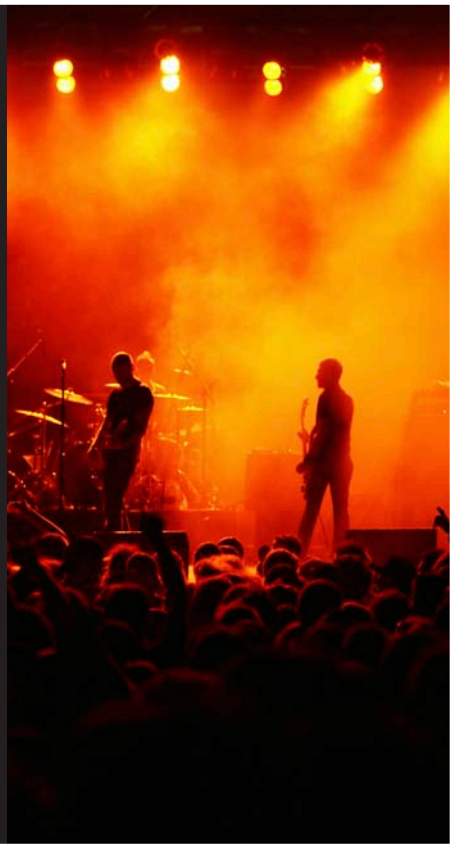
BACK STAGE MATHS



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European Social Fund

Contents

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Introduction

Workshop Summary

In this workshop, pupils are invited to organise a series of concerts in castles across Wales, choosing the performing artists and setting the ticket price based on the costs they have calculated. To do this, they will need to draw information from the graphs and tables provided. In groups, pupils will organise eight concerts to be held simultaneously. Pupils may therefore need to negotiate their choice of artists with other groups.

Pupils are given a series of requirements to meet and will need to use the data provided to carry out calculations with money. They will also need to work with percentages to calculate the estimated ticket sales.

Overall Preparation: 30 minutes

Please refer to individual sessions for guidelines.

Workshop Structure

Pre-workshop Activity	To be completed by pupils before the workshop
Back Stage Maths Workshop	To be presented by Techniquest
Post-workshop Activity	To be completed by pupils after the workshop

Skills Development

The activities in the workshop and the accompanying resources feature the following skills:

Careers and the World of Work | Curriculum Cymreig | Developing Communication | Developing ICT | Developing Number | Developing Thinking | Personal Social Education

The relevant skills are highlighted next to each activity.

Pre-workshop Activity

Preparation: 10 minutes

This can be used as an introduction to the workshop and given to the students before the first session. Answers to this activity are on page 11.

- Read the teacher notes and familiarise yourself with the materials.
- Print sufficient copies of the accompanying activity sheets, one per pupil.

Introduction

In this homework activity, pupils will:

- Explore different music genres.
- Carry out a survey of people's favourite music.
- Compile the results into a graph.
- Analyse their results.

Resources Required

You will need:

- Printed copies of the homework activity sheets (A1, A2), one copy of each sheet per pupil.

Prior Knowledge and Skills

Pupils should already be able to:

- Tally information
- Draw graphs
- Comment on information from graphs

Curriculum Links

Links with the Key Stage 3 Maths Curriculum and Skills Framework are included at the end of this booklet.

Differentiation

Most pupils will:

- Research a range of music genres.
- Carry out a survey to obtain the data they need.
- Make use of their data to draw a graph with at least some of the following: title, labels, key.
- Analyse their graph to draw a range of conclusions.

Pupils making slower progress will:

- Research a limited range of music genres.
- Carry out a survey to obtain at least some of the data they need.
- Make use of their data to draw a graph with at least one of the following: title, labels, key.
- Analyse their graph to draw a limited range of conclusions.

