

**Additional Applied Science A**

Twenty First Century Science Suite

Teacher Support

OCR GCSE in Additional Applied Science A J632

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# Managing Skills Development and Assessment in Twenty First Century Science

An education in science means different things for different people. The report *Beyond 2000 – science education for the future* [Robin Millar and Jonathan Osborne, eds; King's College, London 1998, ISBN 1 871984 78 5] identified two main purposes for science education at secondary level:

- the first stage in training for future scientists;
- a preparation for life in a modern society for all candidates.

The new assessment structure for GCSE Science in the National Curriculum recognises that these two purposes require courses with different content and different approaches. Thus, the former “Double Award” science, which tried to combine the different purposes into a single course, has been replaced by “Dual Science” – two separate specifications, taught with different aims in view, and leading to two independent qualifications.

The Twenty First Century Science suite of specifications has been designed from the beginning to address both purposes in a way which allows the maximum curriculum flexibility. It provides valid, meaningful and motivating learning experiences for the widest possible variety of candidates, regardless of interest, ability or career intentions.

The key to this flexibility is provision of a full suite of single subject specifications, which can be combined in many different ways.

The National Curriculum core requirement for science is a minimum of single award science. This must provide a basis of scientific literacy: science for citizenship, for all young people, based on sufficient knowledge of science content to comprehend major issues in modern society.

This coverage is provided through the specification:

- Science (J630), which provides an education for all candidates, based on scientific contexts and issues in contemporary society;

It is anticipated that the majority of candidates will wish to learn more about science. In this suite, two alternative varieties of Additional Science are offered:

- Additional Science (J631), which extends knowledge and understanding of science to provide a sound basis for more advanced study’;
- **Additional Applied Science (J632), which provides a work-oriented experience of how science is applied in chosen manufacturing or service areas.**

These three specifications are designed to suit different populations with different needs. Thus, the assessment of skills is different in each specification and designed to match the different objectives of each specification. Because many candidates will take one of the additional sciences as well as Science, the assessments for the Additional Science specifications are designed to be complementary to those for Science, not merely to repeat similar activities.

The three schemes of assessment are different, but each is based on activities which should occur as a normal part of teaching and learning in the course. The general procedures followed in awarding, recording and submitting assessment marks follow the same pattern for all of the specifications.

## An Introduction to Skills Assessment for the Three Schemes

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Where a centre is introducing all three schemes at the same time, it may be helpful to ask different staff to 'lead' on different schemes, thus sharing out the load of developing new techniques and learning new marking criteria.

The key features of the three schemes are summarized in table 1.

Table 1: *Key features of each skills assessment scheme*

Specification	Science A J630	Additional Science A J631	Additional Applied Science J632
Abilities to be developed	Responding to science in the media and in society	Practical investigative skills	Workplace skills and activities
Assessment activities	Analysis of first-hand data + A case study of science in the media	A complete practical investigation	Standard procedures + Suitability test + Work-related report

# Marking Internally Assessed Work

## Strands and aspects of performance

The method of marking the skills assessment is the same across all specifications in this Science suite. The award of marks is based on the professional judgement of the science teacher, working within a framework of descriptions of performance which are divided into **strands and aspects**. Within each strand, there are different aspects of performance, which in turn have four descriptions of performance illustrating what is expected from candidates working at different levels.

For example, in the assessment of the Work Related Report, Strand B: Description of workplace

Aspect of performance	Strand B Description of workplace			
	2	4	6	8
(a) Description of the expertise of an individual, or a working group, with the vocational qualifications and personal qualities required	Gives an account which is superficial or lacks detail or focuses on only one aspect	Gives a partial account of the expertise of an individual, or a working group, with the vocational qualifications or personal qualities required	Describes the expertise of an individual, or a working group, with the vocational qualifications or personal qualities required	Gives a clear account which explains the relevance to the work of the vocational qualifications and personal qualities required
(b) Description of the nature of the work, its purpose and place in the wider organisation	Gives an account which is superficial or lacks detail or focuses on only one aspect	Gives a partial account of the work, its purpose and place in the wider organisation	Gives an account of the work and describes its purpose and place in the wider organisation	Gives a full account of the work and explains its purpose and place in the wider organisation
(c) Understanding of the financial or regulatory context in which the work is done (e.g. health and safety regulations).	Makes a link between one financial or regulatory factor and the work	Identifies one relevant example of the impact of a financial or regulatory factor on the work	Describes one example of the impact of a financial or regulatory factor on the work.	Explains one example of the impact of a financial or regulatory factor on the work

Each aspect in turn should be considered, comparing the work first against the two mark performance descriptor, then the four mark, then six etc. until the best match is found.

Where performance significantly exceeds that required by one descriptor, but does not sufficiently match the next, the intermediate mark (1, 3, 5 or 7) should be awarded.

Note the implication that performance descriptors indicate the quality of performance required, as distinct from mark criteria which look for mechanical matching and too easily lead to 'hoop jumping' for its own sake.

Thus, the level of performance in each aspect is decided. The single, overall mark for the whole strand is then taken as the best fit to the level of performance shown. This would normally be the average of the levels judged for the individual aspects.

All the aspects must be taken into account in reaching the final mark for the strand. If there is no evidence of achievement for an aspect, a mark of zero should be recorded and included in calculation of the overall strand mark.

Candidates may not always report their work in a particular order, so evidence of achievement in a strand may be located almost anywhere in the work. Thus, it is necessary to look at the whole piece of work for evidence of each strand.

Where a decision is based partly on teacher observation of the candidate at work, the work should be suitably annotated at the appropriate point in the report.

## Marking Grids

Marking decisions should be recorded on marking grids. A master copy for Additional Applied Science is provided in Appendix I. The completed grid serves as a cover-sheet for the work if it is required for moderation.

Within any one strand, each aspect should be considered in turn. A tick on the grid should be used to indicate the performance statement that best matches the work.

When each aspect of performance within a strand has been assessed in this way the pattern of achievement is interpreted by a 'best-fit' judgement to give a mark for that strand. For example,

Strand	Aspect of performance	Level of performance related to mark scale										Mark for Strand
		0	1	2	3	4	5	6	7	8		
B	(a) expertise and qualifications					✓						5
	(b) nature of work					✓						
	(c) regulatory control							✓				

This method of marking can be applied even where there is a wide variation between performance in different aspects. Thus, weak performance in one aspect need not depress marks too far if other aspects show better performance.

## Work-Related Portfolio A337

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This unit aims to develop candidates' practical scientific competencies in a range of contexts that candidates may well encounter in their working or everyday lives. In addition, it is intended that these will equip candidates with the competencies necessary to embark on science related vocational courses.

Candidates produce a Work Related Portfolio, which comprises three components:

- six Standard Procedures
- a Suitability Test
- a Work Related Report.

The unit is worth 50% of the assessment for the Additional Applied GCSE. If a Suitability Test or Work-Related Report is missing from a candidate's Portfolio, this is likely to significantly affect their overall grade.

### Standard Procedures

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These must be short, practical tasks which include observations, which can be recorded. Two are submitted from each module studied (six in all).

### Suitability Test

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This is a practical activity which includes an assessment on the collection of data in order to compare the suitability of materials, devices or tests for a specific purpose. A wider body of data could be used for the evaluation; for example data may be pooled from the whole class.

### Work Related Report

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This is a written report which must be produced independently by each candidate. Candidates develop literacy skills by finding sources of information to describe roles within a workplace; and the scientific and technical knowledge and skills which are used there. They are also assessed on the communication skills used in presenting the Report.

If it is felt that a particular study would benefit from some degree of joint work or collaboration, then the OCR Science Team should be used in advance to obtain guidance on the acceptability of the collaboration.

### Arriving at the Final Mark

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The final mark for each candidate comprises:

- the marks for two Standard Procedures from each of three Units, i.e. **six** in all;
- the total mark for **one** whole Suitability Test;
- the total mark for **one** whole Work-Related Report.

It is not permitted to aggregate part-marks from different activities as the assessment covers the candidate's ability to complete all aspect of the tasks. Candidates should be given opportunities to develop their skills before completing the assignments for assessment. The marks awarded for each task are recorded on the cover sheet – a master copy is provided in Appendix I.

## Standard Procedures

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### Why Standard Procedures?

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Standard Procedures are used in the workplace to ensure that work is done in a consistent manner, regardless of which employee performs the task. Following a Standard Procedure minimises the risk of any hazard in the work. Many types of task are described by Standard Procedures.

Candidates also learn the importance of consistency and safety in the workplace by following Standard Procedures for each module.

### How many Standard Procedures?

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Two Standard Procedures are required from each of the three modules.

Thus six Standard Procedures are required altogether.

This gives total of 24 marks and is worth 12% of the Additional Applied Science GCSE.

### How are Standard Procedures assessed?

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Each assessed Standard Procedure should involve **more than one** single step or measurement to be assessed against the four criteria.

These are the Assessment Criteria:

(a)	Follows instructions, step by step, without guidance	1 mark
(b)	Works safely, observing safety procedures and hazard warnings	1 mark
(c)	Makes observations/takes measurements	1 mark
(d)	Observations/measurements made to an appropriate degree of accuracy	1 mark
<b>Total per Standard Procedure</b>		<b>4 marks</b>

### Choosing and organising the Standard Procedures

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Standard Procedures of a suitable level of demand are described in the Teacher and Technician Guide for each Unit. Centres are free to choose their own Standard Procedures, but suggestions are listed, in Appendix A, which have worked well in pilot schools. The references refer to the Teacher and Technician Guide.

The Standard Procedures are not intended to differentiate at higher levels, so making simple measurements accurately would suffice for four marks, provided the method was more than one step.

The assessment could take as part of normal class practical work, but some pilot centres have set up a circus of Standard Procedures for a dedicated assessment session.

It is important to make sure that candidates understand that their observations must be accurate in order to obtain the fourth mark.



**The observations and measurements must be recorded so that evidence is available for moderation. Before awarding the final mark, it is advisable to mark the work to make sure that candidates have actually recorded their observations and to check the quality of the observations. Detailed marking with annotation is not required in Standard Procedures.**

The instructions and the observations can usually be written on one sheet of A4 paper. Some centres have colour-coded the assessment sheet according to the Unit.

## Examples of responses awarded 3 and 4 marks

Standard Procedure	3 marks	4 marks
testing pH	distinguish red, green, purple	distinguish pH1, pH7, pH14
comparing thermal conductivity	state which rod becomes hot first	measure and record the time before wax on the rod starts to melt
measuring voltage using an oscilloscope	measure the trace to the nearest centimetre	measure and record the trace to 0.2 of a centimetre
measuring blood pressure	results outside normal range for adolescents	results as expected, before and after exercise

Appendix A includes suggestions of suitable tasks for Standard Procedures. Appendix J provides specific guidance for supporting very weak candidates in producing their work-related portfolio.

## Suitability Test

Each candidate is required to present one Suitability Test based on a practical activity.

### Why a Suitability Test?

The success of any company or organisation depends on its decisions. Decisions have to be made regarding materials, devices, procedures, and tests, to select which is the most suitable for a given purpose. The reasons for each decision must be clear. Candidates learn the importance of evidence-based decisions by carrying out a Suitability Test. A clear context should be defined for the suitability test. A quantitative, practical test is necessary to meet all the Assessment Criteria.

Only one Suitability Test is required for the Assessment, but it has a very high mark weighting (40 marks out of 96), i.e. 21% of the Additional Applied GCSE. It is necessary to teach and develop the skills so it may be helpful to attempt one test in each module; the first could be a teacher-given model to follow, then one to practise a particular skill and the third for a full assessment. This could also help to avoid the problem of candidates who have missed a Suitability Test owing to absence. Candidates may need particular help with the Evaluation skills before carrying out the Assessment, especially Strand D (a) where the data must be linked with the purpose of the test. A test of low demand could be used to teach the requirements of this activity.

### Comparison with the Data Analysis activity in Science A

Like the Data Analysis activity, the Suitability Test gives first hand experience of the problems of collecting valid and reliable data in order to reach a valid conclusion to a question.

Each candidate must be personally involved in generating their own data because the collection of data is assessed. However, shared data can be used for comparisons in order to help evaluate the data collected.

In Strand E, candidates should use the skills and vocabulary they developed in the data analysis exercise to discuss the accuracy, validity and reliability of their data. They should relate this to the conclusion they reach.

## Choosing a topic

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Choosing the right topic can be critical to the success of this exercise, to allow candidates to achieve at the appropriate level. It is helpful to give them a clear question to answer which refers to a context that they can understand.

Weaker candidates will need careful guidance, perhaps with writing frames, while the more able will need to be given opportunities to use initiative in planning and executing their tests.

It is important that the candidates can describe the relevant characteristics of the techniques or materials which are to be tested, and that they understand why these are relevant to its purpose, so that they understand why they are carrying out this test.

## Organising the work

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The Suitability Test will need 4 – 5 lessons to complete. This would be scheduled as an introduction, one or two practical sessions, and a lesson for writing results and conclusions. Time for producing the final version and for some catch-up work for absentees or slower workers will be needed.

The practical tasks need to be planned according to the abilities of the candidates; they must allow more able candidates to use initiative in their work. The science technicians need to be aware that there may be requests for slight variations on the equipment that will be ordered for the practical lessons.

It is important to check that individual support staff understand the internal assessment; and especially that they understand that it is the candidates' own work that is being assessed, so that doing work for them may stop them from getting marks. It would be helpful to have clear instructions on how to support individuals who may have particular difficulties with practical tasks.

This test involves assessment of a practical component, which under certain circumstances can prove difficult. Candidates would be disadvantaged if they had no means of attempting this task, so as a solution to a difficult problem, it may be possible to use a demonstration for candidates to collect their data. The marks in Strands B and C would be low. Teacher-generated data could be used to help write the evaluation. Further guidance for difficult circumstances can be obtained via the Coursework Consultancy Scheme, by contacting the Subject Officer.

## How is the Suitability Test assessed?

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The assessment criteria for the Suitability Test are given in Appendix B.

### Strand A: Purpose of the test

In Strand A the candidates are assessed on their ability to describe the use or purpose of the material, procedure or device to be tested, related to its workplace context; and the criteria for 'suitability' of the material, procedure or device.

A class discussion or brainstorm could be used initially to share ideas about suitability in many aspects of the specification. The candidates could then be asked to write a brief description. For the Suitability Test selected for assessment, all but the weakest should be able to write their descriptions independently after initially sharing ideas. Writing frames have been shown to be very helpful in supporting the work of weak candidates, but they can restrict independent work.

## Strand B: Carrying out an appropriate test

In Strand B candidates are assessed on their ability to work with autonomy and independence, but the level of demand of the task is also taken into account. It is important to select a task at the right level because if a task has low demand, the higher ability candidates may be unable to demonstrate the skills required for higher marks. To gain six marks, there must be scope to demonstrate practical skill, autonomy and independence.

## Strand C: Collecting data or observations

In Strand C the quality of the data collected is considered and assessed. There are three aspects to this and the 'best fit' mark should be awarded after the separate aspects have been considered. Marks of six and above reflect an independent approach to ensuring good quality data.

The first aspect concerns the ability to record data systematically. Weaker candidates should be given a clear format for their results to ensure adequate recording, and given a score in aspect (a) which reflects the help given.

The second aspect assesses the amount and range of data. A good range of data points should be available to candidates; for example, if testing glucose concentrations, a range of concentrations should be tested. If testing thermometers, some ice and the means of heating water should be available.

A poor range and/or quality of results makes it hard to evaluate the procedure, which is necessary for Strand D, so candidates should be encouraged to collect plenty of data.

Following the teacher's instruction to repeat measurements is worth 4 marks, but if a candidate independently plans to repeat measurements in order to improve reliability, that is worth six marks. This decision could also be made during the course of the experiment, to check on unexpected results.

The third aspect of Strand C concerns the quality of the data, which will reflect the candidate's practical skills.

## Strand D: Evaluation of suitability

Candidates should be reminded of the original purpose and context of the test. They need to base their conclusion on both the data they have collected, and the purpose of the test. Many candidates will find this difficult. First they should draw a conclusion based on what they have found out by doing the test, i.e. the data they have collected. When they have done this, they can be prompted to consider the purpose of the test in its wider context.

More able candidates should also discuss the reliability of their data and the extent to which they can base a conclusion on it. For example, their range of results will probably be fairly limited and their conclusions may only be valid over this range.

Candidates are also assessed on their evaluation of the quality of their own method and techniques. They may need clear guidance to avoid confusion, especially where testing methods are being compared.

Strand D demands reflective thought about ideas which candidates find difficult. It would be considered acceptable for a centre to provide much more detailed guidance for this Strand than for the others, perhaps by extending the use of writing frames to guide achievement at 4 marks.

## Strand E: Quality of scientific communication

This Strand assesses scientific communication skills in a similar way to the Work-Related Report and the case study in Science A. The assessment criteria are identical to those used in these Reports.

If a writing frame is provided, care should be taken that it is used appropriately for those who need it and that it does not restrict the scope of the more able candidates. A copy of the writing frame and any other guidance should be submitted with the Moderation Sample.

Even weak candidates should be encouraged to make a Contents listing, as this will help them to organise their ideas, and to number the pages. Candidates are assessed on their use of scientific vocabulary and so should be given help with this, such as providing lists of key words and phrases for the topic.

# Work-Related Report

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## Why a Work-Related Report?

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Many occupations are based on applications of scientific knowledge. The Work-Related Report allows candidates to discover some of these applications and should arise naturally from work in the course Units. Only one Work-Related Report is required for the Assessment, but it has a high mark weighting (32 marks out of 96) i.e. 17% of the Additional Applied GCSE.

The skills required need to be taught but the literacy aspects are the same as those of the case study in Science A, so it would be helpful to remind candidates of what they did for this project. A teacher-led Work-Related Report can be produced under guidance so that candidates understand what is required, then in other modules candidates could produce a short practice Report before tackling a full assessment. This can improve performance and helps to avoid the problem of candidates being completely without a Work-Related Report owing to absence.

The weakest part of the Reports in the Pilot has been the science content. In a practice Report, the importance of the scientific knowledge can be emphasised and used to consolidate work from the Unit.

## Comparison with the Case Study for Science A.

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The literacy skills developed are very similar to those for the case study in Science A, which develops competency in searching for information, acknowledging sources and presenting ideas effectively. Like the case study, the Work-Related Report requires the use of specific scientific ideas which are relevant to the chosen topic.

## Organising the work

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Each Unit includes sections on 'People and Organisations' and this provides a natural introduction to the Work-Related Report.

### Choosing a topic

The candidates are better motivated if they can choose their own topic, but this can make it hard for the teacher to support them. A compromise can be to suggest a limited list of topics which link to the module being studied. It is important to ensure that the scientific aspects of the work can be understood by the candidates and that they will be able to find enough information at a suitable level. The list could be compiled by candidates in discussion with the teacher as the Work Related Report is introduced to the class. One or two recommended resources for each would provide a starting framework.

The occupation studied should be at a level which can be well understood by the candidate. For example, a weak candidate would produce a better Report on the work of a Scene of Crimes Officer than on the duties of a Forensic Scientist. Conversely, an able candidate would have more opportunity to explore scientific and technical skills in describing the role of a nurse practitioner, than if describing the work of an auxiliary nurse. Ease of contact with a workplace or practitioner should be considered, and the availability of reliable sources. Topics involving 'pseudoscience', such as a reflexologist or aromatherapist, must be avoided, because they give a poor fit to the assessment criteria.

Some suggestions for contexts are listed in Appendix F.

## **Timetabling**

When the Report is introduced, a clear timetable for the work can make it easier for the teacher to keep track of candidates' progress in the work.

The centre should provide the lesson time, supervision and support which is needed. The work could be done over an extended period, perhaps as one lesson per week, or a full week of science lessons could be devoted to it.

The work should be supervised to avoid plagiarism and shared work, to check that the work is in line with the assessment criteria and to check that candidates do not stray away from their chosen title. Some lessons should be booked to allow Internet access and it could be helpful to book library sessions for wider access to scientific information.

## **Guidance and level of demand**

It is better to give enough guidance and an appropriate level of demand, than to let candidates struggle or produce unsatisfactory work. The amount of guidance and level of demand should be accounted when marking.

Some candidates will need worksheets or writing frames in order to complete a successful Report.

Candidates may find it helpful to use 'Candidate-speak' versions of the assessment criteria. Teachers should not use these versions for marking the work as the criteria have been paraphrased.

It is important to ensure that all candidates have collected enough information before starting to write their report.

## **How is the Work-Related Report assessed?**

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### **Strand A: Information sources**

Candidates are assessed on their initiative in finding relevant sources of information, on their ability to select relevant information and their use of direct quotations. The assessment criteria allow for success at all levels, as candidates can gain low marks for actively using material provided for them. At least three sources should be used in order to gain 4 marks in Strand A.

It is very important that candidates clearly understand the task.

Remind candidates to check whether the websites they find are UK based or not, as vocational qualifications and regulations differ between countries and they are judged on the relevance of their information.

### **Bibliographies/referencing style**

Where possible, candidates should use multiple and different types of sources of information e.g. web-sites, encyclopaedias, library books, course textbooks and their own notes. There should be a list of the sources used and these should be detailed referring to e.g. book and page number and full URL and not just homepage of particular website.

Weaker candidates often prefer to extract information from each source in turn and conclude each section with a statement like, 'I got this information from ...', rather than listing their sources in a bibliography. Using this method avoids the problem of sources being listed but not used in writing the Report.

## **Attributing quotations**

Reworking extracts can cause problems for some candidates, but they are assessed on their ability to acknowledge directly-reported information. They may find it helpful to:

- use coloured paper to help organise the content;
- physically cut out text and paste it within their written Report, or add captions;
- choose one font for their own words and a different font for 'cut and paste' sections;
- put text from an extract into a textbox;
- supply their original material in an appendix to show the amount of reworking.

## **Reworking extracts**

Candidates are assessed on their ability to select relevant information. Information from extracts should be reworked to avoid including information which is not relevant. Too much 'copy and paste' would score low marks in Strand A, and would not help the candidate to process the information required for the other Strands of the Report.

## **Information from people and organisations**

Candidates should obtain information from a variety of sources, which for higher marks must include a practitioner and/or a workplace. The centre needs to ensure that the opportunity for this is available for all candidates. It may be possible to organise a visiting speaker or a visit to a workplace. Parents or people with local businesses may be willing to help. However, practitioners may not be used to talking to groups of people and may appreciate help. Candidates could prepare suitable questions so the speaker can know what to expect and so their answers are fully understood. Speakers would be an ideal source of relevant information about the workplace and technical skills. They could identify relevant scientific knowledge but candidates should use other sources, such as textbooks, to obtain a full explanation of the science involved.

It is acceptable for candidates to approach someone they know, but not all will be able to do so. It is not recommended that candidates rely on contacting organisations directly, as requests for information may be unanswered and the time delay in waiting for a reply can cause problems.

CRB checks: it is not a legal requirement for a visiting speaker to be checked by CRB but it is advisable to check the identity of anyone in direct contact with young people. The school or LEA may have a policy for checks on visitors.

Links to information on legal aspects pertaining to work-related learning industry links can be accessed on the Learning and Skill's Network website.

## **Help with finding contacts**

Local organisations which might be able to help find contacts include:

- the work-related learning coordinator for the Centre;
- Education Business Partnerships;
- universities;
- professional bodies, e.g. Royal Society of Chemistry, Institute of Physics; Institute of Biology;
- training organisations;
- firms with a Public Relations Department;
- promoters of charities e.g. Special Care Baby Unit, Kidney Unit (this could also benefit other curriculum areas such as citizenship, community links);
- sports centres;

- museums; for example, the National Museum of Film, Photography and Television can arrange a day's TV workshop working with technicians and freelance directors (for Unit 5 Communications);
- the Construction Industry Training Board (CITB) has Ambassadors who are willing to talk to young people; contact the local Regional Office and ask for an Ambassador (for Unit 6 Materials and Performance).

## Strand B: Description of workplace

The description of the workplace is assessed on three distinct aspects.

### Aspect (a):

A description of the vocational and personal qualities required for a particular job. Candidates could access the careers service or one of the many websites which offer sound advice on careers and qualifications. Most professional associations have informative websites. They should check that their information is relevant to the UK.

### Aspect (b):

Candidates describe not only the nature of the work, but also its purpose and how it relates to role in a wider context. Most candidates will be aware of the nature of the work for their Report but need to make sure they are clear about its purpose, as many are unclear about the separate roles within an organisation. They may need to compare closely related roles such as those of the Scene of Crimes Officer and the Forensic Scientist, or the Ambulance Technician and the Paramedic.

Some workplaces may seem autonomous rather than part of a wider organisation; for example, a dairy farm. In a situation like this, the wider organisation would be interpreted as the wider market or the social context. For a dairy farmer, this would be the dairy industry.

