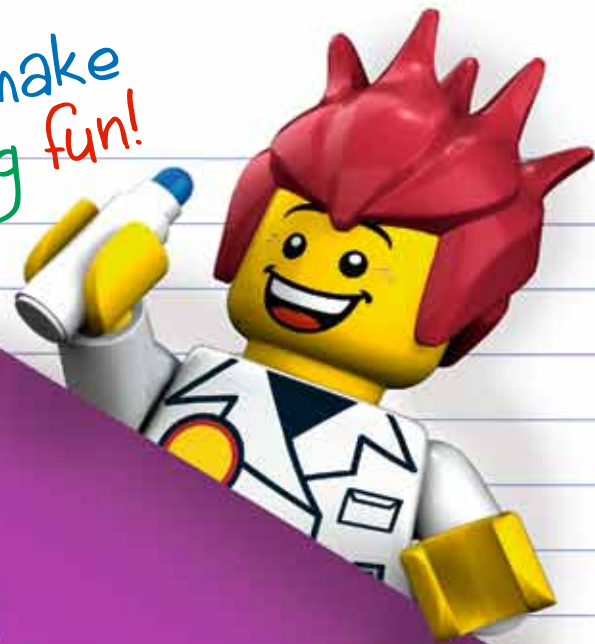


Let's make learning fun!



**education**  
EXPERIENCES

This book belongs to: **Teacher**

Class: **Get Moving**

## Education Objectives

The objectives of this programme are to give your group the opportunity to:

- Be introduced to aspects of forces that affect movement.
- Understand how gravity, mass and friction affect the speed of an object.
- Experience and explore how they are used through Hands On activities.
- Relate Hands On activities in the workshop to the experience of the attractions in LEGOLAND® Windsor.

Different activities are built into the programme to enable pupils to work at their own pace and according to their individual needs.

Although rides and attractions cannot be reserved, your school party is encouraged to enjoy the Eyes On and Body On activities before and/or after the workshop. There are some height restrictions on the rides so it is advisable to check these before you visit. If your group has special needs requirements there is a guide available that will help you make the most of your visit.

## National Curriculum Mapping

This resource corresponds to the following areas of the National Curriculum:

### KS1

**Design & Technology** KS1: 1a, b, c, d, e; 4a, b; 5a

**Science** KS1: Sc1-2d, h; Sc4-2c

### KS2

**Science** KS2: Sc1-2f, g, j; Sc4-2b, c

**Design & Technology** KS2: 1c, d; 2b; 3a, c; 5a



Dear Class,

We are a team that designs workshops in LEGOLAND® Windsor.

Yesterday we heard that you are all coming on a school trip to the Park. We are sure that you will have a great time while you are here! There are lots of exciting things to see and do in the Park. Your teacher will tell you more about them.

One of the great things about your visit is a special workshop that you will be taking part in. Here you will be building cars out of LEGO® bricks and then entering them into the 'Big Race'. In this race all your cars will be tested on a special speed ramp, which measures their speed as they travel down the slope.

We have electronic equipment, which helps us work out which car is the quickest - and the quickest one will be the winner of the race!

Other pupils have already been to LEGOLAND Windsor and tested cars on the speed ramp, and some of them have been superfast! I bet you can do better than them - especially if you prepare for the workshop. Think about what makes cars go fast and make some sketches of the cars you want to build. You will not have any motors to help them move - all the cars travel on their own.

We can't wait to see how fast your cars will go!

See you soon

Professor Albrick!

Prof. Albrick  
Dept. LEGOLAND Learning  
LEGOLAND Windsor

Distributed in the UK by LEGOLAND Windsor Park Ltd, Winkfield Road, Windsor, Berkshire SL4 4AY.

