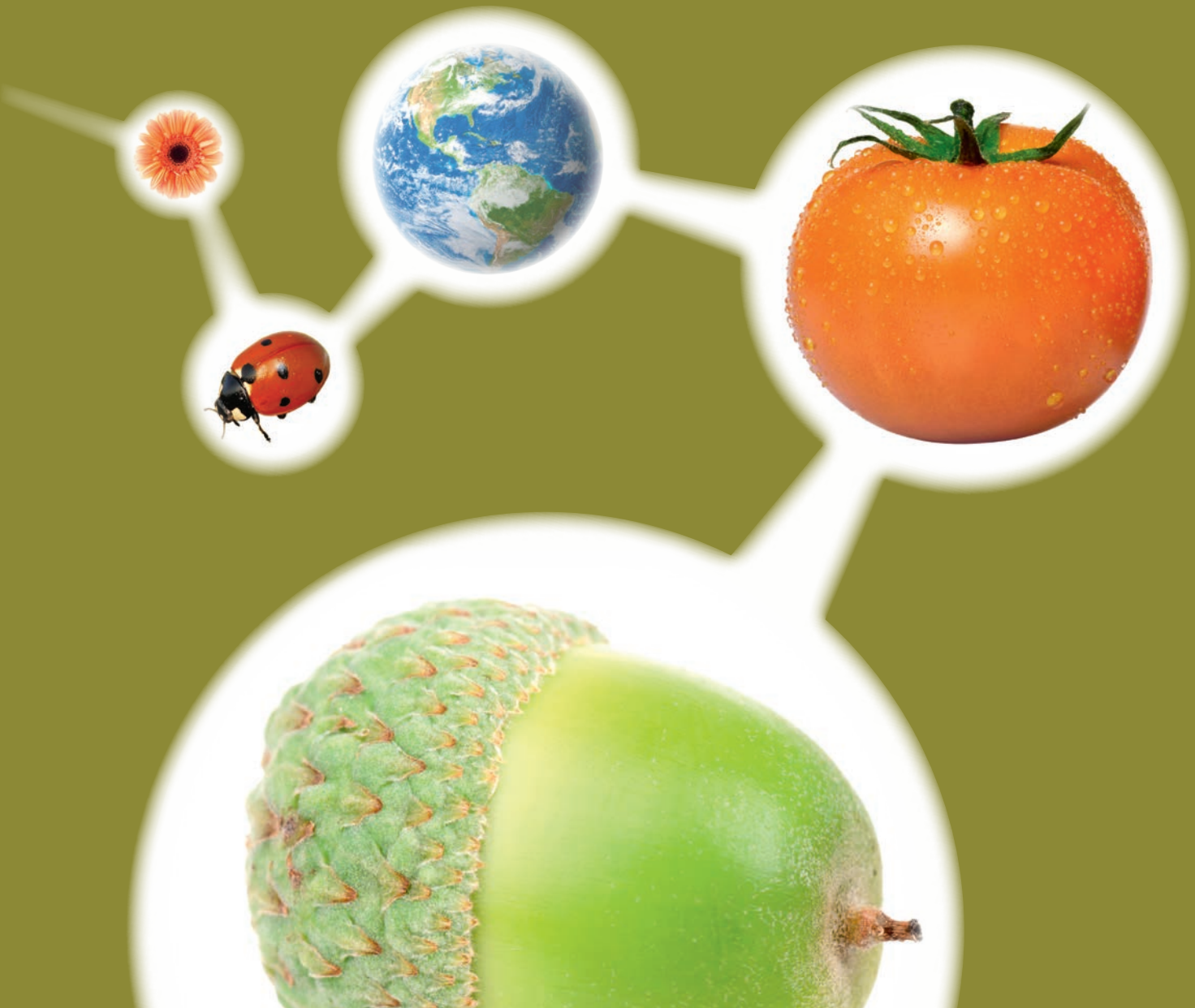
GCSE ENVIRONMENTAL AND LAND-BASED SCIENCE

ACCREDITED SPECIFICATION

J271

VERSION 3

AUGUST 2013



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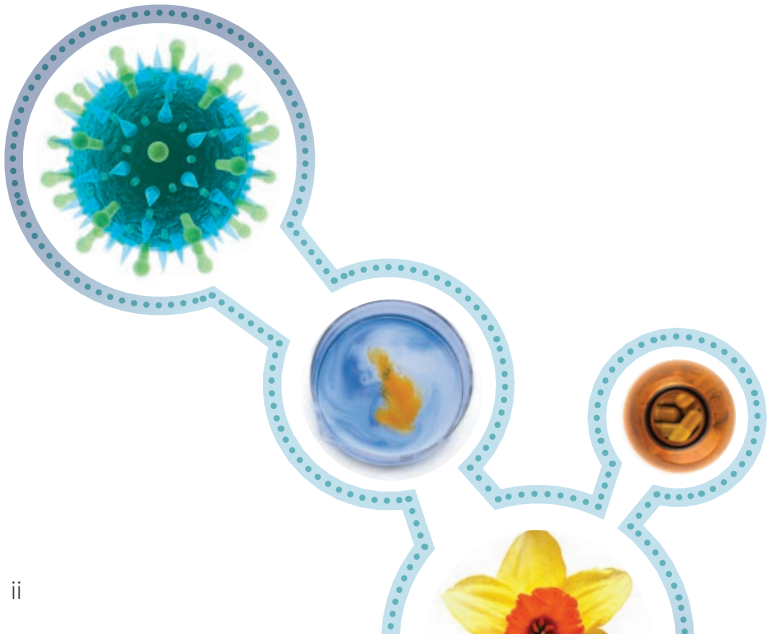
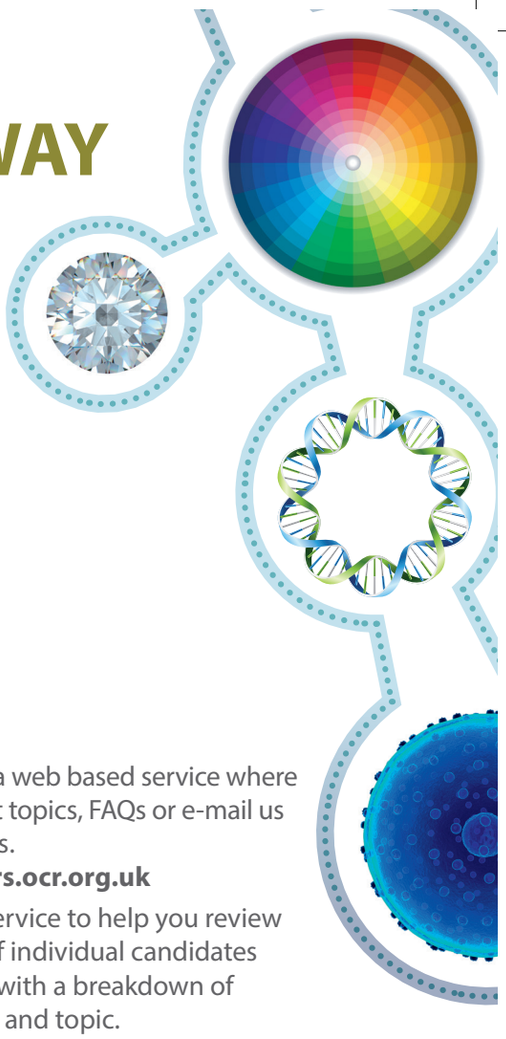


SUPPORTING YOU ALL THE WAY



Our aim is to help you at every stage and we work in close consultation with teachers and other experts to provide a practical package of high quality resources and support.

Our support materials are designed to save you time while you prepare for and teach our new specifications. In response to what you have told us we are offering detailed guidance on key topics and controlled assessment.

Our essential FREE support includes:

Materials

- Specimen assessment materials and mark schemes
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- Sample controlled assessment material
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ENVIRONMENTAL AND LAND-BASED SCIENCE

SCIENCE GETS DOWN TO EARTH

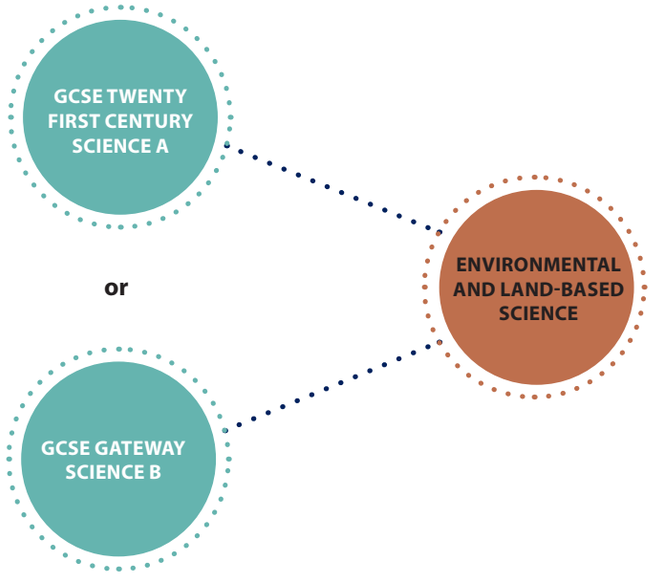
An introduction to science as it relates to the environment and the commercial use of land and best suits the vocational learner who is looking to explore the skills needed for work in these sectors.

This specification may be taught as an additional applied science or as a stand-alone GCSE. This specification may be of particular interest to those schools in England aspiring to include the 'rural dimension' in their Specialist School application.

KEY FEATURES

- Takes a practical, hands-on approach to learning
- Is an **ideal foundation** for students to progress to more-advanced studies and science-related careers
- Well regarded for its proven **work-related** teaching approach to science.

POSSIBLE GCSE COMBINATIONS



ENVIRONMENTAL AND LAND-BASED SCIENCE

This specification provides an introduction to some of the skills, knowledge and understanding students need in the workplace, set in the context of the environmental and land-based sector.

It is designed to motivate students:

- by providing opportunities to use teaching and learning styles that enable students to take charge of their own learning
- allowing them to develop some of the practical skills relevant for work in land-based enterprises.

COURSE OVERVIEW

ASSESSMENT OVERVIEW

UNIT B681: Management of the Natural Environment

50 marks
1 hour written paper

20% of total GCSE

UNIT B682: Plant Cultivation and Small Animal Care

50 marks
1 hour written paper

20% of total GCSE

or

UNIT B683: Commercial Horticulture, Agriculture and Livestock Husbandry

50 marks
1 hour written paper

20% of total GCSE

Two examined units each:

- is offered in Foundation and Higher Tiers
- comprises objective and longer answer questions
- assesses the quality of written communication.

UNIT B684: Environmental and Land-Based Science portfolio

120 marks
Approx 38 hours

60% of total GCSE

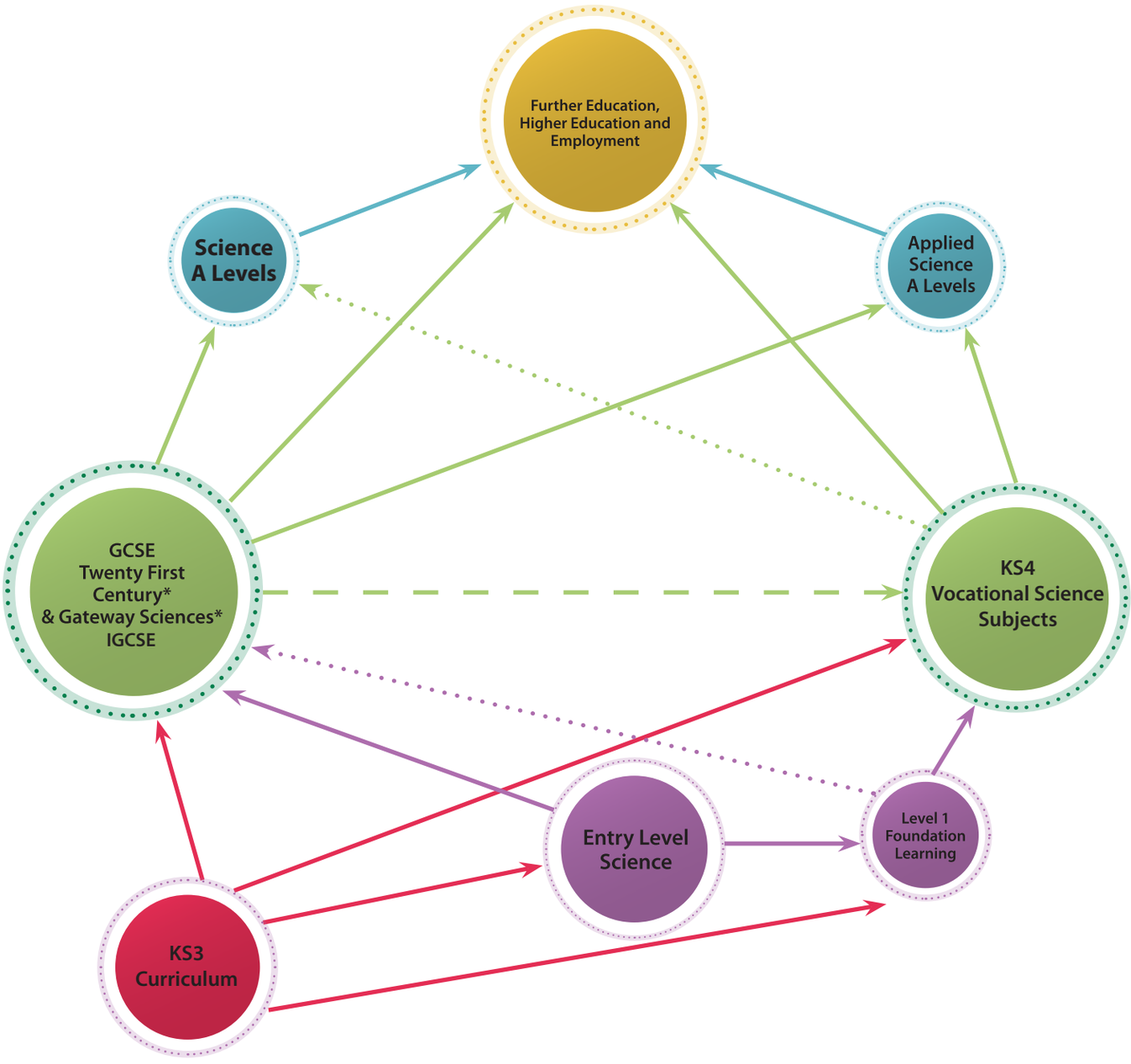
Candidates compile a portfolio of:

Element 1: Practical skills tasks

Element 2: Investigative project

Element 3: Work-related activity/ enterprise.

