GET MOVING

A LEGOLAND® Malaysia
Educational Resource Guide

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Welcome to LEGOLAND Malaysia!

Education Programs:
Get Moving was developed by the LEGOLAND Education Department. For information on LEGOLAND Education programs, visit www.LEGOLAND.my/education.

Directions:
LEGOLAND Malaysia is located in Nusajaya, Johor. The Park is just **18 minutes** from Singapore via Tuas Second Link. From Tuas Second Link, proceed until you see the Nusajaya EXIT 312, within few minutes you will see LEGOLAND Malaysia Signage.

Just **30 minutes** from Johor Bahru, CIQ Johor and Singapore, LEGOLAND Malaysia is accessible via Coastal Highway. From Danga Bay, proceed all the way to Nusajaya. LEGOLAND Malaysia signage will be seen before reaching Kota Iskandar.

Located **30 minutes** from the North-South Highway and Senai Airport. Take Tuas/Nusajaya/Pontian/Tanjung Pelepas EXIT 253, proceed all the way to Nusajaya EXIT 312. LEGOLAND Malaysia signage will lead you to the destination.

Safety:
LEGOLAND Parks are built to the highest standards of quality and safety. Height restrictions apply on selected attractions throughout the Park.

Hands-on Investigations:
The Get Moving program is a hands-on activity located at Build-N-Test in the IMAGINATION area of the Park. The program is available through reservations upon availability. Self guided programs do not offer these activities. Please call reservations at +607-597 8888 for more information.

About Get Moving!

Educational Objectives

• Learn about forces, such as gravity, friction, and inertia.
• Build a vehicle.
• Explore how forces cause movement and change of speed.
•Relate Hands-on Investigations to the experience of LEGOLAND attractions.

Background Information

What is Force?

Force is any push or pull. Force is needed to provide motion, change direction or speed, and to stop.

Forces cause objects to move

- **Gravity** constantly pulls all things toward the center of the earth. TECHNIC® Coaster is gravity-powered.
- **Inertia** makes an object resist a change of motion. When the TECHNIC Coaster speeds up, riders feel pinned to the back of the car. Inertia makes it a fun ride!
- Riders also experience inertia when the car stops and they feel "pushed" forward against the lap bar. Inertia makes your body want to continue moving as it had been moving.

When inertia is at work, an object at rest tends to stay at rest, and an object in motion tends to stay in motion.

Centrifugal Force pulls objects away from the center of motion. AQUAZONE® riders hang on as centrifugal force pulls them to the side of the car, away from the center of the ride.

Wind resistance pushes the riders' hair backwards. Riders on many different rides can feel wind resistance. Cars that are low and sleek face less wind resistance.

What forces act on a car going down a slope?

Friction is the amount of surface contact between a car and the slope: Less friction, faster car. Friction can cause heat when two surfaces come in contact and rub together.

How do we reduce friction to make a car go faster?

- Change the slope's surface. The smoother the surface, the faster the car.
- Change the slope's angle. The steeper the slope, the faster the car.
- Change the tires. Usually the car will go faster with narrow and smooth tires.

Weight can also make a car go faster or slower. In theory, a heavy and lightweight object released at the same time from the same point on a ramp should reach the bottom at the same time.

In reality, a light object often travels faster, but not as far. A heavy object often travels slower, but farther. This is due to different amounts of friction in the wheels and axles.

Hands - On Investigations

Get Moving in IMAGINATION!

Plan Your Design

Think about forces that would make your car go faster or slower.
What design might make the fastest car?

Build and Test!

Work in pairs to build a fast car. Test your car on the speed ramps. Redesign and test your vehicles until you are ready to race.

Race on the Speed Ramp!

Race the cars on the speed ramp in heats until all cars have raced.
Which car went the fastest? Look at the design of the car. Why do you think it was the fastest?

Discovery Worksheet

How do forces act on these rides?

Think about inertia, centrifugal force, gravity, friction, and wind resistance.

Kid Power Towers

Riders pull the cable to go up, then slowly come down when they let go of the cable.

What force helps riders go down?

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What force makes your hands feel hot as they rub against the cable?

_____

TECHNIC® Coaster

TECHNIC® Coaster speeds up suddenly. Which force makes riders feel pinned back, as if they haven't started moving?

_____

AQUAZONE® Wave Racer

AQUAZONE® riders feel air pushing against them. Which force is at work?

_____

Before and After the Visit: Minds-On Investigations

Make your own Speed Ramp!
Set up a ramp in your classroom and test the effects of forces acting on the cars you race.

Materials and Set up
1) Cardboard or plank propped at an angle with books
2) Toy cars or LEGO® cars
3) Carpet runner to place on ramp
4) Weights for cars (coins, for example)
5) Tape measure to measure the distance travelled
6) Bar graph to record distance travelled under different conditions

See the changes when different forces are at work
Change only one factor at a time to see how the car's performance changes under different conditions. Use the same car for each trial.

Trial #1
Release a car from the top of the ramp. Record the distance travelled from the bottom of the ramp.

Trial #2
Put a carpet runner on top of the ramp. This will increase friction. Now release a car from the top of the ramp. Did the car travel slower or faster? Did it go farther or not as far?

Trial #3
Take the runner off the ramp. Tape a weight to the car. Release it from the top of the ramp. Did it affect the car's performance?

Trial #4
Take the weight off the car. Add books to the ramp to make it steeper. Release a car from the top of the ramp. Did the car go faster or farther? Now take books off the ramp to make it less steep. How does the car perform?