

EXTENDED TASKS

FOR GCSE

MATHEMATICS

A series of modules to support school-based
assessment

Applications

Plan It



MIDLAND EXAMINING GROUP

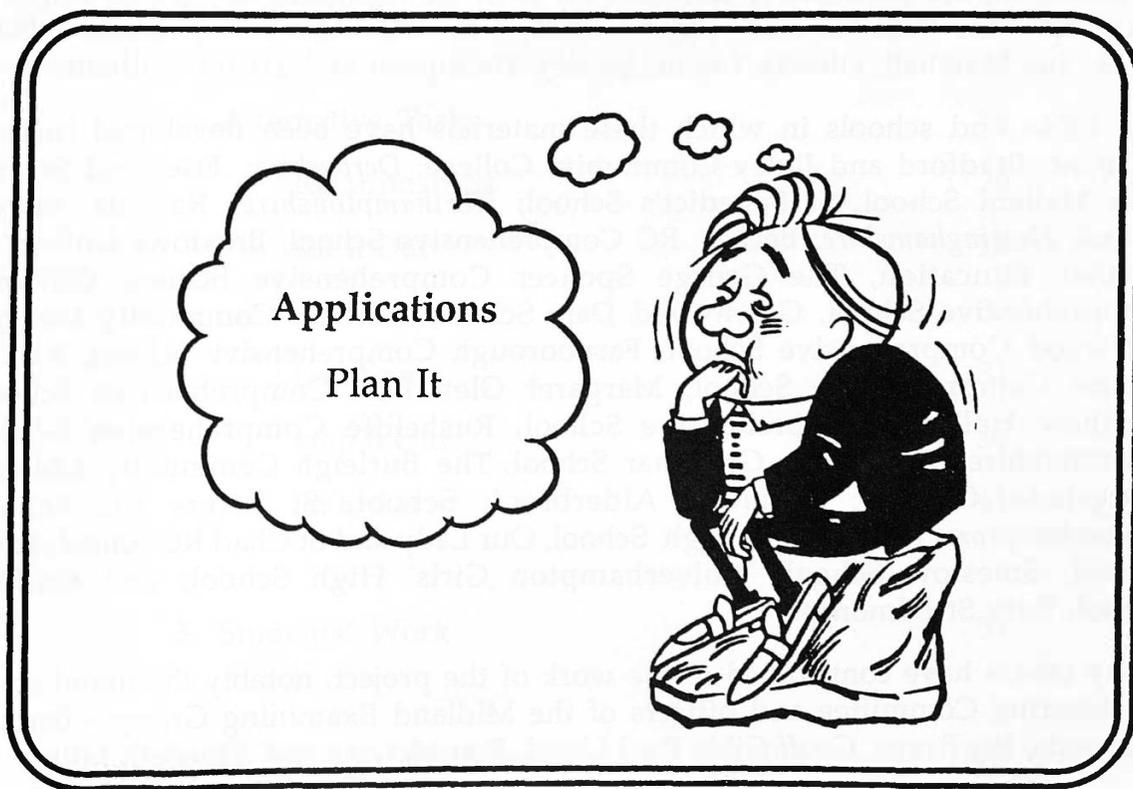
SHELL CENTRE FOR MATHEMATICAL EDUCATION

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A series of modules to support school-based
assessment



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National STEM Centre



N23920

Authors

This book is one of a series forming a support package for GCSE coursework in mathematics. It has been developed as part of a joint project by the Shell Centre for Mathematical Education and the Midland Examining Group.

The books were written by

Steve Maddern and Rita Crust

working with the Shell Centre team, including Alan Bell, Barbara Binns, Hugh Burkhardt, Rosemary Fraser, John Gillespie, Richard Phillips, Malcolm Swan and Diana Wharmby.

The project was directed by Hugh Burkhardt.

A large number of teachers and their students have contributed to this work through a continuing process of trialling and observation in their classrooms. We are grateful to them all for their help and for their comments. Among the teachers to whom we are particularly indebted for their contributions at various stages of the project are Paul Davison, Ray Downes, John Edwards, Harry Gordon, Peter Jones, Sue Marshall, Glenda Taylor, Shirley Thompson and Trevor Williamson.

The LEAs and schools in which these materials have been developed include *Bradford*: Bradford and Ilkley Community College; *Derbyshire*: Friesland School, Kirk Hallam School, St Benedict's School; *Northamptonshire*: Raunds Manor School; *Nottinghamshire*: Becket RC Comprehensive School, Broxtowe College of Further Education, The George Spencer Comprehensive School, Chilwell Comprehensive School, Greenwood Dale School, Fairham Community College, Haywood Comprehensive School, Farnborough Comprehensive School, Kirkby Centre Comprehensive School, Margaret Glen Bott Comprehensive School, Matthew Holland Comprehensive School, Rushcliffe Comprehensive School; *Leicestershire*: The Ashby Grammar School, The Burleigh Community College, Longslade College; *Solihull*: Alderbrook School, St Peters RC School; *Wolverhampton*: Heath Park High School, Our Lady and St Chad RC School, Regis School, Smestow School, Wolverhampton Girls' High School; and Culford School, Bury St Edmonds.

Many others have contributed to the work of the project, notably the members of the Steering Committee and officers of the Midland Examining Group - Barbara Edmonds, Ian Evans, Geoff Gibb, Paul Lloyd, Ron McLone and Elizabeth Mills.

Jenny Payne has typed the manuscript in its development stages with help from Judith Rowlands and Mark Stocks. The final version has been prepared by Susan Hatfield.

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1 Introduction

PLAN IT is one of eight such 'cluster books', each offering a lead task which is fully supported by detailed teacher's notes, a student's introduction to the problem, a case study, examples of students' work which demonstrate achievement at a variety of levels, together with six alternative tasks of a similar nature. The alternative tasks simply comprise the student's introduction to the problem and some brief teacher's notes. It is intended that these alternative tasks should be used in a similar manner to the lead task and hence only the lead task, has been fully supported with more detailed teacher's notes and examples of students' work.

The eight cluster books fall into four pairs, one for each of the general categories: Pure Investigations, Statistics and Probability, Practical Geometry and Applications. This series of cluster books is further supported by an overall teacher's guide and a departmental development programme, IMPACT, to enable teacher, student and departmental experience to be gained with this type of work.

The material is available in two parts

Part One		The Teacher's Guide
		IMPACT
	Pure Investigations	I1 - Looking Deeper I2 - Making The Most Of It
	Statistics and Probability	S1 - Take a Chance S2 - Finding Out
Part Two	Practical Geometry	G1 - Pack It In G2 - Construct It Right
	Applications	A1 - Plan It A2 - Where There's Life, There's Maths

This particular 'cluster book', PLAN IT, offers a range of materials designed to support students as they pursue applications tasks within any GCSE mathematics scheme. The material has been designed and tested, as extended tasks, in a range of classrooms. A total of about twelve to fifteen hours study time, usually over a period of two to three weeks, was spent on each task. Many of the ideas have been used to stimulate work for a longer period of time than this, but any period which is significantly shorter has proved to be rather unsatisfactory. These applications tasks are intended to arouse students' interest in, and understanding of, the world in which they live. As they pursue these tasks students will be involved in selecting materials and mathematics to use for their chosen task, checking they have sufficient information, working methodically and reviewing their progress, interpreting mathematical information presented in oral, written or diagrammatic form, as well as in making and testing hypotheses.

It is important that students should experience a variety of different types of extended task work in mathematics if they are to fully understand the depth, breadth and value of the subject. The tasks within this cluster concern real life situations, and they are intended to be tackled practically. However, it is important that this practical approach should be followed up using reasoning, calculation and proof, according to the individual need and ability of each student. The common element amongst all the items within this cluster is the idea that the students should be involved in planning or organising an event, or some other aspect of their everyday life, using information they have collected.

Clearly, there are many styles of classroom operation for GCSE extended task work and it is intended that this pack will support most, if not all, approaches. All the tasks outlined within the cluster books may be used with students of all abilities within the GCSE range. The lead task The Celebration may be used with a whole class of students, each naturally developing their own lines of enquiry. It is intended that all the tasks within the cluster may be used in this manner. However, an alternative classroom approach may be to use a selection, or even all, of the ideas within the cluster at one time, thus allowing students to choose their preferred context for their applications task. There is, however, a further more general classroom approach which may be adopted. This is one that does not even restrict the task to that of an applications nature. In this case some, or all, of the items within this cluster may be used in conjunction with those from one or more of the other cluster books, or indeed any other resource. The idea is that this support material should allow individual teacher and class style to determine the mode of operation, and should not be restrictive in any way.

Teachers who are new to this type of activity are strongly advised to use the lead tasks.

These introductory notes should be read in conjunction with the general teacher's guide for the whole pack of support material. Many of the issues implied or hinted at within the cluster books are discussed in greater detail in The Teacher's Guide.

2 *The Celebration*

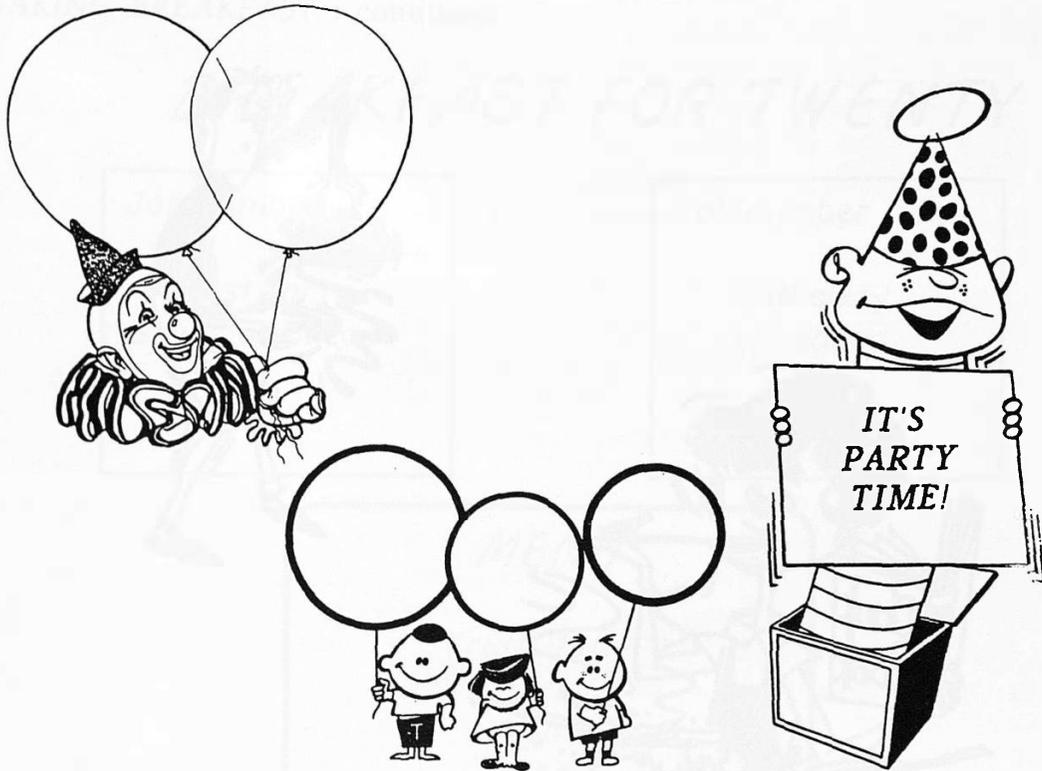
The lead task in this book is called *The Celebration*. It is based on a real life situation and provides a rich and tractable environment for applications type coursework tasks at GCSE level.

The task is set out on pages 7 - 9 in a form that is suitable for photocopying for students.

The Teacher's Notes begin on page 10. These pages contain space for comments based on the school's own experiences.



THE CELEBRATION



As you complete this task you will be involved in planning something like a birthday celebration for a group of friends. You can go about this in any way that you like.

You do not have to consider a birthday celebration, it can be anything that you would like to organise, or you feel would be useful to you in the future. You may choose to go in any direction that you wish. Basically you can plan or organise anything that interests you, for whatever reason and in any way.

If possible, try to link it to something that you are going to have to do in real life, whether it is in the near future or just a possibility in the long term. You will be able to gain a lot from this experience, even if it is only a dummy run at organising something. You may be lucky enough to have the chance of putting your plan into action.

Don't forget to record all your ideas and decisions as you go along. These need to be discussed in your final report. Your report should outline your problem and how you tackled it. It should include any information you collected, any decisions you made, comparisons of alternatives, calculations made, and many more things.

MAKING BREAKFAST



Write down a list of all the jobs involved in making breakfast.

Now think about how long each job takes, and in what order these jobs need to be carried out. During your group discussion, you may find it helpful to write each job on a piece of paper, together with the time needed, so that you can move them around on the table as you talk about the different possible orders in which the jobs can be done.

What other things do you need to think about when you are planning how to make breakfast?

What if you had to cook a traditional breakfast for a large number of your friends? Would it make any difference?

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MAKING BREAKFAST : continued

BREAKFAST FOR TWENTY

Job number

Toast forty
slices of bread

Time

Job number

Grill sixty
sausages

Time

MENU

Fruit Juice

Muesli

Yogurt

Scrambled Eggs

Baked Beans on Toast

Bacon, Egg and Sausages

Rolls, Toast

Honey, Marmalade

Tea, Coffee

Job number

Boil ten
pints of water

Time

Job number

Make six
pots of tea

Time

The Celebration - Teacher's Notes

The ability to plan and organise is an important skill in everyday life. It usually involves us in applying our basic mathematical knowledge so that we can make more informed decisions. It is unusual to find adults, even mathematics teachers, using higher level mathematics to solve everyday problems in mathematics. However, mathematics used at a suitable level is a powerful aid in decision making. *The Celebration* is a piece of work which fits into the area of Applications of mathematics and provides students with an opportunity to plan and organise a wide variety of events.

This type of activity is a very popular one in mathematics classrooms, although it often degenerates to the collection of pictures from magazines, and the carrying out of a small number of very basic calculations. We anticipate that students who complete a piece of GCSE coursework under this heading, will become involved with their problem in a different way, and at a different level, than has been indicated above.

Naturally, the problem will motivate and interest the students more highly if it actually belongs to them. Therefore, it is suggested that this work should, if possible, be linked to something which they could be, or are likely to be, involved in. The initial suggestion is that the context could be a birthday celebration.

Many contexts have been, or may be, explored under this heading. Some are more well known than others. These include

- * Planning a trip
- * Organising a disco
- * Catering for a wedding, party, anniversary or similar event
- * Planning a meal for a large group
- * Organising a young child's birthday party
- * Planning a barbecue

- * Organising the school's sports day
- * Organising a charity event
- * Having the family to stay
- * Organising a club.

Clearly, the context chosen will determine what type of mathematics may be involved in the solution to the problem, but there is likely to be considerable common ground amongst most problems. This is likely to include

- * Planning of time
- * Costing
- * Quantity
- * Value
- * Comparing alternatives
- * Data collection
- * Data representation
- * Ratio and proportion
- * Percentage
- * Estimation.

Initially, it is often difficult for students to think of something they would like to plan, and then to decide how they should go about it. Therefore, we offer an initial small group activity, followed by a brainstorming session, before students select their own context and begin to consider the details of their own individual planning and organising tasks.

When students are working on GCSE extended tasks, it is impossible to give a lesson by lesson plan, but it could be useful to outline what may happen over the two to three week period which the work will probably span.

Understanding and Exploring the Problem

The resource sheet *Making Breakfast* offers a task which has proved helpful when encouraging students to think about organising and planning events. This task is in a form which is suitable for handing out to small groups of, say, three or four students. Immediately, they can become involved in discussing and thinking about this type of activity. Naturally, each group will tackle the problem at their own level, and make the task as difficult as is appropriate at this stage. However, there is some degree of flexibility for the teacher, and the making breakfast activity may simply be used as a brief introduction, or as a slightly longer task.



Some discussion points which are likely to arise during this stage of the work are

- * Which jobs cannot be done until others have been completed?
- * Which jobs can be done at the same time?
- * Are you waiting or working for most of the time?
- * Which jobs are the most crucial?

Such questions lead on to the idea of critical path diagrams and these could be introduced here, although this is not intended to be the main focus. Indeed, the use of such mathematics in a very simple case may serve only to suggest the contrived nature of using such techniques, and that the method lacks any power since the problem can be considered using less powerful mathematics.

However, it certainly is useful here if the students record their decisions using some form of diagram. This can help both you as a teacher, and your group to develop notes which form a suitable basis for final reports. Each student can briefly explain her problem, and illustrate her particular solution together with anything she discovers or notices during her work. This then stands both as a miniature model of what the students' final reports may look like or, indeed, form a part of the report itself.

At the end of this introductory task, which will probably take approximately an hour, the overall task should be explained to the students. It may be useful to give them some preliminary notice of the work on this extended task, so that they can think about possible contexts which are of personal interest for their work.

Devising and Planning Individual Studies

A brainstorming session is very valuable at this stage to help generate lots of ideas, as well as possible approaches to one or two of the ideas suggested. One useful way of developing this is to ask each student to write down as many ideas as they can in a short period of time, before sharing their ideas with others in their small group. Each small group should reach some degree of consensus about which ideas are worth pursuing, and how they might go about it.

Finally, each group should report on a few of their ideas to the whole class. The whole class reporting back session will involve the teacher in chairing the discussion, and trying to involve as many students as possible. It is also useful to select one or two of the ideas, and to ask members of the group to expand further on these. Other students can be invited to add their ideas to the those already suggested.

The next few lessons will probably involve each student in thinking about a few events they may wish to plan and organise, choosing a particular context and thinking about how they are going to tackle their own individual problems. During this stage, it is worthwhile emphasising a range of mathematical skills and processes which students may wish to use such as those listed on page 11. However, it is important that this list should not merely be written down by the teacher. During the whole class reporting back session, students should be encouraged to identify useful mathematical skills and processes within the context they wish to explore. After the class reporting back session, it is likely that the suggested list will have emerged, as well as others.



Implementing Plans and Pursuing Ideas

This next period of time will involve students in pursuing their individual lines of enquiry. The teacher's role here is almost entirely one of acting as a consultant and resource. Wherever possible, students should take the initiative and assume responsibility for their own progress. Their work may involve them in collecting relevant information and data outside school hours, and sometimes over a period of time. Clearly the situation has implications for the organisation of lesson time on the part of the teacher. During our project trials, many teachers found that it was best to move to a one lesson per week approach whilst such data was being collected and compared. This avoids wasted time in the classroom while waiting for information.



This phase provides a valuable opportunity for the teacher to talk to individual students about their work. Information gained during this period will prove extremely valuable for assessment purposes, since the teacher will naturally develop a greater awareness of each student's work, and acquire much more evidence than can be learned from merely reading the final reports.

During this time the teacher will need to emphasise the importance of each student keeping a careful record of their work, so that the final report made by each individual student contains an accurate and detailed account of information collected and analysed, together with decisions taken.

Reviewing and Communicating Findings

Before embarking on the final written report, it may be useful for each student to briefly outline to their own small group what they have done so far. Apart from the obvious advantages in personal and social development, this helps a student to clarify their own ideas about their work to date.

It is important that students should begin to review and analyse what they have discovered sufficiently early, to complete the task well. Some students tend to continue collecting information



until time runs out, and are rather reluctant to organise or analyse it.

In our trial classrooms, some students appeared to be surprised at the amount of time it takes to organise information, and to consider all aspects of the task, before making final decisions and recommendations.

The assessment will naturally be based on the final report which a student submits, together with the knowledge of the student's work which the teacher has gained through observation and discussion during the whole period in which the work has been completed.

This problem may be tackled by students of all abilities, since they will set themselves tasks within their capabilities, and then demonstrate their ability and knowledge through their own solutions to issues which are of some personal significance.

Whilst we have made it clear that greater motivation is achieved with student ownership of the task, this is also true if the student is organising a task which is really going to happen. Again, during our trials, we saw groups organising a variety of events which they actually carried through. These include

- * A meal at Pizzaland followed by a matinee showing at the local cinema, for a group of about six students
 - * A day trip to the seaside
 - * A school disco
 - * A charity break-time ice cream stall
 - * A sherbert factory for a week
 - * A cake production line to supply local shops and stores
 - * A papier mâché brick making process for the local group of senior citizens
 - * A charity coffee bar
- etc.

3

A Case Study

Fourth Year

Higher/Intermediate Level.

The work was done in the second half of a term. In order to give time for thought and research, I introduced the idea a week before the half-term break and asked the students to go away and think of an event they would like to plan. This made it wider than just a celebration, but I felt it was important that they should do something that they had chosen, and therefore would have an interest in. This was their second piece of GCSE Coursework in the fourth year but they had completed two 'trial runs' during their third year. This was a top set of 28 students from a year group of 130.

The last lesson before half-term, we used the Making Breakfast activity which was quite useful, if only to make some of the students realise they had no idea of catering in quantity! It did give them a brief insight into the problems of time planning, and reminded them of the topics they needed to research over half-term. I suppose that this activity could be used in a variety of ways, but it went well for us when we used it in this manner and so I would probably do it again.

After half-term when the work began, there was a huge range in the progress made, I suppose this will always happen with this sort of approach. Some students had done a lot of preparation, and were well into their events. Others were struggling to get beyond a list of jobs, with no idea of ordering, timing or detail. This was particularly true of weddings and discos which sounded good, but actually proved quite difficult to structure. These students required quite a lot of prompting which worried them as they know I make notes on any help given. They felt rather frustrated by their own lack of knowledge and their need to ask for help. We managed to assemble a collection of 'planner' booklets and cookery books which helped, but I did not really start collecting them early enough. This is a reflection on the fact that I had not really thought carefully enough about what they would need, perhaps these are now things that departments ought to think about collecting, but I suppose this is one of the skills for the students to develop themselves, knowing where to find information.

I think almost all the students were rather anxious about not getting enough mathematics into the work, as they do not see logical thinking, ordering of activities, planning, and the weighing up of alternatives as mathematics, perhaps

this was an initial fear of mine, which I have passed on. I discussed this issue with the Shell Centre Team and they reassured me on this matter, and it is interesting to read the Moderator's comments on the pieces of work from my students which have been included in this book. Maybe we all need to take a broader view of mathematics within this area of coursework. The students worked hard at doing scale plans, areas, costing and ratios to get what they considered mathematics into their work. However, this was sometimes rather contrived and therefore contributed very little to the project.

From the teacher's point of view, it was a very demanding activity as the students were asking questions on an enormous range of topics, some of which I knew little about. The idea that they all had basically the same problems was quite hard for them to grasp. It may be an idea next time to attempt to have a 'worries session' where they can all state their problems in order to support each other, make suggestions, and perhaps give advice to each other.

We always encourage our students to write up as they go along, when doing a piece of coursework, but this piece did not seem to lend itself to that in the same way that previous work had. However, quite a lot of finished sections were in evidence during the latter part of the work. All the students had their work ready by the deadline date. I suppose the write up issue depends very much on the individual student and their chosen activity.

One worrying aspect for me was the relatively low scores (grade C) achieved by a few of the most able students in the group. They were also worried and have asked to do another piece of work, possibly to submit instead. Perhaps this was because they did not challenge themselves sufficiently within the task as I had presented it. Alternatively, I suppose it could be said that the students who are good at 'usual mathematics' may not be the best at this type of work and we should be looking for broader achievement. Certainly, some students achieved top grades, so there is scope for this. If I'm honest, this problem probably crops up at the end of every piece that we do. I wonder if a scheme of submitting the best 3 from 4 will become the eventual norm?

Taken overall, I think the students enjoyed their work and found it a refreshing change.

We are hoping to submit some of the work as a Home Economics (Food) unit in a Design course. I learned a lot about fishing, ski slopes, and golf tournaments, amongst other things. We would all like to try out the London weekend visit to a rock concert at Wembley Stadium, which one student planned.

4

Alternative Tasks

Relationships

Kit It Out

Turn It In

Locations

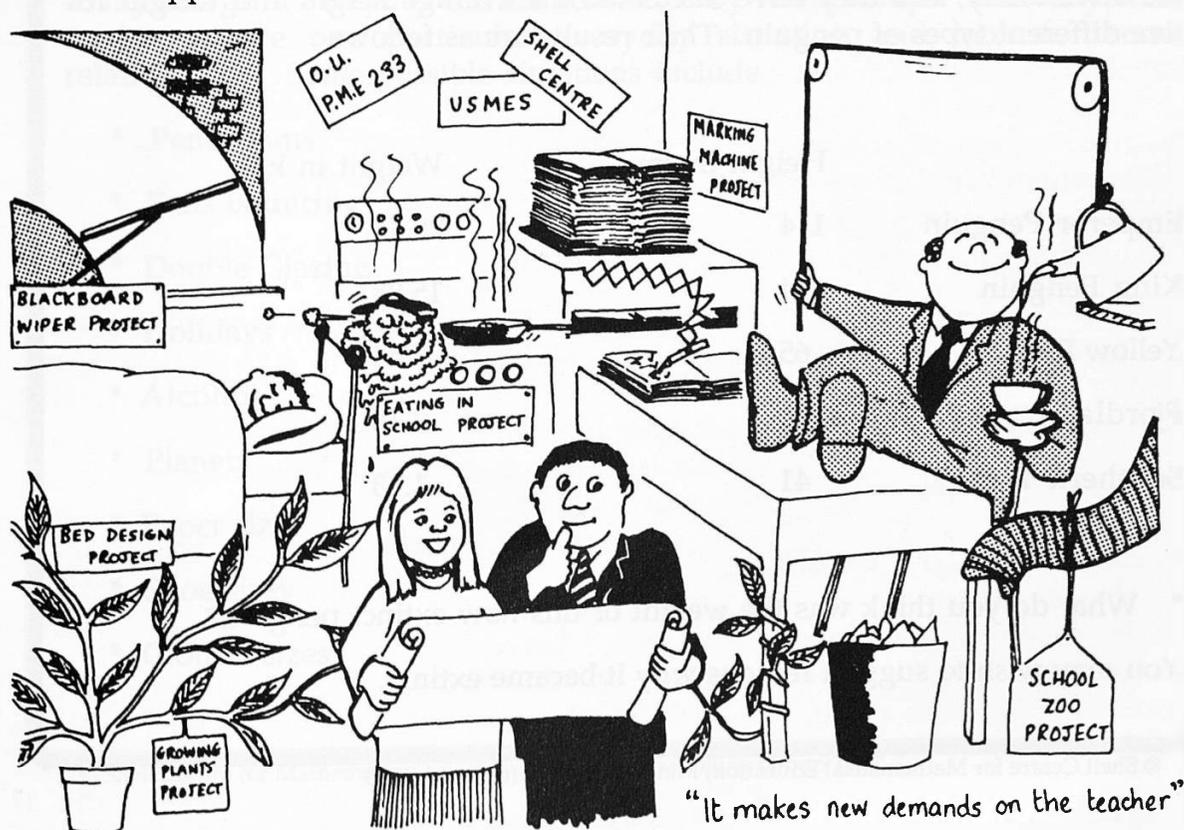
Map It Out

Fit To Eat

Alternative Tasks

General Notes

The six alternative tasks are all intended to be used in the same way as the lead task, The Celebration. The teacher's notes for each task are brief and should be read and considered in conjunction with those for The Celebration. The student's notes are in the same form as those for the lead task. The student's notes offered for the six alternative tasks in this cluster book are all written in a similar style. They outline the context of study to the student and offer one or two problems to be considered. This provides the student with an opportunity to consider the problem and gain some understanding of it. Students are then encouraged to investigate the problem in any way they wish. Some further suggestions are offered which may be used if the teacher feels this is appropriate for any individual student, group or class. These suggestions provide further ideas for investigation without prescribing exactly what should happen.



