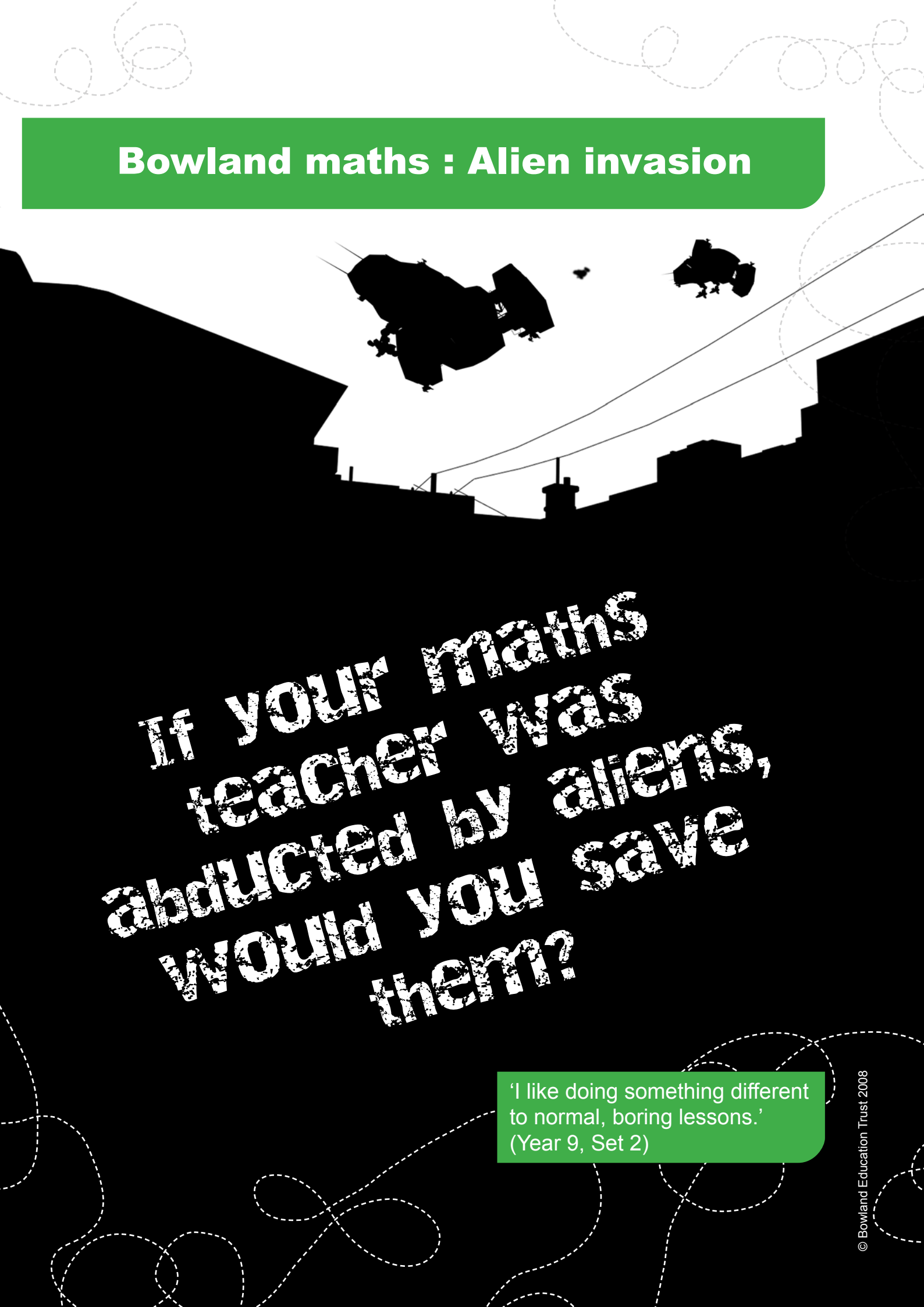


Bowland maths : Alien invasion

The background of the page features a black silhouette of a city skyline with various buildings and chimneys. Above the skyline, two large, dark, angular alien spacecraft are depicted in flight, with a smaller one further away. Thin white lines representing power cables stretch across the sky. The entire scene is set against a white background with faint, decorative dashed lines forming loops and swirls at the top and bottom.

