

A watery balancing act: Teacher's Notes

Preface:


A watery balancing act is an activity designed to apply the principles of moments to one of the most important maritime industries in the world; container shipping. The *watery balancing act activity sheet* begins with an overview of the value of container shipping and its importance in our everyday lives, before applying key physical terms such as pivot, moment, turning force and centre of mass to the loading of ships. The activity sheet provides pupils with the opportunity to undertake three distinct experiments, consolidating their scientific understanding by answering questions and carrying out activities in each.

The *plenary activity* folder provides a PowerPoint entitled *moments gone wrong*, illustrating the catastrophic effect of calculating moments incorrectly when recovering a vehicle from the water by crane.

Audience: Key Stage 3 pupils – Year 9

Length: 1 hour

Learning Objectives:

 To apply physical theory regarding buoyancy, forces and moments to practical application using shipping as an example.

 To remind pupils of the everyday application of physics principles to the real world.

Running the activity:

Starter – 10 minutes: Using whole class discussion, ask pupils to brainstorm the topic “*moments in the real world*” discussing where moments are applied in everyday life. Write down pupils ideas on the whiteboard and tell pupils that today they will be looking at the application of moments to the loading of container ships.

Main – 45 minutes: In groups of three, provide pupils with a copy of the *watery balancing act activity sheet*. For this activity, each group will need:

- a 30cm ruler (for experiment two)
- a 1m ruler (for experiment three)
- a rubber
- a textbook

- two force meters
- a stand
- Various weights in g

Plenary – 5 minutes: Present the *moments gone wrong slideshow* in the *plenary activity* folder of this resource, to illustrate the catastrophic consequences of calculating moments incorrectly.

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