From *The Real World and Mathematics*, Hugh Burkhardt, published by Blackie and Son

RELATIONSHIPS



Scientists have discovered evidence to suggest that there was once a penguin 150cm tall.

They have measured the heights and weights of some of the penguins that are alive today, and they have calculated the average height and weight for five different types of penguin. Their results are as follows

	Height in cm	Weight in kg
Emperor Penguin	114	29.48
King Penguin	94	15.88
Yellow Eyed	65	5.44
Fjordland	56	3.18
Southern Blue	41	1.13

* What do you think was the weight of this now extinct penguin?

You may wish to suggest reasons why it became extinct.

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RELATIONSHIPS : continued



From *The Real World and Mathematics*, Hugh Burkhardt, published by Blackie and Son

Many things in everyday life are connected by relationships. You may wish to investigate one particular everyday situation and look for some relationships. Some possible situations include

- * Pendulums
- * Balls bouncing
- * Double Glazing
- * Holidays
- * Alcohol
- * Planets
- * Paper sizes
- * Shoe sizes
- * Clothes sizes

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Relationships - Teacher's Notes

Tasks such as this benefit tremendously if students are encouraged to discuss the issues involved as they work in small groups of about three or four. This introductory task is designed to encourage students to search for possible relationships between the heights and weights of existing penguins, in order to attempt to determine the probable weight of a now extinct penguin using its height.

Finding relationships between variables using a table of values such as this can be quite difficult, since errors and approximations in measurements are likely to be involved. However, if students plot weight against height for the values given, these appear to lie on a smooth curve. Students should be encouraged to suggest a range of possible relationships from merely looking at the curve. For some students, statements such as 'when the height gets bigger the weight gets even more bigger' may be appropriate. For others, mathematical symbolism and discussion may be appropriate. For example, $W \propto H^2$, $W \propto H^3$, etc. Commonsense is also often useful in such circumstances. Some students, probably those who have considered the relationship in a more mathematical form, may argue that the weight of a body is proportional to its volume and, perhaps, the volume is proportional to the cube of the height. Investigating ideas such as this for the data provided gives us

$$\frac{H^3}{W} = 50255, 52303, 50482, 55225, 60992.$$

If we make allowances for errors, it look as if

$$W = \frac{H}{37}^3 \text{ approximately.}$$

Extending their graph, or using this rough approximation, students can determine the possible weight of the extinct penguin. Some students may then chose to investigate possible relationships between the heights and weights of other things; human beings, perhaps.

However, the main task is not to solve this rather closed problem. Through discussing the

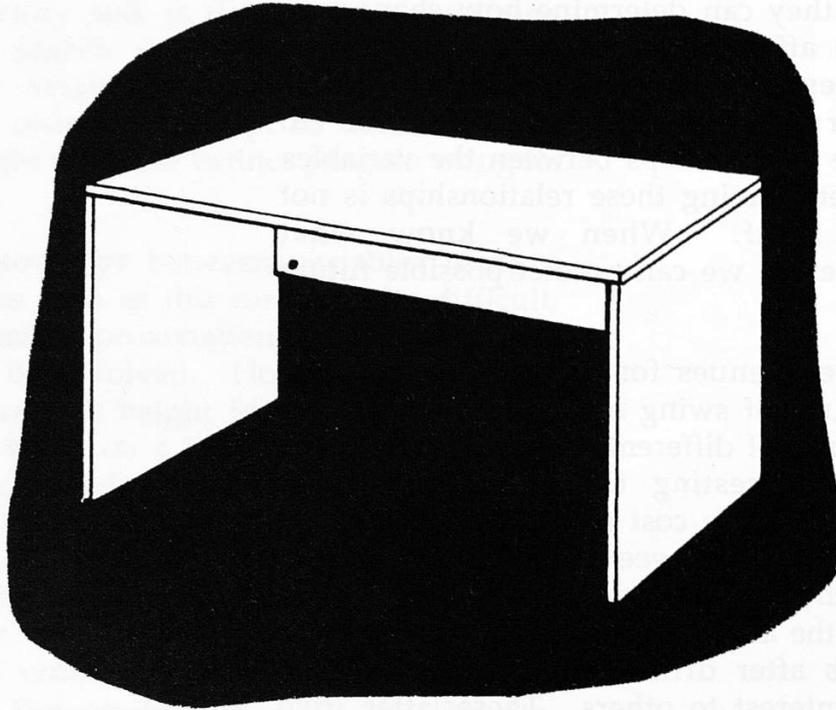
introductory task, it is intended that students should begin to consider everyday situations and to look for possible relationships between variables. It is anticipated that students will identify the variables present and that they will perform experiments, or alter one variable at a time, so that they can determine how changes in each variable affects the system. Each student needs to investigate a particular situation and collect information which enables her to determine the relationships between the variables involved. Determining these relationships is not an end in itself. When we know what relationships exist, we can predict possible future outcomes.

Some possible avenues for further investigation include the time of swing of a pendulum, or the height of bounce of different balls. Some students may find it interesting to consider everyday situations such as the cost of double glazing. Is there a relationship between the overall cost and the size of the glass needed or the perimeter? Investigating the amount of alcohol in the blood at various times after drinking different amounts, could be of interest to others. These latter two situations are discussed in *The Language of Functions and Graphs*, produced by the Shell Centre. Many further examples from this pack, including the topic of The Missing Planet are also possible areas for investigation.

Some students may find it stimulating to consider the cost of holidays in a particular brochure. Does the cost depend upon factors such as, distance travelled, the cost of hotels, number of nights? Alternatively, some students may find it stimulating to consider the prices at which they might market some items they could produce themselves. Attempting to make allowances for all the factors involved, and all the materials they would need to buy, could prove extremely interesting.

It is again important for students to feel that they own their tasks and to have some degree of choice. It may require a considerable amount of discussion if students are to find their own directions throughout their work. Our role as teacher is very much one of a listener and counsellor.

KIT IT OUT



Amjid's parents have agreed to refurbish his bedroom so that he has more space to complete his GCSE coursework tasks.

He thinks that the most important thing he needs is a large flat surface, so that he can write and spread his books around at the same time.

He is keen to get a clean, modern effect, and he has seen the desk shown above in a self-assembly pack.

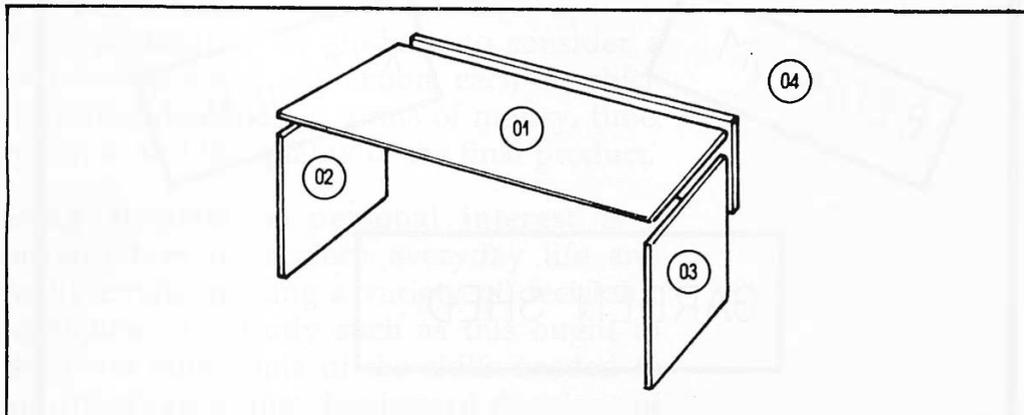
The desk top measures 120 cm x 60 cm and it is 72 cm high. The back panel is 40 cm high. It is finished in a black ash effect and it costs £34.99.

Similar black ash effect board is available in 8 feet lengths, the 60 cm width costs £11.25 and the 40 cm width costs £8.45.

Do you think he should buy the kit?

KIT IT OUT : continued

In your carton you will have...

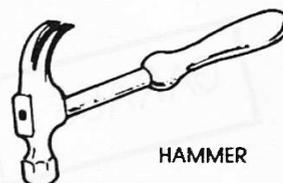


PART	NO.	QTY.	✓
Top	01	1	
Left Side	02	1	
Right Side	03	1	
Back Panel	04	1	

The tools you'll need...

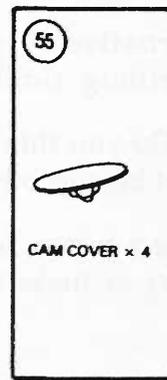
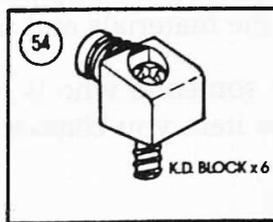
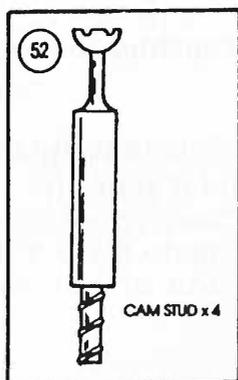
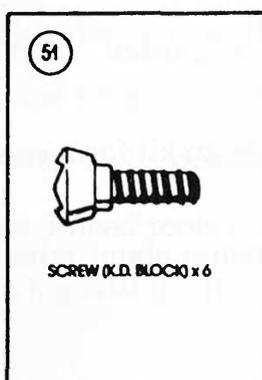


MEDIUM CROSSHEAD SCREWDRIVER

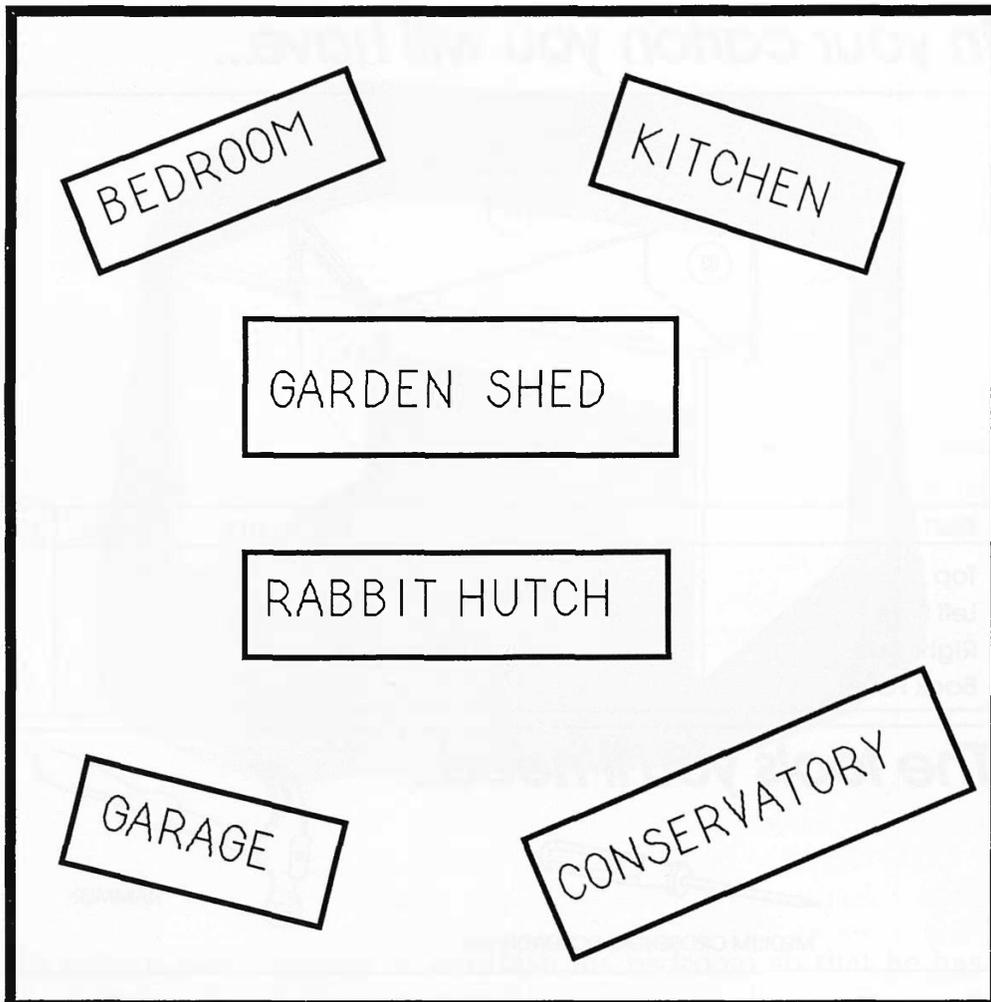


HAMMER

...and a fittings pack comprising:-



KIT IT OUT : continued



You may be interested in considering other pieces of furniture.

Alternatively, you may prefer to consider buying a garden shed or something similar.

- * Do you think it is best to buy your item in ready made, in kit form or is it best to buy the materials and build it yourself?

Write a report for someone who is trying to make a decision about whether to buy or make the item you consider.

Kit It Out - Teacher's Notes

This starting task is intended to encourage students to discuss situations in which it is possible to achieve a desired end point in several ways. It provides opportunities for students to consider a range of possible courses of action, each of which makes differing demands in terms of money, time, skills available and the quality of the final product.

Purchasing an item of personal interest is a common situation in modern everyday life and this usually entails making a variety of decisions. The completion of a study such as this ought to equip students with some of the skills needed to make informed rather than haphazard decisions of this nature.

The introductory task is straightforward and sufficient information is supplied to get students into the task as they sort out what materials they need to buy. We have deliberately chosen not to supply the costs of fittings, since we feel it more appropriate that students should discuss how they are going to construct the desk and find prices which are relevant to their needs. It may even be that students will wish to use the prices of an alternative desk and materials.

What is essential is that students should consider different ways of obtaining their desk, and that they should think about factors such as

- * How much does it cost?
- * How long does it take?
- * What skills does it need?
- * Do I need tools I don't already own?
- * What will be the quality of the final product?

etc.

The introductory task could be given to students as they work in pairs. Each pair should examine the problem in detail, then make and record their decision together with their reasons for taking this particular line of action. It is interesting then for a

later group to examine the variety of views held by the pairs of students.

After working on the introductory task, students should be able to suggest other things which are available both ready made and in kit form, and which they would find interesting to investigate.

A brainstorming session, with one student acting as a scribe, could produce a list of possibilities on the blackboard or a wall poster. The list may well include

- * A garden shed
- * A pre-erected or personally built brick garage
- * A rabbit hutch
- * Fitted wardrobes for their bedroom
- * A go-cart
- * Soccer posts and net
- * A house extension
- * Clothes
- * Packed lunches for the whole family
- * A holiday of some kind
- * A wedding reception

and many more.

As students develop their work, both on the initial task and their personal investigations, through discussion of their various endeavours, they may discover that

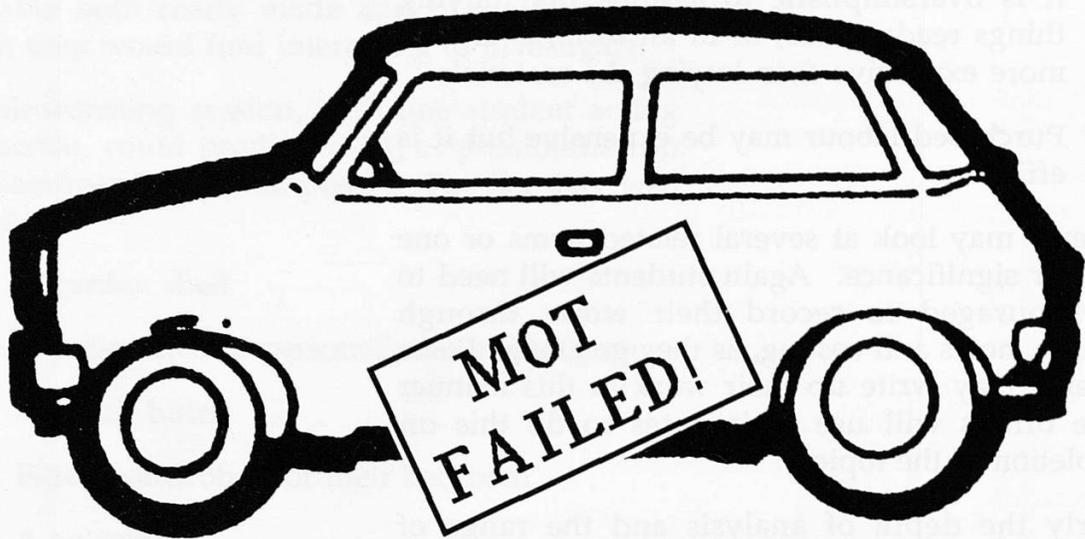
- * It can be very expensive to buy tools for a single job
- * Hiring tools, is cheaper, but are they safe and reliable?
- * Many jobs need more than one person available
- * Mistakes are easily made and they can be expensive

- * Some parts of some jobs really do need more than DIY tools and skills
- * Some decisions lead to many more decisions
- * It is oversimplistic to assume that buying things ready made, or in kit form, is always more expensive than buying the materials
- * Purchased labour may be expensive but it is efficient.

Students may look at several related items or one of major significance. Again students will need to be encouraged to record their work through sketches, notes and costing, as they go along. Some students may write up their work in this manner while others will use their notes to do this on completion of the topic.

Clearly the depth of analysis and the range of alternatives considered will depend entirely upon the ability of each individual student.

TURN IT IN?



When certain things break down we often have to make expensive decisions.

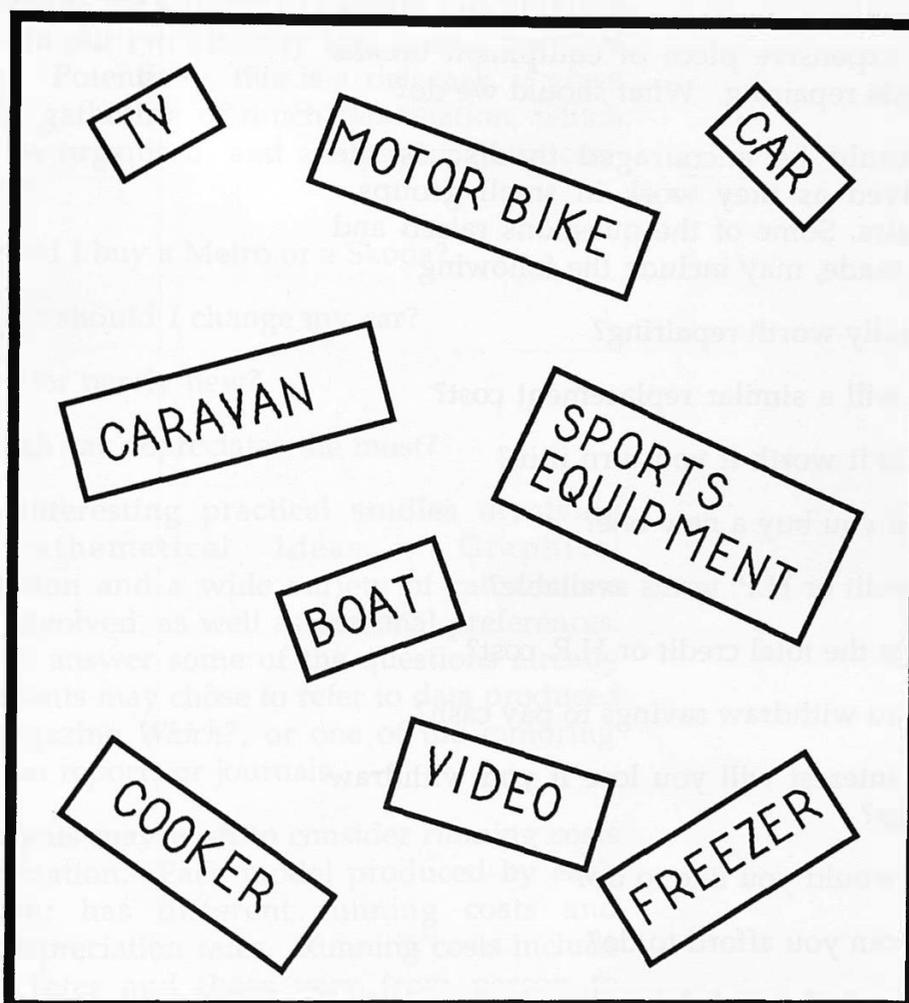
Before we can make these decisions we may need to collect some information.

When Louise had to cope with the situation in which her car had failed its MOT, she collected the following information.

	£
Cost of MOT repair	210
Could sell for scrap	30
Newish Ford Fiesta 1.1L	2 400
Old Mini - Part Exchange	<u>600</u>
Balance	<u> </u>

* What do you think she should do?

TURN IT IN: continued



You and your family may be coping with a similar situation. If so, you may wish to collect some information which will help you to make your decision.

Alternatively, you may be able to forecast that you and your family will need to make an important decision in the near future.

You may wish to investigate this situation, as fully as you can, and to collect all the information you would need if you had to make your decision now. This will help you to spring into action if a crisis situation suddenly emerges. Decisions taken in haste can be very expensive.

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Turn It In - Teacher's Notes

We have probably all experienced an event similar to the one used as a starter for this task. Our car, or some other expensive piece of equipment breaks down or needs repairing. What should we do?

Students should be encouraged to discuss the issues involved as they work in small groups, maybe in pairs. Some of the questions raised and suggestions made, may include the following

- * Is it really worth repairing?
- * What will a similar replacement cost?
- * What is it worth if you turn it in?
- * Should you buy a new one?
- * Are credit or H.P. terms available?
- * What is the total credit or H.P. cost?
- * Can you withdraw savings to pay cash?
- * What interest will you lose if you withdraw savings?
- * What would you like to do?
- * What can you afford to do?

Students may find it helpful to list the issues they need to consider on separate pieces of paper. They can then try to organise their random thoughts, as they attempt to reason their way through the argument before making their recommendations. After students have discussed the situation presented, they then need to identify a similar situation and gather some information for themselves. The list of questions they may need to answer could look quite formidable. Even a simple question such as "How much will the repair cost?" will produce a different answer from each garage approached and hence complicate the situation further. While there may be a manufacturer's recommended price for a new car, each retailer probably offers a different discount, which will depend upon whether you turn in the old one or not. If you do turn it in, the good

discount may disappear. If you decide to sell it yourself, this can cause a delay and you may not be able to sell it without its MOT.

Many students may chose to explore the situation presented in our introductory task from a personal viewpoint. Potentially, this is a rich task, it gives rise to the gathering of much information, which needs to be organised, and analysed. Questions such as

- * Should I buy a Metro or a Skoda?
- * When should I change my car?
- * New or nearly new?
- * Which car depreciates the most?

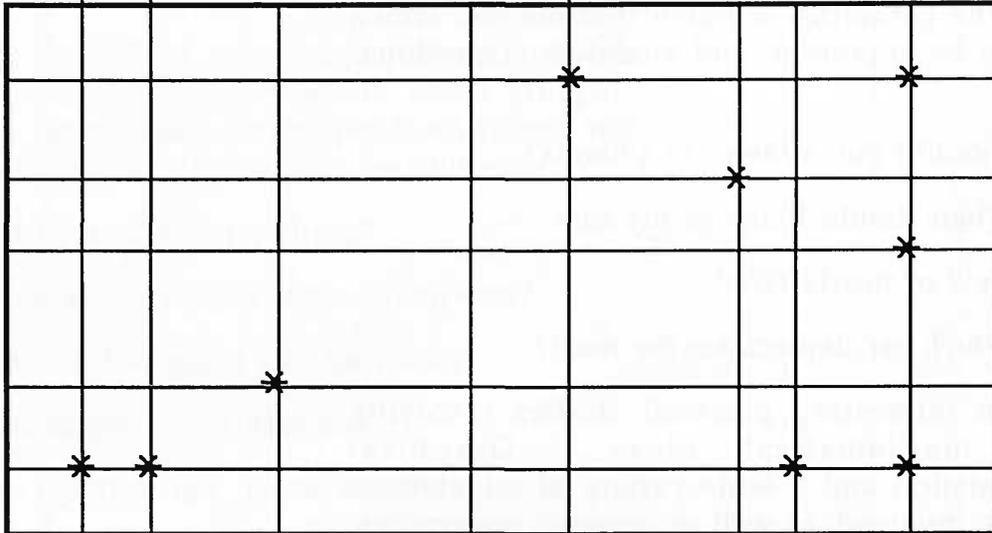
all form interesting practical studies involving many mathematical ideas. Graphical representation and a wide variety of calculations are often involved, as well as personal preferences. In order to answer some of the questions already listed, students may chose to refer to data produced by the magazine *Which?*, or one of the motoring organisation reports or journals.

Some students may wish to consider running costs and depreciation. Each model produced by each manufacturer has different running costs and different depreciation rates. Running costs include insurance rates and these vary from person to person, as well as from model to model. Is there one model which is best for one type of person and another for others?

Although many students may wish to explore situations relating to cars, other students may prefer to pursue different topics, which are of greater interest to them. It may be that some students would find it stimulating to consider issues such as, 'Should we extend our house or move home?', or other questions relating to things of personal interest. Whatever situation is considered, the issues are likely to be the same.

Most of the contexts suggested within this task will require a great deal of data collection; local newspapers, advertising magazines and trade books are all valuable sources of information.

