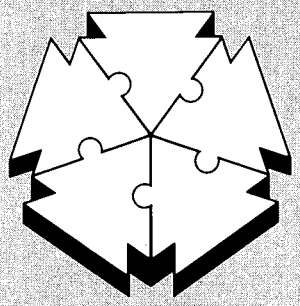
CAMBRIDGE
UNIVERSITY PRESS & ASSESSMENT

GCSE

Biology

Session: 1994
Type: Syllabus
Code: 1325



Midland
Examining
Group

GENERAL CERTIFICATE OF SECONDARY EDUCATION

SCIENCE: BIOLOGY

Syllabus Code 1325

1004

Examination
Syllabus

GENERAL INFORMATION

Availability: This syllabus will be examined by the Midland Examining Group (MEG) in the Summer of the year shown on the cover.

Details of the provision of Autumn examinations are given in Part 2 of the MEG Handbook for Centres.

Certification: This subject will be shown on the GCSE certificate as

SCIENCE: BIOLOGY

Certificates will be issued by the Home Board on behalf of MEG.

Exclusions: In any one examination series, candidates entering for this subject may not in addition enter for any other MEG examination with the same certification title.

Entries: All candidates, including private candidates, must be entered by a Centre registered with MEG.

In order to enter candidates, a Centre must register with one of the MEG Boards (designated its Home Board). The Centre must make its entries for all MEG examinations through that Home Board.

All candidates must meet the full requirements of this syllabus and must therefore have their Course Work/Assessed Practical Work authenticated and assessed by an approved Centre.

Results: Results will be certificated as levels 4 - 10 of the National Curriculum ten level scale.

The relationship between the National Curriculum levels and GCSE grades certificated up to 1993 is shown below:

Grade	Level
	10
A	9
B	8
C	7
D	6
E	
F	5
G	4

Enquiries: All enquiries about MEG or its examinations should be made to the Centre's Home Board.

Addresses and telephone numbers of the Boards in MEG are given on the back cover of this syllabus.

Marginal downrules indicate alterations to the previous year's syllabus, where appropriate.

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SCIENCE: BIOLOGY
(Syllabus Code 1325)

AIMS

1 To develop an interest in, and enjoyment of, the study of living organisms.

2 To develop and encourage an attitude of curiosity and scientific enquiry.

3 To promote awareness of, and an appreciation of, the development and significance of Biology in personal, social, environmental, economic and technological contexts.

4 To develop a concerned and informed awareness of relationships between living organisms, of relationships between organisms and their environment, of the effect of human activities on these relationships, and to promote a respect for all forms of life.

5 To provide a worthwhile educational experience for all, a suitable preparation for careers which require a knowledge of Biology, and a suitable foundation for further studies in Biology and related disciplines.

6 To develop knowledge and understanding of fundamental biological concepts and principles.

7 To promote an appreciation of the importance, relevance and limitations of experimental and investigatory work in the study of Biology and its wider applications.

8 To develop a critical approach to evidence and the ability to apply knowledge and to solve problems.

9 To develop communicative, observational and manipulative skills, including the safe and effective use of apparatus and the handling of biological and chemical materials.

Not all these aims can be translated readily into assessment objectives.

ASSESSMENT OBJECTIVES

The assessment objectives listed below reflect those aspects of the aims which will be assessed. The assessment will include wherever appropriate, personal, social, environmental, economic and technological applications of biology in modern society. Candidates should be able, under the following headings:

A Knowledge with understanding

to demonstrate biological knowledge and understanding in relation to the use of

1 language: terms, symbols, quantities and units,
2 facts, concepts, principles, patterns, models and theories,
3 the techniques, procedures and principles of safe laboratory work,

B Handling ideas and information

B1 Handling Information

to use oral, written, symbolic, graphical and numerical material to

1 locate, select, organise and present information from a variety of sources,
2 translate information from one form into another form,
3 use information to identify patterns, report trends and draw inferences.

B2 Solving Problems

to use knowledge to

1 present reasoned explanations for phenomena, patterns and relationships,
2 make predictions and propose hypotheses,
3 solve problems, including some of a quantitative nature.

C Practical activities

C1 Practical skills and techniques

1 to follow instructions,
2 to use and organise techniques, apparatus and materials,
3 to handle apparatus and materials safely and correctly,
4 to make and record observations, measurements and estimates.

C2 Practical enquiries carried out by candidate

1 to identify problems and plan an investigation,
2 to organise and conduct an investigation in a systematic manner,
3 to interpret and evaluate observations and experimental data,
4 to evaluate methods and suggest improvements.

WEIGHTING OF OBJECTIVES

The table below indicates mark allocations and relationships between the assessment objectives and the content. It is recognised that marks cannot be allocated with total precision to particular assessment objectives within elements of an examination but it is intended that the figures should provide a clear guide to the required degrees of emphasis.

The same balance as indicated in the National Criteria for Biology will be maintained whether candidates take the Basic Scheme or the Extended Scheme of examination.

At least 15% of the marks in the complete examination will be allocated to topics related to personal, social, economic and technological applications of biology, with the greater emphasis being given to technological considerations.

Assessment Objectives / Content	A Knowledge with Understanding	B Handling ideas and Information C Practical Activities	Mark allocations in complete assessment
Theme I. Diversity of Organisms			between 5% and 10%
Theme II. Relationships between Organisms and with the Environment			between 25% and 40%
Theme III. Organisation and Maintenance of the Individual			between 25% and 40%
Theme IV. Development of Organisms and the Continuity of Life			between 15% and 25%
Mark allocations in complete assessment	Of the order of 45%	Not less than 40% (at least 20% to experimental and observational skills)	

SCHEME OF ASSESSMENT

There will be three written components and an internal assessment of experimental skills, of which Components 1, 2 and the Internal Assessment, Component 4, will be compulsory. Components 1 and 2 will be papers allowing scope for weaker candidates to demonstrate their ability in Biology. Component 3 will be an optional extension paper allowing scope for more able candidates to demonstrate their ability.

Components 1 and 2, together with the Internal Assessment, are therefore intended for candidates of middle and low ability. Levels 7-4 will be awarded on the performance in this part of the examination.

Component 3 is designed to provide discrimination between candidates of higher ability, and Levels 10, 9 and 8 may be awarded on this part of the examination. Only candidates for whom there is some expectation of gaining a Level 10,9 or 8 should be entered for Component 3.

(a) Candidates will be awarded levels up to Level 7 on the basis of their performance on Paper 1 and 2 together with the Internal Assessment.

