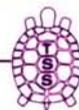


# Be a Shrewd Chooser



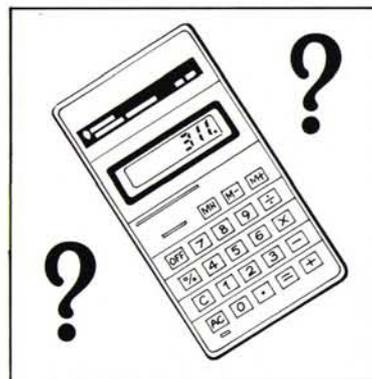
Shell Centre for Mathematical Education

Joint Matriculation Board



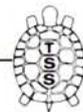


# Be a Shrewd Chooser



Shell Centre for Mathematical Education

Joint Matriculation Board



## About this scheme . . .

This scheme for the teaching, learning and assessment of numeracy through problem solving consists of a series of modules which provide effective support for teachers of mathematics who wish to introduce into the curriculum a component which enables their students to link their mathematics to the real world in which they live.

It has been developed with students of all abilities in the age range 13–16, and their teachers.

Each module package provides comprehensive materials for both teaching and assessment, related to a practical context which has proved interesting and enjoyable to the students who have taken part in its development. It is accessible to those who normally find mathematics difficult, while at the same time it provides a challenge for the most able.

A Scheme of Assessment based on these modules is offered by the Joint Matriculation Board. It includes both coursework and examination components of the kind illustrated in this book. Successful candidates receive a Statement of Achievement on each module at Basic, Standard or Extension level and, subject to certain conditions, the JMB Certificate of Numeracy through Problem Solving.

The Scheme relates closely to the attainment targets in the National Curriculum, particularly to those concerned with using and applying number and measures, and with handling data in practical tasks and real-life problems. It also relates to the GCSE National Criteria in Mathematics.

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<b>1 Classroom materials</b>	9
<p>This chapter contains detailed suggestions and hints on the use of the module in the classroom. It begins with information about preparation, including lists of equipment needed. It then gives a detailed commentary, with teaching suggestions, on the Student's Booklet. Some suggested assessment tasks are also included at the end of each stage.</p>	
<b>2 Developing the mathematics</b>	53
<p>This chapter looks in more detail at various ways of making use of the mathematical opportunities offered by the module. A collection of sample teaching materials is offered.</p>	
<b>3 The role of assessment</b>	71
<p>This chapter contains a discussion of assessment issues, and offers examples of assessment tasks at different levels of difficulty.</p>	
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**Please note:**

Throughout this book, all references prefixed with the letter T refer to pages in the Teacher's Guide, references prefixed M refer to the Masters for Photocopying and unprefixed references refer to the Student's Booklet.

# Authors

This series of module packages has been developed, as part of a joint project on the assessment of numeracy by the Shell Centre and the Joint Matriculation Board. Many teachers and their students have worked with the central team: Alan Bell, Colin Billington, Roger Brown, Hugh Burkhardt, Rita Crust, Rosemary Fraser, John Gillespie, Jim Ridgway, Kaye Stacey, Malcolm Swan and Clare Trott. Building on previous discussions involving the Shell Centre and the JMB, it was conceived and directed as part of the Testing Strategic Skills programme, by

**Hugh Burkhardt**

This module, *Be a Shrewd Chooser*, has been written by

**Malcolm Swan, Barbara Binns and John Gillespie**

It is a result of successive revision through four versions on evidence collected from the comments and suggestions of the teachers and students involved, and through classroom observation by the team.

The assessment tasks owe much to the advice of John Pitts.

Many contributions to the work of the project have been made by staff and committee members of the Joint Matriculation Board – notably John Mathews, the Chairman of the JMB's Steering Committee and Austin Fearnley, who has played a major role in the organisation of the operational trials.

The later trials of the scheme involved teachers and students in over 50 schools in many local authorities including Barnsley, Bradford, Bury, Calderdale, Cheshire, Cumbria, Derbyshire, Doncaster, Gateshead, Humberside, Kirklees, Knowsley, Lancashire, Leeds, Leicestershire, Manchester, Newcastle Upon Tyne, Northumberland, North Tyneside, North Yorkshire, Nottinghamshire, Rochdale, Rotherham, Salford, Sheffield, Stockport, Sunderland, Tameside, Trafford, Wakefield and Wigan. Consultations with their Mathematics Advisers have made significant contributions to the development of the scheme.

The manuscript was prepared through many revisions by Susan Hatfield, Diane Jackson, Jenny Payne, Judith Rowlands and the staff of Burgess and Longman.

The 'Be a Shrewd Chooser Radio Show' was recorded by David Seymour and contains original music by Mike Giddins.

We are grateful to them all.

## *Note:*

The survey data using actual products is a result of work carried out by students in classrooms and as many of the samples are very small the conclusions reached should be treated with caution. The project in no way endorses any of the conclusions drawn from the data.

# Numeracy through problem solving

Be a Shrewd Chooser is one of a series of modules that have been designed to encourage a new approach to the teaching and learning of numeracy, understood in the original broad sense<sup>(1,2)</sup> as

the ability to deploy mathematical and other skills in tackling problems of concern or situations of interest in everyday life.

There is now a general acceptance that people need to learn to *use* the knowledge and skills they acquire at school, and that this requires a shift in the balance of the curriculum to include more real problem solving. This is particularly important for the mathematics curriculum, because the power of mathematics in helping people tackle real problems more effectively is not often realised.

The Cockcroft Report says

'Most important of all is the need to have sufficient confidence to make effective use of whatever mathematical skill and understanding is possessed, whether this be little or much.' (paragraph 34)

and

'Our concern is that those who set out to make their pupils 'numerate' should pay attention to the wider aspects of numeracy and not be content merely to develop the skills of computation.' (paragraph 39)

TVEI and other recent curricular initiatives have similar aims, emphasising that curricula should contain a strong element concerned with the tackling of practical problems relevant to everyday life and work. The assessment criteria for the GCSE emphasise these aspects too. Employers say that they are primarily interested in people who can use their knowledge sensibly and effectively.

A curriculum component of this kind places new demands on teachers; it needs a broader range of teaching strategies than does the traditional mathematics curriculum, with some new roles for both teachers and students. The scheme has been developed to provide an introduction to such work in the classroom that is both effective and enjoyable for those involved.

<sup>1</sup> 15–18 A report of the Central Advisory Council for Education (England). HMSO, 1959.

<sup>2</sup> Mathematics counts. Report of the Committee of Enquiry into the Teaching of Mathematics in Schools under the chairmanship of Dr W H Cockcroft. HMSO, 1982.

## What are the skills?

The modules are based on practical contexts which have been chosen to allow students of all abilities to develop general problem solving (or strategic) skills in areas of activity such as designing and making, planning and organising, and choosing.

These *strategic skills* include:

- understanding general ideas and details
- following instructions precisely
- distinguishing between essential constraints and desirable features
- identifying faults
- correcting faults
- generating and listing possibilities (brainstorming)
- developing a rough plan, including: reviewing the prepared suggestions; reaching and recording agreed decisions; maintaining a broad level of description, avoiding excessive detail; identifying needed information and materials; making estimates of quantity and cost; describing, testing and evaluating the plan
- making the final plan, product and/or detailed instructions with comprehensiveness, accuracy, clarity and quality
- implementing the activity with full preparation
- testing and evaluating the plan or product comprehensively.

Various *tactical skills*, more specific to each context, are involved in implementing these strategies. For example, different ways of collecting and recording information are appropriate if you are considering alternative products to buy, or alternative routes to follow.

*Technical skills* are, of course, required to carry through the solution of problems using the higher level skills described above. Technique is only useful for these purposes in so far as it is *reliable*. This implies much higher standards in this respect than are expected in the traditional curriculum, with a greater emphasis on thorough understanding and checking of whatever techniques are used.

Among the mathematical techniques and concepts, of importance in this scheme, are:

- the ability to
  - carry through simple calculations with suitable accuracy, using a calculator where appropriate
  - make estimates
  - make measurements (including number, length and time)
  - draw accurately,
  - interpret and display data in a variety of representations (including graphs, maps, timetables and other tables).
- understanding and using some techniques of
  - probability and statistics
  - ratio and proportion
  - geometry in two and three dimensions.
- logical reasoning, including the ability to enumerate alternative possibilities and classify them in various ways.
- research skills, including the collection and evaluation of relevant data.

The relevant mathematical skills are discussed in more detail in each module package. There is also opportunity for the use of other parts of the mathematics curriculum which a student has mastered.

In addition skills from other curriculum areas, such as language and arts, are inevitably called upon, as these are necessary for the presentation of the reasoned arguments which are essential for real problem solving. Since group work is involved, social skills also play their part. Thus, though numeracy is focussed on the deployment of mathematical skills and reasoning in real problem solving, it has a broad cross-curricular aspect.

### What is provided?

The scheme is implemented in a modular form, each module being designed to occupy between 10 and 20 hours of teaching time spread over 3 to 6 weeks. Five modules will be available in the first instance. A feature of each module is the importance attached to students working in groups, explaining their ideas and listening to each other, making their own decisions and living with the consequences, reflecting on their experience and learning from it, just as they do in life outside the classroom. While working through the modules, students themselves become responsible for setting and tackling their own problems, rather than simply responding to tasks set by the teacher. Modules are not necessarily staged nor are they dependent upon each other but the sequence which follows is recommended as providing an appropriate progression and a balance of different kinds of context.

The modules in the series are:

- **Design a Board Game:** in which students design and produce a board game which can be played and evaluated by other members of the class.
- **Produce a Quiz Show:** in which students devise, schedule, run and evaluate their own classroom quizzes.
- **Plan a Trip:** in which students plan and undertake one or more class trips, and possibly some small group trips.
- **Be a Paper Engineer:** in which students design, make and evaluate 3-dimensional paper products, such as pop-up cards, envelopes and gift boxes.
- **Be a Shrewd Chooser:** in which students research and produce consumer reports which inform people on how to make better choices.

Many contexts were considered and tried in the early stages of development, to see which led to the best balance of classroom activities and learned skills. Those that were chosen all have a practical outcome, interesting and relevant to the students' present circumstances. This corresponds with our observation that people best develop the strategic skills of numeracy in the course of solving problems which they see as realistic, stimulating and within their capabilities. The themes selected were found to have general appeal and to require the use of a wide range of skills, whilst not making unreasonable demands on classroom or school organisation.

Discussion with students and observation in the classroom support the expectation that students' problem-solving abilities improve as they work through the series of modules and that skills acquired in one area are subsequently applied in others. Students themselves maintain that they will be able to apply these strategic skills with advantage in tackling further problems as they arise in their lives outside the classroom. Groups of students also suggested many other interesting and worthwhile themes, each of which could form the basis for a further module. These include: planning and running a jumble sale; raising money for charity by sponsored events; planning and running a magazine; setting up a small business; planning a party; designing a bedroom; planning a youth group weekend; making a garden; orienteering; designing and marketing T-shirts.

The scheme provides classroom materials and assessment tasks, together with further support materials to help teachers explore in greater depth the issues and teaching strategies involved. Suggestions for further mathematical development are also included.

**Classroom materials**, including detailed teaching suggestions, have been developed to offer a proven approach that has worked well for a representative group of teachers, new to this kind of work, without imposing on them excessive demands of design or implementation. We recognise that, of course, each teacher works in his or her own way in the classroom but most have been found to appreciate detailed, explicit suggestions which they can use, and adapt, in the knowledge that they have worked well for others. Such materials are provided in each module package.

**Assessment tasks** play an important role in the curriculum, providing targets that help students and teachers recognise objectives more clearly and help them to progress towards them. (The effect of assessment on the curriculum has often been to narrow and distort its aims but, equally, assessment can be used to enhance what is achieved.) In a new curriculum component like this one, assessment is particularly important. Thus assessment tasks are provided throughout these materials. They relate closely to the Scheme of Assessment for the Certificate of Numeracy through Problem Solving offered by the Joint Matriculation Board, but may be used more widely.

The suggestions for further mathematical development provide a variety of ideas, together with discussion on

how and when they might be introduced and linked to the more traditional teaching of mathematical techniques.

**Support materials** are designed to help teachers with the new aspects of classroom activity and teaching style that this work involves. The materials relate to the three principal differences between this work and the traditional mathematics curriculum – the broader range of skills involved, the practical priorities of numeracy, and the much greater responsibility of the students for their own work. In the traditional curriculum students are largely *imitative*, here they are *autonomous* in deciding on and carrying through their approach to the task. The primary support is provided by the teaching suggestions in the classroom materials and elsewhere in each Teacher's Guide. The support materials, which form a separate package, take this further, sharpening awareness and tackling more fully and deeply the teaching and assessment issues and skills involved. They may be regarded as a do-it-yourself in-service course, designed to be used either on a distance-learning basis by teachers in a school or within LEA or college courses. This material, which is linked particularly to the 'Be a Paper Engineer' module, includes a video of the modules in use, together with comments from teachers and students on the work, its challenges and its benefits.

# Introduction to Be a Shrewd Chooser

Students frequently face and make consumer decisions. Such decisions are often made on impulse, with little appreciation of the many factors which could be taken into account to help the student make a better choice. In this module, students work together to consider how people make consumer decisions in real life and to produce consumer reports which can inform people on how to make better choices.

The teaching materials are in four stages:

## **Stage 1: Learning from experience.**

Students listen to a radio show on audiotape which contains a number of interviews with people who have just bought different items, and an interview with two students who have been involved in producing a consumer report on choosing orange drinks. This latter interview is supported by a written consumer report which students can discuss. As students reflect on and analyse the tape and the report, they begin to consider important factors that are taken into account when making a choice and different methods of making consumer decisions. They also begin to realise the processes involved in producing a consumer report.

## **Stage 2: Preparing your research**

In this stage groups begin to work on their own consumer reports. They have to choose an item and decide on their research aims and methods.

## **Stage 3: Carrying out your research**

In this stage students carry out their plan. They will be involved in conducting surveys, writing questionnaires and carrying out experiments in the classroom. They will also be considering how best to present their findings. This could involve posters and oral presentations in addition to written reports.

## **Stage 4: Presenting and evaluating a report**

In this stage all the written reports are circulated around the other groups, and any group wishing to make an oral presentation does so. The reports are evaluated by the rest of the class, and then each group improves its own report taking into account these comments.

The mathematical techniques required, and the tactical skills needed for their deployment, will depend on the students' abilities and the demands made by the particular item that the group is researching. The range is likely to include:

- devising a questionnaire or conducting an interview,
- analysing data,
- selecting and using sources of information,
- presenting data in various ways,
- interpreting data and presenting clear and reasoned recommendations.

# 1

## Classroom materials

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# Classroom materials

## Introduction

This chapter provides a detailed guide to the classroom materials. The suggestions are offered in the recognition that every teacher has an individual style in which he or she prefers to work. Many teachers, however, have found it helpful to be given detailed suggestions which they can then adapt to meet their own needs. This has also enabled us to offer an approach which we have seen working well in a representative range of classrooms.

The classroom materials are centred on the Student's Booklet which is important for the following reasons:

- It provides students with a coherent structure for their work. At any point, it should help students to have an overview of what they have achieved and where they are going.
- Students who are inexperienced in planning and carrying out a piece of research often tend to rush into an idea that seems superficially attractive, without carefully considering implications or alternatives. This booklet helps to slow down and stimulate the more impatient or less imaginative students by, for example, asking them to comment on work produced by other students before embarking on their own.

Much of the work involves students working collaboratively. It is often difficult to assess an individual's contribution to the work of a group, so we have also included a number of short assessment tasks, associated with each stage, which provide evidence of what a particular student can do on his or her own. You will find more detailed suggestions on how to use these tasks in Chapter 3.

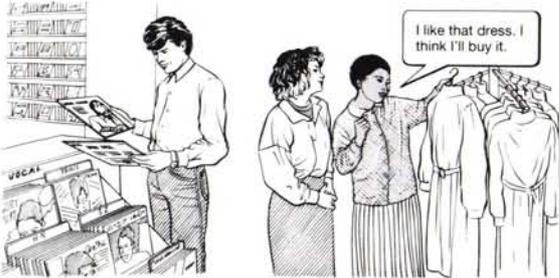
Real problem solving in the classroom demands a different balance of teaching styles and strategies from that in the traditional mathematics curriculum. The emphasis on student-led decision-making will be unfamiliar to some teachers. For this reason, we offer the following suggestions which have been found helpful.

Your role will involve rather less task-setting and explaining than you may be used to. Instead, you will be acting more as an adviser and resource, responding to the students rather than directing them. It is helpful if you can

- listen to students and ask questions which may help them to clarify their own thinking and move beyond superficial discussions
- encourage students to listen to one another, making sure that the less forceful or less articulate are given the chance to express their views
- help students to pace their work, by agreeing target dates by which phases of their work should be completed
- avoid 'taking over' by suggesting your own ideas and making decisions for students. If you do this, students may feel that they are no longer working on their own ideas and may become disenchanted. As far as possible, therefore, allow the students to experience the consequences of their own decisions!

These suggestions are amplified in the Checklist which may be found on the final page of this book.

**Stage 1 Learning from experience**



We all have to make choices.  
Have you ever made a choice that you later regretted?  
In this stage, you will listen to the 'Shrewd Chooser Radio Show' and consider

- how the method of choosing depends on the item you buy,
- how different people go about choosing pairs of training shoes,
- how a group of students produced their consumer report called 'Drinking Orange!'

You will then discuss your own experiences . . . . .

Later on, you will write a consumer report about an item of your own choice.

2

**Stage 2 Preparing your research**



In this stage your group will begin to work on your own consumer report.

You will need to

- choose an item to research,
- decide what people want to know,
- plan how you will carry out your research,
- share out the research tasks and make final preparations.

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**Summary of activities**

**Time needed for Stage 1**

About 4 to 5 hours.

**Students' activities**

- Listening to the 'Shrewd Chooser Radio Show'. This is presented on audiotape and is divided into three parts, each followed by an activity:
  - (i) On tape, five people are interviewed about items they have just purchased. Students are asked to summarise the ways in which the decisions were made and how they would make similar decisions.
  - (ii) On tape, three people are interviewed about the training shoes they own. Students analyse the interviews and then conduct similar interviews on their friends.
  - (iii) On tape, two people present a consumer report. Students examine the report and try to reach some conclusions.

These are a mixture of individual and group activities.

- Writing about their own experiences of making poor consumer choices. An individual activity, possibly following a class discussion.

**The teacher's role**

- Maintaining pace and enthusiasm.
- Helping students to organise small group discussions and develop listening skills.
- Helping students to summarise and draw conclusions from written and oral information.

**Time needed for Stage 2**

About 2 to 3 hours.

**Students' activities**

- Choosing an item to research.
- Deciding on interesting research aims.
- Making detailed plans and sharing out tasks.
- Producing a final plan.

These are all group activities.

**The teacher's role**

- Ensuring that all students are kept involved, reducing group sizes if necessary.
- Making external constraints clear to students. (For example, if they are permitted to visit shops in school time.)
- Checking that the students choose sensible items to research.

### Stage 3 Carrying out your research



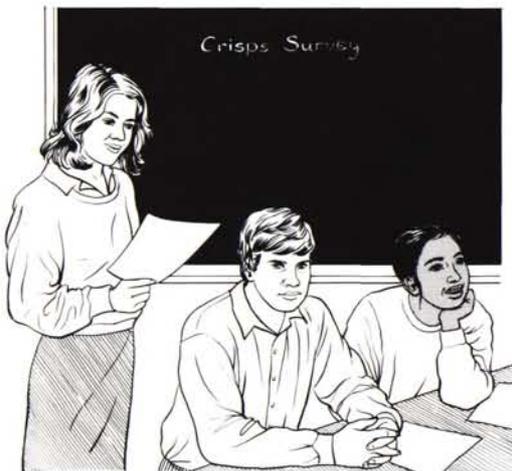
In this stage, your group will carry out your final plan, and prepare a consumer report on your chosen item.

You will need to

- collect and organise your data,
- decide how to present your report,
- complete your final report.

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### Stage 4 Presenting & evaluating reports



In this stage, each group will present its report to the rest of the class.

You will

- read and listen to each report, ask questions and evaluate it,
- evaluate your own report in the light of comments made by other groups.

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### Time needed for Stage 3

About 3 to 4 hours.

#### Students' activities

- Choosing appropriate ways of collecting and presenting data.
- Deciding how the reports will be presented.
- Preparing the final report.

These are all group activities.

#### The teacher's role

- Enabling students to carry out their surveys and experiments. (For example, by organising the duplication of questionnaires, organising movement around the room etc.)
- Ensuring that the necessary equipment is available.
- Encouraging students to use mathematical techniques when analysing data and preparing reports.

### Time needed for Stage 4

About 1 to 2 hours, but this may vary depending upon the number of groups involved and the nature of their reports.

#### Students' activities

- Presenting reports to the rest of the class. A group activity.
- Making comments on reports made by other students. A group activity.
- Evaluating and improving their own reports in the light of comments made by other students.