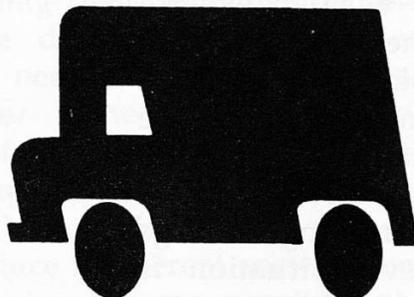
LOCATIONS



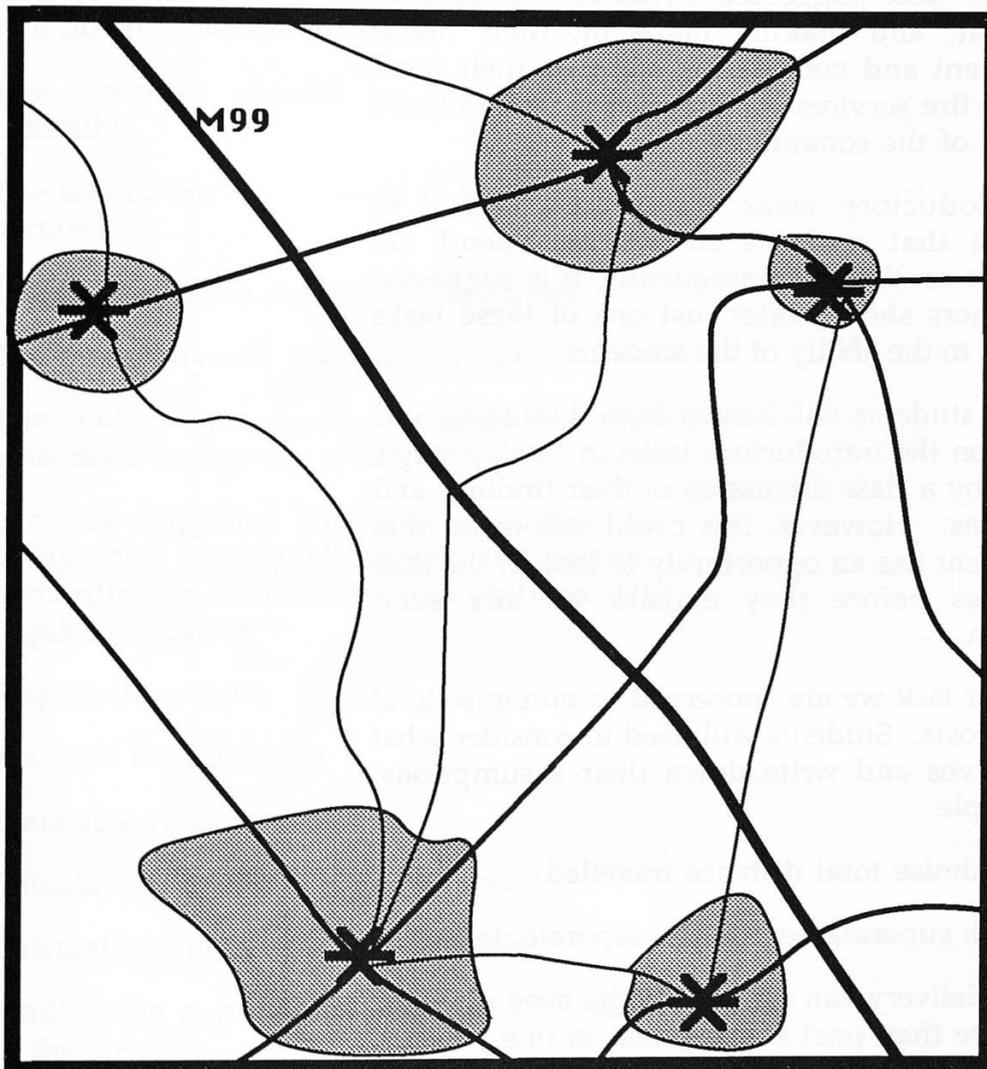
The diagram above is a map of a city in which all roads run north-south or east-west. The stars mark seven supermarkets.

A company which supplies bread daily to each of these supermarkets needs to build a new bakery.

- * Where do you think the bakery should be located so that total delivery costs are minimised?



LOCATIONS : continued



The Regional Health Authority of FITSHIRE has agreed to build a new modern hospital with equipment and amenities for the twenty first century.

- * If the hospital is to serve the whole region, where do you think it should be located?

You may find it interesting to look at a map of your own home town or city and find where the hospitals, fire service, schools, shopping centres, railway station, bus station, etc. have been located.

- * Do you think they are well placed to serve the needs of the local community?

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Locations - Teacher's Notes

The main task suggested involves students in looking at, and making maps of, their home environment and considering whether their local hospitals, fire services etc. are well placed to serve the needs of the community.

Two introductory tasks are offered, but it is important that students should not spend too much time on them. Consequently, it is suggested that teachers should offer just one of these tasks according to the ability of the students.

As usual, students will benefit from discussing and working on the introductory tasks in small groups, followed by a class discussion of their findings and suggestions. However, this could still mean that each student has an opportunity to look at the task themselves before they embark on any such discussion.

In the first task we are concerned to minimise total delivery costs. Students will need to consider what this involves and write down their assumptions. For example

- * Minimise total distance travelled
- * Each supermarket needs a separate delivery
- * A delivery van can supply the need of all (or more than one) supermarket in one journey.

Students may wish to follow up this introductory task by considering whether their home area would provide a good location for some particular new industry.

The computer program SALESMAN which is in the pack *Teaching with a Micro Maths 1* is a useful introduction to a consideration of in what order should a salesman who lives in a specific place visit ten towns to keep his journey as short as possible.

With our first task, the length of each particular stage of the journey is not crucial as long as the total distance travelled is minimised.

The second, alternative, starting task will again benefit if students discuss the issues involved as they work in small groups. In this case, students will again be making assumptions, which should be written down. These may include

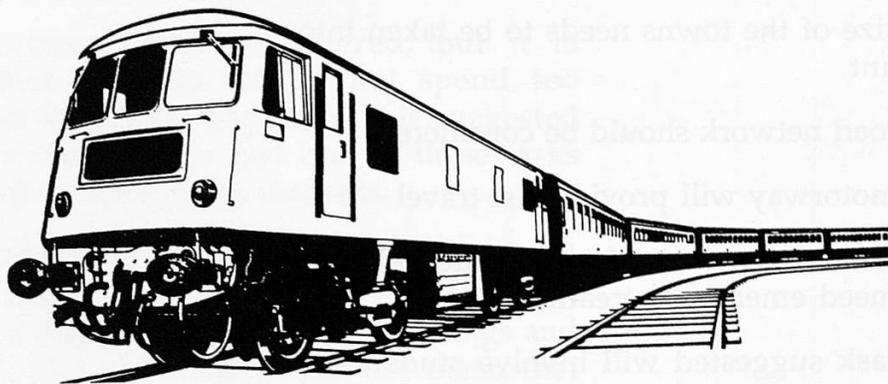
- * The hospital should be located fairly centrally
- * The size of the towns needs to be taken into account
- * The road network should be considered
- * The motorway will provide fast travel
- * The motorway may also provide patients who need emergency treatment.

The main task suggested will involve students in considering their local environment and related issues according to their individual abilities. It could require the use of

- * Map reading skills
- * Accurate map drawing
- * Timetable reading skills
- * Calculations involving time of travel
- * Calculations involving cost of travel
- * Finding the populations of towns and cities in the area
- * Finding the centre of gravity for the region when each town has been weighted appropriately for the factors which are felt to be important.

Whilst we have suggested hospitals and delivery points many other services such as schools, clubs, sports centres, churches, telephone boxes, post boxes, etc. may be considered in a local area or city community. Some work of this nature is discussed in relation to positioning a post box in *Solving Real Problems with Mathematics Vol. 2* by the Spode Group. Some students may wish to continue with the first task, working with the initial task data or that provided with the SALESMAN software.

MAP IT OUT



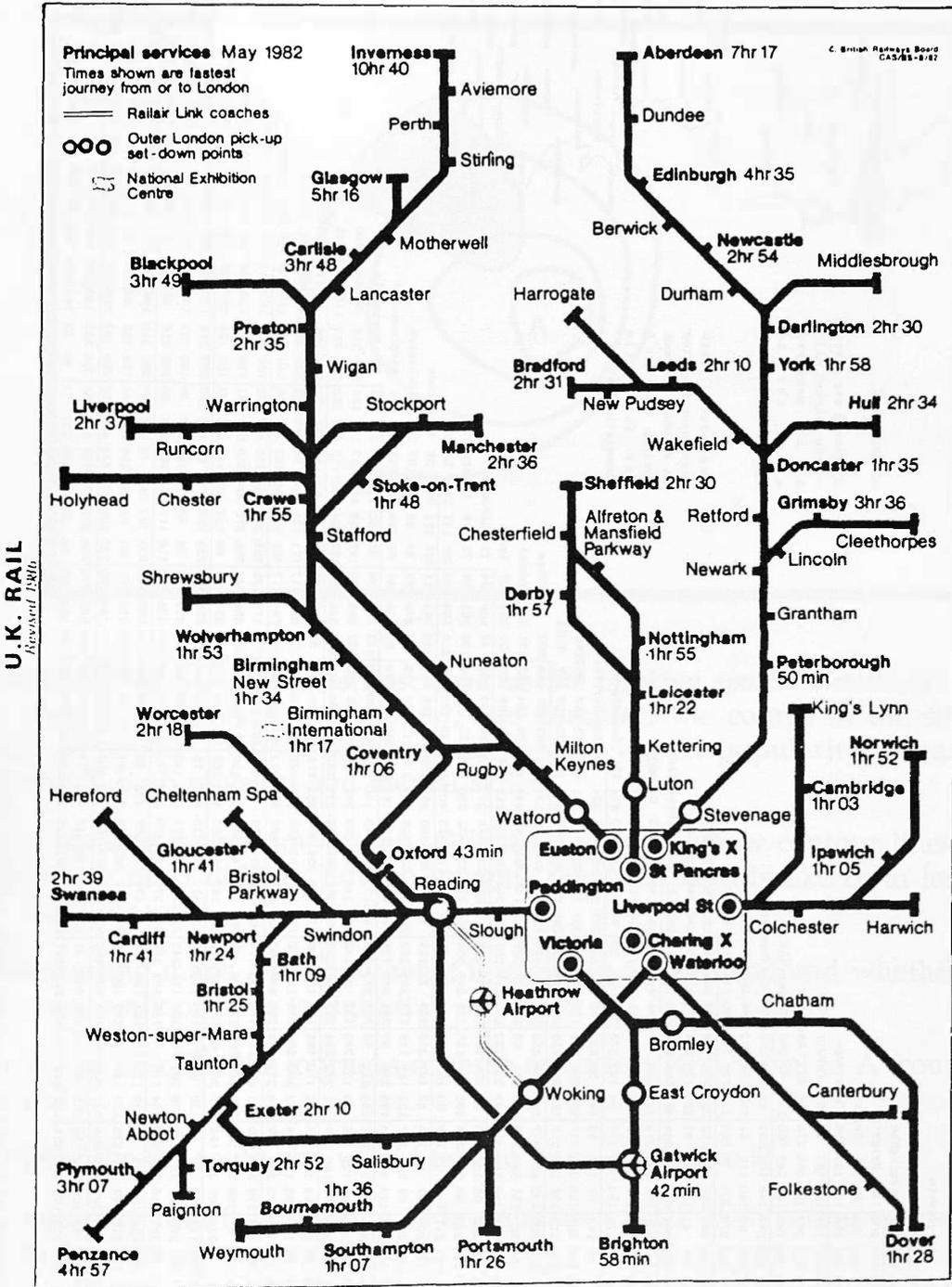
When we look at a map, we can see how far it is between different places.

In today's busy world the *time* to travel is often more important than the distance travelled.

- * If people who travel to London daily are willing to travel by train for about an hour, how far away from London can they live?
- * You may find it interesting to investigate the situation using your home area as the centre rather than London.
- * You may wish to explore your local situation for people who prefer to travel by bus or by car rather than by train.
- * You may also find it useful to consider the cost of travelling.

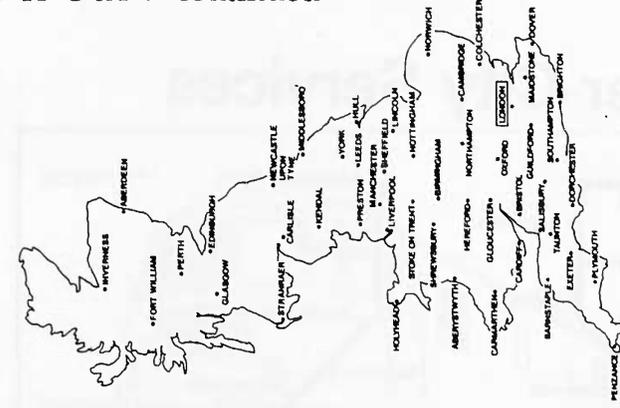
MAP IT OUT : continued

Inter-City Services



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MAP IT OUT : continued



MILEAGE CHART

Distances are given to the nearest mile and are measured along the AA recommended route.

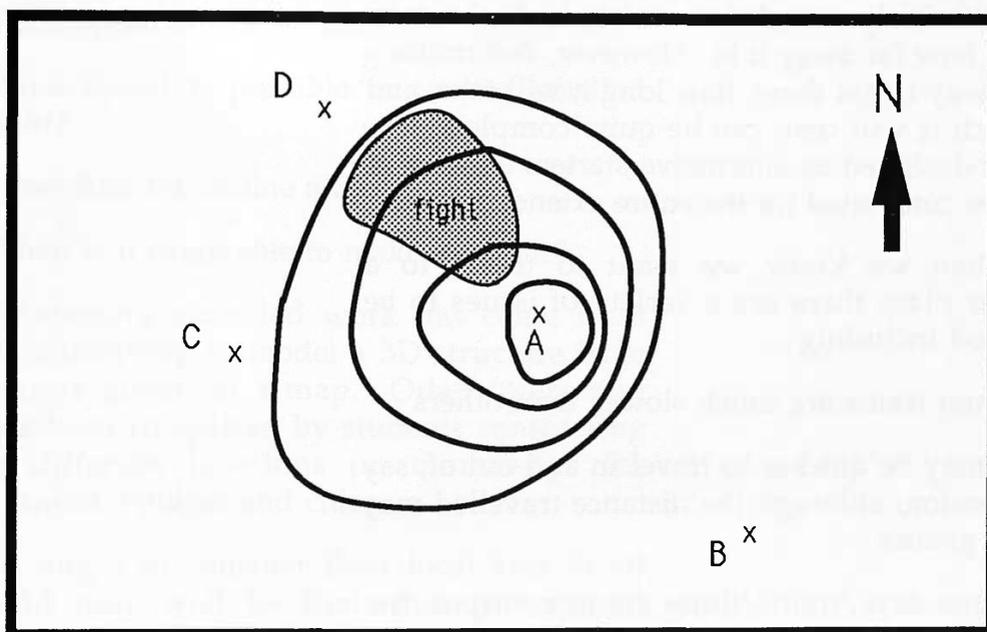
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Aberdeen	470	Aberystwyth	430
218	Barnstaple	430	119
176	Birmingham	599	268
202	Brighton	511	126
85	Bristol	468	221
101	Cambridge	533	110
122	Cardiff	234	233
186	Cardiff	234	367
197	Carlisle	520	49
265	297	133	247
282	Garmarthen	525	263
277	148	123	182
49	219	309	280
280	Colchester	588	204
86	160	118	61
179	123	352	184
186	Dorchester	595	319
270	203	78	203
127	238	393	300
111	195	Dover	520
333	464	293	467
373	337	395	96
382	390	451	460
Edinburgh	584	197	41
157	174	81	233
120	347	181	234
53	246	446	Exeter
176	430	564	402
575	484	462	505
209	494	539	561
169	135	556	Portsmouth
149	327	461	291
464	372	349	393
97	376	404	447
490	45	444	103
Glasgow	477	110	126
51	145	35	121
61	245	112	162
111	196	341	108
440	337	Gloucester	557
224	174	124	44
107	94	143	320
203	98	99	97
421	148	530	414
101	Guildford	465	79
145	58	177	53
144	58	230	85
193	130	227	328
126	427	324	31
132	Hereford	459	106
307	155	325	217
250	209	223	155
307	293	351	327
289	433	321	183
273	157	Holyhead	361
274	277	157	246
155	273	211	290
282	229	297	362
245	194	239	197
217	Hull	105	494
628	453	629	537
501	568	260	543
554	613	622	158
610	66	171	504
583	491	488	393
Inverness	285	187	321
151	320	229	218
251	49	236	272
307	347	148	301
1247	144	199	279
184	180	131	311
Kendal	336	174	305
115	253	216	143
236	122	220	198
291	268	205	288
331	215	181	220
168	165	59	367
72	Leeds	396	193
257	96	199	166
93	206	180	234
147	228	210	263
239	378	275	132
176	157	202	48
408	144	71	Lincoln
361	110	270	98
267	178	195	200
158	240	256	295
222	250	332	220
146	225	116	106
126	385	78	72
128	Liverpool	543	237
217	118	53	119
60	155	307	216
63	121	77	405
170	513	405	104
42	422	203	565
454	155	85	186
316	244	583	311
227	171	257	37
Maldeston	354	129	258
88	256	167	153
188	118	178	205
243	283	218	239
325	214	133	213
124	125	97	379
72	43	88	34
197	251	Manchester	277
242	388	170	310
263	195	286	93
291	249	332	319
145	333	302	186
235	280	238	236
87	308	80	64
128	141	252	280
113	Middleboro'	239	275
358	198	340	291
224	311	58	324
279	359	348	107
361	243	150	262
305	265	262	121
268	96	91	155
170	278	307	141
37	Newcastle	480	173
202	54	125	114
50	137	243	177
93	143	148	344
183	453	341	77
93	91	203	151
503	199	131	88
147	67	114	135
192	216	Northampton	501
283	313	161	180
217	62	252	284
297	60	238	169
365	295	492	379
183	153	206	313
153	528	250	173
106	232	115	130
183	230	258	112
Nottingham	402	157	242
59	187	151	82
170	185	193	139
206	211	268	222
397	281	118	156
121	176	92	432
163	73	36	99
128	177	71	130
156	66	123	Nottingham
497	156	170	63
113	74	82	109
260	173	115	102
135	361	152	470
354	49	60	80
212	188	523	217
172	136	164	56
98	153	230	253
41	144	104	Oxford
692	310	109	272
288	202	346	232
462	293	348	163
353	561	112	662
559	222	262	204
403	411	724	417
401	358	366	283
317	355	449	487
295	407	336	265
Penzance	83	380	510
339	514	420	385
443	144	429	439
497	506	43	494
106	60	446	467
374	372	277	115
195	251	307	269
453	487	263	192
159	388	413	316
407	607	Perth	624
239	67	199	218
125	275	164	391
227	276	92	287
488	45	589	486
150	191	168	331
341	654	344	328
279	294	215	245
281	378	410	224
336	265	193	78
537	Plymouth	692	310
109	272	288	202
346	232	462	293
348	163	353	561
112	662	559	222
262	204	403	411
724	417	401	358
366	283	317	355
449	487	295	407
336	265	Penzance	547
180	116	112	86
52	139	99	313
160	146	40	156
412	91	515	412
75	61	104	252
250	576	270	232
188	217	82	115
203	292	319	103
197	166	62	204
459	133	229	Salisbury
376	164	270	87
232	179	119	202
126	175	245	241
250	249	371	255
142	148	160	68
407	121	34	46
78	167	202	36
106	132	102	150
45	143	364	291
293	80	205	Sheffield
50	219	112	144
110	178	126	192
188	245	276	183
375	272	77	167
51	106	169	439
130	116	117	64
160	209	69	189
216	98	207	81
106	297	322	229
91	146	93	Shrewsbury
569	202	139	128
63	75	132	123
339	181	140	54
145	437	114	547
436	99	50	130
280	253	599	293
235	193	211	76
104	224	297	319
108	191	171	67
228	483	157	251
23	205	174	Southampton
387	110	219	44
217	125	139	149
156	190	205	241
252	200	360	248
94	173	118	413
107	90	89	55
156	205	44	164
188	93	176	51
111	313	297	243
64	166	52	34
191	Stoke	244	344
479	307	476	386
361	406	109	393
420	464	503	126
457	167	88	351
432	338	234	259
282	232	282	234
419	468	226	200
160	232	292	234
419	468	226	200
371	577	150	502
198	423	198	423
287	448	261	Stratford
554	166	49	126
182	50	203	87
318	149	228	41
221	415	32	515
412	77	124	95
258	269	581	270
256	209	221	167
179	208	306	335
152	264	193	121
147	462	78	231
66	221	152	89
170	428	Taunton	325
200	313	128	268
221	153	241	117
249	210	287	281
191	291	325	208
190	236	192	38
354	93	24	72
100	209	237	71
49	83	144	185
86	185	406	238
340	83	247	60
144	252	119	228
263	York		

From SALESMAN, Teaching with A Micro, Maths 1

MAP IT OUT : continued

ORIENTEERING



Orienteering is sometimes described as *the thinking sport*. Orienteers have to pass through each check point, and complete the course in the *shortest time* possible. It is a sport which is growing in popularity, because it demands both physical and mental skills.

Map reading is very important. Orienteering maps show contour lines, and orienteers need to learn how to imagine what the land is like from looking at these contours.

Orienteering maps also show what is growing on the land and whether you can run, walk or have to fight it.

- * Try to describe the journeys of three orienteers who travel to A from B, C and D.
- * Describe the route you would take to travel from B to D.
- * You may find it interesting to investigate a local orienteering course and to describe your experiences.

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Map It Out - Teacher's Notes

These introductory tasks are designed to provide an opportunity for students to discuss a variety of issues relating to travel, as they work in small groups. When we need to travel to another town or city it is fairly straightforward to look at a map and find how far away it is. However, determining the best way to get there, how long it will take, and how much it will cost, can be quite complex. The tasks are designed as alternative starters and not as a set to be completed for the entire extended task.

Even when we know we want to travel to a particular place there are a variety of issues to be considered including

- * Some trains are much slower than others
- * It may be quicker to travel in and out of, say London, although the distance travelled may be greater
- * Some days/trains/times are more expensive
- * It may be quicker to drive on to a motorway, even if the journey is much longer
- * Driving through towns and cities at certain times of day may take a long time because of heavy traffic
- * Driving through bottlenecks, such as the Dartford Tunnel on the M25, may cause considerable delays at certain times of day
- * When travelling by bicycle we need to take into account not only distance, but steep inclines.

It is important that students should move away from the starting task and begin to look at their local situation and individual circumstances, as they formulate and attempt to solve their own travel problems.

The resource sheet Orienteering is provided as a starter for students who may prefer to consider travelling on foot, and in a more rural environment. The problems which arise may appear to be different but, in essence, this task

makes similar demands on students. They need to look at maps and at the same time consider other factors

- * What does the land look like?
- * What speed can they run?
- * What speed do they walk?
- * What speed is possible in terrain labelled *fight*?
- * How does the incline affect speed?
- * When is it preferable to make a detour?

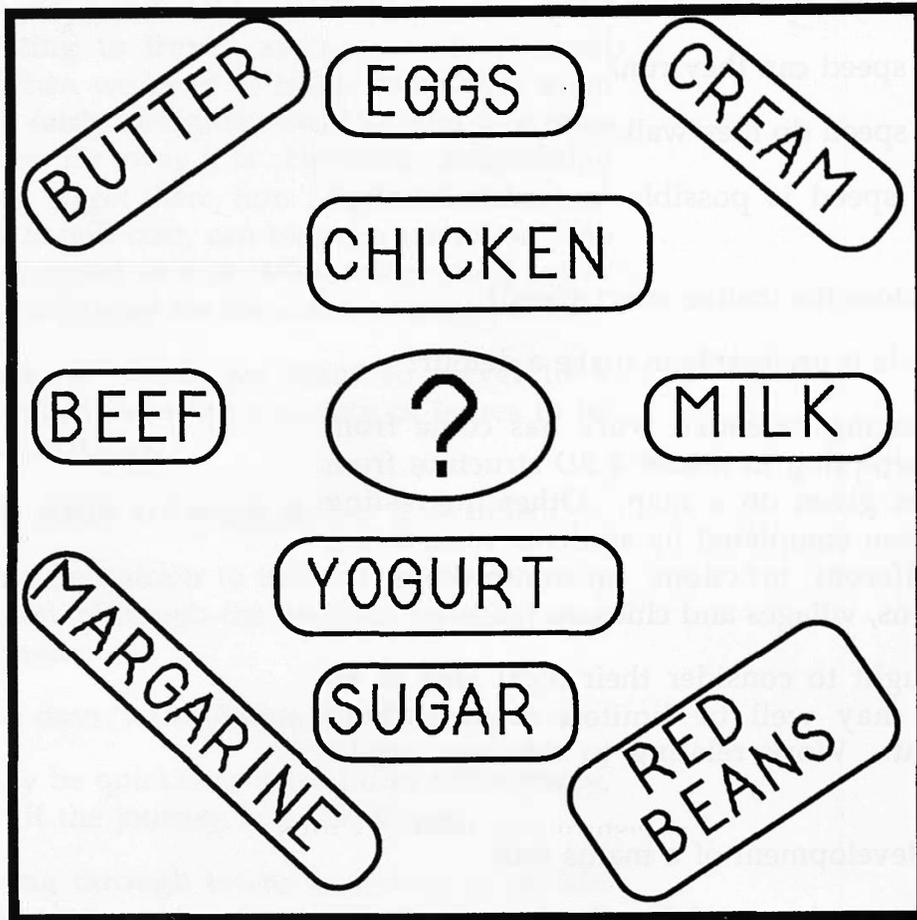
Some interesting extended work has come from students attempting to model a 3D structure from the contours given on a map. Other interesting work has been completed by students considering leaving different junctions on motorways for various towns, villages and cities.

Students ought to consider their local area at all times and may well be limited to the school environment. Work relating to this area could include

- * The development of a maths trail
- * A contoured map of the school site
- * Routes to school from all the roads in the catchment area which avoid congestion.

As with most applications in GCSE mathematics, it is important that the context for the study belongs to the student. Whilst we have suggested a few areas for student investigation it is likely that the variety of suggestions in a typical class will be much broader than those in our list. However, this particular task may be one for the more experienced group.

FIT TO EAT



Do you know what you should eat if you want to be fit and healthy?

Some people claim that you can even *boost your brain power* if you eat the right type of food.

- * Choose a meal you would enjoy from the menu on the next page.
Then choose what you think is a healthy meal from the same menu.
- * Use the information provided on the following resource sheets as you try to decide whether the food you enjoy is healthy.
Is your healthy meal *really* healthy?
- * You may find it interesting to record what you and your family eat in a normal day or week, and then try to analyse your diet.

FIT TO EAT : continued

Menu

Fruit Juice

Grapefruit

Tomato Soup

Cheese Salad

Chicken Salad

Sausages, Egg, Chips

Fishfingers, Beans, Chips

Steak, Peas, Chips

Trifle

Apple Pie with Custard

Yogurt

Orange or Banana

Roll and Butter

Baked Potato

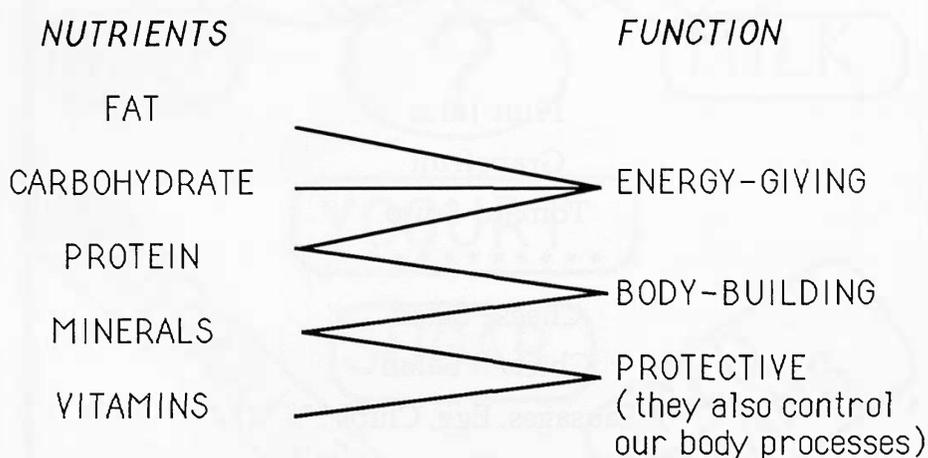
Tea, Coffee

FIT TO EAT : continued

NUTRITION

The food we eat provides us with energy, and enables us to build and repair our bodies. It also helps us to control the production of energy and the processes of growth and repair.

Most foods contain the following nutrients, which perform the functions shown.



