J.P.
MARCH 1990

NATIONAL CURRICULUM

TECHNOLOGY in the National Curriculum

Department of Education and Science
and the Welsh Office

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HMSO

MARCH 1990

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Foreword

This Document contains provisions relating to attainment targets and programmes of study in technology and is prepared by the Secretaries of State for Education and Science and for Wales in anticipation of an Order being made by them under Section 4 of the Education Reform Act 1988 referring to such a Document and directing that its provisions have effect in accordance with the Order.

Text in italics, including the examples, which serve to illustrate the attainment targets and programmes of study, is non-statutory.

Contents

1990 No.

EDUCATION, ENGLAND AND WALES

The Education (National Curriculum) (Attainment Targets and Programmes of Study in Technology) Order 1990

Made - - - -	*March 1990*
Laid before Parliament	*March 1990*
Coming into force in accordance with articles 2 to 5	

Whereas the National Curriculum Council, after due consultation, submitted to the Secretary of State and published its report on a proposal to make this Order which he had referred to it, in accordance with section 20(2) to (4) of the Education Reform Act 1988(a);

And whereas the Secretary of State had given notice of the said proposal to the Curriculum Council for Wales and to all other persons with whom consultation appeared to him desirable, in accordance with section 21(2) of the said Act;

And whereas the Secretary of State, in accordance with subsection (5) of the said section 20, and subsection (3) of the said section 21, duly published a draft of this Order and the other documents mentioned in those subsections and sent copies of them to the said Councils and to each of the persons consulted by them, and allowed a period of not less than one month for the submission of evidence and representations;

And whereas that period has now expired:

Now therefore the Secretary of State for Education and Science, as respects England, and the Secretary of State for Wales, as respects Wales, in exercise of the powers conferred on the Secretary of State by section 4(2)(a) and (b) and (4) and 232(5) of the Education Reform Act 1988 hereby make the following Order in the terms of the said draft with a modification(b):

Citation and commencement and interpretation

1.—(1) This Order may be cited as the Education (National Curriculum) (Attainment Targets and Programmes of Study in Technology) Order 1990 and shall come into force in accordance with articles 2 to 5.

(2) In this Order–

"the Document" means the document published by Her Majesty's Stationery Office entitled "Technology in the National Curriculum"(c);

references to the first, second, third and fourth key stages are references to the periods set out in paragraphs (a) to (d) respectively of section 3(3) of the Education Reform Act 1988;

(a) 1988 c.40.
(b) The modification is to Article 2.
(c) ISBN 0 11 270709 2.

references to levels of attainment are references to the levels set out in the Document in relation to each attainment target; and

references to ranges of levels of attainment are references to the range of levels of attainment specified for pupils of different abilities and maturities in respect of the key stage in question.

2. The provisions of this Order relating to the first key stage shall come into force–

(a) on 1st August 1990 in respect of pupils in the first year of that key stage; and

(b) on 1st August 1991 in respect of all other pupils.

3. The provisions of this Order relating to the second key stage shall come into force–

(a) on 1st August 1990 in respect of pupils in the first year of that key stage;

(b) on 1st August 1991 in respect of pupils in the second year of that key stage;

(c) on 1st August 1992 in respect of pupils in the third year of that key stage; and

(d) on 1st August 1993 in respect of all other pupils.

4. The provisions of this Order relating to the third key stage shall come into force–

(a) on 1st August 1990 in respect of pupils in the first year of that key stage who do not have a statement of special educational needs;

(b) on 1st August 1991 in respect of pupils in the first year of that key stage who have a statement of special educational needs and in respect of pupils in the second year of that key stage; and

(c) on 1st August 1992 in respect of all other pupils.

5. The provisions of this Order relating to the fourth key stage shall come into force–

(a) on 1st August 1993 in respect of pupils in the first year of that key stage; and

(b) on 1st August 1994 in respect of all other pupils.

Specification of attainment targets and programmes of study

6. It is hereby directed that the provisions relating to attainment targets and programmes of study set out in the Document shall have effect as provided in Articles 7 to 9 hereof for the purpose of specifying in relation to technology–

(a) attainment targets; and

(b) programmes of study.

7.—(1) Schedule 1 has effect in accordance with paragraph (2) for specifying the attainment targets (including the ranges of levels of attainment) for each key stage.

(2) The attainment targets described in the Document and set out in column 2 of Schedule 1 to this Order are specified in relation to the key stages set out beside them in column 1 of that schedule, the levels applicable being those appropriate to the different abilities and maturities of the pupils being taught.

8.—(1) Schedule 2 has effect in accordance with paragraph (2) for specifying the programmes of study (including the range of levels of attainment) for each key stage.

(2) The programmes of study described in the Document and set out in column 2 of Schedule 2 to this Order are specified in relation to the key stages set out beside them in column 1 of that schedule, the levels applicable being those appropriate to the different abilities and maturities of the pupils being taught.

9. The examples printed in italics in the Document (which serve to illustrate the attainment targets and programmes of study therein described) do not form part of the provision made by this Order.

SCHEDULE 1

Article 7

SPECIFICATION OF ATTAINMENT TARGETS

(1) *Key stages*	(2) *Attainment targets*
First key stage	Attainment targets 1–5; levels 1–3, where specified in the Document.
Second key stage	Attainment targets 1–5; levels 2–5, where specified in the Document.
Third key stage	Attainment targets 1–5; levels 3–7, where specified in the Document.
Fourth key stage	Attainment targets 1–5; levels 4–10, where specified in the Document.

SCHEDULE 2

Article 8

SPECIFICATION OF PROGRAMMES OF STUDY

(1) *Key stages*	(2) *Programmes of study (as described in the Document)*
First key stage	Levels 1 to 3.
Second key stage	Levels 2 to 5.
Third key stage	Levels 3 to 7.
Fourth key stage	Levels 4 to 10.

1990 Secretary of State for Education and Science

1990 Secretary of State for Wales

EXPLANATORY NOTE

(This note is not part of the Order)

Section 4(2) of the Education Reform Act 1988 places a duty on the Secretary of State to establish the National Curriculum by specifying appropriate attainment targets, programmes of study and assessment arrangements for each of the foundation subjects.

Section 4(4) allows for such an Order, instead of containing the provisions to be made, to refer to provisions in a Document published by Her Majesty's Stationery Office and to direct that those provisions shall have effect according to the Order.

This Order accordingly refers to "Technology in the National Curriculum" and provides for the attainment targets and programmes of study set out in it to have effect for the four key stages of a pupil's compulsory schooling. The Document sets out up to ten levels in respect of attainment targets to cover the full range of abilities and maturities of pupils of compulsory school age; the Order accordingly specifies as part of each attainment target the appropriate range of attainment levels.

The Order further provides that any examples printed in italics in the Document are for illustrative purposes only, and do not form part of the Order.

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Attainment targets and statements of attainment for design and technology capability

Attainment target 1
Identifying needs and opportunities

Pupils should be able to identify and state clearly needs and opportunities for design and technological activities through investigation of the contexts of home, school, recreation, community, business and industry.

LEVEL	STATEMENTS OF ATTAINMENT	EXAMPLES
	Pupils should be able to:	
1	1a) describe to others what they have noticed in familiar surroundings or visualized about imaginary situations. 1b) suggest what might be done.	*Describe how other children are playing (games, toys); describe what it may be like to be shipwrecked.* *Suggest making different toys or games; suggest providing shelter of some kind.*
2	2a) describe what they have observed or visualized and found out in their exploration. 2b) suggest practical changes that could be made in response to a need and describe to others why they suggested certain changes. 2c) ask questions which help them to identify needs and opportunities for design and technological activity.	*Describe different methods to create movement in pop-up toys and books.* *Suggest reorganising the home corner/ practical area in the classroom so that toys can be stored more effectively.* *Find out how the school cook chooses the menus for school dinners.*
3	3a) starting with a familiar situation, use their knowledge and the results of investigations to identify needs and opportunities for design and technological activity. 3b) develop and clarify their ideas about possible needs and opportunities through discussion with those involved.	*Use their knowledge that plants need water, look at plant catalogues and talk to teachers in exploring their opportunities for improving the surroundings.* *Talk to a playgroup leader about how children in a playgroup like to play.*

LEVEL	STATEMENTS OF ATTAINMENT	EXAMPLES
4	4a) starting with an unfamiliar situation, identify needs and opportunities for design and technological activity. 4b) devise ways of gathering information in addition to using printed sources. 4c) recognise the points of view of others and consider what it is like to be in another person's situation. 4d) explain that a range of criteria which are sometimes conflicting must be used to make judgements about what is worth doing. 4e) provide oral and written justification for the conclusions they reach as a result of investigation. 4f) know that in the past and in other cultures people have used design and technology to solve familiar problems in different ways.	*Investigate bus routes near the school and the location of sheltered bus stops.* *Devise a questionnaire asking what pupils like and dislike about the playground to identify a need or opportunity for changes.* *Discuss what it may be like to live near a large play park.* *Understand that a product may be desirable but may be too expensive or too difficult to produce.* *Produce an account using maps and information about traffic density to support improved provision for cyclists.* *Know some ways people in different countries irrigate their crops and get water into their homes.*
5	5a) show judgement in the choice of sources of information, both qualitative and quantitative, in the systematic search for a need or opportunity for a design and technological activity. 5b) recognise that economic, social, environmental and technological considerations and the preferences of users are important in developing opportunities.	*Use information from questionnaires and books to compile a database on adults' eating habits to consider ways of encouraging healthy eating.* *Give a justification for developing a new range of products.*
6	6a) explain how they have identified needs and opportunities for design and technological activities and give a justification of the conclusions they have reached. 6b) explain how different cultures have influenced design and technology, both in the needs met and opportunities identified. 6c) understand how the introduction of new technologies can offer new opportunities and create new demands for design and technological activity.	*Present reasoned conclusions resulting from interviews and surveys on the problems faced by old people when shopping.* *Explain the influence of religious beliefs on the demand for different food products.* *Consider the demand for convenience foods arising from the availability of microwave cookers; the opportunity for newsletter design arising from desk-top publishing.*

LEVEL	STATEMENTS OF ATTAINMENT	EXAMPLES
7	7a) analyse information of several kinds and draw conclusions about the needs and opportunities for a design and technological activity, recognising and resolving conflicting considerations about what is worth doing.	*Examine the feasibility of recycling household waste commenting on prices, costs and benefits, competition.*
	7b) vary methods of investigation to obtain all the information required.	*Use interviews, questionnaires, reference books, a computer database, to find out about energy conservation.*
	7c) consider both the user and the producer when defining the need for a technological activity.	
	7d) identify and draw upon sources of expert advice relevant to the identification of needs and opportunities for design and technological activity.	*Write to businesses, visit workplaces, ask specialist teachers, consult books.*
8	8a) provide a detailed evaluation, in the light of a range of considerations, of the needs and opportunities for design and technological activity.	*Evaluate the opportunity for a mini-enterprise activity including economic, social, moral, environmental and legal considerations.*
	8b) plan in detail the various stages of their investigation.	
	8c) investigate how needs and opportunities have led to design and technological activity in other cultures.	*Explain why certain types of clothing have developed in different parts of the world.*
9	9a) demonstrate how they have devised and implemented a strategy for the investigation of unfamiliar situations which draws on their previous experience of design and technology.	*Prior to a work observation at a shop, consider relevant knowledge and skills acquired and identify aspects of shop work which they might explore further and how this might be achieved.*
	9b) review their own knowledge and draw up a strategy to exploit expert sources.	

LEVEL	STATEMENTS OF ATTAINMENT	EXAMPLES
10	10a) convey, using presentation techniques matched to their audience, that their identification of needs and opportunities is justified and worth developing. 10b) elicit and interpret the perceptions, motivations and needs of people in a range of contrasting situations. 10c) make reasoned judgements about what is a subject for design and technological activities and what is better dealt with in other ways.	*Use videos, models, diagrams and cost data to justify the extension of the school library.* *Review responses to a questionnaire and interpret these by age, sex and social group.* *Conclude, using reasoned arguments, that although it is possible to design and make a system to monitor air pollution, decisions about reducing pollution are complex and involve social, economic, health and safety and political considerations.*

Note: Pupils unable to communicate by speech, writing or drawing may use other means including the use of technology or symbols as alternatives.

Attainment target 2
Generating a design

Pupils should be able to generate a design specification, explore ideas to produce a design proposal and develop it into a realistic, appropriate and achievable design.