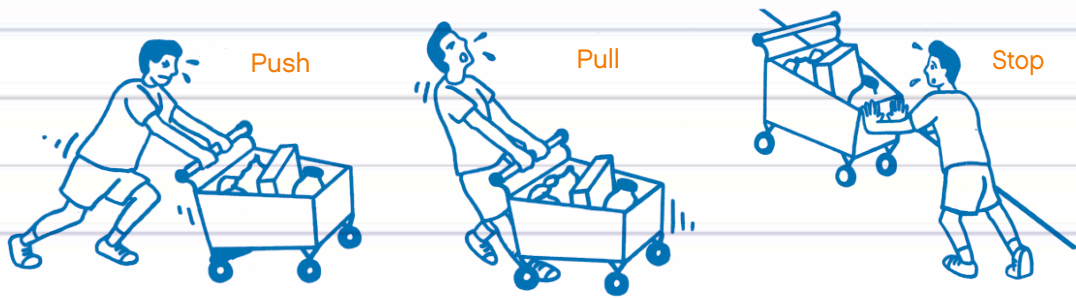
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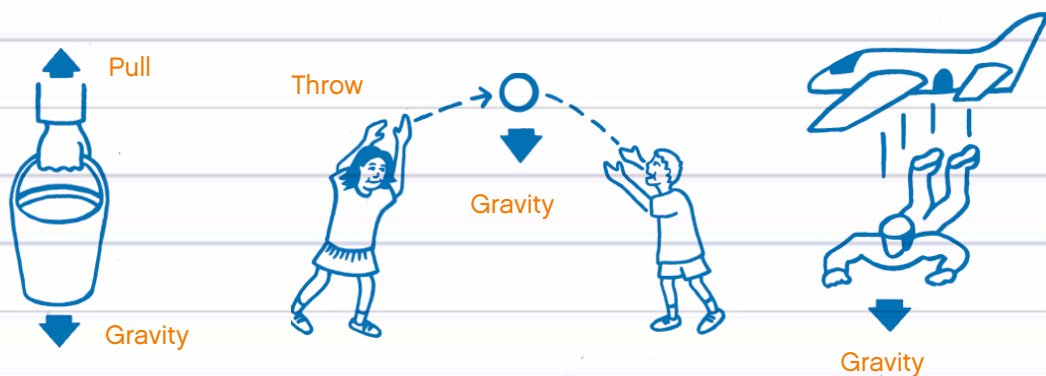


# Movement and forces

Force is required to provide motion, alter direction, change speed and even stop.



There are different types of force that can cause an object to move. One force that is always present is gravity. Gravity is constantly pulling things towards the centre of the Earth.



## Forces can be:

- Static or balanced (weight on top of an object)

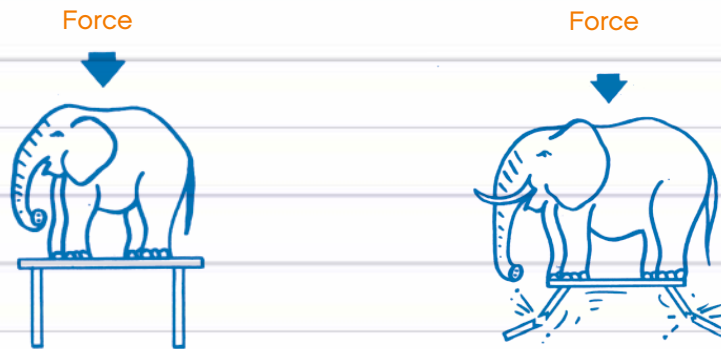


- Dynamic (pushing, pulling, twisting and bending as well as those produced by the wind and by waterfalls).

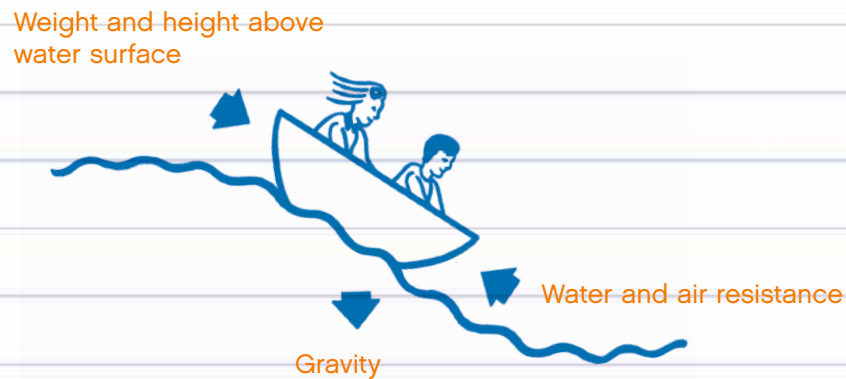


As well as making objects move, force can also change the shape of an object. When we play with plasticine we are using force to twist or bend it in order to shape it.