Recommended Daily Requirements

	Energy kcal	Protein g	Iron mg	Vitamin C mg
Boys 15-17	2 880	72	12	30
Girls 15-17	2 150	53	12	30
Men 18-34 { <i>Moderately</i>	2 900	72	10	30
Men 35-64 <i>active</i> }	2 750	69	10	30
Women 18-54	2 150	54	12	30
Women Pregnant	2 400	60	13	60

Note: Many people refer to kilocalories (kcal) as calories.

FIT TO EAT : continued

FOOD

Composition per 100 g (raw edible weight except where stated)

No.	Food	Inedible waste %	Energy kcal	Energy kJ	Protein g	Fat g	Carbo-hydrate (as mono-saccharide) g	Water g	Calcium mg	Iron mg	Vitamin A (retinol equivalent) µg	Thia-min mg	Ribo-flavin mg	Nicotinic acid equivalent mg	Vitamin C mg	Vitamin D µg	No.
Milk																	
1	Cream, double	0	447	1,841	1.5	48.2	2.0	49	50	0.2	500	0.02	0.08	0.4	1	0.28	1
2	Cream, single	0	195	806	2.4	19.3	3.2	72	79	0.3	155	0.03	0.12	0.8	1	0.12	2
3	Milk, liquid, whole	0	65	272	3.3	3.8	4.7	87	120	0.1	461	0.04	0.19	0.9	2	0.03 ¹	3
4	Milk, condensed, whole sweetened	0	322	1,362	8.3	9.0	55.5	26	280	0.2	124	0.08	0.48	2.2	2	0.09	4
5	Milk, whole, evaporated	0	158	660	8.6	9.0	11.3	69	280	0.2	108	0.06	0.51	2.3	1	2.91 ³	5
6	Milk, UHT	0	65	274	3.3	3.8	4.7	88	120	0.1	40	0.04	0.19	0.9	0	0.02	6
7	Milk, dried, skimmed	0	355	1,512	36.4	1.3	52.8	4	1,190	0.4	0	0.42	1.60	9.7	6	0	7
8	Yogurt, low fat, natural	0	52	216	5.0	1.0	6.2	86	180	0.1	10	0.05	0.26	1.2	0	0.01	8
9	Yogurt, low fat, fruit	0	95	405	4.8	1.0	17.9	75	160	0.2	22	0.05	0.23	1.1	2	0.01	9
Cheese																	
10	Cheese, Cheddar	0	406	1,682	26.0	33.5	0	37	800	0.4	412	0.04	0.50	6.2	0	0.26	10
11	Cheese, cottage	0	96	402	13.6	4.0	1.4	79	60	0.1	41	0.02	0.19	3.3	0	0.02	11
Meat																	
12	Bacon, rashers, raw	11	422	1,744	14.4	40.5	0	41	7	1.0	0	0.36	0.14	5.8	0	0	12
13	Bacon, rashers, cooked	0	447	1,851	24.5	38.8	0	32	12	1.4	0	0.40	0.18	9.2	0	0	13
14	Beef, average, raw	17	266	1,107	17.1	22.0	0	64	8	1.8	0	0.05	0.17	7.3	0	0	14
15	Beef, corned	0	217	905	26.9	12.1	0	58	14	2.9	0	0.01	0.23	9.0	0	0	15
16	Beef, stewing steak, raw	3	176	736	20.2	10.6	0	69	8	2.1	0	0.06	0.23	8.5	0	0	16
17	Beef, stewing steak, cooked	0	223	932	30.9	11.0	0	57	15	3.0	0	0.03	0.33	10.2	0	0	17
18	Black pudding	0	305	1,270	12.9	21.9	15.0	44	35	20.0	0	0.09	0.07	3.8	0	0	18
19	Chicken, raw	33	230	954	17.6	17.7	0	65	10	0.7	0	0.08	0.14	9.3	0	0	19
20	Chicken, roast, light meat	0	142	599	26.5	4.0	0	69	9	0.5	0	0.08	0.14	15.3	0	0	20
21	Ham, cooked	0	269	1,119	24.7	18.9	0	54	9	1.3	0	0.44	0.15	8.0	0	0	21
22	Kidney, average	12	89	375	16.2	2.7	0	79	9	6.0	120	0.39	1.90	10.7	10	0	22
23	Lamb, average, raw	17	335	1,388	15.9	30.2	0	53	7	1.3	0	0.09	0.19	7.4	0	0	23
24	Lamb, roast	25	291	1,209	23.0	22.1	0	54	9	2.1	0	0.10	0.25	9.2	0	0	24
25	Liver, average, raw	0	162	680	20.7	8.1	2.0	69	6	11.4	14,670	0.26	3.10	18.1	16	0.75	25
26	Liver, fried	0	243	1,016	24.9	13.6	5.6	56	14	8.8	19,010	0.26	4.30	20.4	12	0.38	26
27	Luncheon meat	0	313	1,298	12.6	26.9	5.5	52	15	1.1	0	0.07	0.12	4.5	0	0	27
28	Pork, average, raw	26	325	1,343	16.0	29.0	0	54	8	0.8	0	0.59	0.16	7.0	0	0	28
29	Pork chop, grilled	22	332	1,380	28.5	24.2	0	46	11	1.2	0	0.66	0.20	11.0	0	0	29
30	Sausage, pork	0	367	1,520	10.6	32.1	9.5	45	41	1.1	0	0.04	0.12	5.7	0	0	30
31	Sausage beef	0	299	1,242	9.6	24.1	11.7	50	48	1.4	0	0.03	0.13	7.1	0	0	31
32	Steak and kidney pie, cooked	0	286	1,195	15.2	18.3	14.6	49	37	2.8	126	0.14	0.52	6.8	2	0.55	32
33	Tripe, dressed	0	60	252	9.4	2.5	0	88	75	0.5	0	0	0.01	2.1	0	0	33

1 Summer value 2 Winter value 3 fortified

From A Manual of Nutrition, Ministry of Agriculture, Fisheries and Food, HMSO

FIT TO EAT : continued

Composition per 100 g

No.	Food	Inedible waste %	Energy kcal	Energy kJ	Protein g	Fat g	Carbo-hydrate (as mono-saccharide) g	Water g	Calcium mg	Iron mg	Vitamin A (retinol equivalent) µg	Thia-min mg	Ribo-flavin mg	Nicotinic acid equivalent mg	Vitamin C mg	Vitamin D µg	No.
Fish																	
34	White fish, filleted	5	76	322	17.4	0.7	0	82	16	0.3	0	0.08	0.07	4.9	0	0	34
35	Cod, fried in batter	0	199	834	19.6	10.3	7.5	61	80	0.5	0	0.04	0.10	6.7	0	0	35
36	Fish fingers	0	178	749	12.6	7.5	16.1	64	43	0.7	0	0.09	0.06	3.1	0	0	36
37	Herring	37	234	970	16.8	18.5 ⁵	0	64	33	0.8	45	0	0.18	7.1	0	22.50	37
38	Kipper fillets	2	184	770	19.8	11.7 ⁵	0	68	60	1.2	45	0.02	0.30	7.0	0	22.25	38
39	Salmon, canned	6	155	649	20.3	8.2	0	70	93	1.4	90	0.04	0.18	10.8	0	12.50	39
40	Sardines, canned in oil, fish only	7	217	906	23.7	13.6	0	58	550	2.9	0	0.04	0.36	12.6	0	7.50	40
Eggs																	
41	Eggs, fresh	12	147	612	12.3	10.9	0	75	52	2.0	140	0.09	0.47	3.7	0	1.75	41
Fats																	
42	Butter	0	740	3,041	0.4	82.0	0	15	15	0.2	985	0	0	0.1	0	0.76	42
43	Lard; cooking fat; dripping	0	892	3,667	0	99.1	0	1	1	0.1	0	0	0	0	0	0	43
44	Low-fat spread	0	366	1,506	0	40.7	0	57	0	0	900 ³	0	0	0	0	7.94 ³	44
45	Margarine, average	0	730	3,000	0.1	81.0	0	16	4	0.3	900 ³	0	0	0.1	0	7.94 ³	45
46	Oils, cooking and salad	0	899	3,696	0	99.9	0	0	0	0	0	0	0	0	0	0	46
Preserves, etc.																	
47	Chocolate, milk	0	529	2,214	8.4	30.3	59.4	2	220	1.6	6.6	0.10	0.23	1.6	0	0	47
48	Honey	0	288	1,229	0.4	0	76.4	23	5	0.4	0	0	0.05	0.2	0	0	48
49	Jam	0	262	1,116	0.5	0	69.2	30	18	1.2	2	0	0	0	10	0	49
50	Marmalade	0	261	1,114	0.1	0	69.5	28	35	0.6	8	0	0	0	10	0	50
51	Sugar, white	0	394	1,680	0	0	105.0	0	2	0	0	0	0	0	0	0	51
52	Syrup	0	298	1,269	0.3	0	79.0	20	26	1.5	0	0	0	0	0	0	52
Vegetables																	
53	Beans, canned in tomato sauce	0	64	270	5.1	0.5	10.3	74	45	1.4	50	0.07	0.05	1.3	0	0	53
54	Beans, broad	75	69	293	7.2	0.5	9.5	77	30	1.1	22	0.28	0.05	5.0	0	0	54
55	Beans, haricot, dry	0	271	1,151	21.4	1.6	45.5	11	180	6.7	0	0.45	0.13	5.9	0	0	55
56	Beans, runner	14	24	102	2.3	0	3.9	89	27	0.8	50	0.05	0.10	1.3	0	0	56
57	Beetroot, boiled	20	44	189	1.8	0	9.9	83	50	0.7	0	0.02	0.04	0.4	5	0	57
58	Brussels sprouts, raw	25	26	111	4.0	0	2.7	88	32	0.7	67	0.10	0.15	1.5	0	0	58
59	Brussels sprouts, boiled	0	18	75	2.8	0	1.7	92	25	0.5	67	0.10	0.10	0.9	41	0	59
60	Cabbage, green, raw	30	22	92	2.8	0	2.8	88	57	0.6	50	0.06	0.05	0.8	53	0	60
61	Cabbage, green, boiled	0	15	66	1.7	0	2.3	93	38	0.4	50	0.03	0.03	0.5	23	0	61

⁵ Fat content varies throughout the year between 10 and 25 per cent. ³ fortified.

From A Manual of Nutrition, Ministry of Agriculture, Fisheries and Food, HMSO

FIT TO EAT : continued

Composition per 100 g

No.	Food	Inedible waste %	Energy kcal	Energy kJ	Protein g	Fat g	Carbo-hydrate (as mono-saccharide) g	Water g	Calcium mg	Iron mg	Vitamin A (retinol equivalent) µg	Thia-min mg	Ribo-flavin mg	Nicotinic acid equivalent mg	Vitamin C mg	Vitamin D µg	No.
62	Carrots, old	4	23	98	0.7	0	5.4	90	48	0.6	2,000	0.06	0.05	0.7	6	0	62
63	Cauliflower	30	13	56	1.9	0	1.5	93	21	0.5	5	0.10	0.10	1.1	64	0	63
64	Celery	27	8	36	0.9	0	1.3	94	52	0.6	0	0.03	0.03	0.5	7	0	64
65	Crisps, potato	0	533	2,224	6.3	35.9	49.3	3	37	2.1	0	0.19	0.07	6.1	17	0	65
66	Cucumber	23	9	39	0.6	0	1.8	96	23	0.3	0	0.04	0.04	0.3	8	0	66
67	Leentils, dry	0	304	1,293	23.8	1.0	53.2	12	39	7.6	10	0.50	0.20	5.8	0	0	67
68	Lettuce	20	9	36	1.0	0	1.2	96	23	0.9	167	0.07	0.08	0.4	15	0	68
69	Mushrooms	25	7	31	1.8	0	0	92	3	1.0	0	0.10	0.40	4.6	3	0	69
70	Onions	3	23	99	0.9	0	5.2	93	31	0.3	0	0.03	0.05	0.4	10	0	70
71	Parsnips	26	49	210	1.7	0	11.3	83	55	0.6	0	0.10	0.08	1.3	15	0	71
72	Peas, frozen, raw	0	50	212	5.7	0	7.2	79	33	1.5	50	0.32	0.10	3.0	17	0	72
73	Peas, frozen, boiled	0	38	161	5.4	7.7	4.3	81	31	1.4	50	0.24	0.07	2.4	13	0	73
74	Peas, canned, processed	35	76	325	6.2	0	13.7	72	27	1.5	67	0.10	0.04	1.5	0	0	74
75	Peppers, green	14	12	51	0.9	0	2.2	94	9	0.4	33	0.08	0.03	0.9	100	0	75
76	Potatoes, raw	27 ⁶ 14 ⁷	86	369	2.1	0	20.8	76	8	0.5	0	0.11	0.04	1.7	8-30 ⁸	0	76
77	Potatoes, boiled	0	79	339	1.4	0	19.7	81	4	0.3	0	0.08	0.03	1.1	5-18 ⁸	0	77
78	Potato chips, fried	0	253	1,065	3.8	10.9	37.3	47	14	0.9	0	0.10	0.04	2.1	6-21 ⁸	0	78
79	Potatoes, roast	0	157	662	2.8	4.8	27.3	64	10	0.7	0	0.10	0.04	1.9	6-21 ⁸	0	79
80	Spinach	25	21	91	2.7	0	2.8	91	70	3.2	1,000	0.12	0.20	1.3	60	0	80
81	Sweet corn, canned	0	76	325	2.9	0.5	16.1	73	3	0.6	35	0.05	0.08	0.3	4	0	81
82	Tomatoes, fresh	0	14	60	0.9	0	2.8	93	13	0.4	100	0.06	0.04	0.8	20 ⁹	0	82
83	Turnips	16	17	74	0.8	0	3.8	93	59	0.4	0	0.04	0.05	0.8	25	0	83
84	Watercress	23	14	61	2.9	0	0.7	91	220	1.6	500	0.10	0.10	1.1	60	0	84
Fruit																	
85	Apples	20	46	196	0.3	0	11.9	84	4	0.3	5	0.04	0.02	0.1	5	0	85
86	Apricots, canned (including syrup)	0	106	452	0.5	0	27.7	68	12	0.7	166	0.02	0.01	0.4	2	0	86
87	Apricots, dried	0	182	772	4.8	0	43.4	15	92	4.1	600	0	0.20	3.8	0	0	87
88	Bananas	40	76	326	1.1	0	19.2	71	7	0.4	33	0.04	0.07	0.8	10	0	88
89	Blackcurrants	2	28	121	0.9	0	6.6	77	60	1.3	33	0.03	0.06	0.4	200	0	89
90	Cherries	13	47	201	0.6	0	11.9	82	16	0.4	20	0.05	0.07	0.4	5	0	90
91	Dates, dried	14	248	1,056	2.0	0	63.9	15	68	1.6	10	0.07	0.04	2.9	0	0	91
92	Figs, dried	0	213	908	3.6	0	52.9	17	280	4.2	8	0.10	0.08	2.2	0	0	92
93	Gooseberries, green	1	17	73	1.1	0	3.4	90	28	0.3	30	0.04	0.03	0.5	40	0	93
94	Grapefruit	50	22	95	0.6	0	5.3	91	17	0.3	0	0.05	0.02	0.3	40	0	94
95	Lemon juice	64	7	31	0.3	0	1.6	91	8	0.1	0	0.02	0.01	0.1	50	0	95
96	Melon	40	23	97	0.8	0	5.2	94	16	0.4	175	0.05	0.03	0.5	25	0	96
97	Oranges	25	35	150	0.8	0	8.5	86	41	0.3	8	0.10	0.03	0.3	50	0	97

⁶ old potatoes ⁷ new potatoes

⁸ vitamin C falls during storage

⁹ Feb, 27; May, 14; Aug, 20; Nov, 21 mg per 100 g

 From *A Manual of Nutrition*, Ministry of Agriculture, Fisheries and Food, HMSO

FIT TO EAT : continued

Composition per 100 g																	
No.	Food	Inedible waste %	Energy kcal	kJ	Protein g	Fat g	Carbo-hydrate (as mono-saccharide) g	Water g	Calcium mg	Iron mg	Vitamin A (retinol equivalent) µg	Thia-min mg	Ribo-flavin mg	Nicotinic acid equivalent mg	Vitamin C mg	Vitamin D µg	No.
98	Orange juice, canned, unsweetened	0	33	143	0.4	0	8.5	89	9	0.5	8	0.07	0.02	0.3	35	0	98
99	Peaches, fresh	13	37	156	0.6	0	9.1	86	5	0.4	83	0.02	0.05	1.1	8	0	99
100	Peaches, canned (including syrup)	0	87	373	0.4	0	22.9	74	4	0.4	41	0.01	0.02	0.6	4	0	100
101	Pears, fresh	28	41	175	0.3	0	10.6	83	8	0.2	2	0.03	0.03	0.3	3	0	101
102	Pineapple, canned (including syrup)	0	77	328	0.3	0	20.2	77	13	0.4	7	0.05	0.02	0.2	12	0	102
103	Plums	8	32	137	0.6	0	7.9	85	12	0.3	37	0.05	0.03	0.6	3	0	103
104	Prunes, dried	17	161	686	2.4	0	40.3	23	38	2.9	160	0.10	0.20	1.9	0	0	104
105	Raspberries	0	25	105	0.9	0	5.6	83	41	1.2	13	0.02	0.03	0.5	25	0	105
106	Rhubarb	33	6	26	0.6	0	1.0	94	100	0.4	10	0.01	0.03	0.4	0	0	106
107	Strawberries	3	26	109	0.6	0	6.2	89	22	0.7	5	0.02	0.03	0.5	60	0	107
108	Sultanas	0	250	1,066	1.8	0	64.7	18	52	1.8	5	0.10	0.08	0.6	0	0	108
109	Nuts																
109	Almonds	63	565	2,336	16.9	53.5	4.3	5	250	4.2	0	0.24	0.92	4.7	0	0	109
110	Coconut, desiccated	0	604	2,492	5.6	62.0	6.4	2	22	3.6	0	0.06	0.04	1.8	0	0	110
111	Peanuts, roasted	0	570	2,364	24.3	49.0	8.6	5	61	2.0	0	0.23	0.10	21.3	0	0	111
112	Cereals																
112	Barley, pearl, dry	0	360	1,535	7.9	1.7	83.6	11	10	0.7	0	0.12	0.05	2.3	0	0	112
113	Biscuits, chocolate	0	524	2,197	5.7	27.6	67.4	2	110	1.7	0	0.03	0.13	1.4	0	0	113
114	Biscuits, cream crackers	0	440	1,857	9.5	16.3	68.3	4	110	1.7	0	0.13	0.08	2.5	0	0	114
115	Biscuits, plain, semi-sweet	0	457	1,925	6.7	16.6	74.8	3	120	2.1	0	0.13	0.08	2.0	0	0	115
116	Biscuits, rich, sweet	0	469	1,966	6.2	23.4	62.2	3	87	1.8	0	0.16	0.04	1.7	0	0	116
117	Bread, brown	0	223	948	8.9	2.2	44.7	40	100	2.5	0	0.24	0.06	2.4	0	0	117
118	Bread, starch reduced	0	234	996	10.5	1.5	47.6	36	100	1.3	0	0.18	0.03	2.7	0	0	118
119	Bread, white	0	233	991	7.8	1.7	49.7	39	100	1.7	0	0.18	0.03	2.2	0	0	119
120	Bread, wholemeal	0	216	918	8.8	2.7	41.8	40	23	2.5	0	0.26	0.06	1.7	0	0	120
121	Cornflakes	0	368	1,567	8.6	1.6	85.1	3	3	6.73	0	1.80 ³	1.60 ³	21.3 ³	0	2.8 ³	121
122	Custard powder, instant pudding, cornflour	0	354	1,508	0.6	0.7	92.0	12	15	1.4	0	0	0	0.1	0	0	122
123	Crispbread, rye	0	321	1,367	9.4	2.1	70.6	6	50	3.7	0	0.28	0.14	1.8	0	0	123
124	Flour, white	0	350	1,493	9.8	1.2	80.1	13	150 ³	2.4 ³	0	0.33 ³	0.02	2.8 ³	0	0	124
125	Oatmeal	0	401	1,698	12.4	8.7	72.8	9	55	4.1	0	0.50	0.10	2.8	0	0	125
126	Rice	0	361	1,536	6.5	1.0	86.8	12	4	0.5	0	0.08	0.03	1.5	0	0	126
127	Spaghetti	0	378	1,612	13.6	1.0	84.0	11	23	1.2	0	0.14	0.06	2.8	0	0	127

³ fortified ⁴ unfortified

From A Manual of Nutrition, Ministry of Agriculture, Fisheries and Food, HMSO

FIT TO EAT : continued

Composition per 100 g

No.	Food	Inedible waste %	Energy kcal	Energy kJ	Protein g	Fat g	Carbo-hydrate (as mono-saccharide) g	Water g	Calcium mg	Iron mg	Vitamin A (retinol equivalent) µg	Thia-min mg	Ribo-flavin mg	Nicotinic acid equivalent mg	Vitamin C mg	Vitamin D µg	No.
Beverages																	
129	Chocolate, drinking	0	366	1,554	5.5	6.0	77.4	2	33	2.4	2	0.06	0.04	2.1	0	0	129
130	Cocoa powder	0	312	1,301	18.5	21.7	11.5	3	130	10.5	7	0.16	0.06	7.3	0	0	130
131	Coffee, ground, infusion	0	3	12	0.3	0	0.4	—	3	0	0	0	0.20	10.0	0	0	131
132	Coffee, instant powder	0	100	424	14.6	0	11.0	3	160	4.4	0	0	0.11	25.1	0	0	132
133	Coca cola	0	39	168	0	0	10.5	90	4	0	0	0	0	0	0	0	133
134	Tea, dry	0	0	0	0	0	0	—	0	0	0	0	0.900 ¹⁰	0	0	0	134
135	Squash, fruit, undiluted	0	122	521	0.1	0.1	32.2	63	16	0.2	0	0	0.01	0	1	0	135
Alcoholic beverages per 100 ml																	
136	Beer, keg, bitter	0	31	129	0.3	0	2.3	—	8	0	0	0	0.03	0.5	0	0	136
137	Spirits, 70° proof	0	222	919	0	0	0	—	0	0	0	0	0	0	0	0	137
138	Wine, red	0	68	284	0.2	0	0.3	—	7	0.9	0	0.01	0.02	0.1	0	0	138
Puddings and cakes etc.																	
139	Apple pie	0	281	1,179	3.2	14.4	40.4	42	42	0.8	2	0.08	0.02	0.9	2	0	139
140	Bread and butter pudding	0	154	649	5.3	7.1	18.5	67	112	0.7	79	0.06	0.22	1.5	1.5	0.30	140
141	Buns, currant	0	328	1,385	7.8	8.5	58.6	25	88	1.6	24	0.15	0.10	2.0	0	0.27	141
142	Custard	0	118	496	3.8	4.4	16.8	75	140	0.1	43	0.05	0.21	1.0	0	0.03	142
143	Fruit cake, rich	0	332	1,403	3.7	11.0	58.3	21	75	1.8	121	0.08	0.08	1.2	0	1.14	143
144	Jam tarts	0	384	1,616	3.5	14.9	62.8	19	62	1.6	0	0.08	0.01	1.1	4	0	144
145	Plain cake, Madeira	0	393	1,652	5.4	16.9	58.4	20	42	1.1	82	0.06	0.11	1.4	0	1.20	145
146	Rice pudding	0	131	552	4.1	4.2	20.2	72	130	0.1	33	0.04	0.14	1.1	1	0.02	146
147	Soup, tomato, canned	0	55	230	0.8	3.3	5.9	84	17	0.4	35	0.03	0.02	0.2	0	0	147
148	Trifle	0	160	674	3.5	6.1	24.3	65	82	0.7	60	0.05	0.14	1.0	1	0.17	148
149	Marmite	0	172	730	39.7	0.7	1.8	25	95	3.7	0	3.10	11.00	67.0	0	0	149
150	Ice-cream, vanilla	0	166	698	3.5	7.4	22.8	65	130	0.3	7	0.04	0.17	1.0	1	0	150

¹⁰ 90 to 100 per cent is extracted into an infusion

From A Manual of Nutrition, Ministry of Agriculture, Fisheries and Food, HMSO

FIT TO EAT : continued

Recommended daily amounts of nutrients for population groups
(Department of Health and Social Security, 1979)

Age ranges years	Energy MJ	kcal	g	mg	µg	Vitamin A (retinol equivalent)	mg	Thiamin	mg	Riboflavin	mg	Nicotinic acid equivalent	µg	Total folic acid	mg	Vitamin C	µg	Vitamin D ¹	
Boys																			
Under 1	3.25	780	19	600	6	450	0.3	0.3	0.4	0.4	5	50	20	50	20	7.5			
1	5.0	1,200	30	600	7	300	0.5	0.4	0.6	0.6	7	100	20	100	20	10	10		
2	5.75	1,400	35	600	7	300	0.6	0.6	0.7	0.7	8	100	20	100	20	10	10		
3-4	6.5	1,560	39	600	8	300	0.6	0.6	0.8	0.8	9	100	20	100	20	10	10		
5-6	7.25	1,740	43	600	10	300	0.7	0.7	0.9	0.9	10	200	20	200	20	—	—		
7-8	8.25	1,980	49	600	10	400	0.8	0.8	1.0	1.0	11	200	20	200	25	—	—		
9-11	9.5	2,280	56	700	12	575	0.9	0.9	1.2	1.2	14	200	25	300	25	—	—		
12-14	11.0	2,640	66	700	12	725	1.1	1.1	1.4	1.4	16	300	25	300	25	—	—		
15-17	12.0	2,880	72	600	12	750	1.2	1.2	1.7	1.7	19	300	30	300	30	—	—		
Girls																			
Under 1	3.0	720	18	600	6	450	0.3	0.3	0.4	0.4	5	50	20	50	20	7.5			
1	4.5	1,100	27	600	7	300	0.4	0.4	0.6	0.6	7	100	20	100	20	10	10		
2	5.5	1,300	32	600	7	300	0.5	0.5	0.7	0.7	8	100	20	100	20	10	10		
3-4	6.25	1,500	37	600	8	300	0.6	0.6	0.8	0.8	9	100	20	100	20	10	10		
5-6	7.0	1,680	42	600	10	300	0.7	0.7	0.9	0.9	10	200	20	200	20	—	—		
7-8	8.0	1,900	48	600	10	400	0.8	0.8	1.0	1.0	11	200	20	200	20	—	—		
9-11	8.5	2,050	51	700	12 ²	575	0.8	0.8	1.2	1.2	14	200	25	300	25	—	—		
12-14	9.0	2,150	53	700	12 ²	725	0.9	0.9	1.4	1.4	16	300	25	300	25	—	—		
15-17	9.0	2,150	53	600	12 ²	750	0.9	0.9	1.7	1.7	19	300	30	300	30	—	—		
Men																			
18-34	10.5	2,510	62	500	10	750	1.0	1.6	1.6	18	300	30	300	30	30	—	—	—	
																			Sedentary
																			Moderately active
35-64	10.0	2,400	60	500	10	750	1.0	1.6	1.6	18	300	30	300	30	30	—	—	—	
																			Sedentary
																			Moderately active
65-74	10.0	3,350	84	500	10	750	1.1	1.6	1.6	18	300	30	300	30	30	—	—	—	
																			Moderately active
75 and over	9.0	2,400	60	500	10	750	1.0	1.6	1.6	18	300	30	300	30	30	—	—	—	
Women																			
18-54	9.0	2,150	54	500	12 ²	750	0.9	1.3	1.3	15	300	30	300	30	30	—	—	—	
																			Most occupations
55-74	10.5	2,500	62	500	12 ²	750	1.0	1.3	1.3	15	300	30	300	30	30	—	—	—	
75 and over	7.0	1,900	47	500	10	750	0.8	1.3	1.3	15	300	30	300	30	30	—	—	—	
Pregnant	10.0	2,400	60	1,200	13	750	0.7	1.3	1.3	15	300	30	300	30	60	10	10	10	
Lactating	11.5	2,750	69	1,200	15	1,200	1.1	1.8	1.8	21	400	60	500	1.6	60	10	10		

¹ Most people who go out in the sun need no dietary source of vitamin D (p. 50), but children and adolescents in winter, and household adults, are recommended to take 10µg vitamin D daily.
² These iron recommendations may not cover heavy menstrual losses.