PROGRESSION PATHWAYS IN SCIENCE



This could be a progression route along a particular curriculum pathway. (Stage, not age pathways)

This could be a progression route however students would require additional support.

Alternative qualification options

* Offered as
Science, Additional Science, Biology, Chemistry and Physics.

OCR GCSE in Environmental and Land-Based Science J271

Contents

Contents

1 Introduction to GCSE Environmental and Land-Based Science

This course aims to equip candidates with the scientific knowledge, understanding and skills needed for further study in the environment and land-based sector. The course requires candidates to apply science to issues relating to the environment and land-based sector, make both scientific and ethical judgements, evaluate evidence and consider the implications of science for society. Candidates consider and evaluate critically their own data and conclusions and use ICT to research, present and organise information. The course involves candidates in a range of practically-based activities which enable them to build a portfolio of their achievements.

GCSE Environmental and Land-Based Science can be taught as a stand-alone qualification but will usually be taken as an alternative to GCSE Additional Applied Science, alongside or following a course in GCSE or Entry Level Science.

GCSE Environmental and Land-Based Science, taken alone, does **not** cover the National Curriculum Programme of Study for Science for Key Stage 4.

This course is designed to enable candidates to:

- make informed decisions about issues related to the environment and land-based sector that involve science
- relate experience in the classroom, science laboratory and in the field to a variety of vocational opportunities in the environment and land-based sector.

2.1 Overview of GCSE Environmental and Land-Based Science

Unit B681: *Management of the Natural Environment*

This is a tiered unit offered in Foundation and Higher Tiers.

Written paper

1 hour – 50 marks

20% of the qualification

Test comprises of objective and longer answer questions.

Candidates answer all questions.

+

Unit B682: *Plant Cultivation and Small Animal Care*

This is a tiered unit offered in Foundation and Higher Tiers.

Written paper

1 hour – 50 marks

20% of the qualification

Test comprises of objective and longer answer questions.

Candidates answer all questions.

OR

Unit B683: *Commercial Horticulture, Agriculture and Livestock Husbandry*

This is a tiered unit offered in Foundation and Higher Tiers.

Written paper

1 hour – 50 marks

20% of the qualification

Test comprises of objective and longer answer questions.

Candidates answer all questions.

+

Unit B684: *Environmental and Land-Based Science portfolio*

This unit is not tiered.

Controlled assessment

3 strands:

4 Practical Scientific Skills

Scientific Investigation

Work-related Report.

Approx 38 hours – 120 marks

60% of the qualification

2.2 Guided learning hours

GCSE Environmental Land-Based Science requires 120–140 guided learning hours in total.

2.3 Aims and learning outcomes

GCSE Environmental Land-Based Science follows the Additional Applied Science subject criteria. Therefore, this specification should provide insight into and experience of how science works, encouraging learners' to develop an understanding of science, its applications and its relationship with the world of work. Specifications should prepare learners to make informed decisions about further study and training opportunities in applied science and career opportunities.

The aims of this specification are to enable candidates to:

- develop their knowledge and understanding of science and its applications
- develop their understanding of the benefits, drawbacks and risks of scientific developments for industry, the economy and society
- develop their understanding of the need for monitoring and regulation of the work of practitioners in science and science-related industries
- develop their awareness of risk factors and their ability to assess potential risks and manage them in practical and workplace contexts
- develop their understanding of the use of scientific protocols and standard procedures in the laboratory and the work place
- develop their understanding of the scientific process
- develop their practical, problem-solving, enquiry and scientific modelling skills and understanding in laboratory and work-related contexts
- develop their understanding of the relationships between data, evidence and explanations and their ability to evaluate scientific methods, evidence and conclusions
- develop their communication, mathematics and technology skills in scientific contexts.

2.4 Prior learning

Candidates entering this course should have achieved a general educational level equivalent to National Curriculum Level 3, or Entry 3 at Entry Level within the National Qualifications Framework.

Content of GCSE Environmental and Land-Based Science

3

3.1 Summary of content

Unit B681: *Management of the Natural Environment*

Environmental issues and relationship of the soil to the animals and plants it supports. Human activities and energy requirements and the effects on the environment. Traditional and alternative food production.

Unit B682: *Plant Cultivation and Small Animal Care**

Issues relating to the care and maintenance of plants and small animals in the home, the garden and at school.

Unit B683: *Commercial Horticulture, Agriculture and Livestock Husbandry**

Issues relating to the care and maintenance of plants and livestock in a commercial environment.

Unit B684: *Environmental and Land-Based Science Controlled Assessment portfolio*

Three elements:

Element 1: Practical Scientific Skills presented as an annotated photo diary with a critical reflection. 4 set tasks: 2 tasks based on Unit B681 and 2 based on Units B682 or B683; 6 raw marks each.

Element 2: Scientific Investigation based on one or more of the topics studied within the selected units; 48 raw marks.

Element 3: Work-related Report. Candidates to research authentic contexts in which science is important to the environment and land-based sector. Opportunity to learn through work, learn about workplace practice and make links relevant to their scientific knowledge; 48 raw marks.

* Candidates take **either** B682 **or** B683.

3.2 Layout of specification content

The detailed specification content is displayed in tabular format, designed to provide a teacher-friendly approach to the content. This allows teachers to see, at a glance, the way in which topics are differentiated at Low, Standard and High Demand, and assessed in the examinations at Foundation and Higher tiers.

3.3 Unit B681: *Management of the Natural Environment*

Unit B681: Management of the Natural Environment

This unit requires an understanding of the formation and structure of soil and its effect on the plants and animals it supports. It focuses on the inter-relationships and energy requirements within ecosystems and the effects of human activities on the environment. These activities include traditional agricultural, horticultural, and those resulting from alternative methods of food production.

To provide practical contexts for learning at an appropriate level of demand, candidates should be able to do some/all of the following tasks. These will provide opportunities for the assessment of practical skills. They will not be tested in the examinations.

- Identify sand, clay and loam soils; determine the air, water and organic content of different soils and their drainage characteristics.
- Take random samples of soils from different areas to determine their pH values and relate these to the plants/crops which grow there.
- Identify appropriate methods for collecting data on climatic factors, measure variations in microclimates and show how these affect plant growth and land use.
- Identify and use appropriate methods for collecting data about a habitat and investigate the distributions of plants and animals in an ecosystem.
- Use ICT and a range of other reference sources to investigate the contribution made by a conservation body.

Candidates should be able to demonstrate knowledge and understanding of the following:

Foundation Tier only: Low Demand	Both Tiers: Standard Demand	Higher Tier only: High Demand
1. what makes an ecosystem and the factors that affect habitat: climate, soil, and organisms	• the characteristics of the major types of ecosystem in the UK: deciduous and coniferous woodland, meadows, ley grassland, wetland, moorland, and the plants and animals they support	• **two** of the major UK ecosystems in terms of the ecological relationships between the plants, animals and their non-living surroundings
2. biological and behavioural adaptations help plants and animals to survive in the habitat in which they live		
3. how the climate influences the distribution of organisms	• how human activity can affect micro-climates, including planting hedgerows and trees	• the ways that human activity can impact on organisms, so changing the balance of plant and animal populations in an ecosystem
4. the inter-relationships between plants and animals in the food web	• how energy is lost between trophic levels; the concept of energy transfer in a food chain; pyramids of biomass and energy in animal and plant production systems	• management of food chains and food webs to increase the output of agricultural and horticultural systems; how intensive production improves the efficiency of energy transfer

Foundation Tier only: Low Demand	Both Tiers: Standard Demand	Higher Tier only: High Demand
5. why it is important to monitor and keep records of environmental conditions	• how ICT and technology can be used to monitor and record environmental conditions	• the advantages of the use of ICT and technology in monitoring and recording environmental conditions
6. how weathering, erosion and deposition are involved in the formation of soil and landscapes	• how plants, animals and rock type may affect the formation of soil and landscapes	• the impact of human activity on the landscape to include ways of managing soil erosion
7. biodiversity is the variety of different species living in a habitat	• the differences in biodiversity in natural and artificial ecosystems	• the reasons for the differences in biodiversity in different ecosystems
8. how measures of species' distributions and population size, and the diversity of communities, are estimates based on samples	• the use of sampling techniques, including quadrats, to establish species' distributions and population size, and the diversity of communities	• how estimates of species' distributions and population size, and the diversity of communities, depend upon the way in which samples are taken
9. the main soil types, their characteristics and components: sand, clay, silt and organic matter (humus)	• the characteristics of the mineral particles in soil: sand, clay, silt and organic matter (humus)	• the impact soil type has on land-based activities
10. the role of earthworms in improving soil structure and fertility	• living organisms in the soil require supplies of air and water	• how human activity (to include cultivation, use of organic matter and drainage) can affect the structure of the soil and its fertility
11. how to carry out pH tests on soil and why these are important	• the importance of pH in determining the plants which can be grown and the yields obtained; the effects of lime on cropping, including provision of calcium	• the effects of lime and pH on mineral availability and flocculation in the soil
12. the need to keep weeds under control to prevent competition with crops for light, water and nutrients	• the differences between chemical weed control (herbicides) and cultural weed control (mulch, polythene, hoeing and companion planting)	• the possible effects of weed control methods on the environment: effects on food chains, watercourses and soil
13. the characteristics of intensive and extensive animal and plant production systems (in relation to agriculture, commercial horticulture, forestry and aquaculture)	• the environmental advantages and disadvantages of intensive and extensive animal and plant production systems (in relation to agriculture, commercial horticulture, forestry and aquaculture)	• different production systems (in relation to agriculture, commercial horticulture, forestry and aquaculture) and their consequences for land-based industries, industrial activity, urbanisation and leisure, and how priorities change over time

Foundation Tier only: Low Demand	Both Tiers: Standard Demand	Higher Tier only: High Demand
14. the meaning of the terms mixed cultivation, monoculture, organic, inorganic and GM food production	• the effect that intensive monoculture has on the natural environment: to include hedgerow destruction, loss of wildlife habitats, soil structure and nutrients, and soil organisms, including pests and diseases	• the principles of genetic modification to include identification of desired characteristics, isolation of genes responsible, insertion of genes into other organisms and replication of these organisms
	• the advantages and disadvantages of: organic, inorganic, mixed, monoculture and GM food production in terms of quality, cost, yield, inputs, and environmental considerations	
15. the nitrogen cycle: the terms fixation, decay, nitrification; and that plants take up nitrates	• the significance of soil organisms and legumes in making nutrients available to plants, including the importance of crop rotation	• the role of bacteria in the nitrogen cycle, limited to nitrogen fixing, nitrifying and denitrifying (names of bacteria not required); management of the nitrogen cycle to include fertiliser application and crop rotation
16. the role of the following conservation bodies: RSPB, Natural England and RBST, in the context of the land-based industries	• the difference between preservation and conservation and that conservation is the management of the environment to maintain natural balances; how one conservation body studied contributes to conservation	• the impact designations such as National Parks, SSSIs, nitrate sensitive areas and nitrate vulnerable zones have on the land-based industries
17. the responsibility those who manage land have in: maintaining the character of the landscape, improving biodiversity, managing public access, preserving historical features, protecting resources (including soil and water)	• the roles of local and national government in land management including: planning regulations and green belt land, the Environmental Stewardship Scheme, legislation for open access	• how the influence of local and national government can affect: the character of the landscape, biodiversity, soil and water resources
18. the reasons for using larger and more powerful machines in agriculture, including combines and sprayers	• the effects of using larger machinery on soil (compaction) and the environment (loss of hedgerows in the past)	• how growers and manufacturers can reduce the effects of larger machinery on soil and the environment

Foundation Tier only: Low Demand	Both Tiers: Standard Demand	Higher Tier only: High Demand
19. how the land-based industries might use alternative methods to meet their energy needs: wind, water, solar, fuel crops	• the advantages and disadvantages of using alternative methods to meet energy needs: wind, water, solar, fuel crops	• the role the land-based industries might have in helping to meet future national energy needs, to include bio-diesel, biogas and fuel crops
20. the different ways water is used in the land-based industries	• different systems for providing water on farms	• the ways the land-based industries manage water consumption to include water recycling, waste reduction and irrigation systems
21. the hazards associated with the environment as a work place including: the weather, bodies of water, unsafe ground, disease, chemical hazards, use of electrical and mechanical equipment, approaching and moving livestock; the need for risk assessments	• how to carry out a risk assessment for a work situation in the context of the land-based industries	• to be able to use a risk assessment to make recommendations to reduce/avoid risks, in the context of the land-based industries

3.4 Unit B682: *Plant Cultivation and Small Animal Care*

Unit B682: Topic 1: Plant Cultivation

This part of the unit focuses on plant biology through the growing of plants. It includes soil and environmental factors affecting growth, nutrient requirements for producing healthy plants, plant reproduction, both sexual and asexual, and the breeding of improved varieties.

To provide practical contexts for learning at an appropriate level of demand, candidates should be able to do some/all of the following tasks. These will provide opportunities for the assessment of practical skills. They will not be tested in the examinations.

- Grow plants from seed and use three different methods of plant propagation.
- Use data to determine appropriate fertiliser application for crops and apply fertiliser by two different methods; determine the effects on plant growth of varying N applications in the field, glasshouse or under cloches.
- Cultivate crops in the garden or allotment and in a greenhouse or polytunnel or cold frame or under cloches.
- Recognise signs of ill health in plants and identify and use suitable treatments, both biological and chemical.

