TEACHER NOTES

Science: Physics

Motion & Force (Speed, Distance & Time)

Education Destination

RED FUNNEL

Contextual Summary

This resource is for students in key stage 3.

It relates to the 'Motions' part of the Science curriculum. Students will be using formula for speed / distance/time and plotting graphs.

Task Implementation

This is an on-site resource, designed for use whilst on the students' ferry journey to the island.

Students will explore the relationship between speed, distance and time and will rearrange equations.

The higher resource will also encourage students to think about acceleration. This knowledge will be used to plot distance-time graphs and lead into conversion of measurements.

Students will also think about why different vessels travel at different speeds.

SUBJECT

Science: Physics

UNIT

Motion & Force (Speed, Distance & Time)

OPPORTUNITIES FOR USE

- × Pre-Visit
- ✓ On-Site Activity
- × Post-Visit
- × Peripheral Task

S1-S3

CURRICULUM / SYLLABUS

- ✓ National Curriculum 2014
- ✓ Curriculum for Excellence

Applies to Resources numbered:

10705 1

10705 2

Ability Levels

There are two variants of this resource for students of higher and lower ability in key stage 3.

Teachers can support as necessary.

The language is simpler in the lower resource, equations are given and acceleration is not covered.

Key skills practised in this unit:

- Independent work.
- Observation skills.
- Numeracy skills
- Use of formulae, conversion of units and graph plotting skills.

Relationship to Curriculum

This resource links to the required teaching as specified by the National Curriculum 2014 for key stage 3 Science. The tasks cover physics / motion; producing distance/time graphs and calculating speed and acceleration.

Learning Opportunities

On-Site

- Students complete the Science resource linked to this teacher note:

Resource ID: 107051 (KS3 mid ability)

107052 (KS3 high ability)

Enrichment Opportunities

- Opportunities for practising Maths and Science skills i.e. measurement conversions.
- Students will understand and practise how to convert between mph, km/h and knots.
- Teachers can discuss with students how boats and ships normally describe their speed in Knots.

Below is some information which could be discussed:

Factual IOW ferry details

- Length 93m or 305.8ft
- Crossing time approx. 55 mins
- Tonnage 3953
- Beam 17.5m or 574ft
- Average speed 12knots / 22.22kmh / 13.81mph
- 13842 sailings per year

Learning Outcomes

- ✓ To calculate speed, distance and time, using the appropriate formulas.
- ✓ To produce a distance-time graph accurately.
- ✓ To understand initial and final velocity in view of acceleration (higher only).

TEACHER ANSWERS

Answer Sheet – higher resource (107052)

Q1 Catamaran, sailing boats, speed boats yachts, etc. Some are travelling faster, so overtake the ferry. Some are slower, so the ferry passes by them.

Q2 Different shapes, sizes, engine size, some under sail only, streamline, less friction/ water resistance.

Q3 Green buoys indicating speed restrictions of 6 knots in the harbour.

Q4 **Speed = distance ÷ time**

Q5 **Distance = speed x time** 13.13mph x 1hr = 13.13 miles

Q7 The distance is different because QS only used average speed, which means the ferry could be travelling faster or slower at different points of the journey. I.e the harbour restrictions of 6 knots.

Q8 **Speed = distance ÷ time** 11.385 ÷ 0.75 = 15.18mph
0.75 = ¾ of an hour.
Also accept 0.765 for ¾ hr (as 0.017 x 45) 11.385 ÷ 0.765 = 14.88 mph

Q9 In the harbours the ferry will need to travel slowly, at the 6 knots, this will bring the overall average speed down.

Extension – see individual graphs.