LEVEL	STATEMENTS OF ATTAINMENT	EXAMPLES
	Pupils should be able to:	
1	1a) express their ideas about what they might do to meet an identified need or opportunity.	*Draw pictures showing different ways of scaring birds in a field of crops.*
2	2a) use talk, pictures, drawings, models, to develop their design proposals, giving simple reasons why they have chosen to make their design.	*Explain why they have chosen to make bird scarers. Draw a picture showing how they will make a scarecrow and say how it will scare away the birds from crops.*
3	3a) make a design proposal by selecting from their ideas and giving reasons for their choices.	*Explain why they have chosen certain features of their different designs for a desk tidy to use in their design proposal.*
	3b) apply knowledge and skills to select ideas for different parts of their design.	*Choose from a range of designs and materials, produced by their class for the front cover and contents of a class book on pets.*
	3c) draw from information about materials, people, markets and processes and from other times and cultures to help in developing their ideas.	*Gather information on different types of ethnic food and people's preferences when planning a party.*
	3d) use models including annotated drawings and three-dimensional working models to develop their design.	*Use a model, drawing, or an existing example, to try out different ideas for the detail of a bird scarer.*
	3e) record how they have explored different ideas about a design and technological proposal to see how realistic it might be.	*Record different designs for bird scarers, a rattle, a kite.*

LEVEL	STATEMENTS OF ATTAINMENT	EXAMPLES
4	4a) record their ideas as they develop.	*Keep a record containing sketches, pictures, stimulus materials or notes.*
	4b) review their design proposal to identify where decisions still need to be made, suggest possible courses of action which will improve their proposal.	*In modelling a lighthouse the pupils recognise that it would be better to hide the wiring to the light bulb and discuss why this is important in a real lighthouse.*
	4c) estimate the resource requirements and check on availability.	*Estimate the resources and time likely to be needed, and the methods required by their design proposal.*
	4d) describe and edit design proposals.	
5	5a) record the progress of their ideas, showing how they have clarified and developed them.	*Produce a series or set of drawings showing how the design developed, with details of drawings, models, plans, patterns.*
	5b) extend their first ideas by combining various aspects of them to formulate a design proposal and explain why some ideas were not used.	*Combine their proposals for fabric, colour, style and cost of toddlers' clothing to make a marketable product.*
	5c) seek out and organise information to help them develop their ideas and refine their design proposal.	*Use magazines, encyclopedias, databases, videos etc to make informed choices about the range of kitchen surfaces, storage spaces, appliances available when designing a kitchen.*
	5d) establish and check the availability of the resources required, adapting their design as appropriate.	*Check time, materials, skills, tools and equipment required and adapt their design in the light of these constraints.*
	5e) specify what they intend to do and what they will need by using simple plans and flow diagrams.	*Draw up a plan for an automatic greenhouse watering system, including in it a symbolic form of the system, and listing what they need, including information, materials, equipment, skills.*

LEVEL	STATEMENTS OF ATTAINMENT	EXAMPLES
6	6a) produce a design specification and use it to develop their design proposal.	*Having included warmth and robustness as features of a design specification for toddlers' clothing, choose materials that meet the specification.*
	6b) produce a design proposal recording their decisions and the ways of reaching their chosen outcome.	*Use drawing methods, patterns, instructions, anthropometric models and other ways of recording decisions on how to put them into practice. Record these in a folio.*
	6c) make judgements about realistic ways forward by exploring alternative solutions and use these to refine their design proposal.	*Set up tests, experiments, or trials on prototypes, mock-ups or working models. Evaluate the results against relevant criteria leading to a modification of their design proposal.*
	6d) use specialist modelling techniques to develop design proposals.	*Use basic orthographic projection.*
7	7a) systematically seek out, appraise, organise and use information from different sources to develop and combine ideas and judge how realistic they might be.	*Use information about materials and construction techniques in order to produce a design proposal for survival shelters for use after natural disasters.*
	7b) review the detail of their design, using their own experience and that of others, and suggest alternative ways of achieving what is intended.	*In reviewing their design, consider cheaper or more easily installed sensors in a burglar alarm system.*
	7c) apply relevant criteria including user requirements, costs, time, skill demands, scale of production and aesthetic considerations, to take decisions about the details of the design proposal.	*Establish realistic criteria for a design proposal for an automatic watering device. Test a prototype in use in the field against these criteria and modify their design proposal.*
8	8a) record and present, using a range of methods and media, the progress of their ideas; detail and refine their design proposal and incorporate modifications; use computer aided design, image generation and desk top publishing techniques, where appropriate, to explore, detail and refine their ideas.	*Present interim ideas for a school magazine, using mock-ups and scale drawings and use audience feedback to refine the design using computer supported editing techniques.*
	8b) plan their activities to take into account multiple constraints which may at times be conflicting.	*Make a plan for a piece of jewellery within a fixed budget. Match the size and complexity of the piece with the cost of the material and the time required to make it.*
	8c) show a willingness, subject to safety considerations, to experiment and take risks recognising the implications of decisions taken in designing.	*Produce a design proposal for an experimental new food product. Explore ideas involving novel uses of common materials (cf. concrete in boatbuilding).*

LEVEL	STATEMENTS OF ATTAINMENT	EXAMPLES
9	9a) develop ideas by drawing on information and understanding from a broad knowledge of sources, and showing judgement about the detail required.	*Bring together the best parts of different ideas after further research. How could the design be improved? What problems are still likely to exist and how could the design be changed to overcome these? Know when they have enough information of sufficient accuracy for the next stage of development of their design proposal.*
	9b) refine their design to achieve an optimum practicable outcome demonstrating originality and understanding of constraints in the justification of their design.	*Develop a series of linked spreadsheets to be used by a builder to calculate the cost of building home extensions.*
10	10a) provide a substantiated account of the full range of ideas they have explored and the strategies used showing: (i) how they explored ideas used in existing artefacts, systems or environments and how they used them to develop their own ideas; (ii) evidence that they have: – identified ways of improving and refining their proposals; – predicted with accuracy the outcomes of possible improvements and refinements; – resolved conflicting demands; – included their decisions in a coherent specification; and using an appropriate range of media and methods.	*Through a presentation and exhibition, which includes a comprehensive folio of drawings, sketches, models, technical drawing and other techniques, show evidence of thorough investigation of existing artefacts, systems and environments and how and why they incorporated some features of these and rejected others. It will also contain evidence of thorough research of needs and opportunities, original ideas and a justification of all decisions taken in refining their proposal including fitness for purpose, experiments, tests and trials.*

Note: Pupils unable to communicate by speech, writing or drawing may use other means including the use of technology or symbols as alternatives.

Attainment target 3
Planning and making

Pupils should be able to make artefacts, systems and environments, preparing and working to a plan and identifying, managing and using appropriate resources, including knowledge and processes.

LEVEL	STATEMENTS OF ATTAINMENT	EXAMPLES
	Pupils should be able to:	
1	1a) use a variety of materials and equipment to make simple things.	*Use scissors, paper and paint to make a decorative protection for a display table.*
2	2a) describe to others how they are going about their work. 2b) use knowledge of the working characteristics of materials and components, including construction kits, in making artefacts, sytems or environments. 2c) show that they can use simple hand tools, materials and components.	*Describe their actions to their group or to a visitor.* *When building a model roundabout use sandpaper to smooth wood, allow enough time for the paint to dry.* *Use tools for cutting and shaping clay to make a model.*
3	3a) consider constraints of time and availability of resources in planning and making. 3b) choose resources for making by using their knowledge of the characteristics of materials and components. 3c) use a range of hand tools and equipment, appropriate to the materials and components, with some regard for accuracy and quality. 3d) improvise within the limits of materials, resources and skills when faced with unforeseen difficulties.	*Where glue is used in making a mobile, choose a type appropriate to the materials used.* *Choose an appropriate tool to drill, cut, smooth and join different materials such as wood, clay, paper, card, fabric, polystyrene to make a boat.* *When a glue will not stick a model together recognise that alternative methods might work instead e.g. another glue, staples, sellotape.*

LEVEL	STATEMENTS OF ATTAINMENT	EXAMPLES
4	4a) adopt procedures which minimise waste, pay regard to cost and achieve accuracy and finish.	
	4b) work with others in the planning and apportioning of tasks.	*Allocate tasks to gather information to be included in a school newspaper.*
	4c) choose tools, equipment and processes suitable for making their design and use these appropriately.	*Choose tie and dye as a means of producing their design on a fabric.*
	4d) adopt alternative ways of carrying forward their plan when difficulties are encountered and recognise when help is needed.	*When a material is not strong enough for the task, change the design to overcome the problem.*
	4e) use drawings, diagrams and three-dimensional models, to assist making.	*Make a model to test part of their design.*
5	5a) identify stages in making and co-ordinate these into a simple plan to ensure efficient use of time, materials and labour.	*Produce an effective production plan taking account of factors such as delays caused by waiting to use particular equipment or for time-consuming processes such as paint drying.*
	5b) use knowledge and understanding of the properties of a range of materials in their planning and making.	*Properties, such as hardness of a metal, consistency of a mix, softness of dough, which determine how the material is cut or manipulated.*
	5c) demonstrate by their choice and use of a variety of equipment that they understand the principles upon which these work and the requirements of safety and accuracy.	*Recognise the appropriateness of using a food processor rather than a grater; a power drill rather than a hand drill.*
	5d) apply knowledge of materials, components and processes to overcome problems in making as these arise.	*Adapting a spreadsheet/accounting system to accommodate an unexpected increase in business.*

LEVEL	STATEMENTS OF ATTAINMENT	EXAMPLES
6	6a) plan and organise making in order to achieve the desired outcome.	*Use flow charts, prepare equipment.*
	6b) combine knowledge of the properties of a range of materials and of processes to identify those most suitable for their design.	*In making a piece of jewellery, take into account qualities such as durability and malleability of different parts of the construction and the way the material will need to be worked.*
	6c) demonstrate, by their choice and use of a variety of tools and equipment, that they understand the limitations of them and the need for safety and accuracy.	*Develop a simple jig to enable work to be done quickly, safely and more accurately.*
	6d) use knowledge of materials, components, tools, equipment and processes, to change working procedures to overcome obstacles as making proceeds.	*Make modifications to take account of a cost increase of a component or the discovery of a more appropriate alternative. Make simple modifications to the control program of a piece of equipment.*
	6e) show judgement in seeking advice and information.	*While designing a page of the school magazine, seek expert advice regarding the equipment and processes available to them.*
	6f) use knowledge of technical and symbolic representations of materials, components and processes to assist making.	*Use drawings and plans to assist making.*
7	7a) plan and carry out working procedures to match the constraints on making, to overcome problems and to achieve the desired quality.	
	7b) demonstrate competence in the use of general planning and making skills as a result of understanding the materials, components, tools and equipment, and the scale of production.	*Identify materials appropriate to the design specification. Identify appropriate tools and equipment. Use accurately measured materials by size, weight and volume. Precisely mark out materials prior to cutting. Finish the artefact e.g. fix a laminate; lay out a buffet.*
	7c) use a range of technical, symbolic and other means of representation to assist in planning, organising, making and incorporating necessary modifications.	

LEVEL	STATEMENTS OF ATTAINMENT	EXAMPLES
8	8a) review how to make best use of materials, procedures, tools and equipment. 8b) show evidence of knowledge of making processes and devise and implement procedures for quality assurance. 8c) identify and incorporate modifications during making.	*Experiment with alternative techniques in order to simplify or improve the methods of realization of a design.* *Develop quality assurance features within the planned production at key points, for example in silk screen printing.* *Solve the problem of a blind spot on an infra-red detector by modifying position of a sensor, introducing another type of sensor or increasing sensitivity.*
9	9a) make judgements about the quality and usefulness of sources of advice and information consulted during planning and making. 9b) demonstrate how they have overcome constraints encountered in planning and making to achieve a quality product. 9c) use knowledge of specialist conventions to assist making, to introduce improvements and to explain what they are doing.	*Produce a report using models, illustrations, text and plans.*
10	10a) use a range of techniques, processes and resources with confidence, safety and creativity to achieve high quality work. 10b) review the design proposal during planning and making and show resourcefulness and adaptability in modifying the design in the light of constraints to make a high quality product.	*Use a combination of computer-aided design and other high quality graphic techniques to produce a house style and image for a new company.*

Note: Pupils unable to communicate by speech, writing or drawing may use other means including the use of technology or symbols as alternatives.

Attainment target 4
Evaluating

Pupils should be able to develop, communicate and act upon an evaluation of the processes, products and effects of their design and technological activities and of those of others, including those from other times and cultures.