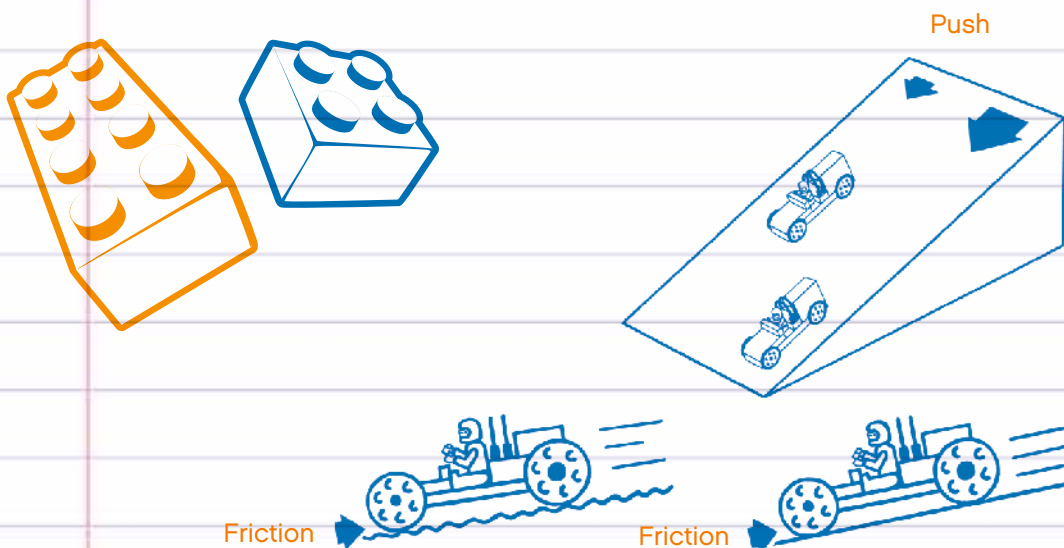
The greater the force, the greater its effect on an object, causing it to change its shape or to move.



Sometimes objects are subjected to a number of forces working in different directions.



If you release an object down a slope, its speed will be affected by several forces such as pushing, friction, weight/mass, air resistance, and the angle of the slope. In the Hands On workshop and in some of the other activities suggested for the Get Moving Programme you will experience the following about movement and forces:





### Pushing

The harder you push or pedal, the faster the object will go.

### Friction

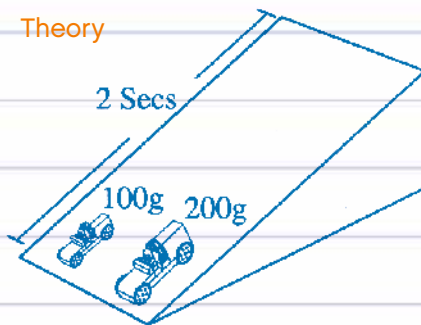
The less friction (or amount of surface contact), the faster the speed will be. The amount of friction is determined by the type of surface and the type of tyres used.

- Type of surface (smooth, slippery, rough uneven) – the smoother the surface, the faster the speed.
- Tyres used (narrow, broad, tread) – generally, narrow and smooth tyres will make the object move faster.

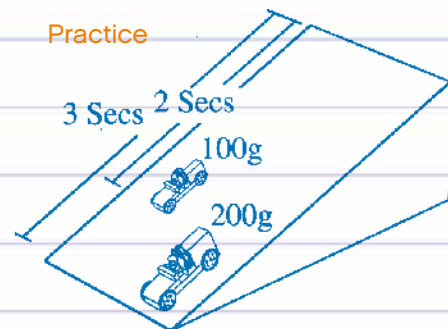
### Weight of the object

In theory, a heavy and a light object released from the same point on a ramp should reach the bottom at the same time. In practice, however, this often does not work; you will often experience that the light object travels faster down the slope and that the heavy object travels slower, but further. This is due to the different amounts of friction in the bearings of their wheels and axles.

