

## PRODUCT WARS: MARKET RESEARCH

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

### INTRODUCTION

In this activity, pupils are invited to carry out a survey to gather information about smoothie drinks. The activity will help pupils to prepare for the other activities in this case study.

This activity is mainly ICT based. It has been designed for use with pupils in an ICT suite although it could be adapted for use in a maths classroom equipped with a data projector and whiteboard. It is suggested that pupils work together in pairs or small groups to encourage appropriate levels of participation and discussion.

The activity contains 3 options offering varying degrees of challenge. Different groups within your class can work on different options. Alternatively, you may prefer to ensure each group has a mix of pupils. This will help to create appropriate conditions for peer support.

These different options are as follows:

- **Option A:** Pupils are presented with a pre-defined questionnaire and a data sheet containing a batch of pre-prepared sample data. Pupils are asked to process the sample data and to analyse the patterns and trends found within. This option is considered appropriate for learners working at **level 3 – level 4 of the National Curriculum**.
- **Option B:** Pupils are presented with a pre-defined questionnaire and a blank data sheet. Pupils are asked to carry out a survey using the questionnaire with other pupils to complete their data sheet. Pupils are then asked to process their data and to analyse the patterns and trends found within. This option is considered appropriate for learners working at **level 4 – level 6 of the National Curriculum**.
- **Option C:** Pupils are presented with a blank questionnaire outline and a blank data sheet. Pupils are asked to complete the questionnaire then carry out a survey with other pupils using their questionnaire to fill in the data sheet. Pupils are then asked to process their data and to analyse the patterns and trends found within. This option is considered appropriate for learners working **at or above level 6 of the National Curriculum**.

### LEARNING OBJECTIVES

By the end of the lesson pupils will:

- decide which data to collect to answer a question;
- collect data using a suitable method;
- calculate statistics;
- construct charts and graphs.

### LEARNING OUTCOMES

Most pupils will:

- discuss which data needs to be collected in order to inform their decisions;
- collect data;
- analyse their data;
- produce bar charts and pie charts to represent their data.

Pupils making slower progress will:

- discuss which data needs to be collected in order to inform their decisions;
- analyse some pre-prepared data;
- produce bar charts to represent their data.

Pupils making faster progress will:

- discuss which data needs to be collected in order to inform their decisions;
- devise an appropriate questionnaire;
- collect data;
- analyse their data;
- critically select and produce a range of charts and graphs to best illustrate their data.

## **NATIONAL CURRICULUM OBJECTIVES**

### **Ma4 Handling data**

#### **Using and applying handling data**

- 1 Pupils should be taught to:
  - a) carry out each of the four aspects of the handling data cycle to solve problems:
    - i specify the problem and plan: formulate questions in terms of the data needed, and consider what inferences can be drawn from the data; decide what data to collect (including sample size and data format) and what statistical analysis is needed
    - ii collect data from a variety of suitable sources, including experiments and surveys, and primary and secondary sources
    - iii process and represent the data: turn the raw data into usable information that gives insight into the problem
    - iv interpret and discuss the data: answer the initial question by drawing conclusions from the data.

#### **Specifying the problem and planning**

- 2 Pupils should be taught to:
  - c) discuss how data relate to a problem; identify possible sources of bias and plan to minimise it.

#### **Collecting data**

- 3 Pupils should be taught to:
  - a) design and use data-collection sheets for grouped discrete and continuous data; collect data using various methods including observation, controlled experiment, data logging, questionnaires and surveys.

#### **Processing and representing data**

- 4 Pupils should be taught to:
  - a) draw and produce, using paper and ICT, pie charts for categorical data and diagrams for continuous data, including line graphs for time series, scatter graphs, frequency diagrams and stem-and-leaf diagrams.

#### **Interpreting and discussing results**

- 5 Pupils should be taught to:
  - a) relate summarised data to the initial questions.

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

### **1 Key concepts**

#### **Competence**

- a) Applying suitable mathematics accurately within the classroom and beyond.
- b) Communicating mathematics effectively.
- c) Selecting appropriate mathematical tools and methods, including ICT.

**Creativity**

- c) Posing questions and developing convincing arguments.

**Applications and implications of mathematics**

- b) Understanding that mathematics is used as a tool in a wide range of contexts.