LEVEL	STATEMENTS OF ATTAINMENT	EXAMPLES
	Pupils should be able to:	
1	1a) describe to others what they have done and how well they have done it.	*Describe how well they made a mask and whether it fitted well and was strong enough.*
	1b) describe to others what they like and dislike about familiar artefacts, systems or environments.	*Describe what they like about their school bag.*
2	2a) discuss with teachers and others how satisfied they are with their design and technological activities, taking into account their original intention and how they went about their task.	*Suggest other ways of ordering the task, commenting on the appearance of the final product. Does it work well and consistently? Does it meet all the original requirements?*
	2b) make simple judgements about familiar artefacts, systems or environments, including those from other times and cultures.	*Comment on appearance and usefulness of a range of cutlery ranging from a child's curved spoon to chopsticks.*
3	3a) discuss their design and technological activities and their outcomes with teachers and others, taking into account how well they have met the needs of others.	*Discuss whether the preferences of others have been taken into account when making food for a festival. Have people with different needs or interests been satisfied? Have people from different cultures been considered?*
	3b) comment on the materials and processes used and how the task was tackled.	*Explain why they chose materials to make a model and how they went about making it.*

LEVEL	STATEMENTS OF ATTAINMENT	EXAMPLES
4	4a) review the ways in which their design has developed during the activity, justifying decisions and appraising results in relation to intentions.	*Explain their initial ideas on how to guide visitors around a nature trail, how these have changed and how the nature trail is better as a result of the changes.*
	4b) review the decision-making process they used in producing their final artefact, system or environment.	*Justify reasons for choice of methods of making, materials, function, aesthetic appeal, cost of materials and safety.*
	4c) comment upon existing artefacts, systems or environments, and those from other times and cultures, including appearance and use of resources.	*Compare board games from different times.*
	4d) understand the social and economic implications of some artefacts, systems or environments.	*Understand how convenience foods have allowed altered life styles.*
5	5a) evaluate their product in relation to the design intentions and to the original needs or opportunities, taking into account users' views, cost-effectiveness and scale of production.	*Evaluate wooden and plastic prototypes for a range of mechanically articulated figures for sale at a school fete.*
	5b) justify the ideas, materials, components, procedures, techniques and processes used, and indicate possible improvements.	*Explain why a model suspension bridge was used to span a one-metre gap and why it was made of wood and wire and why smaller pieces of wood could be more suitable for the decking.*
	5c) understand that artefacts, systems or environments from other times and cultures have identifiable characteristics and styles, and draw upon this knowledge in design and technological activities.	*Consider designs of Victorian railway stations when presenting plans for the renovation of a local station, taking account of passenger comfort and the needs of handicapped people.*

LEVEL	STATEMENTS OF ATTAINMENT	EXAMPLES
6	6a) review the needs and opportunities originally identified and decide if they are appropriate.	*Conclude, after trials with the target group, that a travel guide, although adequate for leisure pursuits, should have focused on public transport and availability and cost of accommodation.*
	6b) devise and carry out ways of testing the extent to which the product satisfies their design specification.	*Devise and carry out tests on a prototype food and drink holder.*
	6c) evaluate the ways in which materials have been used.	*Appraise a leisure garment against criteria of visual appearance, finish, fastness of dyes, and comfort, durability, cost and efficient use of materials.*
	6d) evaluate the procedures, techniques and processes used and indicate possible improvements.	*Evaluate an automatic watering system for plants for speed, accuracy, reliability and ease of use.*
	6e) illustrate the economic, moral, social and environmental consequences of design and technological innovations including some from the past and other cultures, using specific examples.	*Present the impact of mass-produced plastic goods on developed and developing countries.*
7	7a) present an evaluation of their activities against the original need, drawing on information gathered about the product and the reactions of users. Evaluation should include suggestions for improvements.	*Evaluate an aid for old people in terms of consumer response to the product, and its cost-effectiveness. Explain how it could be improved. Discuss value for money, effectiveness in use, style and fashion.*
8	8a) present an evaluation of their activities, including suggestions for improvements, and a discussion of: (i) the relationship between the materials chosen and the procedures, techniques and processes used; (ii) justification of possible improvements; (iii) the suitability of the product for manufacture; (iv) an estimate of the effects and consequences, including environmental and economic ones.	*Evaluate an automatic camera activating trigger they have designed and made as a means of detecting and photographing wildlife.*
	8b) understand that artefacts, systems or environments reflect the circumstances and values of particular cultures and communities.	*Understand how factors such as climate, religious belief, and social trends influence the design and choice of clothes.*

LEVEL	STATEMENTS OF ATTAINMENT	EXAMPLES
9	9a) demonstrate that they have applied knowlege and understanding derived from evaluations of their own and others' design and technological activities.	*Obtain detailed evaluations from users of an office layout and make suggestions on how to improve on it.*
10	10a) demonstrate, through their choice of working methods and discernment and flair in decision taking, the quality of their design and technology capability. 10b) evaluate artefacts, systems or environments to show the interaction of influences on their development and use this knowledge in their own work.	*Evaluate an artefact they have made which is of high quality and original design and evaluate the working methods used to make it.* *Identify economic, political, moral and social influences in designs.*

Note: Pupils unable to communicate by speech, writing or drawing may use other means including the use of technology or symbols as alternatives.

Programmes of study for design and technology capability

In each key stage pupils should design and make:

- artefacts (objects made by people);
- systems (sets of objects or activities which together perform a task); and
- environments (surroundings made, or developed, by people);

in response to needs and opportunities identified by them.

Contexts (situations in which design and technological activity takes place) should include the home, school, recreation, community, business and industry, beginning with those which are most familiar to pupils, and progressing to contexts which are less familiar.

Pupils should be taught to draw on their knowledge and skills in other subjects, particularly the foundation subjects of science, mathematics and art, to support their designing and making activities. These activities should also reflect their growing understanding of the needs and beliefs of other people and cultures, now and in the past.

As pupils progress, they should be given more opportunities to identify their own tasks for activity, and should use their knowledge and skills to make products which are more complex, or satisfy more demanding needs.

Pupils should be taught to take reasonable care at all times for the safety of themselves and of others.

Pupils should be taught to discuss their ideas, plans and progress with each other, and should work individually and in groups.

At each key stage pupils should be given opportunities to work with a range of materials, including textiles, graphic media (*such as paint, paper, photographs*), construction materials (*such as clay, wood, plastic, metal*), and food.

A pupil who, because of a disability, is unable to undertake a practical activity required under the programmes of study, may undertake an alternative activity which most closely matches that activity.

Throughout these programmes of study, the term materials includes components, and the term equipment includes tools.

The examples are written to illustrate aspects of the programmes of study, and must be seen as part of a wider design and technology activity.

Programme of study for key stage 1

Levels 1 to 3 (ages 5 to 7)

Pupils should develop design and technology capability by exploring familiar situations *(such as home, school and local shops)*. They should also look at familiar things *(such as pictures, poems, stories, television programmes)* as starting points for some of their design and technological activities.

PROGRAMME OF STUDY	EXAMPLES
Developing and using artefacts, systems and environments	
Pupils should be taught to:	
• know that a system is made of related parts which are combined for a purpose;	*a bicycle; a house*
• identify the jobs done by parts of a system;	*bicycle chain; a kitchen*
• give a sequence of instructions to produce a desired result;	*prepare a shopping list in order of shops to be visited*
• recognise, and make models of, simple structures around them;	*making model buildings from simple construction kits*
• use sources of energy to make things move;	*stretched elastic bands to turn a propeller on a model plane; a battery to make a toy move; moving things manually*
• identify what should be done and ways in which work should be organised.	*stamping a pattern on a fabric*
Working with materials	
Pupils should be taught to:	
• explore and use a variety of materials to design and make things;	*use a variety of materials such as cotton reels or building blocks to make a tower; making a collage*
• recognise that materials are processed in order to change or control their properties;	*yeast dough to bread; clay to pot*
• recognise that many materials are available and have different characteristics which make them appropriate for different tasks;	*fabric, paper, card, clay, paint, wood; clay for making a beaker; newspaper for covering the table when painting*
• join materials and components in simple ways;	*gluing card, sewing on buttons*
• use materials and equipment safely.	
Developing and communicating ideas	
Pupils should be taught to:	
• use imagination, and their own experiences, to generate and explore ideas;	*by brainstorming, role-play, drawing, painting, modelling*
• represent and develop ideas by drawings, models, talking, writing, working with materials;	*draw plans of possible layouts of a home for the pet they have or would like*
• find out, sort, store and present information for use in designing and making.	

PROGRAMME OF STUDY	EXAMPLES
Satisfying needs and addressing opportunities	
Pupils should be taught to:	
• know that goods are bought, sold and advertised;	*talking about what shops sell*
• realise that resources are limited, and choices must be made;	*sharing materials provided for a task*
• evaluate their finished work against the original intention.	*does the model car move as intended?*
In addition pupils working towards level 1 should be taught to:	
Developing and using artefacts, systems and environments	
• recognise that materials can be linked in various ways to make or allow movement;	*puppets, mobiles, pop-up books, hinges and zips*
• make simple objects for a purpose.	*containers for pencils*
Satisifying needs and addressing opportunities	
• talk about what they have done during their designing and making;	
• evaluate familiar things by observing and describing them, saying what they like or dislike about them and why people have or need them.	*evaluate toys, buildings and asking such questions as what for? what is it made of? how is it put together? how does it work? does it achieve its purpose?*
In addition pupils working towards level 2 should be taught to:	
Developing and using artefacts, systems and environments	
• recognise that control involves making things work as desired.	*moving the limbs of a card figure, steering a model boat, lighting a model house using switches, setting a microwave oven to bake a potato*
Working with materials	
• choose materials and equipment to make objects;	*choosing a fabric that feels soft for dressing a doll or toy, or for protecting it when carried*
• investigate the properties of materials in the course of their designing and making;	*density, strength, texture, adhesion*
• identify natural and manufactured materials;	*clay, wood, wool, metal, plastic*
• use simple hand tools, and know how to look after them;	*scissors, grater*
• care for their surroundings.	*keeping the work-tray tidy; clearing up*

PROGRAMME OF STUDY	EXAMPLES
Satisfying needs and addressing opportunities	
• ask people about their preferences;	*how pupils like to spend playtime; which colour of car people prefer*
• recognise that goods are designed, made and distributed;	*observing and drawing things used at home; talking about delivery vans, factories and shops*
• recognise a variety of forms resulting from people's different values, cultures, beliefs and needs;	*buildings; styles of dress*
• recognise aesthetic qualities in things around them, and use them in their work;	*drawing and talking about wallpapers and decorations that they like, bearing in mind the combination of shapes, forms, structures, colours, patterns and textures*
• recognise that people like certain objects, but not others, find the reason why and use this knowledge in their own designing and appraising;	*talking about a favourite toy; asking friends their reasons for liking or disliking the appearance of a particular ornament*
• talk about what they have learnt and what they might do differently next time.	

In addition pupils working towards level 3 should be taught to:

Developing and using artefacts, systems and environments	
• recognise pattern in the structure of objects;	*textiles, scaffolding, parts of a machine*
• know that objects are changed by the forces applied to them;	*placing a load on paper folded in different sections*
• know that systems have inputs, processes and outputs and recognise these in a variety of simple systems;	*a hand whisk, a bicycle pump*
• use simple mechanisms to transfer motion;	*a pedal car, a hand drill*
• recognise that a source of energy is required to make things work;	*batteries, stretched elastic bands, flowing water, moving air*
• organise their work, taking account of constraints;	
• realise that, when working in teams, people may have specialist roles;	*nurses and surgeons in an operating theatre*
• use a variety of energy devices.	*lamps, motors, levers*
Working with materials	
• recognise that materials and equipment need to be safely stored and maintained;	*suggesting ways of storing pencils, scissors, glue*
• be aware of the dangers of the misuse of materials and equipment, and the consequent risk of accidents;	
• use alternative means of joining materials;	
• recognise the appropriate tools for working with a variety of materials.	

PROGRAMME OF STUDY	EXAMPLES
Developing and communicating ideas	
• develop a range of simple skills used in drawing and modelling.	*sketches; scale models using clay, wire, card; measurement of people and products*
Satisfying needs and addressing opportunities	
• know the importance of exploring needs and opportunities before proposing solutions;	
• recognise that a solution may result in problems in other areas;	*the noise of a bird scarer may disturb people*
• consider how well their products are designed and made;	*are they robust? are they safe?*
• propose simple modifications to improve the effectiveness of designs and to overcome difficulties when making;	
• reflect, individually and in groups, on how they went about their work, and whether changes might be needed.	

Programme of study for key stage 2

Levels 2 to 5 (ages 7 to 11)

Within the general requirements of design and technology, activities should encourage the appraisal of artefacts, systems and environments made by others as well as the application of enterprise and initiative.