Theory

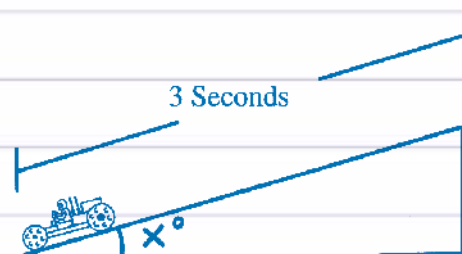
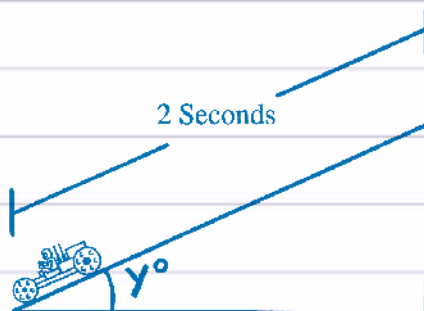


Practice



### Angle of the slope

As the angle of the slope increases, the speed of the object increases, it accelerates faster.





# Activities before the visit

- Show your pupils the map of LEGOLAND Windsor.  
Discuss their expectations of the visit and any concerns, e.g. what to do if they are separated from the group or they feel unwell during the day.
- Read out the letter from Professor Albrick to stimulate interest in making vehicles.
- Introduce the pupils to the concept of force as a push or pull. Make a collection of moving toys and encourage the pupils to describe their movement in terms of pushes and pulls. Help the pupils to notice that a twist is a combination of a push and a pull and the toys in which gravity is important.



# Activities after the visit

## Driving School Game instructions

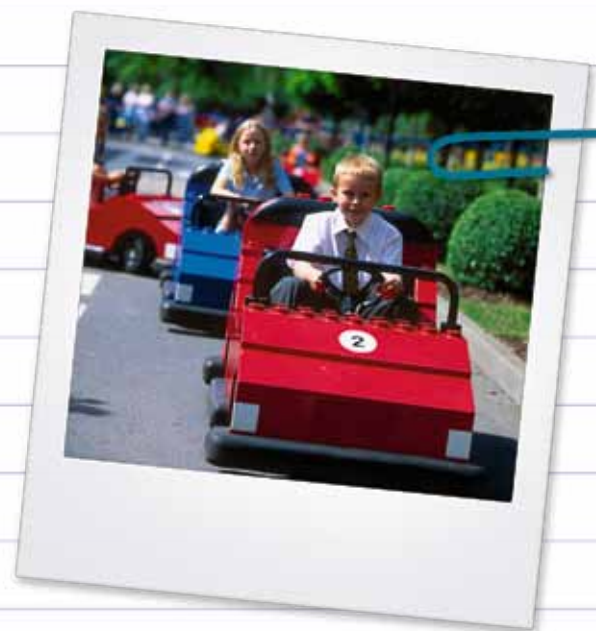
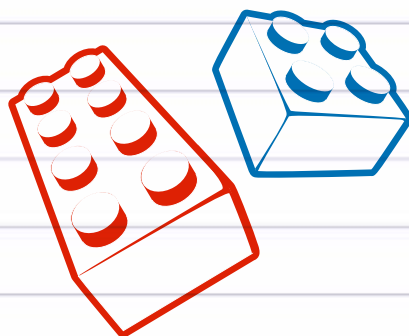
First of all, introduce the pupils to traffic signs and their meanings. Copy the signs below, and ask the pupils to colour them in.

**Players:** Two to three pupils and a referee.

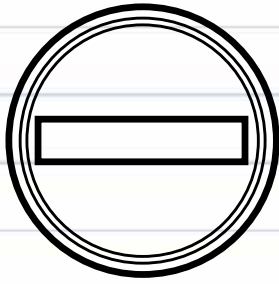
**Materials:** Make photocopies of the track.  
Copy the rules and guidelines for the referee, note pad and pencil for the referee, die, and two or three building blocks in different colours.

**Rules:** Throw the die.  
The eyes of the die show how far you can move on the track.  
If you land on a square with a traffic sign you must announce what the sign means.  
You get 1 point and another throw for a right answer.  
You get a penalty for a wrong answer and the next player takes over.  
The winner of the game is the one with the most points.