**If your maths
teacher was
abducted by aliens,
would you save
them?**

'I like doing something different
to normal, boring lessons.'
(Year 9, Set 2)



1 Overview

Alien Invasion is a set of four interactive lessons about a full-scale alien attack that coincides with a class visit to Manford City. To set the scene and support the lessons, live TV news bulletins, radio broadcasts and telephone messages help to develop the story line. The invasion leads to a series of non-routine problems for pupils to solve as the narrative unfolds. The problems are on the theme of mathematical communication and are intended to promote discussion, reasoning and creativity.

Alien Invasion is an opportunity for pupils to apply and use skills that they have previously been taught and to see connections between mathematical topics. In this case, the lessons are best taught consecutively. Alternatively, it can be used to introduce or extend skills and be taught, say, as one lesson per week for four or more weeks. In this case, intervening lessons can be used for further teaching and practice.

Teachers are free to tailor the lessons, activities and resource sheets to the particular needs of their classes.

2 Mathematical content

As they solve the problems, pupils are involved in:

- planning and organising;
- exploring and discovering relationships;
- analysing and reasoning;
- representing and interpreting;
- reflecting and communicating.

The mathematics involved is mainly at National Curriculum levels 5 and 6. Pupils:

- estimate and calculate using measures in everyday situations;
- convert one metric unit to another;
- use and interpret maps and scale drawings;
- recognise that all points on the circumference of a circle are the same distance from the centre;
- use all four operations with decimals to two places;
- solve simple problems involving ratio and direct proportion;
- find and describe the n th term of a sequence;
- formulate and solve linear equations;
- discuss and interpret graphs arising from real situations;
- use the mean, median and mode.

Before they embark on Alien Invasion, pupils should be able to:

- use and interpret coordinates in all four quadrants;
- recognise simple properties of parallelograms and circles;
- calculate with decimals, using a calculator when appropriate;
- solve simple problems involving ratio;
- identify multiples, square and triangular numbers, and powers of 2;
- construct and use simple formulae;
- construct and interpret data in simple line graphs;
- understand and use the mode and range to describe sets of data.

3 Organisation and pedagogy

Alien Invasion involves four 50- to 60-minute lessons. Some parts of the lessons are optional so that teachers can tailor them to the time they have available.

The lessons are suitable for pupils working at National Curriculum levels 5 and 6, i.e. of average or above average attainment in Years 8 or 9, and high attaining Year 7 pupils. They involve the class working in pairs and small groups to solve problems, with individual work for homework.

The teacher's role in the lessons is to lead the development of the story and introduce the problems, then leave it to groups of pupils to decide how to solve them. Optional supplementary problems are provided for any groups that solve the main problems quickly. Teachers can ensure that groups do not get 'stuck' by taking whole-class feedback, or by pairing groups to learn from each other. Full details of the teacher's role and how the activities can be differentiated are in the lesson notes.

The first homework is essential to the progress of the story, although it could be adapted to create an extra lesson. The rest of the homework is optional. If the supplementary problems are not tackled in the lessons, they could be offered as an alternative to the homework tasks.

4 Resources

The materials include:

- detailed introductory notes
- four lesson plans
- video and audio clips
- slides
- resource sheets which include supplementary problems and homework tasks
- solutions to the problems.

Each set of lesson plans starts by explaining the possible learning points for the lesson and how the video, audio and print resources relate to the storyline. The rest of the lesson notes are a guide to less experienced teachers, or teachers from non-conventional backgrounds, on the possible flow of the lessons, questions to ask and adaptations of activities for pupils of differing abilities.

To run the resource, teachers will need an IWB or whiteboard, data projector and laptop.

For the lessons and homeworks, a maximum of 13 resource sheets need to be printed, in either colour or in black and white, mostly one sheet per group or pair of pupils, although a few will need to be printed one per pupil. For the third lesson, cards need to be cut out, either in advance or by the pupils in class.

To solve the problems, pupils will need string, rulers, compasses, scissors, calculators and small counters to use as markers on maps.

The launch page of the Case Study contains links to the Introduction notes, the Lessons, and the Solutions. When you click on the Lessons button you are led through to a sub menu of Lessons 1-4. Click on an individual lesson to access the lesson notes, resource sheets, and audio and video clips. They are numbered in the order you will need them in the lesson. All print resources can be viewed on screen or printed off.