Candidates should be able to demonstrate knowledge and understanding of the following:

Foundation Tier only: Low Demand	Both Tiers: Standard Demand	Higher Tier only: High Demand
1. how growing medium, water, humidity, nutrients, temperature and light can be controlled in crop production and the effects of these factors on plant growth	• the balanced symbol equation for photosynthesis	• how CO_2, temperature and light affect photosynthesis, including consideration of limiting factors
2. the signs of a healthy plant and an unhealthy plant: wilting, pest damage and poor growth	• the causes of plant ill health: pests, including aphids and slugs, fungal disease including damping off and potato blight, over and under watering; the effect of these factors on yield	• how pests, viruses and fungi are controlled in plant cultivation
3. the differences between biological and non-biological methods of pest control	• the advantages and disadvantages of biological pest control	• how biological control agents are used in glasshouses, using a named example
4. the effects of excess N and deficiencies of N, P, K and Mg on plant growth and development	• how nutrients NPK are taken in by plants	• the uses plants make of NPK to produce growth, including N for proteins, P for DNA and cell membranes, K for enzymes used in photosynthesis and respiration

Foundation Tier only: Low Demand	Both Tiers: Standard Demand	Higher Tier only: High Demand
5. the differences between organic and inorganic fertilisers	• the advantages and disadvantages of using organic and inorganic fertilisers	• how plant nutrient ratios in common fertilisers: general purpose (1:1:1), high N (2:1:1), high P (1:2:1) and high K (1:1:2), relate to their use for brassicas, legumes, root crops and tomatoes
6. adaptations of flower structure for wind and insect pollination	• adaptations in plants to prevent self pollination and encourage cross-pollination, to include dioecious plants	• management of pollination in crop production and breeding
7. the structure of a pea or bean seed, to include the testa, cotyledon, embryo, plumule and radicle	• the functions of testa, cotyledon, plumule and radicle and their roles in germination; the role of oxygen, water and temperature in germination to include mobilisation of enzymes	• techniques used to encourage different seeds to break dormancy, to include light and vernalisation
8. how a named plant is grown from seed to include the process of sowing, thinning, pricking out and potting on	• the reasons for thinning, pricking out and potting on	• the advantages and disadvantages of heated propagators, mist propagators and capillary matting, cloches and cold frames when raising plants from seed
9. how plants can be propagated using softwood, leaf and root cuttings, using named examples	• how the procedures used, including the control of the environment, ensure successful propagation; the advantages and disadvantages of sexual and asexual reproduction in plant breeding	• the techniques used in tissue culture (cloning) for plant propagation and the advantages of these methods, using named examples
10. plants are selectively bred to improve yield, disease resistance, hardiness and appearance	• how selective breeding is used to produce new varieties of plants such as tomato; the meaning and importance of hybrid vigour	• the uses and advantages of genetic engineering in the production of new varieties of plants, and the possible environmental and ethical issues arising
11. the differences between a bulb, a runner, a tuber, a corm and a rhizome used in plant cultivation and a named example of each	• how plants are propagated asexually including runners, rhizomes, tubers, corms and bulbs	• the advantages and disadvantages of sexual and asexual reproduction in plant breeding
12. the terms dominant, recessive and F1 and their meanings in relation to plant breeding	• the terms: chromosomes, genes, mutation, phenotype, genotype and their meanings in relation to plant breeding	• how to apply the mechanism of simple monohybrid inheritance, where there are dominant and recessive alleles, to plant breeding

Foundation Tier only: Low Demand	Both Tiers: Standard Demand	Higher Tier only: High Demand
13. the principles and purpose of soil cultivation by hand	• the importance of soil (crumb) structure; the use of humus, garden compost and manure in maintaining soil fertility	• methods of improving soil fertility and crumb structure using lime, coarse sand and well rotted manure
14. the problems associated with storing crops: relative perishability of crops and pests and diseases	• that systems for crop storage can extend storage life by controlling pests and diseases, using a named example	• how a controlled atmosphere, humidity and temperature can be used to manage storage life, to include the role of ethylene gas

Unit B682: Topic 2: Small Animal Care

This part of the unit focuses on the scientific basis for providing food and care for non-agricultural, small animals. This includes breeding of animals, safe handling of animals and interaction of animals and people.

To provide practical contexts for learning at an appropriate level of demand, candidates should be able to do some/all of the following tasks. These will provide opportunities for the assessment of practical skills. They will not be tested in the examinations.

- Safely handle a small animal, pick it up, weigh it and record the results.
- Carry out the routine husbandry of a small animal, including routine health care when needed.
- Identify signs of ill health of an animal and identify suitable treatments.
- Identify when an animal needs cleaning out, replace bedding and prepare housing for newborn animals.

Candidates should be able to demonstrate knowledge and understanding of the following:

Foundation Tier only: Low Demand	Both Tiers: Standard Demand	Higher Tier only: High Demand
1. animals can be kept for pets, food, research, competition, security, conservation or hunting and are treated differently for different purposes, including requirements for space, exercise, security	• factors needing to be considered when keeping animals, including animal interaction with people and other animals and ethical and welfare issues	• the biological, ethical and welfare issues involved with the castration and spaying of small animals
2. different breeds have different characteristics, including size and temperament and are selected for different purposes	• the difference between cross breeding and line breeding	• the advantages and disadvantages of cross breeding and line breeding
3. how the process of selective breeding has led to the development of different breeds of animal; what to look for in a named show animal: correct conformation and markings	• selective breeding can lead to inbreeding which can cause health problems to animals	• the dangers associated with inbreeding: reduction in variation and accumulation of harmful recessive characteristics; the ethical and welfare issues involved in breeding pedigree animals
4. the reproductive cycles in a named mammal and a named bird	• the formation of gametes, fertilisation, gestation, development and birth in mammals and birds; the functions of the shell gland and vent in birds and the uterus and vagina in mammals	• how hormones control the timing of oestrus and reproduction in mammals, and the effect of day length on egg production in birds
5. how to set up and use an incubator, to include the conditions provided and 'candling'	• the advantages and disadvantages of natural and artificial incubation in birds	• how an embryo obtains nutrients and removes waste during its development inside the egg, to include the porosity of the shell, yolk and allantoic sac

Foundation Tier only: Low Demand	Both Tiers: Standard Demand	Higher Tier only: High Demand
6. the constituents of an animal's diet: carbohydrates, proteins, fats, fibre and water; the importance of a balanced diet	• the importance of carbohydrates, proteins, fats, fibre and water in an animal's diet; the role of vitamins (A, C and D) and minerals (Ca and Fe); the effects of a poor diet, to include deficiencies in fibre, vitamins (A, C and D) and minerals (Ca and Fe) and excesses of fats and carbohydrates	• how different small animals meet their dietary requirements, to include carnivores, herbivores and omnivores
7. the range of different types of food used for small animals, including poultry and rabbits	• the difference between roughage, succulent and concentrate foods and an example of each	• the differences between feeding a ration and feeding ad lib and the advantages/disadvantages of each
8. the differences in the structure of the digestive systems of a rabbit and a bird; the significance of the caecum in rabbits and of grit in the diet of seed-eating birds	• the functions, in outline, of the mouth, stomach, small intestine, large intestine, caecum/caeca, rectum, anus, crop and gizzard in digestion in small animals	• the principle of enzyme action in digestion (no specific enzyme details needed); the role of microorganisms in cellulose digestion in the caecum
9. the characteristics of the different forms of housing used for small mammals, birds and fish or reptiles; how they meet the needs of animals	• the risks associated with inadequate housing for small animals	
10. the routine health checks that are used when keeping a named small animal	• the reasons for the routine health checks of a named small animal; including how ill health (diseases caused by bacteria, viruses, fungi and parasites) can be recognised (loss of condition and other evidence of parasites and diseases)	• the treatment of diseases caused by bacteria, viruses, fungi and parasites; the use of routine vaccinations to prevent diseases of small animals, including the advantages and disadvantages of these techniques
11. how to handle, transport and weigh small animals correctly	• the importance of handling small animals in the correct manner and the hazards of poor handling, including disease (tetanus, salmonella), parasites, being bitten; the ways these hazards may be reduced	• the health and safety and legal requirements for keeping, transporting and breeding small animals, and the reasons for these
12. the regular routine husbandry for small mammals, birds and reptiles or fish, including feeding and cleaning	• the care needed for pregnant mammals and very young mammals and birds, including housing, diet, health care	

3.5 Unit B683: *Commercial Horticulture, Agriculture and Livestock Husbandry*

Unit B683: Topic 1: Commercial Horticulture and Agriculture

This part of Unit B683 focuses on conditions needed and methods employed for the cultivation of plants in market gardening, parks and garden nurseries. It includes disease control in intensive and extensive situations, working safely in the garden, correct use of garden equipment and the preparation and growing of plants for sale.

To provide practical contexts for learning at an appropriate level of demand, candidates should be able to do some/all of the following tasks. These will provide opportunities for the assessment of practical skills. They will not be tested in the examinations.

- Measure and produce a plan for an area to be planted; cultivate and prepare the area and use recommended planting distances to calculate the number of plants required for an area.
- Provide plants with sufficient space to grow by pricking out and thinning seedlings and potting on.
- Plant out seedlings and cuttings, raise them to maturity and prepare plants for sale.
- Use tissue culture and hydroponics for plant production.
- Grow plants from seed and use propagation techniques.
- Adjust the cutting height of a lawnmower and cut a lawn.

Candidates should be able to demonstrate knowledge and understanding of the following:

Foundation Tier only: Low Demand	Both Tiers: Standard Demand	Higher Tier only: High Demand
1. how growing medium, water, nutrients, light and temperature can be controlled and how they affect plant growth	• the balanced symbol equation for photosynthesis	• how CO_2, temperature and light affect photosynthesis, including consideration of limiting factors
2. how plants are grown from seed, including the process of sowing, thinning, pricking out, potting on	• the reasons for thinning, pricking out and potting on	• the uses, advantages and disadvantages of heated propagators, mist propagators and capillary matting when raising plants from seed
3. the differences between annual, biennial and perennial life cycles and a named example of each; the differences between deciduous and evergreen plants	• how plants are propagated asexually: bulbs, corms, rhizomes, tubers and runners, using named examples of plants used in amenity horticulture; the advantages and disadvantages of sexual and asexual reproduction in commercial horticulture	• the techniques used in tissue culture for plant propagation (cloning) and the advantages of these methods, using named examples

Foundation Tier only: Low Demand	Both Tiers: Standard Demand	Higher Tier only: High Demand
4. plants are selectively bred to improve yield, disease resistance, hardiness and appearance	• how selective breeding is used to produce new varieties of plants such as tomato; the meaning and importance of hybrid vigour	• the uses and advantages of genetic engineering in the production of new varieties of plants, and the possible environmental and ethical issues arising
5. named examples of plants used in bedding schemes, tubs and baskets, to include *Fuchsia, Pelargonium* (geranium), *Begonia*, marigold and *Lobelia*	• features of plants used in bedding schemes, tubs and baskets and how these plants are maintained	• the factors which determine the choice of plants used in bedding schemes, tubs and baskets, to include aspect, shade, drainage
6. named examples of trees and shrubs used in parks, gardens and street plantings, to include cherry, *Acer*, beech, birch, and *Hydrangea, Buddleia, Forsythia, Viburnum*	• features of plants used in parks, gardens and street plantings and how these plants are maintained	• the factors which determine the choice of plants used in parks, gardens and street plantings, to include aspect, shade and drainage
7. the need to maintain permanent planting by watering, feeding using organic or inorganic fertilisers, weeding and pruning	• how to maintain permanent planting by weed control: mechanical, chemical and cultural, and by pruning: reasons for pruning and basic techniques used	• the hormonal effects of pruning on plants, to include bud and flower development and fruiting
8. the key features of different types of lawnmower: rotary and sidewheel/blade (cylinder), powered by petrol and electricity, including hover mowers	• the advantages and disadvantages of the different types of lawnmower; how to set the height of cutting	• the reasons for setting the height of cutting appropriate to the grass condition and season, and its use to include amenity and sports
9. the process of producing a lawn from seed and turf	• the advantages and disadvantages of producing a lawn from seed or turf; the characteristics of turf for different purposes	• grass mixtures used in different applications, to include amenity and sports
10. the uses of glasshouses, polytunnels, cloches and fleece ground cover	• the advantages and disadvantages of glasshouses, polytunnels, cloches and fleece ground cover	• the functions of cold frames, their uses and their importance in hardening off
11. the factors involved in siting a glasshouse correctly	• the advantages and disadvantages of different materials used in glasshouse construction, to include plastic and glass and their different properties	• the economic factors involved when using a glasshouse: usage all year round to grow crops out of season, temperature control and automation to reduce labour costs

Foundation Tier only: Low Demand	Both Tiers: Standard Demand	Higher Tier only: High Demand
12. the differences between biological and non-biological methods of pest control	• the advantages and disadvantages of biological pest control	• the pest control implications of the use of biological control agents in protective culture
13. the differences between the types of compost available: soil based, peat based, soil-less and peat-free	• the dangers associated with growing plants year after year in glasshouse soil	• the advantages and disadvantages of using different growing media in the glasshouse, including environmental and ethical considerations in the use of peat
14. how hydroponics can be used as an alternative to compost	• the commercial and environmental advantages of using hydroponics	• the use of ICT to maintain hydroponic systems

Unit B683: Topic 2: Livestock Husbandry

This part of the unit focuses on the care of farm animals, including the effects of different animal production systems on the yields, health and well being of livestock. The unit covers causes of ill health, the safety of treatments, the application of recent scientific advances to the breeding of livestock, welfare issues and modern farming methods.

To provide practical contexts for learning at an appropriate level of demand, candidates should be able to do some/all of the following tasks. These will provide opportunities for the assessment of practical skills. They will not be tested in the examinations.

- Carry out the routine husbandry of livestock, including routine health care when needed.
- Identify a range of feeds used for livestock, record feed intake, growth rate or milk yield, and calculate food conversion ratios for livestock.
- Approach, move and weigh livestock safely.