From A Manual of Nutrition, Ministry of Agriculture, Fisheries and Food, HMSO

Fit to Eat - Teacher's Notes

Over the past few years we have been bombarded by a wealth of information about what we should or should not eat. Some of the information, and certain authorities even appear to offer conflicting advice. Sometimes this advice appears to be based on scientific evidence, but often it seems merely to be based on opinion and prejudice. There seems to be little doubt that because a healthier diet is available to many of us, it is possible for us to live longer, healthier lives. However, it also appears to be the case that some of us tend not to avail ourselves of these benefits.

The intention of this task is to make some information available to students, and to encourage them to discuss the range of issues involved, so that when they make their own decisions, they do so as informed adults.

This task offers an excellent opportunity for cross curricular links with say Home Economics (Food), Biology, and most importantly, Health Education. Many claims are made by companies marketing slimming aids and health foods. As students discuss and pursue their own tasks, they should come to some conclusions about issues which they personally perceive to be relevant to their own everyday life.

Students are invited to select from the menu provided, first a meal they would enjoy and then a meal which they see as being healthy. They then need to use the tables provided to determine whether their healthy meal really is healthy. These tables tell us what the components of 100 grams of each type of food are. Therefore students will need to estimate the weight of an average portion of each type of food. Their estimates can, of course, be checked by weighing, and averages determined, in order to complete the introductory tasks. The data on page 46, relating to how many kilocalories different types of people need per day, will be helpful at this stage. But what fraction of a day's intake is one meal?

The real task begins when students attempt to answer questions such as

- * Is my normal diet healthy?
- * Is our family diet healthy?
- * How can my Dad lose weight safely?
- * How can I balance my diet?

Students will need to record what they eat over, say, a week or two and then analyse it. This can prove quite time-consuming, and some students may find it helpful to use the computer program DIET, from the *MicroPrimer Pack* or the program which is available from Longman. Alternatively, students may prefer to set-up their own spreadsheets as they attempt to analyse their own diets and draw graphs of the various components. The *Manual of Nutrition* produced by the Ministry of Agriculture, Fisheries and Food (MAFF), available from HMSO at a moderate cost, contains much interesting and up to date information about diet including the tables shown on pages 47-52.

Clearly, an analysis of one's present diet leads on to a further discussion of how it might be improved. Many people feel that a healthy diet is expensive. However, this is not the case. Students may find it useful and worthwhile to consider how they can improve their diet without spending extra money, or how they can eat a healthy diet on a budget, whilst cooking for one.

As they pursue their individual studies they should be encouraged to look carefully at food labels, and to become increasingly aware of what is inside the packets they frequently buy and consume. A recent free booklet, *Look at the Label* produced by MAFF is available from Lion House, Willowburn Trading Estate, Alnwick, Northumberland NE66 2PF. This is a useful and attractive resource. This area again leads a student towards a survey of food stuffs as being the main activity within their individual work.

5

Students' Work

These six pieces of work cover a wide range of achievement. Two pieces of work are offered at each of the three levels of GCSE study; Foundation, Intermediate and Higher. These three levels are common to all GCSE schemes although the level titles differ.

The six pieces are in rank order of attainment and finish with the piece which is considered the best from the set. In Chapter 6, you will find detailed comments made on each piece by the Midland Examining Group Chief Coursework Moderator. We recommend that you should consider each piece of work in detail, make a few written comments and attempt to grade each student's work, before you read the moderator's comments.

For identification purposes, the six students' scripts are labelled A1/1 to A1/6. Because of space constraints the project team decided to reduce the size of the students' scripts, in order to include a wide range of student achievement. In addition to the loss of quality through the reduction in size, some scripts suffer from the loss of colour which originally added emphasis and clarity to the arguments presented. Nevertheless, we are hopeful that much of the strength inherent in the original scripts will become apparent as you read through the following pages.

"MINI GYM"!

A1/1

I have decided to make an unused room into a Mini Gym.

The room is located on the first floor of a 3 storey house, the room has been decorated but is unfurnished there was a ready built in mirror.

All prices include VAT.

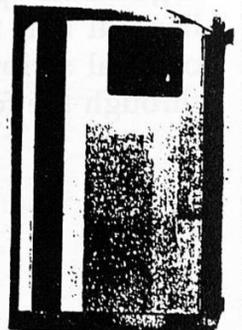
Size of Room = 12ft x 10ft

carpet size = 12 x 10 = 120 sq ft

cost of carpet = 120 x £3.50 =



price of heaters = £34.95ea = 34.95 x 2



PRICES

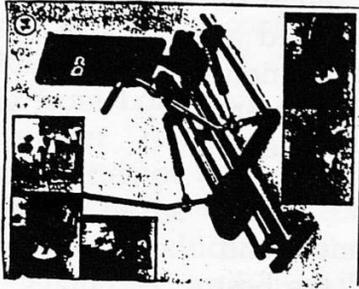
£420.00

£69.90

£489.90

WEIGHTS

A. 1 Set of body Tone weight =

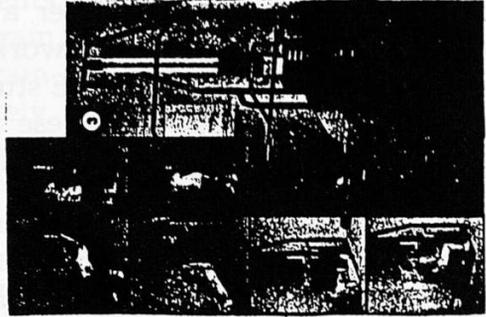


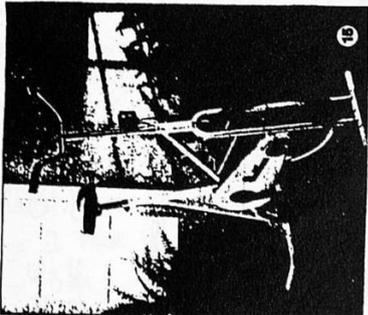
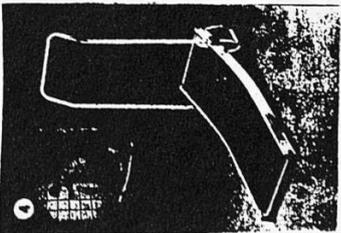
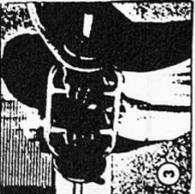
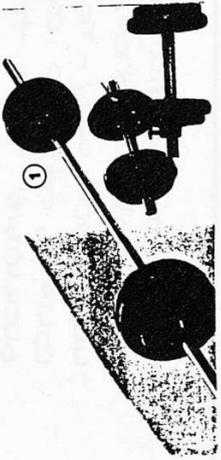
PRICE

£

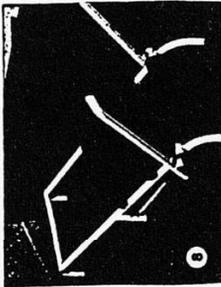
127.49

1 Set of York 2001 home gym weights: £65.00



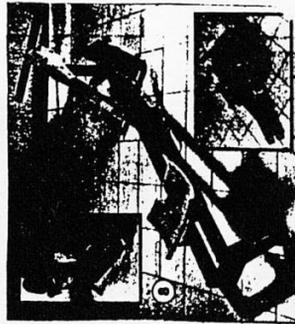
<p>1 set of weider exercise cycle</p> 	49.95
<p>1 set of kettle Treadmill</p> 	36.95
<p>1 set of weider Triceps Bar</p> 	6.95
<p>1 set of weight lifters Belt</p> 	9.49
<p>1 set of weider lifters leather Gloves</p> 	6.99
<p>1 set of weider Lifters Combed Bar for curling exercise</p> 	6.95
<p>York cast iron Combination Barbell Dumbell Klt - 70 Kilos</p> 	64.95

1. Weider Rowing Machine



3699

1. Spenby Row Slum machine



2249

Total cost of weights = 73412

christmas offer - 10% = 7341

Total cost of weights = 66071

The weights were all bought from the Catalogue Shop.

Make a full list at the end, with prices and five measurements of all the items.

To get this information, I went to The Catalogue Shop, by bus, it cost 40p each way - to town, back to college, and no catalogues were available until the end of the week I went again on Friday which cost 40p each way.

Total cost of Bus fare = £1.40

I saved myself £50.00 on a weight training kit as I already have one.

My brother took £2.50 for petrol, for the 2 journeys made to collect my items from the store = £5.00

The Total cost of my room was £1154.77

Bank Balance at start = £1300

minus

Bank Balance at end = £1154.77

every member of my family; 5 brothers, 2 sisters will be able to use the gym. ✓

Good idea, but lacking in Maths content. You need to show some calculations and produce a pie or bar charts.

List of All Equipment

see Appendix I

- A Heater 1
- B Heater 2
- C 1 set of body tone weight
- D 1 set of York 2001 Home Gym
- E 1 set of weider exercise cycle
- F 1 set of Kettler Treadmill
- G 1 set of weider Triceps Bar
- H 1 set of weight lifters Belt
- I 1 set of weight lifters Gloves
- J 1 set of weider lifters
- K 1 York cast combination Barbell
- L 1 weider Rowing Machine
- M 1 Spenby Row Slim machine
- N Chair

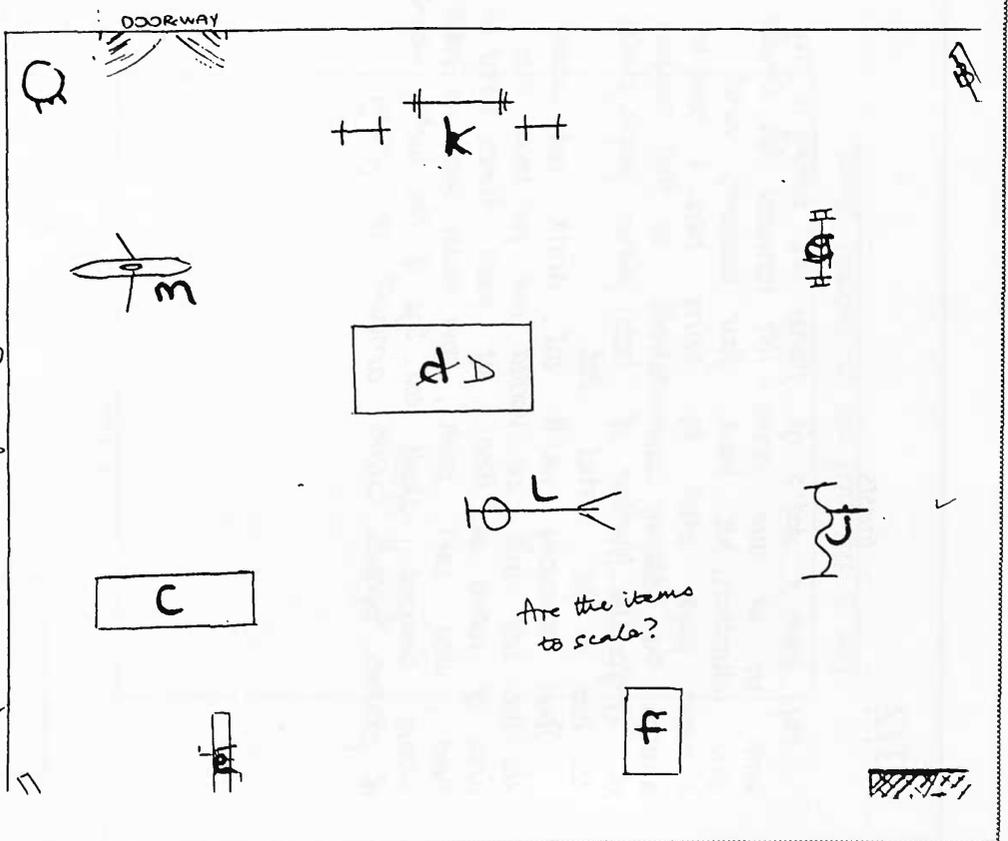
APPENDIX I

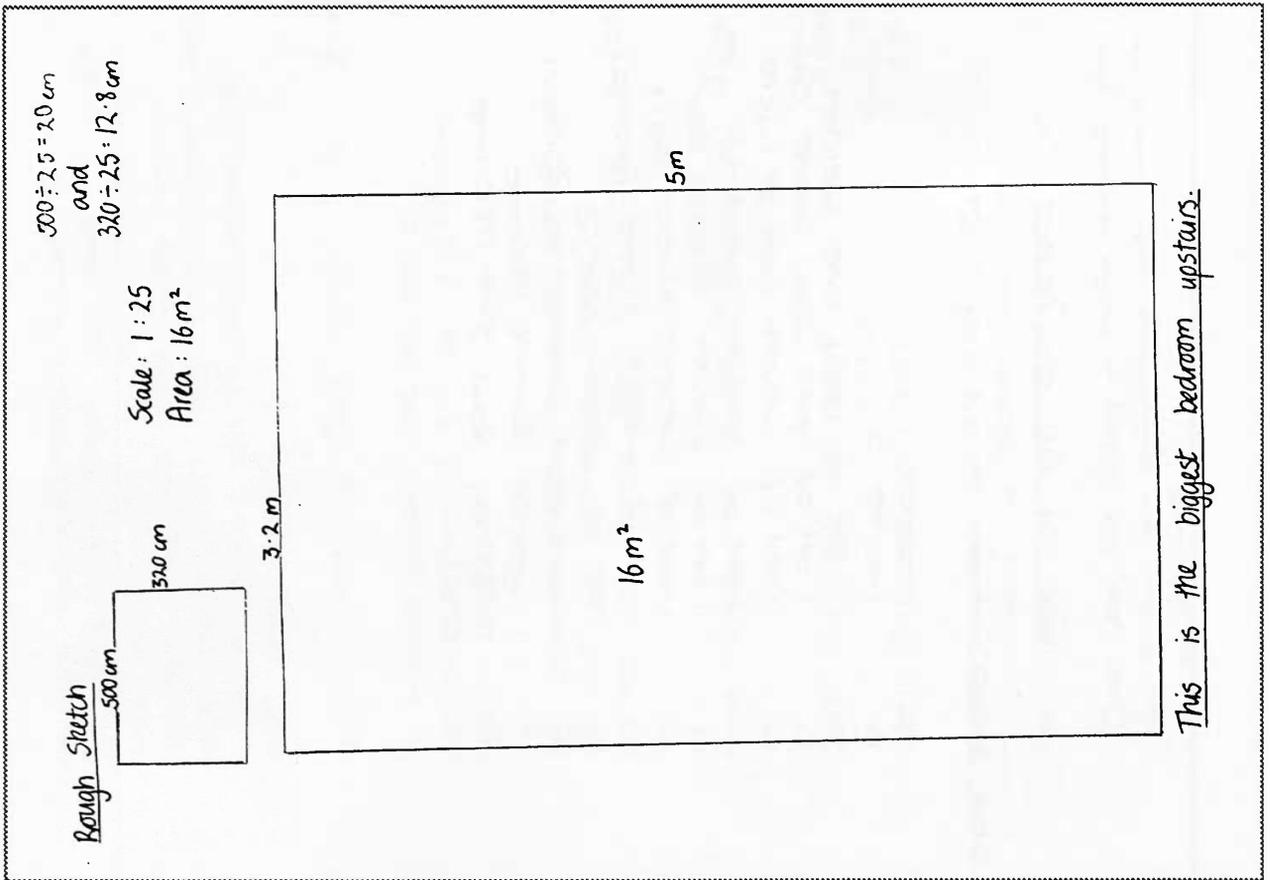
The reason a lot of space has been left between weights is because the manager of Castle Gym explained you must allow plenty of space for safety reasons and training.

KEY!

2 cm = 1 foot ✓

▣ = Box ✓





Guests

A1/2

My mum + dad's old friends are coming to stay with us at our house - 137 Herwood Rd., Compton over christmas. We have four bedrooms and eighteen people shall be living here. I have to arrange the sleeping accommodations so that everyone is comfortable. Number of beds, pillows, people, places etc. has to be sorted out.

Then obviously we'll eat, drink, use water etc. The cost can be worked out per head and area of rooms etc. Also at meal times, what we need, who can cook, how much space we need where everyone shall eat. Size of the turkey, weight of potatoes, sprouts, carrots, amount of gravy.

Bedroom 3

Rough Sketch

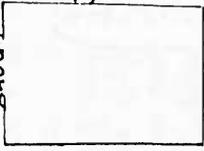
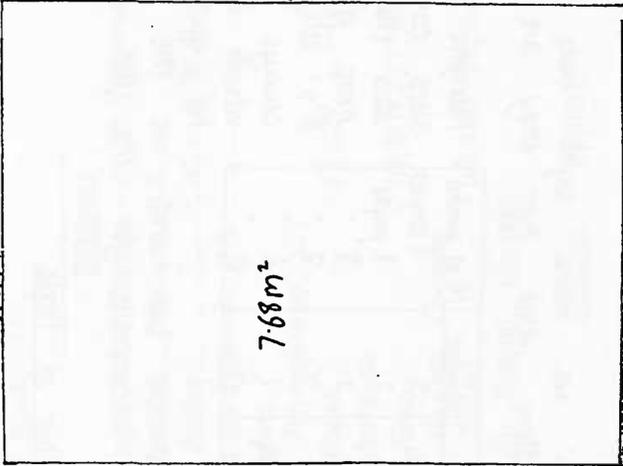
320cm

240cm

Scale: 1 : 25

Area: 7.68 m²

240 ÷ 25 = 9.6 cm
and
320 ÷ 25 = 12.8 cm

2.4m

3.2m

7.68m²

This is the smallest bedroom

Bedroom Two

Rough Sketch

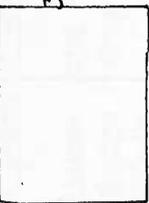
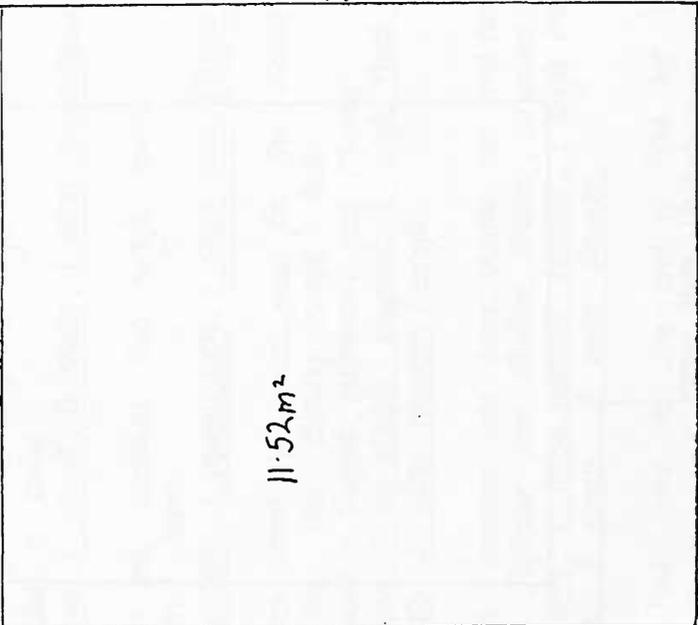
360cm

320cm

Scale: 1 : 25

Area: 11.52 m²

360 ÷ 25 = 14.4 cm
and
320 ÷ 25 = 12.8 cm

3.2m

3.6m

11.52m²

This is the next size of bedroom down.

Number of Beds

Altogether we have eight beds. Here is a table to show what type they are.

Type of bed	Number	No. of persons
Normal double	2	2 couples
Normal single	2	2 people
Large double	1	3
Bunk single	2	2
Inflatable double	1	2
Inflatable single	0	0

Therefore 13 people can sleep comfortably. but, alas there are five more of us. It's alright there's always the caravan which is six berth. We can open up

the large double bed and use the two single bunks that can accommodate for the five more.

Number of People

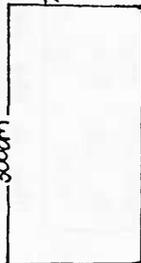
Our family: Mum, Dad, sister + me.

married couples {
 Mike + Pauline
 Gusharan + Mickey
 Jagdish + Kimy
 Jaginder + Thiboo
 Karnath + Hema
 Jasward, Sujjet, (Ariene + Sharlene) - cousins.

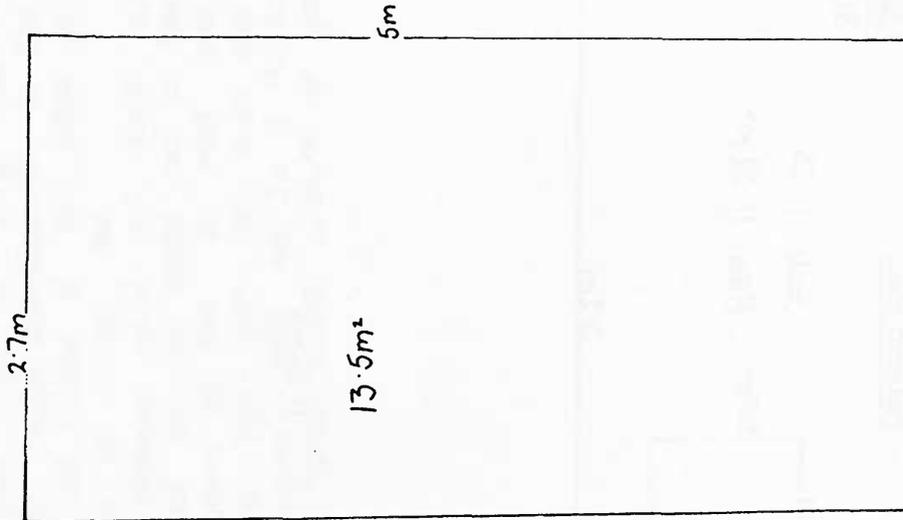
All of the above people except for us are coming over from the states. Karnath + Hema, however, are coming down from Aberdeen Scotland.

Rough Sketch

Scale: 1:25
 Area: 13.5m²



$270 \div 25 = 10.8\text{cm}$
 and



This bedroom is downstairs

Bedroom two - contains one double bed.
Pauline + Mike
2 pillows, 1 duvet, 2 sheets, 1 extra blanket.

Bedroom three - contains one double bed.
Jacquish + Kimy
2 pillows, 1 duvet, 2 sheets, 1 extra blanket.

Bedroom four - contains one large double bed
Mum, dad + Gully
3 pillows, 1 duvet, 3 sheets, 1 extra blanket (double).

Bedroom one - contains two single bunks.
Kamath + Hema
1 pillow each, 1 duvet each, 1 sheet each, 1 extra blanket each.

In this room we can also fit the double mat and the two folding single beds.
∴ Jaswant + Surjeet, Gusharan and Mickey.
4 pillows, 1 big-double blanket, 3 single thick blankets
4 sheets, 4 extra blankets (single).

Caravan - contains one large double bed and two single bunks. Jaginder and Thuboo. Arlene, Sharlene + me
* { 5 pillows, 1 thick double blanket, 3 single thick }
blankets, 5 sheets, 5 extra blankets.

* I had come to the end of the list, stuff was running out. we had the pillows, the double blanket, ~~and~~ two sheets and five extra blankets. So instead of the 3 single-thick blankets we used 3 sleeping bags.

Total sheets, pillows etc. needed.

Pillows = 18
Sheets = 19
Sleeping-bags = 3
Double-quilts = 2
King size quilt = 1
Single quilt = 2
Double-thick blankets = 3
Single-thick blankets = 2
Double extra blankets = 2
Single extra blankets = 11

Total no. of items = 62

References

Jaswant, Surjeet, Arlene, Sharlene - 42, 35 N 83, 14 W.
Bloomfield Hills, Michigan, U.S.
Gusharan, Mickey - 40, 41 N 76, 11 W. } same street
Pottsville, Pennsylvania, U.S.
Mike, Pauline
Pottsville, Pennsylvania, U.S.
Kamath, Hema - 57, 10 N 2, 04 W
Aberdeen, Scotland
Jagdish, Kimy - 45, 31 N 73, 34 W
Montreal, Quebec, Canada
Jaginder, Thuboo - 43, 47 N 79, 15 W
Scarborough, Ontario, Canada.

Distances (approx.)

Detroit - Birmingham = 8250 km. or 5280 miles.
Toronto - Birmingham = 7725 km. or 4944 miles.
Aberdeen - Birmingham
Montreal - Birmingham = 7125 km. or 4560 miles.

Pub Grub.

In the week days for lunch we would go out into family pubs. Then 'Pub Grub' is cheap. One whole meal costs £2.00 - £3.00. So the most it could cost us would be :-

$$18 \times £3.00 = £54.00$$

Here, I think everyone would pay for themselves or the cost would be too much for just us. The drink could be paid in rounds. Like first my dad could buy a round of drinks for everyone and then maybe Mike and so on.

Also we might decide to go out eg to see the Oxford St lights as this would not cause us to freeze outside. It would be a day trip so the only costs would be petrol and food. The food would be something like sandwiches. Also we could do some shopping in London.

Breakfast

Our breakfast would consist of cereals + milk. Here are a few:-

- Coco Pops
 - Cornflakes
 - Alpen
 - Wheatix
 - Crunchie Nut Cornflakes
 - All Bran
 - Froshies
 - Kia Kiriappies
 - Special K
 - Weeto
 - Ready Brek.
- With these we'd need milk. It would also be needed for tea, coffee etc. For 18 people, I think about ten pints would be enough. 1 pint costs 26p (delivered). Therefore £2.60 a day or £18.20 a week. There would also be the cost of the actual cereals. How! What a lot!

Water

The average person in the U.K. uses 180 litres of water a day. This includes 12 litres for gardening and car washing. In our situation all the other uses apply but not this one, especially not during Christmas:-

- Toilet flushing - 70 l
 - Personal washing - 50 l
 - Clothes washing - 25 l
 - Dish washing - 15 l
 - Cooking - 5 l
 - Drinking - 3 l
- = 168 l

All of us staying in the house make 19 people so therefore we would get through - 3024 litres of water per day. There are many deductions like going out for meals, using disposable cutlery and crockery etc and also additions like going to the toilet more often therefore washing hands a lot.