**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.

**Communicating and reflecting**

Pupils should be able to:

- a) communicate findings effectively
- b) engage in mathematical discussion of results.

**3 Range and content****Statistics**

The study of mathematics should include:

- a) the handling data cycle
- b) presentation and analysis of grouped and ungrouped data, including time series and lines of best fit
- c) measures of central tendency and spread

**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
- d) work on problems that arise in other subjects and in contexts beyond the school
- f) work collaboratively as well as independently in a range of contexts
- g) become familiar with a range of resources, including ICT, so that they can select appropriately.

**LESSON PREPARATION**

- Allow some time to familiarise yourself with the accompanying Option A, Option B and Option C materials.
- Identify which materials will best address your pupils' needs.
- Make certain that a projector and speakers are available for the starter.
- Create a wall display identifying key vocabulary and include real life examples of charts and graphs taken from newspapers, magazines and the internet.
- Make certain that pupils have access to computers (optional).
- You may wish to create a certificate of achievement to award to pupils that perform well in the activity.

**Vocabulary**

Average, statistics, mean, median, mode, range, pie chart, bar chart, composite bar chart, comparative bar chart, bias, sampling, questionnaire, survey

**Materials required**

- Internet access or a downloaded version of this case study
- A data projector or interactive whiteboard
- Copies of the chosen questionnaire sheet
- Copies of the chosen data sheet
- Pupils will need paper and basic materials to construct graphs and create their presentations. This may include graph paper, pairs of compasses, colouring pencils, sugar paper, scissors and glue.
- Microsoft Excel.
- Pupils will require access to computers if they are going to use computer generated graphs and charts.

**Classroom set-up**

- Pupils should be able to work with a partner or in small groups.
- Pupils will need to be able to move around the classroom to gather their data.
- Pupils may require access to ICT facilities (optional).

**Prior knowledge required**

Pupils should already be able to:

- construct a variety of statistical charts and graphs either using paper or ICT;
- calculate averages and measures of spread.

**LESSON DETAILS****Starter**

Write a spoof advertising statistic on the board such as:

- **“8 out of 10 cat owners said that they would choose cat-o-chunks”**

Ask pupils to consider this statistic.

Examples of questions might include:

- How did the advertisers arrive at this statistic? (*e.g. by collecting data*)
- Who did they ask? (*e.g. people buying cat food or shoppers in general*)

Ask pupils to consider the general concept of market research.

Ask pupils to consider why market research is considered important.

Introduce pupils to the Product Wars case study.

In particular, make sure that pupils understand the context in which they will be working.

Once ready, play the introductory video of Brad King.

Ask pupils to decide what types of data they will need.

Pupils can be asked to summarise their ideas on mini whiteboards or on paper.

Ask groups to provide one suggestion each.

Summarise their suggestions on the board, e.g. as a spider diagram.

Ask pupils to consider who they would get the data from:

- in an ‘real-life’ market research situation;

- in the more 'restricted' classroom situation.

## Main

This will vary according to the option that has been chosen:

### Option A

Analysing the data

- Pupils should be given a copy of the Option A sheets, i.e. the pre-defined questionnaire and the data sheet containing the pre-prepared sample data.
- Ask your pupils to analyse the pre-prepared sample data, e.g. by calculating the mean, median and mode values for each statement.
- Ask your pupils to then produce a summary of their findings including a range of charts and graphs based on what they think are the most useful pieces of data.
- If time allows, show one of the slides from the Misrepresenting Data presentation and ask your pupils to identify examples of errors or inaccuracies with the chosen graph.
- Encourage them to make sure that their charts and graphs are entirely fit for purpose.
- Pupils will need to work together within their groups to avoid unnecessary duplication.
- Pupils may be given the choice of constructing graphs by hand or by using ICT.

### Option B

Collecting the data

- Pupils should be given a copy of the Option B sheets, i.e. the pre-defined questionnaire and the blank data sheet.
- Ask your pupils to complete the data sheet using the pre-defined questionnaire to collect data from 20 people, e.g. other pupils within the class.
- This aspect of the activity may present a number of classroom management issues depending on factors such as class size and the amount of room available – if so, consider ways in which the movement of pupils can be controlled, e.g. setting up a carousel system, using an envoy from each group to share data between groups, etc.
- Each group should collect a set of full data between them.
- Learners should ensure that they each have an individual copy of the data collected as they will need it to complete the homework or in case of subsequent absence.

