3-5 years

pri-sci-net

inquire
investigate
evaluate
connect

**Science Content:**
Physical Science

**Target Concepts/Skills:**
Floating and Sinking

**Target Age group:**
3-5 years

**Duration of activity:**
20 minutes

**Summary:**
This activity falls within the theme of "floating and sinking". Children first discover the notion of floating and sinking. Children need to first experience this concept by exploring some materials on floating and sinking. This activity starts with the children exploring different materials. Children try various objects to find 'Which ones float and which ones sink?' After this exploration phase, children are confronted with specific scientific problems (challenges) concerning floating and sinking: The children get a marble and a piece of silver paper/tinfoil. The challenge is: How can you make the marble float? After this challenge, the children get a little box. How can they make the marble float with this little box? The next challenge is then to make more marbles float, and finally make a toy car float.

**Objective:**
By the end of the activity children should be able to:

- practice and develop the skills of systematic observation, questioning, planning and eventually recording to obtain evidence;
- execute an experiment whereby one variable is altered in order to obtain a certain result (does the volume of an object has an effect on floating and sinking? / does the weight of an object has an effect on floating and sinking?)
- discover the concept of floating and sinking (only) through direct experience;
- devise ways to make an object which usually sinks to float.

**Resources:**

- A plastic container filled with water;
- Different materials for children to explore floating and sinking (some of these materials do have the same volume but different weight, which affects their floating and sinking. Some materials are stones, but one is also a pumice. Some materials have the same weight, but different volume – limestone, pumice or other type of stone);
- Marbles;
- Silver paper;
- Different empty boxes of different size (from small to bigger);
- Eventually: Worksheet accompanies the inquiry process.

# Let's float!

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# Let's float!

## 1. Engage (Forming hypotheses)

*Decide which question to investigate* (= *the challenge*)
*What do children already know? What are their ideas?*

Children first explore floating and sinking of different objects. (stones, wood: for materials see worksheet. It is important that children can explore that it is not the 'material' that makes objects float or sink. Eg. Not all stones sink and not all wood sinks! Give them materials so they can explore that it is weight and volume that matters: see 'note for the teacher' on the worksheet)

The teacher asks the children to find out which materials will float and which will sink. Before they do the experiment, the children first group the materials in 2 groups: Which ones do you think will float and which ones do you think will sink? Eventually this can be done with pictures of the materials. So after trying out, the children can see if they were right.

Differentiation (for older children): They can use the worksheet to indicate which materials will float and which will sink. First they have to predict, then they can do the experiment. While exploring the different materials, they can indicate on their worksheet which ones float (= I know).

The teacher guides this process and gives no feedback on the content of floating and sinking. He/She only scaffolds the children to express their findings.

Probably the children won't be right in predicting what will float or sink, because they only use the criterion 'weight' or type of material to predict if something will float or sink.
After they have carried out the experiment, the teacher can reflect on the process and asks what the children have found out. The teacher lets the children use the balance to measure the weight of the different objects. In some cases they will see that the object that is more heavy will sink as they have predicted. But when there are objects of the same weight and different size (eg. Small and bigger box of the same weight) they can experience that there is more than only weight that makes things float or sink. (so also volume matters). (see attachment below for more information on what materials can be used)

surrounding sounds can perturb the detection of the sensor too. Consequently, he/she asks children: how can we avoid perturbation or "noise" in order to have an exact measure? Various solutions are proposed by children. Teacher comments these solutions and also propose his/her solution: finding an average. This can be done by noting the highest and the lowest values appearing on the interface when pointing the sensor towards the sound source, summing these two values, and dividing the result of the sum by 2. Children are thus invited to produce high and low sounds and to calculate the average.
Actuators programming

The teacher proposes approaching actuators programming (motors) to make the robot move. As an example, he/she drags and drops motor icons on the interface, and then he/she manipulates the motors parameters on the interface (direction, speed, duration). Children are invited to program a specific movement (e.g. backward or forward, etc.) and to discuss after the execution of the program: is the same thing to use one icon for each motor or to use the double motor icon? Which strategies can they use to make the robot turn? Should the two wheels behave in the same way to make a turn?

