

# Bowland Maths: Torbury Festival

**As megastars converge on the quiet village of Torbury, disaster strikes for the world's biggest festival. Can your pupils save the day or will they leave thousands of hopeful fans stuck in the mud?**

**"I would like more of these lessons because they use group work so they are a lot better than working from text books." (Pupil, Year 8, Set 2)**

**"I really enjoyed the challenges that were thrown at us. I wish we could do more of it." (Pupil, Year 8, Set 2)**

**"It's different to normal lessons and makes a nice change. It's more likely that we'll come across these problems than the ordinary stuff we do in class!" (Pupil, Year 9, Top set)**

## Overview

Megastars from all over the world are about to converge on the quiet village of Torbury, but with just hours to go until the famous festival begins, everything is going wrong. With storm clouds overhead and a herd of frisky cows on the loose, the eccentric site manager, Mavis Broom, has retired to her office with a case of the screaming wobbles. Is the festival destined for disaster? Or can the Festival Support Squad transform the floods, bickering market sellers, cow-wreckage and angry crowds into a fantastic weekend?

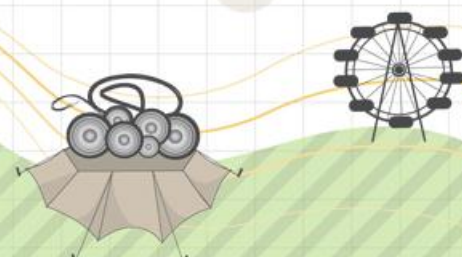
Torbury Festival involves four 50 to 60-minute lessons, each with optional homework:

- 1 Underwater
- 2 Merchandise mayhem
- 3 Cows gone wild
- 4 Emergency plans

With high profile festivals like Glastonbury and the V Festival dominating the music scene, a music festival is guaranteed to engage pupils. As the story unfolds, the mathematical challenges emerge from the situation but you will find that solutions to them are not immediately obvious. Pupils step into the role as the Festival Support Squad. Over the four lessons they meet a variety of wacky characters as they deal with four very different situations. The aim is to ensure that the final night is a sell-out show, complete with spectacular music and video effects.

The challenges are designed to promote discussion, reasoning and thinking skills. Some parts of each lesson are optional so that you can tailor them to the teaching time that you have available. Each lesson ends with a 'cliffhanger' intended to maintain pupils' interest and encourage them to look forward to the next lesson.

The Torbury Festival case study includes this introduction, four lesson plans, video and audio clips, slides, resource sheets presenting the challenges, and some possible solutions to the problems.



## Mathematical content

The mathematics in Torbury Festival is suitable for pupils who are confident with the content of National Curriculum levels 6 and 7, i.e. pupils of above average attainment in Year 8, and average or above average pupils in Year 9 and in Key Stage 4.

Some of the lessons are opportunities for pupils to focus on process skills as they select, apply and use mathematical techniques that they have previously been taught. Other lessons (e.g. lesson 2) could be an opportunity to introduce new techniques and harder work in an enjoyable 'non-text-book' scenario from which the mathematics arises naturally.

To benefit fully from the lessons, pupils will need to calculate with decimals and percentages, including finding areas of circles and volumes of prisms and cylinders. They will also need to construct triangles and bisectors of line segments and angles, and apply the idea of locus. For some problems they will need to be able to solve equations and draw graphs of functions, using ICT as appropriate.

## The teacher's role

Torbury Festival is an opportunity for pupils to apply and use skills that they have previously been taught and to see connections between mathematical topics. The lessons are best taught consecutively to maintain momentum but you will need to **prepare pupils in advance by teaching or refreshing any mathematical skills that will be new or that they have not used for some time.**

After introducing the case study, organise the class in groups of about four pupils, who could stay together throughout the lessons. Your role as the teacher is to **lead the development of the story and introduce the challenges, then encourage the groups to decide for themselves how to resolve them.**

If your pupils are not accustomed to solving unfamiliar problems, you may need to forewarn groups that they could be challenged by the case study, because the problems are not five-minutes-or-less activities. They may well get stuck at some point. They need to know that this is a normal part of problem-solving and that working out how to start on a problem is an important skill.

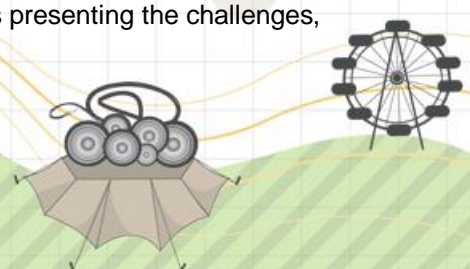
Aim to establish guidelines for the frequency and type of help that you will offer as the story unfolds. It is essential to **feed in hints only when and if pupils get stuck and not over-structure your support so that pupils merely follow the steps you have outlined.** Advise the groups to brainstorm to generate ideas, to explain and consider each proposed strategy or solution carefully so that everyone in the group can verify whether or not it works, and to try a variety of approaches. You can also pose suitable questions or prompts to stimulate pupils' thinking, pair groups to learn from each other and take whole-class feedback at any point. At the end of each lesson, lead a whole-class discussion, helping the groups to share their problem-solving strategies and to evaluate their progress.