Pupils making faster progress will:

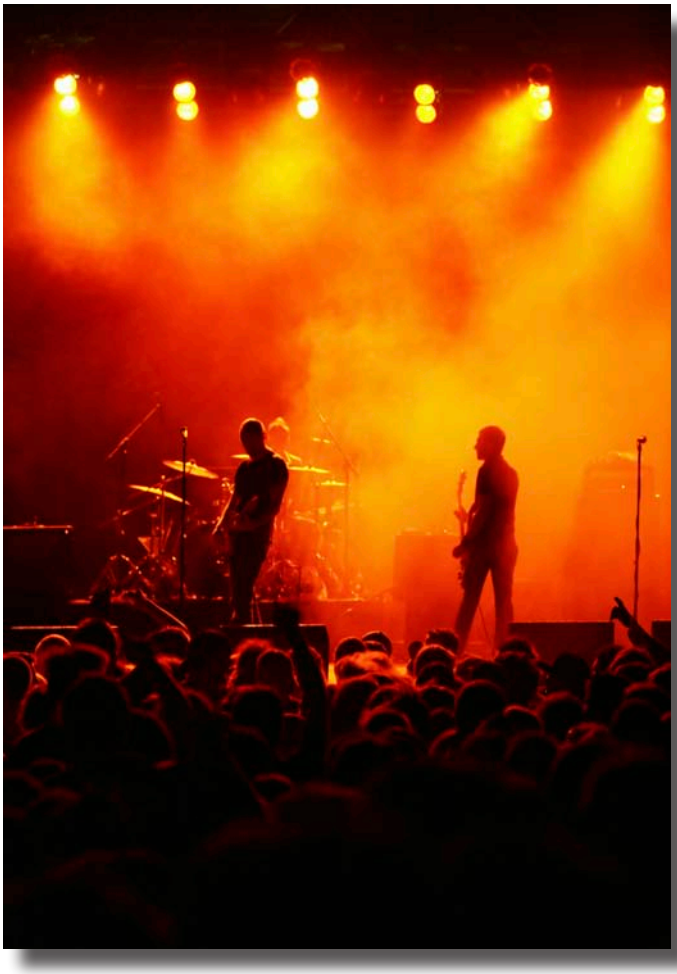
- Research a broad range of music genres.
- Carry out a survey to obtain all the data they need.
- Make use of their data to draw a graph with all of the following: title, labels, key.
- Analyse their graph to draw a broad range of conclusions.

Pre-workshop Activity

A1

There are many different types of music. Think about the different music you hear and where you hear it. You may hear music in the street, on the radio, in television adverts, in concerts, in restaurants and in films.

In this activity, you will explore the different types of music and investigate which types of music are the most popular among the people you know. You will then compare your results with the music charts to see if your friends' tastes in music reflect those of the rest of the population.



1. Carry out research to compile a list of the different genres (types) of music.

Music genres:

2. Which of these types of music have you heard?

3. Which of these types of music have you never heard?

Pre-workshop Activity

A2

4. Carry out a survey into people's favourite type of music.

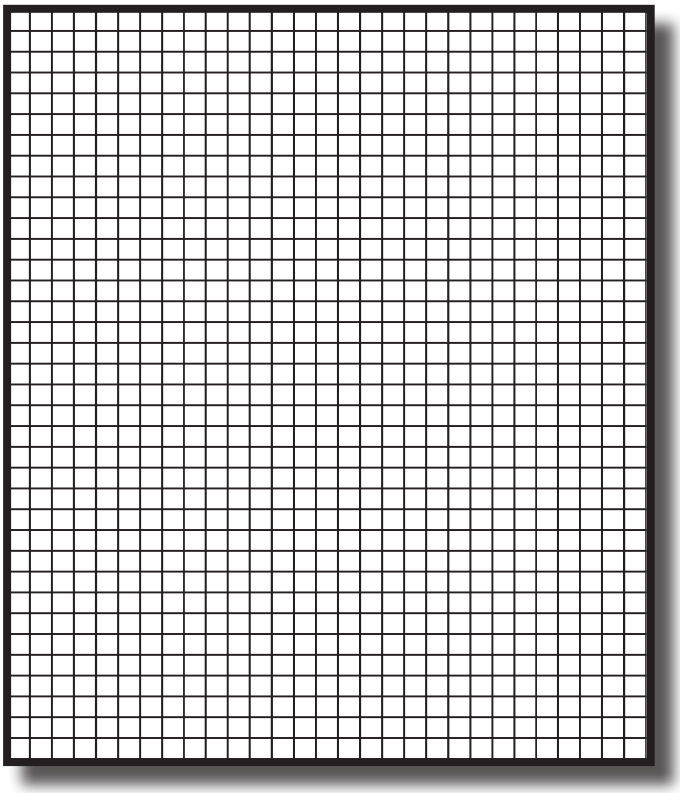
What questions do you need to ask in your survey?

Ask at least 12 people (friends and family) as part of your survey.