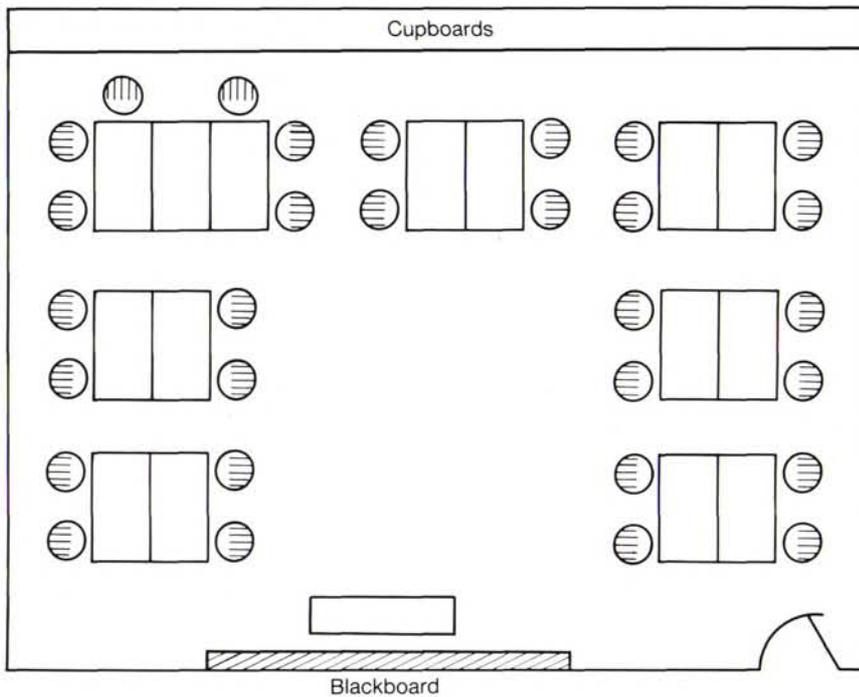
#### The teacher's role

- Organising the presentation of the reports.
- Encouraging students to make constructive comments.

## Preparation

This module requires students to work on practical activities both on their own and in groups. The tables should therefore be arranged to encourage group discussion while at the same time enabling students to see the blackboard, which may be used for class discussion.

For example:



During the latter stages of the module, students will need to move around the classroom, conducting surveys and taking part in experiments. With larger classes, this can become rather chaotic and you may need to limit the number of surveys and experiments being carried out at any one time. With smaller classes, students may enjoy inviting students from other classes to take part as subjects in these activities.

Some activities (for example, library visits, shopping surveys) will involve students in leaving the school premises. These may be carried out in the students' own time, but as some teachers have found, it is often more motivating to arrange for a class visit to a local shopping centre or supermarket in lesson time. (If you do this, ensure that the necessary permission and goodwill is obtained beforehand.)

**Resources required**

<b>When needed</b>	<b>Item</b>	<b>Quantity</b>	<b>Source</b>
Throughout the module	Student's Booklet	1 for each student	supplied
	Envelope or folder in which to keep work	1 for each student	
	Rough paper	A plentiful supply	
	Calculators	at least 8 for a class of 25	
<b>Stage 1</b>	The 'Shrewd Chooser Radio Show' tape	1 per class	supplied
	A cassette player	1 per class	
	The 'Shrewd Chooser Radio Show' script	At least 3 copies per class	masters supplied (M1-11)
	'People making choices' sheet	1 for each student	master supplied (M12)
	'Drinking Orange!' consumer report	1 for each student	masters supplied (M13-18)
	'Drinking Orange! – Discussion questions.' sheets 1, 2 and 3	1 for each student	masters supplied (M19-21)
	'Drinking Orange! – Some conclusions' sheet	1 for each student	masters supplied (M22-23)
	'Learning from mistakes' sheet	1 for each student	master supplied (M24)
<b>Stage 2</b>	'Possible aims of research' sheet	1 for each student	master supplied (M25)
	'Final plan' sheet	1 for each student	master supplied (M26)
	Assessment tasks (if required)	1 for each student	masters supplied (M27-28)
<b>Stage 3</b>	Resources required for students' own consumer reports (see below*)	(see below*)	(see below*)
	Assessment task (if required)	1 for each student	masters supplied (M29-30)
<b>Stage 4</b>	'Evaluating a report' sheet	1 for each student for each consumer report that is produced by the class	master supplied (M31)

\* When Stage 3 is reached and students begin to prepare their own consumer reports they are likely to find that they need resources additional to those listed above.

As far as possible, encourage students to organise and collect these resources for themselves, but you may need to assist in negotiating with the school reprographics unit or the office to ensure that, for example, questionnaires may be duplicated and school stationery may be used for letter writing. The following list contains many of the items that have been found useful.

**For written reports:**

- pencils and erasers
- rulers
- set squares
- protractors
- pairs of compasses
- lined and unlined paper
- graph or squared paper
- typewriter or word processor

**For posters:**

- felt-tipped pens
- large sheets of paper or card

**For oral presentations:**

- overhead projector, acetates and pens

**For a 'radio show':**

- tape recorder
- blank cassette tapes.

## Stage 1 Learning from experience

### Introduction

This stage is based on the 'Shrewd Chooser Radio Show' which is presented on an audiotape with accompanying written material. This show is concerned with the consumer decisions that people make in their everyday lives. It is in three parts.

#### Part 1 Street interviews

People are interviewed on how they have chosen five different items; a suit, a notebook, a washing machine, a record and some orange squash. After listening to the tape, the students are asked to list important factors that were taken into account, write down the method that was used for choosing each item and describe how they would choose a similar item.

#### Part 2 Choosing trainers

This part consists of three studio interviews with people who have chosen pairs of training shoes in very different ways. Each interview illustrates an example of poor decision making, although there are redeeming features. This is followed by a classroom activity where the students interview each other about how they bought their own trainers. They then compare their methods with the ones on the tape.

#### Part 3 Producing a consumer report

This part contains an interview with two students who have been involved in producing a consumer report on choosing orange drinks. As students listen to the tape, they refer to a copy of the report. The interview is in three sections: a shopping survey, a classroom survey and a classroom experiment. After each, the tape is stopped and the students discuss the questions provided.

### Total time needed

4 to 5 hours.

### Organisation and equipment needed

For much of the time, the students work in groups of four. For some of the activities, these groups will be broken down further into pairs or individuals.

You will need

- either
- the 'Shrewd Chooser Radio Show' tape and
  - a cassette player
- or
- at least three copies of the Radio Show script, so that the show may be role-played.

Each student will need

- a Student's Booklet
- a 'People making choices' sheet (M12)
- the 'Drinking orange!' consumer report (M13–18)
- a copy of each of the three 'Drinking orange! – Discussion questions' sheets (M19–21)
- a 'Drinking orange! – Some conclusions' sheet (M22–23)
- a 'Learning from mistakes' sheet (M24)
- an envelope or folder in which to keep his or her work
- access to a pocket calculator.

# Be a Shrewd Chooser

This booklet is about

- how people choose things to buy or do,
- how people could make better decisions,
- making consumer reports to advise people.

As you work through it, we hope that you will see ways of making better choices in *your* life.

There are four stages involved.

**Stage 1**  
Learning from experience  
Pages 2 to 8

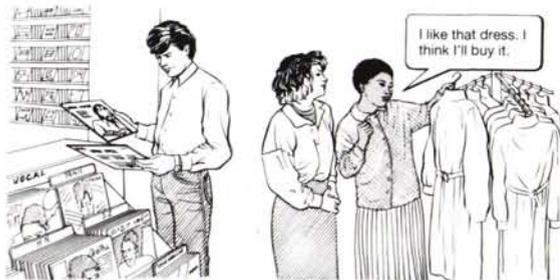
**Stage 2**  
Preparing your research  
Pages 9 to 17

**Stage 3**  
Carrying out your research  
Pages 18 to 22

**Stage 4**  
Presenting and evaluating the reports  
Pages 23 to 24

1

## Stage 1 Learning from experience



We all have to make choices.

Have you ever made a choice that you later regretted?

In this stage, you will listen to the 'Shrewd Chooser Radio Show' and consider

- how the method of choosing depends on the item you buy,
- how different people go about choosing pairs of training shoes,
- how a group of students produced their consumer report called 'Drinking Orange!'

You will then discuss your own experiences . . . . .

Later on, you will write a consumer report about an item of your own choice.

2

## Related assessment criteria

This stage offers students the opportunity to show that they can

- (i) identify important factors and methods involved in decision-making
- (ii) obtain and interpret information from oral interviews
- (iii) obtain and interpret information from tables and graphs

## Purpose

To introduce Stage 1, and set it in the context of the entire module.

## Presentation

Class discussion.

## Suggestions and comments

You may like to introduce the module with a brief general discussion on the consumer choices that students have to make in their everyday lives. It is helpful to focus on items that students have with them in the room. (For example, bags, clothes, pens, calculators.) You may like to ask the class questions like the following.

'Why did you buy this?'

'How did you go about making your choice?'

'Were you affected by the brand name or price?'

'Are you pleased with your choice?'

'Have you ever made a choice that you later came to regret?'

Read through page 1 of the Student's Booklet to introduce the students to the purpose of the module and the four stages involved. Emphasise that this module is designed to make us think about the way we make choices, and to help us become more discerning choosers. Make it clear to the class that, by the end of the module, *every* student should aim to produce a consumer report which will advise other people on how to choose a particular item. The reports produced by your class could be bound together to form a consumer magazine which could then be distributed among other members of the school.

Now read through page 2 of the booklet, and explain that Stage 1 is based on a radio show. Explain that there are three parts, and after each part the class will be asked to do an activity.

### Note:

On the tape, each of the three parts is separated by a short piece of music. Within each part, the interviews are separated by a pause long enough for you to stop the tape when you need to.

STAGE 1

**The Shrewd Chooser Radio Show**

**Part 1: People making choices**

Listen to the first part of the radio show. Five people are being interviewed about things they have just bought.



Excuse me, but I'm doing some consumer research for the Shrewd Chooser Radio Show. Would you mind answering a few questions about your purchase?

As you listen, think and make notes on the 'People making choices' sheet. Leave the last column blank for the time being.

What factors were important to the people being interviewed? (For example, price, size.)



How did they go about making their choices? (For example, looking in catalogues.)

The Shrewd Chooser Radio Show		
Part 1: People making choices		
Name:	Important factors and specifications	How the choice was made
Paul	Price weight (light)	what was one shop I tried on a few more
		How you would choose a similar item
		I would go into S or a shop and I would make sure that I know

After you have made notes on all five interviews, discuss what you have written and then fill in the final column.

3

**Purpose**

The street interviews in part 1 are intended to show the variety of factors that people consider and the methods they use when making consumer decisions.

**Presentation**

Audiotape followed by group discussion.

**Time needed**

1 hour.

**Suggestions and comments**

Read through page 3 with the class. Before you play the tape, issue a copy of the 'People making choices' sheet to each student, and ensure that everyone is ready to make notes on the sheet answering the two questions emphasised in the bubbles. Explain the difference between "Important factors" and "How the choice was made", referring students to the example at the bottom of the page. Tell the class to leave the final column blank for the time being.

It is probably better to play part 1 of the tape through *twice*, once without interruptions then a second time with pauses after each interview to allow time for students to fill in their sheets.

If students have any difficulty in hearing the tape, you may like to ask pairs of students to role-play the interviews using copies of the scripts provided in the copy-masters.

You may like to hold a class discussion to enable students to share what they have written before they attempt to fill in the final column of the sheet. 'Similar' items could be:

- any item of clothing,
- any item of stationery,
- any machine (for example, a personal stereo),
- any item for personal entertainment (for example, a videotape),
- any soft drink.

STAGE 1

**The Shrewd Chooser Radio Show**

**Part 2: Choosing a pair of training shoes**

Now listen to the second part of the radio show.



Three people are being interviewed to find out how they went about choosing pairs of trainers.

As you listen to each interview note down the factors that each person took into account.

After each interview, in your group,

- agree on the list of factors used,
- describe how the person went about making the choice,
- describe any mistakes made and suggest how they could have been avoided.

After hearing all the interviews, as a class, try to make a complete list of the factors that may affect a person's choice of training shoes. Can you decide which is the most important factor?

**Purpose**

To encourage the students to realise that people use a variety of methods even when choosing the same product.

**Presentation**

Audiotape, group and class discussions with students interviewing each other in pairs.

**Time needed**

1 hour.

**Suggestions and comments**

Play through part 2 of the radio show, twice as before, the second time pressing the pause button after each interview to allow time for group discussion.

After listening to all three interviews construct, on the board, a complete list of factors that may affect a person's choice of training shoes. This can be done by asking different people in turn to name one factor each, then, when ideas stop flowing freely, opening the discussion to suggestions from anyone who can think of further factors.

The final question is likely to generate a lively discussion with no definite conclusion. It will, however, encourage students to consider the interrelationship between different factors.

The students now work in pairs, interviewing each other on the trainers they own. If students do not own a pair of trainers, they may be interviewed about any other pair of shoes.

Students should prepare for this activity by writing down some suitable interview questions. Some students may prefer to work collaboratively on this.

When students interview each other, encourage them to ask follow-up questions, rather than sticking rigidly to their written questions.

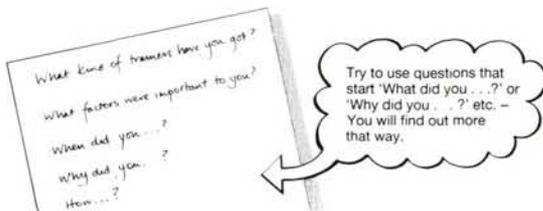
The final activity in part 2 encourages students to reflect on their own priorities when buying a pair of training shoes, and to compare these with the priorities of other members of their group.

STAGE 1

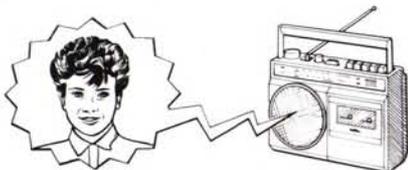
You are now going to interview a friend to find out about

- the trainers he or she already owns,
- what he or she will look for when next buying a pair.

Begin by writing down the things you will ask.



Now interview your partner. Make notes of the replies, and any follow-up questions you ask. Then let your partner interview you. You could tape your interviews and play them to the rest of the class, or perhaps you could act them out.....



Finally, as a class, compare the different ways you went about choosing your trainers. Try to give reasons for any differences.

STAGE 1

**The Shrewd Chooser Radio Show**

**Part 3: Looking at a consumer report**

Three students have written a consumer report called 'Drinking Orange!'  
You will need to refer to it as you listen to the tape.



In the radio programme the students describe how they

- visited shops and looked in the public library,
- carried out a classroom survey,
- carried out some classroom 'taste' experiments.

After hearing about each section of the report, you will be asked to

- describe *exactly* what the students did,

1



6

STAGE 1

- get to grips with their report,

2

What do the tables and graphs really show?

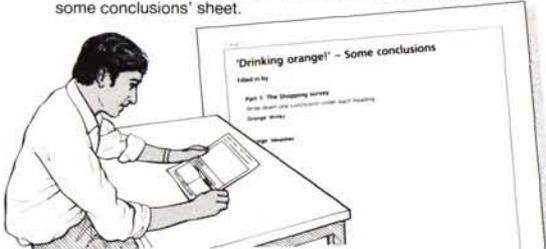
- answer some discussion questions about the report,

3



- write down what you learn from the report on a 'Drinking Orange! - some conclusions' sheet.

4



Soon you will be asked to produce your own consumer report. Will you be able to produce a better one than this?

7

**Purpose**

The third part of the radio show consists of a studio interview with two girls who have been involved in producing a consumer report called 'Drinking orange!'. (see M13-18.)

This report should give students some ideas of how they can conduct their own research, later on.

**Time needed**

2 to 3 hours.

**Presentation**

Audiotape, followed by class and group discussion, and individual work.

**Suggestions and comments**

This part of the radio show is divided into three sections: a shopping survey, a classroom survey and a classroom experiment. Each student will need to refer to a copy of the consumer report, 'Drinking orange!', as they listen to the tape. Point out that, by the end of their work on the module, they will be asked to produce a similar report. They should, therefore, listen closely to how this report was prepared.

For each section of the tape, the students are asked to do four different activities. In general we suggest the following presentation for all three sections, but the specific details will vary, as shown on the following pages.

1 **Recalling what happened.**

Ask students to describe, in their own words, what Barbara, Colin and Natalie did. Suggested recall questions are given on the following pages. (5 minutes).

2 **Getting to grips with the report**

Now divide the class into groups of three or four and ask them to read through and try to understand the appropriate section of the report. (5 minutes).

3 **Discussing the report**

Issue each student with the appropriate sheet of discussion questions (see M19-21) and a pocket calculator. Explain that one fault of the report is that it contains no conclusions. Tell the students that it is their job to supply these conclusions. The sheet of discussion questions is designed to help them do this; it is *not* intended to be used as a list of exercises that everyone must plough through!

# Drinking Orange!



A consumer report by Barbara, Colin and Natalie

Our research aims	Our research methods	Results on page
What can you buy in the shops?	Shopping survey	2
What types of fruit drink do people like? How much orange do people drink? How do people decide which orange to buy? What do people <u>really</u> know about orange? What do people want to know about orange?	Classroom survey	4
Can people tell how much sugar there is in orange, by taste? Which drinks taste most like real oranges?	Classroom experiment	9

1

Be selective in the questions you ask students to attempt. Some students may find many of the questions too demanding.

For sections 1 and 2, 'The shopping survey' and 'The classroom survey', the question sheets have each been divided into four parts. Ask groups of students to share out the questions so that each individual is working on a different part. Emphasise that conclusions only need to be noted down in rough at this stage. After 5 to 10 minutes, ask students to take it in turns to share their conclusions with the rest of their group. In this way, everyone should have something different to contribute. Ask a representative from each group to report the group's conclusions to the whole class.

For section 3, 'The classroom experiments', the groups should work together on the questions. As before, follow this by asking each group to share its conclusions with the whole class.

Each discussion may take up to 30 minutes. Do not be afraid to curtail or postpone discussions if interest seems to flag. It is not vital that every (or even most) of the questions are answered. The main objectives are to make sure that students understand why and how the surveys and experiments were carried out, and to give them some ideas of ways in which data may be organised and presented.

#### 4 Drawing conclusions.

After groups have shared their conclusions ask students to summarise the main points in the relevant section of the 'Drinking orange! – Some conclusions' sheet. (This should be done without consultation if the sheet is to be used for assessment.) (10 minutes).

### 1. The shopping survey

#### Recall questions

- How many shops did they visit?
- Did they visit the supermarket more than once? Why?
- What did they find embarrassing about the survey?
- How could they have improved their survey, given more time?

# 1. The shopping survey

Below is a summary of what we found out on a short trip to Sainsbury's on 26th May 1988. The table is divided into 3 sections:

- Orange "drinks" - which must contain at least 10% whole orange (this can include the peel!).  
All the "drinks" in our survey need to be diluted.
- Orange "squashes" - which must contain at least 25% orange juice  
All the "squashes" in our survey need to be diluted.
- Orange "juices" - which are 100% pure orange.  
These are not normally diluted before drinking.

(We found these percentages in the July 1987 "Which?" report.)

Orange "drinks"	Volume	Cost	Packaging and colour	Top 3 ingredients
Sainsbury's Whole Orange Drink	1 litre	54p	Plastic bottle Orange is medium colour	Water Sugar Oranges
	2 litre	£1.04	Large polythene containers	
	3 litre	£1.49		
Quosh Whole Orange Drink	1 litre	67p	Plastic bottle Orange is deep colour	Water Sugar Oranges
Robinsons Whole Orange Drink	1 litre	69p	Plastic bottle Orange is deep colour	Water Glucose syrup Oranges
Kia Ora Whole Orange Drink	1 litre	67p	Plastic bottle Orange is deep colour	Water Glucose syrup Oranges
Sainsbury's Sugar-free Orange Drink	1 litre	49p	Plastic bottle Orange is pale colour	Water Oranges (16%) Malic acid

2

Orange "squashes"	Volume	Cost	Packaging and colour	Top 3 ingredients
Sainsbury's "High Juice" Orange squash	730ml	69p	Glass bottle Orange is pale colour	Orange juice (50%) Sugar Water
St. Clement Orange squash	1.25 litres	£1.12	Plastic bottle Orange is pale colour	Orange juice (40%) Sugar Water
Robinsons "High Juice" Orange squash	1.5 litres	£1.42	Plastic bottle Orange is pale colour	Orange juice (35%) Water Sugar

Orange "juices"

Orange "juices"	Volume	Cost	Packaging and colour	Top 3 ingredients
Sainsbury's pure Jaffa Orange Juice	540ml	45p	Tin	Orange juice (100%)
	600ml	65p	3 small 200ml cartons each with straw.	
	1.2 litres	£1.19	6 small 200ml cartons each with straw.	
	1 litre	65p	Large carton	
	2 litres	£1.09	Very large carton	

3

## Getting to grips with the report

Students should find the data fairly straightforward. You could ask a few short questions to check that students can interpret the tables. For example,

'How much do 2 litres of Sainsbury's Whole Orange cost?'

'What is the main ingredient of Orange Drink?'

'What does ml mean?'

The data are not exhaustive. Only one supermarket was visited. Many other brands are available elsewhere. The supermarket did stock other kinds of orange (notably orangeade, orange mixed with other flavours, pre-diluted orange squash, frozen or 'long-life' orange juice). There is still, therefore, a great deal of work to be done on orange!

## Discussion questions

(See M19. Answers are given on T32.)

### Orange 'drinks'

- Which is the most economical way of buying orange 'drink'?
- Rank the different ways in order, from most economical to least economical.
- Give reasons why you think people buy 'drink' in each of the different ways.

### Orange 'squashes'

- Which is the most economical way of buying orange 'squash'?
- Rank the different ways in order, from most economical to least economical.
- Give reasons why you think people buy 'squash' in each of these different ways.

### Orange 'juices'

- Which is the most economical way of buying orange 'juice'?
- Rank the different ways in order, from most economical to least economical.
- Give reasons why you think people buy 'juice' in each of the different ways.

## Making comparisons

- Why do you think that, in general, orange 'squashes' cost more than orange 'drinks'?
- Why should someone buy a litre of orange 'squash' when he or she could buy a litre of orange 'juice' for less money?
- 'It's always more economical to buy large quantities'.

