



Communicating vessels

SEQUENCE 1

Age group	6-9 y.o.
Prior knowledge	None
Material needed	<p>The communicating vessels box, 2 Aluminum pans (for the river and the ocean, the communicating vessels), sand, and pebbles (Note: If you do not have any sand or pebbles, you can substitute these with other materials such as Lego® or blocks. If you use other materials, make sure they are not able to dissolve in water or float on the water surface),</p> <p>water, a bottle with a narrow opening, aluminium foil, a small bowl for water collection, scissors, tape, nails, book or box, paper towels.</p> <p>Optional: Blue food dye (Optionally, you can add some blue food dye to the water so you can see it better)</p>
Subjects	Communicating vessels
Skills involved	<ul style="list-style-type: none"> - Describe the path taken by a flowing water (river) in nature. - Identify the conditions of flowing from the river to the ocean.
Time to carry out the sequence	1 hour



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Step 1: Introduction

For a short introduction to the subject, you can look at the map and identify rivers and oceans.

Rivers and oceans are very distinct in appearance, size, shape, and movement. In this activity, you will explore the distinct characteristics of a river.

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.

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

1. Find pictures of different rivers online. Think about these questions while looking at the images. What do all the rivers in the different images have in common? What are the shores of a river like? How much water is in a river? Is it big or small? What is the shape of a river?
2. Make a list of things that describe a river. How many things can you come up with?

Step 3: Discovering the content of the box

Flow is a function of water volume and velocity. It is important because of its impact on water quality and the living organisms and habitats in the stream. Large, swiftly flowing rivers can receive pollution discharges and be little affected, whereas small streams have less capacity to dilute and degrade wastes.

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: “Build” the Communicating vessels – formalisation

Once you have an idea of what characterises a river, with the help of the materials in the box, start building your river model.

When you have finished building, carefully pour the water into your aluminium foil river. Add as much water as you need. Compare your model with an image of a real river.

So far, the water in your river model is not moving.

To replicate how water moves in a river, first set up another aluminium water collection container at the end of the aluminium pan.

Incline the aluminium pan by placing one end on a book or box and drain the river. Then, pour more water into the top of the river using a bottle with a narrow opening.

Step 5: Extension/reinvestment

When you built your river, you probably made a long channel from the aluminium foil that was either straight or had several bends. Every river flows inside a channel, which can be narrow or very wide. The channel pattern of a river can be very curvy (also called meandering), braided, or just straight. A river carves its path through the landscape around it. When you built your landscape around the river, it could have resembled anything from steep canyons to flat fields or sandbanks. The soil, sand, or rocks around the river confine the river to its riverbed.

Form several teams, and each team has to write (or tell, depending on the level of the pupils) their own story of a drop of water, describing the water passing through the communicating vessel.



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SCIENCES

- The first team writes the story of a drop of water that begins in a river. They have to explain why the water you added to your model filled up the aluminium river channel and then stayed there (In a real river, however, the water is moving.)
- Team number 2 writes the story of a drop of water travelling along the river. They have to explain why once you propped up your aluminium pan and created a slope, you should have observed that the water was travelling downhill along the river channel until it flowed out of the pan and into the collection container. (Just like in a real river, the water movement you observed was caused by gravity as the water is moving from a higher elevation to a lower elevation).
- Team number 3 begins its story with a drop of water in the collection container (the ocean is very different from a river based on its shape, size, or the way its water moves).



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SEQUENCE 2

Age group	9-12 y.o.
Prior knowledge	Concepts of the flowing water (river) in nature
Material needed	The communicating vessels box, plastic bottles
Subjects	The communicating vessels
Skills involved	<ul style="list-style-type: none">- Identify the conditions of flowing from the river to the ocean.- Describe the principle of communicating vessels
Time to carry out the sequence	1 hour

Step 1: Research

Ask the students to draw and describe the path taken by flowing water (river) in nature (based on their knowledge or by trying to guess).

If they have no ideas, they should do some 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.

Two plastic glasses connected to each other by a straw or communicating vessels, the surface of the liquid remains always at the same horizontal level in each vessel (no matter how the vessels are formed or tilted).

Create the box using the materials provided.



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Step 3: Formalisation

Look back at what they have done with the box.

Draw a simple diagram of the principle of communicating vessels.

Step 4: Extension/reinvestment

From this sequence, you can start a sequence of storytelling about long-distance water transport in Roman times. It was realised by means of aqueducts just because they didn't know the principle of communicating vessels. Water was conveyed in mortared open channels with a downward slope from spring to destination. Also wooden channels and clay pipelines were applied. The Aqua Appia, the oldest aqueduct of Rome, was constructed in the third Century BCE.

It might be exciting to discuss an interesting application of the principle of communicating vessels: water towers.

In cities, water towers are frequently used so that city plumbing will function as communicating vessels, distributing water to higher floors of buildings with sufficient pressure.



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