In the final problem of the case study try to make sure that all pupils in the class succeed so that they end the case study feeling a real sense of achievement.

## Resources needed

The Torbury Festival materials include:

- these introductory notes
- four lesson plans, with resource sheets and slides presenting the challenges, including optional homework tasks
- video and audio clips





- where applicable, some solutions to the problems.

The application is easy to operate and is designed for use in a normal maths classroom. It requires only an interactive whiteboard (IWB) or whiteboard, one laptop (to be used by the teacher to load and navigate around the resource), data projector and speakers.

The launch page features links to the introduction and the lessons, numbered 1–4. Click on an individual lesson to access the lesson notes, resource sheets, slides and audio and video clips for that lesson. The resources are numbered in the order needed in the lesson. All the print resources can be either viewed on screen or printed out. A button labelled 'Teachers' Notes' is at the bottom of each lesson menu which links to the lesson plans and solutions for that lesson.

To return to the main application after viewing the print resources, close the pdf viewer. The main application will remain open in the background whilst you are viewing the pdf documents.

Each lesson plan starts with a narrative explaining the plot, followed by a description of the problems, the skills linked to the mathematical content, and a list of the video, audio and print resources for the lesson. The rest of the lesson plan is a guide to the possible flow of the lesson, questions to ask and ways of adapting activities for pupils of differing abilities.

For the lessons and homework a maximum of 4 pages of resource sheets need to be printed per lesson, either one copy per pair of pupils or one per pupil.

Pupils will also need calculators, graph paper, graphics calculators (optional), rulers, compasses, stiff card and squared paper.

### Adapting the lessons

Torbury Festival is designed to be adaptable, giving you the freedom to modify lessons to match pupils' ages and abilities and the school timetable. All the lesson plans make suggestions for differentiation, with ideas for simplifying or extending the main problems or providing alternatives.

Since lessons vary in duration from one school to another, in all the lessons some activities are optional. These can be omitted if lessons are less than 50 minutes, or if pupils take longer than you expect to solve the problems.

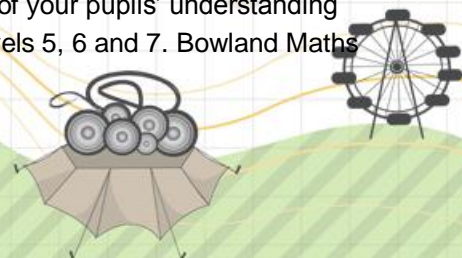
The resource sheets for each lesson include a selection of shorter and longer tasks or problems, all related to the plot. You can choose from these as you wish. For example, they can be used as:

- supplementary problems for any groups that solve the main problem quickly, or for schools where the lesson is longer than an hour
- alternative problems to provide further differentiation in lessons
- introductory or follow-up work
- optional homework.

Where younger or middle ability pupils work on the case study, it may be advisable to develop a lesson plan over two periods rather than one so that they have sufficient time to solve the problems.

### Assessment

You could use the Torbury lessons to build a picture of your pupils' understanding and skills, selecting suitable criteria to focus on at levels 5, 6 and 7. Bowland Maths



provides useful assessment materials on the Bowland Maths website ([www.bowlandmaths.org.uk](http://www.bowlandmaths.org.uk)).

### Cross-curricular opportunities

Subject	Topic
Music	Performance activities, contextual influences that affect the way music is created, performed and heard, current trends in music
Art and design and CDT	Exploration of media, processes and techniques to produce T-shirt designs; designing and making T-shirts
English	Imaginative writing, developing ideas, imagery, settings and/or characters around the music festival theme, pop song lyrics and the relationship between standard and non-standard spoken language
PSHEE	Financial capability

### Useful websites

#### Bowland Maths

[www.bowlandmaths.org.uk](http://www.bowlandmaths.org.uk)

#### Music festivals

[www.glastonburyfestivals.co.uk/history/](http://www.glastonburyfestivals.co.uk/history/)

#### Floods

[www.energysavingsecrets.co.uk/climate-change-in-action-uk-floods.html](http://www.energysavingsecrets.co.uk/climate-change-in-action-uk-floods.html)  
[www.defra.gov.uk/environment/index.htm](http://www.defra.gov.uk/environment/index.htm)

#### Manufacturing T-shirts

[www.madehow.com/Volume-2/T-Shirt.html](http://www.madehow.com/Volume-2/T-Shirt.html)

#### Problems related to getting the best return for your money

The legacy: [nrich.maths.org/5893](http://nrich.maths.org/5893)  
Tree tops: [nrich.maths.org/918](http://nrich.maths.org/918)

#### Loci problems and constructions

Triangle inequality: [nrich.maths.org/1979](http://nrich.maths.org/1979)  
Two points plus one line: [nrich.maths.org/2840](http://nrich.maths.org/2840)  
Three tears: [nrich.maths.org/4321](http://nrich.maths.org/4321)

### Professional development

Bowland Maths also includes Professional Development materials to help teachers develop the skills needed for the case studies and for the new Programme of Study. There are seven modules which cover the main pedagogical challenges for this type of investigative problem solving, including two on assessment. Each module is activity-based; it is built around problems similar to the case studies, but short enough to fit into a single lesson. For an outline of the Professional Development modules, go to:

<http://www.bowlandmaths.org.uk/pdmodule.htm>