(b) Candidates who achieve a Level 6 or 7 on the basis of performance on (a) above and a Level 10, 9 or 8 mark on the optional extension paper will be awarded Level 10, 9 or 8 respectively. The internal assessment of experimental skills will make an appropriate contribution to the award of Levels 10, 9 and 8.

The following components will be set:

Component 1	Multiple Choice Test (Paper 1) (1 hour) (30%). Fifty items of the five choice type will be set. Neither multiple completion nor assertion/reason items will be included. This paper will assess objectives A and B.
Component 2	Paper 2 (1 hour 20 minutes) (50%) will consist of two sections, in which all questions are compulsory. Section A (40 minutes) will consist of short answer questions assessing mainly objective A. Section B (40 minutes) will consist of short answer questions including the assessment of data interpretation and test mainly objective B.
Component 3	Optional Paper 3 (1 hour 30 minutes) will consist of two sections. Section A (40 minutes) will consist of short answer questions, including the assessment of data interpretation and test objectives A and B. Section B (50 minutes) will consist of two pairs of structured free-response questions from which candidates will be expected to answer one question from each pair. It will test assessment objectives A and B.
Component 4	Internal assessment of experimental skills (20%) Refer to pages 22 to 28.

Private Candidates
The syllabus is available to private candidates provided they are able to undertake assessed practical work (Component 4).

Weightings

The different parts of the examination will be weighted as shown in the table below.

BASIC SCHEME for the award of Levels 7, 6, 5, 4		EXTENDED SCHEME for the award of Levels 10, 9, 8	
COMPONENTS		COMPONENTS	
Description	**Weighting**	**Description**	**Weighting**
Paper 1 (1 hour)	30%	Paper 3 (1 h 30 min)	80%
Paper 2 (1 h 20 min)	50%		
Internal Assessment	20%	Internal Assessment	20%

Differentiation

The purpose of this differentiated scheme of assessment, by using components that are designed to test particular parts of the ability range, is to examine candidates at levels at which they can demonstrate achievement and provide positive evidence of attainment.

It follows that if candidates are to obtain benefit from taking papers designed to meet their particular needs, Centres must take care to ensure that each candidate is entered for the combination of papers for which he or she is most suited.

It should be recognised that papers designed primarily for candidates expected to achieve the lower levels will be unlikely to yield sufficient evidence of higher abilities for the highest levels to be awarded.

Candidates who take the Extended Scheme will be expected to achieve at least a Level 6 on the Basic Scheme in order to be awarded Levels 10, 9 and 8 on component 3. A poor performance on Paper 3, however, will in no way affect the level awarded for components 1, 2 and 4.

MATHEMATICAL, PHYSICAL AND CHEMICAL CONCEPTS

For the assessment of this syllabus the following background will be assumed.

1 An understanding of temperature, pressure and evaporation.

2 An understanding of the terms elements, mixtures, compounds, atoms, molecules and ions.

3 An understanding of the terms acids, bases and pH values.

4 An understanding of energy transfer/conversion.

5 An understanding of decimals, fractions, percentages, ratios and means.

6 An ability to construct simple line graphs, bar charts and histograms (block graphs).

7 An understanding of the relationship between length, surface area and volume.

SUBJECT CONTENT

The subject content is set out in a three-column format. The left hand column indicates the main themes and topic areas. The centre column sets out the main concepts and principles and the right hand column provides amplification and notes for guidance.

Candidates will be expected to be able to demonstrate a clear understanding of any of the terms in bold type.

Cross-references (X-ref.) are provided to indicate areas of overlap or close association.

Suggestions are given for the approximate teacher time which may be devoted to each theme.

It is anticipated that courses based on this syllabus will be taught using as wide a range of organisms as possible with emphasis on familiar examples and on those occurring locally. Thus, the range of organisms used in teaching should not necessarily be limited to those organisms listed under Theme I, 2(b).

Theme I DIVERSITY OF ORGANISMS (approximately 5% of teaching time)

1 Characteristics of living organisms	All organisms have a method of nutrition, move, carry out respiration, excrete, respond to environmental changes, grow and reproduce.
2 Classification of living organisms	The concept and use of a classificatory system.
(a) Classification system and keys	The use of dichotomous keys based on common, observable characteristics shared by a group of organisms. The binomial system for the naming of species.
(b) Variety of organisms	The main features of living organisms (shown in brackets), as seen in living or preserved specimens where possible.

Viruses (non-cellular, totally parasitic)

Bacteria (cell wall, no nucleus)

Fungi (mycelium of hyphae, no chlorophyll, spores)

Flowering plants (flowers, fruits containing seeds)
- Monocotyledons, Dicotyledons (differences in leaf and seed structure)

Arthropods (exoskeleton, segmented body, jointed limbs)
- Insects (three body regions, wings, three pairs of legs)
- Crustaceans (two pairs of antennae)
- Arachnids (four pairs of legs)
- Myriapods (appendages on all segments)

Vertebrates (spinal cord protected by vertebrae)
- Fish (scales, gills and fins)
- Amphibians (moist skin, aquatic and terrestrial life cycle)
- Reptiles (dry scaly skin, soft-shelled egg)
- Birds (feathers, wings, hard-shelled egg)
- Mammals (hair, mammary glands)

Theme II RELATIONSHIPS BETWEEN ORGANISMS AND WITH THE ENVIRONMENT (approximately 25% of teaching time)

1 Fertile and infertile soils	The application of knowledge of soil structure to developing a fertile soil.	Soil pH, drainage and composition in terms of humus, water, air, mineral particles and micro-organisms, (X-ref. practical investigation, p. 27).
2 Food chains and food webs	The sun as the principal source of energy input to biological systems.	
(a) Source and flow of energy within the **ecosystem**	The importance of green plants as the energy converters and food producers in food chains.	The importance of energy to living organisms. The non-cyclical nature of energy-flow.
(b) Food chains	The relationship between producers, consumers and decomposers.	Components of a **food chain** in terms of **producers, consumers** and **decomposers** constituting a **community** in a chosen **habitat.**
(c) Food webs		The interpretation of a given **food web** with arrows indicating the direction of energy flow. Energy losses at each trophic level. **Pyramids of numbers and biomass.** The implications of green plants as primary sources of food in supplying food for Man.
(d) Biotechnology		The use of fermenters to mass-produce the desirable products of a fermentation and the need to maintain sterile and constant conditions in their operation.
3 Nutrient cycles	The importance to organisms of the recycling of nutrients.	The carbon cycle in terms of photosynthesis, heterotrophic nutrition, respiration, combustion.

