

Flying Start Challenge



How Do Boats Float? - Teacher Guide

AIRBUS

ATKINS
Member of the SNC-Lavalin Group

BAE SYSTEMS



ROYAL NAVY
FLEET AIR ARM
MUSEUM



 **LEONARDO**
HELICOPTERS

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Materials and Lesson Procedure

The following materials are required to complete this activity pack:

- Background Knowledge (see below)
- Activity instructions
- Aluminium Foil
- Ruler
- Tape
- Scissors
- Permanent marker
- Paper
- Pen or pencil
- Towel or kitchen roll
- Pennies (or anything small you know the weight of or can weigh)
- Calculator
- Large bowl/container (preferably clear)
- Water
- Mark scheme

Lesson Procedure

This activity should be completed in the following order:

- Read through the background knowledge on the subject.
- Go to the following websites if you would like more information:
 - <https://www.bbc.co.uk/bitesize/topics/zc89k7h/articles/zytqj6f>
 - [Density - Density - GCSE Physics \(Single ... - BBC Bitesize\)](#)
- Follow instructions in activity 1.
- Follow the instructions in the competition.
- Perform tests with your boat to see the buoyancy principle in action.
- The boat made in activity pack 2 should then be judged using the mark scheme and a prize awarded.
- Reflect back on what has been learnt during this activity.

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Mark Scheme

Name: _____ Date: _____

| Topic | Mark Scheme | Score |
|-----------------------------------|--|-------|
| Background understanding | 0 – No attempt made 1 – Attempts made, incorrect understanding 2 – Attempts made, all correct understanding | |
| Use of equations (Applies to all) | 0 – No attempt made 1 – Attempts made, incorrect use 2 – Attempts made, correct use | |
| Calculation of water density | 0 – No attempt made 1 – Attempts made, incorrect answer 2 – Attempts made, correct answer | |
| Activity instructions | 0 – No attempt to follow instructions 1 – Attempts to follow instructions 2 – Correct following of instructions | |
| Graph | 0 – No attempt at creating a graph 1 – Attempt to make a graph with incorrect labelling of graph or plotting 2 – Correct labelling of graph and plotting | |
| Design creativity | 0 – Template design used 1 – Template design slightly adapted 2 – Template design heavily adapted 3 – Completely unique design from the template | |
| Amount of weight held | 0 – No weight held and sank 1 – No weight held and floated 2 – some weight held and floated 3 – Top three for most weight held and floated in the class | |
| Total score: | | |



Analysing the Data

- Calculate the average percent of the ball submerged for each diameter, write these in your table. **Topic: Activity instructions. Marks for attempt made**
- Plot a graph with the diameter of the aluminium balls on the x-axis and the average percent submerged on the y-axis. **Topic: Graph. Marks for a neat and readable graph.**
- Did the balls sink? If so at which diameter?
- At which diameter did the balls have the lowest density?
- At which diameter was the density of the balls roughly equal to the density of the water? **Topic: Background understanding. Any answer between and including where their ball sank or was about to sink.**
- Can you calculate the density of the water? **Topic: Calculation of water density. 1000kg/m³ – give or take 500kg/m³.**

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