

MYSTERY TOURS – LEAD YOUR TOUR

The activities are designed for 60-minute lessons. You may need to adapt the materials for use in longer or shorter lessons.

Brief activity descriptions are provided for the pupils on the right-hand side of the screen. They can read all of this text, or they may prefer to read only the simplified Summary text.

INTRODUCTION

In this activity pupils lead their tour, directing their tour party and responding to issues that arise. Pupils should be encouraged to use the tour plan they devised in the previous activity but may need to modify their plans as the tour progresses in response to feedback.

As the tour proceeds, pupils will be presented with a variety of challenges which they must attempt to solve to keep their tour party satisfied. Each challenge is based on meeting the needs of different tour members and is represented by an algebraic or geometric problem.

This activity is mainly ICT-based.

LEARNING OBJECTIVES

Pupils will:

- use mathematical problem solving skills in collaboration with each other
- calculate with fractions and percentages
- synthesise information in a variety of different formats
- solve a range of algebraic and geometric problems.

LEARNING OUTCOMES

Most pupils will:

- use mathematical problem solving skills in collaboration with each other
- extract information from a range of charts, graphs and tables
- use mental or pencil and paper methods to solve a range of non-standard problems involving geometry and algebra
- be able to complete their tour meeting most of the pre-defined time, budget and satisfaction criteria
- evaluate their strategies and report back to the class.

Pupils making slower progress will:

- use mathematical problem solving skills in collaboration with each other
- extract at least some information from a range of charts, graphs and tables
- use calculator methods to solve at least some non-standard problems involving geometry and algebra
- be able to complete their tour meeting at least some of the pre-defined time, budget and satisfaction criteria
- evaluate their strategies and report back to the class.

Pupils making faster progress will:

- use mathematical problem solving skills in collaboration with each other
- extract the most relevant information from a range of charts, graphs and tables
- use mental methods to solve a range of non-standard problems involving geometry and algebra
- be able to complete their tour meeting all of the pre-defined time, budget and satisfaction criteria
- evaluate their strategies and report back to the class.

NATIONAL CURRICULUM OBJECTIVES**Ma2 Number and algebra****Using and applying number and algebra**

- 1) Pupils should be taught to:
- a) explore connections in mathematics to develop flexible approaches to increasingly demanding problems; select appropriate strategies to use for numerical or algebraic problems
 - d) select efficient techniques for numerical calculation and algebraic manipulation.
 - j) show step-by-step deduction in solving a problem; explain and justify how they arrived at a conclusion.

Solving numerical problems

- 4) Pupils should be taught to:
- a) draw on their knowledge of the operations and the relationships between them, and of simple integer powers and their corresponding roots, to solve problems involving ratio and proportion, a range of measures and compound measures, metric units, and conversion between metric and common imperial units, set in a variety of contexts
 - b) select appropriate operations, methods and strategies to solve number problems.

Equations, formulae and identities

- 5) Pupils should be taught to:
- a) distinguish the different roles played by letter symbols in algebra, knowing that letter symbols represent definite unknown numbers in equations
 - f) use formulae from mathematics and other subjects (for example, formulae for the area of a triangle, the area enclosed by a circle, density = mass/volume); substitute numbers into a formula; derive a formula and change its subject (for example, convert temperatures between degrees Fahrenheit and degrees Celsius, find the perimeter of a rectangle given its area and the length of one side)
 - h) find the exact solution by eliminating one variable.

Sequences, functions and graphs

- 6) Pupils should be taught to:
- a) generate common integer sequences (including sequences of odd or even integers, squared integers, powers of 2, powers of 10, triangular numbers)
 - b) find the first terms of a sequence given a rule arising naturally from a context (for example, the number of ways of paying in pence using only 1p and 2p coins, or from a regularly increasing spatial pattern).

Ma3 Shape, space and measures**Using and applying shape, space and measures**

- 1) Pupils should be taught to:
- a) select problem-solving strategies and resources, including ICT, to use in geometrical work, and monitor their effectiveness
 - b) select and combine known facts and problem-solving strategies to solve complex problems
 - c) identify what further information is needed to solve a problem; break complex problems down into a series of tasks
 - d) interpret, discuss and synthesise geometrical information presented in a variety of forms
 - e) communicate mathematically, making use of geometrical diagrams and related explanatory text.

Measures and construction

4) Pupils should be taught to:

- a) interpret scales on a range of measuring instruments, including those for time and mass; know that measurements using real numbers depend on the choice of unit; recognise that measurements given to the nearest whole unit may be inaccurate by up to one half in either direction; convert measurements from one unit to another; know rough metric equivalents of pounds, feet, miles, pints and gallons; make sensible estimates of a range of measures in everyday settings.

