

### **Narrative**

The class has gathered at the top of the Imperial Hotel where they can see the whole city. The school has notified the Army that the class is stranded and a teacher has heard that everyone will be airlifted out during the night. The Army has asked for more information about the Aliens. The request is for information on the habits and movements of the Aliens to be sent to Army HQ.

### **Problems**

- What information do we have about the behaviour of the Aliens?
- How can we represent the information so that it can be sent to HQ and interpreted quickly?

### **Mathematics Content Objective**

- Discuss and interpret graphs arising from real situations (level 5)

### **Learning points**

- A distance-time graph or travel graph describes stages in a journey.
- Before you interpret a distance-time graph, work out the scales on the axes.
- The horizontal axis is used for time.
- A sketch of a graph is not accurate but its shape gives a picture of what is happening to one variable in relation to the other.
- Two graphs of different stories or situations could have the same shape.

### **Alien invasion resources**

- 3.1 Slides: Graphs for interpretation
- 3.2 Audio clip: Army commander requesting assistance (3 minutes)
- 3.3 Video clip: Globe news report with observations of the Aliens' behaviour and interviews with terrified citizens (4 minutes)
- 3.4 A4 resource sheets of a situation report to be copied and cut up to make packs of cards (make one pack per group of four pupils)
- 3.5 Optional A4 resource sheet with a supplementary problem for groups that finish quickly (print several copies)
- 3.6 Slides: Graphs to support discussion of situation report
- 3.7 Audio clip: Faint message from a teacher reporting her capture by the Aliens when she went outside to see if she could spot the helicopter (1 minute)
- 3.8 Optional A4 resource sheet of homework task 3 (print one per pupil)

For pupils: scissors to cut out the cards.

## Main activity

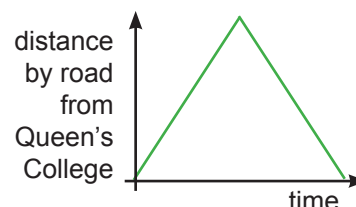
Either before or at the start of the lesson, show or remind pupils how to interpret a distance-time graph. Display **Resource 3.1, slide 1**, a graph representing the bus journey to Manford. Each section of the journey was at a constant speed (click on the slide to show each section in a different colour). Ask questions such as:

- ▶ How far is the school from Manford? How long did the journey take?
- ▶ How do we know from the graph when the bus was stationary? At what time did we stop? For how long?
- ▶ Which was the quickest part of the journey? How can you tell? What was our speed for this part of the journey?
- ▶ What kind of roads do you think we travelled on? (e.g. town and city roads for the first and last sections; a motorway for the middle two sections)

Invite someone to tell the story of the graph.

*If time allows, show the graphs on **Resource 3.1, slides 2 and 3**. Ask pupils to discuss in pairs what the story of each graph could be.*

Show **Resource 3.1, slide 4**, the map of Manford. Ask pupils to sketch a graph to represent the journey of someone walking at a constant speed around the square from Queen's College and back again. Make sure that pupils appreciate the difference between sketching a graph and drawing it accurately, and why the graph changes direction at the halfway point.



Introduce the next stage of the invasion. Explain that the class has travelled by bus to the Imperial Hotel and has gone to the top floor, which has access to the helipad on the roof. A teacher has heard that everyone will be airlifted out during the night and a message has been received from the Army Commander. Play **Resource 3.2**, a 3-minute audio clip of a request for information about Alien behaviour.

Discuss what you already know about the Aliens (e.g. they double in mass before exploding into two and need a green fog to support their existence). Say that a TV news broadcast is due, which may have more information. Play **Resource 3.3**, a 4-minute video clip reporting other bizarre behaviour and interviews with people who have had close encounters with the Aliens. Discuss the salient points.

Say that you have found what appears to be a report on the invasion, with graphs and information about the Aliens, but it has been cut up ready for shredding. If the groups could put it back together it could contain useful information for the Army.

Give each group a prepared set of cards made from **Resource 3.4**. *If time allows, groups could cut them out.* Ask the groups to match each item of information to its graph and to identify how to label the axes. When two groups have finished, ask them to join forces to compare and justify their decisions to each other.

## Differentiation

For pupils who need more support, simplify the pack of cards by removing one or two of the harder matching pairs. When they have finished the matching activity, the pack could be shuffled, placed face down, and used for a game of Pelmanism.

For able pupils, add the extension cards to the pack for matching. When they have matched their pairs of cards correctly, they could be given more items of information about the Aliens (or invent their own) and then sketch graphs to show the information, labelling the axes appropriately.

*If time allows, pupils could try the supplementary problem on **Resource 3.5**, an analysis of the distances Aliens have travelled when they become very dangerous*

### Review

Take feedback on the matching pairs of cards and the labelling of the axes asking pupils to explain their thinking. Draw out that a graph of a particular shape can represent more than one situation.

If you wish, support the discussion with the slides in **Resource 3.6**.

### Homework

Play **Resource 3.7**, a 1-minute audio clip. One of the teachers is missing. She went outside to see if she could spot the helicopter and the Aliens have taken her.

Give out copies of **Resource 3.8**, Homework Task 3, choosing Task A or Task B or both, depending on the amount and level of challenge that you want to provide.