Candidates should be able to demonstrate knowledge and understanding of the following:

Foundation Tier only: Low Demand	Both Tiers: Standard Demand	Higher Tier only: High Demand
1. that livestock need to be kept healthy for reasons of profit and animal welfare; the need animals have for food, water and a suitable environment for good health	• the care needed for pregnant animals and for new-born animals, including housing, diet, health care	• the health care strategies used in livestock husbandry aimed at preventing potential health problems; the benefits and risks of routine use of antibiotics to prevent disease and enhance growth
2. recognise the signs of a healthy and unhealthy animal	• how ill health in livestock (disease caused by bacteria, viruses, fungi and parasites) can be recognised: loss of condition and other evidence of parasites and disease	
3. the characteristics of the different forms of housing used for livestock; how they meet the needs of animals	• the risks associated with inadequate housing and poor management of livestock	
4. the difference between intensive and extensive systems of livestock management	• the advantages and disadvantages of intensive and extensive systems of livestock management, including ethical and animal welfare issues	• how analysis of economic and environmental factors has been used in discussions about intensive and extensive systems of livestock management
5. the range of different types of food used with livestock	• the difference between bulk and concentrate foods, and an example of each	• the difference between the role of maintenance and production rations, and how each is used with livestock, with examples; food conversion ratios

Foundation Tier only: Low Demand	Both Tiers: Standard Demand	Higher Tier only: High Demand
6. the constituents of an animal's diet: carbohydrates, proteins, fats, fibre and water; the importance of a balanced diet	• the importance of carbohydrates, proteins, fats, fibre and water in an animal's diet; the role of vitamins (A, C and D) and minerals (Ca and Fe); the effects of a poor diet, to include deficiencies in fibre, vitamins (A, C and D) and minerals (Ca and Fe) and excesses of fats and carbohydrates	• how different livestock animals meet their dietary requirements, to include omnivores and ruminants
7. the role of digestion in breaking down the food an animal eats into simpler molecules that it can use	• the functions of the main parts of the digestive system in a pig and a ruminant	• the differences between digestion in pigs and ruminants
8. the structure and function of: ovary, oviduct, testes, sperm ducts, uterus, vagina and penis	• fertilisation, development and birth in mammals	• how hormones control the timing of oestrus and reproduction in mammals and the factors that influence hormone production
9. the signs that signify that an animal is on heat, ready to mate; why it is important to recognise these signs	• the techniques used in artificial insemination (AI) and embryo transfer	• how artificial insemination (AI) and embryo transfer are used in animal breeding, their advantages and the ethical and animal welfare issues involved
10. the structures of milk producing organs in mammals	• the factors that influence milk production	• the main features of the lactation curve and how the principal components of milk differ during lactation
11. the terms dominant, recessive and F1 and their meanings in relation to breeding livestock	• the terms chromosomes, genes, mutation, phenotype, genotype and their meanings in relation to breeding livestock	• the mechanism of simple monohybrid inheritance, where there are dominant and recessive alleles, applied to breeding livestock
12. cloning is an example of asexual reproduction	• use of cloning to produce many animals with the same desirable characteristics; the ethical issues concerning cloning	• the techniques of cloning to include nuclear transfer and implantation of the embryo; the risks and benefits of using cloning technology
13. animals are bred to improve yield, disease resistance, hardiness and conformation; the role of selective breeding to produce the characteristics of a named commercial breed of cattle, pig or sheep; how desirable characteristics have changed over time	• the meaning and importance of hybrid vigour; selective breeding can lead to inbreeding which can cause health problems to animals	• how selective breeding can reduce genetic variation, and the role of rare breeds in maintaining a wide genetic base (gene pool); why certain breeds have fallen in popularity over time and why it is considered important to preserve these rare breeds
14. how to approach, move, transport and weigh farm livestock safely	• the importance of handling livestock animals in the correct manner and the hazards of poor handling, including disease (tetanus, salmonella), parasites, being hurt; the ways these hazards may be reduced	• the health and safety and legal requirements for keeping, transporting and breeding livestock animals, and the reasons for these

4 Assessment of GCSE Environmental and Land-Based Science

4.1 Overview of the assessment in GCSE Environmental and Land-Based Science

For GCSE Environmental and Land-Based Science candidates must take units B681 and B684 plus either unit B682 **or** unit B683.

GCSE Environmental and Land-Based Science J271	
Unit B681: *Management of the Natural Environment*	
20% of the total GCSE 1 hour written paper 50 marks	Written paper: • environmental issues and relationship to the soil and the animals and plants it supports; human activities and energy requirements and the effects on the environment; traditional and alternative food production • offered in Foundation and Higher Tiers • comprises objective and longer answer questions • assesses the quality of written communication.
Unit B682: *Plant Cultivation and Small Animal Care*	
20% of the total GCSE 1 hour written paper 50 marks	Written paper: • issues relating to the care and maintenance of plants and small animals in the home, the garden and at school • offered in Foundation and Higher Tiers • comprises objective and longer answer questions • assesses the quality of written communication.
Unit B683: *Commercial Horticulture, Agriculture and Livestock Husbandry*	
20% of the total GCSE 1 hour written paper 50 marks	Written paper: • issues relating to the care and maintenance of plants and livestock in a commercial environment • offered in Foundation and Higher Tiers • comprises objective and longer answer questions • assesses the quality of written communication.
Unit B684: *Environmental and Land-Based Science Portfolio*	
60% of the total GCSE Controlled assessment Approx 38 hours 120 marks	This unit is internally assessed and externally moderated. Candidates compile a portfolio comprising: • Practical Scientific Skills (24 marks) • a Scientific Investigation (48 marks) • a Work-related Report (48 marks).

4.2 Tiers

All written papers are set in one of two tiers: Foundation Tier and Higher Tier. Foundation Tier papers assess grades G to C and Higher Tier papers assess Grades D to A*. An allowed grade E may be awarded on the Higher Tier components.

In Units B681, B682 or B683 candidates are entered for an option in either the Foundation Tier or the Higher Tier. Unit B684 (controlled assessment) is not tiered.

Candidates may enter for either the Foundation Tier or Higher Tier in each of the externally assessed units. So a candidate may take, for example, B681/F and B682/H.

4.3 Assessment objectives (AOs)

Candidates are expected to demonstrate their ability to:

AO1	Recall, select and communicate their knowledge and understanding of Science
AO2	Apply skills, knowledge and understanding of Science in practical and other contexts
AO3	Analyse and evaluate evidence, make reasoned judgements and draw conclusions based on evidence.

4.3.1 AO weightings – GCSE Environmental and Land-Based Science

The relationship between the units and the assessment objectives of the scheme of assessment is shown in the following grid:

Unit	% of GCSE			Total
	AO1	AO2	AO3	
Unit B681: *Management of the Natural Environment*	8	9	3	20%
*Unit B682: *Plant Cultivation and Small Animal Care* *Unit B683: *Commercial Horticulture, Agriculture and Livestock Husbandry*	8	9	3	20%
Unit B684: *Environmental and Land-Based Science portfolio*	10	25	25	60%
Total	26%	43%	31%	100%

* Candidates sit either Unit B682 or Unit B683.

4.4 Grading and awarding grades

GCSE results are awarded on the scale A* to G. Units are awarded a* to g. Grades are indicated on certificates. However, results for candidates who fail to achieve the minimum grade (G or g) will be recorded as *unclassified* (U or u) and this is **not** certificated.

Most GCSEs are unitised schemes. When working out candidates' overall grades OCR needs to be able to compare performance on the same unit in different series when different grade boundaries may have been set, and between different units. OCR uses a Uniform Mark Scale to enable this to be done.

A candidate's uniform mark for each unit is calculated from the candidate's raw mark on that unit. The raw mark boundary marks are converted to the equivalent uniform mark boundary. Marks between grade boundaries are converted on a pro rata basis.

When unit results are issued, the candidate's unit grade and uniform mark are given. The uniform mark is shown out of the maximum uniform mark for the unit, e.g. 40/80.

The specification is graded on a Uniform Mark Scale. The uniform mark thresholds for each of the assessments are shown below:

(GCSE) Unit Weighting	Maximum Unit Uniform Mark	Unit Grade								
		a*	a	b	c	d	e	f	g	u
20%	80	72	64	56	48	40	32	24	16	0
60%	240	216	192	168	144	120	96	72	48	0

Higher tier candidates who fail to gain a 'd' grade may achieve an "allowed e". Higher tier candidates who miss the allowed grade 'e' will be graded as 'u'.

A candidate's uniform marks for each unit are aggregated and grades for the specification are generated on the following scale:

Qualification	Max Uniform Mark	Qualification Grade								
		A*	A	B	C	D	E	F	G	U
GCSE	400	360	320	280	240	200	160	120	80	0

The written papers will have a total weighting of 40% and controlled assessment a weighting of 60%.

A candidate's uniform mark for each paper will be combined with the uniform mark for the controlled assessment to give a total uniform mark for the specification. The candidate's grade will be determined by the total uniform mark.

4.5 Grade descriptions

Grade descriptions are provided to give a general indication of the standards of achievement likely to have been shown by candidates awarded particular grades. The descriptions must be interpreted in relation to the content in the specification; they are not designed to define that content. The grade awarded will depend in practice upon the extent to which the candidate has met the assessment objectives overall. Shortcomings in some aspects of the assessment may be balanced by better performance in others.

The grade descriptors have been produced by the regulatory authorities in collaboration with the awarding bodies.

4.5.1 Grade F

Candidates recall and communicate their limited knowledge and understanding of effects and risks of scientific developments and its applications on society, industry, the economy and the environment. They recognise simple inter-relationships between science and society. They demonstrate a limited understanding of how scientific applications, technologies and techniques change over time. They use a limited range of technical terms.

They apply appropriate skills, including communication, mathematical and technological skills, knowledge and understanding in a limited range of practical and other contexts. They apply limited knowledge and ideas in different practical contexts. They identify simple links between evidence and explanations. Using a limited range of skills and techniques, they follow instructions to investigate scientific questions. They recognise a narrow range of risks and work safely. Candidates interpret and evaluate some qualitative and quantitative data and information from a limited range of sources. They can draw elementary conclusions having collected limited evidence.

4.5.2 Grade C

Candidates recall, select and communicate secure knowledge and understanding of the effects and risks of scientific developments and its applications on society, industry, the economy and the environment. They describe with reasons how scientific applications, technologies and techniques change over time. They use scientific, technical and mathematical terminology and conventions symbols and techniques appropriately.

They apply appropriate skills, including communication, mathematical and technological skills, knowledge and understanding in a range of practical and other contexts. They use models and scientific ideas to provide straight forward explanations of scientific applications. They plan and use appropriate methods and apply a variety of skills to address scientific questions and practical problems. They follow procedures, recognising and managing risk, to work safely and competently.

Candidates analyse, interpret and evaluate a range of quantitative and qualitative data and information. They recognise some of the limitations of evidence; undertake some evaluation and present reasons for argument. They draw conclusions consistent with their evidence.

4.5.3 Grade A

Candidates recall, select and communicate precise knowledge and detailed understanding of science and its applications, and of the effects and risks of scientific developments and its applications on society, industry, the economy and the environment. They demonstrate a clear understanding of why and how scientific applications, technologies and techniques change over time and the need for regulation and monitoring. They use terminology and conventions appropriately and consistently.

They apply appropriate skills, including communication, mathematical and technological skills, knowledge and understanding effectively to a wide range of practical contexts and to explain applications of science. They apply a comprehensive understanding of practical methods, processes and protocols to plan and justify a range of appropriate methods to solve practical problems. They apply appropriate skills, including mathematical, technical and observational skills, knowledge and understanding in a wide range of practical contexts. They follow procedures and protocols consistently, evaluating and managing risk and working accurately and safely.

Candidates analyse and interpret critically a broad range of quantitative and qualitative information. They reflect on the limitations of the methods, procedures and protocols they have used and the data they have collected and evaluate information systematically to develop reports and findings. They make reasoned judgements consistent with the evidence to develop substantiated conclusions.

4.6 Quality of written communication

Quality of written communication is assessed in all units and is integrated in the marking criteria.

Candidates are expected to:

- ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear
- present information in a form that suits its purpose
- use an appropriate style of writing and, where applicable, specialist terminology.

Questions assessing quality of written communication will be indicated by the icon of a pencil ().

Controlled assessment for GCSE Environmental and Land-Based Science

5

This section provides general guidance on controlled assessment: what controlled assessment tasks are, when and how they are available; how to plan and manage controlled assessment and what controls must be applied throughout the process. More support can be found on the OCR website.

Teaching and Learning

Controlled assessment is designed to be an integral part of teaching and learning. There are many opportunities in teaching and learning to develop skills and use a variety of appropriate materials and equipment. These opportunities allow students to practise a wide range of tasks, and teachers can discuss and comment on performance as appropriate.

When all necessary teaching and learning has taken place and teachers feel that candidates are ready for assessment, candidates can be given the appropriate controlled assessment task.

5.1 Controlled assessment tasks

All controlled assessment tasks are set by OCR.

Controlled assessment tasks will be available on Interchange from 1 June, for certification in the following academic year, and will be reviewed every two years. Guidance on how to access controlled assessment tasks from Interchange is available on the OCR website.

Centres must ensure that candidates undertake a task applicable to the correct year of the examination by checking carefully the examination dates of the tasks on Interchange.

The controlled assessment aims to enable candidates to:

- develop practical and scientific skills specific to the environment and land-based sector
- learn how science is used to research a problem
- assess risk and devise ways to manage risk
- devise methods to solve problems
- provide experience of the challenges of collecting valid and reliable data
- process primary and secondary data, and to be able to analyse and evaluate data
- draw evidence-based conclusions; understand how science can be used in the workplace, and relate it to the science used in their own practical work.

The controlled assessment in Unit B684 comprises three elements:

- Practical Scientific Skills used in Environmental and Land-Based Science
- Scientific Investigation
- Work-related Report.

For each candidate, the three elements together form a coursework portfolio, which will be completed, stored and moderated using ICT. Further guidance on producing and submitting the portfolio will be found in the guidance materials for controlled assessment for this specification.

For each element, centres can choose from a number of task titles offered by OCR and drawn from the content areas of the specification.

Element 1: Practical Scientific Skills used in Environmental and Land-Based Science

This element involves the completion of four individual practically-based tasks associated with the environment and land-based sector. These tasks will develop skills and competencies needed for the Scientific Investigation (Element 2). Two practical tasks are chosen from the context of Unit B681 and two from either of the optional units (B682 or B683). The controlled assessment tasks will be chosen from a list of five for each unit, providing an element of choice to accommodate available centre resources.

Candidates must:

- work safely, observing safety procedures
- demonstrate competence in the practical tasks, recording these electronically as video clips and/or photographs
- collect and record appropriate measurements and observations
- analyse and process the results
- make a brief critical evaluation of the task.

The facilities available within centres vary greatly, but a special feature of this specification is that candidates learn by experience of practical work. Each centre should incorporate as much practical work as possible into their study programme. Teachers assess and record the skills that are learned during the practical work.