Use the space below to reccord your findings.

Survey findings:

5. Draw a graph of your results using the grid below.



6. What conclusions can you draw from your graph?

7. Find out the top ten singles chart for this week. What types of music are featured in the top ten?

8. What type of music is featured most often?

9. Is this type of music the most popular among the people you surveyed? Explain your answer.

Back Stage Maths Workshop

Session Preparation: 10 minutes

Read the teacher notes and familiarise yourself with the materials.
The pre-workshop activity can be completed in preparation for this session. A lesson plan and all materials are included in this booklet.
This session will be presented by Techniquest.

The session is designed to last for 2 hours. This can be adapted to fit longer or shorter lessons.

Introduction

In this session, pupils will:

- Explore various music genres.
- Estimate how popular each genre may be.
- Apply orders of magnitude.
- Use mathematical problem solving skills in collaboration, and in competition, with each other.
- Calculate area and perimeter.
- Calculate with percentages and money.
- Synthesise information from a variety of formats.
- Present decisions to the class.
- Consider ways of measuring the success of the task.

Resources Required

All resources will be provided by Techniquest.

Prior Knowledge and Skills

Pupils should already be able to:

- Estimate.
- Apply orders of magnitude.
- Calculate area and perimeter.
- Calculate percentages.
- Calculate using money.

Curriculum Links

Links with the Key Stage 3 Maths Curriculum and Skills Framework are included at the end of this booklet.

Back Stage Maths Workshop

Differentiation

Most pupils will:

- Collaborate within their groups to discuss the issues.
- Generate a range of responses to the questions raised.
- Generate estimates for the number of fans for each genre.
- Apply orders of magnitude in their problem solving.
- Collaborate within their groups to address the problem.
- Extract information from a range of sources, including graphs and tables.
- Use mental or pencil and paper methods to solve a range of numerical problems.
- Emerge with a plan that meets most of the pre-defined criteria.
- Evalaute their strategies and report back to the class.
- Draw a range of conclusions from their calculations.
- Consider ways of measuring the success of the task.

Pupils making slower progress will:

- Collaborate within their groups to discuss the issues.
- Generate some responses to the questions raised.
- Generate some estimates for the number of fans for each genre.
- Apply some orders of magnitude in their problem solving.
- Collaborate within their groups to address the problem.
- Extract some information from a range of sources, including graphs and tables.
- Use calculator methods to solve a range of numerical problems.
- Emerge with a plan that meets some of the pre-defined criteria.
- Evalaute their strategies and report back to the class.
- Draw some conclusions from their calculations.
- Consider some ways of measuring the success of the task.

Pupils making faster progress will:

- Collaborate within their groups to discuss the issues.
- Generate a broad range of responses to the questions raised.
- Generate realistic estimates for the number of fans for each genre.
- Apply a range of orders of magnitude in their problem solving.
- Collaborate within their groups to address the problem.
- Extract all information needed from a range of sources, including graphs and tables.
- Use mental methods to solve a range of numerical problems.
- Emerge with a plan that meets all of the pre-defined criteria.
- Evalaute their strategies and report back to the class.
- Draw a broad range of conclusions from their calculations.
- Consider ways of measuring the success of the task.

Post-workshop Activity

Preparation: 10 minutes

This can be used as a conclusion to the workshop and given to the students after the final session. Alternatively, it can be used as an additional lesson. Answers can be found on page 11.

- Read the teacher notes and familiarise yourself with the materials.
- Print sufficient copies of the accompanying activity sheets, one per pupil.

Introduction

In this homework activity, pupils will:

- Explore what is meant by the term "carbon footprint".
- Consider how much carbon is produced by concerts.
- Consider the impact of the fans on the environment.
- Read information from graphs and pie charts.
- Compile information into graphs.
- Explore what is meant by the term "off-setting".

Resources Required

You will need:

- Printed copies of the activity sheets (B1, B2), one copy of each sheet per pupil.

Prior Knowledge and Skills

Pupils should already be able to:

- Draw graphs.
- Calculate using information from graphs and pie charts.
- Comment on information from graphs and pie charts.

Curriculum Links

Links with the Key Stage 3 Maths Curriculum and Skills Framework are included at the end of this booklet.

Differentiation

Most pupils will:

- Define what is meant by "carbon footprint".
- Use graphs, pie charts and tables to calculate the carbon footprint of a concert.
- Draw a range of conclusions from their calculations.
- Define what is meant by "off-setting".