		The nitrogen cycle in terms of the role of micro-organisms in providing usable nitrogen-containing substances by **decomposition** and **nitrogen fixation** in roots. The absorption of these substances by plants and their conversions to protein followed by passage through food chains, death, decay and the return of nitrogen to the soil or the atmosphere. Denitrification. (Names of intermediate products and specific micro-organisms are not required).
		The water cycle in terms of evaporation, transpiration, drainage, precipitation.
4 Population size and control	The effect of limiting factors on population size.	
		The effects of food supply, predation and disease as limiting factors in population size.
		The increase in population size in the absence of limiting factors (X-ref. Natural selection, p.21).
		The three phases of a sigmoid curve of population size, resulting from the action of one or more limiting factors.
		Predator/prey relationships and their influence on population size.
		Human population pyramid showing population by age structure.
		The social implications of Man's current survival rate, including the need for family planning.
5 Parasitism	The relationship between parasite and host.	
Main features of parasitism		The main features of the host-parasite relationship with special reference to transmission and control of the vector and of malarial pathogen. (Details of the life cycle of the pathogen are nor required). HIV as an example of a parasite and human cells as the host. The methods of spread and means of control. Social and medical problems of AIDS (X-ref. Human reproduction p.19).

6 Effects of Man on the ecosystem (a) Agriculture	The impact of technology on food production.	The conflict between maximising soil productivity and the destruction of fertile soil structure. The over-use of fertilisers including the pollution of freshwater and drinking water by nitrates.
(b) Industrial pollution	Industrialisation and population increase resulting in pollution.	Air pollution including the effects of lead in petrol and sulphur dioxide from combustion. Water pollution including the effects of domestic (sewage) and industrial (heavy metal and inorganic waste) effluents. The effects of Man in reducing pollution by means of clean air legislation and the control of effluent release into rivers.
7 Conservation	The concern of biologists to maintain species, habitats and resources.	**Conservation** and its implications. Examples should include: sites (Nature Reserves); amenity areas (reclamation of spoil heaps or gravel pits); natural resources (fish, timber and the recycling of paper); species (rare and endangered plants and animals and conservation of genes).

Theme III ORGANISATION AND MAINTENANCE OF THE INDIVIDUAL (approximately 45% of teaching time)

1 The cell	The cell as a mass of cytoplasm bounded by a membrane with genetic material in the nucleus. The relationship between cell structure and cell function.	The structure of a plant and animal cell as seen under the light microscope (X-ref. practical investigations, p. 27).

		The major differences between a 'generalised' plant cell and a 'generalised' animal cell.
		Variations in cell size and shape as shown by palisade cells and nerve cells.
		The existence of intracellular enzymes which catalyse stages in biochemical reactions.
		The importance of the cell membrane in controlling the passage of substances into and out of the cell.
2 Mitosis	The chromosomes as the sites of genetic information	An outline of mitosis only in terms of the exact duplication of chromosomes. (Details of DNA structure and replication are not required).
3 Tissues, organs and organ systems	Levels of biological organisation as illustrated by tissues, organs and organ systems.	**Tissues,** as composed of cells whose structures are modified to perform specialised functions as illustrated by the functions of: epithelia – protective; muscle – contractile; bone – support; palisade – nutritive; phloem – transport; xylem – support and conduction; nerve – communication.
		(Where cells are mentioned in this syllabus, the relationship between structure and function should be emphasised).
		Organs, as composed of one or more different tissues modified to perform specialised functions as illustrated by the eye and parts of the flower (X-ref. Sexual reproduction, p. 18).
		Organ systems as composed of organs which combine to perform specialised functions within organisms, (X-ref. appropriate part of the syllabus, e.g. alimentary, gaseous exchange, circulatory, excretory, nervous and reproductive systems).

4 Nutrition in plants	Photosynthesis as the fundamental process by which food is manufactured and on which most other forms of life, including humans, depend.	
(a) Photosynthesis		The process in terms of raw material intake, energy absorption and conversion (light energy to chemical energy, end products and subsequent storage, (X-ref. Energy, p.7).
		Equation in words or symbols.
		The upgrading of sugars into complex carbohydrates and fats and their functions.
		Leaf structure related to photosynthetic function. Surface area/ volume ratio. Light and chloroplasts; stomatal opening (guard cell turgidity) and mesophyll (palisade and spongy) in relation to gaseous **diffusion;** vascular bundles and the movement of water, salts and synthesised materials.
		The effect of light intensity and carbon dioxide concentration on the rate of photosynthesis.
(b) Basic nutritional requirements for healthy growth in plants.		Ion uptake: (nitrate and magnesium ions) their absorption by **active uptake** and use by the plant. Nitrogen as an essential element for amino acid and protein formation, building on photosynthetic products.
		The importance of artificial fertilisers (X-ref. Agriculture, p.9).
5 Nutrition in mammals	Basic nutritional requirements for healthy growth in mammals using synthesised food.	
(a) Classification of nutrients	The principles of building simple units into long chain molecules.	
		The elements present in carbohydrates, fats and proteins.

		Simple sugars to starch and glycogen, amino acids to proteins.
		The use of carbohydrates, proteins and fats in metabolism. Tests for starch (iodine), reducing sugar (Benedict's solution), protein (Biuret test) and fat (ethanol).
		Examples of foods rich in the three classes of nutrients. Mineral requirements – iron for blood and calcium for teeth and bones.
		Importance of vitamins; the source and functions of vitamins C and D. Vitamin C for connective tissue growth and production of strong skin and capillary lining cells. Vitamin D for the uptake of calcium ions leading to the maintenance of healthy teeth and bones. Signs and symptoms of scurvy and rickets.
		Necessity for, and sources of, fibre in the diet.
		Water: uses as a solvent, as a component of cytoplasm and body fluids and as a participant in chemical reactions.
(b) Diet	The balance between food intake and energy requirements of individuals.	Constituents of a **balanced diet.** Relative energy value of carbohydrates, proteins and fats (kJ).
		Distinction between starvation and malnutrition.
		The causes of obesity and the biological problems associated with it.
(c) Human alimentary canal (i) Structure and functions		The gross structure of the alimentary canal. Functions of each part (including salivary glands, pancreas and liver) in relation to **ingestion, digestion, absorption, assimilation** and **egestion** where appropriate.
(ii) Breakdown of food (1) Physical		Structure of a tooth. Types of, and functions of, teeth. Mastication and the action of the epiglottis only in swallowing. Dental hygiene and care of teeth. Fluoride controversy. **Peristalsis** and stomach movements.