Links to the revised Programme of Study for introduction in 2008 include:

1 Key concepts**Competence**

- c) Selecting appropriate mathematical tools and methods, including ICT.

Creativity

- b) Using existing mathematical knowledge to create solutions to unfamiliar problems.

Applications and implications of mathematics

- d) Engaging in mathematics as an interesting and worthwhile activity.

2 Key processes**Representing**

Pupils should be able to:

- c) simplify the situation or problem in order to represent it mathematically, using appropriate variables, symbols, diagrams and models
- d) select mathematical information, methods and tools to use.

Analysing

Pupils should be able to:

- b) use knowledge of related problems
- c) visualise and work with dynamic images
- j) reason inductively and deduce.
- m) manipulate numbers, algebraic expressions and equations and apply routine algorithms
- o) record methods, solutions and conclusions
- p) estimate, approximate and check working.

Interpreting and evaluating

Pupils should be able to:

- d) look at data to find patterns and exceptions
- g) consider the effectiveness of alternative strategies.

3 Range and content**Number and algebra**

The study of mathematics should include:

- a) rational numbers, their properties and their different representations
- b) rules of arithmetic applied to calculations and manipulations with rational numbers
- c) applications of ratio and proportion

- d) accuracy and rounding
- e) algebra as generalised arithmetic
- f) linear equations, formulae, expressions and identities.

Geometry and measures

The study of mathematics should include:

- a) properties of 2D and 3D shapes
- d) transformations
- h) perimeters, areas, surface areas and volumes.

4 Curriculum opportunities

The curriculum should provide opportunities for pupils to:

- a) develop confidence in an increasing range of methods and techniques
- c) work on open and closed tasks in a variety of real and abstract contexts that allow them to select the mathematics to use
- e) work on tasks that bring together different aspects of concepts, processes and mathematical content
- f) work collaboratively as well as independently in a range of contexts.

LESSON PREPARATION

- Read the teacher notes and familiarise yourself with the other materials.
- Ensure that the activity is available to use on your teacher laptop or desktop computer.
- Ensure that the activity is available for pupils to use, e.g. via school network.
- Arrange for access to an ICT suite.
- Print sufficient copies of the accompanying activity sheets.

Vocabulary

Algebra, substitution, solve, simultaneous, sequence, triangle numbers, pyramid, cube, cuboid, area, volume, tessellation, metric, imperial, Centigrade, Fahrenheit, conversion.

Materials required

You will need:

- Teacher laptop or desktop computer (for demonstration only)
- Data projector (for demonstration only)
- Access to an ICT suite with enough computers for pupils to work in small groups
- Printed copies of the accompanying activity sheets
 - Tour Diary Sheet
 - Tour Results Sheet
 - Destination Profile Sheets (optional)
- Calculators (optional).

Prior knowledge and skills

Pupils should already:

- be familiar with a range of problem solving techniques
- understand basic substitution and algebraic notation
- be able to follow written instructions to calculate a value.

Health and Safety

All standard safety procedures with computers need to be in place.

Information can be found at <http://schools.becta.org.uk>

LESSON DETAILS**Starter Activity**

This starter is designed to reacquaint pupils with the data used in the previous activity.

Ensure that each group has a printed copy of the Destination Profile sheets.

Project the starter activity onto a whiteboard.

Ask pupils to consider the information shown on the first slide.

Each slide contains a comment from a tourist.

Ask pupils to use the data to work out where the comment was made.

Ask selected groups to choose from one of the destinations listed.

If time allows, take the opportunity to ask some follow-up questions:

- What destination has the tourist travelled from to get here?
- What type of transport has the tourist used to get here?

Repeat the process for the second and third slide.

Lead into the main activity (see below).

Main Activity

The aim of this activity is for pupils to lead their tour responding to any challenges that arise.

Pupils are invited to input their tour plan at the start of each tour day.

Pupils are then able to observe the outcomes of the decisions they have made.

Pupils will need to:

- track the progress of their tour party recording their outcomes for each tour day
- use their mathematical skills to respond to the challenges that arise along the way.

This activity is based around an open problem with a complexity of potential interpretations.

Opportunities for discussion and group presentations have been incorporated into the activity.

Pupils should be arranged in their small groups at a computer.

As before, try to ensure that each group has an appropriate mix of pupils.

This will help to create appropriate conditions for peer support.

Each group will need:

- their tour plan from the first activity.

Each group should also be given:

- a copy of the 'Activity 2 - Tour Diary' sheet
- a copy of the 'Activity 2 - Tour Results' sheet
- a copy of each 'Destination Profile' sheet (optional)

Introduce the activity by projecting it onto a whiteboard.

