SCIENCE DEPARTMENT HANDBOOK

It is intended that this will be a working document which should be word-processed and held in a ring binder to allow for its continued development.
Section One

Setting the Scene
Mission Statement:

The purpose of our school is to create an educational environment which repudiates dyslexia as a barrier to successful learning, so giving each pupil the confidence to realise his/her potential. In this context we aim to produce socially aware, socially acceptable and responsible young people who are fully prepared for further education courses or employment.

1.1 Aims and Objectives of the school:

- to enable pupils to enjoy a happy and non-denominational education where their educational attainments and social development are no longer sabotaged by their dyslexia
- to enable our pupils to access the wider curriculum by providing specialist support in small groups, and individually where appropriate, so that poor literacy, numeracy, organisational and information-processing skills are not a barrier to the successful acquisition and expression of knowledge and understanding
- to allow pupils to learn through structured, spiral teaching schemes employing multisensory teaching methods and allowing for adequate over-learning
- to make maximum demands on their strengths through appropriate curricular differentiation, staffing and resources whilst attenuating the confidence-sapping effects of their specific learning difficulties
- to provide a holistic approach as the remedy to poor self-image and consequent behavioural adaptations by ensuring each pupils achievements bring appropriate rewards through praise and reporting
- to provide an efficient and user-friendly system of reporting that encourages
parental contact and support

• to use the procedures enacted in the 1981 Education Act, the 1989 Children Act and the 1993 Education Act

• to develop self-awareness through an appropriate range of social relationships with peers and adults and the self-confidence to take advantage of opportunities to develop their talents and personalities in order to live as independent and self-motivated members of their community

• to develop lively and enquiring minds with the ability to question and argue rationally and to approach the solution of problems in an imaginative and methodical way

• to develop the skills necessary to work in collaboration with others, to be sensitive to their needs and to have the confidence to form stable personal relationships

• to acquire the knowledge, skills and understanding relevant to adult life and employment in a fast-changing world

• to acquire a reasoned set of attitudes, values and beliefs so as to be able to work towards a just and caring society and be able to respect and tolerate other races, religions and ways of life

• to acquire an understanding of social, economic, political, scientific and technological issues, and the interdependence of individuals, communities and nations

• to promote their own good health and physical development

• to ensure a sense of personal responsibility for environmental issues on a local and global scale

• to ensure movement through the school is continuous and progressive.

• to create an atmosphere in the school within which prejudice and stereotyping
in all its forms can be recognised, challenged and eliminated.

1.2 Aims and Objectives of the science department:

The science department aims to:

- provide access for all our pupils irrespective of gender, culture, race, religion or learning difficulty to NC Science
- ensure that movement from year to year is progressive and continuous
- provide an enjoyable and stimulating variety of learning experiences to match varying learning styles and difficulties
- ensure links with other departments to co-ordinate cross-curricular dimensions, skills and themes
- provide a variety of assessment models to reflect pupils' individual abilities and styles
- provide a good scientific background to meet the aims of the school for those pupils not pursuing formal science education any further
- provide a firm basis for those going on to further science studies
- teach in a manner that attenuates the pupil's specific learning difficulties and makes maximum demands on their strengths.
- to develop abilities and skills that are relevant to the study and practice of science, useful in everyday life and encourage safe practice
- to stimulate curiosity, interest and enjoyment in science and its methods of enquiry
- to stimulate an interest in, and care for, the environment
- to promote an awareness that the study and practice of science are co-
operative and cumulative activities and are subject to social, economic, technological, ethical and cultural influences

• to promote an awareness that the applications of science may be both beneficial and detrimental to the individual and to the environment.

1.3 Problems faced by dyslexic pupils in the classroom:

Dyslexic pupils may have a good working knowledge of the content of science but may have great difficulty when required to supply their answers in handwriting. Pupils with dyslexia have certain difficulties which will be more or less evident throughout their school lives. Amongst these difficulties are -

• slow speed of reading
• misreading
• needing to re-read text several times to extract relevant information.
• unable to scan text.
• note-taking
• copying accurately from board, overhead projector or a book
• organising work in chronological order
• difficulty with time and sequential order
• spelling accurately
• poor handwriting with many crossings out
• writing very slowly
• excessive tiredness due to the amount of effort required
• word-finding or labelling difficulties both orally and when writing
• alphabetical order and using dictionaries/reference books
• using a library
• fine/gross motor skills problems affecting aspects of practical work
• concentration and attention skills associated with inappropriate classroom skills and poorly developed learning strategies.
• independent working, in prep and revision.