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## 2. Inquiry (Designing and running experiments and observations)

*Plan and conduct investigations in order to collect data*

After this exploration phase, children are now confronted with some specific scientific problems concerning floating and sinking. Now the children have to find a way to solve these challenges by using the materials. From now on they are engaged in real inquiry to solve problems.
The problems are presented to the children step by step. So once the first challenge is completed, the second is given by the teacher.

1. The children get a marble. The challenge is: How can you make the marble float? (Let them first try)
2. Children get a piece of silver paper and a little box. How can they make the marble float?
3. (the piece of silver paper is already cut and folded by the teacher so that it can float while carrying the marble – this is too difficult for children to do, but with the little box it works very well)
4. In a next challenge more marbles can be given, and also different empty boxes (from different sizes) are available for the children
5. The final challenge is to make a heavy toy car float.

Make sure that when you give more marbles, the little box will sink. So this is no option anymore. So children will have to use a bigger box...
While thinking and handling in order to solve these challenges, children experience the concept of floating and sinking and experience the relationship between weight and volume..

It will be important that the teacher guides the process and stimulates the children in this inquiry process by posing the right questions. The teacher poses the questions conform to the inquiry cycle:
Orientation phase = Problem orientation/identification: What is the problem? What do we have to find out?
Elicitation phase = How will we solve the problem? How will we do this? Why do you think this will work? What do you think will happen? Why do you think this will happen?
Executive phase = Children carry out the experiment.
Restructuring phase = What have we found out?

*Differentiation (for older children!): This activity can also be done in corner work. In this case a worksheet can guide the children through the process. By using the worksheet children have to indicate if their investigation has led to an answer to the research question.*

## 3. Evaluation (evaluating evidence)

Conclusion: use data to construct knowledge and generate evidence.

Demonstrate understanding of concepts and/or ability to use inquiry skills

If children look back onto the experiments they have done, did they find an answer to the different challenges?
Can they express what they have found?

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# Let's float!

## 'Floating And Sinking'

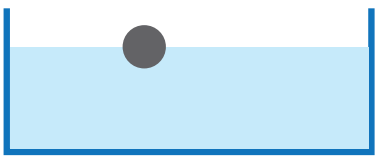
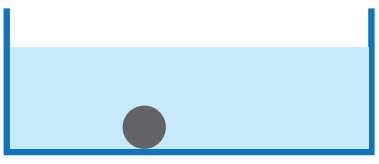
**1. Explore some materials on 'floating and sinking' ...**

**I predict**


**Note for the teacher:**
Choose the materials as follows:
You can use some stones but put also a pumice in it, so that children see that not all stones sink. Because a lot of children do have misconceptions about this and think that floating and sinking only depends upon the type of substance materials are made of.
Make sure there are also materials that have the same volume, but different weight (one can filled with sand and the other empty), and that the heavy one will sink and the light one will float.
Make sure that there are also materials that have the same weight, but a different volume. The bigger one will float and the smaller one will sink (eg. Boxes of different size, with the same weight, eg filled with sand). You can measure them with a seesaw balance. Concept of 'heavy' and 'light', 'in balance' is already acquired by the children before starting this activity.

Make pictures of the different materials, and cut them out so that children can use them to put in the right category.

**I know**

| Floats or sinks? | Which materials? |
|---|---|
| **Floats**  | |
| **Sinks**  | |

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# Let's float!

## 'Floating And Sinking'

**2. How do we make it float?**

This activity focuses upon the influence of weight and volume on floating and sinking. First children have to make one marble float with the already folded silver paper. Then they have to make one marble float with a little box, then more marbles and so on.

Make pictures of the different materials that children will use during the activity and paste them here.

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