(2) Chemical		Digestion, related to enzymes, leading to solubility.
		Enzymes: properties, effects of temperature, pH and substrate specificity. The widespread role of intracellular enzymes (non-digestive enzymes) catalysing biochemical reactions.
		The release of enzymes, for extra-cellular digestion, into the alimentary canal.
		The functions of amylase, protease and lipase only, in the production of reducing sugars, amino acids, fatty acids and glycerol.
(iii) Absorption and **assimilation**	Importance of a large surface area for absorption.	
		Absorption by intestinal villi.
		The role of the liver in glucose metabolism and deamination, (X-ref. Excretion p.15).
		Water absorption in the colon.
6 Transport in flowering plants	The significance of a system in relation to size and the central role of xylem and phloem.	
		Osmosis, in terms of the membrane and movement of water molecules in a direction determined by the water potential.
(a) Water and ion uptake.		Structure and functions of root hairs in relation to their surface area and water and ion uptake (X-ref. Nutritional requirements, p.11).
(b) **Transpiration**		Water vapour loss related to cell surfaces, air spaces and stomata. Mechanisms of water movement in terms of transpiration pull. The effects of variations of temperature, humidity and light intensity on transpiration rate. Wilting and its causes.

(c) **Translocation**		The position of xylem and phloem as seen in TS in an unthickened herbaceous dicotyledonous root and stem and TS of leaf. Functions of xylem and phloem, (X-ref. Tissues etc. p.10). Translocation of applied chemicals including systemic pesticides.
7 Transport in mammals	The significance of a transport system in relation to body size and the central role of capillaries.	
(a) Circulatory system		A system of tubes with a pump and valves to ensure one-way flow. Dual circulation — systemic and pulmonary; named main vessels to and from heart, lungs, liver, gut and kidneys. Structure and function of the heart in terms of muscular contraction and the working of the valves. Heart attacks in terms of occlusion of the coronary arteries and the possible influences of smoking and diet. Structure and function of arteries, veins and capillaries in terms of pressure and pulse (X-ref. Blood, p.14).
(b) Blood		Composition of blood in terms or red blood cells, white blood cells and platelets suspended in plasma. Functions of blood: red cells — haemoglobin and oxygen transport; white cells — phagocytosis and antibody formation; platelets — fibrinogen to fibrin (caused by enzyme action and/or exposure to air) resulting in clotting; plasma-transporting blood cells, soluble food substances, hormones, carbon dioxide, urea. The importance of capillaries in the transfer of substances between plasma and cells.
8 Respiration	The release of energy from food substances with the formation of ATP.	The use of energy in muscle contraction, cell division, active transport, growth, the passage of nerve impulses and the maintenance of a constant body temperature, (X-ref. The cell, p. 9). (No biochemical detail is required).

(a) Aerobic respiration		Equation in words or symbols.
(b) Gaseous exchange	Movement of gases in terms of a large surface area which is permeable, and in the presence of a **diffusion gradient.**	
(i) Gaseous exchange in mammals		Structure of lungs (alveoli and associated capillaries, bronchioles, bronchi, trachea and larynx). Structural inter-relationships and functions of diaphragm, ribs and intercostal muscles. Relationship between pressure and volume in the thorax. Differences in percentage composition between inspired and expired air. Effects of activity on the rate and depth of ventilation and composition of expired air. The role of the exchange surface of the alveoli in the uptake of oxygen and the release of carbon dioxide. Effects of smoking on the gaseous exchange system and on foetal development.
(ii) Gaseous exchange in plants		Structure and function of leaf permitting efficient gaseous exchange, (X-ref. Photosynthesis, p.11).
(c) Anaerobic respiration		Equation in words or symbols for yeasts and mammals. Applications of anaerobic respiration in biotechnology as seen in the brewing and baking industries. The formation of lactic acid in mammals and an associated oxygen debt.
9 Excretion in mammals	The need to remove toxic materials and the waste products of metabolism from organisms.	The removal of carbon dioxide from the lungs, water and urea through the skin and kidneys. (Details of kidney structure and nephron are not required). The removal from the body of toxic materials from the environment (alcohol and drugs). Dialysis in kidney machines.

10 Support, movement and locomotion	The need for support to provide shape and form in order that organisms may function effectively and efficiently.	
(a) Support in flowering plants		Strengthening of cell walls by cellulose and lignin; support of tissues resulting from turgidity of cells. (X-ref. Translocation, p.14).
(b) Support in mammals (i) Cartilage and bone		Cartilage and bone are living tissues with different properties related to the common functions of support, movement and locomotion.
(ii) Mammalian skeleton		Main functions of skeleton: support, protection and movement.
(1) Moveable joints		Structure of a synovial joint and functions of constituent parts. Types of joints as illustrated in the shoulder (ball and socket) and elbow (hinge). (Names of humerus, radius and ulna bone only).
(2) Muscle	Antagonistic muscles and their functions in movement and locomotion.	Pulling action and not pushing as shown at elbow joint, flexor (biceps) and extensor (triceps). Function of ligament (bone/bone) and tendon (muscle/bone).
11 Co-ordination and response	The adaptive response of living organisms to variations in the external and internal environment.	
(a) Co-ordination in plants		Growth movements by plants as a response to their environment. The value of these responses to the plants (no details of plant hormones required).

(b) Co-ordination in mammals	Co-ordination of body responses: the reception of stimuli and the transmission of electrical impulses to and from the central system: action through effectors where appropriate.	The role of sense organs, eye, ear, skin, tongue and nose as transducers of various forms of energy. (No details of structure and related function required). The role of nerve pathways sufficient to understand the reflex arc but without details of the structure of nerve cells.
(c) Homeostasis	The control by organisms of their environment.	Chemical control by hormones produced by endocrine glands (X-ref. Sex hormones p. 19). (Signs and symptoms of hormone deficiency not required) Regulation of blood glucose concentration in response to the production of insulin. Temperature regulation in mammals including relevant structures within the skin. Similarities and differences between nervous and hormone systems.

Theme IV DEVELOPMENT OF ORGANISMS AND CONTINUITY OF LIFE (approximately 25% of teaching time)

1 Reproduction	Reproduction as part of a cyclical process ensuring the continuity of life.	
(a) Asexual reproduction	Asexual reproduction as the process resulting in the production of genetically identical offspring from one parent.	Illustrated by the spread of certain fungi by asexual spores and flowering plants by runners.
(b) Sexual reproduction	Sexual reproduction as the process involving the fusion of two **haploid** (n) nuclei to form a diploid (2n) zygote and the production of genetically dissimilar offspring.	Haploid nuclei, carried in gametes which vary in structure, size, relative numbers and mobility.
(i) Sexual reproduction in flowering plants		Male nuclei are carried in pollen grains and the female nucleus in the ovule. Structure of the flower of a named herbaceous dicotyledonous plant to include sepals, petals, stamens and carpels. **Pollination.** The distinction between self-pollination and cross-pollination. Insects and wind as agents of pollination, and adaptations in structure of insect and wind pollinated flowers. Growth of the pollen tube and its entry into the ovule followed by **fertilisation**, (development of endosperm and embryo not required). Structure of the non-endospermic seed in terms of the embryo (radicle, plumule and cotyledons) and testa, protected by the pericarp (fruit wall). Seed and fruit dispersal by wind and animals, as a means of colonising new areas, (No structural details required).