There is no limit to the number of tasks completed. It will be possible to complete more than the required number of tasks and choose the best combination for final submission. The tasks should be selected within the context of the optional units taught/chosen. If resources allow, candidates can be taught/choose different unit options. Again, if resources allow, there is no requirement for all candidates to complete the same tasks. The tasks will be set so that they may be contextualized as required. Guidance will be provided for each task.

Because of the difficulties of assessing individual candidates in large classes, it is not expected that all candidates will be assessed at the same time.

Tasks will be set to allow for differentiation to accommodate all candidates, and provide the opportunity to demonstrate what they understand and can do.

Element 2: Scientific Investigation

One investigation will be selected from a list of nine supplied by OCR. The investigation will be based on a chosen topic/theme associated with the environment and land-based sector. The evidence generated will normally be a written report, but the use of other media (presentations, posters, video etc), as evidence, is encouraged.

Candidates must:

- plan an investigation based on secondary research
- collect and record appropriate measurements and observations
- analyse and process the results
- evaluate the methods used and data collected.

Element 3: Work-related Report

This element comprises one Work-related Report based around a business/mini-enterprise or school-based business/organisation. The evidence generated will normally be a written report, but the use of other media (presentations, posters, video etc), as evidence, is encouraged.

Candidates must:

- select and use information from primary and secondary sources
- describe the workplace and job roles
- be aware of the impact of regulations on the work selected
- be aware of the effect of the work on society
- make links to relevant scientific knowledge and understanding
- produce a coherent report to present findings.

Candidates are required to produce a written report having researched authentic contexts in which science is applied in the environment and land-based sector. At the core of their report is a description of the nature of the work carried out. They should aim to focus on specific aspects of workplace practice, and make links between relevant scientific knowledge, skills and practical techniques from Units B681, B682 or B683 and their topic.

Candidate's Work-related Report should be based on one or more of the following:

- work experience at a business related to the environment and land-based sector, e.g. a local farm, nursery, market garden, garden centre
- a visit, or series of visits, to a business or company related to the environment and land-based sector, e.g. veterinary practice, farm park, nature reserve and/or visits by practitioners to the centre
- a school-based business or mini-enterprise, e.g. growing plants for sale, rearing livestock.

The report should be based on the task provided but may be carried out in the context of a range of organisations. A list of appropriate organisations which could be used will be provided. This work should be seen as an extension or consolidation of studies undertaken as a normal part of the course.

5.2 The controlled assessment unit

Unit B684 has been designed to be internally assessed, applying the principles of controlled assessment. Controls are set within the assessment so that validity and reliability are ensured and the assessors can confidently authenticate the candidates' work.

These controls take a variety of forms in each of the stages of the assessment process:

- task setting
- task taking
- task marking.

Within each of these three stages there are different levels of control. The following section sets out the overall OCR approach, but Section 5.2.2 includes more detail and any specific requirements.

5.2.1 Task setting

Controlled assessment task titles will be set by OCR. They may be updated or changed by OCR over the specification shelf-life. There are no restrictions as to when they can be completed.

It is the responsibility of the centre to ensure the correct combination of components of the controlled assessment tasks is used depending on when they plan to submit the work.

While the wording must remain unchanged, these tasks can be contextualised so that they allow the usage of local resources available to any centre. These tasks may also be set within overarching scenarios and briefs specifically relevant to the centre's own environment and targeted at their particular cohorts of candidates.

Controlled assessment tasks must be contextualised by centres in ways that will not put at risk the opportunity for candidates to meet the Assessment Criteria, including the chance to gain marks at the highest level.

The same OCR controlled assessment task must NOT be used as practice material and then as the actual live assessment material. Centres should devise their own practice material using the OCR specimen controlled assessment task as guidance, if they wish to do so.

5.2.2 Task Taking

The task taking parameters will be defined for several key controls as outlined below.

Definitions of the controls

Authenticity control: For GCSE in Environmental and Land-Based Science, OCR will assume a medium level of control for research/data collection. Candidates may research the task set with limited supervision, i.e. requirements are clearly specified but some work may be completed without direct supervision by the teacher. Some of the work, by its very nature (e.g. fieldwork, work experience, visits), will be undertaken outside the centre. In this case normal risk assessment procedures will be followed which may result in direct teacher supervision.

A medium level of control will apply for analysis and evaluation of findings when materials obtained through research/data collection are used and applied. This will be carried out under informal teacher supervision at all times. Candidates should keep a record of all sources used as they will need to provide acknowledgement and referencing. In all cases, the teacher must be able to authenticate the work submitted for assessment.

Feedback control: Feedback to candidates will be encouraged but tightly defined. Within GCSE in Environmental and Land-Based Science, OCR expects teachers to supervise and guide candidates who are undertaking work that is internally assessed. The degree of teacher guidance in candidates' work will vary according to the kinds of work being undertaken. It should be remembered, however, that candidates are required to reach their own judgments and conclusions.

Word control: The following are for guidance only:

- 200 words for each of the Practical Tasks
- 1500 words for the Scientific Investigation
- 1500 words for the Work-related Report.

Headings included within the body of the material presented by the candidate should be included in the word count, but footnotes, figures, tables, diagrams, charts and appendices should not be included.

Collaboration control: In the research stage, the work of individual candidates may be informed by working with others. In task production, candidates must complete and/or evidence all work individually.

Resource control: Access to resources will be limited to those appropriate to the task and as required by the unit. Candidates will need to be provided with the most appropriate materials and equipment to allow them full access to the marking criteria. This is the responsibility of the centre, in line with any guidance from OCR.

Quality assuring the controls

It is the responsibility of the Head of Centre to ensure that the controls set out in the specification and the individual units are imposed.

5.2.3 Presentation of work

Candidates must observe the following procedures when producing their final piece of work for the controlled assessment tasks:

- tables, graphs and spreadsheets may be produced using appropriate ICT. These should be inserted into the report at the appropriate place.
- any copied material must be suitably acknowledged.
- quotations must be clearly marked and a reference provided wherever possible.
- work submitted for moderation or marking must be marked with the:
  - centre number
  - centre name
  - candidate number
  - candidate name
  - unit code and title
  - assignment title.

5.3 Marking and moderating controlled assessment

All controlled assessment units are marked by the centre assessor(s) using OCR marking criteria and guidance. External moderation is via a sample of work uploaded to the OCR Repository or submitted by post.

5.3.1 Applying the marking criteria

The starting points for marking the tasks are the relevant marking criteria grids.

For GCSE in Environmental and Land-Based Science there are separate marking grids for each element of the controlled assessment. These contain criteria for the skills, knowledge and understanding that the candidate is required to demonstrate.

Before the start of the course, and for use at INSET training events, OCR will provide exemplification through real or simulated candidate work, which will help to clarify the level of achievement assessors should be looking for when awarding marks.

The total available marks for each element of the controlled assessment are as follows:

- Practical Scientific Skills used in Environmental and Land-Based Science is marked out of a total of 24
- Scientific Investigation is marked out of a total of 48
- Work-related Report is marked out of a total of 48.

The resulting marks are combined to produce a total mark out of 120 for the unit score.

5.3.2 Use of 'best fit' approach to marking grids

The assessment task(s) should be marked by the teacher according to the given marking criteria using a 'best fit' approach.

The award of marks is based on the professional judgment of the science teacher, working within a framework of descriptions of performance. Marking should be positive, rewarding achievement rather than penalising failure or omissions. The award of marks **must be** directly related to the marking criteria.

Centres should use the full range of marks available to them; centres must award *full* marks in any band for work that fully meets that descriptor. This is work that is 'the best one could expect from candidates working at that level'.

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

For each of the skill qualities, teachers should first use their professional judgement to select one of the band descriptors provided in the marking grid that most closely describes the quality of the work being marked.

Following the selection of the band descriptor, the most appropriate mark within the band descriptor is chosen. Teachers should use the following guidance to select this mark:

- where the candidate's work *convincingly* meets the statement, the higher mark should be awarded (for example the 3 – 4 marks band is chosen and 4 marks are awarded)
- where the candidate's work *just* meets the statement, the lower mark should be awarded (for example the 3 – 4 marks band is chosen and 3 marks are awarded).

In Elements 1 (Practical Scientific Skills) and 3 (Work-related Report) each strand is divided into a number of skills. When each aspect of the performance within a strand has been assessed in this way, the marks are averaged (to the nearest whole number) to give a mark for that strand. This method of marking can be applied even where there is a wide variation between performances in different skills.

Marking decisions should be recorded on marking grids. A master copy is provided in the controlled assessment guidance booklet and electronically on the OCR website.

The coursework portfolio accounts for 60% of the marks for this specification. The portfolio work is assessed by teachers, internally standardised and then externally moderated.

The final candidate marks must be sent to OCR by 15 May in the final year of the course.

5.3.3 Annotation of candidates' work

Where a marking decision is based partly on the teacher's observation of the candidate at work, the work should be annotated to record this at an appropriate point on the report.

Each piece of internally assessed work should show how the marks have been awarded in relation to the marking criteria.

The writing of comments on candidates' work, and coversheet, provides a means of communication between teachers during the internal standardisation and with the moderator if the work forms part of the moderation sample.

5.3.4 Marking criteria for controlled assessment tasks

Element 1: Practical Scientific Skills used in Environmental and Land-Based Science

(4 tasks, each marked out of 6: mark total 24)

Skills to be assessed	1 – 2 marks	3 – 4 marks	5 – 6 marks	AO
(a) Demonstrate competence in practical scientific skills	Performs a practical task that involves a series of simple step-by-step practical operations with some advice and guidance.	Performs a practical task which involves a series of step-by-step practical operations with little or no advice and guidance. Makes some appropriate amendments to the method.	Performs independently a practical task which involves a series of step-by-step practical operations and makes decisions, amendments and modifications to improve the task outcome.	AO1: 2 marks
(b) Collect and process primary data	Collects and records some of the data specified by the task, and uses some graphical or mathematical techniques, with errors or inaccuracies.	Collects and records in an appropriate format a range of data specified by the task, and uses graphical or mathematical techniques, with some gaps in data, errors or inaccuracies.	Collects and records accurately and in the most appropriate format the full range of data and information specified by the task. Uses correctly the graphical or mathematical techniques appropriate to the task.	AO2: 2 marks
(c) Evaluate methods used and data collected	Writes relevant comments about the task, including how risks were managed. Comments are simplistic with limited use of specialist terms.	Writes a limited evaluation of the task, including the management of risks. Makes a relevant comment on the appropriateness of the procedure used. Account is clear and specialist terms are for the most part used appropriately.	Writes a detailed critical evaluation of the task, including the management of risks and the appropriateness of the procedure used. Account is clear and organised and specialist terms are used appropriately.	AO3: 2 marks

0 marks = no response or no response worthy of credit

Element 2: Scientific Investigation (mark total 48)

Strand A Planning using appropriate secondary data	Mark
Selects relevant questions with considerable guidance and uses some secondary data within the plan. Identifies basic equipment required and takes action to control risk.	1 – 2
Selects relevant questions with guidance. Plans an appropriate investigation in outline, using some secondary data to inform the plan. Identifies a range of appropriate equipment and takes some action to control risk.	3 – 4
Selects relevant questions with some guidance. Plans an appropriate investigation incorporating some secondary data. Shows an awareness of limitations in the procedure and adequate action to control risk.	5 – 6
Selects relevant questions without guidance. Plans an appropriate investigation using a range of appropriate secondary data to inform the plan. Demonstrates a clear understanding of how to ensure precision, minimise error and control risk.	7 – 8
Selects relevant questions without guidance; clearly expresses information; plans an appropriate investigation using detailed secondary data to inform the plan and identifies a suitable procedure. Justifies how the plan will ensure precision and minimise error. Produces a detailed risk assessment and researches the necessary control procedures.	9 –10

0 marks = no response or no response worthy of credit

Strand B Collecting primary data	Mark
Carries out the investigation with considerable help; provides some data and partially records data using a given format.	1 – 2
Carries out the investigation, with help; provides an adequate amount or range of data which is of variable quality and fully presents data using a given format.	3 – 4
Carries out the investigation, collecting data of generally good quality with appropriate precision and repeatability; devises own format and correctly records data, including all units of measurement.	5 – 6
Carries out the investigation, systematically collecting an extensive range of accurate and precise data; correctly records data to an appropriate degree of precision, presenting it clearly in the most appropriate format.	7 – 8

0 marks = no response or no response worthy of credit

Stand C Processing and analysing data	Mark
Provides one valid deduction, chart or simple line graph.	1 – 2
Uses simple bar charts or line graphs to identify patterns in the data. Provides deductions that are based on the evidence.	3 – 4
Uses one graphical or mathematical technique to reveal patterns in the data. Provides an analysis of one trend/pattern, which is generally related to the evidence and to the underlying science.	5 – 6
Reveals patterns in the data using graphical and/or mathematical techniques. Provides an analysis of the trends/patterns based on the evidence and on scientific knowledge and understanding. Uses the general pattern of results to give conclusions, with reasons, linked to scientific models.	7 – 8
Identifies complex relationships between variables using appropriate complex graphical and/or mathematical techniques. Uses an appropriate quantitative treatment of level of uncertainty of the data. Provides a comprehensive, effective and coherent analysis based on the evidence and gives conclusions with reasons fully explaining and incorporating the appropriate science. Presents clear links to scientific models.	9 –10

0 marks = no response or no response worthy of credit

Strand D Evaluating the procedure and the evidence	Mark
Makes a simple comment about the procedures used and the evidence obtained.	1 – 2
Makes a relevant comment about the procedures used and the evidence obtained, and suggests some improvements.	3 – 4
Makes relevant comments about the procedures used, including management of risks, and evidence obtained, including accuracy and any anomalous results. Suggests and explains changes that would improve the investigation.	5 – 6
Considers critically the quality of the evidence, including repeatability and uncertainty, and the management of risks. Considers whether the evidence is sufficient to support conclusions, accounting for any anomalies. Describes in detail, with reasons, further work to provide additional relevant evidence and information which will support conclusions.	7 – 8

0 marks = no response or no response worthy of credit

Stand E The quality of scientific communication	Mark
Report reasonably well presented, but lacking logical format; with gaps and omissions. The response may be simplistic with frequent errors of spelling, punctuation and grammar, and with some use of scientific or technical terms.	**1 – 2**
Report well set out and a range of visual information used, with sections labelled; sub-headings, a table of contents and bibliography present. Information is effectively organised with generally sound spelling, punctuation and grammar. Scientific and technical terms are used appropriately.	**3 – 4**
Report well presented, well structured and detailed with good use of visual information, sub-headings, a table of contents and an accurate and detailed bibliography. Pages numbered and cross referenced where appropriate. Good spelling, punctuation and grammar. Scientific and technical terms used accurately and appropriately.	**5 – 6**

0 marks = no response or no response worthy of credit

Stand F Determination, initiative and independence	Mark
Completes some parts of a simple investigation but needed guidance.	**1 – 2**
Completes investigation and responds well to any difficulties when given guidance.	**3 – 4**
Completes investigation and deals well with any difficulties without direct support.	**5 – 6**

0 marks = no response or no response worthy of credit

Element 3: Work-related Report (mark total 48)

Strand A Collecting primary data (information)

Skills to be assessed	1 – 2 marks	3 – 4 marks	5 – 6 marks	7 – 8 marks	AO
(a) Collecting primary data (information)	Collects data only from the original stimulus materials.	Collects data from a few additional sources, although some may be irrelevant or inappropriate.	Collects relevant and appropriate data from a variety of sources, including a practitioner and/or workplace visit.	Collects, selects and records accurately an appropriate range of valid data from a variety of relevant sources, including a practitioner and/or workplace visit.	AO1: 4 marks AO2: 4 marks
(b) Reference to sources	Identifies links to some sources of information using limited detail.	Identifies sources using incomplete or inadequate references.	Identifies sources clearly using adequate references.	Identifies sources clearly using references that are accurate, fully detailed and dated.	