### Aspect (c)

Candidates learn about Standard Procedures and regulatory Standards in the work for the modules. In the Work Related Report they are assessed on how they relate these ideas to the work being described. Practitioners are likely to be well aware of the financial situations or legal requirements which affect their work and direct contact with a workplace could help here. Health and safety legislation applies in all workplaces and weaker candidates could focus on this if other considerations are too challenging.

## Strand C: Scientific knowledge and skills applied in the workplace

In order to guide and assess the science content of the report, it is necessary to be aware of the relevant scientific ideas. If the work arises from the module being studied, information will be available from the course materials, but candidates may use information which is beyond GCSE. For higher marks, the scientific ideas must be linked to the work described, and the candidate should describe how the nature of the work depends upon these principles. Higher level science which is not linked to the workplace would not meet the criteria for high marks, so more able candidates should feel no pressure to struggle with hard ideas in order to produce a good report.

The candidates' textbooks, their own notes and library books will be good sources of information for the scientific acts and principles. Candidates should explain these clearly and state how the principles are used in the workplace.

To discover a technical skill required, personal contacts or information from web sites will be helpful. This aspect should be assessed separately from the description of personal and vocational qualities, which is required in Strand B.



## Strand D: Quality of presentation

In Strand D, the ability to communicate scientific information effectively is assessed. The structure of the report and the organisation of ideas within it is an important part of effective communication and candidates should be encouraged to think about the different aspects of the work in order to produce a contents list. Page numbering should be left until last unless the work is word-processed. When marking this strand, remember that the marking is hierarchical, so a contents list would need to be part of a well-sequenced report before 6 marks could be awarded.

Much scientific information is conveyed visually rather than by text. Candidates should use diagrams, tables, charts and graphs to communicate their ideas. Illustrations should add meaning to the report. Some candidates will select relevant illustrations which do not convey much meaning, and these would be credited at the level of 4 marks.

# Management and Administration of the Skills Assessment

The scheme of skills assessment is designed to award credit for capabilities which are developed as part of the normal teaching and learning process through the course.

In order to achieve this, schemes of work should:

- make candidates familiar with the assessment requirements and the marking criteria;
- present activities in ways which emphasise aspects of the assessable skills;
- identify activities which will be suitable for formal assessment.

The overall aims of the course include teaching the ability to assess the quality of scientific data, and of forming critical judgements about issues of public or personal policy which involve science-based decision-making. An important aspect of this is to provide regular activities involving these skills.

## Record-keeping

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Appendix I is a master copy for the record card which should be kept with the marked scripts following assessment. It has spaces in which all marking decisions can be recorded as the work is marked. The sheet is then attached to the candidates work. The record card will be used by the moderator when checking the marks for the work. It will be retained by OCR as a complete record of all marking decisions made by both the centre and the moderator.

## When to enter

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The Coursework component is only assessed in the June sessions. It is not advisable to enter coursework before the summer of Year 11.

The submission date for Coursework marks is normally 15 May. This should be checked by referring to the OCR final timetable for GCSE Examinations.

## Importance of complete portfolios

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The coursework is worth 50% of the assessment for the Applied GCSE. If a Suitability Test or Work-Related Report is missing from a candidate's portfolio, this is likely to significantly affect their overall grade.

## Arriving at the final mark

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The final mark for each candidate comprises:

- the marks for **two** Standard Procedures from each of three Units, i.e. six in all;
- the total mark for **one whole** Suitability Test;
- the total mark for **one whole** Work-Related Report.

It is not permitted to aggregate part-marks from different activities as the assessment covers the candidate's ability to complete all aspects of the task. Candidates should be given opportunities to develop their skills before completing the assignments for assessment.

## Internal Standardisation of Marks

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It is the responsibility of the centre to make sure that the rank-order of candidates is secure. This requires that all work is consistently marked to the same standard.

Appendices E and H provide examples of completed Suitability Tests and Work-related Reports with commentaries to explain the mark decisions. These can be used as a focus for discussion between all staff involved in the marking, to exemplify standards.

Internal standardisation should also be carried out. Some or all of the following procedures may be found to be effective:

- one member of staff moderates samples from all markers, thus providing a single reference standard for all;
- copies of scripts are passed round for marking agreement trials at department meetings (it is essential that this is accompanied by discussion of reasons for any disagreements);
- a common approach to marking, or customised mark-scheme can be devised and agreed by all markers;
- scripts from one cohort, which have been part of external moderation samples, can be kept and referred to, to help in carrying forward consistent standards from year to year.

OCR provide a free consultancy service. As part of this, centres can send up to three marked scripts to the Subject Officer and receive feedback on their marking standards.

## External Moderation of Marks

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After work has been marked in the centre, a sample of the work will be checked by an external moderator. The purpose of this is to ensure that the activities used are appropriate and match the specification requirements, and that the marking standards used in the centre are consistent and in line with national standards.

Shortly after entries are submitted for the skills assessment, OCR will provide form MS1 (mark-sheet) and instructions for what must be submitted from the centre (Appendix K). The mark sheet is in three layers and is self-carboning. The top copy is sent to OCR and will be used to enter raw marks on the computer. The second copy is sent to the moderator. The third copy is kept by the centre as a record.

The moderator will ask for the work of a sample of candidates. The work which counts towards the final total must be sent, together with information which shows what activities were used and how they were presented to candidates. In a few cases, the moderator may ask for further work or information to be sent.

The work will be returned, and a moderator's report will be sent to the centre when results are published. This will provide a commentary on the work seen. In the past, marks from the majority of centres have been in line with standards and have been accepted without change. Where any change has been required, this will be clearly stated and an explanation of the reasons for any changes will be given.

## Authentication of Candidates' Assessed Work

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Samples of work sent for moderation must be accompanied by a signed authentication to certify that the work presented is the authentic work of the individual candidates.

# Appendix A: Assessment Criteria for Standard Procedures

Each assessed Standard Procedure should involve **more than one** single step or measurement to be assessed against the four criteria.

These are the Assessment Criteria:

(a)	Follows instructions, step by step, without guidance	1 mark
(b)	Works safely, observing safety procedures and hazard warnings	1 mark
(c)	Makes observations/takes measurements	1 mark
(d)	Observations/measurements made to an appropriate degree of accuracy	1 mark
<b>Total per Standard Procedure</b>		<b>4 marks</b>

# Appendix B: Suggestions of Suitable Activities for Standard Procedures

A1 Lifecare	
	References to OUP materials
Measuring Body Mass Index	Activity AA1.4 Candidate book page 50
Measuring skinfold thickness	Activity AA1.4 Candidate book page 51
<p>'Measuring the vital signs' is suitable for weak candidates but can be extended for the more able, for example by measuring before and after exercise:</p> <ul style="list-style-type: none"> <li>• measuring blood pressure;</li> <li>• measuring pulse rate;</li> <li>• measuring breathing rate.</li> </ul>	Activity AA1.7
<p>Testing 'urine' samples</p> <p>Explain that candidates must describe the colour changes in as much detail as possible</p> <p>The four samples suggested in AA1.11 should be of different concentrations so as to give a range of colours to be recorded.</p> <p>This Procedure could be developed into a Suitability Test by using colorimetry for the biuret test and by using different methods for testing the glucose concentration; for example by using Fehling's solution or by Clinistix.</p>	Activity AA1.11

## A2 Agriculture and Food

*Standard Procedures can be based on following instructions for making foodstuffs. Measuring the mass or volume of the food produced could gain the accuracy mark. Some of the procedures in this Unit are fairly complex and may not be suitable for assessing weaker candidates.*

Extracting sugar, e.g. from sugarbeet Candidates should record observations of the sugar produced and measure the yield in order to obtain four marks for observation.	Activity AA2.2
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Testing soil: measuring pH, humus content, water-holding capacity	Activity AA2.6
---	----------------

Measuring plant productivity (could include wet and/or dry mass)	Activity AA2.7
--	----------------

Making cheese To obtain the fourth marks, candidates should make measurements; for instance, of the pH change during cheese production.	Activity AA2.15
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Yogurt production To obtain the fourth marks, candidates should make measurements; for instance, of the pH change during yogurt production.	Activity AA2.24
--	-----------------

Testing milk quality Candidates should include the freezing point test in order to obtain the fourth mark for accurate observation. This Procedure could be developed into a Suitability Test by using colorimetry.	Activity AA2.31
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## A3 Scientific Detection

Various measurement activities, including: <ul style="list-style-type: none"><li>• to measure a £5 note;</li><li>• to measure volume and mass;</li><li>• to measure pH values.</li></ul>	Activity AA3.2
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Find the active ingredients in painkillers by chromatography	Activity AA3.17
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Crime Scene Investigation These activities include several possible Standard Procedures. Observations should be detailed in order to obtain the fourth mark, and could include measurements. For example: <ul style="list-style-type: none"><li>• examine pollen grains in honey: a detailed diagram to show surface structure and pattern should be included;</li><li>• make a footprint cast: a detailed diagram of a shoeprint should be drawn and measurements should be made, for example of tread depth and pattern.</li></ul>	Activity AA3.23
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#### A4 Harnessing Chemicals

*This Unit provides opportunities for preparing useful chemical products. To obtain the fourth marks, the yield of the product should be measured.*

Making soluble salts	Activity AA4.17
Making insoluble salts	Activity AA4.18
Making low-sodium salt	Activity AA4.27
Making face cream Accurate observation could be measurement of pH, viscosity, or mass or volume of product.	Activity AA4.30
Making sweeter syrups This activity would be suitable for higher-ability candidates. Measurements of glucose concentration could be made with Clinistix.	Activity AA4.34
Factors affecting reaction rates Each includes a procedure and observation which could be used as a Standard Procedure.	Activities AA4.13, 4.14, 4.15

#### A5 Communications

*Some of these procedures require unfamiliar skills, which may need to be taught before an assessment can be made.*

Making and using a circuit for Morse code; to send and receive a short message.	Activity AA5.4
Measuring current.	Activity AA5.5, AA5.7
Measuring voltage Note: Calculations do not form part of the assessment for Standard Procedures, so calculating resistance should not be included in the assessment. A Standard Procedure for measuring resistance should not be submitted alongside measuring voltage as the techniques are very similar. If candidates measure voltage it is helpful for them to measure current too.	Activity AA5.5, AA5.7
Using an oscilloscope	Activity AA5.11 Activities 1 and 2
Finding the refresh rate required for video images	Activity AA5.15 Activity 2
Rectifying alternating voltage and observe the value of the d.c. voltage produced. This activity is suitable for more able candidates.	Activity AA5.24 Activity 3

#### A6 Materials

*This Unit offers many opportunities for Standard Procedures which include measurement.*

Measuring the mechanical properties of tennis balls	Activity AA6.2
Measuring the mechanical properties of bicycle frames – tubes and rigid structures.	Activity AA6.5
Measuring the stiffness of a ruler	Activity AA6.9
Measuring the focal length of a lens	Textbook p54-55
Measuring current	Activity AA6.16
Measuring voltage	Activity AA6.16



# Appendix C: Examples of Standard Procedures with Commentaries

## Script A: Testing the Quality of Milk

### Method

1. Label 3 test tubes A, B & C. Put  $1\text{cm}^3$  of resazurin dye into each tube.
2. Add  $10\text{cm}^3$  of the milk sample being tested. Stopper the tubes and turn them upside down three times to mix.
3. Stand the tubes in a water bath at  $36^\circ\text{C}$ . Leave for 30 minutes.
4. Use the table below to estimate and record the quality of each sample. Do not open the tubes.

Colour of Sample	Quality
blue (no change)	excellent
blue to mauve	good
mauve to pink	fair
pink to very pale pink	poor
white	bad

### Results

Milk Sample	Colour Change	Milk Quality
A	very pink	poor
B	blue	excellent
C	mauve blue	good

## Commentary

a Follows instructions, step by step, without guidance

b Works safely, observing safety procedures and hazard warnings

The Centre has indicated, on the candidate's Standard Procedure instruction and recording sheet, that these criteria have been fulfilled satisfactorily.

For criteria c and d, written evidence (or evidence provided by some other means of recording) is required to indicate that the criteria have been fulfilled.

c Makes observations/ takes measurements

The candidate has made observations (and these have been recorded on the proforma provided).

d Observations/ measurements made to an appropriate degree of accuracy

Observations have been recorded, but these do not indicate colour *change*, as required by the table heading. The fourth mark, for criterion d, cannot, therefore, be awarded.

Detailed and accurate observations of the colour change (or simply the colour, with the appropriate table heading) could have procured the fourth mark. Note that the judgement made on the quality of milk is not an observation, and although it is good practice to include this, it has no bearing on the award of this criterion.

Perhaps, also, a Standard Procedure extended to include other qualitative information, such as appearance and smell of the milk, would have provided additional opportunities for the procurement of this fourth mark.

	Title of Standard Procedure	Marking Criteria				Total
		1	2	3	4	
Ap3 Ap2	Testing the quality of milk	✓	✓	✓	x	3

## Script B: Testing how Concentration affects Reaction Time

### Method

1. Label 3 large beakers **WATER**, **THIOSULFATE** and **HYDROCHLORIC ACID**. Label 4 small beakers A, B, C and D and put a cross on the bottom of them in black marker pen.
2. To beaker A add 10ml of sodium thiosulfate solution and 5ml of hydrochloric acid.
3. Time how long (in minutes and seconds) it takes for the cross to disappear.
4. Repeat the method with 2ml water and 8ml of sodium thiosulfate and 5ml of hydrochloric acid.
5. Repeat the method again with the different concentrations in the table below.

### Results

<b>Water (ml)</b>	<b>Sodium Thiosulfate (ml)</b>	<b>Hydrochloric Acid (ml)</b>	<b>Time taken for 'X' to disappear (seconds)</b>
0	10	5	25.75
2	8	5	32.32
4	6	5	53.03
8	2	5	1.33.19

## Commentary

a Follows instructions, step by step, without guidance

b Works safely, observing safety procedures and hazard warnings

The Centre has indicated, on the candidate's Standard Procedure instruction and recording sheet, that these criteria have been fulfilled satisfactorily.

c Makes observations/ takes measurements

The candidate has made measurements (and these have been recorded on the proforma provided).

d Observations/ measurements made to an appropriate degree of accuracy

The candidate has made accurate and appropriate measurements, as indicated by the Centre.

An inconsistency has been introduced, however, by the requirements made in point three of the method, the recording of time in minutes and seconds, and those of the table heading, the time taken for "X" to disappear in seconds. This, in principle, negates the award of this fourth mark.

Centres are advised to check carefully their Standard Procedures and recording sheets before use.

	Title of Standard Procedure	Marking Criteria				Total
		1	2	3	4	
Ap4	Testing how concentration affects reaction time	✓	✓	✓	x	3

## Script C: Titration

---

You need to perform a titration to neutralise a known quantity of sodium hydroxide. Follow the instructions below and record your results.

### **Method**

1. Collect the equipment you need.
2. Collect and wear some goggles.
3. Use the pipette and pipette filler to draw up 25ml of sodium hydroxide and put it in a conical flask.
4. Add 2 or 3 drops of indicator to the sodium hydroxide (it should go pink).
5. Lower the burette in the clamp so that you can reach the top and put a funnel in it.
6. Make sure the tap on the burette is closed and fill it with hydrochloric acid as close as possible to 0.
7. Write down the number at the level of acid in the burette (e.g. 0.4ml)
8. Carefully open the tap at the bottom of the burette and let the acid run into the alkali. Keep swirling the conical flask and turning off the tap so you don't miss the end point.
9. Turn off the tap and leave the tap off when the alkali goes completely colourless. This is the end point and the alkali is now neutralised.
10. Write down the number at the level of the acid on your burette in your table and work out the difference between them. This is the quantity of acid needed to neutralise the alkali.
11. Record your results in the table below.

### **Results**

<b>Level of acid in the burette (ml)</b>	<b>Level of acid in the burette after end point (ml)</b>	<b>Quantity of acid needed to neutralise the alkali (ml)</b>
0	32.3	$32.3 - 0 = 32.3$
0	29.7	$29.7 - 0 = 29.7$
0	33.6	33.6

## **Commentary**

a Follows instructions, step by step, without guidance

b Works safely, observing safety procedures and hazard warnings

The Centre has indicated, on the candidate's Standard Procedure instruction and recording sheet, that these criteria have been fulfilled satisfactorily.

c Makes observations/ takes measurements

The candidate has made measurements (and these have been recorded on the proforma provided).

d Observations/ measurements made to an appropriate degree of accuracy

Volumes of acid have been recorded consistently, i.e., to the same number of decimal places, and the accuracy of these measurements has been endorsed by the Centre.

Calculations of the volume of hydrochloric acid used would be expected, but would not form part of the assessment of this criterion.

	Title of Standard Procedure	Marking Criteria				Total
		1	2	3	4	
Ap4	Titration	✓	✓	✓	✓	4

## Script D: Calculating BMI

---

### Method

1. Find 3 different people in the class.
2. Measure their height in m.
3. Measure their weight in kg.
4. Use the calculation

$$\text{BMI} = \frac{\text{weight}}{\text{height}^2}$$

### Results

Name	Weight (kg)	Height (m)	Height <sup>2</sup>	BMI
Rita	47kg	1.70m	2.89m <sup>2</sup>	16.26
Harold	65kg	1.76m	3.0976m <sup>2</sup>	21.03
Edna	70kg	1.64m	2.6896m <sup>2</sup>	26.02

## Commentary

a Follows instructions, step by step, without guidance

b Works safely, observing safety procedures and hazard warnings

The Centre has indicated, on the candidate's Standard Procedure instruction and recording sheet, that these criteria have been fulfilled satisfactorily.

For criteria c and d, written evidence (or evidence provided by some other means of recording) is required to indicate that the criteria have been fulfilled.

c Makes observations/ takes measurements

The candidate has made observations and these have been recorded on the proforma provided.

d Observations/ measurements made to an appropriate degree of accuracy

It is acceptable to include units in the table. Suitable accuracy has been recorded for both weight and height.

Please note however that it is not a requirement when performing standard procedures to process the results obtained. The candidate is only assessed on making the measurements to the appropriate degree of accuracy.

The instructions could be more specific by indicating how to measure and weigh the pupils in the class.

	Title of Standard Procedure	Marking Criteria				Total
		1	2	3	4	
Ap1	Calculating BMI	✓	✓	✓	✓	4



## Script E: Measuring pH

---

### **Method**

1. Place a drop of the test solution in a well of the spotting tile.
2. Add a piece of Universal Indicator.
3. Use the colour chart to decide the pH.
4. Record the results in the table below.

<b>SAFETY</b> Wear eye protection
--------------------------------------

### **Results**

<b>solution</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>	<b>F</b>
<b>colour</b>	orange	mossy green	blue	light green	purple	turquoise
<b>pH</b>	PH3	PH7	PH9	PH8	PH11	PH10

## **Commentary**

a Follows instructions, step by step, without guidance

b Works safely, observing safety procedures and hazard warnings

The Centre has indicated, on the candidate's Standard Procedure instruction and recording sheet, when these criteria have been fulfilled satisfactorily.

c Makes observations/ takes measurements

The candidate has made observations which have been recorded on the proforma provided.

d Observations/ measurements made to an appropriate degree of accuracy

In this example, the Centre has indicated that the candidate has not made suitable accurate measurements of the colour/pH for samples D and E and did not award this fourth mark.

Although 4 recordings are accurate, the instructions are quite basic and therefore the 3 marks given by the centre would be supported.

It is difficult to know whether it is the colour or the pH values which are incorrect. It would help an external moderator to be given information on the colour chart used by the candidates and/or the expected correct pHs for each solution.

	Title of Standard Procedure	Marking Criteria				Total
		1	2	3	4	
Ap3	Measuring pH	✓	✓	✓	x	3

## Script F: Measuring the Strength of Threads

---

### **Method**

1. Cut a 30cm length of thread.
2. Tie a loop at each end.
3. Hang one loop onto a clamp.
4. Hang a 100g mass onto the bottom.
5. Add masses carefully until the thread breaks.
6. Remember 100g mass weighs 1N.
7. Test each type of thread 3 times.

### **Results**

Force needed to break thread in N				
Thread	Test 1	Test 2	Test 3	Average
Polyester	9.00N	8.00N	9.00N	9.00N

## Commentary

a Follows instructions, step by step, without guidance

b Works safely, observing safety procedures and hazard warnings

The Centre has indicated, on the candidate's Standard Procedure instruction and recording sheet, that these criteria have been fulfilled satisfactorily.

c Makes observations/ takes measurements

The candidate has made measurements which have been recorded on the proforma provided.

d Observations/ measurements made to an appropriate degree of accuracy

The recordings have been made to the appropriate accuracy as the candidate was only adding 100g masses.

The candidate has only tested one type of thread. It would be better to perhaps only have the requirement of the procedure to test one type of thread.

Also it may be better to add to instruction 6: "Record force needed to break thread (remember 100g of mass weighs 1N)" and to instruction 7: "Test your chosen thread three times."

The calculation of the average is not required for the assessment.

	Title of Standard Procedure	Marking Criteria				Total
		1	2	3	4	
Ap6	Measuring the strength of threads	✓	✓	✓	✓	4

# Appendix D: Assessment Criteria for Suitability Test

Strand A Purpose of the test				
Aspect	2	4	6	8
(a) The use or purpose of the material, procedure or device to be tested, related to its workplace context.	Makes some reference to its use or purpose.	Gives a limited description of both its use and some aspect of the workplace context.	Gives a reasonable description of both its use and some aspect of the workplace context.	Gives a detailed description of both its use and relevant aspects of the workplace context.
(b) The criteria for 'suitability' of the material, procedure or device.	Gives some description of its desirable properties or characteristics.	Gives a full description of its desirable properties or characteristics.	Gives a full description of its desirable properties or characteristics, explaining why at least one of these is necessary.	Gives a full description of its desirable properties or characteristics, explaining why these are necessary.
Strand B Carrying out an appropriate test				
Aspect	2	4	6	8
(a) Candidate autonomy and independence	The approach is based on specific, task-related structured worksheets with further guidance from the teacher at most stages.	The approach is closely defined by the teacher but is then carried out with further guidance at several points during the testing.	The approach is closely defined by the teacher but is carried out with little further guidance.	The approach is defined by the candidate from a more general brief, and then carried out independently.
(b) Complexity and appropriateness of test	Carries out a simple measurement or comparison task.	Carries out a task of limited complexity.	Skilfully carries out a complex task.	Skilfully carries out a complex task, explaining how it relates to the criteria for 'suitability'.

Strand C Collecting data or observations				
Aspect	2	4	6	8
(a) recording the data	Partially records data or observations in a given format.	Fully records data or observations in a given format.	Devises own format and correctly records data or observations including all units of measurement.	Devises own format and correctly records data or observations to an appropriate degree of precision.
(b) range and quantity of data or observations	Data or observations are limited in amount, covering only part of the relevant range.	An adequate amount or range of data or observations.	An adequate amount and range of data or observations, with repeats or checks for reliability.	Data or observations collected cover the relevant range, with values well-chosen across the range.
(c) quality of data	Data generally of low quality.	Data of variable quality, with some operator error apparent.	Data generally good quality – adequately precise and reliable.	Data has a high level of precision and reliability.
Strand D Evaluation of suitability				
Aspect	2	4	6	8
(a) Conclusion about suitability, drawn by appropriately linking data or observations to the purpose of the test, and awareness of any limits to the conclusions.	Draws some conclusion, but data or observations not linked back to the purpose of the test.	Draws a correct conclusion from individual results or simple pattern in results, by linking these to the purpose of the test.	Draws a correct conclusion from overall pattern of results, by linking clearly to the purpose of the test.	Draws a correct conclusion from overall pattern of results, by linking clearly to the purpose of the test.  Discusses any limitations, such as range over which it is suitable.
(b) Evaluation of testing procedure used.	Makes a relevant comment about how the data was collected.	Comments on any problems associated with the apparatus and techniques used.	Suggests improvements to apparatus or techniques, with little practical detail.	Describes in detail and explains improvements to apparatus or techniques.
Strand E Quality of Scientific Communication				
Aspect	2	4	6	8
(a) The structure and organisation of the report	The report has little or no structure or coherence, or follows a structure provided by worksheets	The report has an appropriate sequence or structure.	Information is effectively organised, with contents listing of key elements and page numbering.	Considerable care has been taken to present the information clearly to a chosen audience.
(b) General quality of communication	Little or no relevant technical or scientific vocabulary is used.	Use of appropriate vocabulary is limited.	Appropriate scientific vocabulary is used.	There is full and effective use of relevant scientific terminology.