Pupils making slower progress will:

- Define with some accuracy what is meant by "carbon footprint".
- Use graphs, pie charts and tables to calculate with some accuracy the carbon footprint of a concert.
- Draw a limited range of conclusions from their calculations.
- Define with some accuracy what is meant by "off-setting".

Pupils making faster progress will:

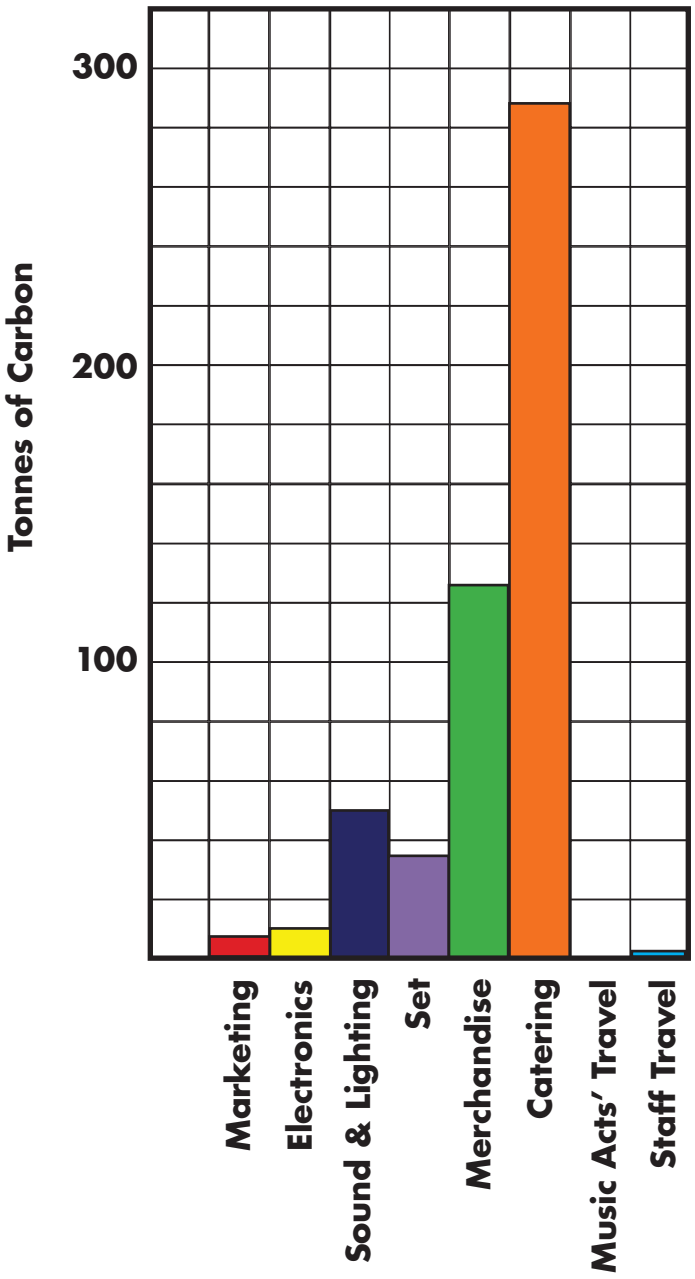
- Define with accurately what is meant by "carbon footprint".
- Use graphs, pie charts and tables to calculate accurately the carbon footprint of a concert.
- Draw a broad range of conclusions from their calculations.
- Define with accurately what is meant by "off-setting".

Post-workshop Activity

B1

1. Investigate what is meant by the term "carbon footprint".

2. One of the concerts was held at Cardiff Castle. Study the graph below. It shows how much carbon was produced from this concert.



Reading the values from the graph, fill in the table below.