Strand B Collecting secondary data (information)

Skills to be assessed	1 – 2 marks	3 – 4 marks	5 – 6 marks	7 – 8 marks	AO
(a) Collecting secondary data (information)	Researches and provides one piece of secondary data linked to the chosen job role.	Researches and identifies related facts from chosen secondary data linked to the chosen job role.	Researches, selects and uses one piece of secondary data to support the importance of the chosen job role.	Researches, selects and records accurately an appropriate range of valid data from a variety of relevant sources.	AO1: 4 marks AO2: 4 marks
(b) Reference to sources	Identifies links to some sources of information using limited detail.	Identifies sources using incomplete or inadequate references.	Identifies sources clearly using adequate references.	Identifies sources clearly using references that are accurate, fully detailed and dated.	

0 marks = no response or no response worthy of credit

Strand C The work carried out					
Skills to be assessed	**1 – 2 marks**	**3 – 4 marks**	**5 – 6 marks**	**7 – 8 marks**	**AO**
(a) The organisation/ workplace **	Makes a relevant statement about the structure of the organisation.	Identifies the structure of the organisation and the different types of employees.	Explains how the roles of the employees contribute to the organisation.	Analyses the importance of the roles of the employees to the organisation.	AO3: 8 marks
(b) The work carried out in a chosen job role and its place in the wider organisation**	Makes a relevant statement about the nature of the work.	Identifies the work and its purpose and place in the wider organisation.	Explains the purpose of the work and how it fits into the wider organisation.	Analyses the purpose of the work and its importance to the wider organisation.	
(c) The location of the organisation/ workplace and the effect on society**	Makes a relevant statement about the location of the organisation and one effect on society.	Identifies one reason for the location of the organisation and one effect of the work on society.	Explains the reasons for the location of the organisation and some effects on society.	Analyses the factors influencing the location of the organisation and its impact on society.	

0 marks = no response or no response worthy of credit

**Where “organisation” is referred to, this could be the Centre if a candidate is reporting on a mini-enterprise

Strand D Skills used in the workplace					
Skills to be assessed	**1 – 2 marks**	**3 – 4 marks**	**5 – 6 marks**	**7 – 8 marks**	**AO**
(a) Technical skills applied in the workplace	Makes a relevant statement about technical skills used in the workplace.	Identifies relevant examples of technical skills applied in the workplace.	Explains how examples of technical skills are applied in the workplace.	Analyses the technical skills applied in the workplace.	AO3: 8 marks
(b) The expertise needed by an individual, or a working group, with the vocational qualifications and personal qualities required	Makes a relevant statement about expertise or vocational qualifications or personal qualities used in the workplace.	Identifies the expertise needed by an individual, or a working group, stating the vocational qualifications or personal qualities required.	Explains how the expertise, vocational qualifications and personal qualities needed by an individual, or a working group, relate to the work.	Analyses the expertise needed by an individual, or a working group, and explains the relevance to the work of the vocational qualifications and personal qualities required.	

Strand E Scientific knowledge applied in the workplace					
Skills to be assessed	**1 – 2 marks**	**3 – 4 marks**	**5 – 6 marks**	**7 – 8 marks**	**AO**
(a) Scientific knowledge applied in the workplace	Makes a relevant statement about scientific knowledge used in the work described.	Identifies the scientific knowledge involved in the work described.	Explains how scientific knowledge underpins the work described.	Analyses the scientific knowledge needed and explains how it underpins the work described.	AO3: 8 marks
(b) Financial or other regulatory contexts that impact on the work done (e.g. health and safety regulations)	Makes a relevant statement about one financial or other regulatory factor relevant to the work.	Identifies two relevant examples of the impact of a financial or other regulatory factor on the work.	Explains the impact of two examples of financial or other regulatory factors on the work.	Analyses the impact of two examples of financial or other regulatory factors on the work.	

0 marks = no response or no response worthy of credit

Strand F Quality of the presentation					
Skills to be assessed	**1 – 2 marks**	**3 – 4 marks**	**5 – 6 marks**	**7 – 8 marks**	**AO**
(a) The structure and organisation of the scientific report	Produces a report with little or no structure and the contents not fully focussed on the task. Presents the information in a form and structure with little or no suitability to its purpose.	Produces a report with an appropriate sequence or structure, with some focus on the task. Presents the information in a form and structure that has some suitability to its purpose.	Communicates information relevant to the task in a clear, effectively organised report, and includes contents listing of key elements, reference page and page numbering. Presents the information in a form and structure that mostly suits its purpose.	Produces a comprehensive, relevant and logically sequenced report which includes contents listing of key elements, reference page and page numbering. Presents the information in a form and structure that fully suits its purpose.	AO1: 8 marks
(b) Use of visual means of communication (charts, graphs, pictures etc)	Uses very little visual material to support the text.	Uses visual material as simply decorative, rather than informative.	Uses a variety of types of visual material to convey information or illustrate ideas.	Uses pictures, diagrams, charts and/or tables effectively and appropriately to convey information or illustrate ideas.	
(c) General quality of communication	Uses little or no relevant technical or scientific vocabulary. Spelling, punctuation and grammar are of generally poor quality.	Uses limited relevant technical or scientific vocabulary. The report is written clearly. Spelling, punctuation and grammar are of very variable quality.	Uses adequate technical or scientific vocabulary. The report is clear and mostly comprehensible. Spelling, punctuation and grammar are generally sound.	Uses full and effective relevant scientific or technical terminology. The report is clear and fully comprehensible. Spelling, punctuation and grammar are almost faultless.	

0 marks = no response or no response worthy of credit

5.3.5 Supervision of work

OCR expects teachers to supervise and guide candidates who are undertaking work that is internally assessed according to the controlled assessment regulations. The degree of teacher guidance will vary according to the kind of work being undertaken. It should be remembered, however, that candidates are required to reach their own judgments and conclusions.

When supervising internally assessed tasks, teachers are expected to:

- offer candidates advice about how best to approach such tasks
- provide guidance on the use of information from other sources to ensure that confidentiality and intellectual property rights are maintained
- exercise continuing supervision of practical work to ensure essential compliance with Health and Safety requirements
- exercise supervision of work in order to monitor progress and to prevent plagiarism
- ensure that the work is completed in accordance with the specification requirement and can be assessed in accordance with the specified mark criteria and procedures.

Teachers must not provide templates, model answers or feedback on drafts. Candidates must work independently to produce their own work.

Candidates should be allowed sufficient time to complete the tasks.

Candidates must be guided on the use of information from other sources to ensure that confidentiality and intellectual property rights are maintained at all times. It is essential that any material directly used from a source is appropriately and rigorously referenced.

Controlled assessment should be carried out under supervision. However, it is accepted that some tasks may require candidates to undertake work outside the centre. Where this is the case, the centre must ensure that sufficient supervised work takes place to allow the teachers concerned to authenticate each candidate's work with confidence.

Candidates will require guidance in their choice of topics areas. Teachers will need to take steps to ensure that the work presented for assessment accurately reflects each candidate's individual attainment.

Legal and ethical working practices

This specification covers topics involving legal and ethical considerations, for example in the care of animals. It is important that the teacher should be aware of these considerations and give clear guidance where such issues arise. Where candidates are planning their own tasks, the teacher has a duty to check the plans before work starts and to monitor the activity as it proceeds. Candidates should understand that ethical and legal guidelines are based on respect and care for the living organisms concerned.

Candidates must not:

- cause or risk any stress, distress or suffering to any animals
- engage in or be a party to any illegal activity.

The attention of teachers is drawn to the following sections in the CLEAPSS® Laboratory Handbook:

14.1 Animals in school
14.2 Animals in the wild
14.11 Greenhouses
15.4 Pesticides
15.5 Plants and seeds
15.6 Ponds
17.1 Fieldwork.

5.3.6 Authentication of work

Teachers must be confident that the work they mark is the candidate's own. This does not mean that a candidate must be supervised throughout the completion of all work but the teacher must exercise sufficient supervision, or introduce sufficient checks, to be in a position to judge the authenticity of the candidate's work.

Wherever possible, the teacher should discuss work-in-progress with candidates. This will not only ensure that work is underway in a planned and timely manner but will also provide opportunities for assessors to check authenticity of the work and provide general feedback.

Candidates must not plagiarise. Plagiarism is the submission of another's work as one's own and/or failure to acknowledge the source correctly. Plagiarism is considered to be malpractice and could lead to the candidate being disqualified. Plagiarism sometimes occurs innocently when candidates are unaware of the need to reference or acknowledge their sources. It is therefore important that centres ensure that candidates understand that the work they submit must be their own and that they understand the meaning of plagiarism and what penalties may be applied. Candidates may refer to research, quotations or evidence but they must list their sources. The rewards from acknowledging sources, and the credit they will gain from doing so, should be emphasised to candidates, as well as the potential risks of failing to acknowledge such material.

Both candidates and teachers must declare that the work is the candidate's own.

- **Each candidate** must sign a declaration before submitting their work to their teacher. A candidate authentication statement that can be used is available to download from the OCR website. These statements should be retained within the centre until all enquiries about results, malpractice and appeals issues have been resolved. **A mark of zero must be recorded if a candidate cannot confirm the authenticity of their work.**
- **Teachers** are required to declare that the work submitted for internal assessment is the candidate's own work by sending the moderator a centre authentication form (CCS160) for each unit at the same time as the marks. If a centre fails to provide evidence of authentication, **we will set the mark for that candidate(s) to Pending (Q) for that component until authentication can be provided.**

5.3.7 Internal standardisation

It is important that all internal assessors of controlled assessment work to common standards. Centres must ensure that the internal standardisation of marks across assessors and teaching groups takes place using an appropriate procedure.

This can be done in a number of ways. In the first year, reference material and OCR training meetings will provide a basis for centres' own standardisation. In subsequent years this, or centres' own archive material, may be used. Centres are advised to hold preliminary meetings of staff involved to compare standards through cross-marking a small sample of work. After most marking has been completed, a further meeting at which work is exchanged and discussed will enable final adjustments to be made.

5.3.8 Moderation

All work for controlled assessment is marked by the teacher and internally standardised by the centre. Marks are then submitted to OCR **and** your moderator: refer to the OCR website for submission dates of the marks to OCR.

There should be clear evidence that work has been attempted and some work produced. If a candidate submits no work for an internally assessed component, then the candidate should be indicated as being absent from that component. If a candidate completes any work at all for an internally assessed component, then the work should be assessed according to the internal assessment objectives and marking instructions and the appropriate mark awarded, which may be zero.

The centre authentication form (CCS160) must be sent to the moderator with the marks.

5.4 Minimum requirements for controlled assessment

There should be clear evidence that work has been attempted and some work produced.

If a candidate submits no work for an internally assessed component, then the candidate should be indicated as being absent from that component on the mark sheets submitted to OCR. If a candidate completes any work at all for an internally assessed component, then the work should be assessed according to the internal assessment objectives and marking instructions and the appropriate mark awarded, which may be zero.

Element	Tasks	Mark	Total
Practical Scientific Skills	4	6	24
Scientific Investigation	1	48	48
Work-related Report	1	48	48
Total for portfolio			Total mark out of 120

Controlled assessment forms will be provided for centres to summarise the marks for each candidate's portfolio. The final total marks out of 120 should be submitted to OCR electronically or on Form MS1 by 15 May in the year of entry for Unit B684. These forms are produced and dispatched at the relevant time, based on entry information provided by the centre. All assessed work which has contributed to the candidate's final total must be available for moderation.

5.4.1 Health and Safety

Teachers should be aware of current legislation that may be applicable to their controlled assessment tasks (see Appendix D).

5.5 Submitting samples of candidate work

5.5.1 Sample requests

Once you have submitted your marks, your exams officer will receive an email requesting a moderation sample. Samples will include work from across the range of attainment of the candidates' work.

The sample of work which is presented to the moderator for moderation must show how the marks have been awarded in relation to the marking criteria defined in Sections 5.3.1, 5.3.2 and 5.3.3. Each candidate's work should have a cover sheet attached to it with a summary of the marks awarded for the task.

When making your entries, the entry option specifies how the sample for each unit is to be submitted. For each of these units, all candidate work must be submitted using the **same entry option**. It is not possible for centres to offer both options for a unit within the same series. You can choose different options for different units. Please see Section 8.2.1 for entry codes.

5.5.2 Submitting moderation samples via post

The sample of candidate work must be posted to the moderator within three days of receiving the request. You should use one of the labels provided to send the candidate work.

We would advise you to keep evidence of work submitted to the moderator, e.g. copies of written work or photographs of practical work. You should also obtain a certificate of posting for all work that is posted to the moderator.