(ii) Sexual reproduction in humans		It is expected that this topic will be treated in a sensitive and objective manner so as to provide a factual background to the processes of physical and emotional development.
(1) Gross structure of male and female reproductive systems (and associated urinary systems)		Structure and function in the male system in terms of testes, scrotum, sperm ducts; prostate gland, urethra, penis. Structure and function in the female system in terms of ovaries, oviducts, uterus, cervix, vagina, vulva.
(2) Fertilisation and foetal development		Fertilisation in the oviduct, early development of zygote to form a ball of cells which implants in the lining of the uterus wall. Functions of amniotic sac and amniotic fluid. Structure and function of placenta and umbilical cord only in relation to exchange of dissolved nutrients, gases, excretory products.
(3) Gestation and birth	Birth as the stage at which the offspring is separated from total dependence on the mother to a relative, and increasing, independence of the mother.	Maternal and foetal health care during **gestation.** (X-ref. Gaseous exchange in mammals, p.15). The biological advantages of breast milk.
(4) Sex hormones		The functions of testosterone (produced by testes) in the regulation of secondary sexual characteristics in males. The functions of oestrogen (produced by ovaries) and progesterone (produced by ovaries and placenta), as appropriate, in ovulation, the menstrual cycle, and pregnancy, and the regulation of secondary sexual characteristics in females, including the menopause.
(5) Biological control of population size		The biological advantages and disadvantages of the following methods of responsible family planning: natural, chemical, mechanical, surgical.

2 Growth and development	All living organisms grow by means of cell division, cell enlargement and an increase in dry mass. Development as the progressive change in the structure of an organism (differentiation) during its life cycle.	
Growth in plants		Increase in length of roots and stems in terms of cell division, cell enlargement and differentiation into conducting and non-conducting tissues. (Details of xylem and phloem are not required) (X-ref. Tissues etc. p.10). **Germination:** the need for the following conditions; suitable temperature, adequate water and oxygen supplies. Changes in dry mass.
3 Inheritance	The transmission of genetic information between generations leading to both continuity of the species and variation within the species.	
(a) Variation		Continuous and discontinuous variations as influenced by genes and environmental factors and as illustrated by height and A,B,O, blood groups in human populations.
(b) Chromosomes as the site of genetic information		**Chromosomes** as the sites of genes which are units of heritable material. **Mutation** as a change in the structure of a gene (sickle cell anaemia) or in the number of chromosomes (Down's syndrome). The chromosome number of humans.

(c) Meiosis	Meiosis as the process involving the separation of chromosomes leading to the formation of haploid gametes to ensure constancy of chromosome number during sexual reproduction.
(d) Monohybrid inheritance	The use of symbols to determine the ratios resulting from monohybrid crosses. An understanding of the use of the following terms: **dominant, recessive, phenotype, genotype, homozygous, heterozygous, F1 generation, F2 generation,** in explaining monohybrid crosses. Complete and incomplete dominance. The inheritance of sex in humans (XX and XY chromosomes).
(e) Selection (i) Artificial selection	Breeding for selected varieties having increased economic importance to humans, including yield, disease-resistance, hardiness, appearance, food value
(ii) Natural selection	The observations of Malthus on population growth, and Darwin and Wallace on variation and competition, leading to the formulation of a theory of **evolution** by natural selection. Changes in the distribution of genotypes in natural populations in response to environmental pressures as illustrated by the peppered moth and sickle cell anaemia/malaria.

INTERNAL ASSESSMENT OF EXPERIMENTAL SKILLS

The experimental skills A to D to be assessed are given below.

A Using and organising techniques, apparatus and materials.

B Observing, measuring and recording.

C Handling experimental observations and data.

D Planning, carrying out and evaluating investigations.

The four skills carry equal weighting.

All assessments must be based upon experimental work carried out by the candidates.

It is expected that the teaching and assessment of experimental skills will take place throughout the course.

The assessment scores finally recorded on the Assessment Sheet (Appendix A) for each skill must represent the candidate's best two marks for each skill.

The minimum Course Work requirement for this syllabus is as follows:

Each candidate should attempt at least one piece of Course Work and this should be assessed for at least one skill according to the criteria in the syllabus. If the piece of work does not satisfy the criteria for the award of one mark, a mark of 0 should be awarded. Candidates who do not attempt any Course Work should be marked A.

For candidates who miss the assessment of a given skill through no fault of their own, for example because of illness, and who cannot be assessed ON ANOTHER OCCASION, MEG's procedure for special arrangements should be followed as specified in the current Handbook for Centres. However, candidates who for no good reason are absent from an assessment of a given skill, should be given a mark of 0 on that occasion.

Teachers must ensure that they can make available to the moderator the evidence for the two assessments of each skill for each candidate. For skills A to D inclusive, information about the tasks set and how the marks were awarded will be required. For skills B, C and D the candidate's written work will also be required.

EXPERIMENTAL SKILLS AND ASSESSMENT OBJECTIVES

Experimental Skills		Assessment Objectives
A	Using and organising techniques, apparatus and materials.	C 1.1; C 1.2; C 1.3
B	Observing, measuring and recording.	C 1.4
C	Handling experimental observations and data.	C 2.3
D	Planning, carrying out and evaluating investigations.	C 2.1 - 4

CRITERIA FOR ASSESSMENT OF EXPERIMENTAL SKILLS

Each skill must be assessed on a 6 mark scale. Each of the skills is defined in terms of three mark levels of achievement at marks 2, 4 and 6. A score of 0 marks is available if there is no evidence of positive achievement for a skill.

For candidates who do not meet the criteria for a mark of 2, a mark of 1 is available if there is some evidence of positive achievement.

A mark of 3 is available for candidates who go beyond the performance defined for 2 marks, but who do not meet fully the criteria for 4 marks.

Similarly, a mark of 5 is available for those who go beyond the performance defined for 4 marks, but who do not meet fully the criteria for 6 marks.

Skill A Using and Organising Techniques, Apparatus and Materials

1

2 Follows written, diagrammatic or oral instructions to perform a single practical operation.

Uses familiar apparatus and materials adequately, needing reminders on points of safety.

3

4 Follows written, diagrammatic or oral instructions to perform an experiment involving a series of step-by-step practical operations.