Part of concert	Tonnes of carbon
Marketing	
Electronics	
Sound & Lighting	
Set	
Merchandise	
Catering	
Music Acts' Travel	
Staff Travel	

3. How much carbon is produced in total from the concert?

4. Here are the figures for the carbon produced from the catering.

Catering	Kg of carbon
Burgers	81,000
Chips	45,000
Beer	108,000
Bottled water	54,000

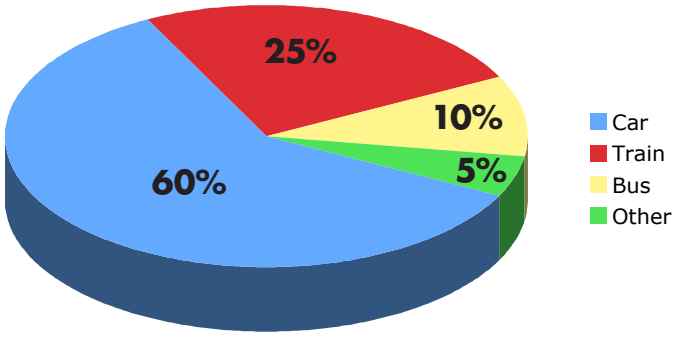
Draw this information in a graph.

Post-workshop Activity

B2

5. 18,000 people attended the concert. Imagine everyone bought one burger and one bag of chips.
How much is each person's carbon footprint for food?

6. This pie chart shows how the 18,000 fans travelled to and from the concert.
Using this information, calculate how many fans used each type of transport.



Transport	Number of fans
Car	
Train	
Bus	
Other	

7. List **two** types of transport that could be covered by the term "other" in the pie chart.

8. Investigate what is meant by the term "off-setting".

9. Suggest one way the carbon footprint of the concert could be off-set.

Answers to Activities

Pre-workshop Activity

1. A sample list of genres includes:

- Blues
- Jazz
- RnB
- Pop
- Rock
- Heavy metal
- Folk
- Country
- Classical
- Garage
- Dance
- Indie
- Soundtrack
- World

2. This depends on the pupils' individual experience.

3. This depends on the pupils' individual experience.

4. Questions may include:

- What is your favourite kind of music?
- How old are you?
- What kinds of music do you know?

5. The graphs will depend on the music people have selected. All graphs should have a title, labelled axes and a key.

6. In broad terms, the graph will indicate which type of music is the most popular, and least popular, among those questioned.

7. This will depend on the music in the charts at that time.

8. This will depend on the music in the charts at that time.

9. This will depend on the music in the charts at that time.

Post-workshop Activity

1. "Carbon footprint" is the total amount of greenhouse gases produced by an individual, organisation, event or product. It is usually measured in tonnes of carbon produced.

2. Figures can be accepted if they are reasonably close to those given below:

Part of concert	Tonnes of carbon
Marketing	7
Electronics	10
Sound & Lighting	50
Set	35
Merchandise	126
Catering	288
Music Acts' Travel	0.2
Staff Travel	2

3. The actual total is 518.2 tonnes of carbon. Any answer reasonably close to this is acceptable.

4. Graphs should be accurate and have a title and labelled axes.

Answers to Activities (cont.)

Post-workshop Activity (continued)

5. Carbon footprint of 1 burger = 81,000/18,000 = 4.5kg of carbon.
Carbon footprint of 1 bag of chips = 45,000/18,000 = 2.5kg of carbon.
Total carbon for each fan = 4.5 + 2.5
= 7 kg of carbon

6. Car: 60% of 18,000 = 10,800 people
Train: 25% of 18,000 = 4,500 people
Bus: 10% of 18,000 = 1,800 people
Other: 5% of 18,000 = 900 people

7. Any two from: walking, cycling, flying, coach, taxi.

8. "Off-setting" refers to anything that reduces the carbon footprint.

9. Any one from: using renewable energy sources, increased energy efficiency, planting trees.

Curriculum Links

Mathematics: Key Stage 3

Skills

Solve mathematical problems

Pupils should be given opportunities to:

- Select, organise and use mathematics, resources, measuring instruments, units of measure, sequences of operation and methods of computation needed to solve problems.
- Identify what further information or data may be required in order to pursue a particular line of enquiry; formulate questions and identify sources of information.
- Develop and use their own mathematical strategies and ideas and consider those of others.
- Select, trial and evaluate a variety of possible approaches; break complex problems into a series of tasks.
- Use their knowledge of mathematical relationships and structure to derive facts that they have not yet learned, and to solve numerical problems.
- Use a range of mental, written and calculator computational strategies.

Communicate Mathematically

Pupils should be given opportunities to:

- Use a wide range of mathematical language, notation, symbols and conventions to explain and communicate their work to others.
- Visualise, describe and represent shapes, movements and transformations, using related mathematical language.
- Read mathematical forms of communication, including tables, diagrams, graphs, mathematical texts and ICT.
- Present work clearly, using diagrams, labelled graphs and symbols.
- Explain strategies, methods, choices, conclusions and reasoning to others in a variety of ways, including orally, graphically and in writing.