5.5.3 Submitting the moderation samples via the OCR Repository

The OCR Repository is a secure website for centres to upload candidate work and for assessors to access this work digitally. Centres can use the OCR Repository for uploading marked candidate work for moderation.

Centres can access the OCR Repository via OCR Interchange, find their candidate entries in their area of the Repository, and use the Repository to upload files (singly or in bulk) for access by their moderator.

The OCR Repository allows candidates to send evidence in electronic file types that would normally be difficult to submit through postal moderation; for example multimedia or other interactive unit submissions.

The OCR GCSE Environmental Land-Based Science unit B684A/01 can be submitted electronically to the OCR Repository via Interchange: please check Section 8.2.1 for unit entry codes for the OCR Repository.

There are three ways to load files to the OCR Repository:

1. Centres can load multiple files against multiple candidates by clicking on 'Upload candidate files' in the Candidates tab of the Candidate Overview screen.

2. Centres can load multiple files against a specific candidate by clicking on 'Upload files' in the Candidate Details screen.

3. Centres can load multiple administration files by clicking on 'Upload admin files' in the Administration tab of the Candidate Overview screen.

The OCR Repository is seen as a faster, greener and more convenient means of providing work for assessment. It is part of a wider programme bringing digital technology to the assessment process, the aim of which is to provide simpler and easier administration for centres.

Instructions for how to upload files to OCR using the OCR Repository can be found on OCR Interchange.

5.6 External moderation

The purpose of moderation is to ensure that the standard of the award of marks for work is the same for each centre and that each teacher has applied the standards appropriately across the range of candidates within the centre.

At this stage, if necessary, centres may be required to provide an additional sample of candidate work (if marks are found to be in the wrong order) or carry out some re-marking. If you receive such a request, please ensure that you respond as quickly as possible to ensure that your candidates' results are not delayed.

Support for GCSE Environmental and Land-Based Science

6

6.1 Free Support and Training from OCR

OCR recognises that the introduction of the new specifications and controlled assessment will bring challenges for implementation and teaching.

Working in close consultation with teachers, publishers and other experts, centres can expect a high level of support, services and resources for OCR qualifications.

Essential FREE support materials including:

- new OCR GCSE Sciences website www.gcse-science.com to access information and support materials quickly and easily
- specimen assessment materials and mark schemes
- guide to controlled assessment
- sample controlled assessment materials
- exemplar candidate work
- sample schemes of work and lesson plans
- guide to curriculum planning
- frequently asked questions.

Essential FREE support services including:

- INSET training – for information visit www.gcse-science.com
- Interchange – a completely secure, free website to help centres reduce administrative tasks at exam time
- e-alerts – register now for regular updates at www.ocr.org.uk/2011signup
- Active Results – detailed item level analysis of candidate results.

6.2 Other resources

OCR offers centres a wealth of high quality published support with a choice of 'Official Publisher Partner' and 'Approved publication' resources, all endorsed by OCR for use with OCR specifications.

6.2.1 Publisher partners

OCR RECOGNISING ACHIEVEMENT

Collins FREEDOM TO TEACH

Official Publisher Partnership

OCR has been working closely with Collins, our publisher partner for OCR GCSE Environmental and Land-Based Science to help ensure their new resources are available when you need them and match the new specifications.

Developed in consultation with examiners and teachers of the course, Collins' new Environmental and Land-Based Science resources will help you:

- Prepare for and deliver the course using detailed schemes of work and lesson plans
- Engage students with exciting practical activities
- Build key skills and track progress to achieve exam success.

6.2.2 Endorsed publications

OCR endorses a range of publisher materials to provide quality support for centres delivering its qualifications. You can be confident that materials branded with OCR's 'Official Publisher Partnership' or 'Approved publication' logos have undergone a thorough quality assurance process to achieve endorsement. All responsibility for the content of the publisher's materials rests with the publisher.

Approved publication
OCR RECOGNISING ACHIEVEMENT

These endorsements do not mean that the materials are the only suitable resources available or necessary to achieve an OCR qualification.

6.3 Training

OCR will offer a range of support activities for all practitioners throughout the lifetime of the qualification to ensure they have the relevant knowledge and skills to deliver the qualification.

Please see Event Booker for further information.

6.4 OCR support services

6.4.1 Active Results

Active Results is available to all centres offering OCR's GCSE Environmental and Land-Based Science specifications.

activeresults

Active Results is a free results analysis service to help teachers review the performance of individual candidates or whole schools.

Data can be analysed using filters on several categories such as gender and other demographic information, as well as providing breakdowns of results by question and topic.

Active Results allows you to look in greater detail at your results:

- Richer and more granular data will be made available to centres including question level data available from e-marking
- You can identify the strengths and weaknesses of individual candidates and your centre's cohort as a whole
- Our systems have been developed in close consultation with teachers so that the technology delivers what you need.

Further information on Active Results can be found on the OCR website.

6.4.2 OCR Interchange

OCR Interchange has been developed to help you to carry out day-to-day administration functions online, quickly and easily. The site allows you to register and enter candidates online. In addition, you can gain immediate and free access to candidate information at your convenience. Sign up on the OCR website.

7 Equality and Inclusion in GCSE Environmental and Land-Based Science

7.1 Equality Act information relating to GCSE Environmental and Land-Based Science

GCSEs often require assessment of a broad range of competences. This is because they are general qualifications and, as such, prepare candidates for a wide range of occupations and higher level courses.

The revised GCSE qualification and subject criteria were reviewed by the regulators in order to identify whether any of the competences required by the subject presented a potential barrier to any disabled candidates. If this was the case, the situation was reviewed again to ensure that such competences were included only where essential to the subject. The findings of this process were discussed with disability groups and with disabled people.

Reasonable adjustments are made for disabled candidates in order to enable them to access the assessments and to demonstrate what they know and can do. For this reason, very few candidates will have a complete barrier to the assessment. Information on reasonable adjustments is found in *Access Arrangements, Reasonable Adjustments and Special Consideration* by the Joint Council www.jcq.org.uk.

Candidates who are unable to access part of the assessment, even after exploring all possibilities through reasonable adjustments, may still be able to receive an award based on the parts of the assessment they have taken.

The access arrangements permissible for use in this specification are in line with Ofqual's GCSE subject criteria equalities review and are as follows:

	Yes/No	Type of Assessment
Readers	Yes	All assessments
Scribes	Yes	All assessments
Practical assistants	Yes	All controlled assessments. The practical assistant may assist with assessed practical task under instruction from the candidate.
Word processors	Yes	All assessments
Transcripts	Yes	All assessments
Oral language modifiers	Yes	All assessments
BSL signers	Yes	All assessments
Modified question papers	Yes	All assessments
Extra time	Yes	All assessments

7.2 Arrangements for candidates with particular requirements (including Special Consideration)

All candidates with a demonstrable need may be eligible for access arrangements to enable them to show what they know and can do. The criteria for eligibility for access arrangements can be found in the JCQ document *Access Arrangements, Reasonable Adjustments and Special Consideration.*

Candidates who have been fully prepared for the assessment but who have been affected by adverse circumstances beyond their control at the time of the examination may be eligible for special consideration. As above, centres should consult the JCQ document *Access Arrangements, Reasonable Adjustments and Special Consideration.*

8 Administration of GCSE Environmental and Land-Based Science

In December 2011 the GCSE qualification criteria were changed by Ofqual. As a result, all GCSE qualifications have been updated to comply with the new regulations.

The most significant change for all GCSE qualifications is that, from 2014, unitised specifications must require that 100% of the assessment is terminal.

Please note that there are no changes to the terminal rule and re-sit rules for the January 2013 and June 2013 examination series:

- At least 40% of the assessment must be taken in the examination series in which the qualification is certificated.
- Candidates may re-sit each unit once before certification, i.e. each candidate can have two attempts at a unit before certification.

For full information on the assessment availability and rules that apply in the January 2013 and June 2013 examination series, please refer to the previous version of this specification GCSE Environmental and Land-Based Science (May 2011) available on the website.

The sections below explain in more detail the rules that apply from the June 2014 examination series onwards.

8.1 Availability of assessment from 2014

There is one examination series available each year in June (all units are available each year in June).

GCSE Environmental and Land-Based Science certification is available in June 2014 and each June thereafter.

	Unit B681	Unit B682	Unit B683	Unit B684	Certification availability
June 2014	✓	✓	✓	✓	✓
June 2015	✓	✓	✓	✓	✓

8.2 Certification rules

For GCSE Environmental and Land-Based Science, from June 2014 onwards, a 100% terminal rule applies. Candidates must enter for all their units in the series in which the qualification is certificated.

8.3 Rules for re-taking a qualification

Candidates may enter for the qualification an unlimited number of times.

Where a candidate re-takes a qualification, **all** units must be re-entered and all externally assessed units must be re-taken in the same series as the qualification is re-certificated. The new results for these units will be used to calculate the new qualification grade. Any results previously achieved cannot be re-used.

For the controlled assessment unit, candidates who are re-taking a qualification can choose either to re-take that controlled assessment unit or to carry forward the result for that unit that was used towards the previous certification of the same qualification.

- Where a candidate decides to re-take the controlled assessment, the new result will be the one used to calculate the new qualification grade. Any results previously achieved cannot be re-used.
- Where a candidate decides to carry forward a result for controlled assessment, they must be entered for the controlled assessment unit in the re-take series using the entry code for the carry forward option (see section 8.4).

8.4 Making entries

8.4.1 Unit entries

Centres must be approved to offer OCR qualifications before they can make any entries, including estimated entries. It is recommended that centres apply to OCR to become an approved centre well in advance of making their first entries. Centres must have made an entry for a unit in order for OCR to supply the appropriate forms and administrative materials.

It is essential that correct unit entry codes are used when making unit entries.

For the externally assessed units B681, B682 and B683 candidates must be entered for either component 01 (Foundation Tier) or 02 (Higher Tier) using the appropriate unit entry code from the table below. It is not possible for a candidate to take both components for a particular unit within the same series; however, different units may be taken at different tiers.

For the controlled assessment unit, centres can decide whether they want to submit candidates' work for moderation through the OCR Repository or by post. Candidates submitting controlled assessment must be entered for the appropriate unit entry code from the table below. Candidates who are re-taking the qualification and who want to carry forward the controlled assessment should be entered using the unit entry code for the carry forward option.

Centres should note that controlled assessment tasks can still be completed at a time which is appropriate to the centre/candidate. However, where tasks change from year to year, centres would have to ensure that candidates had completed the correct task(s) for the year of entry.

Unit entry code	Component code	Assessment method	Unit titles
B681FP	01	Written Paper	*Management of the Natural Environment* (Foundation Tier)
B681HP	02	Written Paper	*Management of the Natural Environment* (Higher Tier)
B682FP	01	Written Paper	*Plant Cultivation and Small Animal Care* (Foundation Tier)
B682HP	02	Written Paper	*Plant Cultivation and Small Animal Care* (Higher Tier)
B683FP	01	Written Paper	*Commercial Horticulture, Agriculture and Livestock Husbandry* (Foundation Tier)
B683HP	02	Written Paper	*Commercial Horticulture, Agriculture and Livestock Husbandry* (Higher Tier)
B684A	01	Moderated via OCR Repository	*Environmental and Land-Based Science portfolio*
B684B	02	Moderated via postal moderation	*Environmental and Land-Based Science portfolio*
B684C	80	Carried forward	*Environmental and Land-Based Science portfolio*

8.4.2 Certification entries

Candidates must be entered for qualification certification separately from unit assessment(s). If a certification entry is **not** made, no overall grade can be awarded.

Centres must enter candidates for:

- GCSE Environmental and Land-Based Science certification code J271

8.5 Enquiries about results

Under certain circumstances, a centre may wish to query the result issued to one or more candidates. Enquiries about results for GCSE units must be made immediately following the series in which the relevant unit was taken and by the relevant enquiries about results deadline for that series.

Please refer to the JCQ *Post-Results Services* booklet and the OCR *Admin Guide: 14–19 Qualifications* for further guidance on enquiries about results and deadlines. Copies of the latest versions of these documents can be obtained from the OCR website.

8.6 Prohibited qualifications and classification code

Every specification is assigned a national classification code indicating the subject area to which it belongs. The classification code for this specification is 1750.

Centres should be aware that candidates who enter for more than one GCSE qualification with the same classification code will have only one grade (the highest) counted for the purpose of the School and College Performance Tables.

Centres may wish to advise candidates that, if they take two specifications with the same classification code, colleges are very likely to take the view that they have achieved only one of the two GCSEs. The same view may be taken if candidates take two GCSE specifications that have different classification codes but have significant overlap of content. Candidates who have any doubts about their subject combinations should seek advice, either from their centre or from the institution to which they wish to progress.

9 Other information about GCSE Environmental and Land-Based Science

9.1 Overlap with other qualifications

This specification has been developed as an alternative to GCSE Additional Applied Science.

9.2 Progression from this qualification

GCSE qualifications are general qualifications which enable candidates to progress either directly to employment, or to proceed to further qualifications.

Progression to further study from GCSE will depend upon the number and nature of the grades achieved. Broadly, candidates who are awarded mainly Grades D to G at GCSE could either strengthen their base through further study of qualifications at Level 1 within the National Qualifications Framework or could proceed to Level 2. Candidates who are awarded mainly Grades A* to C at GCSE would be well prepared for study at Level 3 within the National Qualifications Framework.

9.3 Avoidance of bias

OCR has taken great care in preparation of this specification and assessment materials to avoid bias of any kind. Special focus is given to the nine strands of the Equality Act with the aim of ensuring both direct and indirect discrimination is avoided.

9.4 Regulatory requirements

This specification complies in all respects with the current: *General Conditions of Recognition; GCSE, GCE, Principal Learning and Project Code of Practice; GCSE Controlled Assessment regulations* and the *GCSE subject criteria for Additional Applied Science.* All documents are available on the Ofqual website.

9.5 Language

This specification and associated assessment materials are in English only. Only answers written in English will be assessed.

9.6 Spiritual, moral, ethical, social, legislative, economic and cultural issues

There are many opportunities throughout the course to discuss issues which affect people's lives, for example in areas of food production, animal welfare, and the environment.