1.4 Teacher activity:

Lengthy dictation and copying from the blackboard or books are not allowed modes of teaching, but some may be appropriate with older pupils who need to develop their skills in readiness for F.E. College. Attention should be paid to circumventing auditory and visual memory weaknesses together with associated transfer and retrieval problems. Teaching should use both auditory and visual channels and be supported by lots of opportunity for overlearning (prep). Learning should be as active and varied as possible. Emphasis should be given to plan for breadth and balance in the choice of appropriate learning strategies for each part of the teaching programme bearing in mind the 'not-exhaustive' list above. Strategies in use in the science department include:

Brainstorming  Problem-solving tasks  Role play
Creative writing  Games and puzzles  Fieldwork
Computer-aided learning  Group discussion  Pupil lectures
Debating  Literature search  Project work
Design and making activities  Model making  Drama
Open-ended investigations  Surveys  Poster-making
Displays  Reporting

In addition the following approaches may be helpful sub-activities within a lesson:
matching words and meanings, sequencing exercises, cloze tests, board games, true/false charts and the use of video, tape recorders and IT equipment. A camcorder in a lesson can be used to good effect.

1.5 The Science curriculum.

Timetable allocation -
year 4, 5 and 6 (12.5%)
year 7 and 8 (12.5%)
year 9, 6 periods (12%) - three setted groups
year 10, 12 periods (24%) Double science - one group
6 periods (12%) Single science - two groups
year 11, as year 10

The Science Department uses the BATH SCIENCE SCHEME throughout the school to integrate content, skills, contexts and assessments. Continuity and progression are naturally incorporated.
Examinations - S.E.G. Science, single award 2420 leading to GCSE certification by a level in the range 10 to 4
- S.E.G. Science Double award 2421, leading to GCSE certification by a pair of identical levels in the range 10,10 to 4,4.

1.6 Departmental Organisation.
The department is staffed by three specialist science teachers, 
Mr. D.C.Walker (Sc3) Joint Headmaster and Head of Science. 
Mrs.V.Hoare (Sc2) 
Mr.G.Hull (Sc4) 
Mr A. Jeffery (Sc2/3) 
Mrs H. Wicks (Sc2) 
Mrs J Nicol (Sc2) 
Mr P Williams (Sc3/4) 
Each member of staff is responsible for their own laboratory and maintaining stock 
and equipment relevant to their discipline. (see sect. 2.1)

1.7 Links with other Departments.

Departmental links are fostered by:
(a) staff meetings
(b) curriculum development group meetings
(c) NC attainment target analyses across subject boundaries and inter-departmental 
agreements for the responsibility of teaching agreed areas.
(d) refer to the analysis following covering the cross-curricular dimensions, skills and 
themes.

1.8 Specialist Links with years 4 - 8

GH is responsible for maintaining and servicing links with years 4, 5 and 6 class 
teachers and year 7/8 group teachers.

1.9 Use of local resources.
The department has a positive policy of making use of local resources whenever and wherever appropriate to the needs of the pupils. Links with local working scientists are being actively sought. Years 11 and L6 are taken to Hinkley Point Nuclear Power Station each year. Year 10 visit local water works and sewage treatment plants. Year 9 visits the Exploratory at Bristol. Year 7 and 8 attend the Faraday Lecture in Bristol. Year 4, 5 and 6 are visited by a member of the magic circle who is an ex-Science teacher.

1.10 Current concerns/priority objectives.

This year our major undertaking and concern is the successful introduction of Science throughout the school; this covers appropriate timetabling as well as resourcing. The department is carrying out a self-evaluation exercise. (see section 4.8)

1.11 Criteria for establishing teaching groups.

Years 4, 5 and 6 are taught as class groups. Years 7 and 8 are streamed into two sets, 7.1/7.2 and 8.1/8.2. The three year 9 groups, 9.1, 9.2, 9.3, are set after the first week based on the results of maths tests. Transfer is possible at various times throughout the year. Year 10 science teaching groups are established from the students choice of either Single or Double Science. The students and their parents receive advice about the best decision from teaching staff. At school level our science curriculum must achieve the twin aims of providing an understanding of science and its place in an increasingly scientific/technological world, and for those who follow science beyond 16, giving a firm foundation for further study. The Royal society produces a leaflet to help parents and pupils understand the issues involved. Copies are available from
1.12 Special needs support.