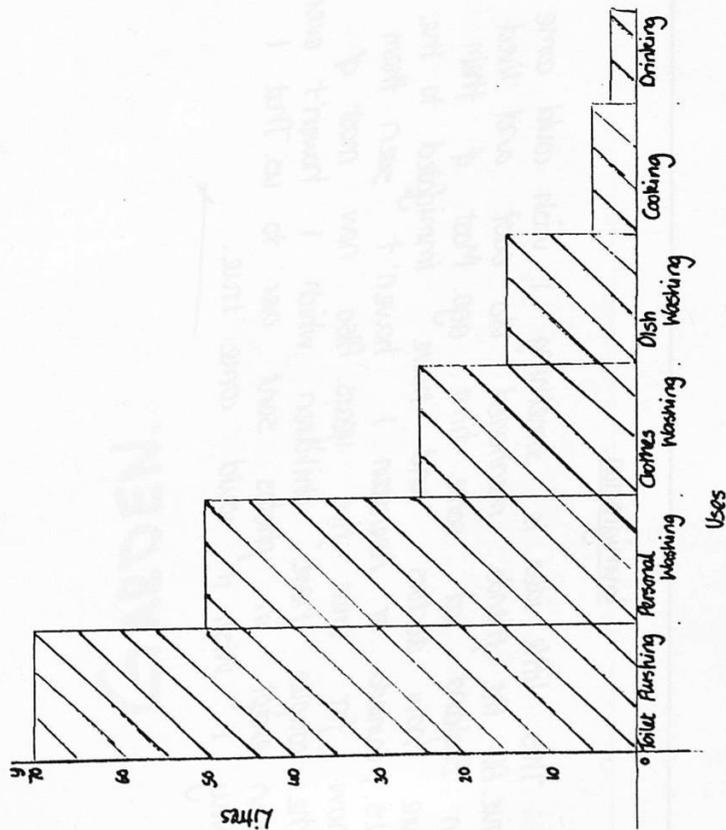
Supper

Indian food - a bit hard to explain! We normally have most of the foodstuffs in store and only stuff like onions and potatoes are needed. The meat is in the freezer always because we buy supplies in advance from James of St. Pershore. So you see we wouldn't actually have to go and buy things for our evening meal.

Amounts of Water Used By One Person Each Day in The U.K.

This totals 168.

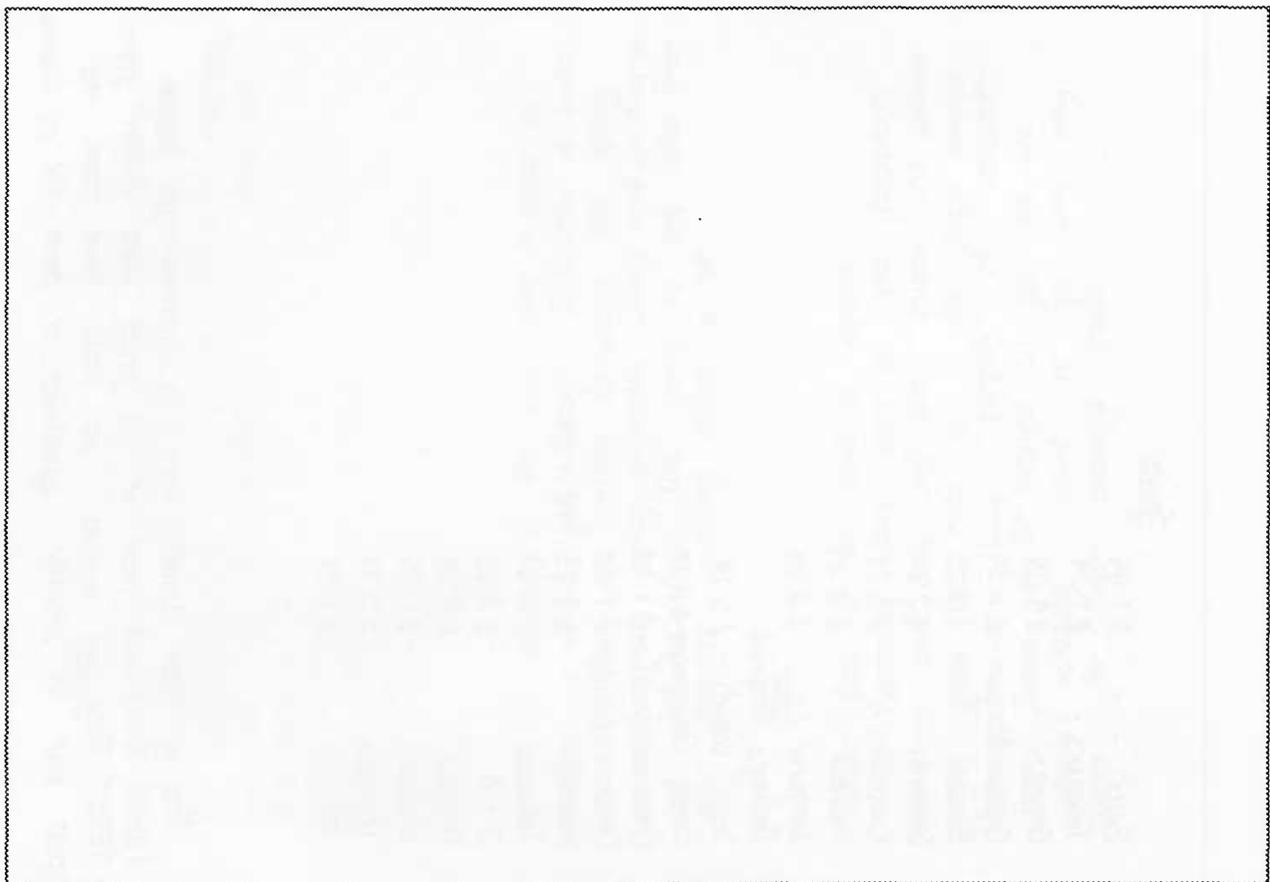
I have excluded the 12 litres used for gardening and car washing.



Spirits

Bells	-	£7.99
Teacher's	-	£7.79
Grant's	-	£9.55
Captain Morgan	-	£4.59
Bacardi	-	£8.25
Gordons	-	£7.29
Cockburns	-	£5.79
Martini	-	£2.29
Ginzano	-	£2.29
Bailey's Original	-	£6.29
Irish Cream	-	£4.69
Brut Champagne	-	£1.49
Concorde (rose)	-	£1.49
Concorde (white)	-	£9.75
Martell	-	£4.59
Advocat	-	£8.25
J+B	-	£7.29
Malibu	-	£6.95
Begleiter	-	£10.99
Combeau	-	£1.99
Espano	-	£11.59

Most of these drinks were in normal size bottles (about 75 cl.) and most of the prices were taken from TESCOs. They are drinks we could have from the pub but in smaller quantities or from the off license



Immigration.

This little idea is something I wish could come true. All the friends mentioned do exist and lived in England at some time ago. Most of them are now doctors and have immigrated to the U.S., Canada or Aberdeen. I haven't seen them now for over five years. Also now most of the couples have children which I haven't ever seen except in photos sent over to us. That I why I wish it could come true.

A1/3
MATHS. PROJECT...
To Build A
GARDEN.

A GARDEN TO ATTRACT BIRDS AND OTHER WILDLIFE

BRAMBLE.
 NETTLE.
 TEASLE +
 OTHER WEEDS.

HEDGE.

WEEP.
 WILT.
 ROWAN.
 TREE.

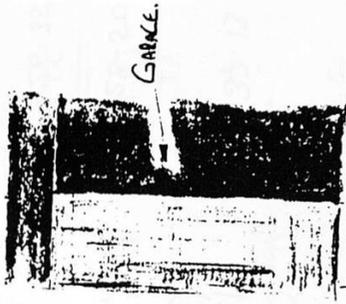
POND

LOWER LAWN.*
 BIRD-TABLE.

OKH.
 TREE.

COTONEASTER
 TREE. STEPS*

UPPER LAWN.*



SHED.

FENCINGS.
 OR WALL

CONCRETE
 DRIVE +
 PATH.

LAWN.
 YEW
 TREE.

Flowers + Plants would be
 planted in the borders these would
 include :-

- Sunflower.
- Primrose.
- Buddleia
- Veronica

PATIO.

PATIO DOORS.

HOUSE.

* LAWNS ARE ON TWO LEVELS;
 JOINED BY STEPS

ii Water. Birds need somewhere to drink and bath in (a drenching lid, optional, and laminated on bricks will do). One end will only be a couple of centimeters deep for this the other will be for deeper, suitable for goldfish.

To find the price of this equipment I went to two places (cycled to Bardills and phoned up the veg. Taylor Gardening Centre, Normanston). There are two different ways of keeping a pond: filtered or the prices are as follows.

Bardills - Filtered

- The G.P.P. pond shaped shell (of which was 64.95 at B+Q!) 37.13
- Coping Stones 2.65 each x 10 needed 26.50
- 200 gallon filter 26.35
- 180 gallon pump 37.13
- Plastic water-fall 7.00
- Total. 134.33

In this project I shall be, in theory, building and designing a garden. This shall be no ordinary garden but one that is designed to attract birds as well as being decorative and practical.

To have a garden that birds are attracted to, it should have certain features.

i. A set place to feed birds ~

I have chosen to use a self-sustaining bird-table because it is removable as birds should not be fed in the spring (they take the large lumps of food to the nest and occasionally choke their chicks, also the chicks do not learn the natural types of food) and it is not necessary in the summer and Autumn.

Other designs of bird tables include making a permanent concrete block on the ground or a table both or tied to a tree (the tied ones swing around in the wind and shake the food all over the lawn.)

At B+Q in Beeston I priced a birdtable at £24.99 (with stand)

In the L.S.P.D. magazine I found one which was self-sustaining, better quality priced £9.95. This is a saving of $24.99 - 9.95 = £15.04$.

At the Landscape Supplies (Ray Taylor's garden filtered).

C.R.P. shaped pond shell	37.95
200 gallon filter (similar size + shape)	25.99
Plastic Waterfall	6.99
180 gallon water pump	38.25
Coping stones £2.65 x 10 cement needed	26.50
Total.	<u><u>135.68</u></u>

Saving on shopping at Boddills for a filter so

135.68
- 134.33
<u><u>= 1.35</u></u>

is

The other way of keeping a pond is to have it naturally created using special oxygenating plants and weed. I cannot have waterfalls or fountains

These are the prices at Boddills.

C.R.P. Shell pond

Coping stones = 26.50

Oxygenative plants, I would need size for my Digel pond $2.30 \text{ each} \times 6 = \text{£}13.80$

Oxygenative weed is also needed (approximately 20 bundles are needed for my Digel pond. $30p \text{ each} \times 20 = 6.00$)

Total = $26.50 + 13.80 + 6.00 = \text{£}46.30$

At Landscape Supplies (The Big Taylor garden Centre, Normanton) Coping Stones = £26.50

Oxygenative plants (here they said I'd need seven plants for my Digel pond $2.00 \text{ each} \times 7 = 14.00$)

Oxygenative weed (here they quoted 15 bundles) $30p \times 15 = 4.50$

C.R.P. Pond Shell = 37.95

Total = 82.95

Saving on shopping at the Landscape Supplies

19.30	83.43
18.50	<u>82.95</u>
1.30	<u><u>4.88p</u></u>

Saving on having an Aisated pond, rather than a artificially pumped ponds

was.

Artificially pumped and filtered pond. 134.3
 Naturally Aisated pond (with plants) 18.5
 Saving = 115.8

I have decided to have a naturally aicats per because I consider it in keeping with the idea of a Natural garden to attract birds and wildlife. (fish and Newts are more likely to lay eggs in a Nat. Aisated pool)

Also for this pool I have decided to have ornamental fish (to keep non happy, shes' pond of goldfish)

Price of fish at Bardsills.

6"-8" Gup each £4.50 (low of these) = £ 18.00
 $\frac{4.50 \times 4}{}$

6"-8" Tench (bottom feeder) each at £4.95 (two of these) $\frac{4.95 \times 2}{}$ = £ 9.90

8" Koi each £ 6.25 (low of these) = £ 25.00
 $\frac{6.25 \times 4}{}$

These total up to

£ 52.90

The price of fish at the Landscape Supplies.

6"-8" Gup at £4.95 each (low of these) 19.80
 $\frac{4.95 \times 4}{}$

6"-8" Tench at £ 4.95 each (two of these) 9.90
 $\frac{4.95 \times 2}{}$

8" Koi at £6.99 each (low of these) 27.96
 $\frac{6.99 \times 4}{}$

Total of £ 57.66

(Both shops advised me to have this amount of fish)

Saving on buy fish from Bardsills.

57.66
 - 52.90
4.76
 Saving =

Total Overall Cost of the Pond and Fish.

Airated Pond plants and stone and C.P.P. pond shaped shell £82.95

Fish £52.90

Total. £135.85

the third necessary element needed in a garden designed for birds is the trees and vegetation.

Feeding on berries and nesting in trees are obvious uses to most people. But few realise that birds have a social order (no, I don't mean that they go down the pub!) This order puts out who is the strongest and fittest. The strongest and fittest feed first and mate with the last females (a bit like us humans!)

I priced plants & trees up at B+Q in Beeston and using the R.S.P.B. Christmas Catalogue.

Bud Q in Beeston

Rowan	- £10.95 x 1	10.95
Trees Oak	£22.95 x 1	22.95
Yew	£12.95 x 1	12.95
Waxing W1	- £15.49 x 1	15.49
Strawble	- £3.54 x 4 needed	14.16
Total		<u>76.70</u>

* I could not find anywhere apart from the R.S.P.B. magazine that sold Cotoneaster trees - these trees are particularly liked by House Finches

The trees at BudQ were approximately 3ft high.

R.S.P.B. Christmas Catalogue.

Mini Copse - this was 3 trees at about 10m in height the rest consisted of

- 1 English Alder
- 1 Wild cherry
- 1 Silver Birch

Price 5.45

also they sold Cotoneaster 1 1/2 m in height
Price 10.25

£3.59 a bush, I could need 4 bushes for the area needed this would cost.

$$\underline{\underline{£3.59 \times 4 = £14.36}}$$

However, Near to my garden there is a piece of disused waste ground, it has lots of Brambles over it. The are just too good, if not better specimens than those in B+Q. Therefore I think it to be common sense to the Brambles from the waste ground, it is not owned by anybody at the moment. This is due to become a public swimming pool.

Grass, Lawns, etc

The lawns will be circular in shape and on two heights. The Garden started off with hedge around it's whole perimeter. I shall take all the right side and part of the rear hedge. It's placed I shall put a shed and a garage. The neighbours are pensioners and have been hinting on how much they'd like a wall in its place as it is easier to maintain than a hedge. I find this reasonable and have decided to build one. We have come to a agreement with our neighbours and shall be going 50.50 on the cost.

I have just realised that the cotoneaster is not sold on its own, but as a set, the set is as follows

R.S.P.B. Shrub Collection

- Pyracantha
- Cytisus Kevenis
- Lavandula, Munstead Variety
- Cotton-aster dammer-leaf variety

these four come to £10.25.

I decide to buy from both B+Q and the R.S.P.B. Catalogue. as follows:

1 Rowan	£10.95
1 Oak	£22.95
1 yew	£12.95
1 weeping Willow	£15.49
1 R.S.P.B. shrub collection	£10.25
1 R.S.P.B. Mini Copse	£5.45
Overall total cost of trees.	<u>£78.04.</u>

For our garden I would like some Bramble bush I can buy this from B+Q at

The area of the lawn is as follows:-

two six metre circles
 One approximately a quarter of a six metre circle.

$$\therefore \frac{\text{area} = \pi r^2}{\pi \times 2 + \pi \times 4}$$

Using B.O.D.M.A.S. Divide first, then Multiply, then Add.

$$\underline{3.142 \times 6 \times 2 + 3.142 \times 6 \div 4}$$

$$\underline{\text{Divide} = 3.142 \times 6 \times 2 + 3.142 \times 1.5}$$

$$\underline{\text{Multiply} = 37.7 + 4.71}$$

$$\underline{\text{Add} = 42.41}$$

The area of grass is $\approx 43 \text{ m}^2$

To find the prices of Turf, Grassed proved to be quite difficult I phoned up Des Fortesque / Greaves, Greenswood Gardens, Flomlands Garden Centre, Talon Construct who put me in contact with Notts. Landscapes, who put me in touch with Minisk Farm.

* I have "rounded up" to make sure I have enough grass.

Finally I found two places Landscapes supplies - Key Taylor's gardens, and the Nottingham Garden Co.

Key Taylor's - Landscapes Supplies.

Turf was £170 a square yard.

$$1 \text{ m} = 1.09 \text{ yd} \quad (1 \text{ yd.} = 0.914 \text{ m})$$

$\therefore 43 \text{ m}^2$ needed to be covered

$$\therefore \frac{43}{1.09} = 39.45 \text{ yards}$$

$$\approx 40 \text{ yards} \times £170 = £68$$

\therefore Cost of Turfing the 43 m^2 area \approx £68.

Grassed £160 pound. I was quoted to need approximately 4-5 pounds to cover a 43 m^2 area.

$$\underline{116 = 454 \text{ g}}$$

$$\therefore 5 \times 454 = 2270 \text{ g} = 2.27 \text{ kg}$$

$$\underline{43 \text{ m}^2 \div 2270 \text{ g} = 18.94 \times 10^4}$$

\therefore to cover 1 m^2 , 189.4 grams of seed are needed

~~$4.54 \div 1.60 = .283$ per~~
 1 gram cost .283 per piece
 ~~\therefore 1 kilogram would cost £2.83~~

I do not think these workings are correct
 as I proved this to myself by:

$116 = 454g \therefore 216 = 2 \times 454 = 908g$

$216 \times 1.60 = \underline{\underline{320}} \text{ !!!}$

Nottingham Garden Centre

Turf was £1.32 a square metre
 \therefore 43 m² needed to be covered
 $43m \times 1.32 = \underline{\underline{56.76}}$ ✓

So cost of Turfing the 43 m² area = $\underline{\underline{56.76}}$ *

* Note: = to because the area is only approx + not 100% accurate.

The other approach to making and growing a lawn is from scratch using a grass seed.

Both Landscaper supplies and The Notch Garden centre tell me that there were many varieties of grasses, did I want meadow seed to cultivated seed? did I want top quality with Rice? did I want an economy (cheap) seed with out rice.

At the Nottingham garden Centre at this point I told them I was doing a project for Maths G.C.S.E....

The lady on the phone didn't like the I was wasting her time and that which had for people on the phone with similar enquiries for projects -> this week.

So I waited the next day and phoned Soa Fortbriques whom I phoned previously and did get an answer.

The Price and weight are as follows:-

Landscaper Supplies / Reg. Taylors

I told them the area, 43 m², they said I'd need about 4 pounds.

for normal seed for a garden £170 a pc

$\therefore 4 \times 170 = \underline{\underline{680}}$

to work out how for 1 pound of seed would go

$43m^2 \div 4 \text{ pounds} = 10.75$
 \therefore 4 pounds of seed would cover nearly $11m^2$

Joe Fortesques
 They said that I'd need about 2kg of seed to cover $43m^2$
 they charged $\pounds 3.84$ per kg
 $\therefore 2kg \times \pounds 3.84 = \pounds 7.68$

$$\begin{array}{r} 7.68 \\ - 6.80 \\ \hline \pounds 0.88 \end{array}$$
 Landscape supplies was cheaper by $\pounds 0.88$

So a recap on Picas to grow a lawn

Reg. Taylors Turf = $\pounds 68.00$
 Nottn. Garden Centre ^{Turf?} = $\pounds 56.76$
 Reg. Taylors Grass seed = $\pounds 6.80$
 Joe Fortesques = $\pounds 7.68$

I have decided to buy Turf from Nottingham Garden Centre (despite the conversation with the

'Nice lady on the telephone!'
 Turf from Nottingham Garden Centre
 = $\pounds 56.76$

Concrete
 To work out the areas of concrete as follows:-
 There are 3 major areas.

$$\begin{array}{r} 1m \times 8m - \text{Path.} \\ 5m \text{ Circle} - \text{Patio.} \\ 4m \times 9m - \text{Drive.} \end{array}$$

Path - $1m \times 8m = 8m^2$
 Patio - $\pi \times 5^2 = 3.142 \times 5^2 = 15.7m^2$
 Drive - $4m \times 9m = 36m^2$

The concrete needs to be 10cm thick
 $\therefore 36m^2 \times 1 =$

This Working Out is weens!

$\text{Path} = 1\text{m} \times 8\text{m} = 8\text{m}^2$
 $\text{Carriage + Drive} = 4\text{m} \times 17 = 68\text{m}^2$
 $\text{Patio} = \frac{\pi r^2}{8} = \frac{\pi \times 2.5^2}{8} = 2.5 \times 2.5 \times 3.142 = 19.63\text{m}^2$
 $\frac{68}{8} = 8.5$
 $\frac{19.63}{8} = 2.45$
 $\frac{95.63\text{m}^2}{8} = 11.95$

The Concrete needs to be 4cms deep.

$\therefore 95.63\text{m}^2 \times 0.04\text{m} = 3.83\text{m}^3$

Prices

I phoned up a firm called 'Concrete Central' in Nottingham.

They quoted me for £42.66 per metre^3 delivered to Long Eaton.

$\therefore 42.66 \times 4\text{m}^3$ (Deliver only in $\frac{1}{2}$ + Full Rates)
 = £170.64 • Ready mixed Concrete and Delivery

Trent Builders

Prices too low! He Concrete and aggregate and "Do-it-myself"

Concrete per bag = £3.26 + V.A.T.

Aggregate per bag = £2.20 + V.A.T.

I was quoted to need 12 lots of concrete (1 bag of concrete + 1 of aggregate) for an area of 3.83.

$\therefore 3.83\text{m}^3 \div 12 = 319\text{m}^3$

(1 bag of concrete + 1 bag of Aggregate would make a 319m³)

1 'lot' of cement = 3.26 + 2.20 = £5.56

$5.56 \times 12 = £66.72 + \text{V.A.T.}$

15% of 66.72 = $\frac{15}{100} \times 66.72 = £10.08$

66.72
 10.08
£76.80

Price to D.I.Y. if from Trent Builders = £76.80

The Garage

At 'Aquagem' they quoted me a price a wooden garage for £332. I phoned a company called 'The Legal Conservatory Centre at Lough Mill'. They quoted me two prices for concrete garages one a 'Crimson Garage' (very good make + guaranteed for 20 years DO the name of the phone told me) at 787 + V.A.T. with free erection and one a 'Walton Garage' at 702 + V.A.T.

I have decided to buy the 'Crimson Garage' because of the free erection, it would probably work out cheaper than to get someone to erect a 'Walton Garage' (nothing like customer manipulation!)

Price of 'Crimson Garage' + V.A.T.

$$\frac{15}{100} \times 787 = 118.05$$

$$\begin{array}{r} \text{£}787 \\ + \text{£}118.05 \\ \hline \end{array}$$

$$\text{£}905.05 = \text{Cost of Garage}$$

(P.S. the person at 'Aquagem' sounded a bit miffed when I said I was doing a project for Collage)

I have decided to order 'Ready-Mix concrete from 'Concrete Central' for convenience.

$$\text{Costing } \text{£}170.64$$

Garage + Shed

For this Garden a Shed 4 x 2 metres and a garage 8 x 4 metres is needed.

The shed.

I phoned a company called 'Aquagem' they quoted me £312 for a wooden 'Apex' type shed.

I phoned a company called 'Banbury' who quoted £459 for a concrete shed with free erection (both of these were + V.A.T.)

I decided by taking into consideration the recent strong winds, on the concrete shed.

$$\frac{15}{100} \times 459 = 68.85$$

$$\begin{array}{r} 459 \\ + 68.85 \\ \hline \end{array}$$

$$\text{£}527.85 = \text{Cost of shed.}$$

Fence/Wall

The Wall using the Super Screen Blocks (see page 18 of the Murdoch's Catalogue)

The gap filled is 9m x approximately 2m.

The Super Screen Block measures

$$290 \times 290 \text{ (mm)}$$



The Coping stone (on top)

$$610 \times 51 \text{ (mm)}$$



Height of wall

$$\text{Block } \frac{290 \text{ cm} \times 4}{=} = 1.16 \text{ m}$$

$$\text{Concrete } \frac{1 \text{ cm} \times 4}{=} = .04 \text{ m}$$

Coping stone
Height

$$\frac{.51 \text{ m}}{=} = 1.71 \text{ m}$$

Length of the wall

$$\text{Blocks } \frac{29 \text{ cm} \times 30}{=} = 8.70 \text{ m}$$

$$\text{Concrete } \frac{31 \text{ cm}}{=} = \frac{9.01 \text{ m}}{=}$$

\therefore the amount of blocks needed for the wall 9m long.

$$= \frac{30 \text{ along} \times 4 \text{ high.}}{=}$$

$$3 \times 4 = 120 \text{ blocks.}$$

$$\frac{120 \text{ blocks} \times £2.65}{=} = 120 \times 2.65 = £318.0$$

Trent Builders say that I need at the most 1 bag of concrete + 1 of aggregate

\therefore this would cost me £3.26 + VAT. and £2.20 V.A.T.

$$\frac{3.26 + 2.20}{=} = 5.46$$

$$\frac{18 \frac{1}{2} \text{ bags} \times 5.46}{=} = 100 \text{ p}$$

$$\therefore \frac{5.46 + 100 \text{ p}}{=} = 6.46$$

Superscreen Blocks \$318.00

Cement 006.28

Total cost of wall \$324.28

to go 'half' with my O.A.P. Neighbor
 = \$324.28 ÷ 2 = \$162.14 each.

Fence.

the other option open to me is fencing. I want to B+Q in Boston.

they had a suitable high in waven panels, they are similar to lattice work as weaving. When the pieces of pine or larch are woven around a frame to form a panel. The appropriate size for me was 6ft x 4ft.

the amount of panels I need is worked out by

$$1ft \Rightarrow 30.5 \text{ cm}$$

$$6ft \times 30.5 \text{ cm} = \text{length of each panel}$$

$$6 \times 30.5 = 1.83 \text{ m}$$

$$9 \text{ m} = 1.83 = 4.9$$

∴ 4.9' panels needed to fill the gap.
 to find out how much '9' is

$$4 \times 183 = 732 \text{ m}$$

$$= 9 \text{ m} - 7.32 = 1.68 \text{ m}$$

So to fill the gap with 6ft panels

I would need 4 panels and one down off to a high = 1.68m.



I have forgotten to take into account the posts of which were 3" x 3" x 4ft.

∴ I would need 6 posts each 3" across:

$$\therefore 6 \times 3 = 18''$$

$$\text{length} = 25.4 \text{ cm} \quad \text{DO} \quad 18 \times 25.4 = 457$$

$$= 45.7 \text{ cm} (46 \text{ cm})$$

$$\therefore 1.68 \text{ m} - 0.46 \text{ m} = 1.22 \text{ m}$$

I would need 4 panels, 6 posts and 1.22m of a panel.

Front Gates.

I got in contact with a No of firms to price up the front Gates. I decided to have Wrought Iron because they are strong and long lasting. and only occasional need any attention.

The prices are as follows for a set of gate 4m wide and 2m high.

- Dave Mott Ironwork, Nottn. * £96.00
- Polydon Products, Langly Mill £102.57
- Anvil Metalcrafts £76.99
- Painted Ironwork £89.99

I have decided to buy from Anvil Metalcrafts

Costs go cost £76.99 + V.A.T.