<b>Guidelines for the referee:</b>	<b>Penalty:</b>
No entry	Back 5 squares
Pedestrian crossing	Back 2 squares
Stop sign	Miss next turn
Roundabout	Back 1 square
T-junction	Miss next turn
No left turn	Back 3 squares
Give way	Back 1 square
One way	Back 4 squares
Hazard	Miss next turn
Low flying aircraft	Back 2 squares



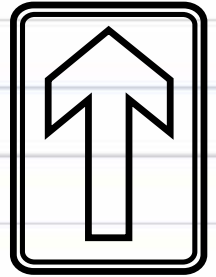
Signs giving orders (mostly circular)



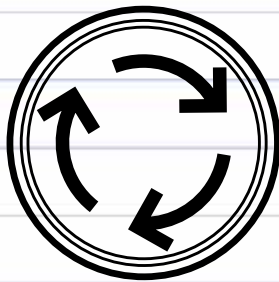
No entry



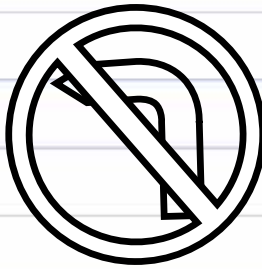
Stop and give way



One-way traffic



Mini-roundabout  
(give way to vehicles from the  
immediate right)

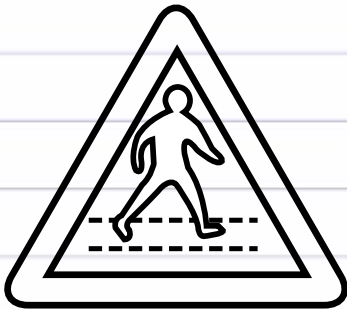


No left turn

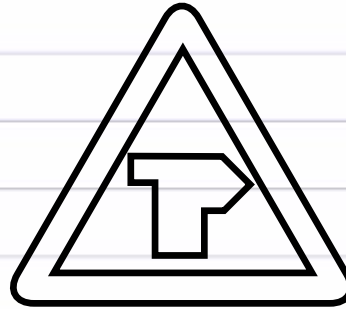


Give way to traffic  
on major road

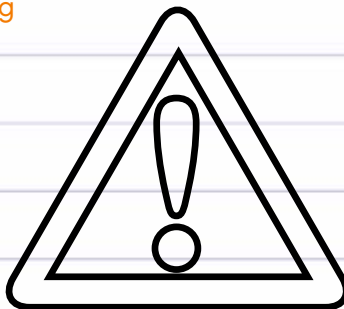
Warning signs (mostly triangular)



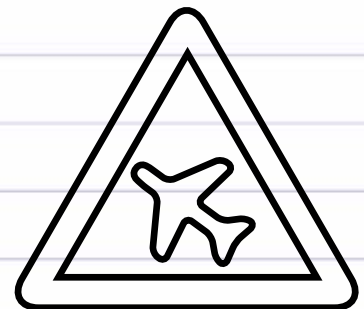
Pedestrian crossing



T-junction



Hazard!