The ethos of the school is to ensure that each pupil can function in each lesson and during prep. Support is given in specialist lessons by specialist staff who are freely available to advise and assist. All staff have received training in multisensory methods and have a brief to be as flexible as possible and to be prepared to change their teaching style to suit their pupils learning styles. Staff have a remit to be caring and helpful, but equally have to create a firm atmosphere with a sense of purpose where pupils can develop their confidence. Staff have been involved in other important skills development areas like assessment, thinking skills, study skills, keyboarding, I.T. and equal opportunities. Again the expectation is that staff will use these skills in their lessons to reinforce the work done in specialist lessons. Pupils have the opportunity to use alternative methods of recording and output but the initial emphasis is to prepare them to function as normally as possible for post-16 courses. School policy dictates that class sizes are kept reasonably small, certainly for the younger age-group but there is some latitude with older age-groups as their skills improve so that the transition to F.E. courses is not too traumatic. Staff should discuss with DCW and ABS/SH/CMP problems concerning communication skills with individuals in their lessons. (reference: *Science and Special Needs: A resource pack for INSET*, from ASE)
2.1 Staff lists

(a) responsibilities:
Mr. D.C.Walker is Head of Science and also has responsibility for Sc3
Mr.W.G.C.Hull is in charge of Physics, has responsibility for Sc4 and liaising with
staff teaching years 4, 5 and 6.

Mrs. V. Hoare is in charge of Biology and has responsibility for Sc2.

Mr. A. Jeffery teaches Sc2 and 3

Mrs. J. Nicholl teaches Science to years 7 and 8.

Mrs. H. Irons teaches Life Science to years 7 and 8

Mr. P. Williams teaches Science to years 7 and 8

Mrs. E. Baker, Mrs. S. Morecombe and Mrs. H. Irons teach class Science to years 4, 5 and 6 respectively.

(b) job profiles:
Section Three

Departmental Policies

3.1 Learning Policy

Staff are expected to read new pupils files for information about strengths, weaknesses, likes, dislikes etc as problems arise. Science staff must also consult with the Word Attack, English and Maths. departments to ensure they are aware of the pupils current literacy and numeracy skills. There is an expectation that in-service course material, eg thinking skills and study skills are drawn upon in their teaching. In some cases it is possible to request that specialist staff sit in on lessons to help staff
with their delivery of the curriculum. The single most important factor is having expectations of every pupil, reviewing those expectations and ensuring that individual pupils are given the opportunity to be successful. Staff have a positive remit to circumvent their pupils learning difficulties, build up their self-confidence and produce a state where the pupil is benefitting from feedback of assessments of learning outcomes. In the short term, mutual observation of each others teaching style will help to promote good practise. In the future, team teaching will assist development of teaching skills. Staff are expected to adopt Active teaching and learning approaches in science. Active learning takes place when pupils:

• have personal involvement in their learning
• take responsibility for their learning
• test their own ideas
• plan and design their own experiments
• solve problems and take decisions
• discuss and interact purposefully in groups
• evaluate their work
• report their work to the rest of the class
• reflect on the work they have done and reformulate their ideas
• question, argue, negotiate, imagine, create, etc.

Active learning is a response to active teaching, which usually takes place when the teacher:

• encourages greater pupil responsibility for learning and self-discipline
• gets pupils to think for themselves
• provides a wide range of learning opportunities and strategies
• promotes co-operation and group work and sharing of ideas and understanding
• acts as a guide and facilitator
• values process skills as well as subject skills
• motivates pupils to achieve success

(see section 1.2)

3.2 Assessment Policy

(a) **Marking Policy** - in line with school policy, pupils work is to be marked regularly and returned with helpful advice. Work is to be marked out of 10 for content etc and a letter grade on a scale A - E for effort/presentation is to be awarded.

(b) **Record Keeping** - (i) During each Key Stage, pupils' progress will be teacher-assessed, and successful attainments recorded. Teacher records are to be kept up-to-date and accurate on behalf of each pupil in the teachers care. The departmental sheets must be used to record pupils progress through the Programmes of Study and indicate that a particular pupil has been taught a particular statement of attainment/level and whether he/she has been tested on that particular statement of attainment.

(ii) department records must be updated each half term, before the start of the new half term and held centrally by VH.

(iii) central records must be updated termly, and before the start of the new term.

(iv) school reports must be completed in line with school policy.

(c) **Reporting** - must be done in line with school policy. Reports must record positive achievements, attainment targets and levels achieved, together with classroom skills and attitudes to learning.

(d) **Assessment programme** - assessment should be carried out by end-of-topic assessments and school examinations in January and June. Sc1 investigations are to be targeted at school examination periods with the bulk being done at the end of the Summer term for year 9/10 pupils.
3.3 Prep. Policy

(a) **School** - Teachers must follow school policy and use the school prep. timetable for the setting of prep. It is required that staff check that pupils have recorded prep and when it is due to be collected. Staff should, for targetted pupils, record the prep themselves in the pupils prep diary. Each pupil is to have a prep diary. It is the tutor’s responsibility to ensure that prep diaries are well-maintained, not "lost" and replaced when necessary. Teachers must also have a record of the prep set and the marks awarded available for inspection.