$15/100 \times £76.99 = £11.55$

$\therefore £76.99 + £11.55 = £88.54$

Overall cost of gates = £84.57

* All prices - V.A.T.

13

to price this.

1 panel = £12.75

1 post = £3.75

1 post top = £0.39

I need 5 panels (they would sell 1/2 a panel ~ 0
I have to buy the whole) £12.75 x 5 = £63.75

6 posts £3.75 x 6 = £22.5

6 post-tops (little caps to help rain runoff) = £0.39 x 6 = £2.34

Total price of fencing. £88.59

Cost of giving '1/2' with neighbour £88.59 ÷ 2 = £44.3

I have decided to 'buy' the wall, as this will take less maintenance than the fence which does need wood preservative. + the wall is stronger.

Cost of Wall = £324.28

This Now completes the Garden.

The overall price is as follows.
£8454

Gate £9.95

Birdtable £135.85

Pond + Fish £78.04

Trees + Shrubs £56.76

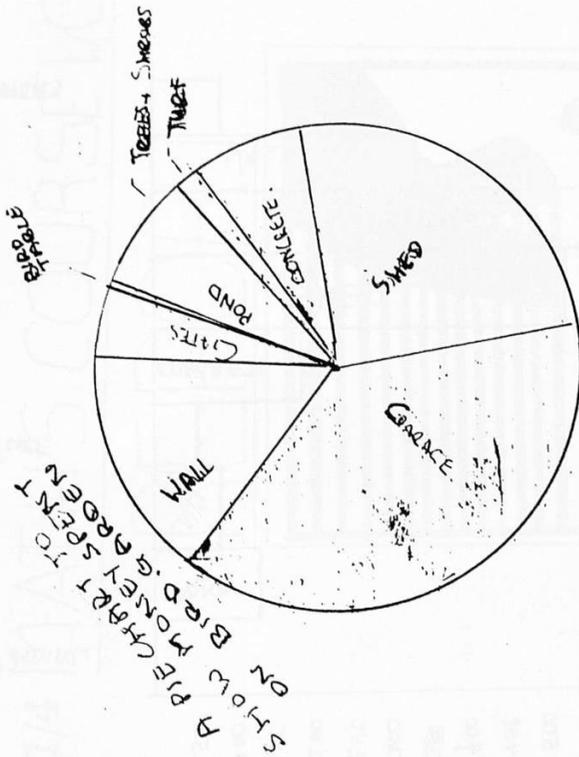
Turf £170.64

Concreting £527.85

Shed £905.05

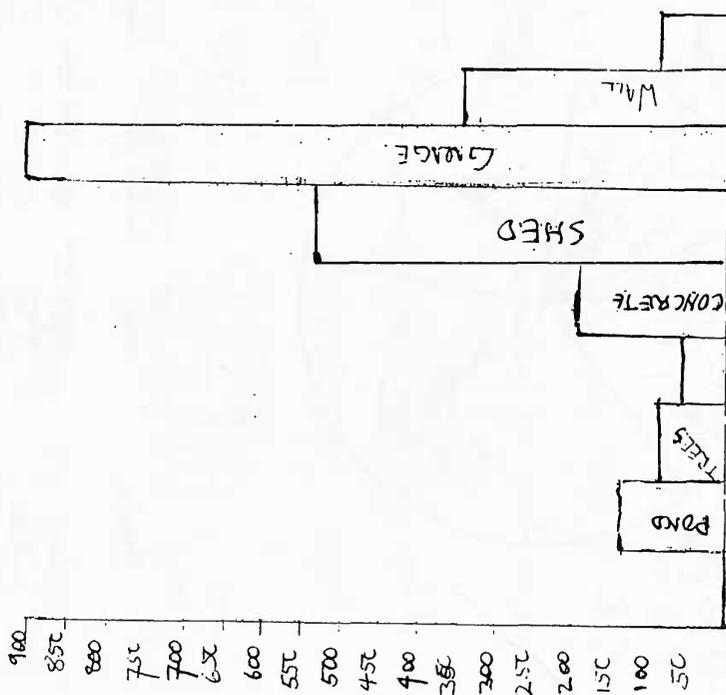
Wall £324.28

Total Cost of the Garden!! £2292.96



Item	Price	Percentage (%)	Angle
Gate	8454	85	15°
Birdtable	9.95	10	2°
Pond + Fish	135.85	13.6	21°
Trees + Shrubs	78.04	7.8	12°
Turf	56.76	5.7	9°
Concreting	170.64	17.1	27°
Shed	527.85	52.8	83°
Wall	905.05	90.5	141°
Shed	324.28	32.4	58°
Total	£2292.96	229.4	360

Bar chart to show money spent on the Garden.



£1000
900
850
800
750
700
650
600
550
500
450
400
350
300
250
200
150
100
50

POND TREES CONCRETE SHED GARAGE WALL

£1000

Conclusion:

Well! that ends this project

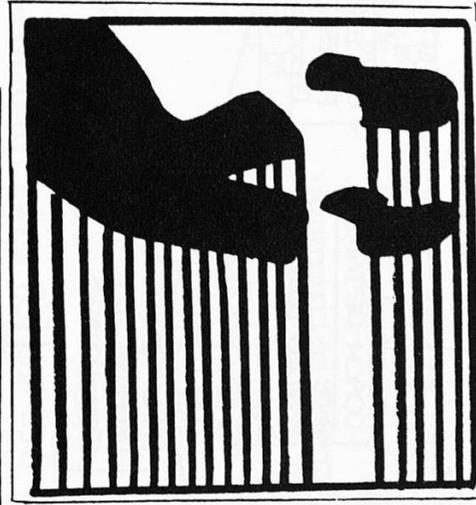
Future Ideas for the garden could probably include a permanent barbecue, with stone wall behind, probably a trolley around the pond, A greenhouse, buying fish in the pond, ... home grown of course! Plants I suppose although I dislike these because they need a lot of attention. I have two young clematis: youngest of which is "falling in garden pond age" - so it would probably need a temporary fence. A lawn mower would be needed and cardboard + wraps for winter.

Before this project I thought a shop-keeper would willingly help me even though I was only doing a college project - but this wasn't so, some refused to help me full stop + others I'm sure would have helped more if I was spending money. (presents the paying money talks) I can understand shopkeepers getting fed up with people doing projects they must have a lot this year - it will be interesting to see if they don't raise their voices to the education authority in the future.

Eventually I ended up pretending that I was actually buying or doing a brand for dad/boss of work. Does this sort of project teach young people to lie on the phone? or is it just young year initiative?

A1/4 MATHS COURSEWORK

REPORT



WEEKEND
IN
LONDON
INCLUDING
MICHAEL JACKSON
CONCERT
AND
SHOPPING TRIP

SET ONE

INTRODUCTION:-

Mrs Cobble gave us another problem to tackle for our course. She gave us a sheet with student's notes explaining what we had to do.

Basically we had to plan or organise something for a group of friends. It could be anything you like and in any direct

First I thought of a disco. Then a birthday party. I decided to organise a birthday disco for a friend in Leicester. I could take up 15 or 20 friends from Flounds to meet 15 or 20 friends from Leicester. We could hold it in a hall in Leicester and could go up in a minibus or something for easier transport. That was one idea I had.

Then I changed. About two weeks before we had been given this idea I had been to a BPO's concert. We had paid £10.00 to go up by coach to Birmingham and we had our ticket included in the price. I wondered how much organisation this needed and planning.

I decided I liked the idea of a concert better than the disco as you can go to a concert to see someone you like performing live but you can go not only for the but for the atmosphere to. You can go to a disco every Saturday if you want to, often a concert is something you never forget.

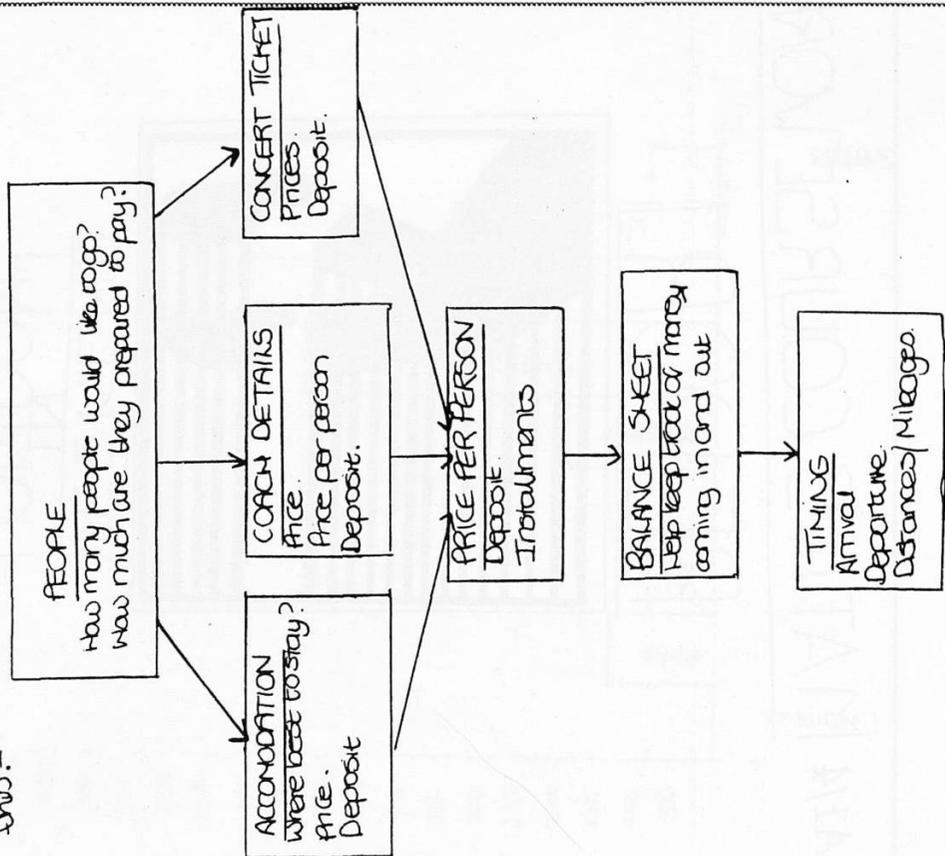
Also I think arranging to go to a concert involves different planning altogether as opposed to a disco. In my report I have included everything I have done, everything I thought of and how I planned it out.

The Problem I am going to tackle and plan out:-

To organise a trip to a pop concert in London for a group of friends. The trip involves staying overnight and coming home the next day.

THE FIRST STAGES:-

When I had established my idea I sat down and attempted to try and start planning it. I must have sat for a good five minutes wondering where to start. I then made a chart of all the things I needed to do to help me plan it out. I kept changing it as adding things I had forgotten about. When I finally had everything I needed to do put down it looked like this:-



PLANNING THE TRIP-

I asked people sitting around me if they would go to a pop concert in London and stay overnight. They said they would. I asked about how much they would be prepared to pay. They didn't really know but not too much as it is only a weekend.
I decided to make the weekend as cheap as possible as the first thing was accommodation.

ACCOMMODATION-

Staying in London overnight can cost quite alot if you stayed in a registered hotel and all we need is a Bed and breakfast place. But Bed and breakfast places rarely have room for the party of 31 I am planning to take. I decided on a Youth Hostel. These are quite cheap but cater for what we need.

Mrs. Corbett is a Youth Hostel Association Member and lent me a book containing registered Youth Hostels around the country.

I looked up London and I had a choice of 7 hostels:-

- Carter Lane
- Scotts Court
- Hampstead Heath
- Highbury
- Hobart House
- White Hart Lane
- Wood Green.

As the concert is held in Wembley Stadium North London I need a hostel in the North or nearby. The concert would start quite late and finish quite late at night and we would want to settle down without a long coach journey.
The youth hostel I chose was:-

- Hampstead Heath
- Youth Hostel,
- 4 Wellgarth Road,
- London NW11 4NR
- Telephone:- 01 458 9054.

The prices-

The workers prefer if there is at least two adults per 15 children and one must be a member. There are 30 children going plus Mr's Corbett who is a YHA member. The coach driver would stay with us making up the other adult.

The price for a junior staying is £17.00 and an adult is £1.00. Breakfast the next morning is all we'll need as we will then go shopping and leave the hostel.

Breakfast costs £1.90.
 Total cost is £6.60 per junior
 and £8.90 per adult.

I have made the figures into £4.00 and £9.00 to make figures easier to calculate.

There are 30 children going and 2 adults. The coach drivers accommodation is paid through the coach company so he/she is not included in the calculations.

$$30 \times £4.00 = 210.00 +$$

$$1 \times 9.00 = 9.00$$

$$\underline{\hspace{1.5cm}} £219.00$$

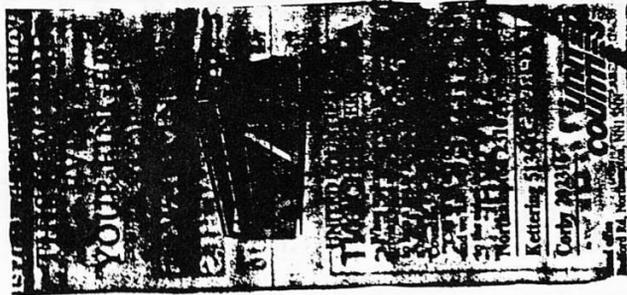
The deposit is £50 and the rest can be paid through instalments (see balance sheet).

COACH DETAILS:-

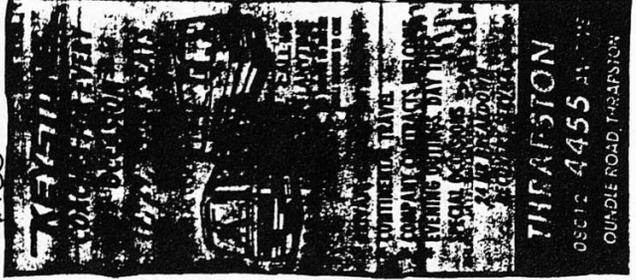
To obtain a price per person I had to find out about some prices. I decided to find a few and find out which are the cheapest.

I asked the same question for each company. "I am doing Maths coursework for GCSE and I was hoping you could give me some information. How much is it, approximately, to hire a coach for 31 people for Monday for the weekend, including drivers accommodation?"

These are the company's I phoned.



This was the most expensive company
 £450



Basically the prices were roughly the same ranging from £100 to £450.

TIMES - ARRIVALS - DEPARTURES.

The times for the weekend are allowing for extra time for toilets, refreshments etc.

leave Round Square at 3:00 pm
 stop for dinner at a service station at 4:30 pm
 for an hour then arrive in London get parked and seated ready for concert to start at 7:00 pm.

concert finishes at approximately 11:30 pm arrive at the Youth Hostel hopefully by 12:00 pm

The next day

leave hostel about 10:30 am and head for solvent gardens. Group can split up but staying around an area meeting up again and registered at 12:30 pm. Group have lunch and split up again. Meet up at 4:30 pm to leave for Round Square arriving at the square at about 6:30 pm.

The £5.00 left over on the balance sheet can be used for things such as the telephone, toilets and any minor emergency.



This company was the cheapest at £400 including drivers accommodation.



All the companies were very helpful and luckily I couldn't get any answerphones.

The price.

£400 for the coach for the weekend to London.
 That is

$$\begin{aligned} &400 \div 31 \\ &= 12.9 \\ &= \pounds 13.00 \text{ per person.} \end{aligned}$$

BALANCE SHEET

DATE	INCOMING	INCOMING	OUTCOMING	OUTCOMING	BALANCE
End of February	Deposit from each person going on the trip	$31 \times 7 = \pounds 217.00$	-	-	$\pounds 217.00$
Beginning of March	-	-	Deposit on tickets Actual price is $\pounds 527 (31 \times 17)$	$\pounds 100.00$	$\pounds 117.00$
March 20th	-	-	Deposit on Youth Hostel Actual price is $\pounds 217 (31 \times 7)$	$\pounds 50.00$	$\pounds 67.00$
End of March	2nd installment from each person	$\pounds 15$ from each person $31 \times 15 = \pounds 465.00$	-	-	$\pounds 532.00$
Beginning of April	-	-	Remaining Hostel money	$\pounds 167.00$	$\pounds 365.00$
End of April	Last installment $\pounds 15$ from each person except senior member.	$\pounds 15$ from each person except senior. $(30 \times 15 + 17) = \pounds 467.00$	-	-	$\pounds 832.00$
Beginning of May	-	-	Cash money } Remaining } ticket } money }	$\pounds 400.00$ $\pounds 427.00$	$\pounds 5.00$

I've worked out a balance sheet which would help me keep track of the money from the concert and what it's all for.

THE CONCERT -

The concert tickets to see Michael Jackson at Wembley Stadium is $\pounds 17.00$ each. It is $\pounds 17.00$ for every body adults and children. You can obtain these through record shops and Wembleys own ticket office.

The concert starts at $\pounds 4.00$ o'clock and finished approximately at 11.30 pm. There is a special coach park with allotted space reducing the risk of losing your coach.

The total price for the tickets is -

$$\begin{array}{r} 17.00 \\ \times 31 \\ \hline \pounds 527.00 \end{array}$$

the deposit for these tickets is $\pounds 100.00$ and the rest will be paid in installments.

From this information I have gathered I can now work out the total cost per person including accommodation, coach fare and ticket.

$$\begin{array}{r} \text{accommodation } \pounds 7.00 \text{ (adult)} \\ \text{coach fare } \pounds 13.00 \\ \text{ticket } \pounds 17.00 \\ \hline \pounds 37.00 \text{ per person.} \end{array}$$

This can be paid in installments:-

end of Feb - $\pounds 7.00$ deposit.
end of March - $\pounds 15.00$ 2nd installment
end of April - $\pounds 15.00$ $\pounds 17.00$ (adult) 3rd installment

The date for the weekend is the 22nd May Saturday
23rd May Sunday

The shopping trip the next day is in Covent garden as the shops there are open on a Sunday.

CONCLUSION-

I hope I have covered all the planning needed to organise my weekend, I didn't think so much was involved! A big company who organise ~~so~~ trips like this all the time must have a lot of work.

I hope I have included enough maths in my report!

I'd like to thank Mrs. Corbett for lending me the YMA book containing all the information about the Hostel's. Also thank you to the coach company's I rang for the prices as they were very helpful.

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PAGE 7	Examples of Adverts in Athletics Weekly.
PAGE 8	The Cost of my Advert.
PAGE 9	The Timetable.
PAGE 10	The Timetable (cont..).
PAGE 11	The Timetable (cont..).
PAGE 12	The Timetable (cont..).
PAGE 13	The Finished Timetable of Track Events.
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MATHS

COURSEWORK.

A1/5

MATHS COURSEWORK.
' THE CELEBRATION'

Introduction.

The title of this coursework is 'The Celebration', but we decided to extend this so instead people could do an event if they wanted. In this coursework we were asked to choose an event or celebration and plan it so that it would be a success. As I enjoy Athletics very much I decided to plan out an Athletics meeting.

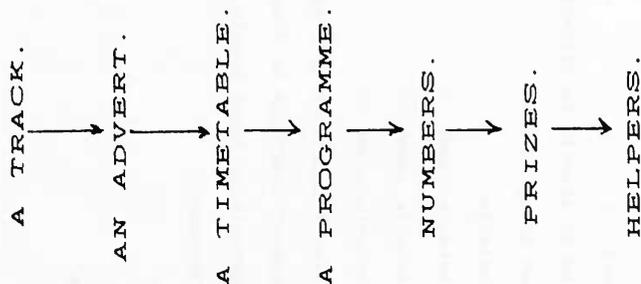
The first thing I decided to do was to write down a list of what I would need.

These are:

- A Timetable.
- A Track.
- An Advert.
- A Programme.
- Numbers.
- Helpers.
- Refreshments.
- Prizes (Medals).

On the next page is a Flow chart to show the order in which things would have to be carried out.

FLOW CHART.



A TRACK.

The track I decided to use is Rockingham Triangle at Corby. I chose this track because Corby Athletic Club is who I run for, but also at the moment Corby's track is the best in Northamptonshire. The surface of the track is Tartan which is the best surface to run on, also it is designed to withstand all weather conditions.

The track at Corby is very well equipped, it has one stand which has under it changing rooms and a weight room. Set aside from the track there is a bar, lounge and a sports hall.

Cost.

It costs £80 to hire the track at Corby for one day. Which is fairly cheap compared to Peterborough which is £100 for the day. The £80 pounds includes the use of all the equipment. But if I arranged the meeting in conjunction with the club then I would not have pay.

AGE GROUPS AND EVENTS.

Before I can write an advert, programme or a timetable I need to write down the possible events to have and the age groups there are:

Possible events:

100 metres
200 m.
400 m.
800 m.
1500 m.
3000 m.
5000 m.
400 m. Hurdles
75 - 110 m. Hurdles.
Steeplechase.

Track Events.

Long jump
High jump
Shot put
Discus
Hammer
Pole vault
Triple jump
Javelin

Field Events.

Age groups.

Minor Girls
Junior ladies
Inter ladies
Senior ladies
Colts
Boys
Youths
Jun/Sen Men.

The events I decided to have were 100m.
200m.
800m.
3000m.
Long Jump
High Jump
Javelin
Discus

AGE GROUPS AND EVENTS.

(cont...)

I did not use all the events only a few of them because if I had used all the events it would take to long to complete the Athletics meeting. In Athletic league meetings the events alternate so that the meetings do not last too long.

Also I have joined together the Inters and the Senior women because usually there is not enough of either group to have different races so they are put together.

AN ADVERT.

Advertising an event helps to obtain a broader range of participants. I have the magazine Athletics Weekly this is a good place to advertise as many athletes have it. To advertise in Athletics Weekly it will cost 20p per word or £5 per single column centimetre.

This cut out shows you the advertising prices:

CLASSIFIED ADVERTISING

To Sell, Promote or Announce from as little as 20p per word, or 15 per single column centimetre. Please add 15% VAT.
CLEARLY PRINTED COPY should be sent, WITH PAYMENT, to: ATHLETICS WEEKLY ADVERTISING, E.M.A.P. Pursuit Publishing, Bretton Court, Peterborough PE3 8DZ.

In my advert I would have to include the events being held, the date of the event, how much the entry fee is, where it is held, and also to include a S.A.E. so that I could send them a timetable and map.

My advert:

CORBY ATHLETIC CLUB
 (Under 14s and 1444 Lvs)
TRACK AND FIELD OPEN MEETING
 SUNDAY 22nd JUNE 1989 at 12.00 p.m.
ROCKINGHAM TRIANGLE, CORBY

EVENTS

- GIRLS 100m 200m L.J.
- JNR LADIES 100m 200m L.J. H.J. Javelin Discus
- SEN/INTER LADIES 100m 200m 800m L.J. H.J. Javelin Discus
- COLTS 100m 200m L.J.
- BOYS 100m 200m L.J. H.J. Javelin Discus
- YOUTH 100m 200m 800m L.J. H.J. Javelin Discus
- SEN/JUN MEN 100m 200m 800m 3000m L.J. H.J. Javelin Discus

Entries close 10th June. (No Entries on the day.)

Entry fee 60p per event.

Entries to: Miss K. Pallatt, 3 Meadow Close,
 Ringstead, Northants, NN14 4TZ.
 Please send S.A.E.

THE TIMETABLE.

The timetable in an Athletics meeting is very important because if you fall behind time then athletes have warmed up and are left waiting, this is very frustrating. Before I can work out a timetable I need to know how many people are competing. This was achieved from the number of entrants answering the advertisement.

NUMBERS COMPETING AFTER ENTRIES RECEIVED.

	100m	200m	800m	3000m	Longjump	Highjump	Javelin	Discus
GIRLS	20	20	/	/	10	/	/	/
JNR LADIES	25	20	/	/	15	10	8	8
SEN/INT LADIES	8	6	5	/	4	6	3	3
COLTS	15	10	/	/	8	/	/	/
BOYS	23	20	/	/	13	9	7	6
YOUTHS	10	10	6	/	6	4	7	8
SEN/JUN MEN	6	5	5	6	5	4	7	3

On a track there is 8 lanes and 12 on the straight but I decided to have a maximum of 6 people in the heats and 8 people in the final. So next I had to work out how many heats I would need in each event, so that later I could work out the timetable.

THE TIMETABLE.

(cont.,.)

THE NUMBER OF HEATS.

AGE GROUP	EVENT	NUMBER OF HEATS	NUMBER IN EACH HEAT			
			H1	H2	H3	H4
GIRLS	100m	4	5	5	5	5
	200m	4	5	5	5	5
JNR LADIES	100m	4	6	6	6	7
	200m	4	5	5	5	5
SEN/INT LADIES	100m	0				Straight Final
	200m	0				Straight Final
	800m	0				Straight Final
COLTS	100m	3	5	5	5	/
	200m	2	5	5	/	/
BOYS	100m	4	6	6	6	5
	200m	4	5	5	5	5
YOUTHS	100m	2	5	5	/	/
	200m	2	5	5	/	/
	800m	0				Straight Final
SEN/JUN MEN	100m	0				Straight Final
	200m	0				Straight Final
	800m	0				Straight Final
	3000m	0				Straight Final

This does not have to be done for the field events as you do not have separate heats and finals.

THE TIMETABLE.

(cont...)

Next I had to decide in what order the events would be run, for example many people who do the 100 metres will also do the 200 metres so these two events need to be apart from each other so that the competitors can recover.

THE ORDER OF TRACK EVENTS.

- 100 metres Heats.
- 800 metres Finals.
- 200 metres Heats.
- 100 metres Finals.
- 3000 metres Finals.
- 200 metres Finals.

Also before I can work out a timetable I need to know how long I should leave for each event. These are the times I worked out:

- 100 metres allow 5 minutes.
- 200 metres allow 5 minutes.
- 800 metres allow 10 minutes.
- 3000 metres allow 20 minutes.

To decide the time that I should start the meeting I worked out the total time taken for each of the track event:

In the 100 metres there is: 17 Heats
7 Finals

So altogether there is: 24 races
Time taken for 24 races = $24 \times 5 = 120$ minutes
2 hours.

In the 200 metres there is: 16 Heats
7 Finals

So altogether there is: 23 races.
Time taken for 23 races = $23 \times 5 = 115$ mins.
1 hour 55 mins.

In the 800 metres there is: 3 Finals
Time taken for 3 races = $3 \times 10 = 30$ minutes.

THE TIMETABLE.

(cont...)

In the 3000 metres there is: 1 Final
Time taken for 1 race is 20 minutes.

So the meeting should take about 4 hours 40 minutes. So the best time to start would be 12 o'clock so that the meeting would finish at about 5 o'clock.

On the next page is the finished timetable:

THE FINISHED TIMEABLE OF TRACK EVENTS.

TIME	EVENT	HEAT OR FINAL	AGE GROUP	TIME TAKEN TO RUN
12.00	100m	Heat 1 Heat 2 Heat 3 Heat 4	Min. Girls	5 mins. 5 mins. 5 mins. 5 mins.
12.20	100m	Heat 1 Heat 2 Heat 3 Heat 4	Jnr. Ladies	5 mins. 5 mins. 5 mins. 5 mins.
12.40	100m	Heat 1 Heat 2 Heat 3	Colts	5 mins. 5 mins. 5 mins.
12.55	100m	Heat 1 Heat 2 Heat 3 Heat 4	Boys	5 mins. 5 mins. 5 mins. 5 mins.
1.15	100m	Heat 1 Heat 2	Youths	5 mins. 5 mins.
1.25	800m	Final	Sen/Int Ladies	10 mins.
1.35	800m	Final	Youths	10 mins.
1.45	800m	Final	Sen/Jun Men	10 mins.
1.55	200m	Heat 1 Heat 2 Heat 3 Heat 4	Min. Girls	5 mins. 5 mins. 5 mins. 5 mins.