Uses familiar apparatus, materials and techniques adequately and safely.

5

6 Follows written, diagrammatic or oral instructions to perform an experiment involving a series of practical operations where there may be a need to modify or adjust one step in the light of the effect of a previous step.

Uses familiar apparatus, materials and techniques safely, correctly and methodically.

Skill B Observing, Measuring and Recording

1

2 Makes observations or readings given detailed instructions.

Records results in an appropriate manner given a detailed format.

3

4 Makes relevant observations or measurements given an outline format or brief guidelines.

Records results in an appropriate manner given an outline format.

5

6 Makes relevant observations or measurements to a degree of accuracy appropriate to the instruments or techniques used.

Records results in an appropriate manner given no format.

Skill C Handling Experimental Observations and Data

1

2 Processes results in an appropriate manner given a detailed format.

Draws an obvious qualitative conclusion from the results of an experiment.

3

4 Processes results in an appropriate manner given an outline format.

Recognises and comments on anomalous results.

Draws qualitative conclusions which are consistent with obtained results, and deduces patterns in data.

5

6 Processes results in an appropriate manner given no format.

Deals appropriately with anomalous or inconsistent results.

Recognises and comments on possible sources of experimental error.

Expresses conclusions as generalisations or patterns where appropriate.

Skill D Planning, Carrying out and Evaluating Investigations

1

2 Suggests and carries out a simple experimental strategy to investigate a given practical problem.

Attempts 'trial and error' modification in the light of the experimental work carried out.

3

4 Specifies and carries out a sequence of activities to investigate a given practical problem.

In a situation where there are two variables, recognises the need to keep one of them constant while the other is being changed.

Comments critically on the original plan, and implements appropriate changes in the light of the experimental work carried out.

5

6 Analyses a practical problem systematically, produces a logical plan and carries out the investigation.

In a given situation, recognises that there are a number of variables, and attemps to control them.

Evaluates chosen procedures, suggests/implements modifications where appropriate and shows a systematic approach in dealing with unexpected results.

NOTES FOR GUIDANCE

The following notes are intended to provide teachers with information to help them to make valid and reliable assessments of the skills of their candidates.

The assessments should be based on the principle of positive achievement. Candidates should be given opportunities to demonstrate what they understand and can do.

It is expected that candidates will have had opportunities to acquire a given skill before assessment takes place.

It is not expected that all of the practical work undertaken by a candidate will be assessed.

Assessments can be carried out at any time during the course. However, at whatever stage assessments are done, the standards applied must be those expected at the end of the course as exemplified in the criteria for the skills.

Assessments should normally be made by the person responsible for teaching the candidates.

It is recognised that a given practical task is unlikely to provide opportunities for all aspects of the criteria for a given mark for a particular skill to be satisfied, for example, there may not be any anomalous results (Skill C). However, by using a range of practical work, teachers should ensure that opportunities are provided for all aspects of the criteria to be satisfied during the course.

The educational value of extended experimental investigations is widely recognised. Where such investigations are used for assessment purposes, teachers should make sure that candidates have ample opportunity for displaying the skills required by the scheme of assessment.

It is not necessary for all candidates in a centre, or in a teaching group within a centre, to be assessed on exactly the same practical work, although teachers may well wish to make use of work that is undertaken by all of their candidates.

When an assessment is carried out on group work the teacher must ensure that the individual contribution of each candidate can be assessed.

Skill A may not generate a written product from the candidates. It will often be assessed by watching the candidates carrying out practical work.

Skills B, C and D will usually generate a written product from the candidates. This product will provide evidence for moderation.

Raw scores for individual practical assessments may be given to candidates as part of the normal feedback from the teacher. The final, internally moderated total score, which is submitted to MEG, should not be given to the candidate.

Additional information regarding "**format**" - Skill B

2 Marks	-	for example, a full results table with labelled columns and units provided would be a suitable "detailed format".
4 Marks	-	for example, a ruled grid with labelled columns but no units would be a suitable "outline format".
6 Marks	-	for example, no results table provided, although the instructions to students might well say "record your results in a table", would be suitable for "no format".

Additional information regarding "**format**" - Skill C

2 Marks - for example, a piece of graph paper labelled and scaled would be a suitable "detailed format".

4 Marks - for example, a blank sheet of graph paper with some instructions such as "plot temperature against time" would be a suitable "outline format".

6 Marks - for example, students told to draw a graph of their results and given a blank sheet of graph paper would be suitable for "no format".

MODERATION

(a) Internal Moderation

When several teachers in a centre are involved in internal assessments, arrangements must be made within the centre for all candidates to be assessed to a common standard.

It is essential that within each centre the marks for each skill asssigned within different teaching groups (e.g. different classes) are moderated internally for the whole centre entry. The centre assessments will then be subject to external moderation.

(b) External Moderation

Assessment sheets (see Appendix A) are to be submitted to MEG no later than the specified date in the year of the examination. For external moderation MEG will require, for a specified sample, evidence which must include for skills A to D inclusive, information about the tasks set and how the marks were awarded. In addition, for skills B, C and D a specified sample of candidates' written work will be required. A further sample may be required. All records and supporting work should be retained until after publication of results.

Centres may find it convenient to use loose-leaf A4 file paper for assessed written work. This is because samples will be sent through the post for moderation and postage bills are likely to be large if whole exercise books are sent.

The samples sent to the moderator should have the sheets stapled together in the top left hand corner and should be clearly labelled with the centre number and the candidate's name and number. On each piece of work the skill(s) assessed and the mark awarded to each skill must be stated. Authenticated photocopies of the sample required would be acceptable.

SUGGESTED PRACTICAL INVESTIGATIONS OR DEMONSTRATIONS

The practical exercises listed below are provided for the guidance of teachers. Any, or all, of these investigations may form a useful part of teaching courses based on the syllabus. They are not mandatory and teachers should not assume that any of these investigations form an essential part of any teaching course based on the syllabus.