(b) **science department** - the policy is to make the prep as active as possible, encouraging the use of I.T. whenever possible and relevant to the lesson/topic being studied. Effort must be made to instil good study habits into the pupils including working on their own initiative in prep.

3.4 **Policy for covering absent staff** - science staff will cover science lessons when timetable blocking allows, otherwise science lessons must have suitable work prepared and left for other colleagues to cover.

3.5 **Policy on the discipline of pupils** - the school has a strong expectation of high standards of behaviour dependent on individuals accepting responsibility for their actions. Class teachers are responsible for setting and maintaining high standards at all times. Pupils are expected to develop self-discipline and an understanding of the requirements of the classroom for good learning conditions. Good discipline is
essential to maintain safety in laboratories. Minor offences are dealt with by the teacher at the time, but it is necessary to discuss incidents at staff meetings to see if there is a pattern of behaviour emerging. Punishment is a period of detention according to school policy. Once offenders are in the punishment book then the Joint Headmasters can see any patterns. More serious offences must be brought to the Heads' attention. Exclusion from the classroom should only be used when it becomes a safety matter and DCW must be informed. Students may exceptionally be sent to DCW but the teacher should assess the, albeit remote, risk of the student running away.

3.6 Expectations

Class teachers are expected to:

• lead by example at all times
• exercise effective supervision of the pupils and to know the emergency procedures in respect of fire, bomb scare and first aid, and to carry them out
• know the special safety measures to be adopted in their own laboratories and ensure that they are applied
• give clear instructions and warnings as often as necessary
• follow safe working procedures personally
• call for protective clothing, guards, special safe working procedures, etc where necessary
• make recommendations to DCW, eg on safety equipment and on additions or improvements to equipment which is dangerous or potentially so.

Pupils are expected to:
• exercise personal responsibility for the safety of self and classmates
• observe standards of dress consistent with school policy, safety/hygiene (this would preclude unsuitable footwear, hairstyles, knives and other items considered dangerous)
• observe all the safety rules of the school and, in particular, the instructions of teaching staff given in an emergency
• use and not wilfully misuse, neglect or interfere with things provided for their safety.

All pupils and parents should be made aware of the contents of the above section.

3.7 Equal opportunities policy

(a) gender - the science department has a positive policy of including all pupils regardless of sex. Science is a core subject throughout the school. Science teachers must be aware of the needs of all their pupils in their classes and ensure that boys and girls receive equal treatment at all times. Science staff must be aware of the cross-curricular dimension of equal opportunity and must ensure the role and contribution of women to science receives equal treatment.

(b) multicultural - is also a cross-curricular dimension, the issues of race and the contribution of non-European civilizations should be emphasised. We must address three main areas in our teaching:

• the context in which the science is set
• the content of the science presented
• the teaching and learning approaches adopted

For more detail see 'Race, Equality and Science Teaching: An active INSET
(c) special needs - this is the 'jewel in our crown' in that all our pupils have special needs and the policy is to achieve success for them in all aspects of science education.

3.8 Differentiation

The organisation chart at the beginning of each unit in the Bath Science Scheme shows the main routes through the activities and indicates where additional ideas for support and extension are provided in the teachers' notes for the section. Within each section, differentiation is further provided by:

- open-ended activities which can differentiate by outcome
- easier alternative versions of the activities in the pupils' books, provided as worksheets or suggestions in the teachers' notes
- more demanding versions of the activities in the pupils' books are provided as worksheets or suggestions in the teachers' notes on the activity
- Extra! activities in the text or as additional worksheets which provide enrichment at various levels

3.9 Safety policy

The aim of the statement is to ensure that all reasonably practical steps are taken to secure the health, safety and welfare of all persons using the laboratories. In order that the laws be observed and that responsibilities to pupils and other visitors to the
school are carried out, all science staff are expected to:

• know the special safety measures and arrangements to be adopted in their own working areas and to ensure they are applied
• observe standards of dress consistent with safety/hygiene
• exercise good standards of housekeeping and cleanliness
• know and apply the emergency procedures in respect of fire and first aid
• use and not wilfully misuse, neglect or interfere with things provided for their own safety and/or the safety of others
• co-operate with other employees in promoting improved safety measures in the school
• co-operate with the appointed safety representative and the enforcement officer of the HSE or the Heads
• shall where necessary, establish and maintain safe working procedures including arrangements for ensuring, as far as is practicable, safety and absence of risks to health in connection with the use, handling, storage and transport of articles and substances (e.g. chemicals, boiling water)
• check, and replenish if necessary, the contents of their first aid boxes termly. The Approved Code of Practice states that such boxes "should contain a sufficient quantity of suitable first aid materials and nothing else". The recommended quantities are: a general guidance card on first aid; 20 individually wrapped sterile adhesive dressings (assorted sizes appropriate to the work environment; 2 sterile eye pads, with attachments; 6 individually wrapped triangular bandages; 6 safety pins; 6 medium sized individually wrapped, sterile, unmedicated wound dressings (approx 13cm x 9cm); 2 large sterile, individually wrapped, unmedicated wound dressings (approx 13cm x 9cm); 3 extra large, sterile, individually wrapped, unmedicated wound...
dressings (approx 28cm x 17.5cm); individually wrapped moist disinfectant wipes; surgical gloves. Travelling first aid kits should be available for use off-site. Mains tap water may be used for eye irrigation. Sterile eye baths (900ml) must be available.

