Syllabus

Cambridge International AS Level Environmental Management

Syllabus code 8291

For examination in June and November 2011

UNIVERSITY of CAMBRIDGE
International Examinations

Note for Exams Officers: Before making Final Entries, please check availability of the codes for the components and options in the E3 booklet (titled "Procedures for the Submission of Entries") relevant to the exam session. Please note that component and option codes are subject to change.

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1. Introduction

1.1 Why choose Cambridge?

University of Cambridge International Examinations (CIE) is the world's largest provider of international qualifications. Around 1.5 million students from 150 countries enter Cambridge examinations every year. What makes educators around the world choose Cambridge?

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A Cambridge International A or AS Level is recognised around the world by schools, universities and employers. The qualifications are accepted as proof of academic ability for entry to universities worldwide. Cambridge International A Levels typically take two years to complete and offer a flexible course of study that gives students the freedom to select subjects that are right for them. Cambridge International AS Levels often represent the first half of an A Level course but may also be taken as a freestanding qualification. They are accepted in all UK universities and carry half the weighting of an A Level. University course credit and advanced standing is often available for Cambridge International A/AS Levels in countries such as the USA and Canada. Learn more at **www.cie.org.uk/recognition**.

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Excellence in education

Cambridge qualifications develop successful students. They not only build understanding and knowledge required for progression, but also learning and thinking skills that help students become independent learners and equip them for life.

Not-for-profit, part of the University of Cambridge

CIE is part of Cambridge Assessment, a not-for-profit organisation and part of the University of Cambridge. The needs of teachers and learners are at the core of what we do. CIE invests constantly in improving its qualifications and services. We draw upon education research in developing our qualifications.

1. Introduction

1.2 Why choose Cambridge International AS Level Environmental Management?

Cambridge AS Level Environmental Management is accepted by universities and employers as proof of knowledge and understanding of the key issues affecting the environment on a variety of scales. Through their study candidates gain lifelong skills and awareness including:

- a knowledge of environmental processes and the impacts of societies on the environment
- the scientific principles that underpin issues of sustainability and environmental management
- the causes of key issues affecting the environment as well as possible ways of managing these
- the pressures which impact on the environment and potential solutions to these.

The syllabus is designed to encourage learning through suitable case studies, both local and global. The syllabus provides a good foundation for further study of Environmental Science and Management or related subjects in higher education. It is suitable for candidates of various ages, backgrounds and nationalities and contributes towards general education and lifelong learning.

Candidates do not need to have studied environmental science/management before taking this course. The course is designed to attract candidates with a good scientific background along with an awareness of broad environmental matters. A good foundation for the course would be a combination of some, but not necessarily all of the following: biology, geography, general science, physics, chemistry and of course environmental science and management.

1.3 How can I find out more?

If you are already a Cambridge Centre

You can make entries for this qualification through your usual channels, e.g. CIE Direct. If you have any queries, please contact us at **international@cie.org.uk**.

If you are not a Cambridge Centre

You can find out how your organisation can become a Cambridge Centre. Email us at **international@cie.org.uk**. Learn more about the benefits of becoming a Cambridge Centre at **www.cie.org.uk**.

2. Assessment at a glance

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All candidates take

Paper 1	1 hour 30 minutes	Paper 2	1 hour 30 minutes
Lithosphere and atmosphere Paper 1 is divided into two sections. Section A: short answer questions based on sets of data, diagrams or extracts. Section B: Candidates choose one essay question from a choice of three. Each essay question is in two parts. Questions will be drawn from parts of the syllabus not covered in Section A. 80 marks		**Hydrosphere and biosphere** Paper 2 is divided into two sections. Section A: short answer questions based on sets of data, diagrams or extracts. Section B: Candidates choose one essay question from a choice of three. Each essay question is in two parts. Questions will be drawn from parts of the syllabus not covered in Section A. 80 marks	

and

Paper 3: Coursework*	Centre-based assessment
Candidates produce a research report of c2000 words covering an issue arising during their course of study. The report may focus on a local, regional or global issue. It may be based on secondary source material and/or internet data, although the use of primary sources and field data collection should be undertaken where practicable. Proposals for Coursework topics must be submitted to CIE in advance. 40 marks	

* See Section 7 for deadlines for the submission of Coursework proposals and the final report.

3. Syllabus aims and assessment

3.1 Aims

Through following this syllabus, candidates should:

1. develop a knowledge of the Earth's natural systems and the effects of human activity on these systems;
2. be challenged to think about important environmental problems which face the world today;
3. understand that solutions to environmental issues are not easy to find;
4. recognise that the environment is an important social and political issue;
5. understand that whilst environmental issues can be debated by government, non-government and scientific organisations, there is an important role for individuals in thinking about these issues and in considering solutions.

The syllabus will address a number of basic issues which are included as learning objectives:

- people are affected by, and respond to natural phenomena in many different ways;
- rapid human growth is the fundamental environmental issue;
- the sustainable use of resources is fundamental to all solutions;
- human beings affect the environment of the whole planet thus the importance of a global perspective;
- urban environmental issues need to be given an important focus.

3.2 Assessment objectives and their weightings

There are three assessment objectives in Cambridge AS Level Environmental Management:

AO1: Knowledge and understanding

Candidates will be expected to demonstrate knowledge and understanding of:

1. the important environmental issues facing the world in the 21st century (within the confines of the syllabus);
2. environmental patterns of organisation, causality and process;
3. policies and mechanisms for managing the environment at local, regional and global levels;
4. critical and supportive evaluations of environmental management policies;
5. relevant scientific phenomena, facts, laws, definitions, concepts and theories, with use of scientific vocabulary, terminology and conventions (including symbols, quantities and units) relevant to the content of the syllabus.

