



## Forces in action

### SEQUENCE 1

Group	6-9 y.o.
Prior knowledge	None
Material needed	The Forces in action box
Subjects	Forces in action
Skills involved	- The ability of simple distance measurements - The ability to measure the mass of objects
Time to carry out the sequence	1 hour

#### Step 1: Introduction

For a short introduction to the subject compare two photos of objects on Earth and from a space shuttle.

Alternatively, you can ask some questions:

- 1) What keeps us grounded?
- 2) What makes objects float in space?
- 3) Why do we float without gravity?

#### Step 2: Initial concepts

If the subject has not yet been discussed with the pupils, it might be interesting to gather their initial ideas by asking them questions like: "why do astronauts float in space but not on Earth?"

Take note of the students' hypotheses so you can return to them later.



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## Step 3: Discovering the content of the box

This step aims at having pupils look at the box content: the material and the notice. Children should have enough time to discover the box and become familiar with it.

## Step 4: Forces in action- measurements

With the help of the materials in the box, you can see the impact between falling objects and a sandy surface, measure the depth of the tracks left in the sand, measure different distances and compare different forces. Try to find what elements determine the growth of the forces using what they have learned from the box.

## Step 5: Extension/reinvestment

Form several teams, students can imagine what would happen if the distance increased. Can you float from space to Earth?

Children can watch documentaries about the International Space Station and astronauts' training for space missions. [https://www.youtube.com/watch?v=06-Xm3\\_Ze1o](https://www.youtube.com/watch?v=06-Xm3_Ze1o)



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## SEQUENCE 2

Group	9-12 y.o.
Prior knowledge	Concept of the force
Material needed	The Forces in action box-Build box.
Subjects	Forces in action-Build
Skills involved	- Know how to build a simple force measuring instrument - Measure forces
Time to carry out the sequence	1 hour

### Step 1: Research

Ask the students to explain what keeps Earth and the planets orbiting around the Sun instead of floating off into space (based on their knowledge or by trying to guess). If they have no ideas, do a little research. This is also an excellent time to learn how to do a good internet search (use keywords, search engines, and trust a source).

### Step 2: Discover the box

Give the students time to observe the different parts of the box and ask them what they think can be done with the material.

Create the box using the materials provided.

### Step 3: Formalisation

Look back at what they have done with the box.

Children build a simple force-measuring instrument.

When an object is suspended on a elastic (rubber) band, the elastic (rubber) band elongates due to the force exerted by the gravity pulling it downward.



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If you change the mass placed on the elastic (rubber) band, it will impact how much the elastic (rubber) band elongates.

Increasing the mass will increase the force exerted by gravity on the mass, resulting in a greater force applied to the elastic (rubber) band. As a result, the elastic (rubber) band elongates more compared to when a lighter mass is placed on it. Conversely, decreasing the mass will result in less force and less elongation.

We can attach an indicator scale to the elastic (rubber) band, we can measure the elongation of the elastic (rubber) band and we can relate the measurements to gravity, and this is the concept of a simple force-measuring instrument.

## Step 4: Extension/reinvestment

From this sequence, you can start a sequence on the different types of forces and the utility of the force-measuring instrument.

The storytelling elements can also be used to create a model of the force measuring instrument.



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