Qualified first aiders as at 1.9.94 are JPW, MW, JT, AW, PL, SF and their advice should be sought.

The safety of pupils in laboratories is the responsibility of class teachers. If for any reason (e.g., the condition or location of equipment, the physical state of the room or the splitting of a class for practical work) teachers consider they cannot accept this responsibility, they should discuss the matter with DCW before allowing practical work to take place.

3.10 Health and Safety

(a) GH is our named Radiation Protection Officer and controls the radioactive isotope stock. Ionising substances are to be used only for agreed demonstrations and in line with COSHH policy.

(b) All pupils must wear safety glasses at all times during experiments, ties must be safely tucked away, long hair must be tied back, safety screens should be used for all demonstrations involving heating, pressure change or chemical reactions. Reactions of this nature must, in any case, be performed in the fume cupboard. Room changes should be arranged in advance if the fume cupboard is required.

(c) All accidents must be reported on the accident report form (appendix *) to DCW who will decide on appropriate action. DCW will keep a central record of reported accidents.
(d) All potential hazards should be discussed with DCW who will decide on an appropriate course of action.

(e) Pupils must report all breakages to their teacher. Broken glass must be swept up by the teacher and disposed of in the correct dustbin.

(f) In the event of an emergency the first action is to evacuate the laboratory, raise the alarm and if the member of staff deems it safe to go back in to turn off the mains etc or deal with the particular problem. DCW should be sent for.

(g) Fire procedures are in accord with school policy, safety is paramount, personal belongings or stock are absolutely secondary. The alarm must be raised at once.

(h) In the event of a hazardous gas or vapour escape, evacuate the laboratory and inform DCW. Check the pupils for symptoms and if necessary send them to the school Doctor. Inform duty members of staff in case of a delayed reaction and complete an accident report form.

(i) Laboratory coats should be worn when handling or working with chemicals.

(j) Spillage of (i) acid - neutralise with a weak alkali such as baking powder or dilute with large volumes of water. Inform DCW

(ii) flammable - evacuate the laboratory, ventilate the room, turn off all naked flames and the mains electric. Use absorbent granules to soak up the liquid and give to Mr. Lanham/Mr Baker for disposal. Complete an accident report form.

(iii) mercury/broken mercury thermometers should be sprinkled with zinc dust. Evacuate the laboratory and ventilate the room. Sweep up the amalgam and give to DCW for safe disposal. Mercury should not be used. Mercury thermometers are being phased out and replaced with digital ones.

(iv) chemicals on the skin or in the eye should be washed off with copious quantities of water, ignoring any mess. Burns, whether from heat or
chemicals, also require flooding the affected area with cold water for 10 minutes or more. Even chemicals that react exothermically with water (e.g., conc. sulphuric acid, alkali metals) can be treated in this way, provided that the quantity of water is sufficient to ensure that any heat generated has a negligible effect on the water temperature.

(k) Safety equipment is located in each laboratory. Fire extinguishers and first-aid boxes are checked termly and renewed if necessary.

(l) The safety information file is located in the Chemistry prep. room.

(m) Croners Head of Science Manual is located in the Chemistry prep room.

(n) CLEAPSS Hazcards are located in the Chemistry prep room.

(o) Control of Substances Hazardous to Health (COSHH) risk assessments should be carried out for all apparatus and chemicals. Risk assessments do not need to be written down, but the Hazcards must be referred to. The Bath Science Scheme provides risk assessments in line with current knowledge and practice. Staff must be aware of new developments through CLEAPSS. HSE Inspectors do not expect to see a record of every time a hazardous substance has been used in school but they will expect that you have consulted general risk assessments and considered how these should be implemented in our science courses. The fume cupboard is inspected annually by an outside service agent.

(p) DCW holds the Certificate for the Safe Handling of Micro-organisms.

(q) All unplanned incidents and accidents must be recorded on the accident form (appendix *) and reported to DCW on the day of the incident/accident.
3.11 Policy on the organisation of educational visits.