3. Syllabus aims and assessment

AO2: Handling information and problem solving
Candidates should be able to:

1. locate, select and organise relevant information from a variety of data sources and communicate it clearly;
2. describe, interpret and offer explanations for data and information presented in the form of tables, graphs, maps, photographs and illustrations;
3. manipulate numerical, graphical and other data;
4. use information to identify patterns, report trends and draw inferences.

AO3: Enquiry and investigation
Candidates should be able to:

1. formulate hypotheses and predictions on the basis of observations and prior research (including plan, select appropriate apparatus/materials and carry out experiments in order to test their hypothesis or prediction);
2. make accurate observations and measurements and record these in an appropriate form (e.g. graphs, tables, diagrams etc.) and use statistical tools to analyse their data;
3. assess the reliability of their data and identify ambiguities
    - make deductions and formulate conclusions based on their data
    - evaluate the validity of their method
    - discuss the implications of findings in terms of the effect on the environment
    - value judgements of individuals, organisations and self.

3. Syllabus aims and assessment

The table below shows the approximate weightings for each of the assessment objectives:

Assessment objective	Weighting
AO1: Knowledge with understanding	45%
AO2: Handling information and problem solving	35%
AO3: Enquiry and investigation	20%

The allocation of marks is shown below according to the different papers.

Papers 1 and 2 have identical mark allowances as the papers have a similar format.

Assessment objectives	Papers 1 and 2 Section A		Papers 1 and 2 Section B	Paper 3 Coursework
	Question 1	Question 2	Question 3, 4 or 5	
AO1	15	15	60	
AO2	25	25	20	
AO3	-	-		40

The mark allowances for Papers 1 and 2 are doubled, as they are totalled across both papers.

4. Syllabus content

This syllabus defines the 'environment', by reference to the four traditional subdivisions of the global environment:

- The **lithosphere** or the upper mantle of rock and crust, that forms the tectonic plates upon which the continents lie.
- The **hydrosphere** or the body of water, present as ice, liquid water or water vapour.
- The **atmosphere** or the gaseous shell outside these two non-living components.
- The **biosphere** or the living organisms that have established themselves in the other three spheres.

The syllabus recognises that human population growth has become the dominant factor producing environmental change. Since the majority of humans now live in cities, issues related to the growth of urban and industrial areas and the impact of rapid population growth are an important aspect of the syllabus.

Environmental management is concerned with both local and global issues and with the various ways in which societies, governments and economic activity (industry, agriculture and urban areas) use, misuse and attempt to manage both local and global environments. Whilst environmental management can often be presented in a negative light by emphasising pollution, exploitation and misuse, it is important to give recognition to the positive ways in which we manage our environment. Thus issues such as global warming, industrial pollution and the impact of rapid population growth need to be balanced with others like the creation of National Parks, sensitive urban design and sustainable management/development.

The syllabus reflects a contemporary concern with sustainable management. Through their study of environmental management, it is hoped that candidates will learn to appreciate that the exploitation of the environment has often had a negative impact and that we should aim for a sustainable management of resources.

The syllabus focuses on environmental issues and their management at local, regional and global levels and is organised in three sections:

- **Key Questions:** These identify major aspects of the syllabus but are not intended as a prescriptive teaching programme
- **Content**
- **Notes for Guidance:** These offer some examples of the type of topics which are suitable and other suggestions for teachers.

Examination questions will be derived from the **Content** column. Candidates should show knowledge and understanding of the points listed in the Content column(s) and be able to handle information and solve problems relating to these points.