# Appendix E: Suggestions of Suitable Activities for Suitability Tests

A1 Lifecare	
<p><b>Which is the best body site for measuring a pulse?</b> This would be suitable for lower ability candidates, or for teaching the skills needed for the Suitability Test. Measuring a pulse could be taught as part of a Standard Procedure. Weak candidates may need reminding that the pulse rate is the same at all sites.</p>	Activity AA1.7
<p><b>Which is the best type of thermometer for a paediatric ward?</b> This test can be made accessible for low ability candidates but does allow candidates of higher ability to achieve appropriately.</p>	Activity AA1.7
<p><b>Is pulse rate or breathing rate better for monitoring fitness?</b> Is breathing rate or peak flow rate better for monitoring fitness? These tests are enjoyed by candidates but there is the problem of how to define fitness so that the effectiveness of the tests can be compared.</p>	Activity AA1.7
<p><b>What is the best way for a diabetic person to measure glucose in urine?</b> A range of concentrations of glucose should be made available so that full use is made of the Clinistix colour chart. The corresponding concentrations should be recorded as well as the colours on the Clinistix. Fehling's solution and Benedict's solution could also be used.</p>	Activity AA1.11
<p><b>Comparing BMI and skin fold measurements to assess body fat.</b> This would be suitable for weak candidates. If candidates generate data on height, weight and skin fold thickness, they can be helped in calculating BMI as calculation does not form part of the coursework assessment.</p>	Activity AA1.4

<p><b>Find the most suitable soil for a particular plant.</b></p> <p>The most suitable soil for growth of a particular plant (soil properties for optimum growth of a specific plant should be defined in the brief given, for instance, heather in acidic soil; lavender in alkaline soil) should be determined. Properties under investigation should include pH, soil humus, soil water holding capacity.</p>	Activity AA2.6
<p><b>Find the best way of measuring plant productivity.</b></p> <p>A number of methods are available, e.g. wet mass, dry mass, height, leaf area, stem diameter, etc. Higher level candidates should consider the validity of the measurements obtained using these methods and discuss the use of destructive vs. non-destructive methods of measurement.</p>	Activity AA2.7
<p><b>Find the best conditions for making yogurt.</b></p> <p>This suitability test is best carried out using data-logging, but the method used to determine suitability could, in fact, form the basis of a Standard Procedure or a Suitability Test itself (qualitative examination; semi-quantitative estimation using resazurin – which could be made quantitative by colorimetry; or quantitative estimation by titration of the lactic acid produced against sodium hydroxide). A range of temperatures from 25 - 55°C would give excellent results. Higher ability candidates could consider why (different) optimum conditions are necessary for the growth of the two bacteria.</p>	Activity AA2.8
<p><b>Find the best conditions for making bread.</b></p> <p>This Suitability test is most suited to low/mid level candidates. Several variables can be investigated.</p>	Activity AA2.9
<p><b>Find the best way of measuring the productivity of micro-organisms.</b></p> <p>This activity is best carried out for yeast or yogurt-producing bacteria. A number of direct (cell counting; cell mass) and indirect (change in pH; measurement of carbon dioxide or alcohol produced; density measurements) methods are available.</p>	Activity AA2.27
<p><b>Compare methods of clotting milk.</b></p> <p>Candidates should consider and investigate the use of a number of enzyme preparations used to produce clotting of milk proteins in cheese production – rennet (calf chymosin), Fromase® (a fungal protease from <i>Rhizomucor</i>), Maxiren® (pure calf chymosin from a genetically modified dairy yeast, <i>Kluyveromyces</i>). In addition to the efficacy of each, scientific, moral and ethical implications of the various enzyme preparations can be considered.</p>	Activity AA2.30



### A3 Scientific Detection

#### **Compare colour matching with colorimetry.**

This is an excellent Suitability test for candidates across the ability range. Higher level candidates should consider the best filter to measure the absorbance of the liquids – they may determine this experimentally or by considering the physics of colour. These candidates could consider the range of concentrations over which the relationship between concentration and absorbance is linear.

Activity AA3.12

#### **Which is the best solvent for chromatography?**

This is an excellent Suitability test for candidates across the ability range. Candidates should investigate the separation of a number of mixtures, for instance, of different types of ink (it may be of help to tell candidates the number of dyes in each type of ink). Higher ability candidates could investigate a number of solvent systems, and/or stationary phases. Mid and higher ability candidates should calculate R<sub>f</sub> values from measurements made and use these to make their judgements.

Activity AA3.20

#### **What is the best way to measure the pH of an unknown solution?**

This suitability test is suitable for candidates across the ability range (using Universal indicator paper and solution, narrow range indicators, and pH meters). The words 'sensitivity', 'accuracy' and 'precision' should be used by higher level candidates. These candidates could make measurements of pH considering a range of buffers to calibrate their pH meters.

#### **How should we test water quality?**

Candidates should test environmental water samples, for instance, for pH, dissolved oxygen, ammonia, and iron, nitrate and phosphate ions using various methods. The parameters to be measured; the number of parameters to be measured; and the methods used should be based on the ability of the candidates carrying out the suitability test.

Activity AA3.9

#### **Which is the best method to test for glucose in body fluids?**

Higher level candidates should consider the physiological use of these tests, i.e. to measure glucose concentrations in urine and blood in conditions where these are elevated, e.g. in the diabetic and in the use of some drugs. Higher ability candidates could consider the degree of specificity, and interference of creatinine and uric acid in tests on urine with reagents involving the reduction of Cu<sup>2+</sup>. Higher ability candidates could also investigate the use of quantitative Benedict's solution and enzymatic methods over a range of (physiological) concentrations.

#### **What is the best way to measure the water content of soil?**

This Suitability test is suitable for lower/mid level candidates. The length of drying (so as to obtain a constant mass) and the temperature used to dry the sample (and not burn off the humus) could be considered.

Activity AA3.22 to match mud on shoe

## A4 Harnessing Chemicals

*This Unit provides opportunities for preparing useful chemical products.*

<b>What is the best way of making large copper sulfate crystals?</b> This suitability test is suitable for candidates across the ability range. The significance of crystals of specific size, for instance in the preparation of silver halides for photographic emulsions, can be discussed. Higher ability candidates could make measurements of crystal size, some microscopically using eyepiece graticules.	Activity AA4.5
<b>What is the best way to measure the pH of fruit juice?</b> This suitability test is suitable for candidates across the ability range (using Universal indicator paper and solution, methyl red - suitable across the pH range of fruit juices, indicators not suitable across this range, and pH meters). The words 'sensitivity', 'accuracy' and 'precision' should be used by higher level candidates. These candidates could measure the pH of different fruit juices and consider a range of buffers to calibrate their pH meters.	Activity AA4.8
<b>Which is the best catalyst?</b> Candidates should be demonstrated the 'clock reaction' and investigate a number of catalysts (copper (II) sulfate, iron (II) sulfate and iron (III) chloride) on the rate of reaction. Careful measurements should be made of the rate of reaction. Candidates should make conclusions concerning the best catalyst (considering also the catalysts on grounds of cost and health and safety).	Activity AA4.16
<b>Which antacid is most effective?</b> Candidates should investigate the ability of various commercial antacids to neutralise hydrochloric acid. As well as volumes of acid that be neutralised by the different antacids, they should also consider other aspects, e.g., cost, other medical effects (for instance the laxative properties of $Mg^{2+}$ ; possible links with dementia for $Al^{3+}$ ), and the use of additional ingredients in the tablet/powder/liquid.	Activity AA4.28 Part D
<b>Which solution has the best buffering capacity?</b> This Suitability Test is best carried out with more able candidates. A range of buffers can be investigated.	Activity AA4.31
<b>What are the best conditions for making sweeter syrups?</b> This Suitability Test is best carried out with more able candidates. A range of factors can be chosen and investigated.	Activities AA4.34

## A5 Communications

*In this Unit, a decision on suitability is usually made in advance of any hands-on practical work. These activities would be considered acceptable for generating data, although demonstrations would reduce the number of marks available for Stands B and C.*

### **Find the most accurate communication code by measuring the error rate.**

The data here would be the number of errors and the number of items of information sent.

Activity AA5.2-

### **Find the most suitable frequency response of different Microphones.**

This could be done as a demonstration, with the class collecting the data by observing the oscilloscope trace. This could be used to teach the skills needed for the Suitability Test, or in a situation where a full class practical would be difficult to manage.

Activity AA5.11 (replace the voice with a signal generator and loudspeaker)

### **Which cable gives the best signal transfer?**

This could also be done as a demonstration, if necessary.

Activity AA5.11

### **Find the best compression for a set of images.**

A class could be shown how to use Microsoft PhotoDraw or a similar package for image compression options; ensure that data such as file size or pixel size is obtained and recorded.

Activity AA5.15

### **Should I use fax, email, text or phone calls to send information?**

The time from sending to receiving and the cost of each message can be collected as data.

### **Use a sampling mask to determine the most suitable sampling rate for a signal.**

This would be suitable for more able candidates.

Activity AA5.25

## A6 Materials

*In some of these tests, individuals could collect enough data to make a comparison (Strand C) but could also share data to help in evaluating their results (Strand D). Very weak classes could collect a limited amount of data but could use shared data together with a writing frame to support work for the Evaluation.*

### **Find the most suitable type of fishing line by comparing tensile strength and stiffness.**

Safety considerations may restrict measuring tensile strength to a demonstration, but data from this could be shared and used together with data on stiffness to form a conclusion.

Activity AA6.3

### **Choose elastic for clothing by comparing its stiffness and elastic behaviour.**

Data on extension can be supplemented by measurements of length without the load, to check the load at which the behaviour becomes plastic.

Activity AA6.4.3

### **Find which mortar mixture has the highest compressive strength.**

- When planning, remember that the mortar requires time to set. Spare samples may be needed for absentees and disasters.
- A clear labelling system is needed.
- This could be used with low ability candidates if safety can be guaranteed.

Activity AA6.8

### **Find the best material for a crumple zone.**

This could be used for low ability classes, generating very simple data such as the number of layers needed before the magnet falls off.

Activity AA6.7  
(could count layers or measure thickness of crumple zone materials)

### **Find the most suitable lens power for correcting an eye defect.**

Lenses of different powers can be used to form an image on a screen. The image distance should be recorded for each lens. The most suitable lens is the one which gives an image closest to 5 cm from the 'eye lens'.

This would be suitable for higher-ability candidates.

Activity AA6.26  
(using an 'eye lens', a screen to locate the image and lenses of different powers)

### **Find the best material for soundproofing a room.**

This could be used for lower ability classes. It could be done as a demonstration, but the marks for data collection would be low. For Strand C, candidates could describe the loudness of the sound by the height of the oscilloscope trace, which might need to be qualitative. Quantitative data could also be given to help with the evaluation. This Suitability Test could be helpful where class management issues cause problems.

Activity AA6.24

# Appendix F: Examples of Suitability Test Reports with Commentaries

## Script G: Which stomach powder is the best indigestion cure?

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Many people in Britain suffer from acid indigestion after eating or exercise. This can be caused by excess (too much) stomach acid or reflux of stomach acid (heart burn) when stomach acid leaves the stomach and passes up the gullet towards the mouth. This causes a burning sensation and is very uncomfortable and unpleasant. As well as being linked to over eating it is also very commonly suffered by pregnant ladies.

You are a research chemist working for a pharmacy and the head of research and development has asked you to investigate which of the current indigestion remedies you should sell in your pharmacies. She would like to know which indigestion remedy is the most effective at neutralizing stomach acid. Your findings need to be written up in a report which will be presented at the next marketing meeting when the company decides which products it should sell.

### **Method**

1. Measure out 20ml of Hydrochloric acid.
2. Add 5 drops of Universal Indicator.
3. Weigh out 1g of a stomach powder and add it to the acid.
4. Keep adding more and more of the stomach powder till the acid is neutralized.
5. Record in your table how many grams of that stomach powder was necessary to neutralize the acid.
6. Repeat the investigation with another stomach powder.

**Remember – BE SAFE, BE PRECISE and TIDY UP!**

## Contents Page

Page 1) Purpose of the test - Describes the purpose of the test, why we did it and what stomach powder is.

Page 2) Table of results - Shows the table of results, the result I think is best to use and which are not.

Page 3) Method and equipment - Show what went well in the test, and how we could improve things to make my results more reliable.

## Suitability Test

### Purpose of the Test

Indigestion is very common. It can be caused by inflammation of the stomach lining, ulcers, gallstones or irritable bowel syndrome. Smoking, stress and excessive alcohol or caffeine consumption all increase the risk of indigestion, the stomach lining is to protect the stomach from the strong Acid which is in our stomach, all of these cause damage to the stomach lining allowing the stomach wall to be in contact with the strong acid (pH 3-4).

The symptoms of indigestion are:

- Bloating
- Wind,
- Belching
- Nausea

Stomach powder has the ability to neutralise (the acids and alkaline cancelling each other out) the stomach acid making it around pH7, this stops the ulcers, heartburn or dyspepsia. The acid is no longer strong and our stomach wall is not affected by this. Stomach powder is not toxic and has no side effects. We did a test to see how much stomach powder you needed to add to make the acid neutralise.

The main people who are going to buy this are people who are excessive smokers, drink lots of alcohol etc, as all of these increase the risk of Indigestion by damaging the stomach lining. Also pregnant women get indigestion.

I think the main property of Stomach powder is the ability to neutralise acid as its other properties were not dangerous to our health and that stomach powder is only beneficial. The amount needed to make the acid neutralise is also important as people don't want to be taking loads of this powder as this will increase costs and be a bit annoying. Another important point would be how long it lasts for people don't want to be having to take the stomach powder every 2 minutes as this will annoy them and they probably won't be able to feel the relief, so from a patients point of view they would like to last longer. Also if the stomach powder lasts longer they won't have to make as many because people won't need to keep buying them which is reducing the patient's costs and the manufacturer as they don't have to produce as many tablets.

Lloyd's chemist would be interested in this product because the company's two main aims would probably be to help people but also to make money, with the product they will defiantly be helping people who suffer from indigestion because it has been scientifically proven to work. The other point about money is that thousands of people across the UK get indigestion especially as certain points of the year which focus on eating such as Easter and Christmas so the would defiantly be buying this product, which will increase their profits.

Table of Results

Type of powder	Amount added to neutralise (G)	Repeat 2 (G)	Repeat 3 (G)	Average (G)
A	2	2	3	2.3
B	3	3	3	3
C	4	3	4	4
D	10+	10+	10+	10+

(G = grams)

I chose to remove one of the results that I got which was 5g on powder C, I did this because it did not fit in with the other results, after retesting this result I got 4g which did fit.

These results show me that Powder A would be the best one to sell at Lloyd's pharmacy because it took less grams of that particular powder to neutralise the acid, the acid was near enough the same acidic as our stomach acid. This would interest Lloyd's pharmacy because it's a good product and customers are going to like it, this which would boost their sell rate, making it a good production as the company is making money and providing their customers with good quality products.

The customer would like this product as they don't have to take loads of tablets as this 1 works with only 2.3g of powder, which would make it work faster as well.

The worst powder would be D as I couldn't even get this one to turn green, in the end I added 100g of powder and it still didn't turn green, the powder stopped dissolving so that's why it says 10+. This would be the worst one to sell as it could make customers sick taking that much powder also they would get annoyed after taking all the powder and then nothing works, also this would cost more for the manufacture as they would have to produce more tablets. If selling the product customers would not be happy as it doesn't work.

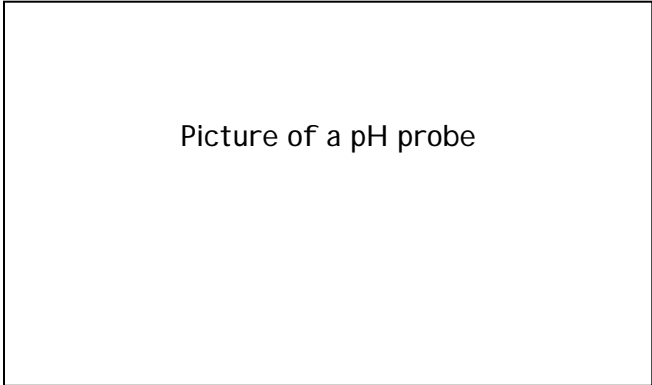
Powders B and C would be acceptable to use as they have a low amount of grams to neutralise, these actually might be better than A because they might last longer, but unfortunately we didn't test how long they lasted for. I don't think customers would mind taking these tablets as it wouldn't be a lot to take and it is proven to work, again would be good for manufacturer as they don't have to create as many.



## Method and Equipment

I think the method was good because it was fairly easy to do and everything was labelled correctly so there were no mix-ups, you had to be careful that you were using the correct powder, we also wore goggles for safety. Sometimes it took a while to make sure we only put 1g of the certain powder in, as the spatulas were rough. We also could have had better acid because the acid we had was not exactly the same as our stomach acid which could have affected the results.

The equipment could be improved such as the weighing scales because they were very sensitive this has good points and bad points the good points would be that it means it is very accurate, the bad point is that because it's so sensitive a very tiny thing can affect it, such as leaning on the surface, to prevent this I moved onto a surface where no-one else was working. We also could have had a pH probe, because the cards we had were not very good because some of them had faded and were hard to read, if we had a pH probe then we could have accurately tested it to make sure it was pH7. Also if we used the pH cards if someone in the class was red-green colour blind it would have been hard for them to read the scale, luckily no-one in our class was red-green colour-blind.



Picture of a pH probe

## Commentary on Script G – Which stomach powder is the best indigestion cure?

Aspect	Mark	Comment
<b>Strand A: Purpose of the test [6 marks awarded]</b>		
(a) The use or purpose of the material, procedure or device to be tested, related to its workplace context.	6	The candidate produced a good introduction to the work giving information on indigestion, stomach acid and what is needed by a powder to relieve indigestion.
(b) The criteria for 'suitability' of the material, procedure or device.	6	The candidate focuses on the main property needed for the stomach acid and also linked the importance of other properties not being dangerous to health. Explanation of neutralisation supports six marks.
<b>Strand B: Carrying out an appropriate test [6 marks awarded]</b>		
(a) Candidate autonomy and independence	6	Annotation on the script by the teacher 'student worked independently and skilfully' adequately supports six marks awarded.
(b) Complexity and appropriateness of test	6	The method for the suitability test is indicated on the task sheet. Perhaps the stomach acid could be added in smaller increments and an indication of colour changes included. For those candidates wishing to access the higher marks, they should be given the opportunity to extend the basic task set.
<b>Strand C: Collecting data or observations [6 marks awarded]</b>		
(a) recording the data	6	Evidence that the candidate has recorded their results in a table which they have devised supports six marks. Units have been recorded (although g rather than G should be used). More precision in weighing is needed to support 8 marks. Candidates would need to use more values in the practical to allow a range of weighing to be used – extension of the practical activity is needed).
(b) range and quantity of data or observations	6	Candidate has looked at the suitability of four different powders in the practical work – this supports six marks as an adequate amount and range of data. Repeats have been made for the practical investigative work.
(c) quality of data	5	Five marks supported – data is generally of good quality – but limited precision.

**Strand D Evaluation of suitability [6 marks awarded]**

(a) Conclusion about suitability, drawn by appropriately linking data or observations to the purpose of the test, and awareness of any limits to the conclusions.	6	Candidate has drawn a correct conclusion from the results. However, it has only been linked to the suitability of the powder in neutralising the stomach acid. More links could be made regarding toxicity, time, costs etc. Six marks are awarded.
(b) Evaluation of testing procedure used.	6	The candidate has made a number of basic statements for the evaluation commenting on the sensitivity of the weighing scales and the use of pH cards. They suggest possible improvements. This is the minimum required for 6 marks.

**Strand E Quality of Scientific Communication [6 marks awarded]**

(a) The structure and organisation of the report	6	The report showed an appropriate structure. Suitable headings were included and the reader was suitably led through the task. Clear contents page with guidance. Six marks awarded.
(b) General quality of communication	6	Six marks are supported as suitable scientific vocabulary has been used. Reference to a range of apparatus, chemical names and techniques have been included.

**The information for the Record Sheet is:**

Title of Suitability Test	Strand A	Strand B	Strand C	Strand D	Strand E	Total mark / 40
Which stomach powder is the best indigestion cure?	6	6	6	6	6	30

## Script H: Disposable Cutlery

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### Contents

Page 1 - Strand A - Purpose of the test.

Page 2 - Strand B - Carrying out the test.

Pages 3 and 4 - Strand C - Collecting the data - Tables showing results for each cutlery sample

Pages 5, 6 and 7 - Strand D - Conclusion and evaluation - Graphs for each cutlery sample showing how far from the ground the sample was after each weight was added.

Pages 8, 9 and 10 - Strand D - Conclusion and evaluation - Graphs for each cutlery sample showing how much the sample bent after each weight was added.

Page 11 - Strand D - Conclusion and Evaluation

## Strand A

### Purpose of the Test

Disposable cutlery is used in school canteens, in shop cafes, on self catered holidays, in prisons, hospitals and in disability homes.

It is used to save on washing up and so you can dispose of it. It is also not too sharp and they are cheap. For supermarkets who sell disposable cutlery and also have a cafeteria, it allows them to be able to market their own product. Plastic cutlery is hygienic as it is only opened when you need to use it and is thrown away once you have used it, whereas metal cutlery is used and used again.

The main items of cutlery used are knife, fork and spoon. Most makes of disposable cutlery are made out of plastic, although some can be made out of wood or in one case which I am going to investigate, potatoes.

The cutlery should have properties such as:

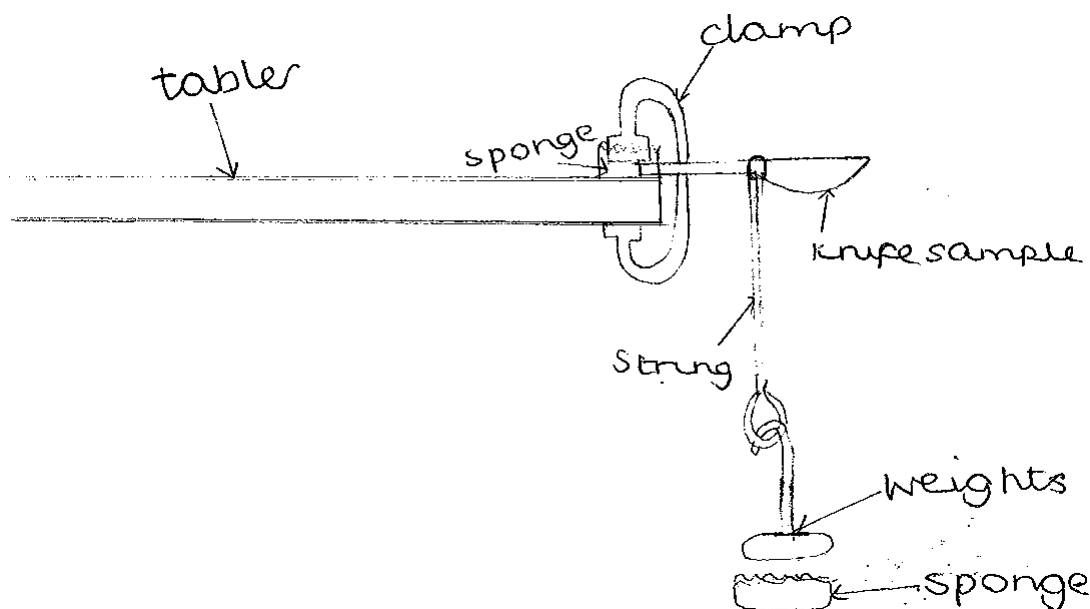
- It should be strong as it should not snap or break
- It should be hard and sharp so it can cut through all foods.
- It should be tough so should not bend, and does not break when cutting through food.
- It should have a high melting point so should not melt when touching hot food and drinks.
- It should be flexible, so it bends rather than snaps.
- It should not be flammable.

I want to be able to test which sample of cutlery is the best for cutting through foods without breaking, so I can see which type would be best for me to use and buy in the future.

Strand BCarrying out the test

I am going to test the property of strength, i.e. how much weight the cutlery can take before it cannot bend any further and breaks. This will show me which sample of cutlery is the toughest and least breakable. I will use three different samples, a Vegeware knife, a Tesco knife and a Sainsbury's knife.

For my experiment, I will clamp each knife to the table, putting a sponge in between the knife and the clamp to make sure the knife does not break before the test has begun. I will tie a piece of string to each knife, and tie a loop in the end hanging down from the knife and add weights to the string. For each knife I will add up to 10 Newtons weight if the knife does not break, or add weights until the knife breaks. I will put the thinnest part of the knife clamped to the table and tie the string before the thickest part so it does not slide off. I will then measure with a ruler how far off the ground the knife is each time a weight is put on.



To make my test reliable I will test each knife three times so I can see if there are any odd results. If the results are completely different for a certain time I will repeat the test a fourth time. The situation is like cutting food so I should be able to see which knife is most suitable.

To make my experiment safe I will wear goggles and put sponges on the floor to catch the weights if they fall.