Educational visits are seen to be valuable extensions of the classroom and are to be encouraged. Year 11 and L6 pupils are not to go on educational visits in the Spring and Summer Term until their examination commitments are ended. All Year 11 and L6 pupils visit Hinkley Point Nuclear Power Station in the Autumn Term where the issues surrounding the generation of electricity from uranium are discussed. VH organises a Year 10 trip in the spring term to a water treatment and sewage plant. DCW organises a trip for Year 9 pupils in the Summer term. Additionally, year 10 have attended the Faraday Lecture at the Colston Hall in Bristol. (Making Waves) Year 7 and 8 attended a presentation called Michael Faraday at the Hippodrome in Bristol.

School policy requires staff organising school trips to complete a visits form (see appendix *) and circulate it to all interested parties two weeks before the trip. Staff planning a visit to an activity centre should consult DFE Circular 22/94, Safety in Outdoor Activity Centres: Guidance.

3.12 School and department charging policy.

Educational visits are paid for within the fee structure of the school.
3.13 Examination policy.

In line with school policy, years 4, 5 and 6 are not given formal written tests. Years 7 and 8 have a class test twice a year, in November and March which is reported on. Years 9 and 10 have a formal examination timetable to follow each January and June. Year 9 have a written Sc1 test which is weighted to give 25% of the final marks. Year 10 have a written Sc1 test which is weighted to contribute 20% of the final marks. These examinations are reported on at the end of the Spring and Summer Term respectively. Year 11 and L6 have mock examinations in January and G.C.S.E. examinations in May/June. The mock examination results are reported on at the end of the first half of the Spring Term.

External examination candidates sit three terminal written components. The coursework component, Sc1, is the same for all candidates. This is the teacher assessment of a candidate's achievement in attainment target one (scientific investigation). The candidates sit three written paper components assessing achievement in each of the attainment targets 2, 3 and 4. Each component is equally weighted at 25% of a candidate's total subject mark. Single award candidates sit three one hour papers at either Foundation, Intermediate or Higher level and Double award candidates sit three one and half hour papers at the appropriate level. Entry must be made after the mocks in January but the level can be changed up until mid-May according to the candidates progress. Teachers should give careful consideration to the concessions required by their candidates. These range through extra time (25%), a reader, an amanuensis, a written transcript, and the production of a word-processed script. An educational psychologist's report has to be submitted to the examining groups to obtain the appropriate concessions. It is policy to extend
these concessions to mock examinations and for pupils to have the opportunity to practice the techniques. Taped examinations should be available for those whose reading age merits it in internal examinations. All pupils are expected to be entered at G.C.S.E.

3.14 Continuity and Progression

The adoption of one scheme running from year 4 through to year 11 promotes continuity and progression. Science staff are expected to attend and respond to the ASE publication *Continuity and Progression in School Science*.

3.15 Keeping up to date

Science teachers are urged to consider joining the *Association for Science Education* (tax deductible!), tel: 01707/267411: fax; 01707/266532. Professional bodies such as *The Royal Society of Chemistry, The Institute of Biology* and *The Institute of Physics* all have good Education divisions.

3.16 Sex Education Policy

Teachers should note that references in the programme of study of National Curriculum science at KS3 to HIV and understanding the need to have a responsible attitude to sexual behaviour have been removed from August 1994. School policy is that we satisfy the requirements of the science order within our science teaching, particularly AT2 and the moral/behavioural aspects of sex education are dealt with under the PSE umbrella. HIV and AIDS are dealt with here. (ref: Education Act 1993: *Sex Education in Schools*) Parents now have the right to opt their children
out of sex education and must be given the opportunity to do so.

3.17 Cognitive acceleration through science education (CASE)

These materials are available in the department and offer:

- a structured way to teach the skills demanded by ScI
- a means of developing the pupil's thinking skills from the concrete operational stage to the formal operational stage (without implying absolute adherence to Piagetian psychology. CASE is being used to develop thinking skills in the Science Club which meets weekly.

Thinking science provides opportunities for the pupil to experience:

- control of variables and exclusion of irrelevant variables
- ratio and proportionality
- compensation and equilibrium
- probability and correlation
- the use of abstract models to explain and predict

3.18 Information Technology

The Science Department recognises the value of I.T. and is committed to its use. Plans are extant to introduce a computer into the department for data-logging experiments. A multimedia computer is being investigated to enable pupils to search, and set up, databases. Pupils are encouraged to produce work on a word-processor. Each pupil must produce at least one piece of word-processed work each term. Refer to *Stimulate to Educate by NCET*
Section Four

Resources
4.1 Plan of the science department - the department consists of four laboratories, one biology, one chemistry, one physics at Shapwick and one general lab on the Edington site. There is a well-stocked freshwater/marginal habitat at Shapwick. Each laboratory is self-contained and quite separate. The specialist laboratories are equipped to the extended levels of G.C.S.E. for groups of up to twelve. The biology and chemistry labs are both on site at Shapwick whilst the physics lab is located with the Technology Block in Shapwick village.