Reason Mathematically

Pupil should be given opportunities to:

- Extend mental methods of computation to consolidate a range of non-calculator methods.
- Justify how they arrived at a conclusion to a problem; give solutions in the context of the problem; confirm that results are of the right order of magnitude.
- Understand general algebraic statements; make and test generalisations; recognise particular examples of a general statement.
- Interpret mathematical information presented in a variety of forms; draw inferences from grpahs, diagrams and statistics; recognise that some conclusions and graphical respresentations of data can be misleading; examine critically, imrpvoe and justify their choice of mathematical presentation.
- Explain, follow and compare lines of mathematical argument; make conjectures and hypotheses, design methods to test them, and analys results to see whether they are valid; appreciate the difference between mathematical explanation and experimental evidence; recognise inconsistencies and bias.
- Evaluate results by relating them to the initial question or problem; develop an understanding of the reliability of results; recognise that inferences drawn from data analysis may suggest the need for further investigation.

Range

Number

Pupils should be given opportunities to:

1. Understand number and number notation

- Extend their knowledge of the number system, including decimals, ratios, fractions, percentages and the relationships between them.

2. Calculate in a variety of ways

- Use a calculator efficiently to plan a complex calculation.
- Calculate with whole numbers, negative numbers, decimals, fractions, percentages and ratios, understanding the effects of the operations.

Curriculum Links

Mathematics: Key Stage 3 (cont.)

Range

Measures and Money

Pupils should be given opportunities to:

1. Understand and use measures

- Extend their understanding of the nature of measurement, including the difference between discrete and continuous measures.
- Develop their understanding of the relationships between units, converting from one metric to another.
- Use and interpret scale on graphs, maps and drawings.
- Find perimeters, areas and volumes of common shapes.

2. Understand and use money

- Understand and use the conventional way of recording money.
- Calculate with money and solve problems relating to budgeting, saving and spending, and currency exchange rates.
- Interpret a calculator display in relation to money

Shape, Position and Movement

Pupils should be given opportunities to:

1. Understand and use the properties of shapes

- Explore properties of shapes through drawing and practical work.

Handling Data

Pupils should be given opportunities to:

1. Collect, represent, analyse and interpret data

- Interpret information given in a wide range of graphs, diagrams and statistics, especially real-life data.

Cross-Curricular Links

The workshop has links with the following Key Stage 3 subjects:

- History.
- Geography.
- Music.
- Business Studies.
- Personal and Social Education.

Links with the Skills Framework

Developing Thinking

Plan
- ● Asking questions.
- ● Activating prior skills, knowledge and understanding.
- ● Gathering information.
- ● Determining the process/method and strategy.
- ● Determining success criteria.

Develop
- ● Generating and developing ideas.
- ◉ Valuing errors and unexpected outcomes.
- ● Entrepreneurial thinking.
- ◉ Thinking about cause and effect and making inferences.
- ◉ Thinking logically and seeking patterns.
- ● Considering evidence, information and ideas.
- ● Forming opinions and making decisions.
- ● Monitoring progress.

Reflect
- ● Reviewing outcomes and success criteria.
- ● Reviewing the process/method.
- ● Evaluate own learning and thinking.
- ● Linking and lateral thinking.

Developing ICT

ICT Skills Framework
- ◉ Finding and developing information and ideas.
- ○ Creating and presenting information and ideas.

Developing Communication

Oracy
- ● Developing information and ideas.
- ● Presenting information and ideas.

Reading
- ● Locating, selecting and using information.
- ○ Using reading strategies.
- ◉ Responding to what has been read.

Writing
- ◉ Organising ideas and information.
- ◉ Writing accurately.

Wider Communication Skills
- ◉ Communicating ideas and emotions.
- ◉ Communicating information.

Developing Number

Use Mathematical Information
- ● Using numbers.
- ● Measuring.
- ● Gathering information.

Calculate
- ● Using the number system.
- ● Using a variety of methods.

Interpret and Present Findings
- ● Talking about and explaining work.
- ● Comparing data.
- ● Recording and interpreting data and presenting findings.

Key

● Main focus ◉ Incidental focus
○ No intended focus