## Equipment needed

A clamp

A sponge

Weights (per 100g - 1N)

A metre ruler

3 cutlery samples - Vegeware, Tesco, Sainsbury's

String

**Strand C**  
**Collecting data**

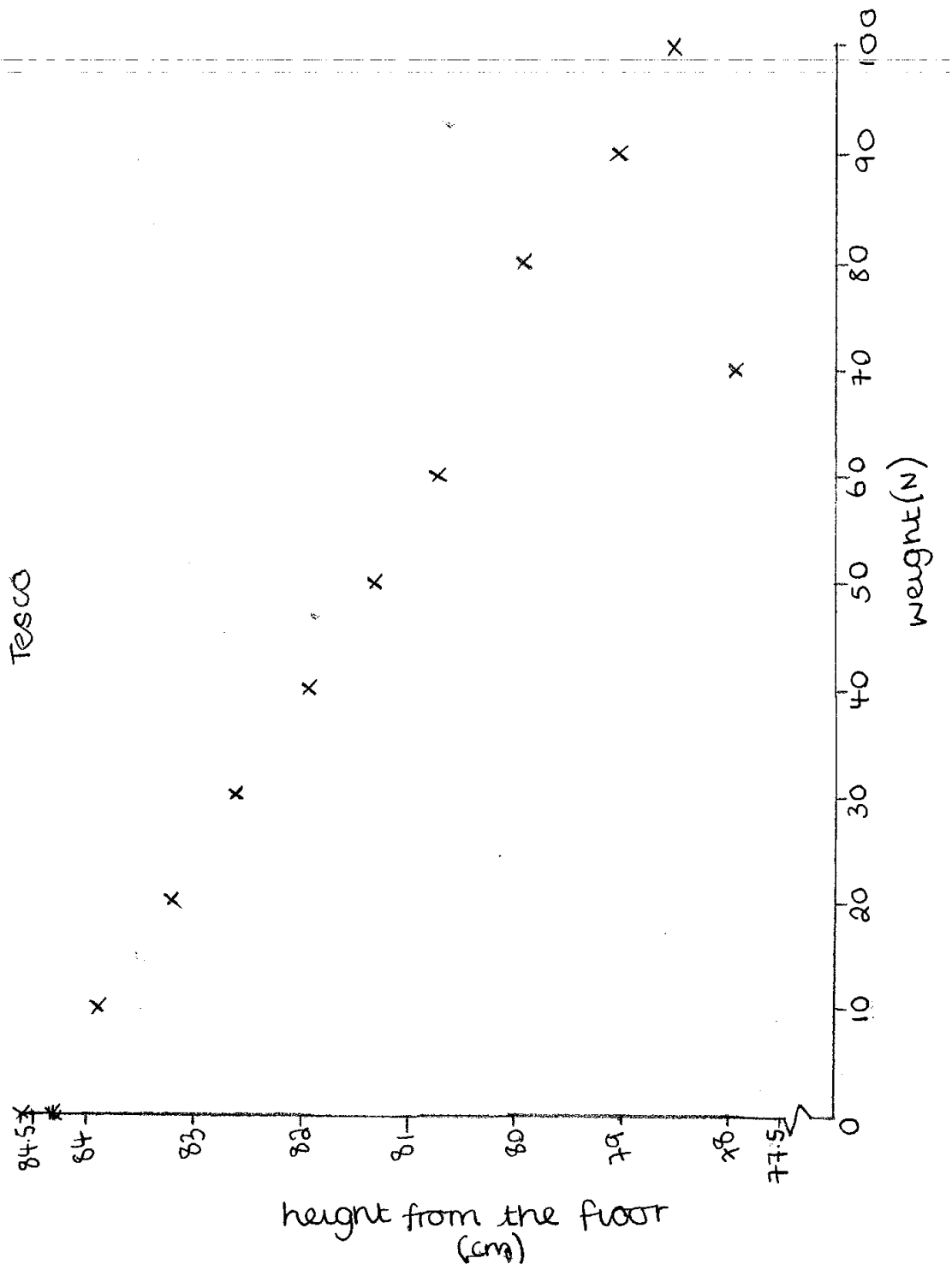
**Table of results**

Sample of Cutlery	Weight (N)	Distance from the floor (cm)			Average	How much the sample bends after each weight is added (cm)
		Test One	Test Two	Test Three		
Tesco	0	84.2	84.8	84.9	84.6	0
	1	83.5	84.3	84	83.9	0.7
	2	82.7	83.7	83.2	83.2	1.4
	3	82	83.3	82.6	82.6	2
	4	81	82.7	82.1	81.9	2.7
	5	80	82.3	81.5	81.3	3.3
	6	79.4	81.9	80.8	80.7	3.9
	7	72.3	81.3	80.2	77.9	-
	8	BROKE	80.1	79.6	79.9	4.7
	9	-	BROKE	79	79	5.6
10	-	-	78.5	78.5	6.1	

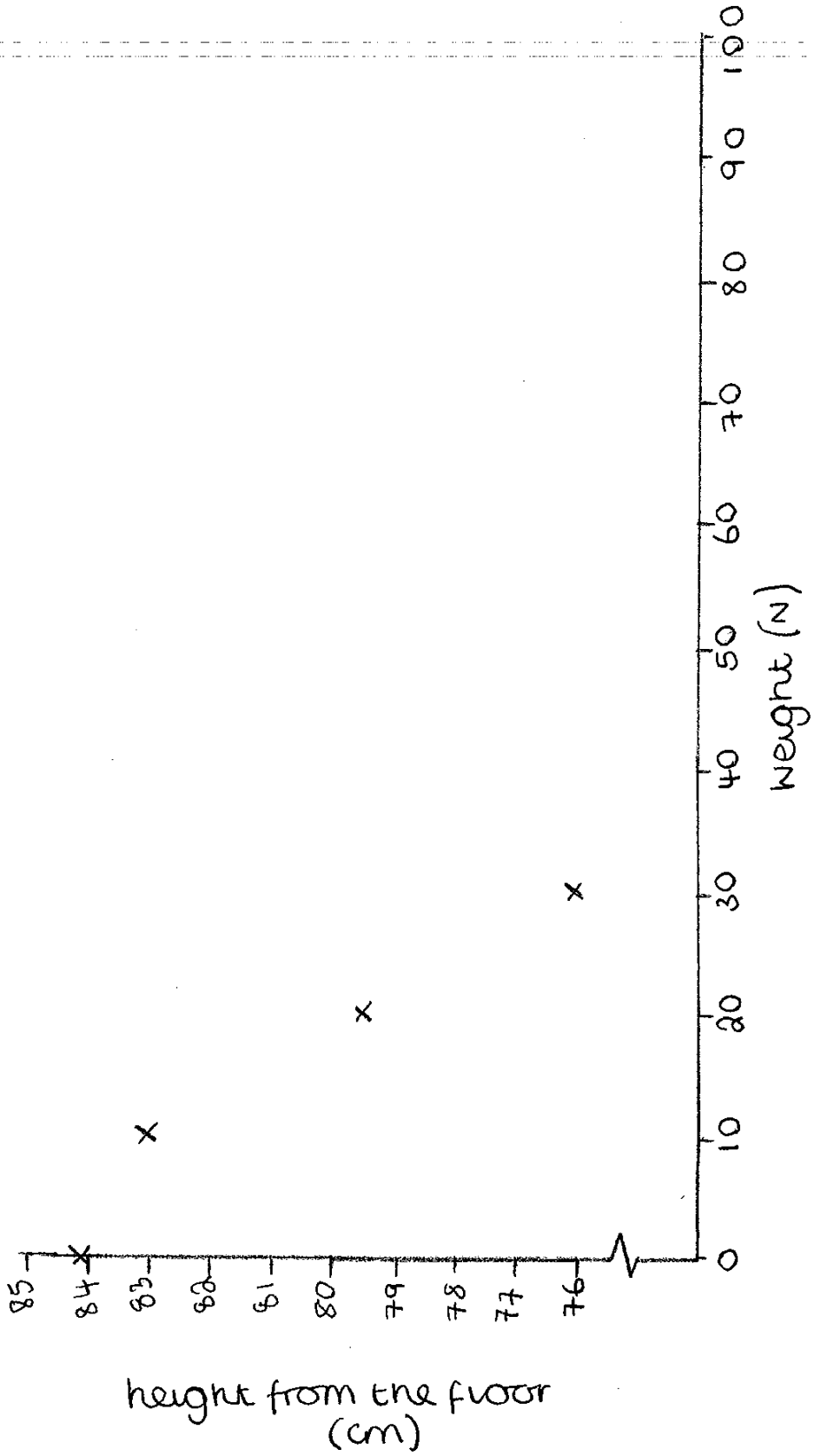
Sample of Cutlery	Weight (N)	Distance from the floor (cm)			Average	How much the sample bends after each weight is added (cm)
		Test One	Test Two	Test Three		
Vegeware	0	85	85.1	84.6	84.9	0
	1	84.2	84.5	84.4	84.3	0.6
	2	83.5	84.1	84	83.9	1
	3	82.4	83.7	83.6	83.2	1.7
	4	81.1	82.1	83.2	82.1	2.8
	5	77.8	78.5	82.5	79.6	5.3
	6	76.5	76.8	80.5	77.9	7
	7	75.3	75.7	79	76.7	8.2
	8	74.2	75	77.2	75.5	9.4
	9	73.7	74.3	76.5	74.8	10.1
	10	73.2	-	75.5	74.3	10.6

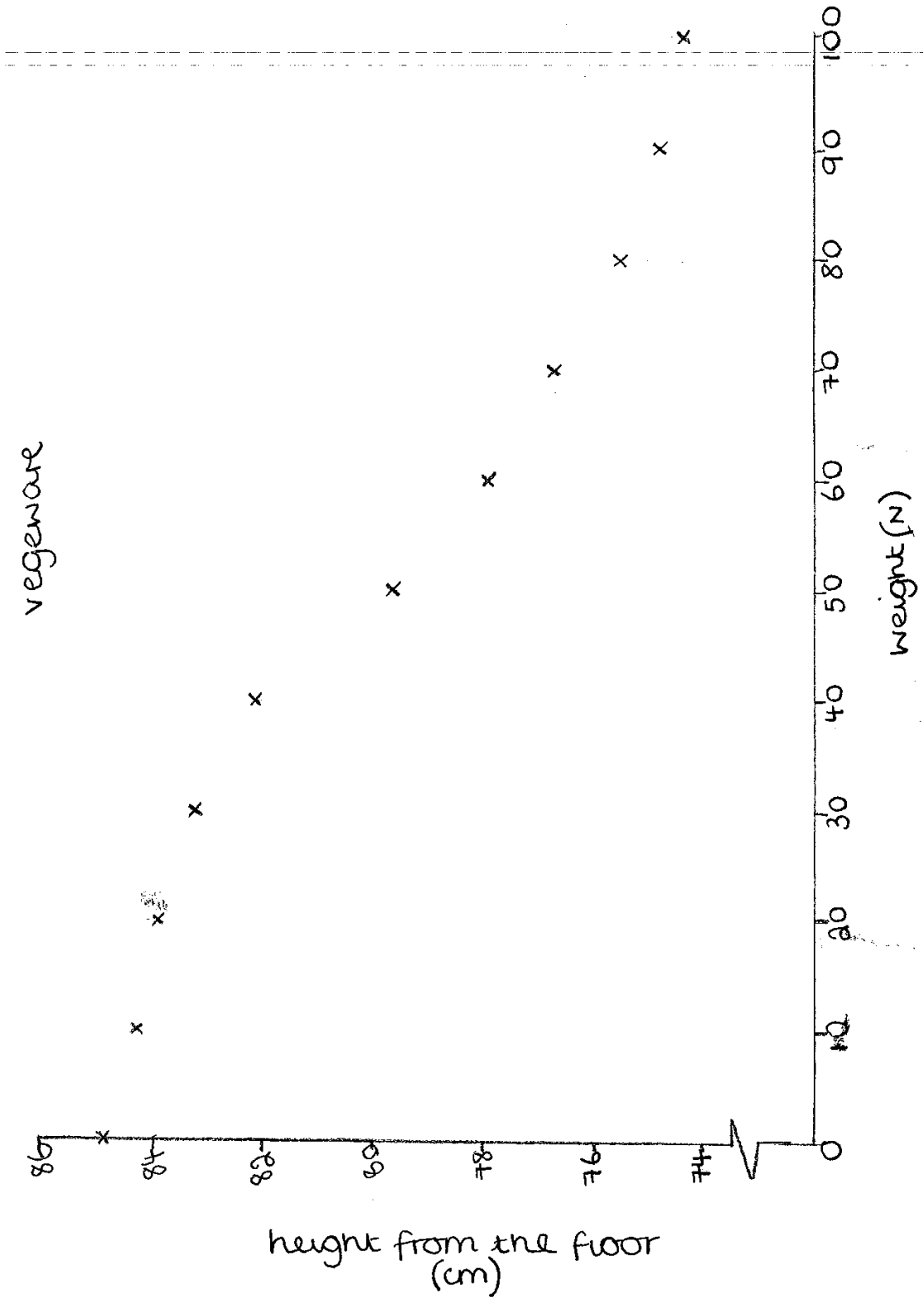
Sample of Cutlery	Weight (N)	Distance from the floor (cm)			Average	How much the sample bends after each weight is added (cm)
		Test One	Test Two	Test Three		
Sainsbury's	0	84.3	84.2	83.9	84.1	0
	1	83.2	83.5	82.4	83	1.1
	2	81.4	81	76	79.5	4.6
	3	73	79	BROKE	76	8.1
	4	BROKE	BROKE	-	-	-
	5	-	-	-	-	-
	6	-	-	-	-	-
	7	-	-	-	-	-
	8	-	-	-	-	-
	9	-	-	-	-	-
	10	-	-	-	-	-



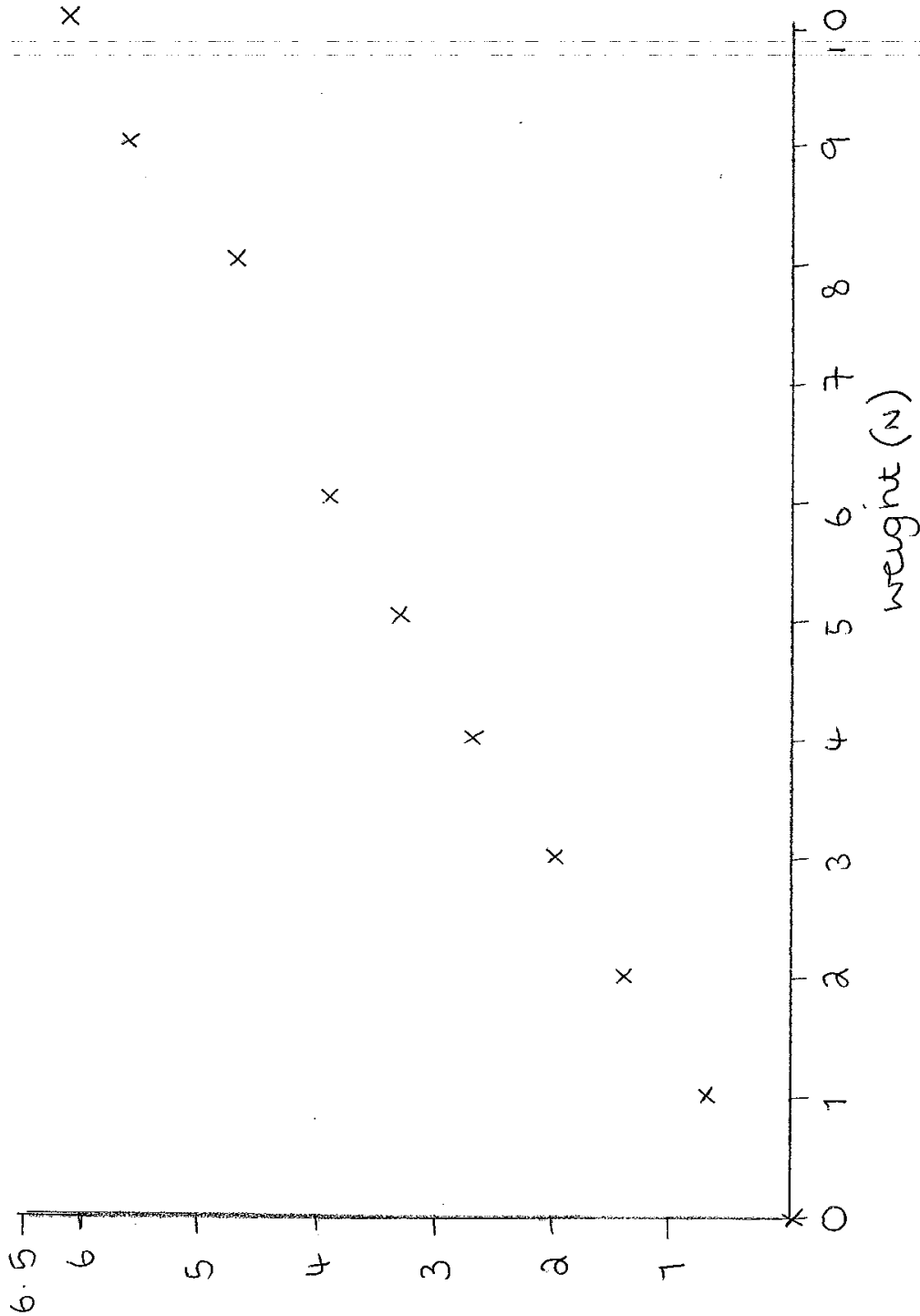


sainsbury's



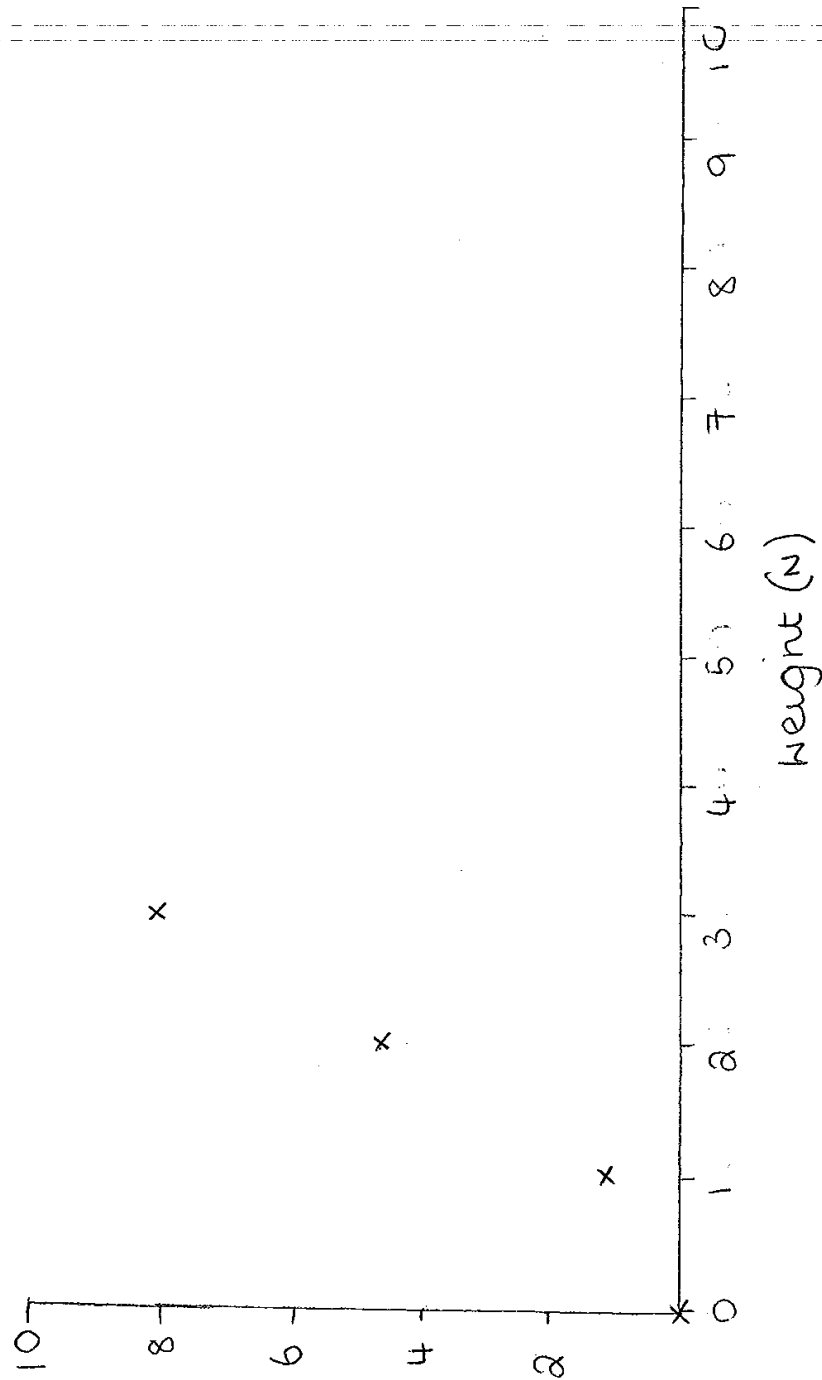


Tesco

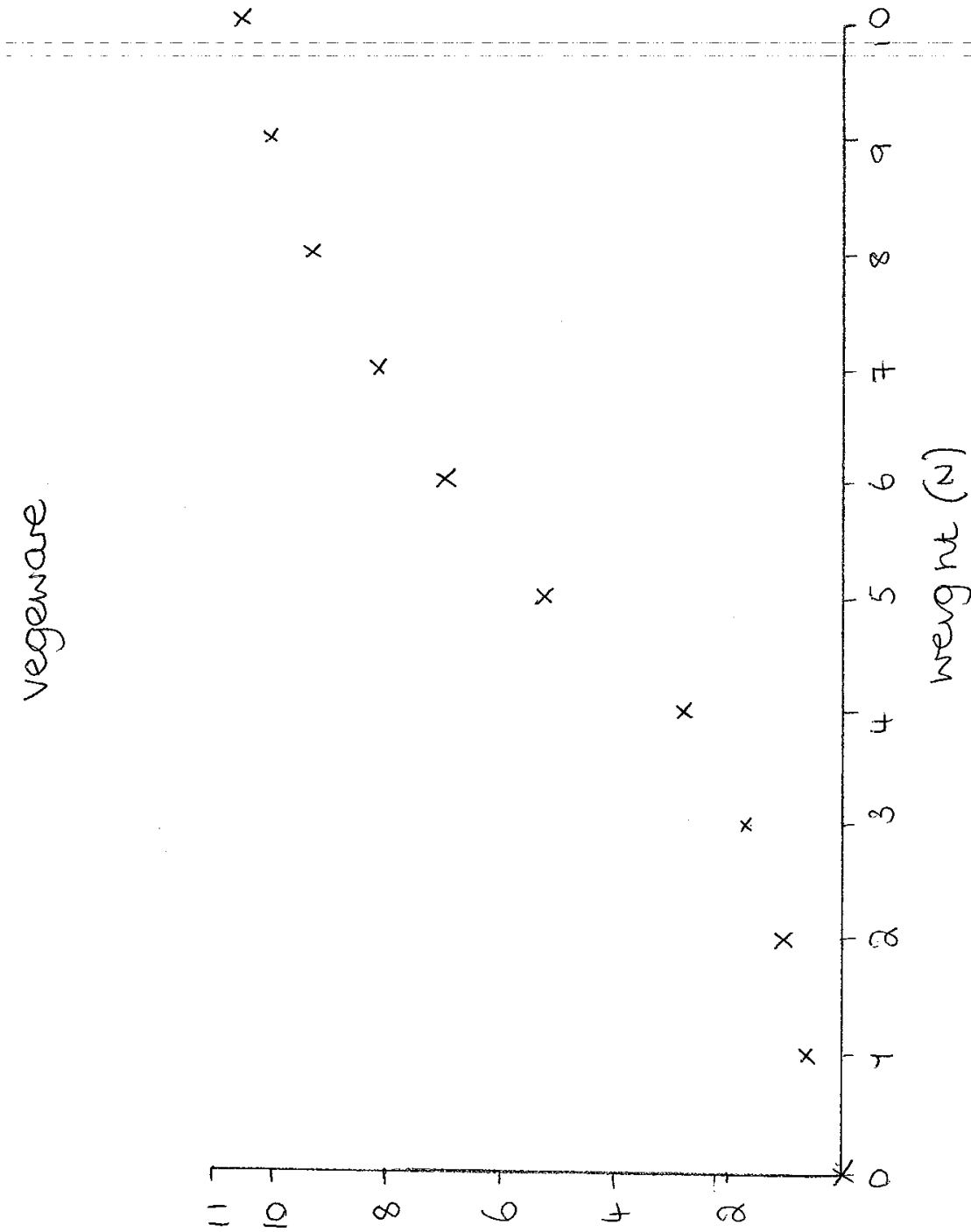


how much the sample has bent after each weight is added (cm)

Sainsbury's



how much the sample has bent after each weight is added (cm)



how much the sample has bent after adding each weight (cm)

## Strand D

### Conclusion and Evaluation

My results show me that the best knife to use would be either the Vegeware knife, as it did not break, or the Tesco knife, as it only broke on two tests. In all of my three tests, the Sainsbury's knife broke when weights were added to it; this shows me that the Sainsbury's knife is the least suitable knife to use out of the three.