The lithosphere		
Key question	**Content**	**Notes for guidance**
1 What are the key elements of the structure of the earth?	The internal structure of the earth including the characteristics of the core, mantle, asthenosphere and the difference between oceanic and continental crust. How seismic wave data provides evidence of earth structure. Plate tectonics: the major plates, convection currents; ocean floor spreading; destructive, constructive and conservative plate boundaries. Post-Pangaea plate movement supported by evidence derived from palaeo-magnetism, palaeontology and geological fit.	Global evidence; mapping the earth's plates, fossil record including dinosaurs, coal measures. Examples chosen from two contrasting regions e.g. The Atlantic with its mid-ocean ridge and evidence drawn from neighbouring continents with the Pacific. Case studies of a major volcanic eruption, a major earthquake; these studies can of course be combined with studies in Key Question 2.
2 What natural hazards are derived from plate movement and how are they managed? What strategies can be employed to limit damage and loss of life?	Earthquakes (e): cause, process and effect; the Richter Scale; frequency; different impacts in LEDCs and MEDCs. Volcanoes (v): types of eruption and their effects, contrasting explosive acid types with basaltic eruptions. Examples to be chosen from LEDCs (e.g. Pinatubo) and MEDCs (e.g. Etna or Unzun). Hazards: to include tsunamis, landslides, ground deformation, volcanic ash, lava and hot ash clouds (nuee ardentes). Strategies for such natural hazards in LEDCs and MEDCs vary and may include: historic records (e,v), frequency (e,v), seismic evidence (e,v), tilt metres (v), chemical analysis (v), building design (e), and rescue and aid (e,v).	This section can be taught through in-depth case studies of earthquake and volcanic activity in both LEDCs and MEDCs. Examples: Earthquakes e.g. Mexico City (1985), Armenia(1988), Loma Prieta (1989), Mt. St Helens (1989), Kobe (1995), Colombia (1999). Volcanic eruptions e.g. Ruapehu (1965, 1975, 1995), Mt. Unzun (1991), Pinatubo (1999), Monserrat (1995), Etna (2001), Grimsvotu Jokulhaup (Glacial burst) 1996.
3 What natural and man-made processes contribute to different types and causes of mass-movement on slopes? How are sudden mass-movements managed?	Rock weathering processes and the accumulation of debris on slopes. Causes of mass movement: flows and slides including rock falls, landslides, earth slumps, soil creep, solifluction and mudflows. Human influences include deforestation and building. Slope management policies including slope angle reduction, afforestation, drainage and surface protection.	A theoretical introduction backed up by a case study, e.g. Hong Kong, Rio de Janeiro, Sarno in Southern Italy, Himalayan Foothills.
4 What are the major causes of soil deterioration and erosion and how can they be prevented?	Soil formation and characteristics including texture, biotic, abiotic components and idealised soil profiles characteristic of moist and arid conditions in temperate and tropical areas. Soil erosion and deterioration through agriculture, deforestation, grazing, salinisation and compaction. Management strategies involving the sustainable use of soils for agriculture. Studies should use examples from MEDCs and LEDCs.	Case studies where possible should be local or text derived; e.g. Southern England, Himalayan foothills, USA Dustbowl. Soil profiles to include: temperate podzols and brown earths, tropical laterites and rain forest soils.
5 What pressures has human activity placed upon the resources of the lithosphere? How can these resources be managed sustainably for future generations?	The nature of renewable, non-renewable and recyclable resources. Energy resources in LEDCs and MEDCs including demand and the depletion of resources in MEDCs; LEDC priorities in the use of fossil fuels; the depleting of reserves of fossil fuels. Strategies to include sustainable use of fossil fuels through developing renewable resources and conserving energy. Land as a resource under pressure from urban sprawl and economic development (surface mining and reservoirs). The management of areas of outstanding natural beauty; conservation areas/National Parks.	Examples should include non-renewable resources (coal, oil and natural gas) and renewable resources (water - HEP, tide and waves, wind and solar energy). Case studies contrasting the policies of one MEDC (e.g. Germany) with a LEDC (e.g. India). Strategies may be illustrated by contrasting the policies of two countries or by using resources; e.g. wind, water and nuclear energy in France with coal in India. Pressure from urban sprawl can be illustrated through examples such as Sao Paulo, Mumbai, London, Tokyo and Paris.

The atmosphere		
Key question	**Content**	**Notes for guidance**
1 What are the structural components of the atmosphere and why is it important to understand their characteristics?	The structure of the atmosphere to include troposphere, stratosphere, mesosphere and thermosphere (ionosphere). Each zone described in terms of composition, temperature and density variation. The interaction of incoming and outgoing radiation within the troposphere and stratosphere; 'the Earth's energy budget'. The importance of the troposphere for weather and human activity.	Reference can be made to models of atmospheric structure, evidence from research (balloons) etc. Ozone and the absorption of UV radiation. The absorption of visible radiation by the earth's surface; emission of thermal infra-red radiation and absorption by tropospheric gases.
2 What is the pattern of air movement in the troposphere and how does it influence regional climates and local weather? What methods are employed to forecast weather patterns?	Variations in global insolation. Regions of high and low pressure. Global and local wind systems. The effects of land, relief and ocean currents. The location and characteristic features of the major climatic regions to include Equatorial, Tropical Desert, Savannah and Monsoon, Warm Temperate Climates and Sub-Arctic (as for the Biomes in the Biosphere module). The formation and characteristics of anticyclones (high pressure systems), temperate frontal depressions and tropical cyclones (hurricanes). Weather forecasting in relation to these weather conditions.	The earth's temperature and pressure distribution/seasonal variations. The study of climatic regions can be linked with the biomes included in the biosphere module. Traditional text based studies or student investigations. The use of weather charts, satellite data in forecasting and recording weather data (visual and infrared photography). Relevant case studies to illustrate drought and hurricanes.
3 How does human activity affect the atmosphere?	The principle sources of CFCs and their role in stratospheric ozone depletion. The role of gases such as carbon dioxide and methane in the enhanced 'greenhouse effect' and possible climatic consequences. Emissions of sulphur dioxide and nitrogen oxides and the formation of acid rain including effects upon buildings, water-courses and soils. Predicted and possible climatic and biospheric effects of global warming.	Examples from the Antarctic and Northern Hemisphere. The likely impact of global warming on raising sea levels, increased storm intensity, climatic change. Where possible use local examples. There is an opportunity to link industrial pollution with Key Question 5 in the Lithosphere module. Emissions from industrialised countries and transference to other countries. Reference can be made to studies in the UK and Sweden (1980s).
4 How can atmospheric pollution be controlled and what are the problems involved with the global management of atmospheric pollution?	Reducing emissions through cleaning flue gases, alternative energy, afforestation, CFC free domestic appliances, sprays etc. The use of alternative sources of energy including wind, water and nuclear energy. International controls/ protocols, recognising that pollution crosses international boundaries. The background to the difficulties in achieving a broad agreement in the reduction of atmospheric pollution.	Reference to controls on CFC emissions; LEDC and MEDC examples: Kyoto and Buenos Aires (1998) and Rio de Janeiro (1992) meetings and the problems in achieving agreement. Afforestation and the use of alternative energy sources. Reference to examples such as an LEDC and an MEDC to illustrate problems in controlling industrial pollution.