Theme	Section	
I	2(a)	Use of keys.
	2(b)	Examination and drawing of a fungus, herb, twig, insect, fish, small mammal.
II	1	(i) Analysis of soil particle size by sedimentation. (ii) Comparison of rates of drainage and capillarity. (iii) Measurement of soil pH. (iv) Collecting soil fauna (or leaf litter fauna) by Tullgren funnel. Collecting by pitfall trap. (v) Percentage of air/water/humus/mineral matter in soil.
	6(a)	Effect of pollution (detergent on aquatic plants).
III	1	Thin section of leaf epidermis. Use of light microscope to see cells.
	4	Experimental investigation: (i) starch test on a leaf following treatment in boiling ethanol, (ii) necessity of light, carbon dioxide and chlorophyll for starch formation, (iii) production of oxygen by Elodea.
	5(a)	Food tests: (i) starch — iodine solution, (ii) reducing sugar — Benedict's solution, (iii) protein — biuret test, (iv) fat — ethanol test. Testing of common foods for presence of different classes of nutrients e.g. peanut, potato, carrot, onion, etc.
	5(b)	Energy value (kJ) of a peanut or cashew nut by burning on a pin under a test-tube containing a known mass of water.
	5(c)	Enzyme experiments: (i) amylase on starch, (ii) pepsin on egg white, (iii) catalase in liver and potato on hydrogen peroxide.
	6(a)	Osmosis in living cells: (i) changes in the mass or length of a potato tuber cylinder placed in water and solutions of different strengths, (ii) observation of epidermal cells under the microscope, (iii) physical process of osmosis with thistle funnel and membrane or cellulose tubing attached to a tube.

6(b) Transpiration:

(i) mass potometer with complete plant and rough balance,

(ii) bell jar experiment with test for water,

(iii) transpiration rates of a leafy shoot, using a potometer under different conditions of temperature, humidity and air movement.

Rise of water through a plant shoot, using coloured water. Sections of the stem to be cut showing tissues in which dye is present.

7(a) (i) Microscope slides/35mm transparencies/film strips — of blood, artery and vein.

(ii) Demonstration of the structure of sheep's heart.

8(b) (i) Demonstration of the structure of lungs, bronchi and trachea of sheep.

(ii) Suitable apparatus showing production of carbon dioxide by a green plant in the dark.

8(c) Production of heat and carbon dioxide by peas/fermenting yeast.

10(a) Sections of a dicotyledonous root, stem and leaf to show supporting tissues.

10(b) Examination and drawings of fore limb bones of the skeleton of a small mammal, e.g. rat or rabbit, to appreciate basic structure.

IV **1(a)** (i) Growth of Mucor (Rhizopus) on damp bread, showing sporangia.

(ii) Examination and drawing of strawberry runner.

1(b) (i) Dissection of a named dicotyledonous flower.

(ii) Growth of a pollen tube on a slide.

(iii) External and internal structure of a dicotyledonous seed.

2 (i) Growth of marked radicle of broad bean.

(ii) Conditions necessary for germination.

(iii) Culture solutions with Duckweed, or Tradescantia making a quantitative estimate of growth by frond/leaf increase.

Plotting of growth curves of Man.

3 Experimental genetics using available material.

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Midland Examining Group

COURSE WORK ASSESSMENT FORM
GCSE EXAMINATIONS 1994

CENTRE NUMBER		SYLLABUS CODE	
CENTRE NAME		SYLLABUS TITLE	

CANDIDATE NUMBER	CANDIDATE NAME	TEACHING GROUP/ SET	INTERNALLY MODERATED MARKS FOR EACH SKILL								TOTAL MARK (out of 48)	COMMENTS (IF NECESSARY)
			SKILL A (out of 6)		SKILL B (out of 6)		SKILL C (out of 6)		SKILL D (out of 6)			

APPENDIX A

QUANTITIES, UNITS, TERMS AND SYMBOLS TO BE USED IN GCSE BIOLOGY EXAMINATIONS

This appendix has been produced by the MEG Biology Committee as a guide to teachers. The contents will be used by Chief Examiners during the setting of papers and Chief Moderators during the examination of Course Work. The contents should therefore be used by teachers during teaching and practical work.

This appendix follows the practice laid down in the following documents :

Association for Science Education booklet SI Units, Signs, Symbols and Abbreviations

Institute of Biology Biological Nomenclature Recommendations on Terms, Units and Symbols (1989)

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1. Numbers

The decimal point should be placed on the line eg 52.35.

Numbers from 1000 to 9999 should be printed without commas or spaces.

Numbers greater than or equal to 10 000 should be printed without commas. A space should be left between each group of three whole numbers eg 4 256 789.

2. Units

The International System of units should be used (SI units). Units should be indicated in the singular not in the plural eg. 28 kg.

(a) SI units commonly used in Biology are listed below.

The first mentioned unit and symbol in the following table is the base unit.

QUANTITY	NAME OF UNIT	SYMBOL FOR UNIT
Length	metre	m
	kilometre	km
	centimetre	cm
	millimetre	mm
	micrometre	μm
Mass	kilogram	kg
	gram	g
	milligram	mg
	microgram	μg

There is no symbol for the tonne (1000 kg)

Care should be taken in the use of mass and weight. In most biological contexts the term mass is correct eg dry mass, biomass.

Time	second	s
	minute	min
	hour	h
	day	d
	year	y
Amount of substance	mole	mol

When the mole is used, the elementary entities must be specified unambiguously (eg atoms, molecules, ions, radicals, electrons).

(b) **Derived SI units are listed below**

Force, weight	newton	N
Pressure	pascal	Pa
	kilopascal	kPa
Energy	joule	J
	kilojoule	kJ
	(The unit calorie is obsolete)	

(c) **Recommended units for area, volume and density are listed below**

Area	square metre	m^2
	square decimetre	dm^2
	square centimetre	cm^2
	square millimetre	mm^2
	hectare = 10^4 m^2	ha
Volume	cubic millimetre	mm^3
	cubic centimetre (ml should not be used)	cm^3
	cubic metre	m^3
	cubic decimetre (dm^3 preferred to litre)	dm^3
	cubic kilometre	km^3
	litre (l should not be used as an abbreviation for litre)	litre
Density	kilogram per cubic metre or	$kg\ m^{-3}$
	gram per cubic centimetre or	$g\ cm^{-3}$

(d) **Use of Solidus**

Negative indices - symbols combined in a quotient - should be written as, for example, either $m\ s^{-1}$ or metre per second.

The solidus (/) should NOT be used for a quotient eg m/s for metre per second.

The solidus (/) is used in tables and graphs to separate a physical quantity from its appropriate unit eg time/s for time measured in seconds. (SEE section 3 below)

3. Presentation of data

(a) Tables :

(i) Figures in tables should be pure numbers.

(ii) Head each column of a table with the physical quantity and the appropriate SI units eg. time/s NOT time (s).

There are three acceptable methods of stating units eg. metre per sec or m per s or m s^{-1}.

(iii) The column headings of the table can then be directly transferred to the axes of a constructed graph.

(b) Graphs

(i) Points on graphs should be plotted as pure numbers.

(ii) The independent variable should be plotted on the x (horizontal axis). The dependent variable should be plotted on the y (vertical axis).

(iii) The graph is the WHOLE diagrammatic presentation.