My graphs show me 'the more weight you add to the knife, the more it bends'. The Sainsbury's knife bent the most, so therefore is the most flexible, as the plots on my graph were steeper than those for Vegeware and Tesco, but the Sainsbury's knife did break after only 3 Newtons was added to it. The tesco knife had only bent 6.1cm after having 10 Newtons added to it, whereas the Vegeware had bent 10.6 cm after having 10 Newtons added to it.

My conclusion is limited because the Vegeware knife did not break at any point and the Tesco knife only broke at a far along point during only two of my tests, it is hard to determine which knife would be best to use. As the Vegeware knife never broke I assume this one is the best.

I could improve my experiment by adding more weights onto the Vegeware and Tesco knives to find out which knife will break first, and is overall more likely to break when cutting into food. I would also test more samples of cutlery to compare the best sample with.

## Commentary on Script H – Disposable Cutlery

Aspect	Mark	Comment
<b>Strand A: Purpose of the test [6 marks awarded]</b>		
(a) The use or purpose of the material, procedure or device to be tested, related to its workplace context.	6	Description of the use of disposable cutlery is limited in the first paragraph but mention of cutting and bending etc is mentioned in the work on properties. The workplace context has been mentioned. This is the minimum required to award six marks.
(b) The criteria for 'suitability' of the material, procedure or device.	6	The candidate has made reference to the basic use of cutlery and a basic description of the properties with an explanation of why these properties are needed for the cutlery. Six marks are awarded. For a full description of the properties, more scientific detail is needed for strength/flexibility/toughness etc. Again a more detailed explanation is needed for several properties for 8 marks.
<b>Strand B: Carrying out an appropriate test [6 marks awarded]</b>		
(a) Candidate autonomy and independence	6	The procedure that the candidate has completed was defined by the centre. One experimental procedure was carried out. It would help an external moderator if a statement could be included stating that the candidate carried out the procedure with little further guidance.
(b) Complexity and appropriateness of test	6	The candidate completed one procedure using a suitably complex task. However, only 6 marks can be awarded as there was no high level explanation showing how the task related to suitability. Much more detail is needed to relate the task to the suitability information given in the introduction of the work.
<b>Strand C: Collecting data or observations [6 marks awarded]</b>		
(a) recording the data	7	Evidence that the candidate has recorded results in a table which they have devised supports seven marks. Suitable units have also been recorded but data shows some omissions of .0
(b) range and quantity of data or observations	6	Candidate has looked at the suitability of three different knives in the practical. However, the data collected relates to strength and flexibility. There is opportunity for a much greater range of experimental work. Repeats have been made for the practical investigative work.
(c) quality of data	6	Again, six marks awarded. Data is generally of good quality – adequately precise and reliable.



**Strand D Evaluation of suitability [6 marks awarded]**

(a) Conclusion about suitability, drawn by appropriately linking data or observations to the purpose of the test, and awareness of any limits to the conclusions.	6	The candidate has made a statement that the best knife to use would be either the Vegeware or the Tesco one based on strength and flexibility. Six marks are awarded as there is a correct conclusion based on the pattern of the data collected.
(b) Evaluation of testing procedure used.	5	The candidate has only made a number of generic statements for the evaluation of the testing procedure. Adding more weights and testing more cutlery do not really reflect ideas worth 6 marks so 5 marks are awarded.

**Strand E Quality of Scientific Communication [6 marks awarded]**

(a) The structure and organisation of the report	6	The report showed an appropriate structure. Suitable headings were included and the reader was suitably led through the work. Contents were appropriate and reflected on the information in the report.
(b) General quality of communication	6	Six marks are awarded as suitable scientific vocabulary has been used. References to a range of apparatus and techniques have been included.

**The information for the Record Sheet is:**

Title of Suitability Test	Strand A	Strand B	Strand C	Strand D	Strand E	Total mark / 40
Disposable Cutlery	6	6	6	5	6	29

## Script I: Comparing Antacids

---

### What is an antacid? What are they used for?

An antacid is a compound that absorbs and neutralises stomach acid. Antacid is useful temporary relief of occasional indigestion and heartburn.

### What characteristics would make a good antacid?

- Colourful – so it is attractive.
- Chewy – if someone does not want to swallow it.
- Right price – not too expensive so people can afford it. Not too cheap because some cheap things don't have an effect.
- Attractive – people buy it because it looks nice.
- Smells nice – people buy it because it smells good and it is going to taste good.
- How you take it – the way you like to take it if you don't want to swallow it you can get one that you can chew.
- Effective – get one that has an effect and that cures your problem.
- Taste nice – buy one that has a good taste.
- Size of tablet – if you can't swallow a large tablet you can get a small one.

### What are you planning to test in your investigation?

I am planning to test what makes a good antacid.

	Cost per Tablet
Tums indigestion relief	4p
Boots heartburn relief	32.5p
Remigen indigestion relief	9p
Pepto Bismol	28.5p
Rennie dual action	19.167p
Rennie fruit	7p
Boots indigestion tablet	2p

I found this information from the Internet on the Boots website.

### What was the best value for money tablet?

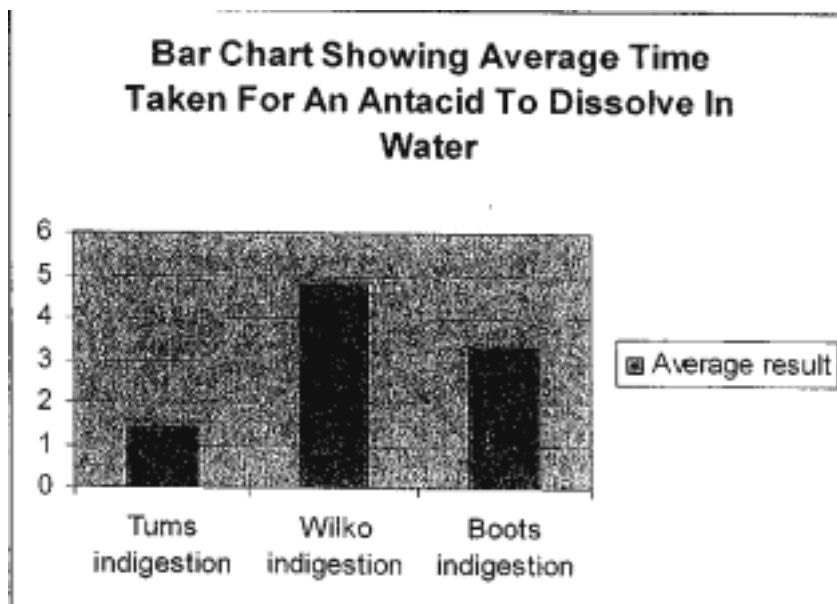
The best value for money was the Boots indigestion tablet because it was the cheapest tablet.

Name of Antacid	Active Ingredients	Mass of one tablet	Cost per pack	Number of tablets per pack	Cost per tablet
Boots indigestion tablet	Calcium carbonate	10.416g	£1.95	48	2p
Tums indigestion relief	Calcium carbonate		£2.93	75	4p
Boots heartburn relief	Raniditine	13.583g	£1.95	6	32.5p
Remigen indigestion relief	Calcium carbonate		£3.32	40	9p
Pepto Bismol	Calcium carbonate	262.5mg	£3.42	12	28.5p
Rennie dual action	Calcium carbonate	14g	£2.30	12	19.167p
Rennie fruit	Calcium carbonate		£3.91	64	7p

### Investigation 2

Investigation 2 was carried out to find which antacid dissolved easily in water at the same temperature. The antacids I tested were Wilko indigestion, Tums fruity relief and Boots indigestion relief. Their results are listed in the table below.

Name of antacid	First result	Second result	Average result
Tums indigestion	1 min 21 secs	1 min 54 secs	1.375
Wilko indigestion	5 min 30 secs	4 min 25 secs	4.775
Boots indigestion	3 min 31 secs	3 min 35 secs	3.33



To do this experiment I used boiling water at a temperature of 45 degrees Celsius, a conical flask to swirl around the solute, a stopwatch to keep an eye for the time it took, I used a measuring cylinder to carefully pour the water at the same amount of 15ml and I wore goggles to protect my eyes if anything splashed out when swirling.

I set out the equipment and got boiling water from the kettle, measured the temperature and then measured the amount of water so it was equal each time for a fair test so every time I repeated the experiment I kept the water the same. I stirred the antacid tablet so it could dissolve quicker. I recorded the results every time the tablet disappeared into liquid and could not be seen.

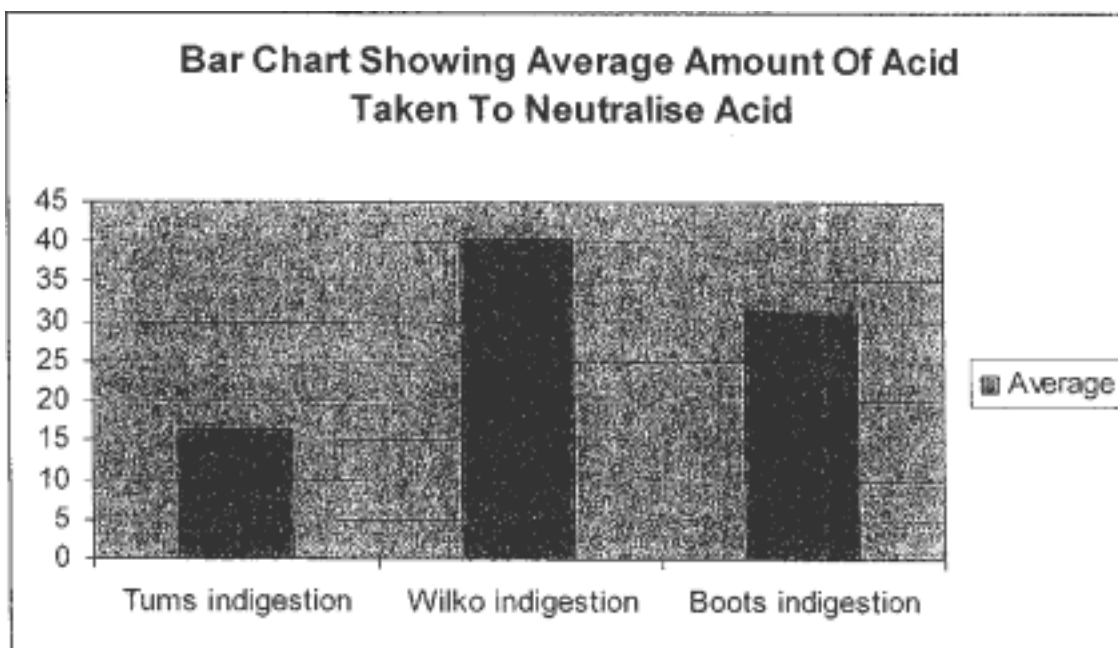
The safety precautions I took when near the alkaline substance were wearing goggles if anything splashed into my face.

From my results I discovered that the Tums indigestion tablet dissolved easier and quicker than the Wilko and Boots tablets because the Tums tablet weighed less and was smaller in size as an advantage to easy dissolving in a liquid. An antacid needs to be soluble so it can be dissolved instead of being taken whole like a normal tablet.

### Investigation 3

In the 3<sup>rd</sup> investigation I was trying to find out how much acid it took to neutralise an antacid which was mixed in with methyl orange indicator. I recorded my results in a table with the amount of acid it took to start neutralisation. My results have been put neatly in this table.

Name of product	First result (ml)	Second result (ml)	Third result (ml)	Average
Tums indigestion	5	22	22	16.3
Wilko indigestion	31	50	40	40.3
Boots indigestion	25.5	31.9	37	31.46



**What equipment did you use?**

We used: a flask, measuring cylinder, a clamp stand with a burette, hydrochloric acid, water, tablet and a crusher. We wore goggles to protect our eyes and when we were pouring the acid into the burette we put the clamp stand on a stool.

**What was the best at neutralising acid?**

The best one was the Wilco indigestion table. It is good in an antacid because so the tablet dissolves quick inside you when you take it. Also it neutralises a lot of acid so it will be more effective.

**Conclusion**

I would recommend the Tums indigestion because it dissolves quick and it is going to have a quick affect.

**Were any parts of your investigation not good enough?**

The investigation I did I had to do it 3 times with each tablet so I can get my experiment as accurate as possible.

**What could you have improved and why would this have helped?**

I could have done the experiments more than 3 times so it is more accurate. Also I could have added more water in my investigation 2 and 3 because I added 15ml of water in investigation 2 and 20ml of water in investigation 3. This could have helped so the tablet dissolves well in the water.

### Did you collect enough information?

I think I collected enough information on the tablets because I have got many different tablets in my table. I would recommend the Tums indigestion because it is cheap and it dissolves quickly which means it is going to have a quick effect.

### Neutralisation

Alkalis neutralise acids to form salts.

The word equation is:

Metal hydroxide + acid → salt + water

### Acid and carbonates

The reaction of carbonate with acid produces a gas. Limestone and marble are forms of calcium carbonate. The minerals mix when mixed with dilute hydrochloric acid.

The equation is:

Metal carbonate + acid → salt + carbon dioxide + water

I have found some of this information from [www.antacid.com](http://www.antacid.com) and GCSE Science Harnessing Chemicals book.

## Commentary on Script I – Comparing Antacids

Aspect	Mark	Comment
<b>Strand A: Purpose of the test [4 marks awarded]</b>		
(a) The use or purpose of the material, procedure or device to be tested, related to its workplace context.	3	The candidate has made reference to the fact an antacid is a compound which neutralises stomach acid. Much more detail could be included here to improve the marks – information to included the type of compound needed for neutralisation with possible reference to stomach acid. No direct reference to ‘the workplace context’ here, although reference to different types of commercial products are listed under cost and mentioned throughout the report. The candidate could include statements relating the ‘active ingredients’ and the types of products which can be used as antacids, to support higher marks.
(b) The criteria for ‘suitability’ of the material, procedure or device.	5	The candidate has made a good effort to bullet point a number of characteristics. There is no reference to the active ingredient needed for the antacid in this section although the table for comparing antacids does have reference to active ingredients – the information describing ‘effective’ as one that ‘has an effect and cures the problem’ does not focus on the required science. For six marks, there needs to be more description of the desirable properties – in this case, the ones chosen in the practical, i.e. solubility and effect on stomach acid. This would also allow an explanation of why the property is necessary.
<b>Strand B: Carrying out an appropriate test [6 marks awarded]</b>		
(a) Candidate autonomy and independence	6	The procedures that the candidate has carried out were defined by the centre. Two experimental procedures were carried out. For the time taken for the tablets to dissolve in ‘hot’ water, more guidance on the quantities and temperatures could have been included. It always supports marks if the centre can perhaps indicate that little guidance was given to the candidate.
(b) Complexity and appropriateness of test	6	The candidate completed a procedure using a suitably complex task – as indicated by the candidate – they used a burette in adding acid to the tablets chosen. Results however are rather varied. Six marks are awarded. Note: in order for the tablet to be effective, it needs to be able to neutralise a larger volume of acid.
<b>Strand C: Collecting data or observations [6 marks awarded]</b>		
(a) recording the data	6	Evidence that the candidate recorded the results in a table which they have devised supports six marks. Suitable units have also been recorded (however $\text{cm}^3$ is preferable to ml)
(b) range and quantity of data or observations	6	Candidate has looked at the suitability of three different antacid tablets in practical work, as well as recording a range of costs/weights etc on a wide range of tablets. This supports six marks since an adequate amount and range of data has been recorded. Repeats have been made for the practical investigative work.

(c) quality of data	6	Again, six marks are awarded. Data is generally of good quality although there are some omissions in the practical recording. For example, no mention of the number of tablets needed in the dose or the variation in accuracy of recordings in the titration. Initial and final readings could be included. Repeat readings varied.
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#### Strand D Evaluation of suitability [5 marks awarded]

(a) Conclusion about suitability, drawn by appropriately linking data or observations to the purpose of the test, and awareness of any limits to the conclusions.	4	The candidate has made a statement that the best antacid is TUMS for the suitability test and that WILKO is the best for the neutralisation work. Four marks are supported as this indicates a correct conclusion from individual results but the candidate has not drawn an overall conclusion linking all the information together. It may have been easier for the candidate, if guidance had been given on what 'dose' is needed, i.e. one or two tablets.
(b) Evaluation of testing procedure used.	5	The candidate has made a number of basic statements for the evaluation. Adding more water or repeating the experiment do not really reflect ideas worth 6 marks so 5 marks are awarded.

#### Strand E Quality of Scientific Communication [5 marks awarded]

(a) The structure and organisation of the report	4	The report showed an appropriate structure. Suitable headings were included and the reader was suitably led through the work. Six marks could easily have been obtained if a contents page was included and the pages numbered.
(b) General quality of communication	6	Six marks are awarded as suitable scientific vocabulary has been used. Reference to a range of apparatus, chemical names and techniques have been used.

Title of Suitability Test	Strand A	Strand B	Strand C	Strand D	Strand E	Total mark / 40
Comparing Antacids	4	6	6	5	5	26



# Appendix G: Assessment Criteria for Work-Related Reports

Strand A Information sources				
Aspect of performance	2	4	6	8
(a) Initiative in collecting information	Information given is restricted to that provided by the original stimulus materials.	Information from a few additional sources is provided, although some may be irrelevant or inappropriate.	Relevant information is collected, from a variety of sources including a practitioner and/or workplace.	Uses relevant information, carefully selected from a variety of sources including a practitioner and/or workplace.
(b) Reference to sources	Sources of information are not identified.	Sources are identified by incomplete or inadequate references.	Sources are identified clearly but in limited detail.	References to sources are clear and fully detailed.
(c) Identification of source of particular information	–	Direct quotations are rarely indicated as such.	Direct quotations are generally acknowledged.	Direct quotations are appropriately used and acknowledged.
Strand B Description of Workplace				
Aspect of Performance	2	4	6	8
(a) Description of the expertise of an individual, or working group, with the vocational and personal qualities required	Gives an account which is superficial or lacks detail or focuses on only one aspect.	Gives a partial account of the expertise on an individual, or working group, with the vocational and personal qualities required.	Describes the expertise on an individual, or working group, with the vocational and personal qualities required.	Gives a clear account which explains the relevance to work of the vocational and personal qualities required.
(b) Description of the nature of the work, its purpose and place in the wider organisation	Gives an account which is superficial or lacks detail or focuses on only one aspect.	Gives a partial account of the work, its purpose and place in the wider organisation.	Gives an account of the work, its purpose and place in the wider organisation.	Gives a full account of the work, and explains its purpose and place in the wider organisation.
(c) Understanding of the financial or regulatory context of the context in which the work is done.	Makes a link between one financial or regulatory factor and the work.	Identifies one relevant example of the impact of a financial or regulatory factor on the work.	Describes one example of the impact of a financial or regulatory factor on the work.	Explains one example of the impact of a financial or regulatory factor on the work.

**Strand C: Scientific knowledge and skills applied**

Aspect of Performance	2	4	6	8
(a) Scientific knowledge and understanding applied in the workplace	Makes a link between the work and one example of scientific knowledge.	Identifies scientific knowledge involved in the work described.	Describes scientific knowledge involved in the work described.	Describes scientific knowledge and explains how it underpins the work described.
(b) Technical skills applied in the workplace	Makes a link between the work and one example of a technical skill.	Identifies a relevant example of a technical skill applied in the workplace.	Describes an example of a technical skill applied in the workplace.	Describes and explains an example of a technical skill applied in the workplace.

**Strand D: Quality of Presentation**

Aspect of Performance	2	4	6	8
(a) The structure and organisation of the report	The report has little or no structure or coherence, or follows a structure provided by worksheets.	The report has an appropriate sequence or structure.	Information is effectively organised, with contents listing of key elements and page numbering.	Considerable care has been taken to present the information clearly to a chosen audience.
(b) Use of visual means of communication	There is little or no visual material to support the text.	Visual material is simply decorative, rather than informative.	Visual information is used to convey information or illustrate ideas.	Visual information is used appropriately to convey information or illustrate ideas.
(c) General quality of communication	Spelling, punctuation and grammar are of generally poor quality.	Spelling, punctuation and grammar are of very variable quality.	Spelling, punctuation and grammar are generally sound.	Spelling, punctuation and grammar are almost faultless.
	Little or no relevant technical or scientific vocabulary is used.	Use of appropriate vocabulary is limited.	Appropriate scientific vocabulary is used.	There is full and effective use of relevant scientific terminology.

# Appendix H Suggestions for Contexts for Work-Related Reports

## A1 Lifecare

Try to avoid: social work; alternative therapies; the role of a doula.

Appropriate occupations include:

nurse (it helps to specify which type of nurse); midwife; paramedic; dietician; fitness instructor; doctor.

## A2 Agriculture and food

Occupations in these sectors:

food processing (sugar, flour, dried foods); plant propagation (seed production, tissue culture, cutting and grafting); animal husbandry (cattle, sheep, pigs, chickens, deer, bison, ostriches); animal fertility (artificial insemination, embryo transfer); food production using microorganisms (yogurt, cheese, mycoprotein, beer); government organisations (meat inspector, veterinarian, inspector for DEFRA, FSA)

## A3 Scientific Detection

Occupations include:

forensic scientist; Scenes of Crime Officer; Fingerprint expert; archaeologist; environmental analyst; food analyst; drugs testing

## A4 Harnessing Chemicals

Occupations include:

Product developer/ manufacturer/ chemical engineer/ analyst/ quality controller in bulk chemicals industries (ammonia products; sulfuric acid products; chlorine products; oil industry; polymers)

Product developer/ manufacturer/ chemical engineer/ analyst/ quality controller in fine chemicals industries (cosmetics; toothpaste; shampoos; synthetic fibres; dyes and pigments; speciality chemicals)

Try to avoid over-reliance on advertisements, especially for cosmetics and toiletries.

## A5 Communications

Occupations include:

sound engineer; TV producer; sports photographer; air traffic controller; security engineer; electronic engineer

## A6 Materials

Occupations include:

trading standards inspector; building inspector; builder; dental technician; optician; sound engineer; prosthetics technician

# Appendix I: Examples of Completed Work-Related Report with Commentaries

## Example J: SOCO

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Page 1

### Contents

Page 2	Introduction and Science Needed
Page 4	Personal Qualities and Technical Skills
Page 6	Qualifications
Page 6	The Workplace
Page 8	Regulations
Page 9	Finance
Page 10	References

A picture showing the tape blocking off a crime scene

<http://www.mayslaw.net/images/crime-scene.jpg> - 19th January 09

### Introduction

The purpose of being a SOCO is to collect evidence in order for helping the police find their criminals. Places where they may work are either the crime scene, or in the police station. They would work for the police, and also forensic scientists.

### Science needed

To be a SOCO, you will need to know how to collect certain evidence like finger prints, footprints, blood and hair etc. To then analyse these samples using techniques such as chromatography, electrophoresis and using a microscope will be needed.

### DNA - Electrophoresis

Electrophoresis is a technique used to separate and identify chemicals. This works by extracting the DNA from the cells in the blood or semen, skin cells, hairs, saliva etc. Then they cut up the DNA into fragments each fragment has a charge. This produces different sized bits of DNA. Then the DNA is suspended in a gel. The chemicals move at different rates due to their charge and size. Then the chemicals are treated to make them visible. SOCO's will use electrophoresis because once the test is completed, they will have a blood sample, or a skin cells, and can compare it which will then find their criminal/s. DNA profiles are made for each person, from there DNA samples which is then kept on the system in order to make it easier for the police to catch criminals. Every single persons DNA profile is different.

A picture showing how the results are analysed in electrophoresis

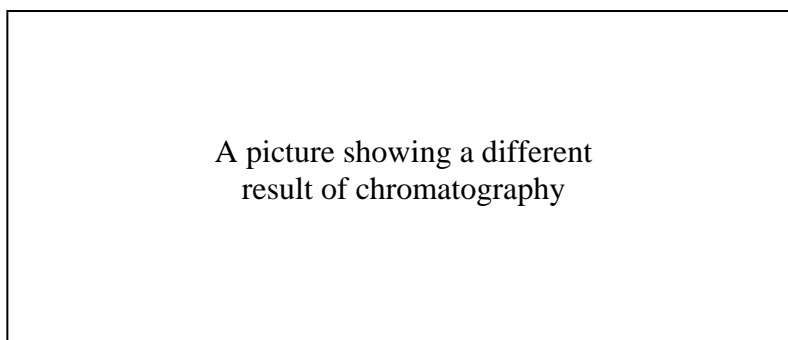
<http://www.marlow.com/Applications/images/Electrophoresis.jp> - 20th January 2009

### Chromatography

Chromatography separates and identifies chemicals in mixtures. The dyes are separated by the movement of a solvent. The liquid or gas is the moving or mobile phase, the fixed medium which does not move is the stationary phase. The dyes move up the paper along with the solvent.