PROGRAMME OF STUDY	EXAMPLES
Developing and using artefacts, systems and environments	
Pupils should be taught to:	
• organise and plan their work carefully, introducing new ideas, so that their work improves;	*working as a group to produce a puppet play; making a garden or a nature area*
• allocate time and other resources effectively throughout the activity;	*setting up a school shop, making a school newspaper*
• control the use of energy to meet design needs;	*making something move; using switches, taps or valves to switch something in their product on or off*
• use a variety of energy devices;	
• plan how practical activities may be organised;	*making three-colour block prints; building up a fabric collage*
• use a variety of information sources in developing their proposals;	*books, videos, databases, other people*
• use knowledge and judgement to make decisions in the light of priorities or constraints;	*choosing the menu for a party, given a spending limit*
• identify the parts of a system and their functions, and use this knowledge to inform their designing and making activities.	*triangular frameworks in pylons; departments in a supermarket*
Working with materials	
Pupils should be taught to:	
• use equipment safely;	
• select materials for their task;	*using criteria such as cost, availability, purpose, weight*
• rearrange materials to change their strength or character, and to increase their usefulness;	*folding and bending paper; adding thickening agents to dyes and paints*
• join materials in semi-permanent forms;	*gluing card and wood to make a buggy frame*
• assemble materials;	*string and wood to make a bow*
• avoid wastage of materials;	
• take responsibility for safe working;	*agreeing and following class rules for safe working*
• develop co-ordination and control in using equipment;	
• finish work carefully.	*painting details on a puppet's head; tidying threads on a knitted garment*

PROGRAMME OF STUDY	EXAMPLES
Developing and communicating ideas	
Pupils should be taught to:	
• take account of people's reactions to aesthetic characteristics;	*the different responses to birthday card designs*
• make the connections between aesthetic characteristics of natural and manufactured objects and relate these to their own work;	*looking at Celtic patterns, Roman tiles, Islamic art, when searching for decorative patterns; honeycombs, snowflakes*
• plan and structure their communication of ideas and proposals;	*producing scripts, storyboards*
• use drawings and plans to investigate and develop ideas for three-dimensional objects;	*producing plans for a working lighthouse with a flashing light*
• use a range of graphic techniques and processes;	*developing an advertising leaflet using word processing and graphics programs*
• use modelling to explore design and technological ideas;	
• use modelling and recording when generating ideas;	*making a preliminary model using a construction kit or card, timber, clay*
• break design tasks into sub-tasks and focus on each in turn as a way of developing ideas;	*when designing a model fairground roundabout, consider the means of movement, the type of structure and the appearance; when designing a turtle graphics program for drawing a row of houses, plan, write and test it in separate procedures*
• use materials and equipment to produce results which are aesthetically pleasing.	
Satisfying needs and addressing opportunities	
Pupils should be taught to:	
• know that the needs and preferences of consumers influence the design and production of goods and services;	*discussing school meal preferences, fashion, clothes for hot and cold weather*
• recognise the importance of consumer choice and hence the importance of product quality and cost;	*making a database of household goods and exploring it to find the best value*
• be aware that the appearance of artefacts and environments is important to consumers and users;	*carrying out a survey of people's views to find out the importance of the visual appeal of a game they intend to make*
• know that human shape, scale, proportion and movement affect the forms of designs;	*furniture, telephones, pots and pans, toys*
• understand that goods may be designed to be produced singly or in quantity, and that this affects what each item costs;	*comparing the costs of designer clothes and chain store clothes, handmade and mass-produced furniture*
• consider the possible consequences of their design proposals before taking them forward to completion;	*will it be safe?* *how will it affect others?*

PROGRAMME OF STUDY	EXAMPLES
continued	
• consider the needs and values of individuals and of groups, from a variety of backgrounds and cultures;	*planning a recreation area for both young and old; making food associated with a religious celebration*
• evaluate at each stage of their work;	
• make adjustments as a result of evaluation;	
• use their appraisal of the work of others to help their own work.	*looking at pottery, painters' use of colour, packaged goods*

In addition, for pupils working towards levels 2 and 3, teachers should refer to relevant material in the programme of study for key stage 1.

Pupils working towards level 4 should be taught to:

Developing and using artefacts, systems and environments

• make a simple system and consider its effectiveness and whether modifications should be made to the design in order to improve it;	*in their working model of a drawbridge can the bridge section be raised smoothly? would it be worth fitting a motor?*
• test simple objects they have made;	*test carrier bags they have made for strength and capacity; check that simple turtle graphics procedures give the correct results*
• recognise that structures have distinctive characteristics including form and stability;	
• use mechanisms to change one type of motion into another;	*gears, pulleys, cams, levers*
• recognise that mechanisms need to be controlled if they are to achieve their intended function;	*steering and changing gear on a bicycle*
• take into account the characteristics of different energy sources when designing products;	
• exercise persistence in their designing and making and recognise when to seek help;	
• allocate tasks when leading a team.	

Working with materials

• recognise that materials have different working properties;	*flexibility, softness, rigidity, texture*
• recognise the aesthetic qualities of natural and manufactured materials;	*brickwork, grain in wood*
• select and use equipment correctly;	
• check the condition of equipment before use.	

PROGRAMME OF STUDY	EXAMPLES
Developing and communicating ideas	
• make two- or three-dimensional models of their design ideas and to test these before proceeding further;	*testing ways of making a lifting bridge; using card models to plan a stage set*
• extend the range of techniques used in their drawing and modelling;	*simple plans, elevations, sections, pictorial perspective, flow diagrams, patterns and templates*
• generate ideas and develop them further using a variety of techniques and media.	*brainstorming, role-play, examining objects and places, drawing and modelling*
Satisfying needs and addressing opportunities	
• propose modifications to improve the performance and appeal of existing products;	*how to make a carrier bag stronger, more attractive, more resistant to rain*
• know that advertising helps promote and sell goods and services;	*advertising a school event; producing a healthy-eating leaflet*
• know that costs include time, people, skills, equipment and materials;	*costing a meal, a family holiday, a topic folder*
• make judgements about products designed and made by others;	*school television programmes, reference books*
• evaluate the outcome of their activity against the original need, and propose modifications that would improve the overall quality of the outcome;	*testing an oven glove for fit, appearance, heat resistance; testing a model bridge for strength*
• reflect on how they went about a task, and how they might plan their next task differently.	

In addition pupils working towards level 5 should be taught to:

Developing and using artefacts, systems and environments	
• recognise that the control of a system involves inputs, outputs, feedback and stability of that system;	
• recognise and represent organisational structures;	
• select and use simple mechanisms, including linkages and gearing, in making prototypes;	
• identify the basic principles of how different mechanisms change speed or change motion, from one form to another;	*changing direction of motion from linear to rotary*
• recognise that mechanisms can be controlled by computers;	
• understand that it may be necessary to practice an operation in order to improve quality;	*cutting wood, composing photographs; coiling clay*
• take account of the effects of transferring and using energy in their designing and making.	*provide friction on wheels to prevent wheel spin on the sudden release of energy*

PROGRAMME OF STUDY	EXAMPLES
Working with materials	
• know the working properties of a range of materials;	
• recognise the purpose of equipment, to understand the way it works, and to use it;	
• identify hazards in the working environment and to take appropriate action if dangerous situations occur.	*trailing electrical leads; hot or sharp equipment left dangerously; bad design of work area*
Developing and communicating ideas	
• use specialist vocabulary when communicating proposals;	*use words like 'file', 'record', 'field' correctly*
• develop styles of visual communication which take account of what is to be conveyed, the audience and the medium to be used;	*communicating design plans to the purchaser; advertising information to a prospective purchaser*
• present their design and technological ideas and proposals using modelling techniques and specialist vocabulary;	
• recognise the relationships between two-dimensional representation and three-dimensional forms;	
• investigate artefacts, systems and environments to find ideas for new designs.	*tipper lorries, bridges, Saxon jewellery, Greek theatres*
Satisfying needs and addressing opportunities	
• identify markets for goods and services;	*parents needing refreshments at a school fete*
• know that, in the production and distribution of goods, the control of stock is important;	*investigating sales of ice-cream in the summer and winter*
• plan a simple budget;	*a simple speadsheet to estimate costs and income*
• investigate the effects of design and technological activity on the environment;	*motorway construction; flooding of valleys; landscaping of a derelict site*
• establish and apply criteria for assessing: the needs and opportunities identified; the choice of materials and equipment to achieve the design; the procedures adopted; the end result.	

Programme of study for key stage 3

Levels 3 to 7 (ages 11 to 14)

Within the general requirements of design and technology, pupils should have increasing opportunities for more open-ended research, leading to the identification of tasks for designing and making. There should be opportunities for some of these activities to take place outside school.

PROGRAMME OF STUDY	EXAMPLES
Developing and using artefacts, systems and environments	
Pupils should be taught to:	
• analyse the task and its components, to identify those which depend upon the completion of previous tasks, and to develop a flow chart;	*when planning a meal, identifying the courses and the items/preparation needed; making a three-colour batik*
• set objectives and identify resources and constraints;	
• organise their working to complete the task on time;	
• produce a documented plan for their work, including an analysis of the resources required and a time schedule;	
• select and use mechanisms to bring about changes and control movement;	*mechanisms such as linkages and gearing; changes such as direction of motion or speed*
• know that using energy affects comfort and convenience;	*heating, lighting, sound, air conditioning*
• use information sources in developing their proposals;	*book, database*
• analyse a system to determine its effectiveness and suggest improvements;	*supermarket check-outs; road traffic layouts; arrangements for school meals*
• test simple objects to determine performance.	*test items of clothing for waterproofing quality; finding the maximum load for a carrier bag*
Working with materials	
Pupils should be taught to:	
• ensure that the working area is well ordered and safe, and that equipment is well maintained;	
• use equipment safely; follow safe working practices and understand the procedures for dealing with accidents;	*how to identify priorities; what to do; whom to contact*
• consider, when selecting and using materials, their physical and aesthetic properties, availability and cost, and the product being made;	*making a musical instrument; making a kite; using a material which will not rust when making a rudder for a model boat*
• combine materials to create others with enhanced properties;	*making a sauce; mixing glue; using sand to give strength to clay; using interfacing to strengthen fabric*
• assemble a range of materials;	
• take account of the constraints imposed by equipment;	*be aware of how much data they may reasonably expect a database program to handle in computer memory*

PROGRAMME OF STUDY	EXAMPLES
continued	
• work with a variety of media to produce graphic outcomes;	*producing information to direct visitors within school; advertising a product, using media such as paint, ink, pens, paper, computers*
• apply simple finishes appropriate to the materials used and to achieve a desired effect;	*glazing a pot; varnishing a wooden toy*
• aim for a high quality of accuracy and presentation;	
• select a match of materials and equipment to create a quality outcome;	*when to use a plane to work wood, a blender to puree food, a wheel to throw a pot; choosing a drill for wood or for metal*
• identify and use machines to perform tasks required by their design activities.	

Developing and communicating ideas

Pupils should be taught to:

• investigate existing solutions to design and technological problems when developing ideas for new ones;	
• explore a range of potential solutions before selecting one;	
• know that aesthetic qualities influence consumers' choices;	*shape of shampoo bottles and packaging; colour and appearance of food*
• use computer-aided design and draughting techniques;	*using desk-top publishing to try different layouts*
• maintain a questioning but open-minded approach when developing their ideas;	
• take account of human scale and proportion when designing.	*designing a nursery, a kitchen, a garment*

Satisfying needs and addressing opportunities

Pupils should be taught to:

• consider the influence of advertising on consumers;	*exploring advertising media and analysing the targeted customers; experimenting with product titles, colour, packaging, text, image*
• identify markets for goods and services and recognise local variations in demand;	*researching regional and national food preferences; investigating the items sold in different parts of a town*
• investigate the effects of design and technological activity on the environment, and take account of its impact;	*motorway construction, computer simulation of industrial pollution, limited global energy resources*
• recognise that the preferences of consumers can change;	*style and choice of cars, fashion in shoe design, compared to functional needs*
• recognise that economic, moral, social and environmental factors can influence design and technological activities;	*designing disposable packaging*
• recognise potential conflicts between the needs of individuals and of society.	*when houses, bridges, roads, factories are being designed*

PROGRAMME OF STUDY	EXAMPLES

In addition for pupils working towards level 3, teachers should refer to relevant material in the programme of study for key stage 1.
In addition for pupils working towards levels 4 and 5, teachers should refer to relevant material in the programme of study for key stage 2.

In addition pupils working towards level 6 should be taught to:

Developing and using artefacts, systems and environments

- use methods of releasing and transferring energy in systems;
- modify a plan, as necessary, explaining the need for changes;

  changes in the order of working because equipment is not available
- use knowledge and understanding of materials to design and make structures which stand up to stress;

  making a light "knock-down" chair in cheap available materials
- take account of the forces which operate on and influence mechanisms when selecting a mechanism for a design;
- recognise aspects of control in a variety of systems, including input, output, feedback and stability;

  a ball valve in a water tank; a central heating thermostat
- estimate how long an activity might take, and the resources required and take this into account in their planning.

Working with materials

- use a variety of material processing equipment to develop craft skills involved in shaping, forming, joining, assembling and rearranging;

  achieving a good fit, and attractive presentation
- select and use appropriate methods of assembling a range of materials;

  choosing the appropriate stitch when sewing by hand or machine; soldering electronic components, gluing and pinning wood
- recognise the purpose of equipment, to understand their handling characteristics, and the basic principles upon which they work.

  how different saws cut wood

Developing and communicating ideas

- gather, select and organise information for use in designing;

  using books, magazines, newspapers, computer databases
- know that the generation of many ideas and the development of single insights can each provide the basis for design proposals.