Analysing the data

- Ask your pupils to analyse the data they have collected, e.g. by calculating the mean, median and mode values for each statement.
- Ask your pupils to then produce a summary of their findings including a range of charts and graphs based on what they think are the most useful pieces of data.
- If time allows, show one of the slides from the Misrepresenting Data presentation and ask your pupils to identify examples of errors or inaccuracies with the chosen graph.
- Encourage them to make sure that their charts and graphs are entirely fit for purpose.
- Pupils will need to work together within their groups to avoid unnecessary duplication.
- Pupils may be given the choice of constructing graphs by hand or by using ICT.

### Option C

Designing the questionnaire

- Pupils should be given a copy of Option C sheets, i.e. the blank questionnaire outline and the blank data sheet.
- Ask pupils to fill in the blank questionnaire outline, i.e. by identifying appropriate statements under each section heading.
- Encourage your pupils to consider good questionnaire design, e.g. ensuring that statements do not overlap.
- Encourage your pupils to consider basic sampling techniques, e.g. ensuring that they ask a broad balance of males and females.

### Collecting the data

- Ask your pupils to complete the data sheet using their group questionnaire to collect data from 20 people, e.g. other pupils within the class.
- Encourage your pupils to consider basic sampling techniques, e.g. ensuring that they ask a broad balance of males and females.
- This aspect of the activity may present a number of classroom management issues depending on factors such as class size and the amount of room available – if so, consider ways in which the movement of pupils can be controlled, e.g. setting up a carousel system, using an envoy from each group to share data between groups, etc.
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- Pupils may be given the choice of constructing graphs by hand or by using ICT.

### Plenary

If time allows, ask your pupils to evaluate the activity, e.g. what are the limitations of your data or in what ways is the activity not totally accurate relative to real-life market research.

### Homework

Pupils should be asked to complete their summaries – in particular, stress that each group should be ready to present their findings at the start of the next lesson.

Alternatively, pupils could be asked to write up an evaluation of the activity based on the points raised in the plenary session.

### TECHNICAL SUPPORT

Throughout all the activities and support notes you will be asked to open various files in Flash, Microsoft Excel or in Adobe PDF. You may also wish to use Microsoft PowerPoint for presentations. To use these, you will need to have the minimum specification installed. This recommendations list can be found below.

The latest **Adobe Flash Player** (previously know as the Macromedia Flash Player) can be downloaded free from the Adobe website. Support and Help can also be found on this site:

[http://www.adobe.com/shockwave/download/download.cgi?P1\\_Prod\\_Version=ShockwaveFlash](http://www.adobe.com/shockwave/download/download.cgi?P1_Prod_Version=ShockwaveFlash)

You will need to have purchased and installed **Microsoft Excel**. It is usually installed with Microsoft Office. You can find help and support on using Microsoft Excel (Versions 2007, 2003, 2002, 2000) on the Microsoft website for Excel. You can also find methods of purchasing or upgrading your Excel here:

<http://office.microsoft.com/en-us/excel/FX100646951033.aspx>

You will be using a version of **Adobe Reader** or Distiller to view these Teacher Notes. If you would like help or to download a newer version, you can find information at Adobe's website:

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

Training, templates and Product information on **Microsoft PowerPoint** can be found on the Microsoft website for PowerPoint:

<http://office.microsoft.com/en-gb/powerpoint/default.aspx>

### **Minimum Machine and Software Specifications**

#### **PC**

P3 800MHz; 128MB RAM; Windows 2000

Screen resolution 1024x768

Browser: Microsoft Internet Explorer 5.5; Firefox 1; Netscape 7; or Opera 7

Microsoft Excel 2000

Microsoft PowerPoint 2000

Macromedia Flash Player 7

Adobe Reader 7

#### **Mac**

G3 500MHz; 128MB RAM; OS X 10.2

Browser: Safari 1; Firefox 1; Netscape 7; or Opera 6.2

Screen resolution 1024x768

Macromedia Flash Player 7

Adobe Reader 7