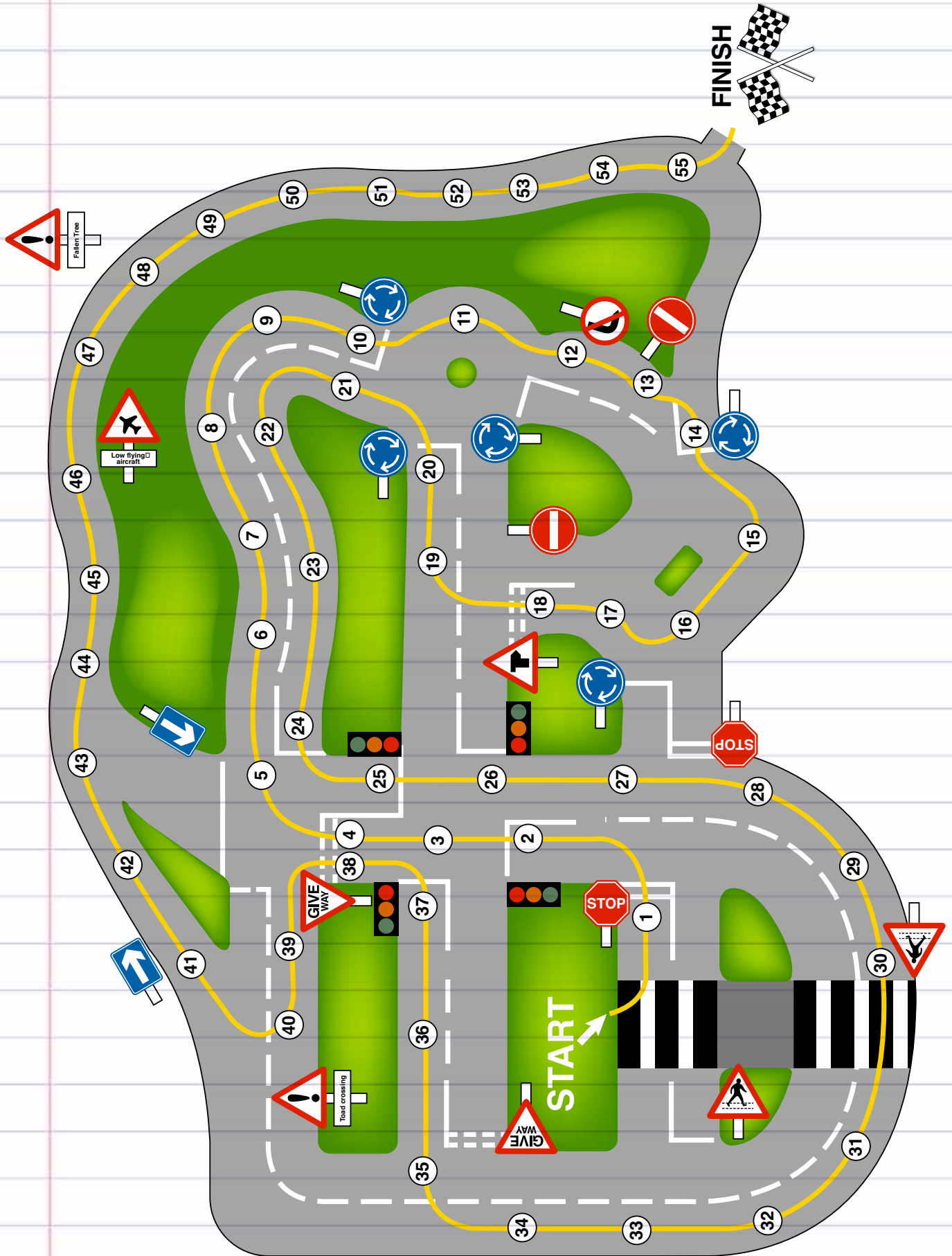


Low flying aircraft

rotate page ↘

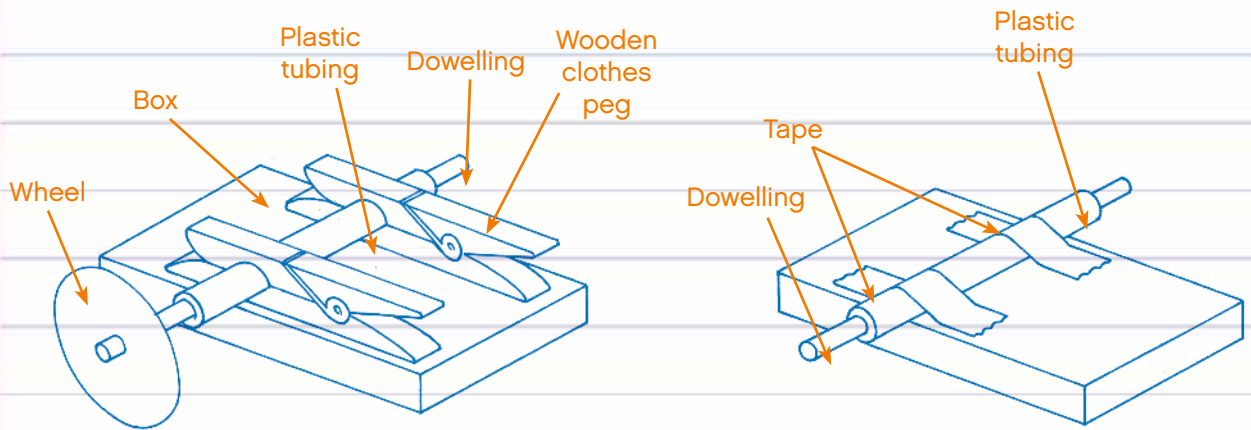
# The Driving School Game

## - Traffic Signs



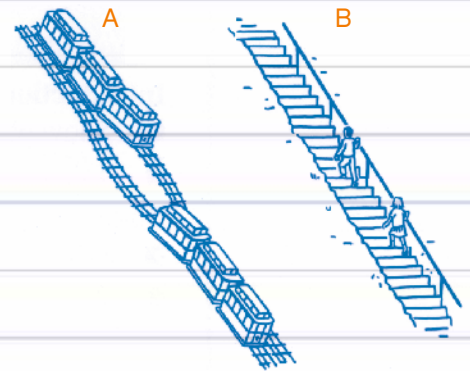


- Enjoy making cars from boxes. Encourage the pupils to notice the places in which friction affects movement (e.g. wheels rubbing against car bodies).



### The Funicular

There are many different ways to get up steep slopes. Two ways are illustrated here. Example A is a machine called a funicular. A funicular is a means of transport for travelling up steep cliffs or hills. It has two identical carriages connected by a cable. The cable runs over a pulley wheel. Neither carriage will move unless pulled as they are equally balanced. When pulled, one set of carriages moves downhill with gravity and it pulls the other set uphill against gravity.



A funicular principle model is easy to make in class:

- Make two identical vehicles from LEGO building bricks or found material.
- Attach the vehicles to either end of a piece of string. Hang the string, on a pulley/a peg/ a doorknob or similar. The vehicles are in balance.
- Now place a load on one of the vehicles: it will go down with gravity, whereas the other vehicle will go up against gravity.

### The Big Race

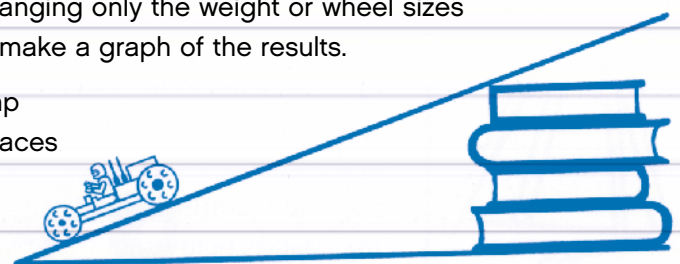
Follow up on the workshop experience by building vehicles out of LEGO Education kits. Make a speed ramp from thick cardboard propped up by a pile of books or something similar.