PROGRAMME OF STUDY	EXAMPLES
Satisfying needs and addressing opportunities	
• how to integrate drawing, modelling and text in developing a design;	
• prepare a business plan, including a cash forecast and budget, and monitor performance against it;	*for a school bookshop or mini-enterprise*
• know that original designs can be granted patents;	
• use factual information and value judgements;	
• recognise objective and subjective information;	
• use information and experience gained from appraising products.	*how to make effective joins between materials; how to achieve a distinctive appearance; how to package an item securely*
In addition pupils working towards level 7 should be taught to:	
Developing and using artefacts, systems and environments	
• know that energy can be a significant cost in manufacture and in the use of a product or system;	
• recognise that people are an important resource and need to be trained, organised and motivated;	*sharing responsibilities when making a stage set*
• design and make structures to take stationary and moving loads;	*a bridge to carry a model train*
• recognise how the efficiency of a mechanism can be improved when designing a product;	*designing a buggy, study the effects of the design and the use of different materials on the distance the buggy travels*
• design mechanical systems to produce a desired output from a given input;	
• estimate the time taken, and the resources required, to complete each task and its components.	*arranging an event to sell products made in the school*
Working with materials	
• use computer- based systems as tools for designing and making;	*graphics programs with libraries of shapes and symbols, computer-controlled knitting machines, printed circuit board design*
• recognise that products must be electrically and mechanically safe.	

PROGRAMME OF STUDY	EXAMPLES
Developing and communicating ideas	
• know how designers and technologists have produced ideas and to make use of similar approaches when designing and making;	*brainstorming, role-play, drawing, modelling, analysis of existing designs*
• collate, sort, analyse, interpret and present information in a form appropriate to the purpose and the intended audience;	*using displays, charts, diagrams*
• devise an effective strategy for investigating a specific situation;	
• distinguish between various techniques of modelling and use appropriate techniques for developing proposals.	
Satisfying needs and addressing opportunities	
• understand how market research can be used to measure user needs and market potential;	*identifying an inexpensive fashion or souvenir product to sell at a school fair*
• calculate costs and make decisions on price;	*making and selling badges; making and selling a school newspaper, raising extra income from advertising*
• recognise the historical and cultural background to design and technological developments;	*comparing their work with that of previous times; tracing developments in style; comparing artefacts and environments from different countries*
• recognise the relationship between price, cost, income and competition in the market for goods and services;	*setting up competing mini-enterprise activities*
• use different ways of assessing the effectiveness of a solution;	
• work together to establish criteria for appraisal of design and technological activity.	

Programme of study for key stage 4

Levels 4 to 10 (ages 14 to 16)

Activities should include at least one extended design and technological task, *for example with a duration of between 15 and 30 hours*. There should be opportunities for visits and work outside school, including work experience placements.

PROGRAMME OF STUDY	EXAMPLES
Developing and using artefacts, systems and environments	
Pupils should be taught to:	
• prepare a flow chart and a detailed work plan to achieve the objectives of the design;	
• use information sources in developing their proposals;	*use anthropometric data in designing a chair*
• allocate tasks when leading a team;	
• estimate the operating costs of a system, its dependency on other systems, and evaluate its efficiency;	*the cost of gas and electricity for central heating systems*
• reduce energy loss and understand why this is important;	*in the home, office, industry, transport*
• recognise that forces of different types are involved in structures;	*tension, bending*
• maximise the efficiency of a mechanism.	
Working with materials	
Pupils should be taught to:	
• use equipment safely;	
• know that organisations need to have procedures for health and safety, and people responsible for enforcing them;	*rules for safe movement in school; laws for the movement of dangerous waste; health and safety officers; fire protection officers*
• join materials in permanent forms;	*soldering, brazing*
• have a working knowledge of the properties of a range of materials;	*specific shrinking of clay when fired; the residual memory of plastic; absorption of dyes in fabrics, melting points of alloys; corrosion resistance of metals*
• use materials economically and efficiently;	*design the production of an object that just exceeds the specification*
• develop test procedures, including those for quality control;	*test shear on a garment*
• know the properties and operational characteristics of a range of components;	*resistors, capacitors*
• develop and apply understanding and knowledge of how materials are shaped, cast, joined and formed;	*joining dissimilar materials such as wood and acrylic; vacuum forming; casting aluminium*

PROGRAMME OF STUDY	EXAMPLES
continued	
• understand that equipment can be adapted to serve a variety of purposes;	
• know how computer systems control machines and equipment;	*computer-controlled knitting machines, graphics programs, desk-top publishing; making a model lift, car park barrier or burglar alarm controlled by computer*
• use computer systems in designing and making;	*three-dimensional images on a plotter; three-dimensional objects on a lathe*
• give attention to detail and work accurately;	*completing a book illustration; completing a presentation model or finished garment; ensuring that components fit*
• develop craft skills;	*by taking time to develop understanding of and to respond to the materials, equipment and processes being used*
• know that efficient mechanisms depend on the appropriate choice of materials used and the number, form and arrangement of their component parts.	

Developing and communicating ideas

Pupils should be taught to:

• analyse alternative solutions to produce a better design proposal;	*consider alternative means for warning when a refrigerator door has been left open*
• design the appearance of an artefact, system or environment so that it appeals to users;	*designing a radio for teenagers, furniture for adults*
• use modelling techniques to communicate design proposals;	*prototypes, garment models, projection drawings, organisation charts*
• use intuition as well as empirical data in developing their design.	

Satisfying needs and addressing opportunities

Pupils should be taught to:

• develop a product and how to market, promote and sell it;	*designing and producing an entry system for a disco; a car alarm; a healthy snack food*
• investigate ways in which solutions could be extended to meet additional needs;	*converting a wind-powered pump into a generator; adapt a fishing box for use as a seat*
• recognise the social, moral and environmental effects of technology;	*considering the effects of a new motorway, intensive rearing, space shuttles*
• recognise and take into account in their designing that people can be an element in a system.	

In addition for pupils working towards levels 4 and 5, teachers should refer to relevant material in the programme of study for key stage 2.
In addition for pupils working towards level 6 and 7, teachers should refer to relevant material in the programme of study for key stage 3.

PROGRAMME OF STUDY	EXAMPLES

In addition pupils working towards level 8 should be taught to:

Developing and using artefacts, systems and environments

• identify the critical path in a flow chart;	*design, construction, installation of playground equipment*
• implement systems in which control is maintained without the need for human intervention;	
• know that mechanisms can be incorporated within electrical, pneumatic and fluid systems, and can be controlled through computer and interface devices;	
• use IT, and where appropriate sensors and interfaces, to monitor and control a system;	*display the temperature of room on a liquid crystal display or as a message on a computer screen*
• design and make structures economically and efficiently using a range of materials to optimise strength;	
• know that forces related to structures have to be in equilibrium.	

Working with materials

• know that the capabilities and limitations of equipment impose constraints on design;	*limitations of line and half-tone in a printed illustration; capacity of a kiln*
• identify the advantages of the making tools and processes they use for particular purposes;	
• recognise that information technology can assist the manufacturing process;	*reducing the cost of "tailor made" clothes; use of CAD/CAM*
• dispose of waste and by-products in an environmentally safe manner.	

Developing and communicating ideas

• present their proposals to an audience, using a range of methods and media;	
• use computer-aided design, image generation and desk-top publishing to develop and communicate their ideas;	*planning the detailed layout of a kitchen or recreation park; developing proposals for a company logo and letterhead*
• use symbols and conventions that have a meaning for an international audience;	*designing working instructions, sign-posts for an airport; warning signs; using electronic symbols in printed circuit design*
• collate, sort, analyse, interpret and present information in a logical and coherent way;	*justifying the choice of a site for a factory*
• recognise the place of experimentation and know that a new solution may be devised which has little basis in existing solutions.	*linear induction motor; hovercraft*

PROGRAMME OF STUDY	EXAMPLES
Satisfying needs and addressing opportunities	
• review the ways in which market research can be used to evaluate user requirements and market potential;	*investigating the siting of a new supermarket; design of a graphics pen or drawing board*
• understand that external influences (legal, environmental, social, health, safety) have effects on business activity;	*considering the restrictions imposed by the Data Protection Act or the need for green belts around towns*
• recognise the needs of individuals and groups from different backgrounds, when designing for their needs;	*the need for different food, clothing or shelter on the grounds of health, religion or culture*
• recognise how economics affects design and technological activities and to work to a budget;	*designing to a fixed budget; making aids for the elderly*
• recognise the importance of the views of users and others affected by design proposals and take them into account in taking design decisions.	*high-rise and low-rise buildings; hypermarkets on the outskirts of towns; furniture design*
• distinguish between objective and subjective criteria when evaluating.	

In addition pupils working towards level 9 should be taught to:

Developing and using artefacts, systems and environments	
• prepare a detailed work plan, showing responsibilities and deadlines;	*prepare a plan for maintaining a conservation area in school grounds*
• set standards against which performance can be measured;	
• design and implement an artefact containing a system which involves control;	*an electronic timer*
• design and make efficient mechanisms using the minimum quantities of materials and components;	
• know that forces related to structures can be calculated;	
• design and make equipment to aid them in the manufacture of solutions.	
Working with materials	
• understand that the best use of materials when designing and making requires evaluation of their: working and mechanical properties; operational characteristics; suitability for the intended environment;	*strength, durability, resistors which are stable, corrosion resistance*
• know that products must allow for unusual eventualities during use;	*designing a road bridge*
• adapt the processes they are using to overcome problems.	

PROGRAMME OF STUDY	EXAMPLES
Developing and communicating ideas	
• prepare computer graphics for communication, analysis and development of design ideas;	*producing slide, animation or video sequences for promoting a product*
• explore a range of solutions, before developing one to completion;	*testing several models of bridges in high winds before choosing the best one*
• prepare computer graphics to develop and communicate design ideas;	
• consider different design approaches to the form of artefacts, systems and environments in developing their designs;	
• use specialist vocabulary, symbols and formulae in communicating ideas.	
Satisfying needs and addressing opportunities	
• research the economic implications of the commercial or industrial application of a design;	*calculating the detailed costs of making and delivering lunches to several businesses. How does the menu and the way lunch is served affect the cost and the break-even figure for the operation?*
• know that external influences such as level of economic development, government policy, international agencies, have effects on business activity;	*learning how the value of the pound affects industry; investigating the preferences of foreign consumers*
• explain the social and environmental issues arising from design and technological activities;	
• measure developments against budget, calculate variances and decide which are significant;	
• undertake a critical review of the cost, income, quality, time and environmental impact and advocate possible alternative strategies.	

In addition pupils working towards level 10 should be taught to:

Developing and using artefacts, systems and environments	
• build in standards against which performance is measured;	*quality of finish, function, appearance; effectiveness; efficiency; consumer response; constraints of cost*
• analyse business systems and organisational models;	
• know that resistant materials can be used to build elastic structures;	*designing buildings for earthquake zones*
• recognise that different sources of energy bring different benefits of cost, reliability, performance and environmental effects;	*investigating the advantages of generating electricity using wind turbines*

PROGRAMME OF STUDY	EXAMPLES
continued	
• understand how an IT system can be constructed and operated to process and transmit information and to establish control over another system;	*automatically detect a high level of rejected items from a production line and cause the assembly line gradually to slow down or stop until some moments after reject bins have been cleared*
• understand that systems can take various forms, including mechanical, electrical, electronic, hydraulic and pneumatic.	
Working with materials	
• recognise that the choice of material depends on the scale of production and cost of disposal of any surplus;	
• judge when to use intuition, quick estimates or detailed calculations when designing;	*considering forces related to a structure*
• make full use of the combination of equipment and processes available to them;	
• recognise that investment in tools and equipment involves consideration of finance, depreciation and obsolescence;	*considering the cost-effectiveness of replacing equipment*
• design and make equipment, to solve particular production problems;	*a jig to enable the correct alignment of parts; profiles for turning pots*
• determine a balance between the demands of quantity and quality;	*printing T-shirts and selling them*
• know that waste disposal may involve moral, legal and environmental responsibilities.	
Developing and communicating ideas	
• develop original ways of communicating design proposals;	*use desk-top publishing to make a cartoon strip outlining the design proposal*
• analyse artefacts, systems or environments by relating knowledge of design history to their own observation and interpretation.	*analysing the ways of storing food used by different cultures and in history in considering shapes and forms of new containers*

PROGRAMME OF STUDY	EXAMPLES
Satisfying needs and addressing opportunities	
• develop effective pricing, promotion and distribution;	*setting up competing companies to design and sell badges*
• use techniques for planning effective cash flow and budgeting systems, including computer modelling, where appropriate, to evaluate options;	
• develop awareness of the competition which surrounds the development and application of inventions and the control of patents;	
• devise alternative solutions which meet social and environmental concerns;	*developing biodegradable or recyclable packaging*
• recognise potential conflicts between the needs of individuals and of society. Negotiate with people having different points of view.	

Attainment target and statements of attainment for information technology capability

Pupils should be able to use information technology to:

- **communicate and handle information;**
- **design, develop, explore and evaluate models of real or imaginary situations;**
- **measure and control physical variables and movement.**

They should be able to make informed judgements about the application and importance of information technology, and its effect on the quality of life.