The hydrosphere		
Key question	**Content**	**Notes for guidance**
1 How is water stored and transferred globally and locally?	The main storage zones of water and the percentages of water held in each. The natural flows and stores within both the global and local (drainage basin) water cycles. The global system includes the transfer between ocean/seas, atmosphere and land; it should refer to the conditions under which the volume of solid, liquid and gaseous water will change. The local water cycle includes evaporation, precipitation, interception, runoff, infiltration and ground water. Groundwater stores are to include the features of natural aquifers: confined, unconfined and perched.	The global (closed) system in conjunction with the more localised open system, which could be a local drainage basin. It is possible to undertake the local element of this study through field work. Examples of natural aquifers can be on a small local scale or of the scale of the Australian Basin.
2 What has been the impact of human activity on the quantities of water in natural stores?	The impact of climatic change and global warming on sea and ice volumes. The impact of rising sea levels, both in the past as with ice ages and currently through the increased likelihood of flooding in low-lying areas. The impact of agriculture and the supply of water for industrial and domestic use upon natural supplies of water.	Emphasis on the fragility of the global climate with reference to both falling (past) and rising sea levels (current and future). Diminishing water supplies as a result of agriculture could include the Aral Sea, Prairies, Australian Artesian Basin. Shortages due to urban and industrial demand may include Mexico City, Middle East, London Basin. Again there is an opportunity to research local water supplies and supply.
3 How can water supply be sustained and what are the environmental consequences of the artificial storage of water?	The management of water supply on a local and regional scale, including disparities in water resources, the demand for water and the supply of water. Dams, barrages and reservoirs. Advantages: water supply recreation, power, environment and local climate. Disadvantages: cost, silting, socio-economic and environmental. Water supply in arid countries to include ground water and desalinisation.	Examples chosen from contrasting areas such as USA (Colorado), China (Three Gorges), Nigeria or Ghana. Examples of desalinisation in Persian Gulf states, Malta.
4 How does human activity lead to the pollution of water stores and how can this form of pollution be managed?	Pollution of groundwater by metals, nutrients, and organic compounds. Nutrient enrichment and eutrophication of lakes and rivers; the main sources of eutrophication and its effects. The impact of sewage disposal upon rivers, lakes and seas and the main health and environmental problems associated with the disposal of sewage sludge. Marine pollution and effects on aquatic and bird life and on the coastal environment. Pollution of rivers and lakes by industrial spillage and river/lake pollution. Management via waste controls, local and regional policies.	There is plenty of scope for candidates to use local studies and link the examination requirements with the wide range of research projects on the topic. Other case studies could include the Rhine, Ganges, the Mediterranean Sea and oil tanker spillage.

The biosphere		
In this module, two contrasting ecosystems should be studied to a greater depth and should incorporate information from Key Questions 1, 2 and 3; ideally one of these studies can be based upon an area with which the students have some personal familiarity.		
Key question	**Content**	**Notes for guidance**
1 What are the major abiotic and biotic factors, which drive and influence the distribution of different ecosystems? What are the main components and characteristics of ecosystems and how are they structured?	The biotic and abiotic factors which control the distribution of the world's major biomes as listed in the notes for guidance. The characteristics of ecosystems in terms of their biotic and abiotic components (soil, temperature, rainfall, photosynthesis, net primary productivity, succession, biomass, biodiversity, trophic levels, food chains and webs, habitats and niches). The interaction of these components to be illustrated through relative size of the flows and stores of nutrients between vegetation, litter and soil.	A survey of the global system followed by a study of the distribution of the following biomes: tropical rain forest, monsoon rain forest, tropical savannah, desert, temperate deciduous and high latitude tundra. The two contrasting case studies should be chosen from these. Whilst a biome can be considered a global scale ecosystem, ecosystems occur on a variety of scales within broad vegetation zones. Photosynthesis: its requirements and process. Photosynthesis and different wavelengths. The influence of light intensity and rainfall on plant productivity.
2 How has human activity both disrupted and destroyed ecosystems?	The impact of agriculture, deforestation, exploitation and fires upon terrestrial ecosystems. The formation of plagioclimaxes arrested successions and loss of biodiversity. The effects of clearing tropical rain forest for industrial and agricultural use. The impact of commercial farming in MEDCs through mechanisation and the expansion of fields leading to the loss of local habitats. The influence of human activity upon marine ecosystems; including coastal waters, oceans and coral reefs.	This can extend the previous examples chosen in KQs 1 and 2 but must also focus on the two examples given in KQ.
3 What methods have been used to preserve, conserve, and restore ecosystems? To what extent have meetings between nations and pressure groups been important in highlighting environmental awareness and managing the biosphere?	Methods to include National Parks, afforestation, maintaining biological diversity through e.g. pollution control, changing agricultural systems, ecotourism, forest conservation, wildlife management, and ecological islands. The impact of international protocols (e.g. Rio de Janeiro and Montreal) and research and pressure from groups such as the WWF. Sustainable development within conservation areas.	Case studies as appropriate or a survey of conservation and restoration of ecosystems with reference to a broader range of examples.
4 What has been the impact of population growth upon the resources of countries at contrasting levels of economic development?	Population, resources and carrying capacity: the population models of Malthus and Boserup. The concepts of overpopulation, underpopulation and optimum population. Policies aimed at resolving these issues include: sustainable and more productive farming methods in LEDCs and MEDCs; economic and social development; the sustainable provision of energy and industrial raw materials.	A study of the population models followed by contrasting case studies e.g. Mauritius, India, UK. Examples can include China, UK or another European country and Canada or Australia. Agricultural improvements can be illustrated through the Green Revolution, biotechnology etc. More general economic and social development through case studies including a MEDC and a LEDC.