How true is this statement, from the tables? Think of situations when it would be better to buy smaller quantities.

## 2. The classroom survey

Here is the questionnaire we used :

ORANGE SURVEY																
1. Do you prefer 'still' or 'fizzy' drinks ? (Ring your answer)	still / fizzy / dont mind															
2. Draw a mouth on each face to show how much you like the flavours. Use these mouths:																
<table border="0" style="width: 100%; text-align: center;"> <tr> <td>Love it!</td> <td>Nice</td> <td>O.K.</td> <td>Not nice</td> <td>Horrible!</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Lemon</td> <td>Orange</td> <td>Blackcurrant</td> <td>Lime</td> <td>Apple</td> </tr> </table>		Love it!	Nice	O.K.	Not nice	Horrible!						Lemon	Orange	Blackcurrant	Lime	Apple
Love it!	Nice	O.K.	Not nice	Horrible!												
Lemon	Orange	Blackcurrant	Lime	Apple												
3. What type of orange do you like best? Tick the box.																
<input type="checkbox"/> Pure orange juice <input type="checkbox"/> Orange 'squash' <input type="checkbox"/> Orange 'drink' (or 'whole orange') <input type="checkbox"/> Orange barley water <input type="checkbox"/> Fizzy orange <input type="checkbox"/> Other	} These normally need to be diluted															
4. On average, about how many glasses of orange do you drink in a week ? _____																
5. What brand of orange do you buy ? For example : Quosh, Robinsons. _____																

4

ORANGE SURVEY (CONTINUED)	
6. When you buy orange, which factors are most important to you ? Put a 1 by the most important, a 2 by the next, and so on up to a 5 for the least important	
<input type="checkbox"/> Price <input type="checkbox"/> Ingredients (sugar, colouring, water etc) <input type="checkbox"/> Brand name (Quosh, Robinsons etc) <input type="checkbox"/> Colour <input type="checkbox"/> Flavour	
What other factors are important to you ?	
7. Which of the following contains most real orange juice ? Orange 'squash'   Orange 'drink'   Both the same   Dont know	
Which of the following contains most sugar ? Orange 'squash'   Orange 'drink'   Both the same   Dont know	
8. What would you like us to find out about orange ? _____ _____ _____ _____	
Thank you for filling in our questionnaire.	

5

## 2. The classroom survey

### Recall questions

- How did the students conduct the survey? Why did they use this method?
- How did they start organising their results? Why did it take two people to draw up a tally chart?
- What is the most important factor that people take into account when buying orange juice? What other results can you remember?

### Getting to grips with the report

Ask the students to answer the survey questions for themselves and compare their own personal responses with those obtained from Barbara, Colin and Natalie's survey. Perhaps they could imagine adding their results to the pie chart, bar charts etc – how would each of these be affected?

### Discussion questions

(See M20. Answers are given on T33–34.)

### The questionnaire

- Do you think that this is a good questionnaire? Why?
- Which questions are good and which are not so good? Why?

Look at the results of the survey . . .

- How many people filled in the questionnaire?
- Do *all* the graphs and tables show this number of people?
- If they do not, what do you think happened?

### What types of fruit drink do people like?

- Look at the results to questions 1, 2 and 3. What conclusions can you draw?
- What is good or bad about the way these results are presented?
- Looking at the results to question 2, 'orange' seems to be the most popular flavour. Try to rank the other flavours in order of popularity. Explain your method.

Results of classroom survey.

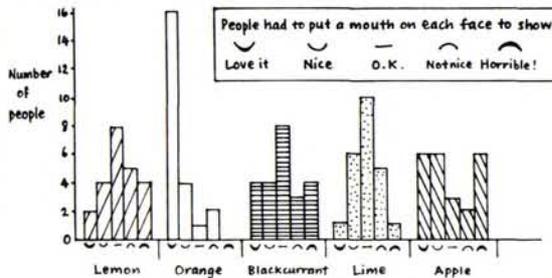
What types of fruit drinks do people like ?

Question 1. Do you prefer 'still' or 'fizzy' drinks ?

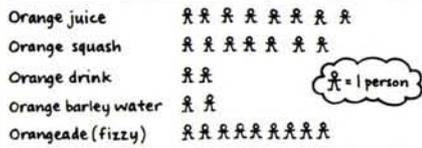
Still drinks chosen by 4 people  
Fizzy drinks chosen by 11 people  
Don't mind chosen by 8 people



Question 2. How much do you like each flavour?



Question 3. What type of orange do you like best ?



6

How much orange do people drink?  
How do people decide which orange to buy?

- Look at the results to questions 4, 5 and 6. What conclusions can you draw?
- What is good or bad about the way these results are presented?
- Could the results to question 5 have been biased by the way the question was asked? How?
- What matters most to people when they buy orange? Price? Ingredients? Brand name? Colour? Flavour? Put these factors in order of importance. Explain your method.

What do people really know about what is in orange?

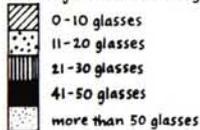
- Look at the results to question 7. What conclusions can you draw?

What else do people want to know about orange?

- Compare the results to question 8 with the results to questions 6 and 7. What conclusions can you draw?

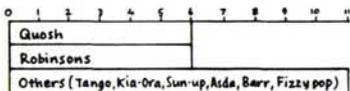
How much orange do people drink ?

Question 4. On average, about how many glasses do you drink in a week?



How do people decide which orange to buy?

Question 5. What brand of orange do you buy?  
For example, Quosh, Robinsons



Question 6. What factors are most important to you?

This table shows the number of people that gave each ranking to each factor.

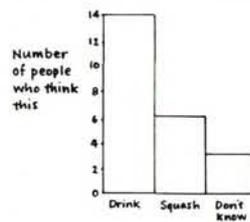
For example, 2 people said "Price is the most important factor."

	Rank	Price	Ingredients	Brand name	Colour	Flavour
Most important	1	2	10	2	0	9
	2	8	5	2	2	6
	3	6	3	2	8	4
	4	3	4	9	5	2
Least important	5	4	1	8	8	2

7

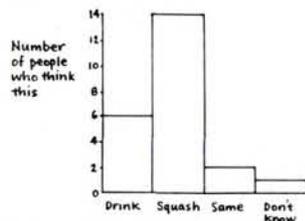
What do people really know about what is in the orange ?

Question 7. Which contains most real orange juice ?



Most people are wrong because 'Squash' must contain at least 25% real orange, and 'Drinks' must contain at least 10% real orange.

Which contains most sugar ?



Most people are right this time. "On average, squashes give you 2 1/2 teaspoonfuls of sugar in a diluted glassful, about 50 calories. Whole orange drinks give you about 30 calories." (from "Which?" report)

What else do people want to know about orange ?

Question 8. What would you like us to find out about orange?

- 15 people wanted to know about ingredients. For example, 'How much artificial colouring?' 'How much sugar?'
- 2 people wanted to know if orange juice makes you fat
- 2 people wondered how the fizz was made.
- 2 people wanted to know where orange is made.
- 1 person wondered if orange juice keeps you awake at night

8

### 3. The classroom experiments.

Can people tell how much sugar there is in orange, just by taste?

We blindfolded 22 people and asked them to taste  
 ♦ 'Sugar-free' orange drink (no sugar)  
 ♦ 'Whole orange' drink (some sugar)  
 ♦ 'High juice orange squash (lot of sugar)

Then they had to tell us which they think contains the most sugar; which contains the least sugar and which is in-between.

Here are the results:

What they tasted	Sugar-free	What they thought		
		least sugar	in-between	most sugar
Whole orange	6	14	2	
High juice	16	6	0	
Sugar-free	0	2	20	

So, 2 people thought that 'sugar-free' orange contained the most sugar!

Which drinks taste most like real oranges?

We blindfolded 22 people and asked them to taste 5 different drinks and rate each one according to "oranginess."

0	1	2	3	4
No orange flavour	Just a bit	Some orange	Quite a lot	Very orangey

We then repeated the experiment without blindfolds to see how much people are affected by the colour.  
 The results are on the next page.

9

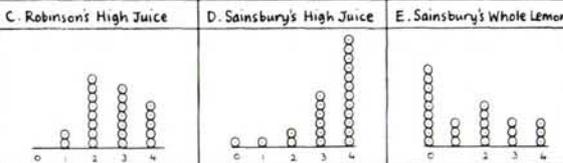
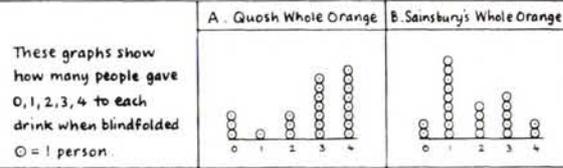
The 5 different drinks were

- A. Quosh Whole Orange Drink } at least 10% whole orange
- B. Sainsbury's Whole Orange Drink }
- C. Robinson's High Juice Orange Squash } at least 36% orange juice
- D. Sainsbury's High Juice Orange Squash } at least 50% orange juice
- E. Sainsbury's Whole Lemon Drink } 0% orange juice!

How much do they taste of orange, blindfolded?

This table shows how each person rated each type of drink, from 0 (no orange flavour) to 4 (very 'orangey' flavour)

Type of orange	Neil	Mark	Louise	Sarah	Kelly	Jeff	Jeanne	Sanjay	Roger	Greg	Daniel	Debbie	Gina	Collette	Rhianon	Paul	Scott	Jamie	Cara	Math. C	Jeanne P.	Lisa	
A	2	3	4	4	2	3	3	4	0	3	4	2	1	1	4	0	4	0	3	3	3	4	4
B	3	2	1	4	0	2	3	1	3	2	1	1	1	1	2	1	0	1	1	4	3	3	
C	3	2	4	3	1	2	3	3	4	4	2	2	2	2	4	2	3	2	3	3	4	1	
D	4	4	4	4	2	4	3	3	4	0	3	3	4	4	4	4	4	3	1	4	3	4	
E	0	3	0	2	0	2	1	2	0	0	4	3	1	4	3	0	0	0	0	2	4	0	



10

### 3. The classroom experiments

#### Recall questions

- What were Barbara, Colin and Natalie trying to find out in the first experiment? ... in the second experiment?
- How many people took part in the experiments?
- Why did they blindfold people?
- Why did they repeat the second experiment without blindfolds?
- Why did they include lemon drink in the second experiment?
- What scale did they use to measure 'oranginess'?

#### Getting to grips with the report

Explain how the report has been laid out, and ask students a few simple interpretation questions. For example,

'Look at the results of the first experiment. How many people tasted Whole Orange and thought that it contained the least sugar? Were they right?'

'Look at the results of the second experiment. First examine the results of the blindfolded tests. Which type of orange did Neil think tasted most 'orangey'? ... least orangey?'

Colour in the ○'s which represent Neil's results in the 5 graphs. The fifth graph, which shows the results for Sainsbury's Whole Lemon Drink, contains an error. Can you spot it?

Who thought that the Lemon drink tasted most 'orangey'?

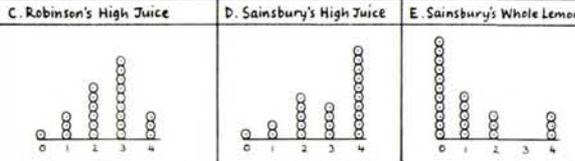
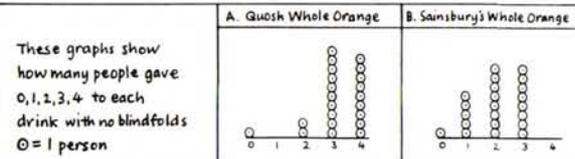
Did they change their minds when the blindfolds were taken off?'

In addition, you may like to calculate one of the missing averages, to show where they came from. (Note: Sainsbury's High Juice had an average rating of 3.22. Sainsbury's Whole Lemon had an average rating of 1.05.)

How much do they taste of orange ... with no blindfolds?

Here are the results for each person:

	Neve	Neil	Mark	Louise	Sarah	Kelly	Jeff	Joanne	Sanjay	Roger	Greg	Daniel	Debbie	Grifa	Collette	Rhiannon	Paul	Scott	Jamie	Cara	Math C.	Joanne P	Lisa
A	2	4	3	3	3	4	3	2	0	3	4	3	3	3	3	4	3	4	4	4	4	4	3
B	1	1	0	1	2	2	2	1	2	2	2	3	2	3	3	3	3	3	3	3	1	3	2
C	1	2	0	2	2	1	3	2	3	4	4	3	3	2	4	3	3	1	2	3	3	3	3
D	2	4	4	2	2	0	3	2	4	4	2	1	4	4	4	4	3	3	3	4	4	4	1
E	1	4	1	1	0	0	0	0	2	0	0	0	4	1	4	2	0	0	0	0	1	2	0



The average ratings for each drink were:

	A. Quosh Whole Orange	B. Sainsbury's Whole Orange	C. Robinson's High Juice	D. Sainsbury's High Juice	E. Sainsbury's Whole Lemon
Blindfolded	2.72	1.82	2.68		1.5
Not Blindfolded	3.18	2.05	2.45	2.91	

**Discussion questions**

(See M21. Answers are given on T34.)

**Can people tell how much sugar there is in orange, just by taste?**

Read carefully through the results of this experiment.

- Which type of orange did most people think contained the least sugar? . . . the most sugar?
- Were they right? How can you tell?
- Were they just guessing? How can you tell?
- What conclusions can you draw?

**Which drinks taste most like real orange?**

Look at the results of the *blindfold* tests.

- From the graphs, which type of orange tastes most like *real* oranges?
- Try to put the 5 drinks in order of 'oranginess'. (The average ratings may help.)
- How true is it that 'Drinks which contain more real orange juice taste more like real oranges?' (Refer to the table at the top of page 10 of the report.)

Look at the results of the tests with *no blindfolds*.

- What effect does colour have? (Refer back to the tables on pages 2 and 3 for the colours of the different types.)

STAGE 1

**Learning from your own experiences**

We all make mistakes . . . . .

Note down your own experiences on a 'Learning from mistakes' sheet.

Now in your group, take it in turns to describe what you have written.

8

**Purpose**

To encourage students to reflect on their own experiences, particularly on the mistakes they have made in making choices.

**Presentation**

Class discussion, individual work then group discussion.

**Suggestions and comments**

Introduce the final activity in this stage by describing a mistake that you have made, and then inviting two or three students to do the same. This should cause no difficulty as most people have, for example, bought an item of clothing they never wear or have bought something on impulse and have then seen a much better buy soon afterwards. The 'Learning from mistakes' sheet could be filled in for homework.

## Assessment tasks for Stage 1

Below, we offer three tasks that relate to the assessment criteria for Stage 1. The tasks may be helpful in deciding whether or not a student can

- (i) identify important factors and methods involved in decision-making
- (ii) obtain and interpret information from oral interviews
- (iii) obtain and interpret information from tables and graphs

All three tasks should have been completed during the normal course of the work.

### Stage 1 Assessment task 1

After part 1 of the audiotape, students are asked to identify important factors and specifications that were taken into account and methods that were used by people purchasing five different items.

The task relates directly to criterion (i).

STAGE 1

### The Shrewd Chooser Radio Show

Part 1: People making choices

Name: \_\_\_\_\_

Item	Important factors and specifications	How the choice was made	How you would choose a similar item
Suit			
Notebook			
Washing machine			
Record			
Orange squash			

M12

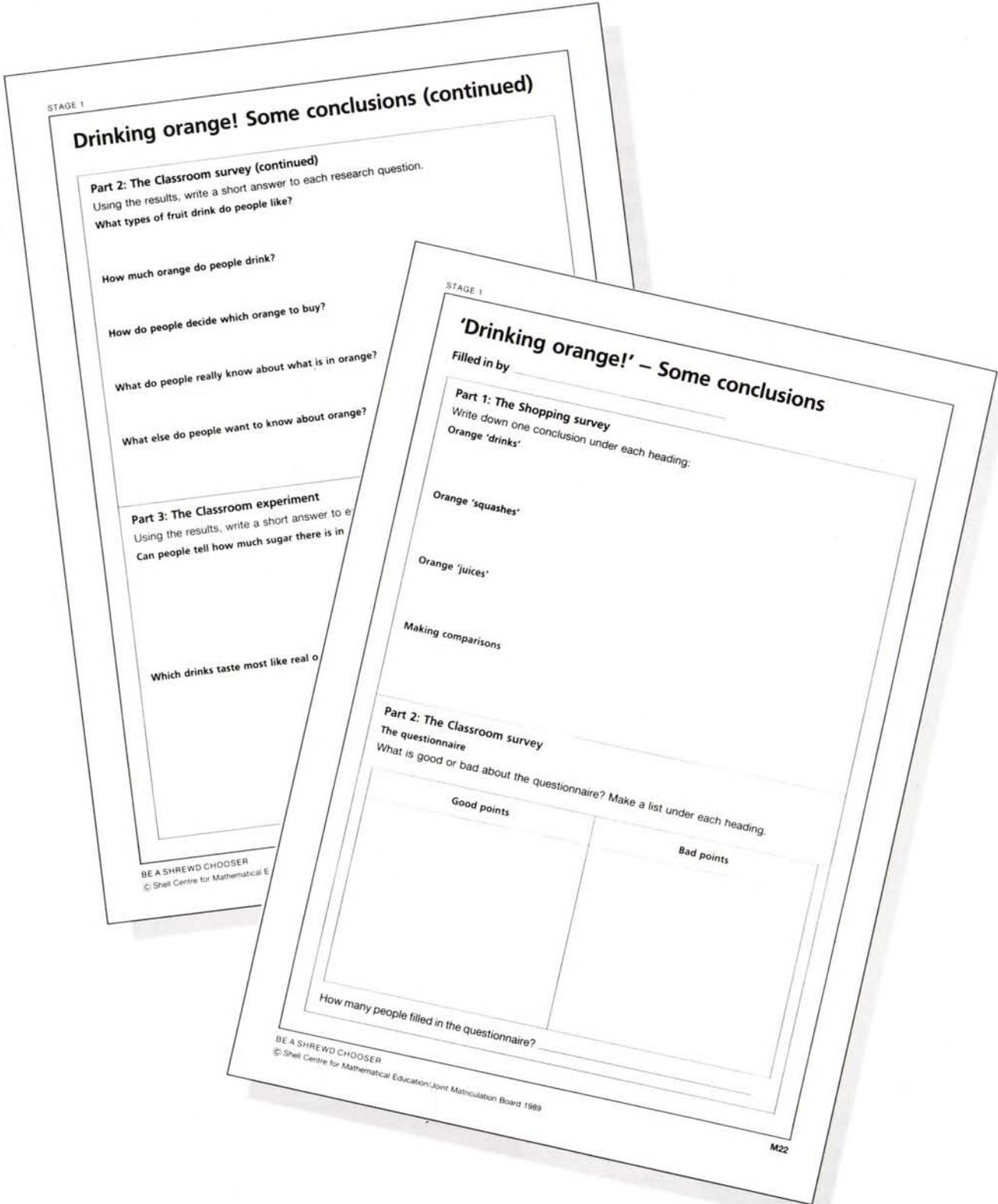
BE A SHREWD CHOOSER  
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### Stage 1 Assessment task 2

After part 2 of the audiotape (see pages 4 and 5 of the Student's Booklet) students are asked to interview their friends to find out about products they have bought, and what they will look for when buying the products on a subsequent occasion. The records of these interviews may be assessed and provide evidence related to criterion (ii).

### Stage 1 Assessment task 3

After part 3 of the audiotape, students are asked to draw conclusions from a consumer report called 'Drinking Orange' and note these down (see page 7 of the Student's Booklet). This tests whether or not they can interpret many different kinds of data (criterion (iii)).



## Some solutions to the assessment tasks for Stage 1

### Stage 1 Assessment task 1

(i) A 'correct' solution is shown below:

Item	Important factors and specifications	How the choice was made
Suit	<ul style="list-style-type: none"> <li>■ Occasion (wedding)</li> <li>■ Material (lightweight)</li> <li>■ Colour (cream)</li> <li>■ Must like style</li> <li>■ Must be washable.</li> </ul>	<ul style="list-style-type: none"> <li>■ Browsed through catalogues for ideas first.</li> <li>■ Went into one shop.</li> <li>■ Tried on a few suits.</li> <li>■ Didn't see suit in natural light.</li> </ul>
Notebook	<ul style="list-style-type: none"> <li>■ Price (cheap)</li> <li>■ Paper (lined)</li> <li>■ Size (must fit into handbag)</li> <li>■ Looks (nice picture on the cover).</li> </ul>	<ul style="list-style-type: none"> <li>■ Went into <i>one</i> shop where goods are reputed to be cheap.</li> </ul>
Washing Machine	<ul style="list-style-type: none"> <li>■ Price (not more than £350)</li> <li>■ Spin-speed (about 1000 rpm)</li> <li>■ Reliability</li> <li>■ Trade-in on old machine.</li> </ul>	<ul style="list-style-type: none"> <li>■ Looked at consumer magazine in the library.</li> <li>■ Looked in 7 shops.</li> <li>■ Asked friends.</li> <li>■ Saw advert in newspaper.</li> </ul>
Record	<ul style="list-style-type: none"> <li>■ Name of group</li> <li>■ Singles or L.P.'s</li> <li>■ Price</li> <li>■ Value for money</li> <li>■ Time to wait for a single to come out on an L.P.</li> </ul>	<ul style="list-style-type: none"> <li>■ Knew which to buy before going into the shop.</li> <li>■ Sometimes browses.</li> <li>■ Has to know some of tracks on L.P. before he'll buy it unless the reputation of the group is good enough.</li> </ul>
Orange Squash	<ul style="list-style-type: none"> <li>■ Price (cheapest)</li> <li>■ Ingredients (no artificial additives)</li> <li>■ Taste (low in sugar)</li> <li>■ Size of bottle</li> <li>■ Value for money</li> <li>■ Brand name.</li> </ul>	<ul style="list-style-type: none"> <li>■ Usually buys in supermarket.</li> <li>■ Used a calculator to work out which is best value for money.</li> </ul>

### Stage 1 Assessment task 3

The 'Drinking orange! – Some conclusions' sheet should contain a selection of answers drawn from the answers to the discussion questions which appear below.