Attainment target 5
Information technology capability

LEVEL	STATEMENTS OF ATTAINMENT	EXAMPLES
	Pupils should be able to:	
1	1a) work with a computer.	*Use an overlay keyboard to select items on a computer screen.*
	1b) talk about ways in which equipment, such as toys and domestic appliances, responds to signals or commands.	*Press a button to ring a door bell; turn a knob to adjust the volume of a tape recorder; observe the automatic switch on an electric kettle.*
2	2a) use computer-generated pictures, symbols, words or phrases to communicate meaning.	*Select furniture for a house displayed on the computer screen, using an overlay keyboard; construct a simple story as a sequence of words, pictures or sounds, using an overlay keyboard or mouse.*
	2b) use information technology for the storage and retrieval of information.	*Write about "today's weather" using a word processor so that the writing can be retrieved later.*
3	3a) use information technology to make, amend and present information.	*Use a word processor to draft a class diary; use information technology, with voices or conventional instruments to make music and replay it.*
	3b) give a sequence of direct instructions to control movement.	*Give instructions to another pupil playing the part of a robot; control the movement of a screen turtle, using turtle graphics.*
	3c) collect information and enter it in a database (whose structure may have been prepared in advance), and to select and retrieve information from the database.	*Enter data recording the birds using the school bird table, check the data and retrieve it to compare the numbers and types of birds on different days.*
	3d) describe their use of information technology and compare it with other methods.	*Write about the differences between using a programmable toy and giving instructions to another pupil; identify the differences between using pencil and paper and using information technology for handling information.*

LEVEL	STATEMENTS OF ATTAINMENT	EXAMPLES
4	4a) use information technology to retrieve, develop, organise and present work.	*Produce a class newsletter or a set of information screens to give parents information about the school.*
	4b) develop a set of commands to control the movement of a screen image or robot; understand that a computer program or procedure is a set of instructions to be followed in a pre-determined sequence.	*Drive a robot round an obstacle course or maze; use turtle graphics to draw a house.*
	4c) amend and add to information in an existing database, to check its plausibility and interrogate it.	*Store personal information (such as name, height, weight, age, sex, shoe size, hair colour, eye colour), check it is correctly stored and find the names of girls and boys with particular characteristics.*
	4d) understand the need to question the accuracy of displayed information and that results produced by a computer may be affected by incorrect data entry.	*Correct a file of data about individuals in the class in which some data has deliberately been entered incorrectly.*
	4e) use a computer model to detect patterns and relationships, and how the rules governing the model work.	*Use a program which simulates a trawler looking for fish, or an adventure program with a clearly defined objective.*
	4f) review their experience of information technology and consider applications in everyday life.	*Investigate overlay keyboards used in fast-food shops.*
5	5a) use information technology to present information in different forms for specific purposes.	*Edit a newspaper for parents; work together to produce a book for younger pupils.*
	5b) understand that a computer can control devices by a series of commands, and appreciate the need for precision in framing commands.	*Investigate control systems such as automatic doors and alarm systems; make a set of computer-controlled traffic lights.*
	5c) use a software package to create a computer database so that data can be captured, stored and retrieved.	*Use information from a survey of prices of goods in local shops and markets.*
	5d) use information technology to explore patterns and relationships, and to form and test simple hypotheses.	*Using a simulation, explore how the populations of predator and prey species fluctuate, and suggest when a predator is most active.*
	5e) understand that personal information may be held on computer, which is of interest to themselves and their families.	*Collect correspondence received by their families which has been addressed using computer databases and discuss data needed to produce it.*

LEVEL	STATEMENTS OF ATTAINMENT	EXAMPLES
6	6a) use information technology to combine and organise different forms of information for a presentation to an audience.	*Produce a report which involves use of different fonts and letter sizes, and illustrations.*
	6b) understand that devices can be made to respond to data from sensors.	*Use a computer to draw a graph of the temperature of a liquid as it cools; write a procedure, using a software package, to provide a warning sound if a light beam is interrupted.*
	6c) identify advantages and limitations of data-handling programs and graphics programs and recognise when these offer solutions to a problem of data handling.	*Use a desk-top publishing program to integrate text and images in the report of a scientific experiment; choose a data-handling program for processing the results of sports day.*
	6d) investigate and assess the consequences of of varying the data or the rules within a simple computer model.	*Define or change the way information is grouped into columns in a spreadsheet showing the nutritional values of types of meals; modify a turtle graphics procedure or its parameters to draw a variety of shapes and transform them.*
	6e) review experiences of using information technology and consider other applications and their impact on everyday life.	*Compare own use of control devices with bar codes used for automatic stock control in supermarkets; compare own expression of information using IT with computer-produced bills or personalised mail and consider the implications of access to personal information.*
7	7a) select software and use it to produce reports which combine different forms of information to fulfil specific purposes for a variety of audiences.	*Produce a presentation suited to a specific audience, combining graphics and text.*
	7b) design, use and construct a computer model of a situation or process and construct computer procedures involving variables.	*Model the queue of people waiting at a supermarket check-out and vary the service time, number of customers and number of check-outs.*
	7c) understand that the results of experiments can be obtained over long or short periods or at a distance using data-logging equipment.	*Use information technology to measure the acceleration of a model car as it runs down a ramp; interpret data transmitted by a weather satellite.*
	7d) select and interrogate a computer database to obtain information needed for a task.	*Make use of a large database about careers or courses, and refine techniques of enquiry to select relevant information.*
	7e) know when it is appropriate to use a software package for a task rather than other means of information handling.	*Consider the usefulness of a computer-aided design package to investigate the ergonomics of kitchen design.*
	7f) understand that dangerous or costly investigations, or those not easily measured can be simulated by information technology.	*Experiment with the operation of a simulated nuclear reactor.*

LEVEL	STATEMENTS OF ATTAINMENT	EXAMPLES
8	8a) design successful means of collecting information for computer processing.	*Design and refine a questionnaire for collecting complex data in a form suitable for analysis by computer; use monitoring and data-logging equipment to record environmental change.*
	8b) select and use software to capture and store data, taking account of retrieval, ease of analysis and the types of presentation required.	*Select and use database or viewdata software to provide information about local amenities.*
	8c) construct a device which responds to data from sensors; explain how they have made use of feedback when implementing a system incorporating monitoring and control.	*Use software to record movement patterns of small mammals, and produce graphs and tables for use in a presentation; develop a robot vehicle which follows a path marked on the ground.*
	8d) use software to represent a situation or process with variables, and show the relationship between them.	*Model and investigate the growth of bacteria using a spreadsheet, use a graph-plotting program to find a curve which fits a set of experimental data.*
	8e) understand why electronically stored personal information is potentially easier to misuse than that kept in conventional form.	*Consider cases of computer fraud and unauthorised access to computer files.*
9	9a) evaluate a software package or a complex computer model; analyse the situation for which it was developed; assess its efficiency, ease of implementation and appropriateness and suggest refinements.	*Evaluate a computer-assisted drafting program used in technology; a graphics package used in art; a desk-top publishing program used in English.*
	9b) design, implement and document a system for others to use.	*Design a system to investigate production schedules and stockholding strategies for a company making and distributing fast foods.*
	9c) understand the effects of inaccurate data in files of personal information.	*Research cases where the use of inaccurate data has caused inconvenience; investigate safeguards on access to personal data in computer systems.*

LEVEL	STATEMENTS OF ATTAINMENT	EXAMPLES
10	10a) decide how to model a system, and design, implement and test it; justify methods used and choices made.	*Develop a system for monitoring the performance of a central heating system in order to plan a system for a house or school; develop a system for notifying parents that their child's immunisation is due.*
	10b) discuss the environmental, ethical, moral, and social issues raised by information technology.	*Visit organisations making extensive use of information technology; prepare for the visit by deciding issues to be discussed with employees, such as how information technology was introduced, its effects on their work, their view of information technology; make suggestions about how the introduction of information technology might have been improved.*

Note: Pupils unable to communicate by speech, writing or drawing may use other means including the use of technology or symbols as alternatives.

ATTITUDES.

Programmes of study for information technology capability

In each key stage pupils should develop information technology capabilities through a range of curriculum activities which will:

- develop confidence and satisfaction in the use of information technology;
- broaden pupils' understanding of the effects of the use of information technology;
- encourage the flexibility needed to take advantage of future developments in information technology;
- enable pupils to become familiar with the computer keyboard;
- encourage the development of perseverance;
- enable pupils to take greater responsibility for their own learning, and provide opportunities for them to decide when it is appropriate to use information technology in their work.

Programme of study for key stage 1

Levels 1 to 3 (ages 5 to 7)

Pupils should be taught:

- that control is integral in many everyday products, *such as cookers, cars, telephones;*
- that information technology can be used to help plan and organise ideas in written and graphical form;
- how to give instructions to electronic devices, *such as programmable toys and computers;*
- how to store, select and analyse information using software, *for example using a simple database package;*
- that information technology can be used for tasks which can often also be accomplished by other means.

In addition pupils working toward level 1 should be taught to:

- know that information can be held in a variety of forms, *for example words, numbers, pictures, sounds;*
- know that it is not always necessary to use the computer keyboard in order to produce information, *for example, by using an overlay keyboard to select musical phrases; by using a two-position switch to select from a menu;*
- control everyday items, *such as central heating thermostats and televisions,* and describe the effects of their actions.

Pupils working towards level 2 should be taught to:

- know that IT can be used to store, modify and retrieve information in words, pictures and sounds;
- organise and present ideas using IT, *for example using a simple word processor package.*

Pupils working towards level 3 should be taught to:

- use software packages confidently and well;
- locate information stored in a database; retrieve information and add to it; check the accuracy of entries.

Programme of study for key stage 2

Levels 2 to 5 (ages 7 to 11)

Pupils should be taught to:

- organise, develop and present ideas in a variety of forms by using software packages, *for example using a word processor or desk-top publishing program;*
- put existing information into a new format, *for example a newspaper, "teletext" screen, message to a remote receiver,* taking account of the audience;
- use information technology to organise ideas in written, pictorial, symbolic and aural forms;
- work together to prepare and present stored information using information technology;
- know that programmable devices, *such as programmable toys and computers* can be controlled using sequences of instructions;
- use information technology for investigations requiring the analysis of data, *for example using a simple database;*
- know that information technology can be used to do things which can also be done in other ways, *for example using a database rather than a card index;*
- know that computers are used to store personal information, *for example medical records and commercial mailing lists.*

In addition for pupils working towards levels 2 and 3, teachers should refer to the relevant material in the programmes of study for key stage 1.

Pupils working towards level 4 should be taught to:

- find and present stored information, *for example retrieve text and amend it using a word processing program; retrieve an image and amend it, replay a musical composition and improve it;*
- insert and amend information in a computer database; test their procedures by checking how reasonable the results are, *for example comparing collected data with national statistics;*
- analyse the patterns and relationships in a computer model to establish how its rules operate; change the rules and predict the effect, *for example considering the way an adventure program responds to the choices made by the user;*
- review their use of information technology and consider applications in the outside world, *for example compare production techniques of a class newspaper with those of a commercial newspaper publisher.*

Pupils working towards level 5 should be taught to:

- collect and organise information for entry into a database, *for example design, trial and refine a questionnaire intended to collect information for a database;*
- know that the order in which instructions are presented, and the form in which they are given to a computer is important, *for example investigate the effect on a computer-controlled model of changing the order of the instructions;*
- write a simple computer program for a particular purpose, *for example a turtle graphics program to draw a street of houses; a set of instructions to operate a simple database program.*

Programme of study for key stage 3

Levels 3 to 7 (ages 11 to 14)

Pupils should be taught to:

- integrate more than one form of information, *for example words and pictures; symbols; pictures and sound,* into a single presentation or report for a particular audience;
  - *desk-top publishing to write about population growth, illustrating with graphs and charts; develop a sequence of screens of information to introduce visitors to the school, co-ordinated with a spoken commentary on a tape recorder;*

- work together to prepare and present information using information technology;

- use information technology to work more effectively;
  - *use a word processor for developing ideas for an essay: use a graphics program to investigate colour combinations for a design (instead of producing a series of design examples by hand);*

- know that each software item has its own strengths and weaknesses, and that the selection of software involves consideration of the facilities offered, ease and simplicity of use, availability and cost;

- select software for a task or application;
  - *choose between a word processing or desk-top publishing package to produce a book for young readers; choose between a database or spreadsheet program to store data about the additives contained in popular foods;*

- know that the use of information technology does not always provide an appropriate solution to a need, and that the effectiveness, appropriateness, and cost of alternative solutions must be considered;
  - *compare books, directories and databases as means of storing and presenting information;*

- know that information technology is used to monitor physical events and conditions, and to process, present and respond to collected data, *for example monitor the dampness of the soil around house plants, with a view to developing a self-watering system;*

- review and discuss their use of information technology applications and to consider related applications in the outside world, and their impact on daily life, *for example compare the setting up and running of a school viewdata system with that of a travel agent.*

In addition for pupils working towards level 3, teachers should refer to relevant material for key stage 1.

In addition for pupils working towards levels 4 and 5 teachers should refer to key stage 2.