5. Coursework: guidance for Centres

5.1 General Information

Candidates should produce a report of 1500–2000 words on an issue arising out of their course of study.

The report may focus on a local, regional, national or global issue. Whilst the issue may derive out of the traditional areas of environmental science, the report must contain an investigation and evaluation of the management issues associated with the topic. The research topic may be chosen from any part of the 4 units of this syllabus.

Whilst secondary source material is useful in providing background information, it is important that candidates use primary sources and collect field data. Candidates may use sources of information other than those obtained from field study; these may include the internet, the media, documented data from companies and organisations.

The report is also a test of a candidate's ability to confine their report to the word limit of 2000 words; over-long reports may contain too much extraneous material which may count against the candidate at final marking.

Candidates are expected to clearly identify an environmental management issue and then organise their report into the following stages of:

- An introduction identifying an issue expressed through a hypothesis or question.
- A methodology, which outlines the investigative avenues used for the study and justifies their use.
- A results and analysis section. This should form the main part of the study and contain data expressed through illustrative techniques such as pictorial (diagrams and photographs), tables and graphs. This illustrative material should be analysed through detailed descriptions and explanations.
- A conclusion which draws together the findings of the investigation.
- An evaluation of the study which assesses its success and/or shortcomings.

To ensure that they comply with the requirements of the syllabus, Centres must seek approval for project titles, in advance, from CIE. The approval form asks for candidate details, project title and a brief description for each candidate.

Centres must submit candidates' report proposals to CIE no later than:

- **November 30th** for the examination in the following May/June.
- **June 30th** for the examination in the following November.

The form must be submitted by email to CIE at cieopf@cie.org.uk. Syllabus number and Centre number should be clearly shown.

5. Coursework: guidance for Centres

It is the responsibility of teachers in the Centre to monitor the work undertaken by the candidates and make certain that the work complies with the syllabus. The report should be assessed by teachers in the Centre who have satisfied CIE requirements on moderation.

The reports should be internally assessed and a sample submitted to CIE for moderation. Please send your sample to arrive at CIE by the following deadlines

- **April 30th** for the May/June examination
- **October 30th** for the November examination.

5.2 Example of a research report

Research topic: 'To what extent has industrial pollution of a nearby river been successfully controlled and reduced'?

Relation of topic to syllabus

(a) The problem identified is the pollution of a river through industrial effluent and the extent to which industries manage their waste and river pollution has been reduced.

(b) This topic relates to waste management, the need to dispose of industrial waste materials and manage/reduce river pollution.

(c) Data sources might include:
- counting the variety of species at various points before and after the discharge point,
- considering the different species present at these points,
- testing samples of river water before and after the discharge point,
- investigating the policies of contributing industries,
- using local or internet data sources.

(d) Candidates should ascertain how much data they can collect and analyse in the time available to enable them to produce viable conclusions.

(e) The scale of the project should not be so small that valid data cannot be identified or that a variety of environments need to be examined. On the other hand, it should not be so big as to make the collection of data too time-consuming.

5. Coursework: guidance for Centres

5.3 Assessment criteria for Coursework

There are three skills that will be assessed in the preparation of the report:

Skill	Description	Mark
C1	Research and planning	6
C2	Data collection and presentation	9
C3	Conclusion and evaluation	5

Mark schemes for assessment should be based on the following criteria:

Skill C1: Research and planning

(a) The hypothesis or question is clearly stated. 1 mark

(b) There is evidence of knowledge through a clear explanation of the principle underpinning the hypothesis or question. 2 marks

(c) The plan includes appropriate methods clearly explained. 2 marks

(d) The developed plan is effective at testing the hypothesis. 1 mark

Skill C2: Data collection and presentation

(a) Data observations are clearly presented in a suitable format. 2 marks

(b) Data is collected and recorded accurately and with an appropriate degree of precision. 2 marks

(c) The report is organised in a logical order of presentation (information, description, explanation, diagrams). 2 marks

(d) The quality of written communication. 2 marks

(e) Suitable statistical tools are used to analyse the data. 1 mark

Skill C3: Conclusions and evaluation

(a) Full conclusions are drawn, supported by reference to the data. 2 marks

(b) Knowledge of environmental and management principles are used to explain trends and patterns in own results. 2 marks

(c) There is an evaluative assessment of the report in terms of its limitations and level of success. 1 mark

This total of 20 marks will then be doubled to a mark out of 40.

Each Skill criterion is marked on a scale of 0 to 1 or 2, as follows:

2 = criterion fully met, 1 = criterion partly met, 0 = criterion not met at all.

or 1 = criterion met, 0 = criterion not met at all.

5. Coursework: guidance for Centres

5.4 Moderation

All aspects of coursework will be moderated. Centres are expected to write their own Schemes of Assessment; these should comply with the syllabus Aims and Assessment Objectives.

