

Floating and Sinking

Some activities for primary, middle and high school students

Here are some ideas for activities. Each activity is based on finding the answer to one basic question. The questions are listed in order of level of difficulty.

(1) Which things float and which things sink?

PROCEDURE:

The teacher gives each group of students a set containing the same kinds of objects. For example: a piece of paper, a stone, a nail or pin, a wooden stick, a rubber, a sharpener, a piece of clay, a leaf, a piece of string or rope, a seed. The teacher should take care to include some objects for which it is difficult to tell whether they will float or sink.

Students who have hardly learned to write can be given a Table with pictures and names of each object and columns headed GUESS, TEST 1, and TEST 2 (see Handout). The teacher asks them to first guess whether each thing will sink or float in water and then write their guess (S or F) in the first column.

After everyone has filled up the first column for all the objects, the teacher gives them each a container of water, and they test the objects and record what immediately happens in the column marked TEST 1.

Then they try to make the objects sink or float in any way they can (e.g. by pushing, crumpling, carefully placing, letting time pass, etc) and write the results in the last column.

After everyone is finished, the answers are compared, different results are discussed, etc. The students can suggest extensions, further questions, etc).

Students in older classes can be asked to design their own experiments, write their plans, then try out the plan, get results, discuss results, and try to come to conclusions.

RESULTS:

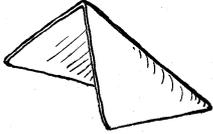
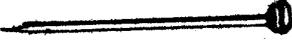
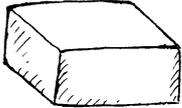
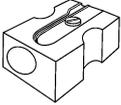
The results will vary, depending on the objects. Hopefully, different students will get different results with the same objects (e.g. depending on how the objects are placed in the water (laying a pin or dropping it), and how long they wait).

NOTES:

If only one TEST is done, the results can be difficult to record and understand because often an object will initially float and then sink after some time, when it gets waterlogged (e.g. a piece of paper, cardboard, or cloth)

This activity has been successfully tried with Class 2 children. One problem that occurred was that after testing and finding out that their guess was wrong, many children tried to erase their initial guess. The teacher has to somehow explain beforehand that it is not bad to make a wrong guess. The idea is to learn how to learn whether a guess is correct.

Does it float or sink?

Object	Guess	Test 1	Test 2
1 Paper 			
2 Stone 			
3 Pin 			
4 Stick 			
5 Rubber 			
6 Sharpener 			
7 Clay ball 			
8 Leaf 			
9 String 			
10 Seed 			

(2) Do all wooden things float? Do all metal things sink?

PROCEDURE:

The students can first discuss the questions and try to give examples and reasons. In higher level classes, students can be asked to write down their hypotheses.

Then the students can put various wooden and metal things into water and see what happens. For younger students, this could be done in two different sessions: wood one day and metal another day. This could also be preceded by a lesson in which students sort the objects into two sets: wooden and metal. The students should be allowed and encouraged to spend plenty of time experimenting and trying to get the objects to do the opposite of what they think they 'should' do – e.g. by pushing, squeezing, crumpling, bending, shaping, etc. Afterwards the results should be discussed, additional questions raised, (followed perhaps by more experimentation).

The teacher can also prepare some waterlogged pieces of wood by leaving soft, rotting wood in water for a long time. The students should be told how these were prepared.

RESULTS:

Most of the wooden objects will float – unless they are waterlogged.

Metal objects may float or sink, depending on their shape, etc.

For primary and middle school, it is not necessary to try to explain in detail the reasons why something floats or sinks. The reasons could be simply based on comparisons, analogies, and experience. For example, "I think a pin will sink because it is like a nail, and I already found that a nail sinks". It will be difficult for young children to understand why a piece of aluminium foil sinks when it is crumbled up but floats when it is shaped like a cup. Nevertheless, wrong answers can be challenged with counter-examples. The main goal is to find answers by testing and observing, and to find out that 'common-sense' predictions may be wrong.

NOTES:

In case the students do not find a way to make any metal object float, the teacher might remind them that there are ships made of metal that do float.....

(3) How can you change a thing that sinks to make it float? (e.g. a lump of plasticine)

PROCEDURE:

This question could be posed to primary or middle school students as an open ended challenge. The material could be given by the teacher, or the students could explore various materials. The solutions should be demonstrated to the whole class and discussed.

Possible materials:

Plasticine

Paper

Aluminium foil

An object that can be built onto by adding other materials, pasting paper, nailing, tying, gluing. etc.

RESULTS:

All the students will probably succeed if they try long enough. The way they succeed may vary, with some very interesting solutions if creativity is encouraged and copying is discouraged.

(4) Why do things float?

PROCEDURE:

This question is not appropriate until at least Class VIII or X, unless they have already completed a number of simpler activities concerning floating and sinking, like the ones given above.

One possible procedure is simply to give the answer as a hypothesis: "Things float because they are lighter than the weight of the amount of water they displace," and see if the students can verify or negate this hypothesis by doing experiments, using an overflow vessel and a balance. Without being told what to do with the equipment, the students can be asked to fool around with it, in small groups. Then they can be asked to plan, write down, and then carry out their own procedure. Even if they have never seen an overflow vessel before, they should be able to figure out what to do with it (with a little cooperative group work).

RESULTS:

Eventually the students should conclude that things float because they are lighter than the weight of the amount of water they displace.

They will use the overflow vessel to collect the water an object displaces, weigh this water, and compare its weight to the object's weight.

It is possible that students will get results that differ from what is expected. This will make the lesson more interesting. The concepts of variation in measurement and probabilities can be discussed.

Another factor is viscosity: the viscosity of water may help prevent an object from sinking (e.g. a pin). Students can find this out by direct experimentation.

Unexpected results will make the activity interesting and worth extending.