Pupils working towards level 6 should be taught to:

- identify clearly the requirements, and make correct use of information technology equipment, software and techniques, in making presentations and reports;

  - *combining text and images in different ways for a newspaper report and a poster; composing and playing music to a class;*

- modify the data and rules of a computer model;
  - *examine the development of a simulated colony of pond algae by varying the rules of reproduction.*

Pupils working towards level 7 should be taught to:

- know that outcomes are affected by incorrect data, inappropriate procedures, limitations in the methods of data capture and the techniques of enquiry used to retrieve information; *for example compare the quality and quantity of data obtained by direct recording such as local weather statistics and remote recording by satellite monitoring;*

- translate an enquiry expressed in ordinary language into forms required by information retrieval systems;

- use search methods to obtain accurate and relevant information from a database; *for example use a database where knowledge of Boolean logic will improve the efficiency of the enquiry;*

- design a computer model for a specific purpose.

Programme of study for key stage 4

Levels 4 to 10 (ages 14 to 16)

Pupils should be taught to:

- work together, using discussion, explanation and negotiation, to improve the quality of the information presented using information technology;

- use information technology to improve efficiency and to support new ways of working;
  - *make use of a word processor for the entire development and production of a piece of written work; use information technology as a single means of accessing large databases instead of using a variety of printed sources of information;*

- select software appropriate for a particular task or application;
  - *choose between a word processing or desk-top publishing package, to develop a book for young readers; choose a database package which can handle large quantities of data, to set up a system to contain the results of a questionnaire for the whole school; choose an integrated software package to include the statistics from a database enquiry in a report;*

- know that there is an increasing range of methods of collecting data for computer processing, including many in which data is collected automatically, without human intervention; *for example bar-coded food and book labels; bank cash cards; computerised car park passes; medical monitoring systems;*

- design and implement an information technology-based system for use by others, *for example design a computer-based system for recording pupil choices and preferences of school meals;*

- review and discuss their use of information technology and consider applications in the outside world, and the impact on daily life, including environmental, ethical, moral and social issues; *for example word processors being more widely available in schools or offices; widely available portable telephones.*

In addition for pupils working towards levels 4 and 5, teachers should refer to key stage 2.
In addition for pupils working towards levels 6 and 7, teachers should refer to key stage 3.

Pupils working towards level 8 should be taught to:

- define the information required, the purposes for which it is needed, and how it will be analysed; and to take these into account in designing ways of collecting and organising the information when creating a database, *for example create a database to enable a paint manufacturer to identify customers' preferences for colour and type of paint;*

- use information handling software to capture, store, retrieve, analyse and present information.

Pupils working towards level 9 should be taught to:

- evaluate methods of searching and sorting data manually and using a computer;
- know that the mathematical basis of a computer representation of a situation determines how accurately the model reflects reality; *for example a program to trace the trajectory of a tennis ball; a spreadsheet to anticipate trends in predator/prey populations;*
- analyse a situation, and then design, implement, assess and refine a complex model to represent it.

Pupils working towards level 10 should be taught to:

- analyse systems to be modelled using information technology, make choices in designing, implementing and testing them, and justify the methods they have used.

Department of Education and Science

Elizabeth House
York Road
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Circular No 3/90
6 March 1990

To: Local Education Authorities

Chief Education Officers of
Inner London Boroughs
and the City Remembrancer

Heads and Governing Bodies
of Maintained Schools

Teacher Training Institutions

Other bodies

THE EDUCATION REFORM ACT 1988:

NATIONAL CURRICULUM: SECTION 4 ORDER TECHNOLOGY: DESIGN AND TECHNOLOGY AND INFORMATION TECHNOLOGY

CONTENTS

I INTRODUCTION

1. This Circular provides guidance on the Order for technology in Key Stages 1-4 which the Secretary of State laid before Parliament on 6 March 1990 under Section 4 of the Education Reform Act 1988.

2. The guidance contained in this Circular does not constitute an authoritative legal interpretation of the provisions of the Act: that is a matter for the courts.

3. All enquiries about this Circular should be addressed to Miss Jenny Manton Schools 3 Branch, Department of Education and Science, Elizabeth House, York Road, London SE1 7PH. Tel (01) 934 0960.

II BACKGROUND

4. In April 1988 the Secretaries of State appointed a working group to advise them on attainment targets and programmes of study for technology. In the light of the group's recommendations the Secretaries of State published proposals which were the subject of statutory consultation. In England this consultation was carried out by the National Curriculum Council (NCC) whose advice was published on 3 November 1989. The Secretaries of State published on 7 December 1989 for further comment a draft Order and associated Document containing details of the attainment targets and programmes of study for technology. All proposed or draft versions of the attainment targets and programmes of study in the Order[1] now laid before Parliament are now superseded.

5. The details of the statutory attainment targets and programmes of study are contained in the associated Document published by Her Majesty's Stationery Office (HMSO) entitled "Technology in the National Curriculum" (ISBN 0 11 270709 2).

6. The Order and the associated Document both have statutory force, with the exception of the italicised text in the Document which is non-statutory. This is mainly in the form of examples which serve to illustrate the statements of attainment and the programmes of study rather than to suggest what should be taught or how.

7. The Order and the associated Document for technology will start to come into force for each key stage as follows:

Key Stage 1	1 August 1990
Key Stage 2	1 August 1990
Key Stage 3	1 August 1990
Key Stage 4	1 August 1993

Definitions of the four key stages are given in Annex 1.

III COMMENCEMENT DATES

8. Details of the commencement dates are set out in Table 1. Paragraphs 10-19 offer an explanatory commentary on the table.

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1 The Education (National Curriculum) (Attainment Targets and Programmes of Study in Technology) Order 1990.

TABLE 1

TECHNOLOGY — SECTION 4 ORDER — (ATTAINMENT TARGETS AND PROGRAMMES OF STUDY) COMMENCEMENT DATES [a]

	Key Stage 1	Key Stage 2	Key Stage 3	Key Stage 4
1990	1st cohort (Year 1) [b]	1st cohort (Year 3)	1st cohort (Year 7)	
1991	1st and 2nd cohorts (Years 1 & 2)	1st and 2nd cohorts (Years 3 & 4)	1st and 2nd cohorts (Years 7 & 8)	
1992	1st assessment reported to parents [c]	1st, 2nd & 3rd cohorts (Years 3,4, 5)	1st, 2nd & 3rd cohorts (Years 7, 8 & 9)	
1993	1st reported aggregate assessment [d]	1st, 2nd, 3rd & 4th cohorts (Years 3, 4, 5 & 6)	1st assessment reported to parents [c]	1st cohort (Year 10)
1994		1st assessment reported to to parents [c]	1st reported aggregate assessment [d]	1st and 2nd cohort (Year 10 & 11)
1995		1st reported aggregate assessment [d]		1st assessment (GCSE)

(a) Commencement dates for attainment targets and programmes of study are 1 August in each year. Assessment will take place in the summer term of the calender year. Section 4 Orders covering assessment will be laid in due course.

(b) Reference in brackets to year numbers follow terminology recommended by NCC and approved by the Secretary of State (see Annex 2).

(c) The results of the first assessment at the end of key stages 1,2 and 3 will only be required to be reported to parents in respect of their own children. This assessment will apply to the first cohort of pupils who have followed the attainment targets and programmes of study. Thus in 1992 pupils in Year 2 will be assessed at the end of Key Stage 1, in 1993 pupils in Year 9 will be assessed at the end of Key Stage 3 and in 1994 pupils in Year 6 will be assessed at the end of Key Stage 2.

(d) The first reported aggregate assessment will be of the second cohort of pupils who have followed the attainment targets and programmes of study.

Key Stage 1

9. For the school year 1990-91, the attainment targets and programmes of study set out in the Order and the associated Document for technology will apply only to pupils in the first year group of compulsory schooling — year 1. Any pupils aged five by the start of the school year who are in reception classes will of course also be covered. But the requirements will not apply to pupils then in the second year of the first key stage — Year 2 — even if that year group includes five year olds working in a teaching group composed mainly of six year olds.

10. For the school year 1991-92 and beyond, the attainment targets and programmes of study will apply to pupils in the first and second years of the first key stage (see Table 1).

11. During the summer of 1992, pupils at the end of the first key stage will be assessed against the attainment targets. But this assessment will be a trial run and the results will only be required to be reported to parents in respect of their own children. The first formal assessment at the end of the first key stage for which results will be required to be published in aggregate form will be in the summer of 1993, ie for the second cohort of pupils who have been taught according to the requirements in the Order and associated Document.

Key Stage 2

12. For the school year 1990-91, attainment targets and programmes of study for technology will apply to pupils entering the first year of the second key stage — Year 3 — ie pupils in a teaching group in which the majority of pupils will reach the age of eight during the school year 1990-91. Thereafter the requirements will extend to each successive year of the key stage.

13. During the summer of 1994 pupils at the end of the second key stage will be assessed, and the results of this assessment will be required to be reported formally to parents in respect of their own children. They will not however be required to be published in aggregate form until the summer of 1995.

Key Stage 3

14. For the school year 1990-91, attainment targets and programmes of study for technology will apply to pupils entering the first year of the third key stage — Year 7 — ie pupils in a teaching group in which the majority of pupils will reach the age of twelve during the school year 1990-91. Thereafter the requirements will extend to each successive year of the key stage.

15. Pupils entering the third key stage may not have completed all the work in technology which is covered by the attainment targets and programmes of study for the first two key stages. Through liaison with primary schools and internal assessment, teachers will need to make an early review of the levels of attainment which these pupils have reached. Professional judgments can then be made about the choice of programme of study material within the range set for the third key stage appropriate to individual pupils' needs.

16. During the summer of 1993 pupils at the end of the third key stage will be assessed, and the results of this assessment will be required to be reported formally to parents in respect of their own children. They will not however be required to be published in aggregate form until the summer of 1994.

Key Stage 4

17. For the school year 1993-94, attainment targets and programmes of study for technology will apply to pupils entering the first year of the fourth key stage — year 10 — ie pupils in a teaching group in which the majority of pupils will reach the age of fifteen during the school year 1993-94. The requirements will extend to pupils in the second year of the key stage — year 11 — from Autumn 1994.

18. During the summer of 1995 the first cohort of pupils at the end of Key Stage 4 will be assessed. The main assessment instrument for the National Curriculum at this stage is the GCSE. Many pupils will take courses leading to a GCSE in technology. However the attainment targets and programmes of study for technology are flexible enough to allow a range of other options at Key Stage 4. There will be scope for combined courses in technology and one or more other subjects leading to a GCSE; and for courses in technology alone which take substantially less time than is required for a GCSE course. There will also continue to be scope for qualifications validated by the vocational examining bodies. The NCC is considering possibilities for combining technology with other subjects inside and outside the National Curriculum for GCSE purposes, and will be issuing guidance in due course.

Pupils will not be allowed to drop technology before the end of the key stage. The Secretary of State has asked the National Curriculum Council to consider what curricular options should be available for children who obtain a good GCSE in technology before the end of year 11. He has also asked the Council to publish general advice to schools on planning the curriculum at Key Stage 4, with examples of good practice.

IV ATTAINMENT TARGETS AND PROGRAMMES OF STUDY

19. The Act defines attainment targets as the knowledge, skills and understanding which pupils of different abilities and maturities are expected to have by the end of each key stage. They provide the objectives for what is to be learned in each subject during that key stage. Programmes of study are defined in the Act as the matters, skills and processes which are required to be taught to pupils of different abilities and maturities during each key stage. They set out the essential ground to be covered to enable pupils to meet the attainment targets at the range of levels specified for each key stage. The programmes of study for technology are grouped under each key stage but include some material which relates to individual levels of attainment appropriate to the Key Stage in question. Because of overlap in the range of levels for each key stage some level related material occurs in more than one key stage.

Range of levels of attainment for each key stage

20. Ranges of levels of attainment of the ten level scale adopted for the National Curriculum are specified in the Order for the key stages (KS) in technology as follows:

KS1	1-3
KS2	2-5
KS3	3-7
KS4	4-10

21. It is expected that the attainments of the great majority of pupils at the end of key stages will fall within these ranges of levels. Of course, pupils' actual attainments, as measured by assessment, may fall outside the ranges specified in the Order; but during the key stage teachers are

required to teach with a view to pupils achieving levels of attainment within the ranges specified. The working assumption, which will need to be tested in practice, has been that pupils should typically be capable of achieving around levels 2, 4, 5/6 and 6/7 respectively at or near the reporting ages of 7, 11, 14 and 16.

22. Teachers are expected to cover all the programmes of study requirements which relate to the whole key stages. They will also need to select from the programme of study material related to the ranges of levels of attainment according to their pupils' individual needs. Pupils may follow programmes of study material related to levels below or above the level towards which they are working if the teacher is satisfied that this will contribute to their overall progress.