(a) Internal Moderation

When several teachers in a Centre are involved in internal assessment, arrangements must be made within the Centre for all candidates to be assessed to the same standard. It is essential that the marks for each skill assigned within different teaching groups (or classes) are moderated internally for the whole Centre entry. The Centre assessments will then be moderated externally by CIE.

(b) External Moderation

CIE carries out the external moderation of internally assessed Coursework.

The internally moderated marks for all candidates must reach CIE by the following deadlines:

- **30 April for the May/June examination**
- **31 October for the November examination**

Marks may be submitted either by using MS1 mark sheets or by using Cameo. Consult the *Handbook for Centres* for more information on both these methods.

Once it has received the marks, CIE will draw up a list of sample candidates whose work will be moderated (a further sample may also be requested), and will ask the Centre to immediately send the Coursework of these candidates together with Individual Candidate Record Cards and Coursework Assessment Summary Forms. Copies of these forms can be found at the back of this booklet. For each candidate on the list, every piece of work which has contributed to the final mark should be sent to CIE.

If there are ten or fewer candidates, the Coursework that contributed to the final mark for **all** the candidates must be sent to CIE.

A further sample may be required and all record and supporting written work should be retained until after publication of results.

For more information about external moderation please consult the *Handbook for Centres* and the *Administrative Guide for Centres*.

5. Coursework: guidance for Centres

Ideally, candidates should use loose-leaf A4 file paper for the Coursework. Original work is preferred for moderation, but authenticated photocopies can be sent if absolutely necessary.

Pieces of work should **not** be stapled together. Each piece of work should be clearly and securely labelled with:

- the Centre number
- the candidate's name and number
- the title of the report
- the skill being assessed
- a copy of the mark scheme used
- the mark awarded.

6. Appendix

6.1 Resource list

Author	Title	Date	Publisher	ISBN
Alma, P J	*Environmental Concerns*	1993	*Cambridge Social Biology Topics* Cambridge University Press	0521428696
Ashworth, W	*The Encyclopaedia of Environmental Studies*	1992	Facts on File	0816015317
Botkin, Daniel B & Keller, Edward A	*Environmental Science: Earth as a living planet*	1999	Wiley	0471358770
Byrne, Kevin	*Environmental Science*	2001	*Bath Advanced Science* Nelson Thornes	0174483058
Chapman, J L & Reiss, M J	*Ecology: Principles and Applications*	1992	Cambridge University Press	0521389518
Chrispin, J & Jegede, Francis	*Population, Resources and Development*	2000	Collins Educational	0003266516
Collard, Roy	*The Physical Geography of Landscape*	1988	Collins Educational	071352734X
Cornwell, A	*Man and the Environment*	1983	*Cambridge Social Biology Topics* Cambridge University Press	0521288924
Cunningham, W P	*Understanding our Environment: An Introduction*	1994	William C Brown	0697204561
Cunningham, W P & Woodworth-Saigo, B	*Environmental Science – A Global Concern*	1995 (3rd ed)	William C Brown	0697158942
Hayward, Geoff	*Applied Ecology*	1992	*University of Bath Science 16-19* Nelson Thornes	017448187X
Kemp, David	*Exploring Environmental Issues, An Integrated Approach*	2004	Routledge, Taylor and Francis Group	0415268648
Miller, G Tyler	*Sustaining the Earth: An integrated approach*	1994	Wadsworth	0534214320
Millerchip, D	*The Food Resources of Man*	1984	*Cambridge Social Biology Topics* Cambridge University Press	0521288916

6. Appendix

Nebel, Bernard J & Wright, Richard T	*Environmental Science: The Way the World Works* (4th ed)	2001	Prentice Hall	0130325384
O'Hare, Greg & Sweeney, John	*The Atmospheric System*	1986	Oliver & Boyd	0050037420
Porteous, Andrew	*Dictionary of Environmental Science and Technology*	1992	Wiley	0471935441
Waugh, David	*Geography: an integrated approach* (3rd ed)	2000	Nelson Thornes	017444706X
Witherick, Michael et al	*Environment and People: an integrated course for A and AS Geography*	1995	Nelson Thornes	0748721207
Woodfield, Judith (editor)	*Ecosystems and Human Activity*	1994	Collins Educational	0003266443

6. Appendix

6.2 Mathematical requirements

CIE assumes that all candidates for Environmental Management are able to:

- perform calculations involving addition, subtraction, multiplication and division of numbers;
- perform numerical work accurately and handle calculations so that significant figures are neither lost unnecessarily nor carried out beyond what is justified;
- make approximate evaluations of numerical expressions (e.g. $\pi^2 = 10$) and use such approximations to check the magnitude of machine calculations;
- express fractions as percentages and vice versa;
- recognise and use expressions in decimal and standard form notation;
- use tables or calculators to evaluate powers, roots, reciprocals, arithmetic means;
- substitute physical quantities into equations using consistent units;
- change the subject of an equation;
- solve simple algebraic equations;
- formulate simple algebraic equations as mathematical models of physical situations;
- recognise and use the forms of expressions such as ab, a/b, x^n , x^{-n};
- comprehend the meanings of, and use the symbols/notations: <, >, =, /, α;
- calculate areas of right-angled and isosceles triangles, circumferences and areas of circles and volumes of rectangular blocks and cylinders;
- test a relationship for direct proportionality graphically and numerically;
- select appropriate variables and scales for plotting a graph, especially to obtain a linear graph of the form $y = mx + c$;
- determine and interpret the slope and intercept of a linear graph;
- choose by inspection a straight line that will serve as the 'least bad' linear model for a set of data presented graphically: use of scatter graphs and lines of best fit;
- understand and use the area below a curve where this has physical significance.