They move at different rates because they have different solubility's.

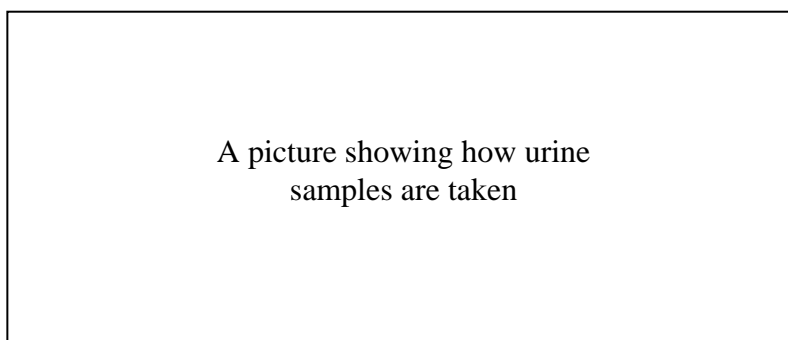
SOCO's would only use thin layer chromatography rather than paper chromatography because it can analyse more samples for example if an unknown drug is found at a crime scene they can recognise it.



[http://2.bp.blogspot.com/\\_KWKYilaGzUA/Rq8VfMNsCsl/AAAAAAAAABhk/rn-zC6jIEzQ/s320/thin%2Blayer%2Bchromatography.jpg](http://2.bp.blogspot.com/_KWKYilaGzUA/Rq8VfMNsCsl/AAAAAAAAABhk/rn-zC6jIEzQ/s320/thin%2Blayer%2Bchromatography.jpg) - 20<sup>th</sup> January 2009

### Collecting Samples

Analysts work with samples. The size of the samples needed depends on what tests need to be carried out. SOCO's will need to know how to correctly do this as they will be doing it a lot. It is important for them to prevent any changes of the sample. They also need to avoid contamination. Protection clothing is worn, and all samples are sealed in bags or bottles to avoid them being contaminated. Sometimes urine samples have been swapped in the past. For some samples, it is important to have 'chain of custody' evidence and tamper proof seals, so it is shown exactly who has had access to the samples.



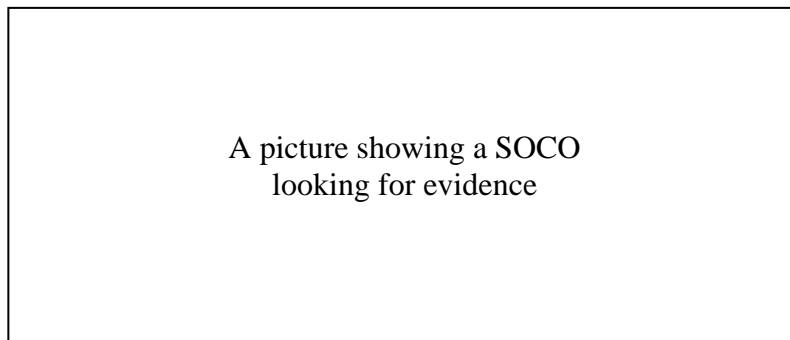
[http://www.hospitalmanagement.net/contractor\\_images/greinerbio-oneqmbh/3\\_urine.jpg](http://www.hospitalmanagement.net/contractor_images/greinerbio-oneqmbh/3_urine.jpg) - 20th January 2009

### Recording Visual Information

SOCO's will also need to collect certain information like written descriptions, drawings, photographs and videos. A written description is a quick method of recording key details. They have the advantage that they can concentrate on the most important visual information. The type of drawing can vary from a quick sketch used as a memory aid to a detailed, accurate measured drawing as a permanent record. Photographs and videos are a quick and accurate recording.

## Personal Qualities

SOCO's will need to be patient as evidence may not be found straight away so they will need the patience to keep looking until they get all of the evidence they need. If the press or families are present at the crime scene, the SOCO's will need to be calm so that they don't worry the other people around which will cause disruption to the SOCO's and other people working. They will also need to be observant as it is very fine detail that needs to be noticed. A good memory will be useful as any extra information not recorded at the crime scene may help the SOCO's find their criminal. SOCO's will need to be cautious and aware of the scene around them. They will need to notice quickly if they or anyone around them may be in danger and protect the safety of them and any other people. Back in the lab once the SOCO has collected their evidence, they will need to be able to follow simple procedures so that any evidence isn't damaged or any unreliable data is given.



[http://www.derby.ac.uk/images/dr\\_72515b40c701fc406e84dbd1ed1b72d9.jpg](http://www.derby.ac.uk/images/dr_72515b40c701fc406e84dbd1ed1b72d9.jpg) - 21st January 09

## Technical Skills

### Finger Print Lifting

One of the most popular methods of finding fingerprints is DUSTING. Most people's fingers carry a coating of perspiration and oil. When any finger comes into contact with a relatively smooth surface, the friction then releases the oil from between the ridges. The SOCO spreads powder by dusting with a fine brush. The dust sticks to the print, and then they lift the print with the sticky paper which they take to the lab and scan onto a computer to compare with other fingerprints in the database. There are several techniques of doing this. Dusting is ideal on wood, metal, glass, plastics and tile. There are also other ways of collecting fingerprints, for example iodine fuming, ninhydrin spray, silver nitrate, superglue fuming and laser.

<http://www.aspu.edu/oconnort/3210/3210cect03.htm> - 22nd January 09

A picture showing what is used for  
finger print lifting and a fingerprint

<http://norwich.edu/about/news/2007/img/122107-forensics.jpg> - 22nd January 09

<http://www.idfpr.com/DPR/images/fingerprint.gif> - 22nd January 09

### Preparing a Microscope

A compound microscope has an eyepiece lens and several alternative objective lenses. The magnification you see is found by multiplying the magnifications of the two lenses used. Firstly you position the microscope with a good light source (not the sun). Then turn to the lowest power objective lens. Adjust the mirror and condenser to given an even bright field of view. Then place the slide on the stage. Looking from the side, use the course focus knob to lower the objective lens close to the surface of the slide. Then looking down into the microscope, use the course knob to bring the microscope into focus. To get it into exact focus use the fine focus knob.

A picture showing a microscope being used

[http://mse.iastate.edu/images/microscopy/opt\\_microscope.jpg](http://mse.iastate.edu/images/microscopy/opt_microscope.jpg) - 22nd January 09

A picture showing VCSE's looking  
for evidence at a crime scene

[http://www.fbi.gov/publications/leb/2006/april2006/april06leb\\_img\\_30.jpg](http://www.fbi.gov/publications/leb/2006/april2006/april06leb_img_30.jpg) - 27th January 09



## Qualifications

Once work has started as a SOCO, about one month is spent working with experienced colleagues in your own force.

Then the SOCO may attend the Initial Crime Scene Investigator Training Course at the National Policing Improvement Agency (NPIA), in County Durham. This is a residential course and lasts for nine weeks.

If you are an assistant scenes of crime officer rather than a SOCO, you may attend a three-week basic training course at NPIA, and then take a four-week conversion course to become a SOCO after gaining some experience.

When the initial training is completed, then some people chose to complete a one-to two-year development programme. Following this on-the-job training period you will attend a further two week course, covering skills and techniques in more detail.

When the training is completed (or have five years' experience as a SOCO) it is possible to study for the University of Durham Diploma in Crime Scene Investigation. This is offered by NPIA in partnership with the University, and is studied by open learning.

The NPIA also offers National Fingerprint Examiner training programme for people specialising in this area, and specialist short courses, such as fire investigation, dealing with major disasters, facial identification techniques and management training.

During your career as a SOCO your employer will usually expect you to attend two-week NPIA course every five years, to review and refresh your knowledge and skills, and to keep up to date with new developments.

<http://careersadvice.direct.gov.uk/helpwithyourcareer/jobprofiles/profiles/profile1060/> - 27<sup>th</sup> January 09

## The workplace

The first thing that SOCO's will begin with is checking what jobs might have come in overnight. The 'Deployer' in the team will then divide these up, at the same time deciding which is the most important. Once that is done, the SOCO's go to the jobs to recover the evidence.

Each Scene of Crime Officer has their own van to get us to each job, and it's full of equipment. Everything that they need should be there, large and small, so it's up to the SOCO's to check that they are well stocked and up to date.

At the scene itself, before any evidence is taken, the victim(s) are spoken to find any other important information needed. A burglary victim, for example, might need to report areas he/she knows have been disturbed, or if there's anything that shouldn't be there. During this time, the SOCO's have to remain sensitive to the fact that the victim is likely to be affected emotionally by what's happened.

Then the SOCO's get on with collection what evidence they can find – it can be anything from fingerprints, footprints and foreign objects to miniscule traces of hair or DNA. It can be a delicate, methodical, sometimes lengthy process, it's important for them to get on with it without being disturbed.

All of the evidence is then brought back with the SOCO's to the station where it's sent off to the relevant department – internal or external, depending on what it is that's been retrieved. If required to do so (mostly just for fingerprints and DNA evidence), statements are written up in the case paper. With some cases (especially where DNA evidence is involved) SOCO's can remain involved through to the end, perhaps culminating in a court appearance.

SOCO's by no means spend their entire time in the field. There's often a bit of paperwork and preparation to do, and from time to time there called on to give advice on other cases, perhaps to a doctor or police officer involved.

It's not a job someone can walk into, there are a number of weeks' training required to become a full-time SOCO, and for the initial six months the new officer is mentored throughout. Forensic evidence can sometimes be the only evidence available to convict or clear a suspect and so the importance of our work is never lost.

[http://www.surrey.police.uk/careers\\_item.asp?artid=4205](http://www.surrey.police.uk/careers_item.asp?artid=4205) – 29<sup>th</sup> January 09

Most SOCOs work with other police officers and outside agencies such as The Serious and Organised Crime Agency (SOCA) and the Forensic Science Service (FSS).

The Serious Organised Crime Agency (SOCA) is an Executive Non-Departmental Public Body sponsored by, but operationally independent from, the Home Office.

SOCA is an intelligence-led agency with law enforcement powers and harm reduction responsibilities. Harm in this context is the damage caused to people and communities by serious organised crime.

The Home Secretary may set SOCA strategic priorities and will judge the success of its efforts. Within that framework, SOCA plans its priorities, including how it will exercise the functions given to it by statute, and what performance measures it will adopt.

<http://www.soca.gov.uk/aboutUs/index.html> - 29th January 09

The Forensic Science Service is a leading provider of analysis and interpretation of evidence from crime scenes. We provide a comprehensive service, from crime scene to court room, and analyse more than 120,000 cases each year.

[http://www.surrey.police.uk/careers\\_item.asp?artid=4205](http://www.surrey.police.uk/careers_item.asp?artid=4205) – 29<sup>th</sup> January 09

When we spoke to a SOCO Tony – he explained how he made his way to becoming a SOCO, and some of the experiences he has had. He began as a VCSE (volume crime scene examiner) which focus's on vehicle crime – things like stolen vehicles. Then he became a Senior SOCO who has a management role – and supervises a team of SOCO's. After that he moved up to a

Scientific Support Manager which is someone that works with crime overseas and with other police officers in other countries. Then after that which lasted three and a half years, he became a SOCO. He said "Crime scene is any place, person or object which could assist in solving crime". "A crime scene is anywhere where a crime has been committed. It could be something as simple as graffiti, but it's still investigated. The SOCO's would look at the different tags people have left, take photographs so they can link to other tags elsewhere. Sometimes we take sample of the paint to analyse".

A typical day for a SOCO would be to: initially check computer data to establish what crime scenes there are. In one day they may attend up to four crime scenes, usually burglaries of homes or business properties. They spend the remainder of the day entering data about the crime scenes onto various software systems. The systems forward recovered samples to the police headquarters, fingerprint bureau or an associated laboratory. Their usual hours are seven-and-a-half to eight-hour day, with a thirty minute unpaid meal break. This makes an average of 37.5 hours a week. Overtime is often required, which is either paid or given as time credits that can be taken as time off at a later date.

<http://www.connexions-direct.com/jobs4U/index.cfm?pid=85&catalogueContentID=2080&parent=635> – 29<sup>th</sup> January 09

He also said "I thoroughly enjoy work most of the time but it can get a bit repetitive". Most of what you see is possible, but the time frame is impossible".

"Throughout Sussex, there are 4 bases. In each base there are around 12-20 SOCO's"

He was then explaining about how things have changed when you're arrested over the years. If you were arrested before, your fingerprints may have been taken, but they wouldn't have been kept. However, if you are arrested now, your fingerprints are taken, and kept on the system.

## **Regulations**

The United Kingdom Accreditation Service is the sole national accreditation body recognised by government to assess, against internationally agreed standards, organisations that provide certification, testing, inspection and calibration services.

The risks associated with not using UKAS accredited evaluators include:

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- Product failure as result of relying on invalid test results
  - Increased costs caused by inaccurate measurement (as a consequence of poorly calibrated equipment)
  - Legal action arising from inadequately inspected equipment resulting in accidents
  - Rejected tenders and orders by not being able to support products claims with a UKAS accredited certificate or test report
- Accreditation by UKAS also brings benefits:
- Market access; for companies with ambitions to export accredited testing is vitally important to avoid the cost and time involved in re-testing products.

- Due diligence; using a UKAS accredited body to carry out an independent evaluation helps demonstrate due diligence in the event of legal action
- Accredited testing and calibration laboratories are a superb source of impartial advice and knowledge transfer leading to product development opportunities

[http://www.ukas.com/about\\_accreditation/default.asp](http://www.ukas.com/about_accreditation/default.asp) - 2nd February 09

If a SOCO were to send their information to a non-accredited lab, there may then be many consequences as the evidence may have been tampered with. For example, the court will not accept evidence from a non-accredited lab as they don't know for definite that the results are correct, which could lead to the wrong criminal being held. If this did happen, a court case may be dropped frustrating a large amount of people. The reasons for a court not accepting results for a non-accredited lab are because they will not have been checked by health and safety regulations. SOCO's rely on labs to run certain tests or experiments; it is accreditation that allows them to do this.

## Finance

SOCO's are allocated within the police force with a certain amount of money yearly from the government. The government gets this money from our taxes. Their budget will have to include things like: vehicles, equipment, clothing, lab tests. The SOCO's wages are also included in this budget. SOCO's wages may range from around £16,500 to around £35,000 a year. If a low budget is given by the government, the SOCO's may put their wages first and make them the most important. If there weren't enough to pay all of the SOCO's in the force, some will lose their jobs meaning when that force goes to a crime scene, it will take them longer to collect all of the evidence they need, and it will also take longer for all the evidence to come back. They would have to limit their money very carefully and ensure that all sufficient equipment is supplied. If their budget was limited, they wouldn't be able to provide themselves with the most up to date equipment which will then restrict their work making it harder for them. Then the police forces may contact other SOCO's to come to a crime scene depending on what equipment they have, which will then decrease their work as well as their wages. Tony told us that "Money plays a huge role, as in any public organisation. It costs £300 for just a torch - but it can have added lenses, a flat light, it's quite robust as it may get dropped or thrown, and it also has coloured filters. For the whole kit, it comes to around £3000 - that's where our budget goes! For example to send a blood sample to the lab to be analysed - it will cost around £250."

Page 2

<http://www.mayslaw.net/images/crime-scene.jpg> - 19th January 09

Page 3

<http://www.marlow.com/Applications/images/Electrophoresis.jp> - 20th January 09

[http://2.bp.blogspot.com/\\_KWKYilaGzUA/Rq8VfMNsCsI/AAAAAAAAABhk/rn-zC6jIEzQ/s320/thin%2Blayer%2Bchromatography.jpg](http://2.bp.blogspot.com/_KWKYilaGzUA/Rq8VfMNsCsI/AAAAAAAAABhk/rn-zC6jIEzQ/s320/thin%2Blayer%2Bchromatography.jpg) - 20<sup>th</sup> January 09

[http://www.hospitalmanagement.net/contractor\\_images/greinerbio-onegmbh/3\\_urine.jpg](http://www.hospitalmanagement.net/contractor_images/greinerbio-onegmbh/3_urine.jpg) - 20th January 09

Page 4 [http://www.derby.ac.uk/images/dr\\_72515b40c701fc406e84dbd1ed1b72d9.jpg](http://www.derby.ac.uk/images/dr_72515b40c701fc406e84dbd1ed1b72d9.jpg) - 21st January 09

<http://www.aspu.edu/oconnort/3210/3210cect03.htm> - 22nd January 09

Page 5

<http://norwich.edu/about/news/2007/img/122107-forensics.jpg> - 22nd January 09

<http://www.idfpr.com/DPR/images/fingerprint.gif> - 22nd January 09

[http://mse.iastate.edu/images/microscopy/opt\\_microscope.jpg](http://mse.iastate.edu/images/microscopy/opt_microscope.jpg) - 22nd January 09

[http://www.fbi.gov/publications/leb/2006/april2006/april06leb\\_img\\_30.jpg](http://www.fbi.gov/publications/leb/2006/april2006/april06leb_img_30.jpg) - 27th January 09

Page 6

<http://careersadvice.direct.gov.uk/helpwithyourcareer/jobprofiles/profiles/profile1060/> - 27<sup>th</sup> January 09

Page 7

[http://www.surrey.police.uk/careers\\_item.asp?artid=4205](http://www.surrey.police.uk/careers_item.asp?artid=4205) - 29<sup>th</sup> January 09

<http://www.soca.gov.uk/aboutUs/index.html> - 29th January 09

[http://www.surrey.police.uk/careers\\_item.asp?artid=4205](http://www.surrey.police.uk/careers_item.asp?artid=4205) - 29<sup>th</sup> January 09

Page 8

<http://www.connexions-direct.com/jobs4U/index.cfm?pid=85&catalogueContentID=2080&parent=635> - 29<sup>th</sup> January 09

Page 9

[http://www.ukas.com/about\\_accreditation/default.asp](http://www.ukas.com/about_accreditation/default.asp) - 2nd February 09

## Commentary on Script J - SOCO

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Aspect	Mark	Comment
<b>Strand A: Information sources [8 marks awarded]</b>		
(a) Initiative in collecting information	7	The award of marks in this aspect of performance is, in many respects, dependent on the circumstances in which various information sources are available and used, and the judgement of the teacher. Here the candidate has a References List which helps to confirm the 7 marks. Here, information from a wide range of sources has been carefully selected and used. This has included information from a face-to-face meeting with a SOCO
(b) Reference to sources	8	Sources of information have been clearly identified, both in the text and in the References List. The candidate has included the date on which each website was accessed, and this is considered good practice. Note that reference could also be made to the practitioner interviewed; the convention is to cite this as, Name of practitioner (date). Personal communication
(c) Identification of source of particular information	8	Sources of textual and visual information are clearly referenced and comments and discussion points made in interview with the practitioner are indicated in quotation marks.
<b>Strand B: Description of Workplace [7 marks awarded]</b>		
(a) Description of the expertise of an individual, or working group, with the vocational and personal qualities required	7	There is excellent detail on the expertise required by the SOCO, and the means by which this expertise is developed, and reference is also made to the continued professional development undertaken to refresh knowledge and skills. A good description of the personal qualities of the SOCO has been provided, but this is a little lacking in detail and one point of speculation ('a good memory will be useful as any extra information not recorded at the crime scene may help the SOCOs find their criminal') quite clearly erroneous. The production of written reports and possible court appearances are mentioned in the workplace section, and the candidate could have discussed the importance of good communication skills to the SOCO. Some good attempts have been made, throughout the Work-related Report, to discuss the relevance of the SOCO's expertise and qualities to the work carried out in their collection, labelling and description of evidence as part of the chain of custody, though explanations of the importance of this could have been further developed.
(b) Description of the nature of the work, its purpose and place in the wider organisation	7	The candidate has made a good attempt to describe the nature of the work carried out in the section on 'the workplace', with the some of the information provided and the 'day in the life of' type of detail provided being particularly effective. The 'chain of custody' was mentioned, but is felt that the SOCO's 'place within the wider organisation' could have been discussed in more detail and better spelt out.

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(c) Understanding of the financial or regulatory context of the context in which the work is done	7	The implications of finance to the role of the SOCO have been discussed, but perhaps more pertinent (and which could have been developed to greater effect) are the references made by the candidate to the importance of the regulation of the chain of custody and UKAS accreditation of the laboratory to which samples are sent.
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**Strand C: Scientific knowledge and skills applied [6 marks awarded]**

(a) Scientific knowledge and understanding applied in the workplace	6	The science that underpins the work of the SOCO is mentioned in the first sentence of the relevant section of the Work-related Portfolio, but the candidate largely goes on to describe <i>analysis</i> of DNA and chromatographic and microscopical techniques, the detail of which is irrelevant. The safe collection, so as to avoid contamination, of a range of different types of evidence, and appropriate packaging and storage, and the science behind these, should have been developed to secure a higher mark.
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There is *some* description of the scientific knowledge involved in the work described, so six marks should be awarded.

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(b) Technical skills applied in the workplace	7	A good description has been provided of the nature of fingerprints and how these can be collected by powdering the scene. Some explanation of the use of this technique in providing a permanent record of a fingerprint from a crime scene, and its matching with those of potential suspects or known criminals, was provided.
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Other techniques are also mentioned, but the technical skills concerned with the collection of a range of different types of evidence could have been developed to a much greater extent.

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**Strand D Quality of Presentation [6 marks awarded]**

(a) The structure and organisation of the report	7	<p>The report is well-structured and organised, with page-numbering and a contents list. The contents were linked with the strands of assessment and aspects of performance, which many Centres find useful practice in focusing candidates' attention to the fulfilment of the assessment criteria.</p> <p>The introduction, which could have defined more successfully the role of the SOCO, was poorly developed, and the report contained some superfluous information, i.e., the detail on analytical techniques, but some parts on the forensic workplace were very good indeed.</p>
(b) Use of visual means of communication	6	<p>There was some use of visual information to convey information and illustrate ideas. This could have been more extensive, and the captioning more informative, to procure a higher mark.</p>
(c) General quality of communication	6	<p>Spelling, punctuation and grammar are generally sound, and scientific vocabulary has been used.</p>

**The information for the Record Sheet is:**

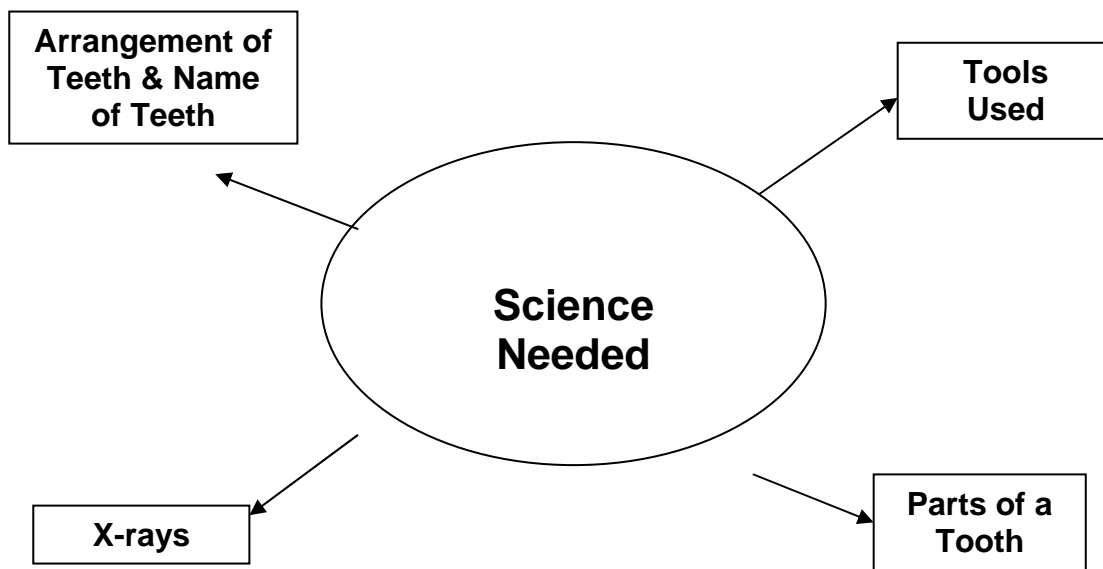
Title of Work Related Report	Strand A	Strand B	Strand C	Strand D	Total mark / 32
SOCO	8	7	6	6	27

**Work related Report – Dentist**

**Contents Page**

Page 1	Introduction
Page 1	X-Rays
Page 2	Parts of a Tooth and Tools Used
Page 2	Arrangement of Teeth and Names of Teeth
Page 2-3	Technical Skills
Page 3	Personal Qualities and Research Qualifications
Page 3-4	The Work Place
Page 4	Regulation
Page 4	Finance
Page 4	Interview with a Dentist
Page 5	Bibliography

In this Work Related Report I am finding out about the work of a Dentist. A Dentist checks the quality of peoples' teeth and if there are problems such as a hole in the tooth, and the Dentist will put a filling in the tooth to cover up the hole. A Dentist works in Dental Practises; these could be NHS or Private. Dentists work with Dental Nurses and also they can work as part of a hospital.