#### Part 1 The shopping survey

##### *Orange 'drinks'*

- The most economical was Sainsbury's Sugar-Free at 49p/litre.
- The remaining drinks, in decreasing order of economy, were
  - 3 litre pack of Sainsbury's Whole Drink at 50p/litre.
  - 2 litre pack of Sainsbury's Whole Orange Drink at 52p/litre.
  - 1 litre pack of Sainsbury's Whole Orange Drink at 54p/litre.
  - Quosh and Kia Ora Whole Orange Drink at 67p/litre.
  - Robinsons Whole Orange Drink at 69p litre.
- Apart from economy, people take into account flavour, colour, ingredients, brand name, portability, storage space required, frequency of use and so on. Such factors account for the range on display.

##### *Orange 'squashes'*

- The most economical was St Clement's at 90p/litre.
- The remaining drinks were both priced at 95p/litre.

##### *Orange 'juices'*

- The most economical was 2 litre carton at 55p/litre,
- then the 1 litre carton at 65p/litre,
- then the 540ml tin at 83p/litre,
- then the 1.2 litres in small cartons at 99p/litre,
- then the 600ml in small cartons at £1.08/litre.

##### *Making comparisons*

- Orange 'squashes' contain more real orange than orange 'drinks'.
- Orange 'squash' must be diluted, so a bottle will go much further.
- It is not always more economical to buy larger quantities, because other factors must be taken into account (brand name etc). Small quantities are easier to carry and, in the case of juices, there is less worry of them going 'off' when stored.

## Part 2 The Classroom survey

### *The questionnaire*

Some good features of the questionnaire are:

- The layout is clear and attractive.
- The questions are varied and interesting.

Two faults with the questionnaire are:

- Question 4 is difficult to answer and may produce unreliable results.
- Question 5 suggests two brands and this may bias the results in favour of these brands. (The results seem to bear this out.)

The results show that 23 people completed the survey.

This total is reflected in all the graphs and tables except for question 3, where some people ticked more than one box on the questionnaire.

### *What types of fruit drink do people like?*

The main conclusion is that fizzy orange drinks are the most popular. The results to Question 3 are poorly presented as the 'stick people' are not evenly spaced.

With the data in their present form, it is hard to rank the flavours in order of popularity. If we allocate numbers to each choice as below, then mean scores may be obtained.

Love it! +2	Nice +1	O.K. 0	Not nice -1	Horrible -2
----------------	------------	-----------	----------------	----------------

Thus we find that, in order of decreasing popularity, the flavours are (with mean scores) Orange (1.5), Apple (0.2), Blackcurrant and Lime (0), Lemon (-0.2).

It is also worth noting that Apple, for example, tends to polarise views more than Lime or Lemon does.

### *How much orange do people drink?*

The 'glass' diagram, illustrating the results to Question 4, is partly misleading as it over-emphasises 'more than 50 glasses' (the tape states that this interval only contained one person). It does not easily enable the numbers that gave each response to be read off. However, it does show that, for example, 50% gave an answer of 0-10 glasses per week.

### *How do people decide which orange to buy?*

The bar chart for Question 5 has grouped six brands together under 'others'. (Some students think that all six are therefore the most popular!) This is poor practice. It is just possible that one of these brands received 6 votes and the others received one vote each! The results to this question may have been affected by the way in which the question was asked.

For Question 6, the factors (with mean rankings) are, in order of descending importance, Ingredients and Flavour (2.2), Price (3.0), Brand name and Colour (3.8).

***What do people really know about what is in orange?***

These results show that most people stated (incorrectly) that 'Drink' contains the most real orange juice, and (correctly) that 'squash' contains the most sugar.

***What else do people want to know about orange?***

Most people want to know more about the ingredients in orange. (This is confirmed by the results of Question 6. The results to Question 7 also reveal that most people do not know how much real orange is in the 'orange' they drink.)

**Part 3 The classroom experiments**

***Can people tell how much sugar there is in orange, just by taste?***

Most people thought that Whole Orange contains the least sugar and High Juice contains the most sugar.

They were correct in the latter case only.

It is unlikely that people were guessing or one would expect the responses to be more evenly distributed.

People were probably misled by the artificial sweeteners in the sugar-free orange.

***Which drinks taste most like real orange?***

Drink D, Sainsbury's High Juice, appeared to taste most like real orange.

The results show that, in order of decreasing 'oranginess', the drinks were

- D. Sainsbury's High Juice
- A. Quosh Whole Orange
- C. Robinsons's High Juice
- B. Sainsbury's Whole Orange
- E. Sainsbury's Whole Lemon.

Without blindfolds, the order changed to A, D, C, B, E. This is perhaps because Quosh had a deeper colour and was therefore perceived to taste 'more orangey'.

## Stage 2 Preparing your research

### Introduction

In this stage, students begin to plan their own research based on consumer items of their own choice. In later stages their results will be presented in a full written report, supplemented perhaps by posters, oral presentations, or even their own taped 'consumer radio show'. For students who have difficulty with writing, more emphasis may be placed on these latter modes of communication.

The activities contained within this stage develop a number of important strategic skills which may be applied to many other planning and organising tasks. These activities, which many students are likely to find unfamiliar, include

- choosing an item to research, considering the potential and feasibility of the idea, and modifying it as necessary to fit in with practical constraints,
- deciding on interesting research aims by considering the needs and interests of potential users of the report,
- deciding on suitable methods for carrying out the research, designing questionnaires, planning experiments, and finding suitable ways of recording information.

### Total time needed

About 2 to 3 hours.

### Organisation and equipment required

From this point onwards, students should work in groups of two, three or four.

Each student will need

- a 'Possible aims of research' sheet (M25)
- a 'Final plan' sheet (M26)

### Related assessment criteria

This stage offers students the opportunity to show that they can plan a piece of consumer research and

- (iv) identify possible research aims
- (v) select appropriate research methods
- (vi) devise suitable methods for the collection and organisation of data.

**Stage 2 Preparing your research**



In this stage your group will begin to work on your own consumer report.

You will need to

- choose an item to research,
- decide what people want to know,
- plan how you will carry out your research,
- share out the research tasks and make final preparations.

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STAGE 2

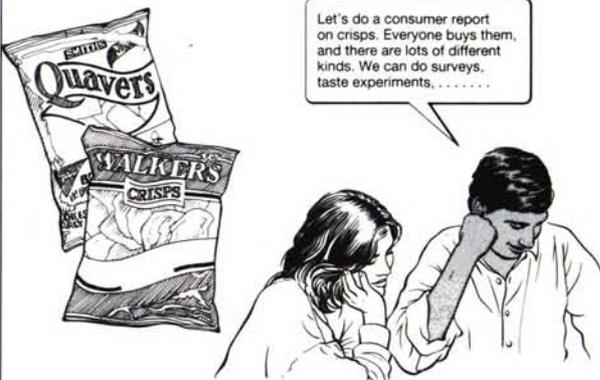
### Choosing your item

You should try to make your report as interesting and useful as possible.  
So you have to choose your item carefully.  
Make sure that

- people in your class have some experience of choosing or using the item,
- you can carry out some tests on it in the classroom,
- the item is cheap enough for you to bring samples to school.

Here are some ideas to start you thinking.

In your group, think of other items that you, your family or your school often choose.



10

## Purpose

To encourage students to choose a suitable item for research.

## Presentation

Class discussion followed by group discussion.

## Suggestions and comments

Introduce Stage 2 by reading through page 9 with the class. Explain that for the rest of the module, students will be working in small groups to produce consumer reports on items of their own choice. This may involve them in conducting interviews, carrying out surveys and experiments, visiting shops, making telephone calls and so on. Challenge them to produce reports at least as good as the 'Drinking orange!' report from part 3 of the radio show.

The first task involves the choosing of suitable items for research. Read through the constraints at the top of page 10 and try to make sure that students fully understand them. While large or expensive items (for example, bicycles, personal stereos) may seem attractive items for consumer research, these do not offer opportunities for students to design and carry out experiments and tests in the classroom. We therefore recommend that you exclude these at this stage. Point out that even with small items, a great deal of money can be wasted in the long term if poor consumer choices are consistently made.

Page 11 offers some ideas that students may like to choose from. The crisps example is developed throughout the rest of this booklet. (It may be noted that the crisps context is rich enough to provide sufficient research questions for an entire class of students. If you have a small class of lower attaining students, you may like them to work exclusively on this topic and produce a collective report.)

STAGE 2



Breakfast cereals

Coffee or Tea

Soft drinks

Chocolate bars or other confectionery

Batteries

Sticky tape or glue

Pencils, pens

Notebooks or files

When your group has chosen an item, tell your teacher about it.

11

STAGE 2

### Deciding what people want to know

On a 'Possible aims of research' sheet,

- list the kinds of people who may be interested in your report.
- list the factors that they may want to know more about.

(For example, prices.)

**TUCK SHOP**

The person who runs the school tuck shop would want to know about prices and brands of crisps.

A parent of a young child would want to know what ingredients they contain.

**Possible aims of research**

Name: *Ram: Hussein*

Item for research: *Crisps*

Kind of person who may be interested in your report:

- School tuck shop*
- Parent of a young child*

Factors that the person is interested in:

- Price, Brand name, Flavours*
- Ingredients, fat, salt*
- colouring etc.*

12

### Purpose

To encourage each group of students to select some interesting research aims.

### Presentation

Group discussion.

### Suggestions and comments

- 1 Encourage students to identify as many different kinds of people who may be interested in their report as possible. After groups have spent a few minutes discussing this, you may wish to invite each group to share its ideas, so that other members of the class can consider whether these people would also be interested in a report on their item.
- 2 The list of factors will naturally lead to research aims. Explain what is meant by 'research aims' referring the class to the examples on page 13. Ask the students to list as many different research aims as they can, using the back of the sheet if necessary, and then ask them to go through their lists choosing those aims that are most interesting and which students feel they may be able to achieve.

STAGE 2

Now, at the bottom of the sheet,

- write down a list of research aims that you might like to work on.

Research aims	Suitable research methods
<i>To find out which flavours people say they prefer</i>	<i>Questionnaire around the class</i>
<i>To see if people really can tell one flavour from another</i>	<i>Get people to taste crisps and guess the flavour.</i>
<i>To find out which crisps give you most for your money</i>	<i>Go round the shops on the way home and do a survey of prices and weights check the weights on classroom scales</i>

BE A SURE AND CHOOSE!  
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In your group, discuss how you could achieve your research aims. What research methods could you use?

3

Read through the ideas on the next two pages before you fill in the 'Suitable research methods' column.

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- 3 At the bottom of page 13, students are invited to hold a preliminary discussion on research methods. Remind students of the methods used in carrying out the 'Drinking orange!' consumer research from the radio show. These ideas are developed more fully on the following pages.

STAGE 2

**Planning how you will carry out your research**

Your research methods may include

- carrying out a survey in the classroom,



- carrying out an experiment in the classroom,



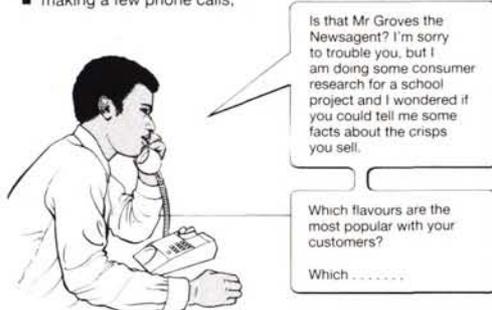
14

STAGE 2

- making a short visit to some local shops,



- making a few phone calls,



- visiting the local public library and looking at consumer reports.

In your group, decide which methods are best for achieving each aim.

Describe the methods in the 'Suitable research methods' column.

15

**Purpose**

To encourage students to use appropriate and imaginative research methods.

**Presentation**

Group discussion.

**Suggestions and comments**

Encourage each group to use a variety of methods including at least one survey and one experiment. This will ensure that groups have sufficient work to do in the classroom.

Some teachers have attempted to motivate their students by arranging a short visit to some local shops during lesson time. Groups were encouraged to prepare for this visit by drawing tables on which they could gather information in an organised way. Other teachers preferred to encourage groups of students to make such visits in their own time.

You may be able to bring a few 'Which?' magazines into school so that the students can refer to them. These reports usually contain articles on expensive, large items, however, and are aimed primarily at an adult market. While these may not be directly relevant, students may find that the methods used and the ways in which the reports are organised offer some inspiration for their own reports.

STAGE 2

**Sharing out the research tasks and making final preparations**

Each member of your group should choose one or two research aims to explore. (Try to make sure that everyone in the group has something they can do in the classroom.)

On a 'Final plan' sheet

- write down the particular aim(s) that you will explore,
- write down your research methods.

Attach to this sheet

- any questionnaires or survey sheets you plan to use,
- lists showing all the equipment you need for your experiments and the names of those responsible for bringing it,
- any tables or charts you will use to help you record information.



Look back at the 'Drinking Orange!' survey for detailed ideas on questionnaires, methods, tables and charts . . . .

**Purpose**

To enable each student to write down a detailed plan for his or her own research activities.

**Presentation**

Group discussion followed by individual work.

**Suggestions and comments**

By now each group should have a list of possible research questions and research methods. Encourage each group to share out among individuals within the group, the tasks that need to be done.

Some students find it difficult to share out tasks in a way that will involve every group member. This can result in some students becoming 'passengers' within a group, leaving all the work to one or two others. If this happens, you may either have to intervene and help the group to identify tasks that can be carried out in parallel, or split the group into two smaller, independent, groups.

Issue one 'Final plan' sheet to each student, and ask everyone to write down their research questions, research methods and give details of how they will collect and organise their data. If, for example, they are planning to carry out a taste experiment on crisps, then they should describe in detail the types of crisps on test and the number of experimental subjects involved. Encourage groups to be specific.

The 'Final plan' sheet is only intended to provide a framework for this activity. Encourage students to develop their own plan using further sheets and staple these to the 'Final plan' sheet.

As the plans are completed, perhaps they could be read out to the rest of the class, and suggestions sought as to how they may be improved.

STAGE 2

**Final plan**

Filled in by: Philip Swan  
Subject for our consumer report: Crisps

**Research aims**

- To find out if people can tell one flavour from another
- To find out how much people like the different flavours

**Research methods**

(Describe in detail how you will do your research)

- Arrange 11 different flavours in a row Blindfold
- 30 people and ask them to taste each flavour and
- say what flavour they think it is
- say which flavour they like best

**How will you take**

Attach to this sheet

- any questionnaires
- any charts
- any tables

List of what we need to bring

Crisps- Plain, Bacon, Cheese n' Chon,  
Chicken, Salt n' Vinegar, Beef,  
Mint, Worcester

Table for recording our results

Flavour	Person 1	Person 2	Person 3	Person 4	Person 5	Person 6	Person 7	Person 8	Person 9	Person 10	Person 11
Plain											
Bacon											
Cheese and Chon											
Chicken											
Salt n' Vinegar											
Beef											
Mint											
Worcester Sauce											

This would mean that I hope that I can see what people like best when they taste our crisps



**Stage 2 Assessment task 2**

## Research methods

Some students are planning to do some consumer research into fizzy soft drinks. Their research aims are listed below. Underneath each aim, write a few lines describing a *method* which will help them to achieve this aim.

- (a) **Aim:** To make a complete list of all the fizzy drinks you can buy.  
**Method:**
- (b) **Aim:** To find out how fizzy drinks are made.  
**Method:**
- (c) **Aim:** To find out which types of fizzy drinks people say they prefer.  
**Method:**
- (d) **Aim:** To find out if people can taste any difference between cheaper fizzy drinks and more expensive fizzy drinks.  
**Method:**
- (e) **Aim:** To find out which adverts for fizzy drinks are most memorable.  
**Method:**

Stage 2 Assessment task 3

## Tea bags

Two students have done a small shopping survey to find out the different kinds of tea sold at a supermarket.

They have made notes on scraps of paper.

Boxes of 80 standard tea bags (250g)  
 Lyons - £1.07  
 Tetley - £1.09  
 Typhoo - £1.07

Twinnings 'Earl Grey'  
 50 bags for £1.05  
 (This weighs 125 g)

Tetley tea bags  
 40 bags cost 55p (125 grams)  
 80 bags cost £1.09 (250 grams)  
 160 bags cost £2.17 (500 grams)

Brook Bond PG Tips  
 £3.12 for 240 bags  
 £2.17 for 160 bags  
 £1.09 for 80 bags  
 (80 bags weigh 250g)

Typhoo have a brand called  
 'one cup' which contains  
 smaller tea bags  
 125 g box holds 60 bags  
 250g box holds 120 bags  
 These cost 61p and £1.19

Sainsbury's  
 Brown Label 80 bags - 62p (250 grams)  
 Red Label 80 bags - 79p (250 grams)

(These figures were obtained in October 1988)

Make a table showing all this information as clearly as you can.  
 Which way of buying tea is most economical?

What other factors would you take into account when buying tea?

## Some solutions to the assessment tasks for Stage 2

### Stage 2 Assessment task 2

Suitable methods may involve the following.

- a) A shopping survey
- b) Telephoning or writing to a manufacturer
- c) A classroom survey involving a questionnaire
- d) A classroom tasting experiment. This could, for example, involve students in tasting three drinks (two cheaper and one more expensive) and identifying the 'odd one out'. (Of course, all other factors will need to be controlled.)
- e) A classroom survey where, perhaps, people are asked to describe adverts for different drinks or identify 'catch phrases' and 'jingles'.

### Stage 2 Assessment task 3

The data may be summarised in a table such as the following.

Brand name	Weight (grams)	Number of tea bags	Price
Brooke Bond PG Tips	250	80	£1.09
	500	160	£2.17
	750	240	£3.12
Lyons	250	80	£1.07
Sainsbury's Brown Label	250	80	£0.62
Sainsbury's Red Label	250	80	£0.79
Tetley	125	40	£0.55
	250	80	£1.09
	500	160	£2.17
Twinings Earl Grey	125	50	£1.05
Typhoo Standard	250	80	£1.07
Typhoo 'One Cup'	125	60	£0.61
	250	120	£1.19

There are, of course, alternative correct solutions.

From the list, the most economical way of buying tea is Sainsbury's Brown Label. Other factors may include taste, free gifts and so on.

## Stage 3 Carrying out your research

### Introduction

In this stage students carry out the research that they have planned and prepare their consumer reports.

They will need to

- choose appropriate ways of collecting and presenting data.
- consider a variety of modes of communication and decide how to present their reports to the rest of the class.

These activities give students the experience of using important statistical concepts which may later be applied in other situations. For example, sampling techniques, validity, reliability, recording techniques, graphical representation, graphical interpretation and measures of central tendency (averages). Students may have experienced all of these, but are unlikely to have been asked to choose when and where to use them.

### Total time needed

About 3 to 4 hours.

### Organisation and equipment required

Students will be working in the same groups as for Stage 2, but for some of the time they will be working individually within their groups.

Students are likely to want to carry out experiments and interviews involving other members of the class. They should be allowed to organise this for themselves as far as possible, but you may wish to set aside a lesson where this can take place, or offer advice which may help in their organisation. They may want to duplicate their questionnaires; you may need to make provision for this.

The groups are responsible for selecting and providing the equipment that they need but it would be useful if you have the following items available in case they are needed.

For posters

- large sheets of paper
- coloured pens.

For oral presentations

- an overhead projector, pens and acetates.

For a radio show

- a tape recorder and blank tapes.

### Related assessment criteria

This stage offers students the opportunity to show that they can

- present a summary of research data in a clear, organised way
- draw sensible conclusions from a collection of research data
- take an active part in compiling their own reports.

### Stage 3 Carrying out your research



In this stage, your group will carry out your final plan, and prepare a consumer report on your chosen item.

You will need to

- collect and organise your data,
- decide how to present your report,
- complete your final report.

STAGE 3

**Collecting and organising the data**

As a final check, answer the questions below that apply to your group, then carry out your final plan.

■ If you are doing a classroom survey, ask yourself . . . 1



- Will we interview people one at a time or duplicate a questionnaire? Why?
- How will we share the work out among us?
- How will we record what we find out?
- Which people should we ask?
- What do we expect to find out?

■ If you are doing a classroom experiment, ask yourself . . . 2

- How many varieties are we testing? Which are they?
- Does everyone know what they are supposed to bring and what they are doing during the experiment?
- Who are the 'guinea pigs'?
- How are we organising the experiment to avoid chaos and mess?
- What do we expect to find out?
- How will we record the results?



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STAGE 3

■ If you are visiting some local shops, ask yourself . . . 3



- Which shops are we visiting?
- Who is going? When are we going?
- What do we need to take with us?
- Can we share the work out?
- What information do we need to find out? How will we write it down *in the shop*?
- Are we sure that the shops have our item in stock? Could we check?
- Would it be easier to phone?

■ If you are making phone calls, ask yourself . . . 4

- How can we find the number?
- Who will make the calls?
- What exactly will we say? Shall we write it down? Shall we practise on each other?
- How will we write down what they say? Can we use tables or charts?
- When should we phone? When is it cheapest?



■ If you are using consumer reports, ask yourself . . . 5



- Could we ring up the library to see if they stock consumer reports?

Now carry out your plan 6

20

**Purpose**

To encourage students to check their plans carefully and then implement them.

**Presentation**

Group discussion followed by group and class activities.

