

# Sink or swim?

## Teacher's Notes




### Preface:

**Sink or swim** is an activity designed to give pupils an insight into the theory behind buoyancy and stability principles applied to the shipping industry. Archimedes principle is discussed in relation to ships' buoyancy, as is the theory of moments applied to ship stability. This is all consolidated through a practical exercise looking at a range of everyday objects and materials to see if pupils can work out which object would provide the best model on which to design a new super ship for NYK Shipping.

**Audience:** Key Stage 3 pupils - all years

**Length:** 1 hour

### Learning Objectives:

-  To apply theory regarding buoyancy and moments to practical application using shipping.
-  To encourage pupils to enquire about model properties for shipping, based on stability and buoyancy principles.
-  To remind pupils of the everyday application of physics principles to the real world.

### Running the activity:

**Starter – 5 minutes:** Using whole class discussion, as pupils to brainstorm why some objects float, and some don't. Encourage use of key words such as density, volume and mass. This contextualises the slideshow presentation.

**Main – 45 minutes:** Present the *sink or swim slideshow* using the notes provided on each slide. At slide 14 hand out copies of the sink or swim handout between groups and provide them with an everyday object to run through the sheet with. Some ideas of the object that could be used are:

- a plastic toy
- a piece of wood
- a piece of iron/bronze
- a plastic tupperware container
- a drinks can
- a glass bottle

Each group of pupils will also need a tray filled with water. Encourage pupils to work their way through the sheet. The sheet provides a practical application of moments and buoyancy applied to floating and sinking.

**Plenary – 10 minutes:** Once pupils have completed the hand-out, construct a table on the whiteboard with a list of all the objects/materials on. Go round the class and ask pupils to describe the strengths and the weaknesses of their objects/materials in relation to buoyancy and stability. Once these are on the board, take a class vote to decide which object/material would be best for Captain Eco. to take inspiration from for designing his new super ship for NYK Shipping.

*Where it fits in:*

### **Module-based curriculum**

#### **1. Unit 7K- Forces and their effects**

- Identify the origins of friction, water resistance, up thrust and weight and describe situations where these forces act.
- Distinguish between mass and weight
- Why objects float in relation to the displacement of water

#### **2 – Unit 9L – Pressure and moments**

- Learn about the principle of moments
- That a force can make an object topple over about a pivot
- That a turning effect is referred to as a moment

### **Enquiry-based curriculum**

#### **3.1 – Energy, electricity and forces**

3.1b – Forces are interactions between objects and can affect their shape and motion

#### **4 - Curriculum opportunities**

4c - Use real life examples as a basis for finding out about science