4.2 Department meeting programme - meetings are held twice termly as a minimum, in the first week of each half term. Head of special needs and the heads of maths/technology are invited to one meeting each to assist cross-fertilization of cross-curricular skills. Science staff take turns to record minutes and distribute them
by the end of the week of the meeting.

Tuesday 13th December 1994 - 10:00 am
Wednesday 8th February 1995 - 1.30 pm
Wednesday 22nd February 1995 - 1.30 pm
Wednesday 19th April 1995 - 1.30 pm
Wednesday 7th June 1995 - 1.30 pm

4.3 Overall apparatus storage system - effectively apparatus is stored in terms of Sc2, Sc3 and Sc4 with each laboratory having basic laboratory equipment. The aim of the department is to take a co-ordinated approach to balanced science with each departmental member retaining responsibility for their specialism. Stockbooks are held in each prep room and are handed in to DCW at the end of each term for audit.

4.4 Available teaching resources - see appendix * for audio-visual catalogue and book lists. The department co-operates by supplying lists of library books to the school library.

4.5 Stock control procedures - laboratories are equipped maximally for groups of twelve and staff have responsibility for keeping a breakages list to enable them to submit replacement orders to DCW at the end of each term. It must be made clear whether the order is a replacement or for new stock.

4.6 Policy on the management and maintenance of laboratories - staff are directly responsible for the upkeep of their laboratories and for the maintenance of Health and Safety under COSHH guidelines. Safety checks on services such as gas, water
and electricity should be undertaken daily and problems discussed with DCW that
day to determine what action should be taken. Checks on storage of chemicals etc
should be undertaken weekly and problems brought to DCW’s attention. Routine
maintenance should be scheduled for holiday periods wherever possible. Please
refer to section 3.7.

4.7 System for ordering - equipment/resources/chemicals/apparatus for lessons must
be obtained the day before it is required to enable staff to familiarise themselves with
it. Ordering of stock is done at the end of each term, through discussion with DCW.
Great care and judgement must be exercised before asking pupils to transport any
items of stock, especially glassware, chemicals and heavy or expensive items.

4.8 Development Plan

Evaluation:

- What quality of science education are we currently offering?
- What changes do we need to make?
- How shall we achieve these changes over time?
- How shall we know whether our management of change has been successful?
- Are our schemes of work appropriate for different ages and ability levels?
- Do we subscribe to them anyway?
- How sure can we be that we are offering consistency of provision and
  expectation for all children?
- Do we avoid a regression to the mean when teaching mixed ability groups?
• What, if anything, is constraining us from performing to the standards we wish?
• Are any of these constraints removable and by what means?
• Do we use assessment to improve the children's learning or merely for reporting purposes?
• Do we all mark to a consistent standard and format that all the children understand?
• Do we help each other with teaching techniques with the aim of becoming better teachers?
• Do our schemes of work offer each of us sufficient help with strategies for differentiation, ideas for homework, and so on?
• Do we match our teaching resources carefully enough to the department's needs?

4.9 Good Quality Learning in Science

The following should be regarded as a checklist of quality judgements (outlined by OFSTED)

Good learning in science means that our pupils:

• acquire an understanding of key scientific concepts and are able to use them in unfamiliar situations
• develop the skills of imaginative but disciplined scientific enquiry
• develop the skills of systematic observation, measurement making and testing hypotheses
• develop the skills of planning and carrying out investigations competently and
safely and draw inferences from investigations

• learn to appreciate the provisional nature of scientific explanation and the processes by which models are created, tested and modified in the light of evidence

• study the practical applications of science and technology and the effect they have on the nature of society and the economy

• explore the moral dilemmas that scientific discoveries may cause

• show interest and curiosity, demonstrate responsible attitudes towards safety

• show a respect for living organisms and the environment.

Checklist for lesson plan - Quality of learning (QoL)

Does the lesson provide opportunities for the pupils to:

• allow the pupil to access the content?

• overlearn

• take the initiative and gain knowledge and skills at a reasonable pace?

• evaluate their own work and make judgements?

• co-operate and help one another?

• demonstrate skills in communication or problem-solving?

• select appropriate methods and organise resources?

• demonstrate responsibility with respect for safety/show a respect for living organisms and physical environment?
• use key concepts in new situations?