**Suggestions and comments**

Introduce Stage 3 by asking groups to make sure that they read the checklists on pages 19 and 20 that are relevant to their plan. You may need to hold a class discussion to sort out some of the details.

1 Tell the class about any methods for duplicating questionnaires that are available within the school.

2 If several groups are carrying out experiments, the class will need to discuss how this will be organised. If the class is small then you may wish to use another class as 'guinea pigs'.

3 Although students could carry out a shopping survey in their own time, it is more motivating if you can arrange a trip during school time, if this is convenient.

4 Some students find using the telephone surprisingly challenging. Many have never had the experience of telephoning a complete stranger and they lack confidence.

5 The local library is likely to have 'Which?' Reports, and other special interest magazines, but as we have said, they usually contain reports on more expensive items aimed at the adult market.

6 After groups have checked their plans, they should begin to implement them. As they do this, emphasise that each group should try to work together to produce a coherent piece of work and that individuals must maintain an overall understanding of what their group is doing.

STAGE 3

**Deciding how to present your consumer report**

You can present your report in many ways.  
You could produce

- a written report,
- a poster,
- an oral presentation with written handouts,
- a taped radio show with written handouts.

Decide which of these methods you will use.

21

**Purpose**

To encourage students to consider alternative methods of presenting reports and then to choose the most appropriate.

**Presentation**

Group discussion.

**Suggestions and comments**

The students should be aware that their reports are going to be presented to at least their class, if not a wider audience. They should therefore attempt to make them as informative, interesting and attractive as possible. You may like to refer them back to the 'Drink-ing Orange!' written report and the audio tape for ideas.

At this stage it is worth considering the possibility of producing a class magazine. If the class wish to do this then it may influence choices and styles of presentation. Students who have difficulty in producing a lot of written material should be encouraged to consider the other three modes of presentation. Students do not need to be restricted to just one mode.

STAGE 3

**Completing your consumer report**

Your report will need to include

- Your research aims,
  - what were you trying to find out?
- Your research methods,
  - how did you gather and organise your information?
- A summary of your data,
  - can you make this clear with pictures, tables, charts, graphs etc?
- Your conclusions,
  - what answers did you find to your questions?

Share out this work among your group.  
If you are giving an oral presentation or making a tape recording, then have a run-through to make sure that your report is clear, interesting and won't take too long.

Be prepared to answer questions about your report from the rest of the class.

22

**Purpose**

To encourage students to present their consumer reports in an original way.

**Presentation**

Group work.

**Suggestions and comments**

Go through the list on page 22 and encourage students to share out the preparation of the report among the members of their groups. Try to make sure that all students are fully involved and that resources are available for visually attractive material to be produced.

Emphasise to students that their presentations should be clear, well organised, interesting and represent the collective views of the group. If groups are planning to make oral presentations, encourage them to rehearse fully beforehand.

## Assessment tasks for Stage 3

These two assessment tasks should help you to decide whether or not students can

- (vii) present a summary of research data in a clear, organised way
- (viii) draw sensible conclusions from a collection of research data
- (ix) take an active part in compiling their own reports.

### Stage 3 Assessment task 1

The students' own consumer reports may be used to help assess if students can satisfy all three criteria.

### Stage 3 Assessment task 2

This may also be used to help assess if a student can satisfy criteria (vii) and (viii).

## Cheese flavoured crisps

A group of students\* have done an experiment to see which of four brands of cheese flavoured crisps taste most 'cheesy'. They blindfolded 19 people and asked them to taste each kind of crisp and then rate it on a scale of 0 to 4. 0 means *no* cheese flavour and 4 means that there is a *very strong* cheese flavour.

Here are their results.

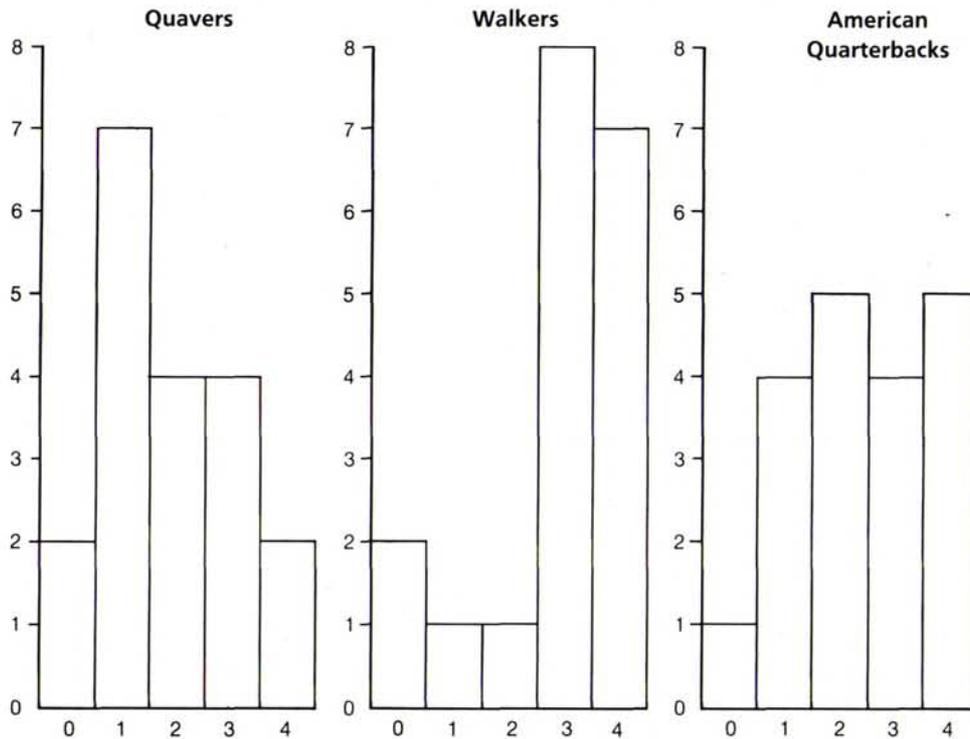
Brand Name	Quavers (cheese)	Walkers (cheese and onion)	'American Quarterbacks' (cheese)	Stix (cheese and onion)
Akhmed	1	3	4	2
Arfan	2	3	1	2
Barry	2	4	1	2
Scott	1	3	2	3
Kevin	1	4	1	3
Shafique	2	3	3	0
Leighton	1	4	4	3
Rehman	3	4	1	4
Yasmin	1	3	2	4
Louise	0	0	0	0
Attia	3	4	3	2
Sarah	1	3	2	1
Rani	4	3	4	3
Anne-marie	4	4	2	3
Kirstie	0	4	4	0
Lisa	3	3	3	4
Malcolm	3	2	4	1
Eileen	2	0	3	3
Eric	1	1	2	0

\*These results were taken from a survey conducted by a group of students at Sandfield School, Nottingham. The project team in no way endorses any conclusions obtained from the data.

Stage 3 Assessment task 2 (continued)

### Cheese flavoured crisps (continued)

The students decided to present their results using bar graphs.



How 'cheesy' the crisps tasted.

- (a) Draw a similar graph for the Stix crisps.
- (b) Using a table like the one below, rank the four brands in order of 'cheesiness'.

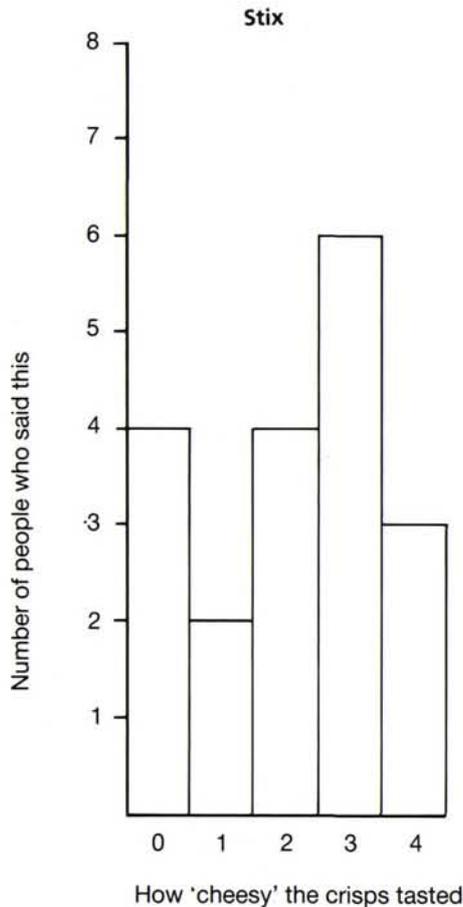
Most 'cheesy' →	a. _____
	b. _____
	c. _____
Least 'cheesy' →	d. _____

- (c) Explain the method you used for part (b).

## Some solutions to the assessment tasks for Stage 3

### Stage 3 Assessment task 2

Part (a). The remaining bar graph is as follows:



Parts (b), (c). The brands may be ranked in several ways depending on which method is used.

For example

- Calculating the mean ranking for each brand gives 1. Walkers (2.9), 2. American Quarterbacks (2.4), 3. Stix (2.1), 4. Quavers (1.8).
- Calculating the median ranking gives 1. Walkers (3), 2. the others all tie with a median ranking of 2.
- Counting the number of 4s for each brand gives, 1. Walkers (7), 2. American Quarterbacks (5), 3. Stix (3), 4. Quavers (2).
- Counting the number of 0s for each brand gives 1. American Quarterbacks (1), 2. Walkers and Quavers (2), 4. Stix (4).

When marking, check that the ranking is consistent with the explanation.

## Stage 4 Presenting and evaluating the reports

### Introduction

In this final stage, groups present their reports to the rest of the class which then offers constructive criticisms. Groups then try to improve their reports in the light of these comments.

### Total time needed

This will depend on the number of groups involved and on the nature of their reports. After all the reports have been presented, 15 to 20 minutes should be made available for groups to make improvements to their own reports.

### Organisation and equipment needed

You will need to organise the circulation of the written reports, arrange wall space for posters and a timed running order for oral and taped presentations.

Each student will need

- an 'Evaluating a report' sheet for each report presented, including his or her own (M31).

### Related assessment criteria

This stage offers students the opportunity to show that they can

- (x) evaluate a report and suggest improvements to it.

**Stage 4 Presenting & evaluating reports**



In this stage, each group will present its report to the rest of the class.

You will

- read and listen to each report, ask questions and evaluate it,
- evaluate your own report in the light of comments made by other groups.

---

23

STAGE 4

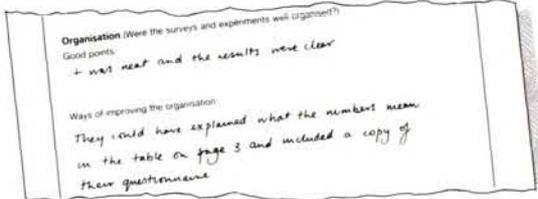
**Evaluating other groups' reports**

As you read or listen to a report, think . . .



Was the report clear and interesting?  
Were the surveys and experiments well organised?  
What can you learn from the report?  
How could the report be improved?

Afterwards, note down your opinions on an 'Evaluating a report' sheet.



**Evaluating your own report**

Read through all the comments that other people have made about your report. Underline the comments you agree with. Fill in an 'Evaluating a report' sheet about your own report, and, if you can, try to improve your report.

Now that all the reports are finished, think how you might use them . . .

Let's produce a consumer magazine for the school.



**Purpose**

To encourage students to comment on each consumer report, and then to improve their own in the light of the comments made by other students.

**Presentation**

Group presentations to the rest of the class, followed by group discussions, then individual work.

**Suggestions and comments**

Go through the questions at the top of page 24 before groups present their reports. After each report has been presented ask the groups to discuss the report before filling in an 'Evaluating a report' sheet. Make it clear that students should write down their own opinions and that their comments should be constructive.

When every report has been presented, groups should be given the opportunity to improve their own reports in the light of other people's comments.

Finally, it would be valuable to conduct a class discussion on ways in which the reports may be used. For example, they may be

- collected into a 'Shrewd Chooser' magazine for distribution among members of the school, parents etc.,
- sent to manufacturers, newspapers or special interest magazines etc.,
- filed in the school library or used to construct a database for future reference.

These activities will enable the class to appreciate the value and relevance of what they have done, and may involve collaboration with other departments within the school.

The students may also like to spend time discussing how their future consumer decisions may be affected by the work they've done.

## Assessment task for Stage 4

Criterion (x) states that a student has shown that he or she can  
(x) evaluate a report and suggest improvements to it.

This criterion may be assessed by either of the two activities on page 24 of the Student's Booklet, where students are asked to fill in a copy of the 'Evaluating a report' sheet (M31):

STAGE 4

### Evaluating a report

Title of report being evaluated \_\_\_\_\_

This sheet filled in by \_\_\_\_\_

**Presentation** (Was the report clear and interesting?)

Good points:

Ways of improving the presentation:

**Organisation** (Were the surveys and experiments well-organised?)

Good points:

Ways of improving the organisation:

**Communication** (What did you learn from the report?)

**Suggestions for further improvements**

BE A SHREWD CHOOSER

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M31

# 2

## Developing the Mathematics

### Introduction

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Which skills may be developed?	55
How and when may they be introduced?	56

### Some sample ideas

Logic, classification, decision trees	58
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# Developing the mathematics

## Introduction

While students are working on this module, *their* main objective is to produce an interesting and useful consumer report, not to develop particular mathematical techniques. The mathematics is used as a tool to facilitate this process and is not seen as an end in itself. You may, however, wish to use the many opportunities provided by the module to motivate the learning of mathematical techniques in a more explicit way. This chapter offers a few ideas on how this may be achieved without destroying the essential flow of activities contained in the module.

## Which skills may be developed?

The table below illustrates a few of the mathematical topics related to the context of this module. This list is not intended to be exhaustive because different mathematical techniques will be found appropriate for different types of consumer research. Research on choosing a holiday will make different mathematical demands on students than, say, research on choosing a breakfast cereal.

Some mathematical topics	Examples in the context of the module
<p><i>Money</i></p> <ul style="list-style-type: none"> <li>■ Carrying out monetary comparisons and calculations</li> </ul>	<p>Deciding which of two purchases is the most economical. For example, a 'family pack' of crisps (containing 6 bags) at 80p or individual bags at 15p.</p>
<p><i>Measurement</i></p> <ul style="list-style-type: none"> <li>■ Understanding and using everyday measures of length, weight, capacity etc.</li> </ul>	<p>Dealing with quantities measured in centimetres, inches, kilograms, pounds, litres, pints and so on. (This occurs throughout the module.)</p>
<p><i>Percentages</i></p> <ul style="list-style-type: none"> <li>■ Understanding and using percentages.</li> </ul>	<p>Special offers usually give reductions in percentage terms. Comparing methods of payment for more expensive items, (cash, credit cards etc.) possibly leading to comparisons of interest rates.</p> <p>Presenting data in terms of percentages in Stage 3. (30% of people prefer . . .)</p>
<p><i>Statistics</i></p> <ul style="list-style-type: none"> <li>■ Making and testing conjectures.</li> <li>■ Designing and conducting surveys and experiments.</li> <li>■ Collecting and sorting data in a systematic way.</li> </ul>	<p>The work of Stages 2 and 3, where students prepare and carry out their own research activities, present many opportunities for statistical work.</p>
<p><i>Graphical and other representations</i></p> <ul style="list-style-type: none"> <li>■ Presenting information in written, tabular or diagrammatic forms.</li> <li>■ Interpreting data presented in different forms.</li> </ul>	<p>Inventing and developing appropriate ways of presenting data in Stages 2 and 3.</p> <p>Interpreting data in Stages 1, in the 'Drinking Orange' report, and in Stage 4 where students read and evaluate reports prepared by other groups.</p>
<p><i>Ratio and proportion</i></p> <ul style="list-style-type: none"> <li>■ Comparing rates (price per kilogram, price per litre and so on).</li> </ul>	<p>Deciding, for example, whether or not a larger carton of orange juice gives better value than a smaller carton, in Stage 1.</p>

### How and when may they be introduced?

Mathematical activity may be initiated either by the student or by the teacher. For example:

- a student may become aware of the need to acquire a particular skill in order to complete her consumer report. 'What is the best way to present this data? Should I draw a pie chart, bar chart or what?'
- you may wish to use some ideas from the module to support a more intensive piece of work on a particular topic. 'Today, we are going to look at the topic of ratio, using the shopping surveys you carried out. Which type of chocolate gives you most for your money?'

The first type of situation can lead to an invaluable learning experience because the student wants to know something. Such opportunities occur rather unpredictably, however, and it is inadvisable to spend a great deal of time helping one person if you have a large class to supervise. One possible solution is to ask the student to describe the problem to the whole class and invite help and advice from other students.

Do not expect students to use, autonomously, mathematics that they have only recently been taught. There is a gap, typically of several years, between first 'learning' a skill and being able to use it with flexibility and fluency. Students will tend only to use skills that they have mastered. (Narrowing this gap requires a more 'rounded' approach to learning, with a variety of applications and non-routine problem solving to supplement and give meaning to technical exercises.)

Teacher-initiated work on mathematical techniques relating to the theme may occur before, during, or after working on the module.

*Before:* 'I'll give them some practice at drawing pie charts now, so that they will be more inclined to use them later on, when they begin work on the module.'

This timing has the advantage that the student will, if all goes well, have techniques polished and ready to be used, but it may seem artificial to learn a new technique before seeing a need for it. Students may tend to assume that the module is merely a vehicle for practising some specific techniques, rather than to develop their autonomy in problem solving.

*During:* They seem to be having difficulty in organising their data. We'll take a break from the module for a few lessons and do some work on this together, using data that I'll provide'.

This timing enables you to respond to needs as they arise, but if students always expect you to produce the method or solution when they are going gets difficult, you may reinforce dependence and undermine autonomy. If this is done too often on a class basis then the work on the module may tend to drag on over many weeks and become boring.

*After:* 'When we have finished the module, we will look at the techniques we have used in greater depth'.

The experiences of working on the module may motivate students and enable them to perceive the value of techniques when they are taught. Students may still not be able to use techniques autonomously unless they are given further opportunities to apply them in other real problem solving contexts.

Whatever you decide, it is important to be vigilant about preserving the students' strategic control of their work on the module: it is too easy to allow them to revert to the imitative role that the traditional curriculum encourages.

## **Some sample ideas**

On the following pages we offer a few ideas for developing mathematical tasks on the theme of consumer decisions. In their present form, these ideas may be too open or difficult for some students and may need some further development before you can use them. We hope that they stimulate some more ideas of your own.

Logic, classification, decision trees

# Which hobby?

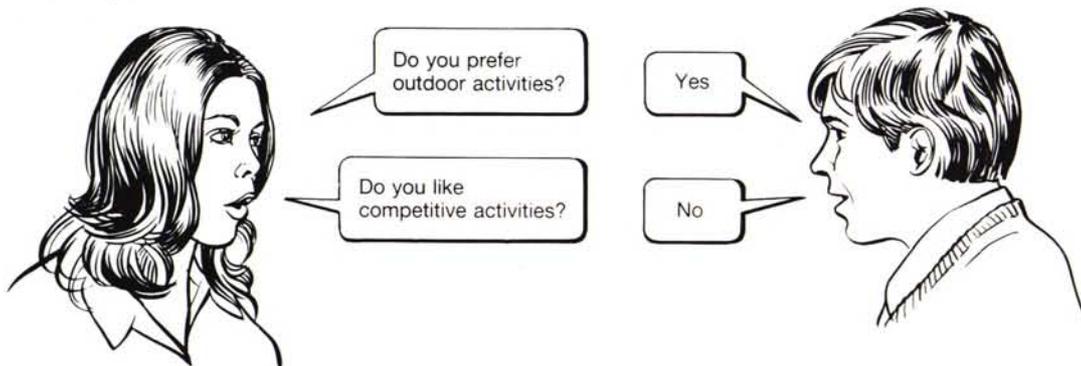


Eric has a big choice. Among other things, he could try

- |               |                  |                              |                     |
|---------------|------------------|------------------------------|---------------------|
| Acting        | Crafts           | Karate                       | Sailing             |
| Archery       | Cricket          | Knitting                     | Sculpture           |
| Badminton     | Dancing          | Model making                 | Singing             |
| Bell ringing  | Darts            | Music                        | Skiing              |
| Bird watching | Fishing          | Needlework                   | Snooker             |
| Bowling       | Flower arranging | Painting                     | Squash              |
| Bridge        | Football         | Parachuting                  | Swimming            |
| Camping       | Golf             | Photography                  | Table Tennis        |
| Canoeing      | Hang gliding     | Playing a musical instrument | Walking             |
| Carpentry     | Hockey           | Pot holing                   | Watching Television |
| Chess         | Horse riding     | Reading                      | Weight lifting      |
| Collecting    | Jogging          | Rock climbing                | Windsurfing         |
| Cooking       | Judo             | Rugby                        | Yoga                |

Your task is to prepare an interview which will quickly and efficiently enable you to suggest suitable hobbies to people like Eric. Your interview questions should only require answers of 'Yes' or 'No'.