Flexibility for teaching outside the ranges of levels specified

23. There are a number of ways in which the current provisions allow for a pupil to be taught programme of study material specific to levels outside the ranges specified where it is sensible to do so:

(i) provided the pupil is mainly taught programme of study material within the range of levels specified for his or her key stage, a school may teach the pupil for part of the time at a level outside that range. For example, an 8 year old not ready for work at level 2 (bottom of the range specified for Key Stage 2 in technology) might be given work at level 1 for part of the time; conversely, a pupil in the third key stage in technology who had, in the teacher's view, already achieved a level 7 standard against some attainment targets (top of the range specified for the third key stage), might be given work on an individual basis at a higher level, while remaining in his or her class of 13 year olds;

(ii) where it makes sense and is practicable, the pupil may be moved up or down a key stage by placing him or her in a teaching group in which the majority of pupils are older or younger. There is, however, no requirement or expectation that pupils should be moved up and down in this way, except where the school judges this to be in the best interests of the pupil;

(iii) a statement of special educational needs may specify disapplication or some modification in the ranges of levels appropriate at different key stages for the individual child.

24. It is expected that the flexibility offered by (i) and (ii) above will deal with very nearly all cases where pupils need to be taught outside the ranges specified for key stages, and that there should be no need, on this account, for a significant increase in the extent to which statementing procedures are used. The Department will keep under review the effect of the new provisions on statementing practice.

V SCHEMES OF WORK

25. Under Section 10(2) of the Act the head teacher has a duty to secure the implementation of the National Curriculum. The head will need to consider with his or her staff whether existing schemes of work adequately cover the attainment targets and programmes of study, or whether the schemes of work need modifying.

26. Section 10(3) of the Act allows it to be made a requirement for schools to teach the foundation subjects for a reasonable time until the attainment targets and programmes of study are fully implemented. The purpose is to ensure that pupils benefit as soon as possible from a broad, balanced curriculum. The requirement is already in effect for all the foundation subjects for pupils in key stages 1-3, except those with statements of special need. It will be extended to pupils with statements in autumn 1990 when it will also start to apply for the core subjects to all pupils in key stage 4.

27. It is accepted, however, that schools need to know the full outline of the National Curriculum before these arrangements could be applied to all the foundation subjects in Key Stage 4. Accordingly, for the non-core subjects it has been decided to introduce the requirement no earlier than 1993.

28. Parents do not have the right to withdraw their children from lessons covering the information technology or any other attainment target and programme of study specified in the technology Order and associated Document. Technology lessons will require pupils to use and learn about computers; other National Curriculum subjects will also involve computing. It is however for schools themselves to decide how far to use other forms of information technology — eg television or radio programmes and videos — to deliver the curriculum, whether in technology or in any other subject. Head teachers and their staff will wish to have regard to parents' views in using these media for teaching and may wish to provide individual pupils, where practicable, with alternative materials. An important issue for head teachers and their staff in making decisions about such use of alternative materials should be whether pupils' access to the curriculum would be seriously harmed if they did not participate in lessons involving the use of these media.

VI CROSS-CURRICULAR THEMES

29. Attainment targets and programmes of study for technology contribute to some cross-curricular themes. For example, economic and industrial understanding, environmental education and health education. The NCC is publishing guidance on cross curricular themes. NCC Circular No.6 provides initial guidance and will be followed by others on cross curricular provision generally and on particular themes.

VII ASSESSMENT ARRANGEMENTS

30. The achievement of individual pupils in relation to the attainment targets for technology will have to be assessed at or near the end of the key stage. The Government has accepted the general model proposed by TGAT as a starting point for considering the conduct of assessment. SEAC has been asked to advise on how that general model might most appropriately be applied in each foundation subject. In the light of SEAC's advice, the Secretary of State will in due course set out the precise assessment arrangements for technology in each of the key stages in an Order under Section 4 of the Act.

31. In the meantime, schools will wish to build on their existing assessment and recording procedures and apply them to pupils well in advance of the first trial run:

i. to ensure that individual pupils are working at the appropriate level for any given attainment target and programme of study;

ii. to be able to inform those with an interest — notably parents, or other teachers with current or imminent responsibility for the pupil — about individual pupils' progress; and

iii. to build up a bank of relevant information about a pupil's progress, including possibly samples of work, on which to draw in the context of any discussions about the level that pupil is judged to have reached at the end of the key stage.

32. Regulations made under Section 218 of the Act govern recording arrangements. These arrangements came into force for all pupils attending maintained primary, secondary or special schools, including grant-maintained schools, from 1 September 1989. Regulations will be introduced later under Section 22 of the Act covering, inter alia, the manner and form in which the assessments of individual pupils are to be made available to parents and other interested parties, and the manner and form in which the aggregate results of schools are to be made available more generally.

VIII PUPILS WITH SPECIAL EDUCATIONAL NEEDS

33. Paragraph 22 above has explained that the range of levels specified in the Orders for the four key stages should be broad enough to cover the substantial majority of the ability spectrum at each reporting age. The Document for technology describes how the requirements of some of the attainment targets and programmes of study may be modified for pupils with identified special needs so as to ensure that they enjoy the fullest possible benefit of the National Curriculum without unnecessary recourse to making or amending a statement of special educational needs under the 1981 Education Act. The Government does not envisage that it will be necessary to prepare Regulations under Section 17 of the Act to modify or disapply the ranges specified in the Orders for pupils with special educational needs.

34. In addition, under Section 18 of the Education Reform Act a statement made under the 1981 Act may modify or disapply any or all of the requirements of the National Curriculum if they are inappropriate for an individual pupil. The connection with a statement ensures that any departure from the National Curriculum will be decided in the light of educational, medical, psychological and other evidence about the pupil, including the views of the pupil's parents. That procedure is subject to consultation with parents and to their right of appeal under the 1981 Act as amended by paragraphs 84 and 85 of Schedule 12 to the Education Reform Act.

35. The Education (National Curriculum) (Temporary Exceptions for individual Pupils) Regulations 1989[2] allow head teachers to give directions temporarily disapplying or modifying the National Curriculum requirements for individual pupils where they judge that a pupil falls within the cases or circumstances specified. Directions may be one of two kinds. General directions may be given for pupils with short-term problems who are expected to resume full participation in the National Curriculum within 6 months — eg pupils who have had long periods out of school, perhaps because of an illness. These directions may be given for pupils with or without special educational needs. Alternatively, special directions may be given, where appropriate, for pupils whose circumstances indicate a need for them to be assessed under Section 5 of the Education Act 1981 with a view to making or amending a statement of special educational needs. Such pupils may need provision made within a statement for longer-term exceptions from the National Curriculum.

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2 SI 1989/1811. For further guidance see DES Circular 15/89 — Education Reform Act 1988: Temporary Exceptions from the National Curriculum.

36. Schools should bear in mind that the objective of the National Curriculum is to ensure that each pupil should obtain maximum benefit, by stretching the pupil to reach his or her potential, but without making impossible demands. Provisions for modification or disapplication should be applied sensitively.

37. It is the responsibility of the local education authority to ensure that pupils with statements of special educational needs have their statements amended, if this is necessary, to take account of the introduction of the National Curriculum, in time to meet the timetable set out in Table 1. Given the arrangements described in paragraphs 33-36 above, there should be no need for a significant increase in the extent to which statementing procedures are used as a consequence of the technology requirements.

IX IMPLEMENTATION

38. A comprehensive statement of statutory responsibilities for the National Curriculum is set out in Circular 5/89: "The Education Reform Act 1988: The School Curriculum and Assessment".

39. In preparing to implement the statutory requirements for technology, LEAs should make use of funding provided under the Local Education Authority Training Grants Scheme (LEATGS) and Education Support Grants. Relevant ESG categories for the financial year 1990/91 include the Basic Curriculum and Assessment (Category XXVIII), Science and Technology in Primary Schools (Category I) and IT in Schools (Category XXII).

40. For the purpose of enabling development work or experiments to be carried out, Section 16 of the Act provides that the Secretary of State may direct, as respects a particular maintained school, that the provisions of the National Curriculum shall not apply, or shall apply with modifications. This enables proposals for development work and experiments which would require disapplication or modification of the statutory requirements for technology to be approved by the Secretary of State, if appropriate. The detailed arrangements for this are set out in paragraphs 49 to 54 of Circular 5/89.

X REVIEW AND UPDATING

41. The NCC is responsible for keeping the National Curriculum under review and advising the Secretary of State on requirements for changes in the light of experience. Her Majesty's Inspectorate will also be monitoring schools' experience of the statutory requirements. In addition the Department will be making its own evaluation. The provisions contained in the Order and the associated Document will be updated and revised as necessary in the light of experience.

XI ALLOCATION OF STATUTORY DOCUMENTS

42. It is important that there is easy access to reference copies of the statutory Documents for all who need to use them. Copies, which include a facsimile of the relevant Order and a copy of this Circular, are therefore being distributed free to local education authorities, schools, institutions providing initial teacher training and national bodies. In accordance with The Education (School Curriculum and Related Information) Regulations 1989[3], schools should ensure that parents and others can have access to them. In all cases these copies of the Documents will remain the property

3 SI 1989/954. For further guidance see DES Circular 14/89.

of the local education authority/institution and not the individuals to whom they are made available. Further prices copies of the Document are available from HMSO. In addition, shrink wrapped editions without ring binders are available by mail order from the HMSO Publications Centre, PO Box 276, London SW8 5DT.

43. The key elements (including attainment targets and programmes of study) of the Statutory Documents for all National Curriculum foundation subjects are to be made accessible through the National Educational Resources Information Services (NERIS), and may be made available on disc for those who might wish to use this for training purposes or for an analysis in devising schemes of work. Further details may be obtained from the contact point given in paragraph 3 above.

JOHN CAINES C.B.

THE KEY STAGES

For the purposes of the National Curriculum the Act divides the period of compulsory schooling into four key stages.

Key Stage 1 begins with a pupil becoming of compulsory school age (that is, the start of the term after his or her fifth birthday), and ends at the end of the school year in which the majority of pupils in his or her class or teaching group attain the age of seven.

Key Stage 2 for a pupil is the period beginning at the start of the school year in which the majority of pupils in his or her class attain the age of eight and ends at the end of the school year in which the majority of pupils in his or her class attain the age of eleven.

Key Stage 3 for a pipil is the period beginning at the start of the school year in which the majority of pupils in his or her class attain the age of twelve and ends at the end of the school year in which the majority of pupils in his or her class attain the age of fourteen.

Key Stage 4 for a pupil is the period beginning at the start of the school year in which the majority of pupils in his or her class attain the age of fifteen and ends when the majority of pupils in his or her class cease to be of compulsory school age.

An individual pupil in a teaching group may of course be younger or older than the age of the majority. Section 3(6) of the Act makes clear that it is the teaching group which a pupil is in for each foundation subject, not the registration class, which determines the key stage which is applicable to the pupil for that subject. So a pupil could be taught with another age group for one or more subjects where appropriate, eg in order to pursue that subject at a higher or lower level, while being taught with his or her peer group for other subjects. There is nothing, however, in the Act to require pupils to repeat a year, or to move early to a higher year group.

In some cases, for example in small primary schools, pupils may be in classes or teaching groups spanning more than one age group. To deal with this, Section 3(5) of the Act gives head teachers the right to determine the key stage appropriate to a pupil according to his or her chronological age, rather than according to the age of the majority of pupils in the class or teaching group.

A NEW DESCRIPTION FOR SCHOOL YEAR GROUPS

(Text of NCC Circular No 2: February 1989)

1. There has in England been no agreed description of the progress of pupils through all stages of schooling such as that in use in Scotland, in may European countries and in North America. Schools have used their own descriptions, usually based on a break at age 11, which is no longer universal. There is need for a simple and easily understood system.

2. The introduction of the National Curriculum from September 1989 underlines the need and provides the opportunity for a uniform description. The Secretary of State for Education and Science has agreed to the proposal of the National Curriculum Council that a system should be introduced. It will be used by DES, HMI and, we expect, local authorities and schools. NCC will use it in all circulars and guidance. It will not however be statutory.

3. The new description is as follows:

Key Stage*	New description	Abbreviation	Age of majority of pupils at the end of the academic year
	Reception+	R	5
1	Year 1	Y1	6
	Year 2	Y2	7
2	Year 3	Y3	8
	Year 4	Y4	9
	Year 5	Y5	10
	Year 6	Y6	11
3	Year 7	Y7	12
	Year 8	Y8	13
	Year 9	Y9	14
4	Year 10	Y10	15
	Year 11	Y11	16
—	Year 12	Y12	17
	Year 13	Y13	18

* The key stages of compulsory education are described in section 3 of the Education Reform Act. Assessment under the National Curriculum takes place at or near the end of each key stage.

\+ Key Stage 1 for the National Curriculum also includes those pupils in reception classes (R) who have reached compulsory school age. The new description does not cover nursery provision. Special arrangements for applying the National Curriculum to five year olds in school year 1989/90 are contained in NCC circular number 1.

4. The new description will emphasise continuity from the beginning of compulsory schooling at 5 to the age of 18. It will encourage pupils and their parents to regard as normal the completion of thirteen years of full-time education.

5. Schools may wish to number age groups in accordance with the new description but will be under no obligation to do so.