TIME	EVENT	HEAT OR FINAL	AGE GROUP	TIME TAKEN TO RUN
2.15	200m	Heat 1 Heat 2 Heat 3 Heat 4	Jnr. Ladies	5 mins. 5 mins. 5 mins. 5 mins.
2.35	200m	Heat 1 Heat 2	Colts	5 mins. 5 mins.
2.45	200m	Heat 1 Heat 2 Heat 3 Heat 4	Boys	5 mins. 5 mins. 5 mins. 5 mins.
3.05	200m	Heat 1 Heat 2	Youths	5 mins. 5 mins.
3.15	100m	Final	Min. Girls Jnr. Ladies Sen/Int Ladies Colts Boys Youths Sen/Jun Men	5 mins. 5 mins. 5 mins. 5 mins. 5 mins. 5 mins. 5 mins.
3.50	3000m	Final	Sen/Jun Men	20 mins.
4.10	200m	Final	Min. Girls Jnr. Ladies Sen/Int Ladies Colts Boys Youths Sen/Jun Men	5 mins. 5 mins. 5 mins. 5 mins. 5 mins. 5 mins. 5 mins.

End at 3.45.

THE TIMETABLE OF FIELD EVENTS.

For the field events I have allowed 30 minutes. This is the finished timetable:

TIME	EVENT	AGE GROUP
12.00	Longjump Highjump Javelin Discus	Min. Girls. Jnr. Ladies. Boys. Youths.
12.30	Longjump Highjump Javelin Discus	Colts. Boys. Jnr. Ladies. Sen/Int Ladies.
1.00	Longjump Highjump Javelin Discus	Jnr. Ladies. Sen/Int Ladies. Youths. Sen/Jun Men.
1.30	Longjump Highjump Javelin Discus	Sen/Jun Men. Youths. Sen/Int Ladies. Boys.
2.00	Longjump Highjump Javelin Discus	Sen/Int Ladies. Sen/Jun Men. Sen/Jun Men. Jnr. Ladies.

CORBY ATHLETIC CLUB.

1989.

OPEN MEETING.

Sunday 22nd June.



NORTHAMPTONSHIRE AMATEUR ATHLETICS ASSOCIATION.

ROCKINGHAM TRIANGLE
SPORTS STADIUM.

(Under AAA and VAAA Rules)

OFFICIAL PROGRAMME 50p.

ORDER OF TRACK EVENTS

Event No.	Time	Event
T1	12.00	100m Minor Girls Heats
T2	12.20	100m Junior Ladies Heats
T3	12.40	100m Colts Heats
T4	12.55	100m Boys Heats
T5	1.15	100m Youths Heats
T6	1.25	800m Sen/Int Ladies Final
T7	1.35	800m Youths Final
T8	1.45	800m Sen/Jun Men Final
T9	1.55	200m Minor Girls Heats
T10	2.15	200m Junior Ladies Heats
T11	2.35	200m Colts Heats
T12	2.45	200m Boys Heats
T13	3.05	200m Youths Heats
T14	3.15	100m Minor Girls Final
T15	3.15	100m Junior Ladies Final
T16	3.15	100m Sen/Int Ladies Final
T17	3.15	100m Colts Final
T18	3.15	100m Boys Final
T19	3.15	100m Youths Final
T20	3.15	100m Sen/Jun Men Final
T21	3.50	3000m Sen/Jun Men Final
T22	4.10	200m Minor Girls Final
T23	4.10	200m Junior Ladies Final
T24	4.10	200m Sen/Int Ladies Final
T25	4.10	200m Colts Final
T26	4.10	200m Boys Final
T27	4.10	200m Youths Final
T28	4.10	200m Sen/Jun Men Final

ORDER OF FIELD EVENTS

Event No.	Time	Event
F1	12.00	Longjump Minor Girls
F2		Highjump Junior Ladies
F3		Javelin Boys
F4		Discus Youths
F5	12.30	Longjump Colts
F6		Highjump Boys
F7		Javelin Junior Ladies
F8		Discus Sen/Int Ladies
F9	1.00	Longjump Junior Ladies
F10		Highjump Sen/Int Ladies
F11		Javelin Youths
F12		Discus Sen/Jun Men
F13	1.30	Longjump Sen/Jun Men
F14		Highjump Youths
F15		Javelin Sen/Int Ladies
F16		Discus Boys
F17	2.00	Longjump Sen/Int Ladies
F18		Highjump Sen/Jun Men
F19		Javelin Sen/Jun Men
F20		Discus Junior Ladies

Note: NUMBERS must be worn front and back in ALL events except high jump.

Northants Amateur Athletics Association 1989 Open Meeting
at Rockingham Triangle, Corby, Sunday 22nd June.

OFFICIALS

- President S. Pallett
- Track Referee E. Pallett.
- Track Judges M. Smith, G. Pratt, J. Still, N. Cole,
L. Wykes, J. Corner
- Chief Timekeeper G. Munn
- Timekeepers K. Harris, P. Jones, A. Williams,
F. Marshall
- Field Referees T. Love, H. Lewis.
- Field Judges E. Hobbs, D. Taylor, R. Walters, O. Brown,
I. Wright, F. Ward.
- Starter G. Jones.
- Assistant Starter B. Bull.
- Medals Steward T. Cruise.
- Recorders Mrs C. Lewis, Mrs K. French.
- Announcer M. Jackson.
- Clerk of the Track Members of Corby A.C.
- Track Assistants Members of Corby A.C.

THE PROGRAMME.

This is my programme for the athletics meeting, which costs 50p to buy:

MY PROGRAMME.

NUMBERS.

In athletics every competitor has to have a number and wear it on the back and front of their vest. This is an example of the numbers:

22

STACY CHELSEA ROAD 142Z

Get your **Numbers** from the specialist
Stacy & Sons Ltd
 8 Brewery Fields, Church Street,
 Great Baddow, Chelmsford, Essex, CM2 7JF (0457) 41232

2895
 OFFER
 CHELSEA

To find out how much my numbers will cost me I rang two companies. When I rang the company above and explained what I was doing they told me that their numbers are £2.25 per hundred. Which I think is a reasonable price. The company below quoted £2.75 which is £0.50 more expensive.

COMPETITORS' NUMBERS

Suppliers to all major merchants.
 Unrivalled quality, choice and service.

T and J PEARCE'S Vintage Firm Industrial Estate
 Pine, Mid Glamorgan, CF33 8NU
Telephone: 0656-744288

PRIZES.

In Athletics athletes are not allowed to accept prizes which are money because it is an amateur sport. So instead they receive medals. From the advertisement below you can see that the medals start at only 39p. For my meeting I will need medals for the first three in each event. Which is:

$$38 \times 3 = 114 \text{ medals.}$$

At 39p a medal this come to £44.46.
I could buy more expensive medals but at £44.46 this is a fairly large outlay and athletes compete for the joy of competing so the medal is just a small reward for a good performance on that particular day.

**UNIQUE
PERSONALISED MEDALS
SUPERB QUALITY
COMPLETE WITH RIBBONS
Starting at only 39p**
Contact:
A. B. (Medals) Ltd
Newlands, New Lane,
Cranston,
Beadford BD10 9AP
Telephone 0274 619031
No. 1 in UK for medals

HELPERS.

In an athletics meeting the helpers are very important. The helpers that I would need are:

- A Starter
- A Track Referee
- A Starters Assistant
- Track Judges
- Timekeepers
- Field Referees
- Field Judges
- A Number Steward
- A Medals Steward
- Recorders
- An Announcer

Also I would need track assistants which are the people who put out the hurdles, move them around and do all the other jobs that need doing.
As you can see I need a lot of helpers who are all unpaid, except for the starter who may be paid for depending on who it is.

A1/6

Bowling Leagues

In a bowling league there are an even number of teams all of whom must play each other at some point during the season. The bowling alley is arranged with the lanes in pairs. The two teams playing each other play on one pair of lanes. Thus not only must the order in which the teams play each other be found, but also the pair of lanes on which each match takes place must be worked out. To complicate matters further the condition that each team must play on one pair of lanes only twice (ie on each individual lane only once in effect) is added to eliminate the advantage which may be gained by a particular lane.

Firstly the team fixtures were worked out for a league consisting of only six teams in order to simplify matters. Teams were labelled A to F

1. How many weeks are required for all the teams to play each other

A vs B }
 A vs C } 5 weeks ie no. of weeks = no. of teams - 1
 A vs D }
 A vs E }
 A vs F }

Several attempts were made to set up a table as follows on trial and error basis.

team	week	1	2	3
A	B	C	D	
B	A	D	C	
C	D	A	B	
D	C	B	A	

This proved to be difficult so the number of teams was reduced to four to see if any pattern could be identified in the table

team	week	1	2	3
A	B	C	D	
B	A	D	C	
C	D	A	B	
D	C	B	A	

Very successful

This was easy to set up because once the matches involving team A were known, only one other match involving the other two teams could take place.

alternatively
 A B C D
 x 1 2 3
 B 1 x 3 2 team A were known, only one other match involving the other two teams could take place.
 C 1 2 x 3
 D 1 2 3 x

Two main patterns were identified

team	week	1	2	3
A	B	C	D	
B	A	D	C	
C	D	A	B	
D	C	B	A	

After much trial and error it was decided to develop the line of A's (circled in green) as the other pattern could not be extended.

Thus for six teams

	1	2	3	4	5
A	B	C	D	E	F
B	A				
C		A			
D			A		
E				A	
F					A

Once again, a great deal of trial and error were involved. Finally after experimenting a system to work out solutions was devised. As the match involving team A was known, these could only be true other combinations of the four remaining teams ie A plays B

C plays D ∴ E plays F
 C plays E ∴ D plays F
 C plays F ∴ D plays E

Using this method of investigating every possible combination a table was set up. The end of many avenues of thought came when the combination produced a match between two teams which had already taken place.

This system was developed fairly late on in the investigation after I had spent a great deal of time under the microscope impression that there was only one solution to the problem ie only one way in which the table could be set up so that each team played each other team only once. The way in which I set up the first solution was by starting with the skeleton of the table as above and then completing each row in alphabetical order based on the position of the A and other replacing the letter at the start of the row with F. This last row was made up by looking to see which letter in each

Week 1 A plays B	Week 2 A plays C	Week 3 A plays D	Week 4 A plays E	Week 5 A plays F
1 2 3 4 5 A B C D E F	1 2 3 4 5 A B C D E F	1 2 3 4 5 A B C D E F	1 2 3 4 5 A B C D E F	1 2 3 4 5 A B C D E F
2 1 3 4 5 B A C D E F	2 1 3 4 5 B A C D E F	2 1 3 4 5 B A C D E F	2 1 3 4 5 B A C D E F	2 1 3 4 5 B A C D E F
3 1 2 4 5 C A B D E F	3 1 2 4 5 C A B D E F	3 1 2 4 5 C A B D E F	3 1 2 4 5 C A B D E F	3 1 2 4 5 C A B D E F
4 1 2 3 5 D A B C E F	4 1 2 3 5 D A B C E F	4 1 2 3 5 D A B C E F	4 1 2 3 5 D A B C E F	4 1 2 3 5 D A B C E F
5 1 2 3 4 E A B C D F	5 1 2 3 4 E A B C D F	5 1 2 3 4 E A B C D F	5 1 2 3 4 E A B C D F	5 1 2 3 4 E A B C D F
6 1 2 3 4 5 F A B C D E	6 1 2 3 4 5 F A B C D E	6 1 2 3 4 5 F A B C D E	6 1 2 3 4 5 F A B C D E	6 1 2 3 4 5 F A B C D E

column was missing:-

1	2	3	4	5
A	B	C	D	E
B	A	F	C	D
C	E	A	B	F
D	F	E	A	B
E	C	D	F	A
F	D	B	E	C

move the start of the algorithm along one place each time

Once I had reached this stage ie I had found a solution, I began to work on this same allocation problem (see below). Using this table I could not find a solution but when I later became aware of different ways of arranging matches I realised that perhaps only one such table would allow this problem to be solved

Thus, 4 teams gives 1 solution } where do these figures come from what are the 15?

6 teams gives 6 solutions }

8 teams?

Looking at the results table - week 1 knowing A plays B

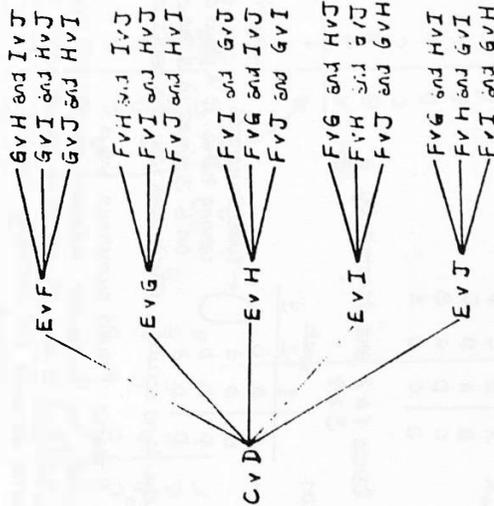
4 teams A v B ∴ CYD 1 choice

6 teams A v B ∴ CVD and EVF 3 choices
 or CVE and DVF
 or CVF and DVE

8 teams A v B ∴ CVD and EVF and BVH 15 choices
 or CVD and EVG and FVH
 or CVD and EVH and FVG
 or CVE and DVF and BVH
 or CVE and DVG and FVH
 or CVE and DVH and FVG
 or CVF and DVE and BVH
 or CVF and DVG and EVH
 or CVF and DVH and EVG
 or CVG and DVE and FVH
 or CVG and DVF and EVH
 or CVG and DVH and EVF
 or CVH and DVE and FVG
 or CVH and DVF and EVG
 or CVH and DVG and EVF

10 Teams A v B ∴ C v D
 or C v E
 or C v F
 or C v G
 or C v H
 or C v I
 or C v J

For just one of these initial choices in question eg A v B and C v D



These are 15 options for each initial choice

∴ for 10 teams in week 1 there are 105 ways in which some could be arranged.

Summary

- 4 teams 1 arrangement in week 1
- 6 teams 3 arrangements in week 1
- 8 teams 15 arrangements in week 1
- 10 teams 105 arrangements in week 1

Write next:

What is the relationship between no of teams and no of arrangements in week 1?

What is the relationship between no of teams and no of

Next I tried using the permutations and combinations notation. However this did not work because

a) A v B was, in this problem, the same as B plays A

b) I had nominally chosen the matches in which A would play A v B in week 1, A v C in week 2, A v D in week 3 and so on

Are you sure of the way the table is (practically) the same?

If matches would have been increased the selection of one match to be played in any one week, did influence the number of available ways of arranging the other two matches (for a 6 team league)

ie if, in week 1 A plays B there are only 3 other way of arranging the other four teams

However, if, in week 1 A does not necessarily play B then there are 15 ways in which the matches for week one will be chosen

is thus given by

$${}^n C_x = \frac{n!}{x!(n-x)!}$$

$${}^6 C_2 = \frac{6!}{2!4!} = \frac{720}{48} = 15 \text{ ways}$$

For eight teams if A does not necessarily play B in week 1 there are 28 ways

- ∴ 4 teams 1 way
- 6 teams 3 ways
- 8 teams 15 ways
- 10 teams 105 ways

If A doesn't necessarily play B, 6 ways, 15 ways, 28 ways, 105 ways? this must be wrong

What else could be tried?

If the teams are allowed to play on the same lanes 2 weeks running :
I found the solution straight away more by luck than judgement

team	week				
	1	2	3	4	5
A	a	b	c	a	b
B	a	c	a	b	c
C	b	b	a	c	a
D	c	a	c	b	a
E	b	c	b	a	c
F	c	a	b	c	b

Once again I assumed that team A played on each pair of lanes in rotation (had I not done this there would have been more than one solution) ie week 1-a, week 2-b, week 3-c, week 4-a and so on.

Once I knew that A was playing on a in week 1 then B had to be playing on a. I therefore had a choice

Match involving C could take place on b or c. The solution was obtained when the match took place on b. What would happen if the match took place on c. Initially we have -

team	week				
	1	2	3	4	5
A	a	b	c	a	b
B	a				
C	c	b			
D	b		c		
E	c			a	
F	b				b

week 2 choice B v F on a } as A v C is on b
or B v F on c }

team	week				
	1	2	3	4	5
A	a	b	c	a	b
B	a	a			
C	c	b			
D	b	c	c		
E	c	c		a	
F	b	a			b

What else did I try?

Before I proved my initial assumption that there was only one solution matrix for six teams, wrong, I worked for some time on the lane allocation problem conditions: as bowling lanes are arranged in pairs, then each team must play on each pair of lanes only twice (equivalent of playing on each individual lane only once). Unfortunately I worked through the problem using a six teams matrix to begin with, absolutely positive that a solution was possible. Had I tried the problem with just teams only, it might have been a little more sceptical

team	week		
	1	2	3
A	B	C	D
B	A	D	C
C	D	A	B
D	C	B	A

If lanes 1 & 2 are denoted by a
3 & 4 " " b

team	week		
	1	2	3
A	a	b	
B	a		
C	b	b	
D	b	a	

← weighting goes wrong here. If A plays on a then C plays on b 3 times in a row and so on. There is no solution which ever way the table is arranged.

More lanes For 6 teams I tried numerous ways. Initially my conditions included the proviso that any team was not allowed to play on the same pair of lanes two weeks running I came up with the following solution

team	week				
	1	2	3	4	5
A	a	c	b	a	c
B	a	b	a	c	b
C	b	c	b	a	a
D	c	a	b	c	a
E	b	a	c	a	b
F	c	b	c	b	c

lanes 1 & 2 = a
3 & 4 = b
5 & 6 = c

If the teams are not allowed to play on a same lanes 2 weeks running F never plays on a this column selected knowing the matches which took place in week 1 (shown earlier in the separate)

Week 5 Final week
 Look at B. B must play on c as B has already played on a and twice.

team	week				
	1	2	3	4	5
A	a	b	c	a	b
B	a	a	b	b	c
C	c	b	b	c	a
D	b	c	c	b	a
E	(c)	(c)	a	a	(c)
F	b	a	a	c	b

∴ this is not a solution

There is therefore no solution if the table is initially set up as shown (i.e. A playing on the lanes in rotation and during week 1 C v E plays on c)

We know that the solution is obtained when C v E plays on b in week 1
 In week 2 choice B v F on a
 or B v F on c

team	week				
	1	2	3	4	5
A	a	b	c	a	b
B	a	a	b	c	c
C	b	b	b	b	b
D	(c)	(c)	(c)	a	c
E	b	c	c	a	a
F	c	a	c	c	b

∴ not a solution

solution initially shown

Working on the same assumption that there was only one solution for the way in which the teams can be arranged to play each other, I tried with eight teams.

I built up the matrix in the same way as I had originally devised the 6 team one - replacing the letters at the start of the row with the letter at the start of the column and moving the start of the alphabet sequence along one column at a time (see sheet).

Week 3 choice - table marked * B v C must play on b because A v D is on c and B has already played twice

table marked ** B v C on a } as A v D on c
 or B v C on b }

team	week				
	1	2	3	4	5
A	a	b	c	a	b
B	a	a	b	c	a
C	c	b	b	b	a
D	b	c	c	a	c
E	c	c	a	a	a
F	b	a	a	b	b

∴ can't be a solution as F plays on b more than twice

team	week				
	1	2	3	4	5
A	a	b	c	a	b
B	a	a	c	b	b
C	c	c	b	b	b
D	b	b	a	a	c
E	c	(a)	(a)	(a)	(a)
F	b	c	a	a	b

∴ can't be a solution as E plays on a more than twice

Week 4 choice B v D on b } as A v E on a
 or B v D on c }

team	week				
	1	2	3	4	5
A	a	b	c	a	b
B	a	a	b	c	a
C	c	b	b	b	c
D	b	c	c	b	b
E	c	c	a	a	a
F	b	a	a	b	b

∴ not a solution

What did the investigation achieve?

Although I did not solve the problem I had set myself, the investigation helped me to understand many of the problems and permutations which people may encounter during their own investigations. The problem I set myself was probably complicated by the fact that

i) I had a certain amount of prior knowledge before starting out. Having run a bowling league last year I had already tried to work out how the initial fixtures matrix which I was provided with was arranged at. Hence the mistaken assumption that there was only one solution

ii) I probably set too many conditions on the problem because I started. Looking back at it, the initial problem was not as simple as it could have been and so perhaps I missed out on some basic ideas which could have helped me solve the problem in the long run.

I found the problem extremely frustrating at times and at the end of it I didn't feel any closer to the solution. However, it made me realise how complex the problem could become. Several other avenues of enquiry could have been followed if I had had a few months to spare. Also, permutations and combinations are not my strong point in Maths and I had to go back to first principles for much of the problem.

team	week						
	1	2	3	4	5	6	7
A	B	C	D	E	F	G	H
B	A	H	C	D	E	F	G
C	G	A	B	H	D	E	F
D	F	G	A	B	C	H	E
E	H	F	G	A	B	C	D
F	D	F	H	G	A	B	C
G	C	D	E	F	H	A	B
H	E	B	F	C	G	D	A

I then tried 'pattern spotting' in the lane allocation matrix for 6 teams

team	week				
	1	2	3	4	5
A	a	b	c	a	b
B	b	a	c	b	c
C	b	b	a	c	a
D	c	a	c	b	a
E	b	c	b	a	c
F	c	a	b	c	b

However, after numerous attempts to find a guide and then to apply it successfully to an eight team league I admitted defeat

Later I realised that my inability to solve the problem could be due to my initial assumption that there was only one solution to the original fixtures matrix. Perhaps there was a solution of the lane allocation problem for another fixtures matrix

6

Moderator's Comments

Applications : Plan a Room/Mini Gym A1/1

Foundation Level

Approximate Grade G

This is an attractive looking and relatively simple single stage task. The student has seen the need to supply the room, and she has catalogued the equipment needed, together with finding the costs, with accuracy. In doing this, she has achieved a minimum grade. She even reminds us of the effort put into the collection of the data with her bus rides. There is some commentary upon the equipment needed, and the reasons for placing it upon the final drawing. She has not had the insight to use scaled drawing to test the viability of the design, but she has produced an entirely satisfactory first stage solution.

I do not agree with the comment that 'more maths' needs to be incorporated by 'some calculation' or 'pie or bar charts'. I feel charts would be irrelevant here, and that it would need to be clearly indicated what calculations could be usefully employed. Far better would be a scale drawing, and scaled cut-outs of the items, placed so as to provide adequate clearance. This would be more relevant to the problem. This might also lead on to choice of different items on the grounds of size and hence cost comparisons etc.

Applications : Guests A1/2

Foundation Level

Approximate Grade E

The application chosen by the student is not necessarily the richest area in terms of mathematical content. True, there is plenty of scope in terms of ordering information, and in solving problems involving constraints. The introduction does cast her net wide, but she doesn't quite meet the targets she set for herself.

The overall impression is of disjointed pieces of mathematics - scale drawing; repeatedly, maximisation of resources, distance, costings and measurement - all put together by a very 'eloquent' foundation level student. However, I feel that she has failed to pull all these ideas together with some references to reality - some of the costings seemed a little fanciful.

A nice looking project but she summed it all up in the summary at the end. "I wish it could come true ...".

Applications : To Build a Garden A1/3

Intermediate Level

Approximate Grade C

Well, there is a decidedly strong personal involvement here, almost too much in places, yet he certainly made me smile when reading the work.

I felt that a great deal of benefit for the pupil has come from doing this project. A lad, who may already be very confident, will have gained valuable experience on the 'phone and through making detailed enquiries. He will know a lot more about gardens, but will he know a great deal more maths? He does use quite a wide range of mathematical skills, distributed through the project, though these never develop beyond Intermediate expectation.

One 'problem' I found was that he was so keen to justify all his decisions that I lost my way at times in the welter of comment, not all relevant, that was supplied. On-the-whole, the 'monologue' approach does tend to submerge the mathematics and should be avoided if possible.

I liked the project, felt he had brought a lot to it, had shown accomplishment in a range of skills, mostly computational, and yet had not quite pulled the whole thing together and expanded its scope to qualify for the top grades, which would be available at the Higher level of entry.

Applications : Weekend in London A1/4

Intermediate Level

Approximate Grade C

What a tidy and well documented piece of individual work. This student has employed a reasonable range of mathematical skills at Intermediate level to display and organise the trip in question. The impression created is of a well thought out and highly individual solution to the problem.

Of course, there are drawbacks to awarding a higher grade, the content is quite limited, and the techniques are largely unrefined and not extended. This would be a necessary condition for entry into the upper grades, which are not available at this level of entry.

Candidates at Higher level might have been expected to read a greater degree of complexity into the task and employ more sophisticated levels of skill into the solution of it. They might, therefore extend the task in other directions. In so doing, considering for example, other outings, methods of finance, investment of large sums of money received as deposits, alternative means of transport, different accommodation costs, transport within London, underlying basis for costing transport - where does the £400 come from?, etc.

However, judging the project as achieved by the student, there is a precise application of skills to the range of techniques employed to produce a satisfactory solution to the original problem.

Applications : Athletics Match A1/5

Higher Level

Approximate Grade B

I feel that this item demonstrates the value of allowing a pupil to decide some of the mathematics they will take part in. This is a most comprehensive and impressive piece of organisation on behalf of a Higher Level candidate. Clearly the personal involvement of the candidate has generated much more enthusiasm for the task than would otherwise be the case for similar work in a 'text book' situation.

Good tables have been used to display the information in a concise form. A thread of logic runs throughout the piece and all the components form a nice, cohesive whole. Certainly the level of some of the 'mathematics' is not excessive but it is applied well, though I feel she might have considered whether she would make a profit on the event - assuming the figures for entry were real. Had she taken this route, as well as the excellent organisational work considered earlier on, then her grade could have been extremely good. Still, the choice of plan is hers and if we choose to direct pupils into all the aspects of work that they must consider then we destroy their own spontaneity and with it, their chance to score well.

The strength of this project lies in the pupil's own strategy in solving the problem and the applications of her skills to a variety of 'real life' situations. This produces a most pleasing result.

Applications : Bowling Leagues A1/6

Higher Level

Approximate Grade A

I was quite impressed by this piece of work. Despite the fact that she did not feel she achieved a satisfactory solution to the problem, yet the methods that have been employed to research the problem are excellent.

The structure of the 'solution' is very clearly presented and commented upon. The initial problem is well documented and the conditions are plainly set out.

There is a distinct 'Higher Level' feel to this piece - the precise use of language, good organisation of results in tabular form and a complex reasoning underlying the work. Results are also presented in a variety of ways, all of which serve to explain the results and methods employed. (Despite one 'slip' where the results are set down for 4 and 6 teams without any support.)

Taking an overall picture, the work is well structured, argued and coherently put together. True, there is no neat solution, but the *method* and the process of the application based investigation is superbly illustrated here.

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