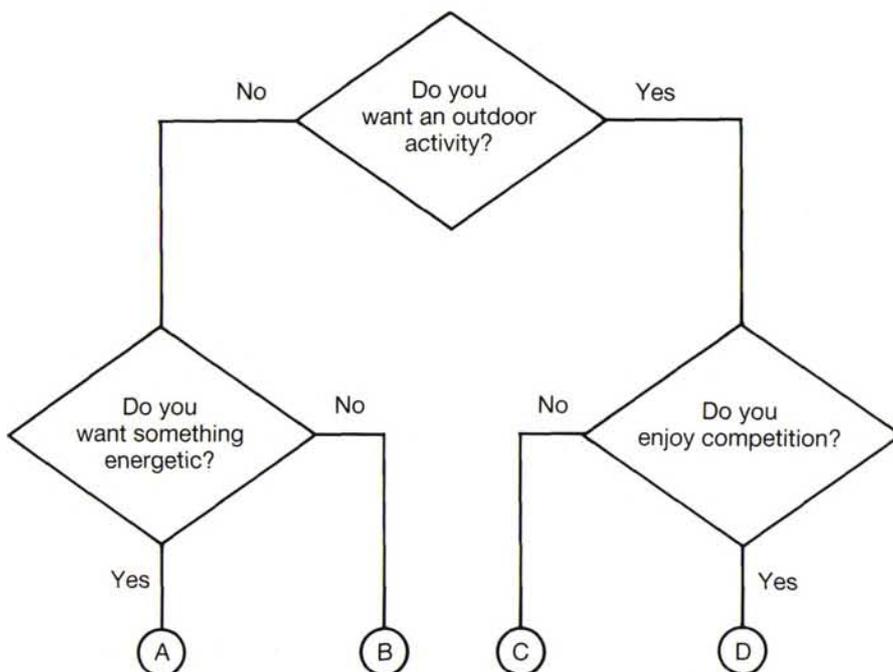
For example:



When you have devised an interview, you could try putting it onto a computer, so that the computer can do the interviewing and advising.

Students could begin planning this task by writing the 52 activities onto cards (supplemented with ideas of their own). They could then take turns at interviewing each other, asking questions which may only be answered 'Yes' or 'No'. After each reply the cards are sorted, putting to one side those that do not fit the requirements of the interviewee.

This should enable them to develop a decision tree. For example,



This tree would successfully distinguish between badminton, chess, parachuting and hockey, but further questions would be needed to distinguish, say, sculpture from watching television or windsurfing from pot holing.

Some students may enjoy the challenge of transferring their decision trees onto the computer so that the computer now does the 'interviewing'.

Other contexts could be used, for example, a computer 'identikit' for distinguishing between the students in the classroom, or a computer 'dating' agency . . . !

(The computer program 'SEEK' may also be used to build decision trees. It is included in Module 4, 'Building your ideas' in the *Micros in the Primary Classroom Series*, Longman 1983.)

Handling data

### Testing a new product

A manufacturer is testing a new deodorant. She has created two possible fragrances, A and B, and two possible names for the fragrances, 'Bouquet' and 'Hunter'. She decides to conduct an experiment to see which combination of fragrance and name people prefer.

40 people are asked to sample a small amount of the deodorants, sprayed from 4 cans. Each person takes a break for 10 minutes between smelling deodorants, so that they do not become confused.



(They are *not* told that 'Bouquet A' and 'Hunter A' both contain exactly the same fragrance, A, or that 'Bouquet B' and 'Hunter B' both contain the same fragrance, B.)

Each person is asked to fill in a sheet, ticking a box to show how he or she feels about each of the four deodorants.

Sex     M    

Bouquet A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Bouquet B	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Hunter A	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hunter B	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

(For example, this person is male. He hates Bouquet A, thinks Bouquet B is wonderful, that Hunter A is average and Hunter B is quite nice.)

The results from the experiment will be given to you. What conclusions can you draw?

### Results of the experiment

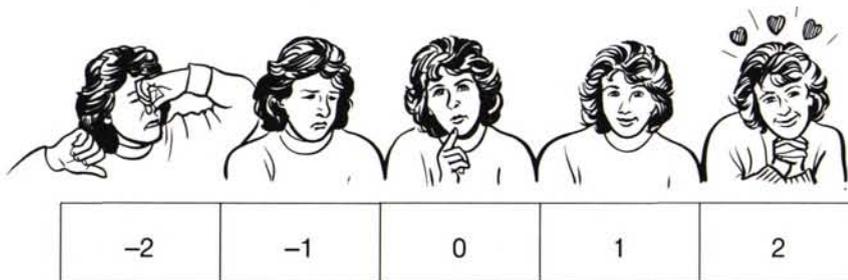
These are cut out from the four data sheets M34-37.

A grid of 40 data sheets, each representing a different experimental condition. Each sheet includes a title for the sex (e.g., M, Female, Male, F, M, MALE, male, Female, female, F, female, M, female, Female, female, F, male, female, female, male, F, female, male, F, female, M, female, Male), a drawing of four children, and a table with columns for Bouquet A, Bouquet B, Hunter A, and Hunter B, and rows for Bouquet A, Bouquet B, Hunter A, and Hunter B. Checkmarks are placed in the cells to indicate results.

Sex: <b>M</b>	Sex: <b>M</b>	Sex: <b>Male</b>	Sex: <b>Female</b>
Sex: <b>Female</b>	Sex: <b>M</b>	Sex: <b>Female</b>	Sex: <b>MALE</b>
Sex: <b>F</b>	Sex: <b>m</b>	Sex: <b>MALE</b>	Sex: <b>male</b>
Sex: <b>Female</b>	Sex: <b>M</b>	Sex: <b>Female</b>	Sex: <b>Female</b>
Sex: <b>Female</b>	Sex: <b>female</b>	Sex: <b>Male</b>	Sex: <b>F</b>
Sex: <b>M</b>	Sex: <b>F</b>	Sex: <b>male</b>	Sex: <b>Female</b>
Sex: <b>female</b>	Sex: <b>male</b>	Sex: <b>Male</b>	Sex: <b>f</b>
Sex: <b>Female</b>	Sex: <b>Male</b>	Sex: <b>female</b>	Sex: <b>male</b>
Sex: <b>male</b>	Sex: <b>FEMALE</b>	Sex: <b>male</b>	Sex: <b>F</b>
Sex: <b>female</b>	Sex: <b>M</b>	Sex: <b>female</b>	Sex: <b>Male</b>

This problem requires students to sort through a large amount of data, and represent them in a form which will enable conclusions to be reached. It is helpful if students work collaboratively in small groups of 3 or 4 and the 40 tables of data are cut out and presented in an envelope to each group. Students can then try to organise the sheets in various ways, distributing tasks among the members of their group. For example, in a group of 4 students, two could be working on the female data while two work on the male data; one student from each pair reading out results while their partner keeps a tally, and so on. They will also need to keep track of which pieces of data they have used, perhaps by allocating a number to each response. The following approach shows just one of the many ways the data could be analysed. It should not be seen as prescriptive.

On the next page, we have drawn bar charts to show how many people gave each rating to each product. The pictorial ratings have been represented by the numbers -2, -1, 0, 1, 2 as shown below:



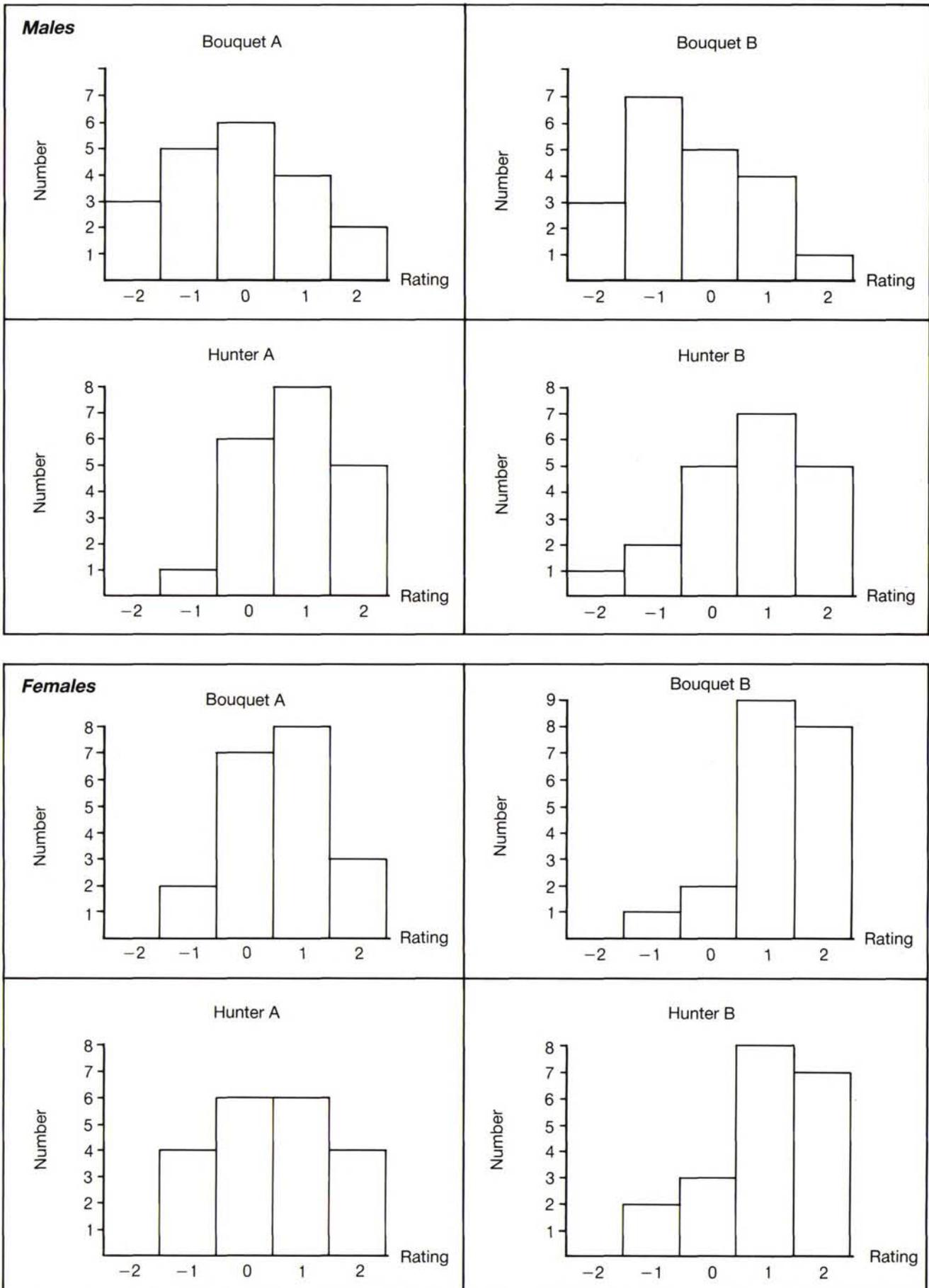
This enables a mean rating to be calculated for each product, giving

		Males		Females	
		Fragrance		Fragrance	
		A	B	A	B
Name	Bouquet	$\frac{-3}{20}$	$\frac{-7}{20}$	$\frac{12}{20}$	$\frac{24}{20}$
	Hunter	$\frac{17}{20}$	$\frac{13}{20}$	$\frac{10}{20}$	$\frac{20}{20}$

Thus it may be seen that the males seem to be more affected by the name than are the females, preferring 'Hunter'. There also appears to be a slight preference for fragrance A.

The females appear more able to distinguish the fragrance, preferring B, while there is also a slight preference for the name 'Bouquet'.

The significance or otherwise of these results, could be tested by more sophisticated statistical methods (a chi-squared test for example), but the above level of analysis will be sufficient for most students.



Graphs, depreciation, interest rates

## Renting or Buying a television



You could rent this set, sir, for £17.98 per month . . .

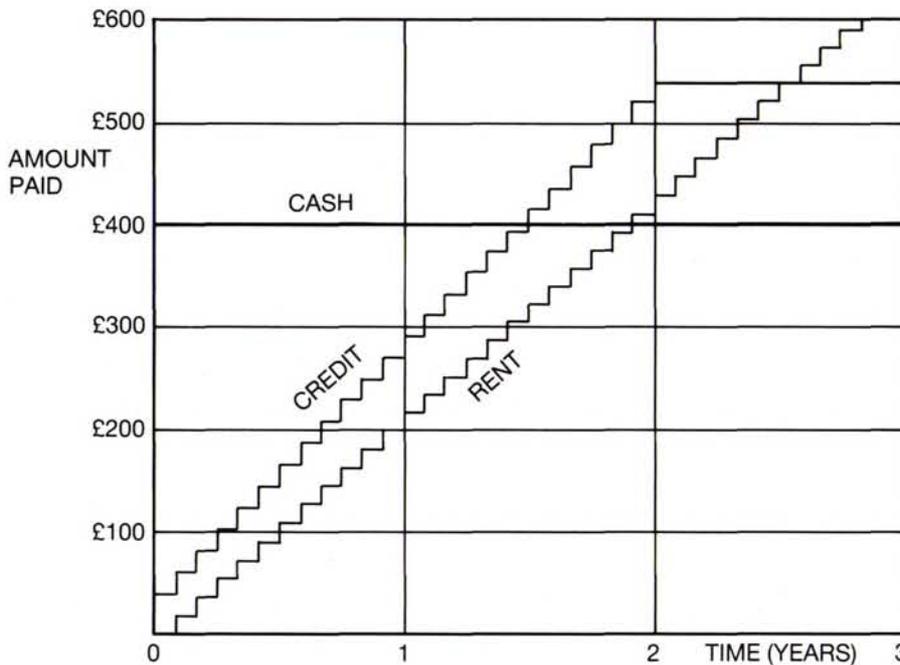
or, you could buy it for cash, which will cost you £399.99 . . .

or you could buy the set using our excellent credit arrangement: 10% deposit then £20.80 each month for two years . . .

- Compare the different ways of paying.
- Which would you advise the customer to choose? Why?
- What other information would you need to know?

M38

There are many levels at which this activity may be explored. (We shall examine it somewhat more deeply than most students would be capable of!) Comparing the methods of repayment directly . . .



This graph shows how, after 18 and 23 months respectively, credit and rental repayments overtake the original cash price, and after 2½ years the rental repayments surpass the credit repayments (which have already ceased).

Such an analysis is over-simplistic, however. Students may notice that we have failed to take many factors into account; i.e. that

- (i) you end up *owning* the set when paying by cash or credit, whereas with rental you do not.
- (ii) the value of the TV set is depreciating.
- (iii) the money tied up in the repayments could have been earning interest in, say, a building society.
- (iv) there may be some inflation.
- (v) the costs of guarantees and repair bills have not been included.
- (vi) you can easily exchange a rented TV set for a more up-to-date model.

We can deal with (i) and (ii) fairly easily if we assume that the television is sold after two years and that in this time its value has fallen by 33% in the first year and 25% in the second (making 50% altogether). (These assumptions are consistent with those quoted in 'Which?' January 1981)

Thus, after 2 years

<i>Cash</i>	Total cash repayment	£399.99
	– resale value of set	£200.00
	Total cost	<u>£199.99</u>

<i>Credit</i>	Total cash repayment	£539.19
	– resale value of set	£200.00
	Total cost	<u>£339.19</u>

<i>Rental</i>	Total repayments	£431.52
---------------	------------------	---------

This model makes paying by credit more attractive than rental over 2 years. Most students should be able to reach this stage.

The loss of interest calculations ((iii) above) are more complex, and will be beyond all but the most able. Suppose, for example, that all the money used to pay for the television was instead invested in a building society, earning interest at an annual rate of 10%.

*Cash*

After 2 years, the £399.99 would have risen to £483.99, earning £84 interest.

The credit and rental calculations need the following result:

Growth of money invested monthly

If £ $m$  is invested at the end of each month at  $i\%$  per month then, putting  $r = (1 + \frac{i}{100})$ , at the end of

month 1	there will be	£ $m$
month 2	there will be	£ $mr + \text{£}m = \text{£}m(1 + r)$
month 3	there will be	£ $m(1 + r)r + \text{£}m = \text{£}m(1 + r + r^2)$
⋮		
⋮		
⋮		
month $n$	there will be	£ $m(1 + r + r^2 + \dots + r^{n-1})$
		or £ $m \frac{(r^n - 1)}{(r - 1)}$

(In the case of 10% interest per year,  $i = 0.8$  and  $r = 1.008$ )  
 (Note:  $1.008^{12} = 1.1003 \dots \approx 1.1$ )

*Credit*

After 2 years the £39.99 deposit would have risen to £48.39.

The total of the saved monthly payments would be

$$\frac{20.80(1.008^{24} - 1)}{(1.008 - 1)} = \text{£}547.94$$

$$\begin{aligned} \text{The total interest earned} &= \text{£}(547.94 + 48.39) - (499.20 + 39.99) \\ &= \text{£}57.14 \end{aligned}$$

*Rental*

After 2 years the total of the saved monthly payments would be

$$\frac{17.98(1.008^{24} - 1)}{(1.008 - 1)} = \text{£}473.65$$

$$\text{The total interest earned} = \text{£}473.65 - 431.52 = \text{£}42.13$$

Our model may now be updated to read:

*Cash*

Total cash repayment	£399.99
Loss of interest	£ 84.00
	£483.99
– Resale value of set	£200.00
Overall cost	£283.99

*Credit*

Total cash repayment	£539.19
Loss of interest	£ 57.14
	£596.33
– Resale value of set	£200.00
Overall cost	£396.33

**Rental**

Total cash repayment	£431.52
Loss of interest	£ 42.13
Overall cost	<u>£473.65</u>

Thus cash is still preferable to credit, although the credit interest rate stated in the above example (39.2% APR) is very high compared with, say, other credit cards or bank loans. If cheaper methods of borrowing were used, there may be little to choose between paying by cash or credit. The rental charges still seem high, although the 'free' repair charges and facilities for exchanging sets may offset this somewhat.

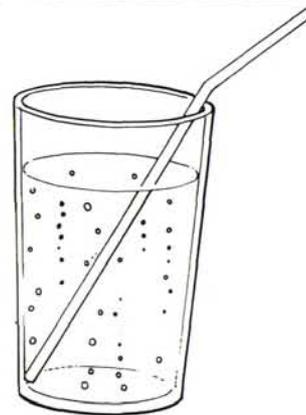
**Statistical significance, simulation****Cola tasting**

Try setting up a small experiment to see if people tell any difference between Pepsi Cola and Coca Cola:

Blindfold members of your class and give each person three glasses of drink to taste; two containing Pepsi and one containing Coke.

Ask each person to identify the odd one out.

- What conclusions can you draw from your results?
- Suppose that, in another experiment, 12 class members tasted the drinks and no-one could tell the difference, everyone just guessed at the 'odd one out'. How many would be expected to guess correctly?
- If 12 people tasted the drinks and 7 correctly identified the odd one out, what conclusion could you now draw?

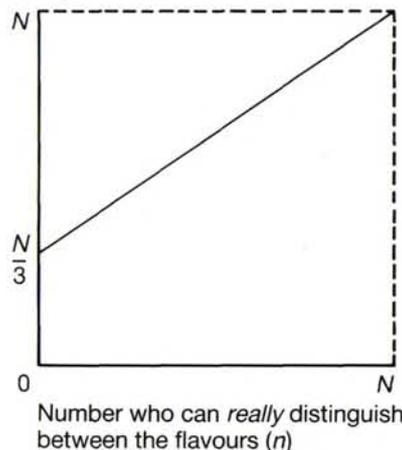


M38

This problem illustrates how a practical consumer experiment can lead to important statistical ideas. Suppose  $N$  people are asked to taste the drinks,  $n$  of whom can really distinguish between the flavours. We would expect  $n + \frac{1}{3}(N-n) = \frac{1}{3}(2n + N)$  to correctly identify the odd one out.

( $\frac{1}{3}(N-n)$  of these would be expected to answer correctly by chance.)

Number correctly identifying the odd one out

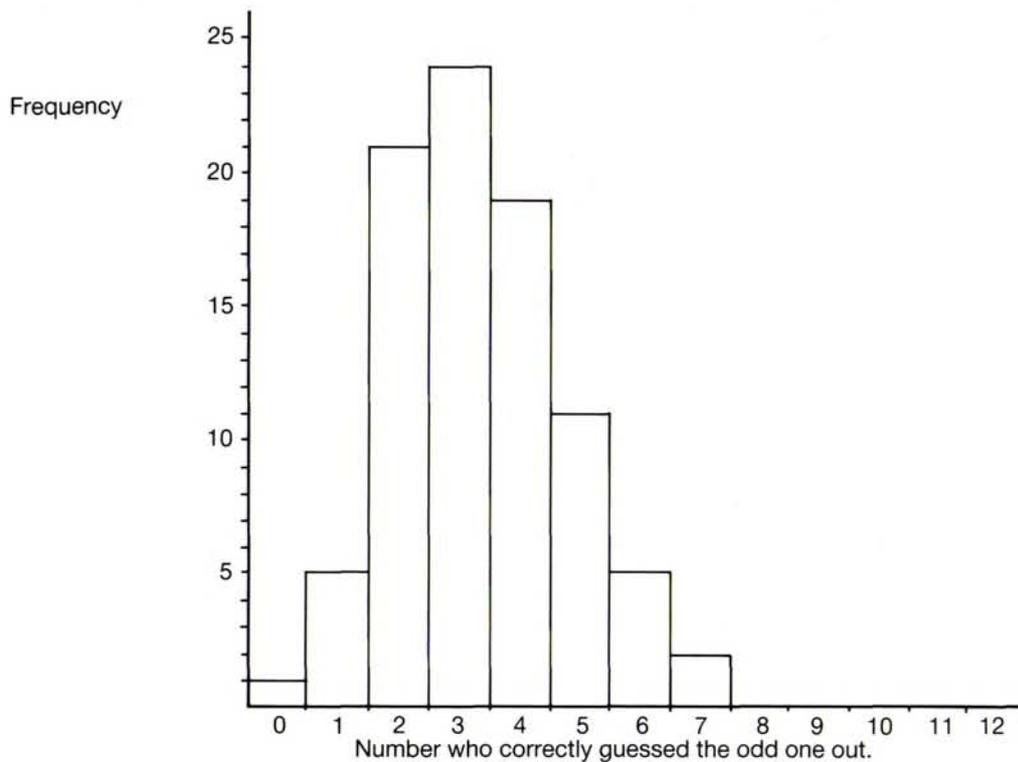


Students may like to simulate the situation where all the experimental subjects just guess randomly, using a die or maybe a computer.