• develop one or more of the following skills?
  - systematic observation and measurement
  - making and testing hypotheses
  - planning and carrying out investigations competently and safely
  - drawing inferences from evidence

• appreciate the nature of scientific explanations and processes by which models are created, tested and modified?

• study practical applications of science including social and economic factors and/or exploring moral dilemmas caused by scientific discoveries and technological developments?

**Good quality teaching in science means that teachers:**

• demonstrate clear exposition of scientific knowledge and concepts

• provide sound instruction

• demonstrate skilful questioning of pupils to probe understanding

• provide a balance of practical demonstrations, with well-organised and well-managed experimental work by pupils

• ensure that pupils plan, carry out and evaluate their own investigations

• create opportunities for pupils to apply scientific knowledge in unfamiliar contexts

• provide lesson contexts in which pupils can demonstrate their skill in handling apparatus safely.
Checklist for lesson plan - Quality of teaching (QoT)

Does the lesson planned:

• clearly convey the aims and purposes of the lesson?
• show the AT’s or elements of PoS to which it relates?
• match the differing abilities and achievements of the pupils - *ie* provide appropriate challenge?
• balance practical teacher demonstrations with well managed experimental work?
• use appropriate strategies to ensure learning *eg* individual work, pairs, small group, whole class?
• provide opportunities for pupils to think and operate scientifically - plan, carry out or evaluate investigations in the context of AT’s?
• encourage pupils to apply knowledge and skills to unfamiliar contexts?
• allow pupils to relate science learned to everyday experiences?
• allow pupils to acquire skills and knowledge progressively?
• include 'linked' prep where prep is to be set?
Proposed model to enhance lesson planning

**WHY** am I teaching this lesson?

**WHERE** room and facilities
location of resources
furniture and group arrangement

**WHEN** the order of elements of the lesson
timing of each element of the lesson

**HOW** key teaching strategies for achieving outcomes *eg*
- class question and answer
- pair discussion
- role play
- comprehension
- poster
- planning, investigation

**WHO**  
class  
ability groups

**WHAT**  
what are the lesson objectives in terms of:  
- pupils' knowledge and understanding  
- what criteria will be used to assess if these objectives have been achieved

**What is the Inspector looking for in my laboratory?**

**Standards of Achievement (SoA)**

<table>
<thead>
<tr>
<th>Standards of achievement in relation to:</th>
<th>Grades for SoA</th>
</tr>
</thead>
<tbody>
<tr>
<td>• national norms</td>
<td>1. High</td>
</tr>
<tr>
<td>• ability of pupils</td>
<td>2. Above average</td>
</tr>
</tbody>
</table>

**Quality of Teaching (QoT)**

<table>
<thead>
<tr>
<th>Quality of teaching focusses on the teacher and the way that the teacher manages the pupils' learning.</th>
<th>Grades for QoT/QoL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Very good: many good features</td>
<td>1. Very good: many good features</td>
</tr>
<tr>
<td>some of them outstanding</td>
<td>some of them outstanding</td>
</tr>
<tr>
<td>2. Good: good features and no major shortcomings.</td>
<td>2. Good: good features and no major shortcomings.</td>
</tr>
</tbody>
</table>
3. **Satisfactory**: sound but unremarkable

4. **Unsatisfactory**: some shortcomings in important areas

5. **Poor**: many shortcomings.

6. **Conflicting evidence**.

**Evidence:**

The inspector will make judgements based on criteria in the handbook and evidence collected from:

- observing the lesson
- talking to teachers and pupils
- pupils' books
- record and mark books
What is the Inspector looking for in the Department?

**Schemes of work**
- how pupil learning is organised and managed:
  - details of progression of learning
  - links with NC AT’s and PoS
  - where and how Sc1 will be assessed
  - guidance for differentiation
  - guidance for non-specialists

**Assessment, recording and reporting**
- is this consistent across the Department?
- does it inform pupil learning and lesson planning?
- does it meet statutory requirements?

**Curriculum content**
• are all aspects of the NC covered?
• does it provide for equality of opportunity?
• is movement between sets possible?

Provision for SEN

• what resources are provided?
• how are these resources differentiated?

Management and administration

• is everyone clear of their role and responsibilities?
• is the department well organised?
• is there an effective development plan?

Resources and their management

• are teaching staff effectively deployed?
• are there sufficient resources to support the curriculum?
• are necessary safety procedures in place?
• are chemicals and equipment stored safely?
• is there an effective equipment ordering system?

Accommodation

• is there sufficient laboratory space (size and number of laboratories)?
• is the accommodation safe?
Numeracy and literacy

- are numeracy, literacy and oracy developed effectively?
- are graphs, calculations effectively integrated?

Use of IT

- how is IT used to support learning in science?