

The need for speed: Teacher's Notes


Preface:

The need for speed is an activity designed to apply the physics of speed-distance-time relationships to the world of shipping. The *need for speed slideshow* provides pupils with an overview of why shipping is important, how ships are designed to maximise speed and efficiency, and how to calculate the speed of ships using speed-distance-time calculations. The plenary activity, *need for speed calculations*, sets about asking pupils to calculate speed-distance-time calculations in relation to genuine shipping routes, applying the principles of speed to real world situations.

Audience: Year 9

Length: 1 hour

Learning Objectives:

 To give pupils an overview of the relationship between the variables speed, distance and time.

 To provide pupils with an application of physics to real world situations.

Running the activity:

Starter – 10 minutes: Using whole-class discussion, ask pupils to provide working definitions for the terms speed, distance and time to set the context for this session. Ask pupils why calculating speed is important in everyday situations.

Main – 25 minutes: Go through *The need for speed slideshow* with pupils using the guidance notes provided at the bottom of each slide.

Plenary – 25 minutes: Provide pupils each with a copy of *The need for speed calculations* sheet and ask pupils to answer the two questions provided. Provide pupils with a sheet of graph paper each and ask pupils to plot their own distance-time graphs with application to the shipping industry by following the instructions provided on slide 16 of *The need for speed slideshow*.

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.
- Ways of reducing friction

1 – Unit 9G – Environmental chemistry

- Ways fuel consumption can be usefully limited

2 – Unit 9K - Speeding up

- Relationship between forces, including balanced forces, on an object and its movement
- In order to increase speed without increasing thrust, resistance or drag has to be reduced
- Effects of water on speed and how streamlining reduces these effects
- Construct and interpret speed-time graphs
- How resistance increases with a speed of an object, which has an effect on distance-time graph shapes.
- Know that force causes a change in movement

Enquiry-based curriculum

1.1 – Scientific thinking

1.1a - Using scientific ideas and models to explain phenomena and developing them creatively to generate and test theories

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

Extension activity:

Pupils could put together their own question scenarios, similar to those presented on *The need for speed calculations* sheet, for their classmates to answer.