If the die reads, for example,  $\square$  or  $\blacksquare$  then we could say that the person has correctly identified the odd one out. In this way, students could simulate what would happen if the taste experiment was repeated many times.

Experiment	Results of 12 throws	Number who correctly guessed the 'odd one out'
1	4, 3, 3, 6, 2, 1, 5, 4, 5, 3, 1, 4	3
2	2, 5, 4, 1, 5, 3, 4, 1, 4, 1, 6, 4	4

If, say, 25 students share this work out, producing 4 simulated experiments each, the results may be aggregated together graphically on the board, and this graph could be used to calculate experimental probabilities of various outcomes (this enables, for example, an answer to question (c) to be obtained.)



The theoretical distribution obtained is Binomial, where the probability of  $r$  people correctly guessing the odd one out is given by

$$P(r) = {}_{12}C_r \left(\frac{1}{3}\right)^r \left(\frac{2}{3}\right)^{12-r} = \frac{12!}{r!(12-r)!} \left(\frac{1}{3}\right)^r \left(\frac{2}{3}\right)^{12-r}$$

Thus, the probability of 7 or more people correctly guessing is given by

$$\sum_{r=7}^{12} P(r) \approx 0.07$$

We can therefore be more than 90% certain that if 7 people correctly identify the odd one out, then they were not just guessing.

## Utility – combining different factors

When making choices, there are usually several relevant factors. Cost is often important, but it must be balanced with others such as quality, appearance, convenience and delivery time. Some factors involve 'discrete' alternatives (a camera with or without autofocus, alternative flavours of crisps and so on), while others may lie anywhere in a *continuous* range of values (weight, cost, delivery time and so on). These different factors must be combined somehow, with each being given an appropriate importance in guiding the decision. An obvious example is to calculate the unit cost of a product, thus combining cost and quantity.

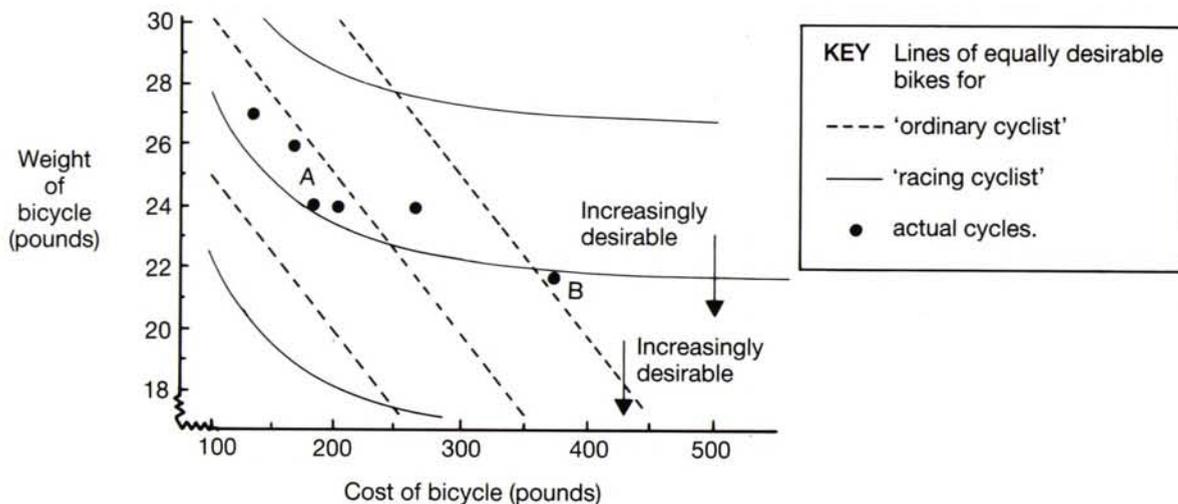
*Discrete factors* may be dealt with in several ways. For example,

- *the overriding choice* – the facility in question is regarded as so important that only those products with it are considered. For example, "I will only look at bicycles with 10 gears".
- *'costing'* – we decide what the facility is *worth to us* and, in comparing examples with or without it, adjust the cost appropriately. It is not easy to decide this added value, which is not usually the same as the extra cost of the facility. Suppose there are a number of similar personal stereos for sale, some with a 'record' facility and some without. We could ask ourselves, "how much more would I be prepared to pay for an otherwise identical stereo with the added facility?" and then compare the adjusted prices directly.

*Continuous factors* may be dealt with in similar ways. Let us use the example of buying a racing cycle.

- It can be turned into a discrete overriding choice. "I won't buy anything that weighs more than 22 pounds."
- A costing can be attached to the 'lightness'. For example, an 'ordinary' cyclist might say "Each pound reduction in weight adds £20 to its value to me". Of course, a 'racing' cyclist may value the very light cycles much more highly.

Graphical methods can help to show this. In the following graph, each line is a 'contour' of constant 'utility' – that is every point on the same line is equally desirable to the person concerned. The dashed lines represent the view we defined above – there is a constant negative gradient of £20 per lb. The solid lines represent the views of a racing cyclist. The dots represent bicycles that can actually be purchased.



From the above graph, we can see that cycle A seems the best choice for the 'ordinary' cyclist defined above, while cycle B seems the best choice for the 'racing' cyclist. The contours of higher utility are those of lower weight and lower cost. This type of model is crude, but it helps us to understand better how different factors interact and the assumptions and implications of our choices.

Able students may like to try sketching utility contours which show a reasonable view of the combination of daily pay, in a Saturday job say, and the travel time to get to and from the job.

# 3

## The Role of Assessment

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# The role of assessment

## Introduction

### Why assess?

You may wish to assess your students' work for a variety of reasons. The style of assessment you use should reflect the purpose it has to fulfil. For example, you may be using the module in the context of an assessment scheme (for example, the JMB Certificate of Numeracy through Problem Solving, GCSE coursework or Records of Achievement), or you may simply want to assess school work, to enable you and your students to recognise their progress.

The purpose will affect the aspects of your students' work that you decide to assess. These include (with examples)

- strategic skills (the ability to plan and design),
- technical skills (the ability to draw graphs and tables),
- social skills (the ability to discuss and listen).

Each of these poses a distinct assessment challenge.

In this chapter, we will focus on ways of assessing and recording

- a student's work within a group setting
- the strategic and technical skills deployed, as referred to in the Introduction (pages T5 and T6).

We include illustrations of students' work based on the assessment tasks which follow each of the four module stages. In addition, we offer examples of two 'examination papers' for students of different ability levels. These papers may be used to help assess your students' retention of skills and their ability to transfer them to unfamiliar situations within the same context. In designing these assessment tasks we have sought to ensure their *curriculum validity*, i.e. that each task should also represent a valuable *learning* activity.

### Assessing a student's work within a group setting

The theme of the module encourages group work, developing each student's ability to discuss, listen and cooperate with his or her colleagues. Such group work will often result in better-planned and more imaginative 'products' than individual students could produce in isolation. Your observation of the groups at work will enable you to note some of the social skills which a student displays. Such skills include

- persistence and attention to detail
- the ability to coordinate the work of the group

- the ability to work well in a team
- the ability to communicate.

These skills are valuable and worth recording whenever you are aware that they are being displayed by a student. It is difficult, however, to assess social skills reliably in this context because students' performances will be affected by the nature of the input from other group members. A student may take an active role in one group, but be overshadowed by a dominant person in another. Merely observing the work of the group as a whole may not give a clear picture of an individual's contribution, acquisition of skills, or understanding of the work of the group.

Thus you may also wish to carry out some form of individual assessment using some combination of the following methods.

- Observation of the students' complete work.

For students who are able to keep a written record of the work that they do, this is likely to be the major method of your assessment. It has the advantage that it can be carried out after lessons thus leaving you free to help students who are unable to produce adequate written records.

- One-to-one discussion with individual students, possibly using a checklist of some kind.

This method is time-consuming, however, particularly with larger classes, and it is difficult to carry out an interview if you are simultaneously trying to supervise the rest of the class.

- Observation of individual students during lessons.

In many cases you are likely to see a student doing something that convinces you that he or she has satisfied a criterion. When groups are working co-operatively, however, group members tend to adopt complementary roles. This means that you are unlikely to see every student displaying every skill involved.

- Students completing a number of specific individual written tasks at stages during the work which reflect their recent group activities.

This has the disadvantages that some skills cannot be assessed in this way, and some students have difficulty in expressing themselves fully in writing, leading to responses which fail to reflect their true abilities.

- Students carrying out self-assessments, which describe those aspects of the group work where they have made particular contributions. Such self-assessments may consist of written notes or the completion of some form of simple checklist.

### Assessing with reference to criteria

The criteria listed below are restatements of the general strategic skills in the context of this module, and have been referred to throughout the classroom materials. Students are given the opportunity to show that they can, in the context of conducting consumer research,

- (i) identify important factors and methods involved in decision-making
- (ii) obtain and interpret information from oral interviews
- (iii) obtain and interpret information from tables and graphs
- (iv) identify possible research aims
- (v) select appropriate research methods
- (vi) devise suitable methods for the collection and organisation of data
- (vii) present a summary of research data in a clear, organised way
- (viii) draw sensible conclusions from a collection of research data
- (ix) take an active part in compiling their own reports
- (x) evaluate a report and suggest improvements to it.

Such criteria assist in providing a useful profile of relative strengths and weaknesses. However, to say that a student has satisfied a criterion, such as 'can identify important factors and methods in decision-making', has little absolute meaning without specifying

- **the context.** The factors and methods involved in choosing a purchase are very different from those involved in choosing a job.
- **the complexity within the context.** Choosing a car is far more complex than choosing a bar of chocolate.
- **the frequency of success.** Has the student satisfied the criterion on many occasions or only once? What proportion of attempts resulted in success?
- **the amount of help given.** How much help did the student receive from the teacher or other group members in understanding and completing the task?
- **the occasion.** When did the student attempt the task? How recently had the student experienced a similar situation?

- **the distance of transfer.** How closely did the task match the student's previous experience?
- **the mode of response.** How did the student respond to the task – in writing or orally?

Thus, if you are basing an assessment on work undertaken on this module alone, you will need to qualify any statements about a student's performance with some additional remarks like 'these abilities have been demonstrated while the student took part in planning and carrying out some small-scale consumer research'.

If, however, students work through a range of extended activities, perhaps corresponding to the range of modules in this series, they are likely to develop the ability to demonstrate similar strategic skills in a variety of different contexts. This will then enable you to make more general statements about a student's ability to satisfy particular criteria.

### Recording students' achievements

You may find it helpful to record your students' successes on a grid like the one shown opposite. The criteria associated with this particular module have been listed across the top, and there are spaces for students' names to be filled in down the side. The criteria are grouped together under the stage at which they are most likely to be satisfied, although they may, of course, be satisfied at other times during the work.

There are many ways of filling in the cells in this grid. You may wish to record only that the student has satisfied or 'passed' a criterion, or you may wish to qualify this by recording, for example, the amount of help that was given and the frequency of success. Thus,

- P may mean 'pass with no help'
- Ph may mean 'pass with a little help'
- PH may mean 'pass with a lot of help'
- PP may mean that a student has 'passed' the criterion on more than one occasion.



You may also wish to record whether a criterion was satisfied by a written or by an oral response. If a student has not yet shown that he or she can satisfy a criterion, we suggest that the cell should be left blank, and the student be given a further opportunity at a later date so that only positive achievement is recorded.

An alternative would be to use a numerical grading system on a 3- or 5-point scale, but there is always a temptation to add such numbers so that a single score is obtained for each student. Although such a result is convenient, it is meaningless and misses the whole point of criterion-referenced assessment.

You may wish to extend your record sheet to allow space for comments concerning social skills that your students have displayed, together with any other particularly noteworthy achievements.

### **Assessing technical skills**

It is relatively easy to test specific technical skills by assessment tasks which are context-free or are set in a context contrived to give an air of realism. Technical skills, however, only become of value in problem solving when they can be deployed readily in the solution of a problem. This requires a student to choose an appropriate technical skill which he or she is confident in using. Thus the technical skill is a means to an end rather than an end in itself.

For these reasons, if technical skills are to be realistically assessed, this should be done in a problem solving context. For instance, Stage 2 assessment task 3 requires students to organise a collection of unsorted data using a table of some kind. This is the kind of context with which they will now be familiar as the task closely mirrors the kind of problem they are likely to have faced when sorting out their own survey data.

### **Using the assessment tasks**

We will now look at the assessment tasks in more detail.

With each task we include

- the related assessment criteria
- examples of students' work to illustrate the type of response which may or may not satisfy particular criteria

The 'satisfactory' responses indicate what we believe is achievable by a substantial majority of 13–16 year old students. You may wish to vary this standard, however, depending on the ability level of your students and the particular assessment approach you are adopting.

**Stage 1 Assessment task 1**

'The Shrewd Chooser Radio Show' – Part 1: People making choices.

**Related criterion**

(i) A student can identify important factors and methods involved in decision-making.

**Required response**

A full solution is given on page T31. It is reasonable to expect that a student can note down at least one factor and one method for each item, in the first two columns of the table.

**Kevin**

STAGE 1

The Shrewd Chooser Radio Show			
Part 1: People making choices			
Name: <u>Kevin Marriott</u>			
Item	Important factors and specifications	How the choice was made	How you would choose a similar item
Suit	because she wanted a light weight suit and a thin one and the colour	She liked it catologes were to expensive	the style and size thickness looks comfortness and try different shops
Notebook	because she wanted a small note book	She liked the picture and it r did not cost much	Cost size I would get one from billy hills WHS
Washing machine	price - 350 pounds one to last her a long time	She went to several shops and looked in her paper	Size looks cost value for money
Record	He went to buy a record and bought a record with no thinking on his birthday	He new what he wanted its his favourite group	What group it is how big the record was
Orange squash	no additives price cheep	Sainsburys and it wont cost as much as Kia Oral quash	how big the bottle is what make it is

M12

Kevin has listened to the radio show carefully and has made a good list of factors, specifications and methods although these do not always appear in the same columns as our solutions. Kevin has therefore satisfied criterion (i).

### Stage 1 Assessment task 2

'The Shrewd Chooser Radio Show' – Part 2: Choosing a pair of training shoes.

#### Related criterion

(ii) A student can obtain and interpret information from oral interviews.

#### Required response

The student should provide a record of the questions and answers produced by his or her own oral interviews. As a guideline, we would expect that most interviews will consist of at least eight questions and responses, at least one half of these questions requiring more than a yes/ no reply. The questions must also elicit informative data.

Sarah

1. How often do you wear trainers?
  2. How long have you had your trainers?
  3. What factors are important to you?
  4. do you buy trainers that are liked by your friends?  
why?
  5. Why did you pick these kind of trainers?
  6. does the brand of the trainers matter to you?  
why?
  7. How long do your trainers last? why?
  8. do your parents mind about the cost?
- 
1. every day.
  2. 3 months
  3. Cost style) Reebok puma addidas.
  4. Buys trainers that he likes.
  5. Comfort name (Blue colour).
  6. Brand names dont matter.
  7. last about 1 year (walk climb.)
  8. yes/ £30 |

Rani

- 1, If you saw some trainers that was £35.00 and then saw some more ~~that~~ alike and they were £20.00 would you buy the cheapest? Yes
- 2, If you saw some nice trainers in the first shop would you still go and look in a another? yes
- 3, does it matter which shop you go in and by buy you trainers from? Yes
- 4, have you got a pair of trainers? Yes why did you pick that pair? because I liked them

Sarah's interview has been quite successful. Her questions are generally well-designed and have succeeded in eliciting useful information. Therefore, she has satisfied the criterion. Rani, on the other hand, has produced a very poor interview which fails to satisfy the criterion. Her questions are insufficient in number, are mostly hypothetical, require mainly yes/no answers and elicit little information of value. Rani should be asked to reflect on her interview then be asked to invent further, more interesting questions which perhaps start with words like 'When . . .', 'How . . .', 'What . . .' and so on.

**Stage 1 Assessment task 3**

'The Shrewd Chooser Radio Show' – Part 3: Drinking orange! – some conclusions.

**Related criterion**

(iii) A student can obtain and interpret information from tables and graphs.

**Required response**

Students are asked to complete a copy of the 'Drinking orange! – some conclusions' sheet for this task. The conclusions they enter on the sheet should be drawn from those listed on pages T32 to T34. Some of the data require fairly sophisticated levels of interpretation which will be beyond the capabilities of many students. Most students, however, should be able to draw some conclusions from the first two parts of the report: the Shopping survey and the Classroom survey.

A suitable, minimum, requirement might be as follows.

Part 1 The Shopping survey: The student lists different, valid conclusions under at least 3 of the 4 given headings.

Part 2 The Classroom survey: The student appreciates at least two features, good *or* bad, of the questionnaire, and must list different valid conclusions to at least 4 of the 5 different research questions.

**Russell****Part 1: The Shopping survey**

Write down one conclusion under each heading:

Orange 'drinks' *The most economical way of buying orange drink is Sainsbury sugar-free orange drink*

Orange 'squashes' *The most economical way of buying squash is St Clements orange squash*

Orange 'juices' *Pure Joffa Juice is the most economical*

Making comparisons *Squashes normally cost more than Juices + drinks because there's more real orange in squashes.*

Rani

**Part 2: The Classroom survey (continued)**

Using the results, write a short answer to each research question.

**What types of fruit drink do people like?** The orange is the most favored and the fizzy was most liked

**How much orange do people drink?** 0-10 is the most popular number 10-20 is very unusual

**How do people decide which orange to buy?** Some decided on the Brand but ingredients is the most important decision then the price then the colour

**What do people really know about what is in orange?** People only aware about the Sugar contents

**What else do people want to know about orange?** Mostly the ingredients

Here we show just a part of two attempts at this task. Russell's first two conclusions are correct. His third is unclear. Perhaps he is comparing 'Pure Jaffa Juice' with the squashes and drinks and is claiming that because it is cheaper, it is more economical. (He may therefore not have realised that the squashes and drinks are normally diluted whereas the juices are not.) His final conclusion also assumes, incorrectly, that juices contain less real orange than squashes. If the definitions of these terms were pointed out to Russell (they are on page 2 of the 'Drinking orange!' report), he will probably be able to correct at least one of these conclusions. If he does so, and also completes part 2 of the sheet satisfactorily, then he will satisfy the criterion.

Rani has shown that she can extract the most basic results revealed by the graphs and tables in Part 2. In response to the question 'How do people decide which orange to buy?' she has ignored 'Flavour', and has left 'Brand' out of her otherwise correct ranking. If this were pointed out to her, she may be able to improve her response. In any case, Rani will have satisfied the criterion if she has satisfactorily answered the rest of Parts 1 and 2.

**Stage 2 Assessment task 1**

The 'Final plan'sheet

**Related criteria**

A student can

- (iv) identify possible research aims,
- (v) select appropriate research methods and
- (vi) devise suitable methods for the collection and organisation of data.

If students have been working closely together on their Final plan, you may find it difficult to disentangle their different contributions. Further evidence relating to criterion (iv), (v) and (vi) may be obtained from your observations of the group or from the 'Aims for research sheet' and the two additional assessment tasks included in this stage.

**Required response**

Students are expected to complete a 'Final plan' sheet, appending their questionnaires, lists of equipment and any tables or charts that they will use to help them record information. This sheet should reflect the work of the student's group and should include at least one reasonable research aim (criterion (iv)) and evidence that a suitable research method for achieving this aim has been thought through (criterion (v)). In some cases students may of course modify their methods in the light of experience and so the assessment of criterion (v) may be made retrospectively, when the student has established a method that works. Criterion (vi) may be assessed by inspecting the tables and charts attached to the Final plan. If these indicate that the student has designed an effective way of collecting and organising his or her data, then the criterion is satisfied. Alternatively, you may prefer to wait until the student is actually collecting data in order to assess this criterion.

**Helen**

STAGE 2

## Final plan

Filled in by Helen Jones

Subject for our consumer report chocolate

---

**Research aim(s)**

What is your favourite chocolate ?  
 How much chocolate do you eat ?  
 Do you know the ingredients ?  
 Can people tell the difference between types of chocolate ?  
 Do adverts influence you ?  
 Why do you buy a particular brand ?

---

**Research method(s)**  
 Describe in *detail* how you will achieve your aim(s)

A questionnaire  
 A taste test  
 visiting shops  
 Asking people  
 Getting leaflets

Helen has listed six research aims in the form of questions. This satisfies criterion (iv). Her research methods have not been explained fully, nor linked to her aims, but the appended questionnaire shows that one method has been thought through fully. She therefore also satisfies criterion (v). At present, there is no evidence to show that she can devise a suitable method for organising the data that she will collect from her survey. The assessment of criterion (vi) may be made either by waiting to see exactly how she collects her data, or by using Assessment task 3, which follows.

Helen Jones

THE QUESTION SHEET

1. How much chocolate do you eat a week, and why do you buy that brand ?

0-10 \_\_\_\_\_

10-20 \_\_\_\_\_

20-30 \_\_\_\_\_

Why ?

2. Have you got a favourite chocolate bar if so what is it ?

3. Which of these chocolate bars do you see most advertised on the television? Rank 1-8 (1 seen the most, 8 not seen very often)

Wispa	
Boost	
Mars	
Twix	
flake	
Milkyway	
Milkybar	
Aero	

4. Do you know the ingredients in a twix

Yes  No  a bit

5. A twix contains 11 different ingredients, try to name the first 4

6. Which of these slogans go with a chocolate bar

- a) Whenever theres a snack ...
- b) The crumbliest flakest chocolate ...
- c) It helps you work rest and play ...
- d) You can't keep quiet about a ...