6. Appendix

6.3 Glossary of Terms

It is hoped that the glossary (which is relevant only to science subjects) will prove helpful to candidates as a guide (i.e. it is neither exhaustive nor definitive). The glossary has been deliberately kept brief not only with respect to the number of terms included but also to the descriptions of their meanings. Candidates should appreciate that the meaning of a term must depend in part on its context.

1 *Define* (the term(s)...) is intended literally, only a formal statement or equivalent paraphrase being required.

2 *What is meant by* (the term(s)...) normally implies that a definition should be given, together with some relevant comment on the significance or context of the term(s) concerned, especially where two or more terms are included in the question. The amount of supplementary comment intended should be interpreted in the light of the indicated mark value.

3 *State* implies a concise answer with little or no supporting argument (e.g. a numerical answer that can readily be obtained 'by inspection').

4 *List* requires a number of points, generally each of one word, with no elaboration. Where a given number of points is specified, this should not be exceeded.

5 *Explain* may imply reasoning or some reference to theory, depending on the context.

6 *Describe* requires the candidate to state in words (using diagrams where appropriate) the main points of the topic. It is often used with reference either to particular phenomena or to particular experiments. In the former instance, the term usually implies that the answer should include reference to (visual) observations associated with the phenomena.

In other contexts, *describe* should be interpreted more generally (i.e. the candidate has greater discretion about the nature and the organisation of the material to be included in the answer). *Describe* and *explain* may be coupled, as may *state* and *explain*.

7 *Discuss* requires the candidate to give a critical account of the points involved in the topic.

8 *Outline* implies brevity (i.e. restricting the answer to giving essentials).

9 *Predict* or *deduce* implies that the candidate is not expected to produce the required answer by recall but by making a logical connection between other pieces of information. Such information may be wholly given in the question or may depend on answers extracted in an earlier part of the question.

10 *Suggest* is used in two main contexts (i.e. either to imply that there is no unique answer (e.g. in chemistry, two or more substances may satisfy the given conditions describing an 'unknown'), or to imply that candidates are expected to apply their general knowledge to a 'novel' situation, one that may be formally 'not in the syllabus').

11 *Find* is a general term that may variously be interpreted as calculate, measure, determine etc.

12 *Calculate* is used when a numerical answer is required. In general, working should be shown, especially where two or more steps are involved.

13 *Measure* implies that the quantity concerned can be directly obtained from a suitable measuring instrument (e.g. length, using a rule, or mass, using a balance).

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14 *Determine* often implies that the quantity concerned cannot be measured directly but is obtained by calculation, substituting measured or known values of other quantities into a standard formula (e.g. relative molecular mass).

15 *Estimate* implies a reasoned order of magnitude statement or calculation of the quantity concerned, making such simplifying assumptions as may be necessary about points of principle and about the values of quantities not otherwise included in the question.

16 *Sketch*, when applied to graph work, implies that the shape and/or position of the curve need only be qualitatively correct, but candidates should be aware that, depending on the context, some quantitative aspects may be looked for (e.g. passing through the origin, having an intercept, asymptote or discontinuity at a particular value).

In diagrams, *sketch* implies that a simple, freehand drawing is acceptable; nevertheless, care should be taken over proportions and the clear exposition of important details.

6.4 Forms and instructions

Following are:

Individual Candidate Record Card

Coursework Assessment Summary Form

Proposal for Coursework Form

ENVIRONMENTAL MANAGEMENT
Individual Candidate Record Card
GCE AS LEVEL

Please read the instructions printed overleaf and the General Coursework Regulations before completing this form.

Centre Number						Centre Name		June/November	**2**	**0**	**1**	**1**
Candidate Number						Candidate Name		Teaching Group/Set				

Title of Research Report					
Assessment Skill				Mark Gained	Comment
C1	Research and Planning	(total 6)	(a) (1)		
			(b) (2)		
			(c) (2)		
			(d) (1)		**C1** Total Mark
C2	Data Collection and Presentation	(total 9)	(a) (2)		
			(b) (2)		
			(c) (2)		
			(d) (2)		
			(e) (1)		**C2** Total Mark
C3	Conclusions and Evaluation	(total 5)	(a) (2)		
			(b) (2)		
			(c) (1)		**C3** Total Mark
			Total Mark (max 20)		Marks to be transferred to the Coursework Assessment Summary Form
Amount of scaling if relevant			Internally Moderated Mark (max 40)		

INSTRUCTIONS FOR COMPLETING INDIVIDUAL CANDIDATE RECORD CARDS

1. Complete the information at the head of the form.
2. Mark the Coursework assignment for each candidate according to the mark scheme devised by the Centre for the Coursework unit. This mark scheme should be developed using the criteria listed in the syllabus.
3. Enter marks and total marks in the appropriate spaces. Complete any other sections of the form required.
4. Ensure that the addition of marks is independently checked.