Predict which vehicle will travel the furthest. Then test the vehicles and record the distances travelled. Discuss the results: what were the properties of the vehicles that travelled the furthest/ the shortest distance? Make a graph to illustrate the results.

Ask the pupils to rebuild their vehicles changing only the weight or wheel sizes of the vehicles. Predict, test, discuss and make a graph of the results.

Expand on the activity by placing the ramp at various angles, testing on different surfaces

- carpets, wood, paper, etc.





## Workshop

During a 45-minute workshop using LEGO® Education Simple and Powered Machine kits, pupils enjoy building LEGO vehicles and testing them on a speed ramp. They learn that friction is a force that slows moving objects and can prevent an object from starting to move.



## The Hill Train

A cable-driven train (funicular) utilising the counter balanced weight of the carriages to produce motion.



## Miniland

A miniature wonderland offering lots of opportunities for observing movement and forces at work: boats, hovercraft, aeroplanes and more.



## Pirate Falls Dynamite Drench

A water ride in which the force of gravity sweeps the pupils in 'logs' down artificial rapids.



## Driving School

The pupils will be introduced to the Highway Code. After this tuition they will drive and steer their own cars around a road layout and utilise their road sense. On completion they get a LEGOLAND® driver's licence.



## Pirate Training Camp

An attraction with net climbs, slides, cables and suspension bridges offering numerous ways of experiencing movement and force.