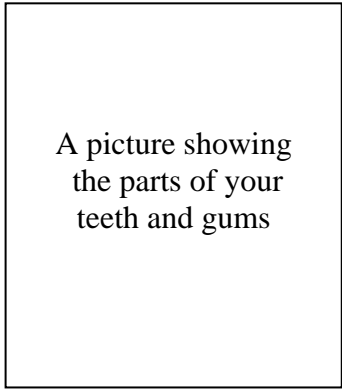
**X-Rays:**

X-Rays are used to see if bones are broken but can also be used by Dentists to see if you have decay under the enamel, or any possible infections in the roots or any bone loss around the tooth. X-Ray radiation passes straight through most body tissue but gets absorbed by bones. Pregnant women should not be A-Rayed as the fetus is easily damaged. There are different types of X-Rays which show different things for Dentists such as a medium-sized X-Ray will show wither one jaw at a time or one side of the face. The Dentist will leave the room during an X-Ray because the Dental staff may take a lot of X-Rays during the week and they are limited to the amount of radiation they can receive. Radiation from X-Rays has also been linked to cancer.

Reference: [www.dentalhealth.org.uk/faqs/leafletdetail.php?LeafletID=44faq595](http://www.dentalhealth.org.uk/faqs/leafletdetail.php?LeafletID=44faq595) GCSE Additional Applied Science, Life Care OCR 26<sup>th</sup> January 2009

**Parts of a Tooth:**

- Crown
- Enamel
- Pulp/Nerve
- Dentin
- Root
- Gum
- Bone
- Blood Vessels



A picture showing  
the parts of your  
teeth and gums

Reference:

<http://www.simplestepsdental.com/SS/ihtSS/r.WSIHWOOD/st.31843/t.31883/pr.3.html>  
9th February 2009

**Tools Used:**

- Dental Filling Condensers
- Periodontal Probe
- Dental Tweezers
- Dental Mirror
- Dental Drill
- Retractors

Reference:

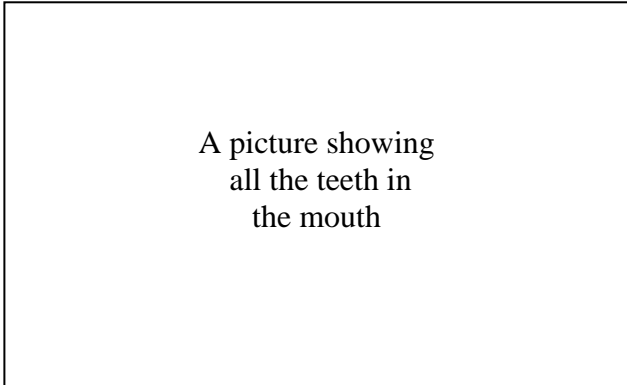
[http://en.wikipedia.org/wiki/Dental\\_instruments](http://en.wikipedia.org/wiki/Dental_instruments) 9th February 2009

**Arrangement of Teeth and Names of Teeth**

The first set of teeth you have are your baby teeth (milk teeth). There are 20 milk teeth 2 incisors, 1 canine, 2 premolars and 1 wisdom tooth. A Dentist would need to know this because otherwise he wouldn't know what he was doing. A Dentist would need to know the arrangement of the teeth because otherwise they wouldn't know what they were doing and wouldn't be helping the customer.

Reference:

<http://www.childrensuniveristy.manchester.ac.uk/interactives/science/teethandeating/types.asp> 27th January 2009



A picture showing  
all the teeth in  
the mouth

### **Technical Skills:**

Technical Skills for a Dentist can vary. One of the main Technical Skills needed for being a Dentist is giving someone a filling. People have filling because the tooth is decayed or broken. You can get decay by having too much sugar in your diet or poor brushing. Fillings fill a hole in the tooth. There are different types of fillings for different types of cavities. Before having a filling you are given a local anaesthetic to numb the area whilst the Dentist puts a filling on the tooth. The decayed part of the tooth are drilled out and removed. If the hole spread to the side of the tooth a band will be placed around the tooth with a wedge to hold it in place. Amalgam Fillings are made out of mercury, tin, copper, silver. Amalgam Filling are good because they are extremely durable. Tooth Coloured Fillings are chosen to match the colour of the tooth making them a more natural colour. They aren't as strong as amalgam Page 3 Filling because they aren't suitable for grinding or chewing on the surface on the filling.

Reference:

[http://hcd2.bupa.co.uk/fact\\_sheets/html/teeth\\_restoring.html](http://hcd2.bupa.co.uk/fact_sheets/html/teeth_restoring.html) 10th February 2009

### **Personal Qualities:**

There are many personal qualities that a Dentist should have. Some examples of these are:

- They should be a people's person
- They should be calm
- Being reassuring
- Have good communication skills
- Be able to relate to people
- Have good eye sight
- Be able to concentrate for long periods of time
- Be able to explain complex procedures
- Be interested in promoting good healthcare

On the 30<sup>th</sup> January I interviewed a Dentist named Nicholas. I asked him what Personal Qualities are needed he said they should be calm, controlled, listen well and are nice.

Reference:

<http://www.ca.courses-careers.com/articles/dentist.htm> 29th January 2009

### **Qualifications:**

TO become a Dentist you need certain qualifications. Theses are a degree in Dentistry which takes around 5 years to complete this leads to a degree. When you graduate you have to register with the General Dental Council. To get on to a degree you usual need:

- 5 Subjects at A-C
- Three A Levels at grades ranging from AAA to ABB this should included Chemistry or a different Science and Maths.

I asked Nicholas Green the Dentist what Qualifications are needed to be a Dentist he said O Levels, A Levels in Maths, Physics, Chemistry and Biology. A Dentist would need these qualifications otherwise they would not be accepted in to University as the University would want qualifications in this.

Reference:

<http://careersadvice.direct.gov.uk/helpwithyourcareer/jobprofiles/profiles/profile426> 29th January 2009

### **The Work Place:**

In a typical day for a Dentist the hours they work are normally around 8.30am until about 5.00pm. They have a lunch break during this time as well which is about 12.30pm. During the day a Dentist will work with a Dental Nurse. A Dental Nurse helps the Dentist by assisting the Dentist when he is with the patient. They record patient information. A Dentist may also work with a Hygienist and Specialists. A Hygienists job is to give patients information on how to clear their teeth properly to stop them from having dental problems. Dentists fit into bigger organisations such as the NHS, Private and also they can be in Hospitals for emergency treatment. I asked Nicholas who else works with him in his Practice he said in his Practice I work with hygienists, other Dentists, Dental Nurses and Specialists.

Reference:

<http://careersadvice.direct.gov.uk/helpwithyourcareer/jobprofiles/profiles/profile162> 30th January 2009

### **Regulations:**

Dentists have to take certain regulation so that their practises are legal. Some of theses regulations are GDC - General Dental Council, European R&R - European Rules and Regulations and H&S - Health and Safety. General Dental Council are the organisation which regulate in dental professions. All dentists and the people they work with must be registered with the GDC to work in the UK. Being apart of the organisation protect patients and promote high standards of dentistry. I then asked the Dentist what Regulations Kelsham Dental Practice belongs to he said General Dental Council (GDC), European Rules and Regulations and Health and Safety Reference:

<http://www.gdc-uk.org/About+us> 6<sup>th</sup> February 2009

### **Finance:**

NHS Dentists are funded by the government. The Government gives the money for a 'medical budget' to 3 different types of health services; theses being dental, emergency services and GPs. The money that gets given to the Dental clinic goes towards the salary of the Dentists and the Dental Nurses. It also funds the money for X-Rays, Fillings and also can fund essential services in the practices such as electricity. The cost for a filling is £78.00 and for an X-Ray is about £8.00.

Reference:

[http://www.kelshamdentalcare.co.uk/kelsham/our\\_fee\\_guide.html](http://www.kelshamdentalcare.co.uk/kelsham/our_fee_guide.html) 9th February 2009

It is exactly the same for Private Dentists accept the government doesn't fund the practices, the clients pay for the service of the Dentist and their money pays for everything such as the uses of X-Rays and Fillings and also the salary for the Dentist. There are problems with money at the moment and if this carries on then the Dentists won't be getting paid as much but also some of the Dentists or Dental Nurses will be fired or they may just get paid less money. The customers would either have to go private or they wouldn't be able to have Dental help.

### **Interview with a Dentist:**

On the 30<sup>th</sup> January I interviewed a Dentist called Nicholas Green at Kelsham Dental Practice in Cranleigh. I asked him questions referring to my coursework. I firstly asked what technical skill is needed to be a Dentist, he said Manual Dexterity. Manual Dexterity is when you are able to manipulate small things and be skilled in the use of your hands. I then asked him what science is need and he said Physics, Chemistry and Biology he also said Maths.

Dental Tools Date: 9<sup>th</sup> February 2009 14.55:  
[http://en.wikipedia.org/wiki/Dental\\_instruments](http://en.wikipedia.org/wiki/Dental_instruments)

Parts of a tooth Date: 9<sup>th</sup> February 2009 14.57:  
<http://www.simplestepsdental.com/SS/ihtSS/r.WSIHWOOD/st.31843/t.31883/pr.3.html>

X-Rays Date: 26<sup>th</sup> January 2009 15.01:  
[www.dentalhealth.org.uk/faqs/leafletdetail.php?LeafletID=44faq595](http://www.dentalhealth.org.uk/faqs/leafletdetail.php?LeafletID=44faq595)  
GCSE Additional Applied Science, Life Care OCR

Arrangement of Teeth Date 27<sup>th</sup> January 2009 09.37:  
<http://www.childrensuniveristy.manchester.ac.uk/interactives/science/teethandeating/types.asp>

Personal Qualities Date 29<sup>th</sup> January 2009 14.19:  
<http://www.ca.courses-careers.com/articles/dentist.htm>

Research Qualifications Date 29<sup>th</sup> January 2009 14.20:  
<http://careersadvice.direct.gov.uk/helpwithyourcareer/jobprofiles/profiles/profile426>

The Work Place (Dental Nurse) Date 30<sup>th</sup> January 2009 14.12:  
<http://careersadvice.direct.gov.uk/helpwithyourcareer/jobprofiles/profiles/profile162>

The Work Place (Dental Hygienist) Date 30<sup>th</sup> January 2009 14.16:  
<http://careersadvice.direct.gov.uk/helpwithyourcareer/jobprofiles/profiles/profile162>

Regulations (General Dental Council) Date 6<sup>th</sup> February 2009 13.47:  
<http://www.gdc-uk.org/About+us>

Cost of a Filling (Kelsham Dentist, Cranleigh) Date 9<sup>th</sup> February 2009 14.46:  
[http://www.kelshamdentalcare.co.uk/kelsham/our\\_fee\\_guide.html](http://www.kelshamdentalcare.co.uk/kelsham/our_fee_guide.html)

Technical Skills (Filling) 10<sup>th</sup> February 2009 09.03:  
[http://hcd2.bupa.co.uk/fact\\_sheets/html/teeth\\_restoring.html](http://hcd2.bupa.co.uk/fact_sheets/html/teeth_restoring.html)

## Commentary on Script K - Dentist

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Aspect	Mark	Comment
Strand A: Information sources [7 marks awarded]		
(a) Initiative in collecting information	7	<p>The award of marks in this aspect of performance is, in many respects, dependent on the circumstances in which various information sources were available and used, and the judgement of the teacher, but this is at least partly confirmed, or otherwise, by the candidate's References' List.</p> <p>Here, information from a wide range of sources has been carefully selected and used. This has included information from interviewing a dentist. For the full eight marks, a candidate is required to collect and <i>use</i> relevant information appropriately, and in this instance, the candidate has used the information with good effect to produce a coherent report.</p>
(b) Reference to sources	7	<p>Sources of information have been, almost always, clearly identified, both in the text and in the references' list. The candidate has included the date on which each website was accessed, and this is considered good practice. Note that reference could also be made to the practitioner interviewed; the convention is to cite this as,</p> <p>Name of practitioner (date). Personal communication.</p> <p>The single book cited in the references' list, however, is not referenced in sufficient detail. Candidates should use one of the accepted conventions, i.e., the Harvard System (usually preferred by scientists) or the Vancouver System. The reference in question should therefore be written:</p> <p>Holmes, Ruth, Kent, M. and Kent, Merryn (2006). <i>GCSE Additional Applied Science 1 Life Care</i>. Oxford University Press.</p>
(c) Identification of source of particular information	7	<p>Sources of textual and visual information are clearly referenced. Quotes from the practitioner, interspersed within the text, are clear, but quotation marks could have been added.</p>



### Strand B: Description of Workplace [6 marks awarded]

(a) Description of the expertise of an individual, or working group, with the vocational and personal qualities required	6	The qualifications and expertise, along with the personal and vocational qualities required, are described, but as indicated by teacher annotation, there is no explanation as to why these are required.
(b) Description of the nature of the work, its purpose and place in the wider organisation	5	<p>There is some description of the work carried out by the dentist, but this is not exhaustive, with some of the dentist's roles being omitted, and some of the information is rather superficial.</p> <p>The candidate has made some attempt to define the dentist's place within the wider organisation by outlining the structure of the dental practice reviewed, and defining a practice's place within the NHS or as a private organisation.</p> <p>The account submitted is more than 'partial' (four marks), but lacks sufficient detail to be awarded six marks.</p>
(c) Understanding of the financial or regulatory context of the context in which the work is done	7	Financial implications for dental practitioners are described, and to some extent explained, and various regulations imposed by British and European organisations reviewed. Although the specification requires the discussion of only one factor in detail, it was felt that other areas discussed by the candidate, notably exposure to X-rays and the use of amalgams in fillings, could have been developed to greater effect, and made the science in this aspect of performance more interesting and more accessible to the candidate.

### Strand C: Scientific knowledge and skills applied [6 marks awarded]

(a) Scientific knowledge and understanding applied in the workplace	6	Aspects of scientific knowledge involved in dentistry are described, but attempts made to explain the importance of these are superficial. This Work-related Report offers much potential in this area, e.g., the science behind tooth decay; oral hygiene; materials technology of fillings, dental crowns, dentures, etc.; transmission of disease and sterilisation of dental instruments; forensic odontology.
(b) Technical skills applied in the workplace	6	The candidate has described how the dentist fills a tooth, but the reason for doing so could have been further developed.

### Strand D Quality of Presentation [6 marks awarded]

(a) The structure and organisation of the report	7	<p>The report is well-structured and organised, with page-numbering and a contents list. The contents were linked with the strands of assessment and aspects of performance, which many Centres find useful practice in focusing candidates' attention to the fulfilment of the assessment criteria.</p> <p>The introduction, which could have defined more successfully the role of the dentist, was poorly developed.</p>
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(b) Use of visual means of communication.	6	Visual means were used effectively to convey information and illustrate ideas. Their use was sparing, although the nature of this Work-related Portfolio is ideally suited to the incorporation of visual material.
(c) General quality of communication	6	Spelling, punctuation and grammar are sound, and scientific vocabulary has been used.

**The information for the record sheet is:**

Title of Work Related Report	Strand A	Strand B	Strand C	Strand D	Total mark / 32
Dentist	7	6	6	6	25

### **Contents Page**

Page 2	Introduction
Page 2	The Job of the Farm
Page 3	The Job of the Farmers
Page 3-4	Finance and Regulation
Page 4-5	Scientific Knowledge and Understanding
Page 5	Technical Skills
Page 5	Conclusion
Page 6	References

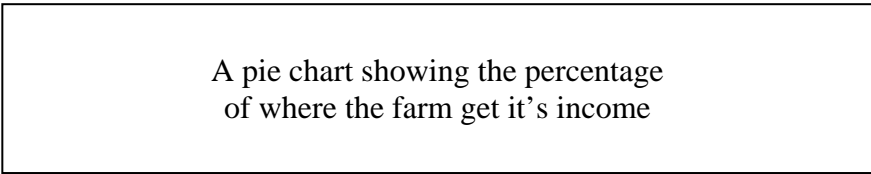


A picture showing  
Whirlow Farmhouse

Animal Productivity and Animal Breeding

Introduction

Whirlow Hall is a working and charity farm. It is situated on the outskirts of Sheffield, in Whirlow. Whirlow farm was set up by Alan Aiken in 1979 who wanted to provide a farm for kids to visit during the war, who were evacuated. The farm has 130 acres of land, with which has; 300 sheep, 500 lambs, 200 free range hens, 370 turkeys, 20 breeding pigs, 20 cows and 4 livery horses. The horses are rented to people, who pay the farm to look after them. The farm also grows crops to sell and for the animals to use as bedding and food. The crops that they grow are fruit such as strawberries, raspberries, gooseberries and currents, this is open to the public where visitors can pick their own fruit from the farm and pay for the weight. They also grow vegetables like turnips, potatoes and barley. In addition, straw and hay is grown for the animals bedding and food. The farm needs £300,000 a year to keep running, below is a pie chart of where the farm gets their income from. (1) (2)



The Job of the Farm

Farms are important because they provide food and jobs for people. A lot of land is managed by farmers. They farmers grow food for the animals after they have been born and look after them until they are taken to the abattoir, which are then taken to the butchers and sold in the supermarket. The jobs of the farm are to clean them and their beds. They feed them but they have to provide them with all the nutrients such as protein. They have to weigh the animals to see how food they would need to eat, which would be a good thing because it's cheaper and healthier for the animals because the farmers are ensuring that the animals are eating the right amount. In the piglet unit they have to make sure that the pigs are warm enough by having lamps and keeping them together for warmth. They have scratching posts because naturally in the wild they have tress that they can scratch on and it's for something to just help them with their itch. Whirlow farm holds events and educational visits; they invite kids from schools to look at the farm and learn about it. By holding them they can get money which contributes to the farms input. (2)

Crops grown on the farm → Farmers can give that food to the animals → Animals are sent to the abattoir → Sent to the butchers then to the Markets or back to the farm (2)

Job of the Farmer

If a person wanted to become a farmer, the qualification they would need is a HND in agriculture; which stands for a Higher National Diploma. Two hours are spent cleaning the pig unit every day. The other jobs, skills and qualifications to be a farmer are:

## Skills

- Feeding, mucking out, caring for sick animals, using a milking machine to milk the cows
- Ploughing fields, sowing, looking after and harvesting crops, spreading fertiliser and spraying crops
- Driving and maintaining tractors, combine harvesters and other vehicles
- Maintaining farm buildings
- Laying and trimming hedges
- Digging and maintaining ditches
- Putting up and mending fences

## Qualifications

- BTEC First Diploma in Agriculture
- BTEC National Diploma in Agriculture
- And 5 good GCSE grades

## Skills needed

- The ability to do hard physical work
- Practical skills
- Awareness of Health and Safety
- The ability to follow instructions

## Hours of Work

You would usually work around 40 hours a week, including weekends, with longer hours at busy times such as lambing season or harvesting. Early starts are common.

Most jobs involve working outdoors in all weather conditions, and include a lot of bending, lifting and carrying. You would usually need to live on or near the farm.

Farm workers can earn between £11,000 and £17,000 a year. Experienced workers can earn around £19,000 a year. (7)

## Finance and Regulation

ON the farm there are two predators; badger and fox. The foxes are allowed to be shot however the badgers aren't because they are protected by law because they are endangered, the law states the farmer isn't allowed to;

- Kill, injure or take a badger
- Cruelly ill-treat any badger
- Interfere with a badger sett

Licenses can also cover situations where badgers are needed to be killed to prevent serious damage to property (i.e. historic buildings), land, crops or livestock or the prevention of disease.

## Badger Control

Taken from the Defra website which states that; Under the licensing outlined above, badgers can be controlled using techniques like electric fencing and one-way gates to exclude badgers from setts, but any interference of badgers or setts is illegal unless under licence.

Illegal baiting, gassing or snaring of badgers is an offence under the badger protection acts.

Farmers don't want badgers on their farm because they eat lambs from the farm and they carry Bovine TB which can be passed onto the animals on the farm. Workers have to walk over a may of disinfectant so that diseases aren't passed onto the animals. Animals have to have ear tags and a passport, the number of the ear tag matches the passport. (5)

All cattle born or imported into Great Britain since 1 Jul 1996 must have a valid cattle passport. This applied to whether the cattle are male, female, dairy or beef. Passports must accompany the animal in all movements. This is for when they move the cows into another area to manage the areas of the farm and cows.

## Scientific Knowledge and Understanding

There is a lot of science used on the farm; when feeding they have to make sure that the food that they eat is highly nutritional and contains protein and fibre. The pigs are fed big nuts which contain wheat, barley and soya. They can choose the genetics of the animals, such as the cows, pigs and sheep by buying in Semen and selecting where the Semen come from which male animal, so they can pick the characteristics of the baby. E.g. if they want a piglet to be brown then they would pick a make pig that was brown too. Farmers are not allowed to breed pits with their relatives because this can cause smaller litters being produced and genetic diseases in the piglets. Farmers need to plan the oestrogen cycle of the Sow so that they can produce as many piglets as possible, this is used on Whirlow farm. The farmer expects 32 piglets with each pig every year. 1 year the pigs will produce 2 litters and the next year 3 litters. Vaccinations needs to be given to the pigs before they are sue to deliver the piglets and the piglets are vaccinated when they are 14 days old to stop diseases being spread and to make them immune against them. They also when the piglets are 4 days old they are given medicine to make them healthy. Pigs cannot sweat because they have no sweat glands so they cannot cool off, therefore farmers have to make sure that pigs are cool enough by having a thermometer in the room and when it gets too hot the shutter automatically open and when it gets too cold it shuts. (2)

A picture showing the life cycle of a pig

"The pigs conceives and if that works the pregnancy lasts 115 days, the piglets are kept and fed milk by their mother for 21-28 days, they are then separated from the mother and weaned to mating interval, then the cycle starts again. However if the Sow fails to get pregnant, they have to wait 21 days (oestrus cycle) and mated again". (2)

## Technical Skills

Artificial insemination is used on Whirlow farm. This is when they buy in quality semen collected from the male and inserted into the uterus of the females. This is commonly used for cows and pigs. Cows must be inseminated at the right time; before ovulation. The semen is checked for quality and sometimes diluted with a special fluid. It is then put into disposable straws and frozen and stored in liquid nitrogen at -196°C. The advantages of doing this is it's cheaper than keeping a male animal to breed with, and less chance of disease spreading. However, there are disadvantages of AI, these are that it requires more labour, facilities and needs more management. It requires more skill and training to do. Below is what farmers need to look for when picking the characteristics of a male animal. (3)

### Selective Breeding Characteristics

Pigs for Meat (Semen from breeding company – A.I.)

- Fast growth
- Low back fat
- Good food conversion

Pigs for Breeding (Semen from A.I. and own boars)

- Large litter size
- Good milking ability
- Successful breeder
- Good conformation (body shape) (2)

## Conclusion

In conclusion, I found out that a lot of science is used on farms such as when they are feeding the animals; they have to make sure that the food is high in nutrition. The genetics of the parents of offspring, they need to pick which characteristics from the male complements the characteristics of the female which would make the offspring stronger genetically and the type of offspring that they need on the farm, e.g. produces more litters etc. Another thing is that they need to make sure that each animal vaccinated at the right time with the right vaccinations.