Set the scene using the introductory narrative and the Tour Diary sheet to help.

If time allows, you may also wish to revisit the guidance on the Tour Rules sheet.

Once ready, refer pupils to the 'Getting Started' section on the Tour Diary sheet.

Allow time for pupils to review their tour plan as directed.

Encourage pupils to record their views in the space provided as directed.

Once ready, refer pupils to the 'Recording Your Results' section on the Tour Diary sheet.

This section initially provides an introduction to the activity interface.

Allow time for pupils to experiment with the activity as directed.

Once ready, refer pupils to the rest of 'Recording Your Results'.

Ask pupils to lead their tour as directed.

Allow time for pupils to input their tour plan at the start of each day.

Pupils will also need time to respond to the challenges that arise at each destination.

Note that a different challenge is generated for each destination visited.

Encourage pupils to spend an appropriate amount of time on each challenge.

Successfully completing a challenge will increase their group's overall satisfaction rating.

In contrast, failing a challenge will decrease their group's overall satisfaction rating.

Destination Challenges – answers

Beddgelert How many rocks are needed to recreate the cairn?	B: 35
Blackpool How many sticks of rock will each tourist receive?	A: 9
Coleraine How many puzzle pieces are needed?	C: 19
Fort William What is the temperature at the summit?	B: Approximately 7°C
London How long does the trip on the London Eye last?	B: 48 minutes
Newcastle How much should John and Sarah pay?	D: John 85p and Sarah 55p
Nottingham How much should each tourist pay in current money?	C: £2.40
Salisbury Which day of the week was 14 February 1972?	A: Monday

Try to circulate between groups listening to discussion and asking questions as required.

Encourage pupils to evaluate their progress as the tour proceeds.

Pupils may wish to amend their upcoming tour plan based on their evaluations.

If so, encourage them to record any changes and note if they were successful.

Take care, however, not to overly direct the pupils.

Pupils will be shown a summary at the end of each tour day.

The summary screen will list the outcomes of each day:

- distance travelled
- destination(s) visited
- mode(s) of transport used
- hotel(s) stayed at
- time spent travelling between destinations
- time spent exploring destinations
- finish time
- budget spent
- changes in satisfaction ratings

Please note that it is important to ensure that pupils record their outcomes at the end of each tour day on the Progress Tracker sheet provided.

Once ready, refer pupils to the 'Finishing Off' section on the Tour Diary sheet.

Ask pupils to consider the questions listed.

Allow some time for pupils to discuss their thoughts and reflect on their performance.

Lead into the plenary activity (see below).

Plenary

Draw the class together and ask pupils to reflect on the activity.

Ask each group to report back on their tour, specifically the:

- destinations, types of transport and accommodation they chose
- outcomes of their tour in terms of time, budget and satisfaction.

Ask selected groups to describe and evaluate the strategies they used.

In particular, ask them to identify what they would do differently next time.

If time allows, ask pupils some follow-up questions such as:

- What was the key to success in this activity?
- Why did the same route and power settings produce different outcomes each time?

Finally, ask the class to consider the maths that they have used during the activity.

Ask the class to identify real-life contexts where people may use similar maths.

Homework Suggestions

Ask pupils to complete their Tour Diary reflecting on the outcomes of their tour and evaluating their performance during the activity.

Additionally, pupils could be asked to gather further information about their chosen destinations, e.g. photographs, maps, graphs, etc. These materials will be of use in the next activity when pupils are asked to report back to Brian on the outcomes of their tour.

TECHNICAL SUPPORT

This activity makes use of Flash and Adobe PDF files. To access all the resources that are provided, you will need the minimum machine and software specifications as listed below.

Adobe Flash Player (previously known as Macromedia Flash Player) is required to launch the activity. The latest version of Flash and guidance on how to use it can be downloaded from:

http://www.adobe.com/shockwave/download/download.cgi?P1_Prod_Version=ShockwaveFlash

Adobe Reader or Distiller is required to view these notes. The latest version of Reader and guidance on how to use it can be downloaded from:

<http://www.adobe.com/products/reader/>

Minimum Machine and Software Specifications**PC**

P3 800MHz
128MB RAM
Windows 2000
Screen resolution 1024 x 768
Microsoft Internet Explorer 5.5, Firefox 1, Netscape 7 or Opera 7
Macromedia Flash Player 7
Adobe Reader 7

Mac

G3 500MHz
128MB RAM
OS X 10.2
Screen resolution: 1024 x 768
Safari 1, Firefox 1, Netscape 7, or Opera 6.2
Macromedia Flash Player 7
Adobe Reader 7