

Sea and Learn – Lesson Plan: Weight in Water

Key Stage: Two

National Curriculum Links: Sc1 1a, 1b, 2a, 2b, 2c, 2e, 2f, 2h, 2j, 2l;
Sc3 1a; Sc4 2b, 2e

Main Subject Focus: Science

Learning Outcomes:

Children will:

- Know that some materials are able to float whilst others will sink
- Know why some materials float and others sink
- Be able to carry out a scientific investigation, predict and test their predictions
- Be able to record their results accurately in a spreadsheet
- Be able to use a forcemeter with increasing accuracy

Resources Required:

- Washing-up bowls/Perspex tanks or similar
- Water
- Large selection of materials for children to test (paper clip, lemon, nail, ball of plasticine, apple, plastic brick, small stone, a cork, plastic duck etc)
- Forcemeters/Newtonmeters
- Hand towels

Lesson Structure:

1. Introduce the lesson by asking the children to try and explain how boats and ships manage to float or how armbands help you to float in a swimming pool. Remind them that they will already have looked into materials that float and sink at KS1 (See Teacher's Notes).
2. Now ask them to look at the objects they have been given and discuss which objects they think will float and which objects will sink. Ask them to note down why (Worksheet 1).
3. The children will need to weigh each object using the forcemeter out of the water and then, in the water. You may wish to make a spreadsheet program available for the children to enter their results here instead/as well – they will need to devise a formula to calculate the 'push up' of the water.
4. Once the investigation has been completed, ask the children to sort their list into 'floaters' and 'sinkers'. If they have entered the information into a spreadsheet, the children could turn their table in a graph to help analyse their results.

5. Ask children to share their results and discuss why some objects were weightless in water but not in air and ask them to suggest why some objects sank.
6. You may wish to use the demonstration activities to conclude the lesson. (See Teacher's Notes) Ask children to suggest how the forces are working in these demonstrations.

Extension/Homework Ideas:

- Ask the children to experiment with the ball of plasticine – can they make it float? If they can make it float, ask them why they think it floats.
- Ask children to make a boat hull from tin foil and then use thin pieces of balsa wood to divide the boat into sections (4-6). Then ask the children to load their 'cargo' (balsa wood) into the two end sections of the boat, then the middle, and one end section. Ask the children how this affects the position of the boat. Discuss how container ships are divided in the same way to prevent containers moving around in rough seas.

Sea and Learn – Teacher’s Notes (1)

Water pushes up against objects and therefore holds them up – they float. This is why we can swim in the water and why boats are able to float.

If an object is too dense it sinks to the bottom of the water. Density refers to how much weight there is within a small volume. Small, heavy objects (dense) e.g. nail, key, and stone will sink. Large, light (less dense) objects such as apples, balloons will float.

Some objects will float at first, but then sink later, e.g. a paper towel will float to begin with but as it soaks up the water, it will begin to sink.

Demonstration Ideas:

How to show water pushing up:

You will need: a tennis ball and a bowl/Perspex tank of water.

1. Place the tennis ball into the water and tell the children that as they push the ball under the water, they will feel it pushing back. Let the children experience this.
2. Show what happens to the ball when you let go (it comes back to the surface)
3. Tell the children that an upward push of water is called ‘upthrust’ and that an object will float if this upthrust of water is strong enough to bear its weight.

How to make a floating object sink

You will need: a lemon, a sponge and a bowl/Perspex tank of water.

1. Firstly place the sponge in the water – it floats high out of the water. Ask the children why they think it floats (the air holes in the sponge make it float)
2. Now, hold the sponge under water and squeeze it. Show the children how the bubbles of air come out of the sponge. Ask them what they think will happen when you let go (the sponge will not float as high because the air holes are now filled with water)
3. Now you need to place a lemon in your tank of water. It will float. Ask the children if they can explain why it floats (there are tiny holes in the peel of a lemon which contain air bubbles – this makes it float)
4. Finally, show the children how you can make the lemon sink by peeling it and putting back into the water. Without the air holes in the peel, the lemon will sink.

Sea and Learn – Teacher’s Notes (2)

Measuring the weight of the objects:

Use forcemeters, which can display either newtons or grams or both – make sure children do not mix their measures when recording the weights. Decide as a class or group, which measure to use.

Recording results in a spreadsheet:

Use a spreadsheet to record the results of the experiment. Ask children to write a formula, which calculates the difference between the weight in air and weight in water.

E.g. In cell D4 you need the formula **'=B4 – C4'** to find the difference in weight and therefore the upward thrust of the water.

floating_and_sinking						
	A	B	C	D	E	F
1	Floating and sinking					
2	object	weight in	weight in	difference	sink or	
3		air (N)	water (N)	in weight (N)	float	
4	apple			0	sink	
5	metal spoon			0	sink	
6	plasticine			0	sink	
7	wooden block			0	sink	
8				0	sink	
9				0	sink	
10				0	sink	
11				0	sink	
12				0	sink	
13				0	sink	
14				0	sink	
15						
16						

Ask children to write a formula that will calculate whether it will float or sink. Put the formulae in column 'E'.

Sea and Learn – Worksheet (1)

Look at the objects you have been given. Decide which objects will float and which objects will sink. Give a reason why.

Will float	Why?	Will sink	Why?

Now weigh each object out of the water and write the weight in this table. Then put the objects into the water and weigh them again. What is the difference in their weight?

Object	Weight in air ()	Weight in water ()	Push of the water ()	SINK or FLOAT?