(iv) Curves and lines joining points on the graph should be referred to as 'curves'.

(v) Points on the curve should be clearly marked as crosses (x) or encircled dots. If a further curve is included, vertical crosses (+) may be used to mark the points.

(c) Pie Charts

These should be drawn with the sectors in rank order, largest first, beginning at 'noon' and proceeding clockwise. Preferably, piecharts should contain no more than six sectors.

(d) Bar Charts

These are drawn when one of the variables is not numerical eg percentage of vitamin C in Apples, Pears, Oranges etc. They should be made up of narrow blocks of equal width which do not touch.

(e) Column Graphs

These are drawn when plotting frequency graphs from discrete data eg frequency of occurrence of nests with different numbers of eggs. They should be made up of narrow blocks of equal width which do not touch.

(f) Histograms

These are drawn when plotting frequency graphs with continuous data eg frequency of occurrence of leaves of different lengths. The blocks should be drawn in order of increasing or decreasing magnitude and **should** be touching.

4. Taxonomy

Taxonomy is the study of the principles of the organisation of taxa into hierarchies. There are seven levels of taxon - kingdom, phylum, class, order, family, genus and species. These may be used when teaching the concept and use of a classificatory system, the variety of organisms, and the binomial system. The following should apply:

(a) Five Kingdoms are now recognised as

Prokaryotae	prokaryotes
Protoctista	protoctists
Fungi	fungi
Plantae	plants
Animalia	animals

The viruses cannot be fitted into this classificatory system.

All the kingdoms - (except the Protoctista) are represented in MEG Biology syllabuses. Latin names are not required - only the English equivalent.

(b) The names of the taxa should have a lower case letter for the word kingdom eg kingdom Fungi.

(c) The binomial system of naming gives each organism a two word name. The first word is the generic name and the second word is the trivial name, eg. ***Homo sapiens***. The trivial name should never by used by itself.

(d) Generic and trivial names are distinguished from the rest of the text either by underlining (when written or typed) or by being set in italics (in print).

Underlining should be used at all levels of study.

(e) The generic name always takes an initial capital letter. It can be accepted as a shorthand for the species name where the intent is obvious eg ***Plasmodium***, and in these circumstances can stand alone.

(f) The common name should NOT normally be written with an initial capital letter eg cat and dog. The exception is Man where it is the common name for a species where the two sexes are distinguished by the terms man and woman.

(g) A species is not easy to define but an acceptable general definition is :

'A group of organisms capable of interbreeding and producing fertile offspring'.

5. Genetics

(a) The terms gene and allele are not synonymous.

A gene is a specific length of DNA occupying a position called a locus. A specific function can be assigned to each gene. An allele is one of a number of different forms of a gene.

(b) A standard form of presenting genetic crosses should be adopted. The following symbols should only be used as shown :

P designates the cross of pure breeding (homozygous) individuals
F1 designates the offspring of homozygous parents
F2 designates the offspring produced by crossing F1 parents

(c) A complete and accurate format for the course of a genetic cross should be labelled :

Parental phenotypes
Parental genotypes
Gametes
Offspring genotypes
Offspring phenotypes
etc. etc.

(d) **Symbols**

The gene should be designated by letter or letters so that upper and lower case versions are easily distinguishable eg B and b. The upper case letter indicates the dominant allele and the lower case letter indicates the recessive allele.

(e) The symbols for gametes should be circled to indicate the discrete nature of each gamete.

(f) Some form of checkerboard should be used to demonstrate genotypes that can result from random fusion of gametes. Students should understand that genotypes are only possible combinations and that only very large production of offspring can result in all combinations being achieved.

(g) The term 'incomplete dominance' **should be discontinued** and in the particular case where alleles are equally dominant it should be called 'codominance'. Thus codominance should be used where the influence of both alleles is shown in the phenotype eg the AB bloodgroup in Man or flower colour in *Antirrhinum*.

6. Terminology

(a) Wherever possible, English terms should be used in preference to Latin or Greek terms eg the terms red blood cell and white blood cell should be used and **not** erythrocyte, lymphocyte etc.

(b) Generalised terms should be stated in English eg middle ear, small intestine.

(c) Where no suitable English terms exist, latinised terms are unavoidable and will need to be used eg cochlea, bronchus, endolymph.

Midland Examining Group

East Midland Regional Examinations Board
Oxford and Cambridge Schools Examination Board
The West Midlands Examinations Board
University of Cambridge Local Examinations Syndicate

18 June 1993

GCSE EXAMINATION 1994

SCIENCE : BIOLOGY (1325)

SYLLABUS AMENDMENT

NOTICE TO TEACHERS

THE MARKING OF SPELLING, PUNCTUATION AND GRAMMAR IN COURSEWORK IN GCSE SCIENCE : BIOLOGY (1325) EXAMINATIONS

In October 1992 the Group informed Centres of the SEAC's decision that candidates' coursework must be assessed for accuracy in spelling, punctuation and grammar in the 1994 and subsequent GCSE examinations. Teachers are required to make an overall assessment of the completed 'folio' of work at the end of the course and the instructions for carrying out this assessment in Science: Biology (1325) are given in the supplement to the syllabus printed overleaf.

Any enquiry about this notice should be made in writing to the Secretary of your Home Board.

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GCSE SCIENCE : BIOLOGY (1325) - APPENDIX TO THE 1994 SYLLABUS

THE ASSESSMENT OF SPELLING, PUNCTUATION AND GRAMMAR

1994

1 The assessment of spelling, punctuation and grammar is required in the following components of this syllabus:

Component Number	Title
2	Paper 2
3	Paper 3
4	Coursework

2 The marks for each component will be awarded on the basis of the performance in spelling, punctuation and grammar on the component overall, in accordance with the performance criteria given in paragraph 4 below.

3 For the internally assessed components, teachers should first assess each candidate's work against the subject specific criteria given in the syllabus on pages 22-24 and award a total mark.

The criteria for spelling, punctuation and grammar should then be applied, and marks added to the total according to the range given below. The Coursework Assessment Forms to be issued by MEG will accommodate the marks awarded for spelling, punctuation and grammar.

4 Application of Criteria	Allocation of Marks Internally Assessed Components Component 4
Threshold performance Candidates spell, punctuate and use the rules of grammar with reasonable accuracy; they use a limited range of specialist terms appropriately.	1
Intermediate performance Candidates spell, punctuate and use the rules of grammar with considerable accuracy; they use a good range of specialist terms with facility.	2-3
High performance Candidates spell, punctuate and use the rules of grammar with almost faultless accuracy, deploying a range of grammatical constructions; they use a wide range of specialist terms adeptly and with precision.	4-5