**Stage 2 Assessment task 2**

‘Research methods’

**Related criterion**

(v) A student can select appropriate research methods.

**Required response**

For this task, students are asked to describe research methods which will achieve five given research aims. This may be done orally, if you prefer. It is reasonable to expect most students to describe satisfactory methods for at least four of these aims. A student should also be able to develop a method orally when asked to do so.

Kirstie

### Research methods

Some students are planning to do some consumer research into fizzy soft drinks. Their research aims are listed below. Underneath each aim, write a few lines describing a *method* which will help them to achieve this aim.

(a) **Aim:** To make a complete list of all the fizzy drinks you can buy.  
**Method:** Go around the shops and make a survey

(b) **Aim:** To find out how fizzy drinks are made.  
**Method:** I would ask a manufacturer of fizzy drinks

(c) **Aim:** To find out which types of fizzy drinks people say they prefer.  
**Method:** I would ask people or do a taste project

(d) **Aim:** To find out if people can taste any difference between cheaper fizzy drinks and more expensive fizzy drinks.  
**Method:** I would buy the cheap drinks and the dear one and ask them to taste them

(e) **Aim:** To find out which adverts for fizzy drinks are most memorable.  
**Method:** Ask people which adverts they remember

Kirstie's answers are brief, but sensible. It may be necessary to ask her to describe, orally, more details about (b) (How would she ask the manufacturer? phone? letter?), (c) and (e) (How would she ask people? orally? questionnaire?) and (d) (How many drinks? Would they be different flavours?) before you can be sure that she can develop these methods and therefore satisfy the criterion.

**Stage 2 Assessment task 3**

'Tea bags'

**Related criterion**

(vi) A student can devise suitable methods for the collection and organisation of data.

**Required response**

In this task, students are asked to organise a collection of unsorted data into a table of some kind. If they can sort *most* of the data in this way, in rows and/or columns under general headings, then they may be said to have satisfied the criterion. One solution appears on page T43.

**Attia**

	Lyons	Telley	Typhoo	Telley Teabags	Telley Teabag	Telley tea bags	Twinnings 'Earl Grey'	Brooke band PG tips	Brooke band PG tips	Brooke band PG tips	'one cup' typhoo	one cup typhoo	Sainsbury Brown label	Sainsbury's Red label.
<u>Price</u>	1.07	1.09	1.07	55p	1.09	2.17	1.05	3.12	2.11	1.09	61p	1.19	62p	79p
<u>Weight</u>	25g	25g	25g	25g	25g	500g	125g	750g	500g	25g	125g	25g	25g	25g
<u>(how much tea bag) The box contains</u>	80	80	80	40	80	160	105	240	160	80	60	120	80	80

**Arfan**

		125g 40 bag	250g 80 bag	500g 160 bag	125g 50 bag	125g 60 bag	250g 120 bag	750g 240 bag
Lyons			£1.07					
Telley		55p	£1.09	£2.17				
Typhoo			£1.07					
Twinnings Earl Grey					£1.05			
PG Tips			£1.09	£2.11				£3.12
one cup						6p	£1.19	
Sainsbury's Brown label								
Sainsbury's Red label			62p					

Both Attia and Arfan have satisfied the criterion, although both tables could be improved by further ordering.

### Stage 3 Assessment task 1

Students' own reports.

#### Related criteria

A student can

- (vii) present a summary of research data in a clear, organised way,
- (viii) draw sensible conclusions from a collection of research data,
- (ix) take an active part in compiling his or her own report.

#### Required response

If students have worked collaboratively on their report then it may be difficult to disentangle individual contributions and say which criteria have been satisfied by which students. Some teachers, perhaps because the work was being assessed as part of GCSE coursework, have insisted that students write up their own individual reports even though the results of the surveys and experiments were produced by groups. This makes it possible to assess criteria (vii), (viii) and (ix) from the final written reports. Criterion (vii) is satisfied if a student has used lists, tables and graphs effectively; criterion (viii) is satisfied if the main conclusions have been identified and reported correctly (orally or in writing); criterion (ix) is satisfied if a student has contributed his or her own ideas to the finished report.

*Helen*

#### The Classroom Experiment

Our classroom experiment was to see if people could tell the difference between normal milk chocolate and diabetic milk chocolate. To do this we blindfolded people and gave them a sample of milk chocolate and asked them if it was normal chocolate, diabetic chocolate or any other sort of chocolate. Then we gave them a sample of diabetic chocolate and asked them the same question. We recorded our results along with the person's name.

Name	(A Milk)	(B Diabetic)
Claire B	M	
Caroline	M	D
Debbie	M	M
Siobhan	O	M
Helen J	D	M
Rachel	M	O
Lucy	M	D
Adrian	O	M
Andrew M.	D	M
Andrew P.	M	D
Russel	D	M
Tim.	D	M
Christopher	M	D
Steven	M	M
Laura	M	D
Joanna	D	O

M=9 O=2 D=5    M=9 O=2 D=5

Milk = M

Diabetic = D

Other = O

In our class there was only 5 people that could tell the difference between normal milk chocolate and diabetic milk chocolate. They were Claire B, Lucy, Andrew P, Christopher and Laura. The rest of the class couldn't. There were 4 people who thought it was the other way round. They were Helen J, Andrew M, Russel, and Tim.

I would say that on average, people can't tell the difference between normal milk chocolate and diabetic milk chocolate.

Helen's account of her group's classroom experiment is clear and well-organised. Her conclusions are sound, although they do not take into account that some students probably answered correctly by chance. Her account was written independently and differs from accounts of the same experiment written by other members of her group. Helen therefore satisfies all three criteria.

**Stage 3 Assessment task 2**

'Cheese flavoured crisps'

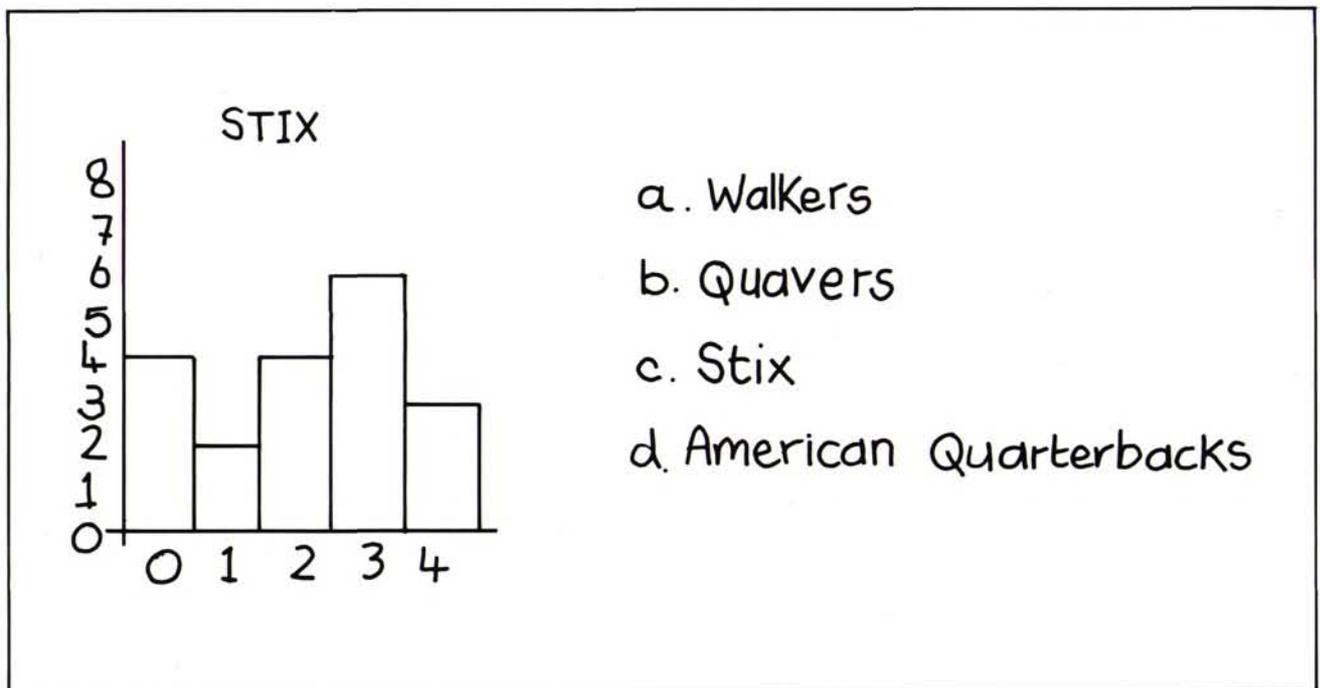
**Related criteria**

- (vii) A student can present a summary of research data in a clear, organised way.
- (viii) A student can draw sensible conclusions from a collection of research data.

**Required response**

Solutions to this task appear on page T49. A minimum requirement might be that students should be able to produce a satisfactory bar graph (for criterion (vii)), correctly identify the names of the crisps which were considered to be most 'cheesy' and least 'cheesy' (consistent with the method used), and describe their method, orally or in writing (for criterion (viii)).

**Angela**



Angela has produced a correct bar graph, so she satisfies criterion (vii). Her conclusions, however, are incorrect and she has not provided an explanation of their origin. It is likely that she has ranked the crisps by comparing the highest bar in each graph. Angela has therefore not shown that she can satisfy criterion (viii). It may help if she were asked to look back at the numerical data, paying particular attention to the interpretation of the numbers in each column. She may then be able to correct her error.

### Stage 4 Assessment task

The 'Evaluating a report' sheet.

#### Related criterion

(x) A student can evaluate a report and suggest improvements to it.

#### Required response

Students are asked to fill in several 'Evaluating a report' sheets during Stage 4. They are asked to comment on the consumer reports presented by other groups and then they are asked to comment on their own report, taking account of comments made by other groups.

**Clive**

Evaluating a report	
Title of report being evaluated	Chocolates
This sheet filled in by	Clive Cowley
<b>Presentation</b> (Was the report clear and interesting?)	
Good points:	
It was set out good	
Ways of improving the presentation:	
typed or neater handwriting	
<b>Organisation</b> (Were the surveys and experiments well organised?)	
Good points:	
It is clear	
Ways of improving the organisation:	
explain the results better	
<b>Communication</b> (What did you learn from the report?)	
Not very much	
<b>Suggestions for further improvements</b>	
The writeing and understanding was poor	

M31

**Sarah**

Evaluating a report	
Title of report being evaluated	Chocolates
This sheet filled in by	Sarah Upton
<b>Presentation</b> (Was the report clear and interesting?)	
Good points:	
It was interesting especially the experiment colourful	
Ways of improving the presentation:	
Untidy use neater writing Draw more pictures	
<b>Organisation</b> (Were the surveys and experiments well organised?)	
Good points:	
The graphs and tables were good. The survey was interesting but they didnt ask many people.	
Ways of improving the organisation:	
Do the survey on more people	
<b>Communication</b> (What did you learn from the report?)	
Most people liked the Mars bar in the experiment	
There werent many conclusions	
<b>Suggestions for further improvements</b>	
Write conclusions out better. Get the report typed out	

M31

These two students have evaluated the same consumer report. Clive's comments are, at present, too brief and inadequate to satisfy the criterion. He needs to be asked to say *what* was good about the way the report was set out, *how* the results could be better explained and *what* conclusions could have been drawn. Sarah's evaluation is more complete and her comments are more specific and helpful. Sarah's response satisfies the criterion.

# Written examination papers

The two examination papers which follow may serve as a useful resource in assessing a student's ability to retain and transfer the skills to fresh situations in the same context.

Paper 1 is intended for nearly all students.

Paper 2 is intended for approximately the top 30% of students.

## Paper 1

PAPER 1

### Crisps for the disco

Some friends are planning to hold a disco for 200 people. They decide to sell crisps at the disco. They want to find out more about crisps before buying any to sell.



If we can make some money from selling crisps, we can keep the ticket price low.

1. Here are three of their 'research aims'.

- a. To find out how many packets of crisps to buy.
- b. To find out which flavours to buy.
- c. To find out which brand of crisps to buy.

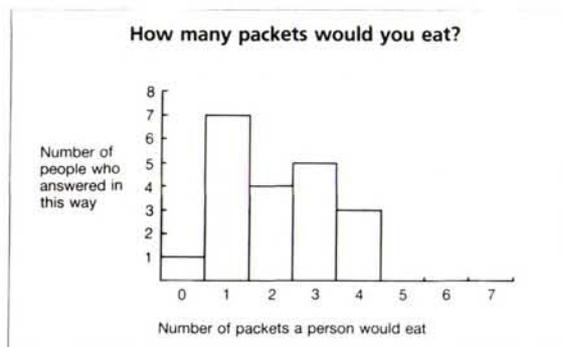
Write down two more research aims which may be important.

They decide to carry out a survey to find out more information.



How many packets of crisps would you eat at a disco?

Here are their results.



BE A SHREWD CHOOSER

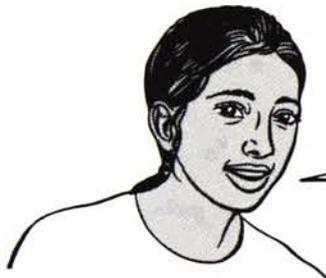
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M40

## Crisps for the disco (continued)

2. From the graph, answer the following questions.
  - a. How many people were interviewed?
  - b. How many people would not eat any crisps?
  - c. How many people would eat 4 packets of crisps?
  - d. Will 200 packets of crisps be enough for the disco?  
Give reasons for your answer.
  - e. How many packets would you advise the group to buy?  
Explain how you obtain your answer.

Here is another question from their survey.



Look at these four flavours, then give them points like this:  
 2 points – 'I like the flavour a lot'  
 1 point – 'the flavour is O.K.'  
 0 points – 'I don't like the flavour'

Here are the results.

Plain	1								
Salt and Vinegar	0	Salt and Vinegar	2	Salt and Vinegar	0	Salt and Vinegar	2	Salt and Vinegar	0
Smoky Bacon	1	Smoky Bacon	1	Smoky Bacon	1	Smoky Bacon	0	Smoky Bacon	2
Cheese and Onion	2	Cheese and Onion	1	Cheese and Onion	2	Cheese and Onion	1	Cheese and Onion	1
Plain	2	Plain	1	Plain	2	Plain	1	Plain	1
Salt and Vinegar	1	Salt and Vinegar	0	Salt and Vinegar	1	Salt and Vinegar	0	Salt and Vinegar	1
Smoky Bacon	0	Smoky Bacon	1	Smoky Bacon	0	Smoky Bacon	1	Smoky Bacon	0
Cheese and Onion	1	Cheese and Onion	2						
Plain	1								
Salt and Vinegar	0	Salt and Vinegar	2						
Smoky Bacon	1	Smoky Bacon	0	Smoky Bacon	2	Smoky Bacon	2	Smoky Bacon	0
Cheese and Onion	2	Cheese and Onion	2	Cheese and Onion	0	Cheese and Onion	1	Cheese and Onion	1
Plain	1	Plain	1	Plain	2	Plain	1	Plain	1
Salt and Vinegar	1	Salt and Vinegar	0	Salt and Vinegar	1	Salt and Vinegar	2	Salt and Vinegar	0
Smoky Bacon	2	Smoky Bacon	0	Smoky Bacon	0	Smoky Bacon	0	Smoky Bacon	2
Cheese and Onion	1	Cheese and Onion	2	Cheese and Onion	1	Cheese and Onion	2	Cheese and Onion	0

## Crisps for the disco (continued)

3. Draw a table to show the *total* number of people giving each rating (0, 1 or 2) to each flavour.
4. Copy the table below, and use it to rank the four flavours in order of popularity.

Explain your method, underneath.

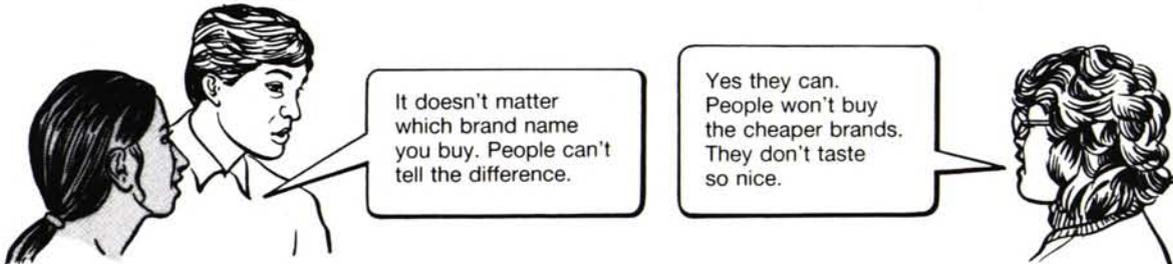
This is the best liked flavour → a. \_\_\_\_\_

b. \_\_\_\_\_

c. \_\_\_\_\_

This is the least liked flavour → d. \_\_\_\_\_

The friends are arguing.



5. On a copy of the table below, describe in detail how *you* would organise an experiment to see if people can tell any difference in taste between an expensive brand of crisps and a cheaper brand.

**Number of people needed** \_\_\_\_\_

**Equipment needed**

**What we would ask people to do**

**How we would collect the results**  
 (Draw the table that you would use and make up some results to show how you would fill it in.)

Paper 2

# Chocolate

A group of students has been doing a consumer survey on chocolate bars. The students began by giving a questionnaire to 30 teenagers in their school. Part of the questionnaire is shown below:

Name \_\_\_\_\_ Sex \_\_\_\_\_

A. How many chocolate bars do you eat each week? \_\_\_\_\_

B. Which of the following types of chocolate do you like best?  
Tick *one* box.

<input type="checkbox"/>				
Milk	Plain	Orange Flavour	Mint Flavour	White

C. Which factors are most important to you when you buy chocolate?  
(Rank the factors in order, 1 = important, 2 = next most important and so on, down to 5 = least important.)

<input type="checkbox"/>				
Price	Ingredients	Brand name	Flavour	Look of packet

The results to question A in the survey are shown below:

Male 1	Female 4	Male 5	Female 1	Male 2	Male 25
Male 13	Female 0	Male 2	Male 9	Male 6	Female 16
Female 14	Male 10	Male 19	Male 11	Female 1	Male 0
Male 1	Male 3	Female 10	Male 25	Female 16	Male 13
Female 30	Male 8	Male 2	Male 0	Male 28	Female 0

## Chocolate (continued)

1. Look at the results to question A.

(a) Draw a histogram or frequency bar chart to show the results to question A. (Begin by grouping the data into suitable class intervals.)

(b)



We have found that the total numbers of bars eaten by all the males is 183, and the total number eaten by all the females is 92. This means that, in general, men eat a lot more chocolate than women.

Give *two* reasons why this conclusion is *false*.

Write down *one correct* conclusion (comparing male and female consumption of chocolate) that can be supported by the data. Explain clearly how you obtain this conclusion.

2. The results to question B are shown below.

Type of chocolate	Milk	Plain	Orange Flavour	Mint Flavour	White
Number who liked this type best	20	6	1	2	1

Draw a pie chart accurately, to show this information.

3. The results to question C are shown below.

	Ranking				
	1	2	3	4	5
Ingredients	1	5	10	3	8
Price	5	11	6	4	2
Flavour	20	6	1	0	0
Brand	1	5	4	12	5
Look of packet	0	0	6	8	13

This table shows the numbers of people who gave each ranking to each factor. (For example, 13 people said that the 'Look of the packet' was the least important factor).

(a) How many people answered question C? (The others left it out.)

(b) One of the numbers in the table is wrong. Which number is it? What should this number be?

Explain how you obtained your answer.

## Chocolate (continued)

3. (c) Copy the table below and, using the data, put the five factors in order of importance. Underneath your table, explain the method you used to do this.

People think that this is most important	→	1. _____
		2. _____
		3. _____
		4. _____
People think that this is least important	→	5. _____

The students decided to conduct an experiment to see if people can taste any difference between white chocolate and milk chocolate. They blindfolded 30 people and gave each person three pieces of chocolate; two were milk chocolate and the other was white chocolate. Each person had to try to identify the 'odd one out'.

4. (a) Suppose that no-one can tell the difference, and that they all guess, randomly.  
How many people would you expect to guess correctly?
- (b) Suppose that 15 people *can* tell the difference, and the others guess, randomly.  
How many people would you *now* expect to identify the odd one out correctly?
- (c) Suppose that you want to adapt the experiment to see if people can tell the difference between milk chocolate, white chocolate and diabetic chocolate.  
Describe in detail, how you would carry out the experiment.

# Checklist for the teacher

Real problem solving demands a different balance of teaching styles and strategies from the traditional curriculum. Students need to learn how to

- assume more control of, and responsibility for, their work
- share and develop ideas with each other
- give and accept constructive criticism
- turn their own ideas into actions, and to learn from the consequences of their own decisions.

To effect this change of roles, it is helpful if the teacher can:

## Frequently

- praise achievement
- encourage students to think further and deeper
- ask clarifying questions
- agree targets
- encourage students who lack confidence.

## Occasionally

- make a suggestion if a student is running out of ideas
- divert a student from a particularly unhelpful idea

## Avoid

- taking over a problem
- making negative comments
- determining whose view is accepted.

Those seem to be really good ideas.

Look back at the 'Drinking orange!' report in Stage 1. Can you use any of those ideas in your own consumer report?

Can you explain that to me again? I didn't quite understand.

Do you think you could finish your final plan by Monday?

Tell me what you'll put in your letter . . .  
. . . Good, I'm sure you'll be O.K.

Why don't you visit the supermarket on the way home from school?

If you choose to do a report on motorbikes, you won't be able to do a classroom experiment.

Why don't you organise your data like this . . .

You're being much too ambitious.

Sarinda's idea seems to be the best.



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