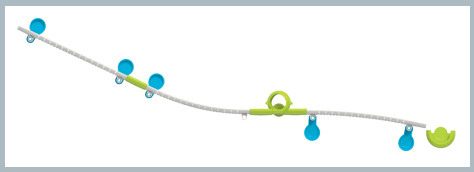
EXPERIMENT 3

You will need

– 3 tracks, 5 adapters, loop, 3 track bridges, 1 track turn, 1 metal marble

Here's how

1. Build the run with the loop as shown.
2. Start the marble about one inch above the adapter that connects to the loop.
3. Move the start position farther and farther up the run until the marble successfully completes the loop.



WHAT'S HAPPENING?

Whether or not the marble successfully completes the loop depends on its kinetic energy. The higher it starts on the track, the higher its starting potential energy, which is converted into kinetic energy. If the marble starts too low on the track, it will be too slow to travel all the way around the loop.



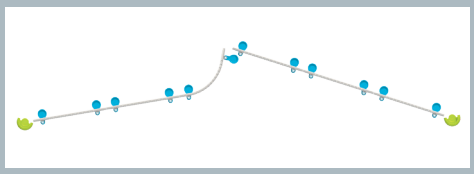
EXPERIMENT 4

You will need

– 6 tracks, 12 adapters, 2 track turns, 2 metal marbles

Here's how

1. Build two runs, each consisting of three tracks: one run should be straight, and one should begin with a sharp dip.
2. Be sure that both runs start and end at the same height.
3. Start one marble on each run at the same time, and compare how fast they reach the bottom.



WHAT'S HAPPENING?

On the curved track, the marble rolls downwards more steeply at the beginning and gains speed. It acquires a lot of kinetic energy early on and is therefore often faster to reach the finish line, even though both tracks start and end at the same height and are the same length.

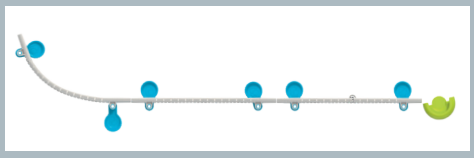
EXPERIMENT 5

You will need

– 3 tracks, 6 adapters, 1 track turn, 2 metal marbles

Here's how

1. Build the run as shown.
2. Place the first marble in the middle of the final track.
3. Roll a second marble from about the halfway point of the run so that it hits the first marble.
4. Repeat the experiment, starting the second marble all the way at the beginning of the run.



WHAT'S HAPPENING?

The rolling marble transfers some of its kinetic energy to the stationary marble, causing it to start rolling. The first marble loses some of its energy in the process and slows down.

CHECK IT OUT

Momentum is mass in motion. When the marble collides with another marble, it can transfer some or all of its momentum to the other marble. This is why the second marble begins to roll.

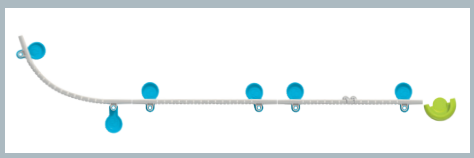
EXPERIMENT 6

You will need

– 3 tracks, 6 adapters, 1 track turn, 3 metal marbles

Here's how

1. Use the setup from Experiment 5.
2. Place two marbles next to each other in the middle of the final track, so that they touch.
3. Roll the third marble from the top of the track.
4. Observe how the momentum transfers.
5. Change the distance between the stationary marbles and repeat the experiment.



WHAT'S HAPPENING?

The kinetic energy of the rolling marble is transferred from marble to marble. How much each marble moves depends on both the distance between the first two marbles and the starting height of the third marble.

TIP

CHANGE THE SPACING OF THE STATIONARY MARBLES WITHOUT CHANGING THE STARTING HEIGHT OF THE THIRD MARBLE. THIS WILL MAKE IT EASIER TO SEE THE EFFECT ON THE CHAIN REACTION.

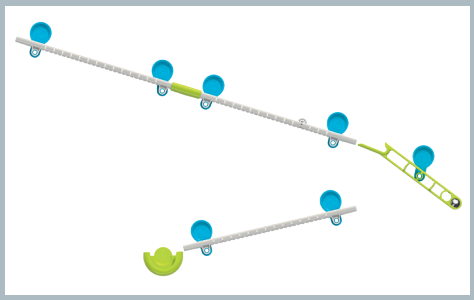
EXPERIMENT 7

You will need

– 3 tracks, lever, 7 adapters, 1 track turn, 4 metal marbles

Here's how

1. Build the run as shown.
2. Insert a marble into the slot at the end of the lever and launch a ball from the top of the run.
3. Add a second marble to the end of the lever.
4. Start one of the remaining marbles from the top of the run, followed by the last marble. Observe when the lever tips.



WHAT'S HAPPENING?

The lever works like a small seesaw. The more marbles used as counterweights, the harder it is to tip it. This allows you to control how many marbles accumulate before the lever tips and they all roll onwards together.

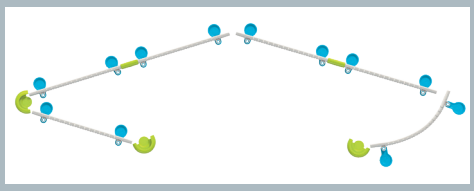
EXPERIMENT 8

You will need

– 6 tracks, 3 track turns, 2 track bridges, 12 adapters, 2 metal marbles

Here's how

1. Build the two runs as shown.
2. Start one marble on each run at the same time.
2. Observe which marble arrives at the bottom first.



WHAT'S HAPPENING?

On the sharp corner, the marble loses energy, slows down, and arrives at the finish line later. The curved track guides the marble in a smooth arc, allowing it to retain more of its kinetic energy.

CHECK IT OUT

A **lever** helps to move a lot of weight with little force — like a seesaw on a playground. A **counterweight** affects how easy or difficult it is to tilt the lever and when it returns to its starting position.

CHECK IT OUT

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.

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Product design: Manuel Aydt, aydtdesign, Pforzheim
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Layout of packaging and instructions: Michael Schlegel, Würzburg
English manual editing: Ava Tessitore, Hannah Mintz
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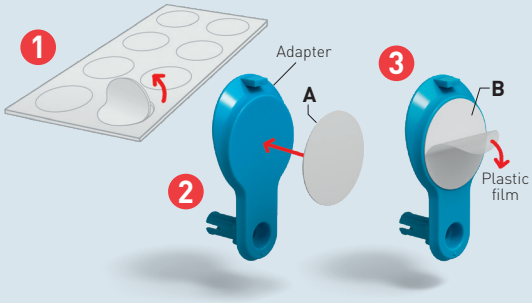
GECKO RUN QUICK-START GUIDE

WHERE TO USE



SCAN FOR A QUICK-START VIDEO:

HOW TO ATTACH THE NANO-ADHESIVE PADS



The pads have two different sides:

(A) Sticky side with permanent glue
(B) Re-positionable nano-adhesive side

To prepare the adapters (as well as some of the trick components) for use, you must first stick pads onto them.

1. **Peel a pad off of the sheet.**
2. **Stick the permanent sticky side (A) onto the back of the adapter.**
3. **Remove the thin plastic film to reveal the nano-adhesive side (B).**

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Do you have any questions?
Our technical support team would be glad to help you!

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

Thames & Kosmos UK
Email: support@thamesandkosmos.co.uk
Phone: 01580 713000