5. **It is essential that the marks of candidates from different teaching groups within each Centre are moderated internally.** This means that the marks awarded to all candidates within a Centre must be brought to a common standard by the teacher responsible for co-ordinating the internal assessment (i.e. the internal moderator) and a single valid and reliable set of marks should be produced which reflects the relative attainment of all the candidates in the Coursework component at the Centre. The outcome of internal moderation, in terms of the number of marks added to or subtracted from the initial total, must be clearly written in the box marked 'Amount of scaling if relevant'. If no scaling is necessary, please indicate by writing a zero in this box.
6. Transfer the marks to the Coursework Assessment Summary Form (see the form for further instructions)

7. Retain all Individual Candidate Record Cards and Coursework **which will be required for external moderation**. Further detailed instructions about external moderation will be sent in late March of the year of the June examination and early October of the year of the November examination. See also the instructions on the Coursework Assessment Summary Form.

ENVIRONMENTAL MANAGEMENT
Coursework Assessment Summary Form
GCE AS LEVEL

Please read the instructions printed overleaf and the General Coursework Regulations before completing this form.

Centre Number						Centre Name		June/November	**2**	**0**	**1**	**1**

Candidate Number	Candidate Name	Teaching Group/Set	**C1** Research and Planning (total 6)	**C2** Data Collection and Presentation (total 9)	**C3** Conclusions and Evaluation (total 5)	Total Mark (max 20)	Internally Moderated Mark (max 40)

Name of teacher completing this form		Signature		Date	
Name of internal moderator		Signature		Date	

UNIVERSITY of CAMBRIDGE International Examinations

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A INSTRUCTIONS FOR COMPLETING COURSEWORK ASSESSMENT SUMMARY FORMS

1 Complete the information at the head of the form.

2 List the candidates in an order that will allow ease of transfer of information to a computer-printed Coursework mark sheet MS1 at a later stage (i.e. in candidate index number order, where this is known; see item B.1 below). Show the teaching group or set for each candidate. The initials of the teacher may be used to indicate the group or set.

3 Transfer each candidate's marks from his or her Individual Candidate Record Card to this form as follows:

(a) Enter the marks initially awarded for each of skills C1; C2 and C3 in the appropriate column (i.e. before moderation took place).

(b) In the column headed 'Total Mark', enter the total mark awarded before internal moderation took place.

(c) In the column headed 'Internally Moderated Mark', enter the total mark awarded *after* internal moderation took place.

4 Both the teacher completing the form and the internal moderator (or moderators) should check the form and complete and sign the bottom portion.

B PROCEDURES FOR EXTERNAL MODERATION

1 University of Cambridge International Examinations (CIE) sends a computer-printed Coursework mark sheet MS1 to each Centre (in late March for the June examination and in early October for the November examination) showing the names and index numbers of each candidate. Transfer the total internally moderated mark for each candidate from the Coursework Assessment Summary Form to the computer-printed Coursework mark sheet MS1.

2 The top copy of the computer-printed Coursework mark sheet MS1 must be despatched in the specially provided envelope to arrive as soon as possible at CIE but no later than 30 April for the June examination and 31 October for the November examination.

3 CIE will select a list of candidates whose work is required for external moderation. As soon as this list is received, send candidates' work with the corresponding Individual Candidate Record Cards, this Summary Form and the second copy of MS1, to reach CIE by 31 October.

4 If there are ten or fewer candidates, all the coursework that contributed to the final mark for all the candidates must be sent to CIE. Where there are more than ten candidates, CIE will select the candidates whose coursework is required.

5 Photocopies of the samples may be sent **but** candidates' original work, with marks and comments from the teacher, is preferred.

6 (a) The pieces of work for each skill should **not** be stapled together, nor should individual sheets be enclosed in plastic wallets.

(b) Each piece of work should be clearly labelled with the skill being assessed, Centre name, candidate name, and index number and the mark awarded.

7 CIE reserves the right to ask for further samples of Coursework.

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International Examinations

OUTLINE PROPOSAL FORM

for GCE A/AS Level Examinations

Please read the instructions printed overleaf before completing this form

Name of Centre		Centre Number	
Candidate Name (if required)		Candidate Number	
Syllabus Title		Syllabus Code	
If this is a re-submission, please check box ☐		Component Number	
Examination/Assessment Session: June ☐ November ☐		Year	

Title of Proposal	

Details of Proposal (see over)	

Date	

Comments:				
	Adviser's Initials		Date	

For CIE use only:	APPROVED	APPROVED WITH PROVISO (see comments)	NOT APPROVED	More information required	Approval not required; please see comments
	☐	☐	☐	☐	☐

UNIVERSITY of CAMBRIDGE
International Examinations

INSTRUCTIONS FOR COMPLETION OF THIS FORM

1 Type information in the spaces provided.

2 One form should be used for each candidate. If extra space is required to complete the outline proposal a second Form should be used.

3 Complete the appropriate boxes at the top of the form. If this portion is not correctly completed, it will be necessary to return the form.

4 The outline should normally include:

(i) the title or aim of the piece of work;

(ii) the methods to be used to collect and analyse information and data and, where possible and appropriate, a brief list of sources;

(iii) a bibliography

5 The completed form must be emailed **before the candidate starts the work**. CIE will return the form with the adviser's comments. This copy of the form **must be included in the completed study after the title page.**

6 Complete the form after reading the relevant coursework sections of the syllabus and email it to **cieopf@cie.org.uk** A copy of the proposal form should be retained.

7 If you are re-submitting a proposal, the form must be accompanied by the original proposal. Candidates who are adjusting their proposal in line with the adviser's comment need not resubmit.

8 Centres should expect an acknowledgement within 10 working days of submission. If you do not receive this, please telephone CIE Customer Services on 01223 553553.

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