

Describing Ferry Motion!

Speed, Distance and Time

Student Introduction

- ▶ In this activity you will compare the speed and acceleration of your Red Funnel ferry with other boats and ships.
- ▶ There are various scenarios for you to consider!



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TASK 1

Observation

Let's see what's going on around you!

Look out of a window or go to the outside deck for a 10-15 minutes. Quietly observe all the other boats and ships that you can see. Answer the following questions:

Q1. Which boats are travelling **faster than the ferry**, and how do you know?

Q2. **Why** do you think all the boats are moving at different speeds?

Q3. Can you see anything which suggests **what speed** the ferry is travelling at as it leaves the dock or harbour?

TASK 2

Perform some calculations

Let's practise some speed calculations!

Complete each of the following problems, showing all your workings where applicable.

Q4. Write down the equation for **SPEED**, relating it to **distance** and **time**.

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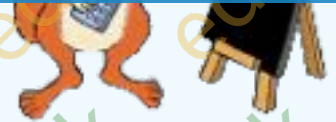
Time - 1 minute (min) = 0.017 hours (h)

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For example:

$$6 \text{ knots} = (6 \times 1.15) = 6.9 \text{ mph}$$

$$6 \text{ minutes} = (6 \times 0.017) = 0.102 \text{ h}$$



Q5. Your journey should take one hour and the ferry will travel at an **average speed of 13.13mph** or 11.42 Kt. **What distance** does the ferry cover?

Q6. The actual distance from Southampton to East Cowes is 11.385 miles. **How many nautical miles is this?**

Q7. Why is the distance you calculated different to the actual distance covered? **Explain your reasoning.**

Q8. If one day the crossing took **45 minutes** to cover the **11.385 miles**, at what speed would the ferry be travelling?

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Q9. The harbour enforces a **speed restriction of 6 Kt** (approx. 6.9 mph). How will this affect the average speed at which the ferry can travel?

Q10. Extension Task: on the graph paper provided, **plot a distance - time graph for your ferry crossing** using the results you have calculated.

THINK about the following:

- ▶ The ferry takes 2 minutes to travel through Southampton Town Quay and a further 6 minutes in East Cowes Harbour, both at 6 Kt (6.9 mph).
- ▶ The total journey will take an hour.
- ▶ The total distance travelled is 11.385 miles.

Calculate the **distance travelled in the harbours** and plot this on your graph.

Add a **title**, label the **axes** and choose a suitable **scale**.



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Acceleration!**TASK**
3

Consider the effects of acceleration and deceleration and how these may affect your distance-time graph.

CHALLENGE!

Can you work out the **acceleration** of the ferry at different points on the journey?

Here's the equation you need:

$$v - u$$

$$a =$$

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If a is negative, this shows *deceleration*.

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Highlight and explain key parts of your distance-time graph.

THINK about the following:

- ▶ Acceleration
- ▶ Constant speed
- ▶ Stationary