## References:

1. Interview with Will the farmer 19/10/08
2. Information from the workers at the farm 19/10/08
3. Presentation from Povey farm with Karen about artificial insemination and the farm September
4. GCSE Additional Applied Science text book pages 6 and 34 10/11/08
5. <http://www.defra.gov.uk/farm/wildlife/badgers/index.htm> badger control 10/11/08
6. <http://www.defra.gov.uk/animalh/id-move/cattle/passports.htm> 10/11/08  
Moving animals
7. <http://careersadvice.direct.gov.uk/helpwithyourcareer/jobprofiles/profiles/profile31>  
7 24/11/08

Aspect	Mark	Comment
<b>Strand A: Information sources [5 marks awarded]</b>		
(a) Initiative in collecting information	6	<p>The award of marks in this aspect of performance is, in many respects, dependent on the circumstances in which various information sources were available and used, and the judgement of the teacher, but this is at least partly confirmed, or otherwise, by the candidate's References' List.</p> <p>Here, information from a range of sources has been carefully selected and used. This has included information from a number of practitioners on the farm.</p>
(b) Reference to sources	6	<p>Information from website sources has been, almost always, clearly identified, both in the text and in the References' List. The candidate has included the date on which each website was accessed, and this is considered good practice. Perhaps 'information from workers on the farm', quoted in the References' List, could have mentioned, by name, the workers involved. The convention is to cite these as,</p> <p>Name of practitioner (date). Personal communication.</p> <p>The single book cited in the references' list, however, is not referenced in sufficient detail. Candidates should use one of the accepted conventions, i.e., Vancouver System (used here) or the Harvard System. The reference in question (4) should therefore be written:</p> <p>4. Kent, Merryn, Kent, M., Hales, Ginny and Shearer, Caroline. GCSE Additional Applied Science 2 Agriculture and Food. Oxford University Press. 2006.</p>
(c) Identification of source of particular information	4	<p>Sources of textual information are clearly referenced. At least some quotations from the practitioners interviewed have been identified by in-text references.</p>
<b>Strand B: Description of Workplace [6 marks awarded]</b>		
(a) Description of the expertise of an individual, or working group, with the vocational and personal qualities required	6	<p>There is a good description of the expertise, qualifications and personal and vocational skills required by the <i>farm worker</i> (taken from reference 7), although the information provided by the candidate is limited to this, and not other practitioners, such as the farm manager and farm owner. The use of largely, or entirely, generic information is clearly a missed opportunity as the References' List cites an interview with the farmer and other farm workers.</p>



(b) Description of the nature of the work, its purpose and place in the wider organisation	6	<p>The candidate has provided a good description of the wide range of work carried out on the farm concerned with the rearing of pigs for meat (though could have also have made much more reference other aspects, such as the production and sale of hens' eggs, and the growth and sale of cereal crops, vegetables and fruit), and the role of the farm in education.</p> <p>The supply of meat to abattoirs, butchers, markets and the farm shop is also referred to in consideration of the farm's position in the supply chain.</p>
--	---	--

(c) Understanding of the financial or regulatory context of the context in which the work is done	6	A number of factors that impact on the work done have been identified and in some instances described, i.e., cattle movements and passports; bovine tuberculosis and its implications; the (possible) impact of badgers and foxes; salaries and working hours, but the section has a disjointed feel. This information could have been much more effectively organised.
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#### Strand C: Scientific knowledge and skills applied [6 marks awarded]

(a) Scientific knowledge and understanding applied in the workplace	6	There is a good description of the scientific knowledge involved in pig breeding.
(b) Technical skills applied in the workplace	6	Principles of pig and cattle breeding have been described, with some reference to the technical skills involved.

#### Strand D Quality of Presentation [7 marks awarded]

(a) The structure and organisation of the report	7	The report is well-structured and organised, with page-numbering and a contents list. The contents were linked with the strands of assessment and aspects of performance, which many Centres find useful practice in focusing candidates' attention to the fulfilment of the assessment criteria.
(b) Use of visual means of communication.	7	There was some good use of visual information to convey information and illustrate ideas, e.g., the pie chart to illustrate farm income, and the diagram of the pig breeding cycle. Other images (the range of which could have been extended) could have been better captioned to procure a higher mark.
(c) General quality of communication	6	Spelling, punctuation and grammar are generally sound. There are some errors in the spelling of scientific terms, and the degrees symbol is incorrectly represented.

#### The information for the Record Sheet is:

Title of Work Related Report	Strand A	Strand B	Strand C	Strand D	Total mark / 32
Farming	5	6	6	7	24

# Appendix J: Guidance for Candidates

## Writing a Work-Related Report

In your Work-Related Report you describe how science is used in an occupation.

This is worth **17%** of your Additional Applied Science GCSE.

You are assessed on four separate aspects of your work.

### Strand A: Information sources

---

#### **(a) How you select information**

You need to collect information from several different sources. You must carefully select the information that is relevant to the job. Be very careful to use UK websites. You also need to get some information from someone who does this job, or from a contact person at the workplace.

There is a checklist to help you find the right information.

#### **(b) How you describe your sources of information**

You need to make a separate list of the sources of information. The list should have enough detail, for someone else to find the sources. It is best to include all the details for each source.

#### **(c) How you indicate any quotations or 'copy and paste' sections.**

Try to use quotations only where they fit in really well, and always indicate any the quotations and their source. Introduce them by a statement such as 'Nurse Nightingale of Lantern Hospital says this:' Make sure that you clearly indicate any 'copy and paste' sections. You could print these onto coloured paper before sticking them in, or use a different colour of ink or a different font to make them stand out. If you forget to do this before your final draft, you could highlight or underline them, but be careful not to make a mistake when you do this.

### Strand B Description of Workplace

---

#### **(a) How you describe the personality and skills needed for this job, and why these are needed.**

You need to describe clearly both the qualifications and the personal qualities that are needed to do this job and why they are necessary for the work. You also need to describe technical skills, which are assessed in Strand C.

#### **(b) How you describe the work and why it is done.**

You should describe the work in as much detail as possible and you must explain the purpose of the work. You will need to contrast the role with that of other similar jobs, for example, other members of a working team. You need to describe how this work fits into the whole organisation or market.

#### **(c) Understanding of the financial or regulatory context of the context in which the work is done.**

You have learned about industry standards and Standard Procedures to ensure safety. There will be regulations like these which affect the work you are studying and you should describe one of

them. You should explain how it affects the way the work is done. In some jobs it makes more sense for you to describe how finances affect the way the work is done, rather than describing regulations. If it is hard to find information about regulations of finance, then look for the rules that cover Health and Safety.

## Strand C: Scientific knowledge and skills applied

---

### **(a) How science ideas are used in the workplace.**

You need to describe the scientific knowledge involved in the work. Then explain how the work is based on these scientific ideas. You can use your school textbooks or library books to help you describe the science.

### **(b) Technical skills applied in the workplace.**

You need to describe a technical skill that is important in this job. You should explain what the skill involves and why it is important for this job. You may need to talk to someone doing the job to get this information.

## Strand D: Quality of Presentation

---

### **(a) How you have organised your report.**

You should put your ideas into a sensible order and use headings and side headings to make the sections clear.

When you are sure your work is in the best possible order, then you should number the pages and make a Contents page.

You may decide to write for a particular group of people. You may gain marks by taking care to make a report that is suitable for that group.

### **(b) How you use charts and illustrations.**

A lot of scientific information is given as tables, charts or diagrams so you should be careful to select some charts and illustrations. They should help to explain the ideas, or to give extra information.

### **(c) The quality of your communication.**

Make sure you check your spelling, punctuation and grammar and make corrections. Check over the key words for the science topic before you start writing about the science, and make sure you can use the words in a sentence. Ask for help if you do not understand any of the words.


What information do I need to collect?

You need to be sure you have all the information you need, before you start to write your Report.

Use this list to help you:

Topic	checked?
the personality needed for the job	
the vocational skills needed for the job	
why these skills are needed	
qualifications needed for the job	
technical skills	
why the technical skill is important for the job	
what the job involves (what do people do every day in their work)	
the purpose of the work	
the role of this job	
how this job fits together with other jobs in the organisation	
how the work contributes to the organisation	
regulations that affect the work, or how finances affect the work	
the science topics that are relevant to the work	
how the work is based on these scientific ideas	
tables, charts or diagrams	
other illustrations	

# Appendix K: Cover Sheet for Work for Moderation



**OCR**  
RECOGNISING ACHIEVEMENT

**GCSE**

**Additional Applied Science A**

OCR GCSE J632 Twenty First Century Science Unit A337  
 Work-related Portfolio Record Card

Record of all marks awarded for assessed coursework **20** award

Centre No: \_\_\_\_\_ Centre Name: \_\_\_\_\_

Candidate No: \_\_\_\_\_ Candidate Name: \_\_\_\_\_

**Standard Procedures (submit 2 per module)**

Title of standard procedure	Marking criteria				Total
	1	2	3	4	

Total
Maximum mark 34

**Suitability Test**

Module: \_\_\_\_\_ Title of Suitability test: \_\_\_\_\_

Strand A purpose of test		Strand B carry out test		Strand C collecting data observations			Strand D evaluation of suitability		Strand E quality of communication	
a	b	a	b	a	b	c	a	b	a	b

Total
Maximum mark 40

**Work-related Report**

Module: \_\_\_\_\_ Title of Work-related Report: \_\_\_\_\_

Strand A information sources			Strand B description of workplace			Strand C knowledge & skills		Strand D quality of presentation		
a	b	c	a	b	c	a	b	a	b	c

Total
Maximum mark 32

Overall total mark for unit A337	
Maximum 96 marks	

## The Work-related Portfolio

The Work-Related Portfolio for Additional (Applied) Science comprises a portfolio of work that includes three types of activity:

- Carrying out Standard Procedures (raw mark 24; assessment weighting 12%)
- A Suitability Test (raw mark 40; assessment weighting 21%)
- A Work-related Report (raw mark 32; assessment weighting 17%)

### Standard Procedures

Each module of study in the course will provide a range of standard procedures. Candidates may be assessed on any occasion where standard procedures are carried out.

For each of the four marking criteria of a standard procedure, performance is assessed as satisfactory (1 mark) or unsatisfactory (0 marks), giving a maximum total mark of 4 for any one procedure.

Note that the final total for this part of the portfolio is made up of the best two marks from each of the three modules studied in the course. When marks are recorded, it is essential to record which module they are obtained from. This can be done by recording the module code (Ap1, Ap2, etc).

No more than two procedures can be counted from any one unit.

### Suitability Test

The mark submitted should be the highest total achieved from any **one** suitability test. It is **not** permitted to aggregate together marks from different pieces of work to produce an overall total.

Incomplete pieces of work will be acceptable for assessment. If the best total for a candidate comes from an incomplete piece of work (fewer than 5 strands attempted), then that total can be submitted as the final assessment mark.

### Work-related Report

The research report is marked on four strands. Each strand is marked on a scale of 0–8, giving a maximum possible mark of 32.

The mark submitted should be the highest total achieved from any **one** work-related report. It is **not** permitted to aggregate together marks from different pieces of work to produce an overall total.

### The overall assessment total for unit A337

The overall total raw mark for the work related portfolio is the sum of the three totals, giving a maximum of 96 marks.

This final overall total must be submitted on form MS1 in the year of entry for the unit.

Form MS1 is an optically readable mark-list which will be supplied to Centres, based on entry information from the Centre.

All pieces of work which have contributed marks towards the final total must be available for moderation.

# Appendix L: Support for Very Weak Candidates to Produce Coursework

## Value of preparation for weak candidates

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The preparation of extra materials and the careful administration needed to support very weak candidates should be given a high priority within the Science Department, because these resources can also be used in cases of extended staff absence, or for candidates who miss the normal opportunities for preparing their coursework in lessons. As the coursework is worth a high proportion of the marks for the whole GCSE it is very important that all candidates attempt every component.

## Organising the work

---

A strict timetable improves the pace of work. A clear, achievable outcome for each lesson builds confidence and makes supervision and guidance much more manageable. An A4 or A3 tick chart for each group can be displayed and updated to confirm completion of each outcome and to indicate work that is incomplete or missing.

Collecting all work in each lesson for checking helps to ensure an appropriate rate of progress. Rough work should also be collected as it may prove useful later. Support staff can help to ensure that all work is named and handed in. A brightly-coloured and clearly labelled folder for coursework emphasizes its value and significance.

It is important to check that individual Support staff understand the internal assessment; and especially that they understand that it is the candidates' own ideas that are being assessed, so that telling them what to write, may stop them from getting marks.

The Work-Related Portfolio allows weak candidates to achieve if they are given adequate guidance and very structured tasks. The assessment criteria take account of the extent of guidance provided whilst crediting the work of the candidate.

## Standard Procedures

---

Weak candidates can be shown a procedure and allowed to practise it before they are assessed on their ability to follow instructions independently. In this way they can learn the importance of working safely and how to follow instructions. They will probably fail to gain the fourth mark, for accurate observations.

Standard Procedures which might be more accessible to weak candidates include:

### Ap 1 Lifecare

AA1.7 'Measuring the vital signs' is suitable for weak candidates but can be extended for the more able, for example by measuring before and after exercise.

- measuring blood pressure
- measuring pulse rate
- measuring breathing rate

## Ap2 Food and Agriculture

### AA2.2 Extracting sugar

Candidates should record observations of the sugar produced and measure the yield in order to obtain four marks for observation.

### AA2.6 Testing soil: measuring pH, humus content, water-holding capacity

## Ap3 Scientific Detection

### AA3.2 various measurement activities, including:

- to measure a £5 note
- to measure volume and mass
- to measure pH values

## Ap4 Harnessing Chemicals

### AA4.17 Making soluble salts.

### AA4.18 Making insoluble salts.

## Ap5 Communications

### AA5.5, AA5.7 to measure current

### AA5.5, AA5.7 to measure voltage

## Ap6 Materials and Performance

### AA6.9 To measure the stiffness of a ruler

### AA6.5 Bicycle frames – tubes and rigid structures

## Suitability Tests

---

Weak candidates need a familiar context for their suitability test, so that they can describe its purpose and the desirable properties required for the purpose. The practical procedure must be simple so they can generate sufficient data of reasonable quality.

Worksheets with detailed writing frames can be used to guide candidates through each stage in their work, but the work for assessment must be their own. It is important that assistants are aware of this and do not compromise the assessment by giving inappropriate assistance.

## Ap 1 Lifecare

### *Comparing BMI and skinfold measurements to assess body fat. (based on AA1.4)*

Candidates measure height, weight and skinfold thickness. They can be helped in calculating BMI as calculation does not form part of the coursework assessment.



## Ap 2 Food and Agriculture

*Find the best conditions for making bread (based on A2.26)*

After Activity 2.26, yeast could be used to make bread dough rise. If identical baking tins are used, such as the baking trays used for buns, the height of the dough could be measured. The bread could also be cooked quickly in a microwave oven.

Portions of flour, water, sugar and yeast could be measured by candidates or prepared by technicians, depending on the level of ability.

Other measurements could include the temperature of the dough and the length of time for which it is allowed to rise (this should be the same for all loaves). The temperature could be classed as cold, warm, hot and very hot but could also be measured with a thermometer.

Class data could be shared to aid an evaluation.

## Ap 3 Scientific Detection

*Which is the best solvent for chromatography? (AA3.20)*

Candidates may have learned chromatography earlier in the school or as a Standard Procedure. The separation of colours with different solvents can easily be seen. Different inks can be used with each solvent, and/or different solvent systems to extend the range of data.

## Ap 4 Harnessing Chemicals

*What is the best way to measure the pH of fruit juice? (AA4.8)*

Measuring pH can be done simply using litmus paper, universal indicator paper and universal indicator solution, and pH meters or dataloggers. A range of juices can be available to test.

## Ap 5 Communication

*Should I use fax, email, text or phone calls to send information?*

The time from sending to receiving a reply can be collected as data. A reliable contact might be needed to guarantee a reply and a result. Data on costs might be useful to aid the evaluation.

## Ap6 Materials and performance

*Find which mortar mixture has the highest compressive strength (AA6.8)*

Candidates should be involved in preparing the mortar samples but it would be advisable to request sets of samples from the technicians, to be sure that some meaningful results can be obtained.

The Candidates will need to be aware of safety issues when crushing their mortar and it may be necessary to plan for adequate supervision. The SEN department may be able to help here.

## Work Related Report

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The work and its context should be familiar to the candidates so they can understand the extra information they find whilst producing their report.

A report can be based on one or two sources of information provided for a weak candidate, and structured by the use of worksheets or writing frames which can guide them through the process.

This information provided should include a clear account of the nature and purpose of the work and at least one financial or regulatory factor relevant to the work. The personal qualities and qualifications needed should also be included. It can be hard for a candidate to see how to rework an account which is already well-written, and worksheets or writing frames can help overcome this problem. One or two alternative sources, such as a familiar textbook, could also be available, with the relevant pages clearly identified.

The link between the work and science ideas studied in the module needs to be made clear, and a revision lesson could be used to consolidate a relevant science topic so that candidates can use the ideas in their Report. The essential scientific vocabulary should be made clear so candidates can learn it and use it correctly in their Report. A particular skill, such as measuring pulse rate, could be revised and possibly assessed as a Standard procedure, to emphasis its relevance to the work studied.

Worksheets should be used to guide the structure of the Report so candidates are able to organise their ideas. They should be encouraged to search for relevant visual material to add to the Report.

Coloured paper and glue sticks can help so direct quotations can be cut out and stuck into place, while different colours of paper can help with organising ideas. This engages the candidate in actively processing the information and makes clear to the Moderator the degree to which the candidate has selected and reworked the information given.

Suggestions for topics:

Ap1 Lifecare	the work of a nurse or ambulance technician
Ap 2 Agriculture and food	animal husbandry (cattle, sheep, pigs, chickens)
Ap3 Scientific Detection	Scenes of Crime Officer
Ap 4 Harnessing Chemicals	Chemical engineer or new product developer
Ap 5 Communications	TV film crew
Ap 6 Materials	builder

# Appendix M: Advice to Centres on Preparation of Sample for Moderation

## Specification J632: Assessment unit A337

This is to remind you of the stages in preparation of a sample of coursework for moderation. If you have any further queries about coursework, or any aspect of the assessment, please contact the science team, tel 01223 553311.

The notes which follow summarise the materials and evidence required for moderation of the coursework assessment, and explain how to use the documentation which is also enclosed.

### Unit A337

Each candidate is required to complete a Work-Related Portfolio.

The final mark for each candidate comprises:

- The marks for **two** Standard Procedures from each of three Units, i.e., **six** in all.
- The total mark for **one whole** Suitability Test.
- The total mark for **one whole** Work-Related Report.

It is not permitted to aggregate part-marks from different activities as the assessment covers the candidate's ability to complete all aspect of the task.

The centre will be provided with self-carboning mark sheets (MS1). The top copy of the completed MS1 form is sent to OCR, the second copy to the moderator, to arrive not later than 15<sup>th</sup> May, and the third copy is retained by the centre.

The moderator will ask for the work of a sample of candidates. The work of these candidates should be sent as quickly as possible to the moderator. The list will identify the names and candidate numbers for each candidate whose work is required by the moderator. This list may be kept to provide a record for you of what work has been sent.

The sample sent to the moderator should contain:

- Brief notes about the activities used for assessment.
- A description of procedures used within the centre to ensure internal standardisation of marking
- The sample of work for each candidate in the sample.
- A completed record card for each candidate in the sample.

### Recording of marks for assessed work

The cover sheet may be photocopied to make sufficient copies to provide for each candidate in the sample. The sheet should be used by the teacher to record marking decisions when marking the work. The pages in each piece of work should be stapled together. A paper-clip provides a convenient way of linking the piece of work and the completed mark sheet.

It is essential that a completed sheet is sent for each sample of work which is called for moderation. Enter the centre name and number and the candidate name and number at the top of the sheet.

The sheet also includes spaces which should be left blank. These will be used as a working document by the moderator when checking the work. The sheets will be retained by OCR as a complete record of all judgments related to the moderation.

The centre should also keep its own record of the work done and marks awarded.

### **Special consideration candidates**

If a special consideration application regarding coursework marks has been made for any candidate, the work of the candidate(s) concerned should be added to the sample, with a note to explain that they are for special consideration.

The sample of work will be returned to the centre, normally early in July. A report on the moderation will be sent with the notification of results.

I hope that these guidelines are clear and will help the process of moderation to run smoothly. Please do not hesitate to get in contact if you have any queries.

# Appendix N: Candidate Authentication Statement



## Candidate Authentication Statement

The completed form should be retained within the Centre and should not be sent to the moderator or OCR unless specifically requested.

### NOTICE TO CANDIDATE

The work you submit for assessment must be your own.

If you copy from someone else or allow another candidate to copy from you, or if you cheat in any other way, you may be disqualified from at least the subject concerned.

1. Any help or information you have received from people other than your subject teacher(s) must be clearly identified in the work itself.
2. Any books, information leaflets or other material (e.g. videos, software packages or Information from the Internet) which you have used to help you complete this work must be clearly acknowledged in the work itself. To present material copied from books or other sources without acknowledgement will be regarded as deliberate deception.

Declaration by candidate

Centre name

Centre No

Session

Year

Specification of Unit title

Candidate Name

Candidate Number

I have read and understood the **Notice to Candidate** (above). I have produced the work without any help from other people apart from that which I have declared in the work itself.

I have acknowledged all source materials in the work itself.

Candidate's signature:

Date:

#### Notes:

The Candidate Authentication statement once completed should be stored securely within the centre. A copy of this authentication form must be available upon request for each coursework/portfolio submission.

Standard Candidate Authentication Statement

# Appendix O: Centre Authentication Form



## Centre Authentication Form

### OCR Advanced GCE GCSE Entry Level

One copy of this form must be completed for **each** unit or coursework component and signed by the appropriate person(s). The completed form **must** accompany the coursework or portfolios submission to the moderator/examiner or be inspected by the visiting moderator for Entry Level, GCSE, GNVQ, VCE and GCE qualifications.

It is now a requirement of the Code of Practice that this authentication form is signed.

*'Authentication of candidates' work – The internal assessor must present a written declaration that the candidates' work was conducted under the required conditions as laid down by the specification.'*

Centre Name  Centre No

Specification or Unit title

Qualification or Unit number/component code

Session  Year 200

**Moderated unit**  *In this case this form must accompany the sample posted to the moderator or inspected by the visiting moderator*

**OR**  
**Examined unit**  *In this case this form must accompany the packet of coursework which is posted to the examiner or assessed by the visiting examiner.*

Signature(s) of internal assessor(s) – i.e. person(s) responsible for carrying out internal assessment and/or supervision (in the case of examined coursework) of work:

I/We the undersigned confirm that the candidates' work was conducted under the required conditions as laid down by the specification.

Signature:..... Print name:.....

Signature:..... Print name:.....

Signature:..... Print name:.....

Please continue on a separate sheet if required.

In order to support internal assessors in authenticating their students' work an **example** of a standard Candidate Authentication Statement is provided on the OCR Website ([www.ocr.org.uk](http://www.ocr.org.uk)). Alternatively centres may wish to continue to use their own internal arrangements for candidate authentication, but these must provide equivalence to the standard Candidate Authentication Statement.

#### Notes

*In the case of private candidates or distant tutored candidates, the centre must ensure that:*

- the tutor/teacher has acquainted themselves thoroughly with the general standard of candidates' work before accepting coursework for Internal Assessment. Work submitted by candidates that is atypical or inconsistent with their general standard may raise concerns over authenticity.
- sufficient on-going regular monitoring of the candidates' examination coursework has taken place.
- Centres are reminded that they must comply with restrictions that may apply to entries e.g. the exclusion of Private candidates from a specification.

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Centre Authentication Form

Oxford Cambridge and RSA Examinations

# Appendix P: Health and Safety Information

In UK law, health and safety is the responsibility of the employer. For most centres entering candidates for GCSE examinations this is likely to be the Local Education Authority or the Governing Body. Teachers have a duty to co-operate with their employer on health and safety matters. Various regulations, but especially the COSHH Regulations 1996 and the Management of Health and Safety at Work Regulations 1992, require that before any activity involving a hazardous procedure or harmful microorganisms is carried out, or hazardous chemicals are used or made, the employer must provide a risk assessment.

A useful summary of the requirements for risk assessment in school or college science can be found in Chapter 4 of Safety in Science Education. For members, the CLEAPSS guide, Managing Risk Assessment in Science offers detailed advice.

Most education employers have adopted a range of nationally available publications as the basis for their Model Risk Assessments. Those commonly used include:

- Safety in Science Education, DfEE, 1996, HMSO, ISBN 0 11 270915 X;
- Topics in Safety 3rd edition, 2001, ASE ISBN 0 86357 316 9;
- Safeguards in the School Laboratory, 10th edition, 1996, ASE ISBN 0 86357 250 2;
- Hazcards, 1995 with 2004 updates, CLEAPSS School Science Service\*;
- CLEAPSS Laboratory Handbook, 1997 with 2004 update, CLEAPSS School Science Service\*;
- CLEAPSS Shorter Handbook (CLEAPSS 2000) CLEAPSS School Science Service\*;
- Hazardous Chemicals, A manual for Science Education, (SSERC, 1997) ISBN 0 9531776 0 2.

\*Note that CLEAPSS publications are only available to members or associates.

Where an employer has adopted these or other publications as the basis of their model risk assessments, an individual Centre then has to review them, to see if there is a need to modify or adapt them in some way to suit the particular conditions of the establishment. Such adaptations might include a reduced scale of working, deciding that the fume cupboard provision was inadequate or the skills of the candidates were insufficient to attempt particular activities safely.

The significant findings of such risk assessment should then be recorded, for example on schemes of work, published teachers guides, work sheets, etc.

There is no specific legal requirement that detailed risk assessment forms should be completed, although a few employers require this.

**When candidates are planning their own investigative work the teacher has a duty to check the plans before the practical work starts and to monitor the activity as it proceeds.**