Issue	Opportunities for teaching the issues during the course
The ethical implications of selected scientific issues	B683: Ethical issues related to genetic engineering and cloning B683: Ethical issues related to agriculture and food production
The range of factors which have to be considered when weighing the costs and benefits of scientific activity	B684: Work-related Report B681: Social and economic issues arising from farming and food processing B683: Long and short term economic and environmental costs and benefits related to the use of glasshouses
Scientific explanations which give insight into the local and global environment	B681: The cycle of elements such as nitrogen in the environment
Scientific explanations which give insight into human nature	B683: Genes and inheritance

9.7 Sustainable development, health and safety considerations and European developments, consistent with international agreements

This specification supports these issues, consistent with current EU agreements, as outlined below.

The specification incorporates specific modules on health and welfare and on the environment within its content. These modules encourage candidates to develop environmental responsibility based upon a sound understanding of the principle of sustainable development.

Issue	Opportunities for teaching the issues during the course
Environmental issues	
Habitat destruction	B681: Loss of hedgerows and common land to demands of farming and urbanisation
Food and agriculture	B683: Intensive versus organic approaches to food production B681: The issues of GM crops in food production
Management of weeds and pests	B681: The effects of herbicides and pesticides on the environment
Energy resources	B681: The environmental advantages and disadvantages of different energy sources for generating electricity
Health and Safety issues	
Safe practice in a laboratory	B684: Carrying out controlled assessment: practical skills and evaluation of risk
Safe practice in the workplace	B681: Hazards associated with the environment as a workplace and risk assessment B683: Handling livestock
Food and nutrition	B681: The risks and benefits associated with new agricultural technologies including GM crops and chemical weed control
Health and disease	B683: The danger to humans of using antibiotics in animal production

9.8 Key Skills

This specification provides opportunities for the development of the Key Skills of *Communication, Application of Number, Information and Communication Technology, Working with Others, Improving Own Learning and Performance and Problem Solving* at Levels 1 and/or 2. However, the extent to which this evidence fulfils the Key Skills criteria at these levels will be totally dependent on the style of teaching and learning adopted for each unit.

The following table indicates where opportunities may exist for at least some coverage of the various Key Skills criteria at Levels 1 and/or 2 for each unit.

Unit	C		AoN		ICT		WwO		IoLP		PS	
	1	2	1	2	1	2	1	2	1	2	1	2
B681	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
B682	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
B683	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
B684	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

9.9 ICT

In order to play a full part in modern society, candidates need to be confident and effective users of ICT. This specification provides candidates with a wide range of appropriate opportunities to use ICT in order to further their study of Science.

Opportunities for ICT include:

- gathering information from the World Wide Web and CD-ROMs
- gathering data using sensors linked to data-loggers or directly to computers
- using spreadsheets and other software to process data
- using animations and simulations to visualise scientific ideas
- using software to present ideas and information on paper and on screen.

9.10 Citizenship

From September 2002, the National Curriculum for England at Key Stage 4 includes a mandatory programme of study for Citizenship.

GCSE Environmental and Land-Based Science is designed as a science education for future citizens which not only covers aspects of the Citizenship programme of study but also extends beyond that programme by dealing with important aspects of science which all people encounter in their everyday lives.

A Appendix A: Guidance for the production of electronic controlled assessment

Structure for evidence

A controlled assessment portfolio is a collection of folders and files containing the candidate's evidence. Folders should be organised in a structured way so that the evidence can be accessed easily by a teacher or moderator. This structure is commonly known as a folder tree. It would be helpful if the location of particular evidence is made clear by naming each file and folder appropriately and by use of an index called 'Home Page'.

There should be a top level folder detailing the candidate's centre number, candidate number, surname and forename, together with the unit code B684 so that the portfolio is clearly identified as the work of one candidate.

Each candidate produces an assignment for controlled assessment. The evidence should be contained within a separate folder within the portfolio. This folder may contain separate files.

Each candidate's controlled assessment portfolio should be stored in a secure area on the centre's network. Prior to submitting the controlled assessment portfolio to OCR, the centre should add a folder to the folder tree containing controlled assessment and summary forms.

Data formats for evidence

In order to minimise software and hardware compatibility issues it will be necessary to save candidates' work using an appropriate file format.

Candidates must use formats appropriate to the evidence that they are providing and appropriate to viewing for assessment and moderation. Open file formats or proprietary formats for which a downloadable reader or player is available are acceptable. Where this is not available, the file format is not acceptable.

Electronic controlled assessment is designed to give candidates an opportunity to demonstrate what they know, understand and can do using current technology. Candidates do not gain marks for using more sophisticated formats or for using a range of formats. A candidate who chooses to use only word documents will not be disadvantaged by that choice.

Evidence submitted is likely to be in the form of word processed documents, PowerPoint presentations, digital photos and digital video.

To ensure compatibility, all files submitted must be in the formats listed below. Where new formats become available that might be acceptable, OCR will provide further guidance. OCR advises against changing the file format that the document was originally created in. It is the centre's responsibility to ensure that the electronic portfolios submitted for moderation are accessible to the moderator and fully represent the evidence available for each candidate.

Accepted File Formats

A

Movie formats for digital video evidence
MPEG (*.mpg)
QuickTime movie (*.mov)
Macromedia Shockwave (*.aam)
Macromedia Shockwave (*.dcr)
Flash (*.swf)
Windows Media File (*.wmf)
MPEG Video Layer 4 (*.mp4)

Audio or sound formats
MPEG Audio Layer 3 (*.mp3)

Graphics formats including photographic evidence
JPEG (*.jpg)
Graphics file (*.pcx)
MS bitmap (*.bmp)
GIF images (*.gif)

Animation formats
Macromedia Flash (*.fla)

Structured markup formats
XML (*.xml)

Text formats
Comma Separated Values (.csv)
PDF (.pdf)
Rich text format (.rtf)
Text document (.txt)

Microsoft Office suite
PowerPoint (.ppt)
Word (.doc)
Excel (.xls)
Visio (.vsd)
Project (.mpp)

B Appendix B: Mathematics skills for GCSE science qualifications

Candidates are permitted to use calculators in all assessments.

Candidates should be able to:

- understand number, size and scale and the quantitative relationship between units
- understand when and how to use estimation
- carry out calculations involving +, - , ×, ÷, either singly or in combination, decimals, fractions, percentages and positive whole number powers
- provide answers to calculations to an appropriate number of significant figures
- understand and use the symbols =, <, >, ~
- understand and use direct proportion and simple ratios
- calculate arithmetic means
- understand and use common measures and simple compound measures such as speed
- plot and draw graphs (line graphs, bar charts, pie charts, scatter graphs, histograms) selecting appropriate scales for the axes
- substitute numerical values into simple formulae and equations using appropriate units
- translate information between graphical and numeric form
- extract and interpret information from charts, graphs and tables
- understand the idea of probability
- calculate area, perimeters and volumes of simple shapes.

In addition, Higher Tier candidates should be able to:

- interpret, order and calculate with numbers written in standard form
- carry out calculations involving negative powers (only –1 for rate)
- change the subject of an equation
- understand and use inverse proportion
- understand and use percentiles and deciles.

Appendix C: Physical quantities and units

C

It is expected that candidates will show an understanding of the physical quantities and corresponding SI units listed below and will be able to use them in quantitative work and calculations. Whenever they are required for such questions, units will be provided and, where necessary, explained.

Fundamental Physical Quantities	
Physical quantity	Unit(s)
length	metre (m); kilometre (km); centimetre (cm); millimetre (mm)
mass	kilogram (kg); gram (g); milligram (mg)
time	second (s); millisecond (ms)
temperature	degree Celsius (°C); kelvin (K)
current	ampere (A); milliampere (mA)
voltage	volt (V); millivolt (mV)

Derived Quantities and Units	
Physical quantity	Unit(s)
area	cm^2; m^2
volume	cm^3; dm^3; m^3; litre (l); millilitre (ml)
density	kg/m^3; g/cm^3
force	newton (N)
speed	m/s; km/h
energy	joule (J); kilojoule (kJ); megajoule (MJ)
power	watt (W); kilowatt (kW); megawatt (MW)
frequency	hertz (Hz); kilohertz (kHz)
gravitational field strength	N/kg
radioactivity	becquerel (Bq)
acceleration	m/s^2; km/h^2
specific heat capacity	J/kg°C
specific latent heat	J/kg

D Appendix D: Health and Safety

In UK law, health and safety is the responsibility of the employer. For most establishments entering candidates for GCSE, this is likely to be the local education authority or the governing body. Employees, i.e. teachers and lecturers, have a duty to cooperate with their employer on health and safety matters. Various regulations, but especially the COSHH Regulations 2002 and the Management of Health and Safety at Work Regulations 1999, require that before any activity involving a hazardous procedure or harmful micro-organisms is carried out, or hazardous chemicals are used or made, the employer must provide a risk assessment. A useful summary of the requirements for risk assessment in school or college science can be found at www.ase.org.uk/htm/teacher_zone/safety_in_science_education.php.

For members, the CLEAPSS® guide, *Managing Risk Assessment in Science** offers detailed advice. Most education employers have adopted a range of nationally available publications as the basis for their Model Risk Assessments. Those commonly used include:

Safety in Science Education, DfEE, 1996, HMSO, ISBN 0 11 270915 X

Now out of print but sections are available at:
www.ase.org.uk/htm/teacher_zone/safety_in_science_education.php

Topics in Safety, 3rd edition, 2001, ASE ISBN 0 86357 316 9

Safeguards in the School Laboratory, 11th edition, 2006, ASE ISBN 978 0 86357 408 5

CLEAPSS® *Hazcards*, 2007 edition and later updates*

CLEAPSS® *Laboratory Handbook**

Hazardous Chemicals, A Manual for Science Education, 1997, SSERC Limited
ISBN 0 9531776 0 2 (see www.sserc.org.uk/public/hazcd/whats_new.htm).

Where an employer has adopted these or other publications as the basis of their model risk assessments, an individual school or college then has to review them, to see if there is a need to modify or adapt them in some way to suit the particular conditions of the establishment.

Such adaptations might include a reduced scale of working, deciding that the fume cupboard provision was inadequate or the skills of the candidates were insufficient to attempt particular activities safely. The significant findings of such risk assessment should then be recorded, for example on schemes of work, published teachers guides, work sheets, etc. There is no specific legal requirement that detailed risk assessment forms should be completed, although a few employers require this.

Where project work or individual investigations, sometimes linked to work-related activities, are included in specifications this may well lead to the use of novel procedures, chemicals or micro-organisms, which are not covered by the employer's model risk assessments. The employer should have given guidance on how to proceed in such cases. Often, for members, it will involve contacting CLEAPSS® (or, in Scotland, SSERC).

*These, and other CLEAPSS® publications, are on the CLEAPSS® Science Publications CD-ROM issued annually to members. Note that CLEAPSS® publications are only available to members. For more information about CLEAPSS® go to www.cleapss.org.uk. In Scotland, SSERC (www.sserc.org.uk) has a similar role to CLEAPSS® and there are some reciprocal arrangements.

Guidance for maintaining health and the safe handling of animals within schools is available in CLEAPSS® guidance documents L56 Housing and Keeping Animals and the Laboratory Handbook (section 14.1).

The safe handling and disposal of pesticides are regulated by the Safety at Work Act 1974 and subsequent updates. Information is also available from the HSE and NFU (National Farmers Union) websites.

YOUR CHECKLIST

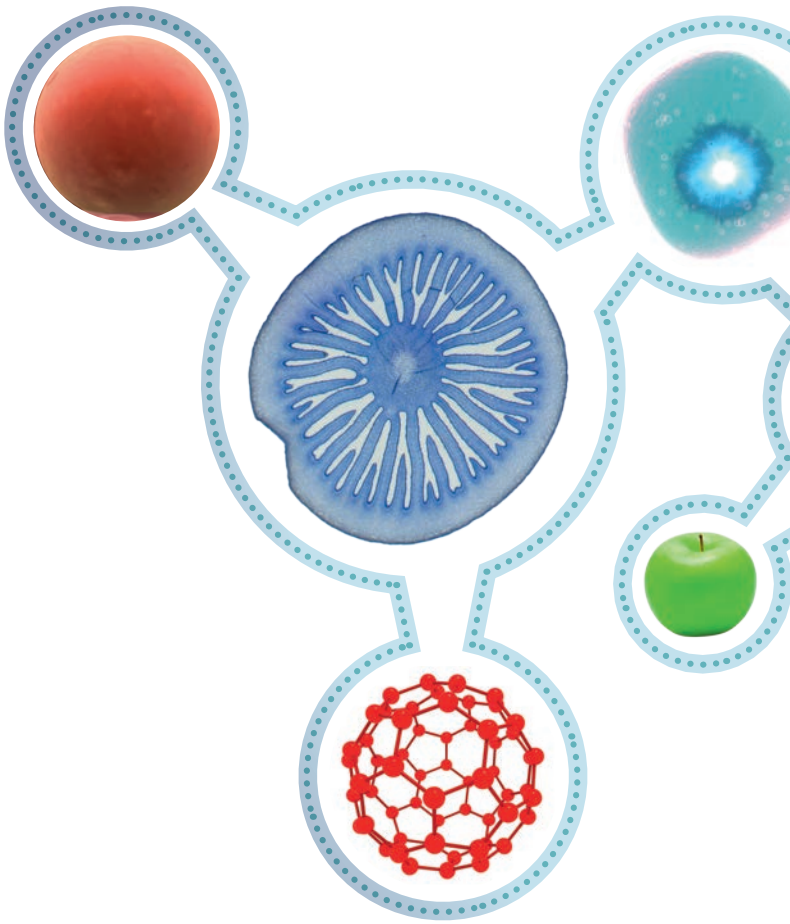
OUR AIM IS TO PROVIDE YOU WITH ALL THE INFORMATION AND SUPPORT YOU NEED TO DELIVER OUR SPECIFICATIONS.

- ☑ Bookmark **ocr.org.uk/science**
- ☑ Be among the first to hear about support materials and resources as they become available. Register for email updates at **ocr.org.uk/updates**
- ☑ Find out about our training courses at **ocreventbooker.org.uk**
- ☑ Find out about controlled assessment support at **ocr.org.uk/science**
- ☑ Learn more about Active Results at **ocr.org.uk/activeresults**
- ☑ Join our social network community for teachers at **social.ocr.org.uk**

NEED MORE HELP?

Here's how to contact us for specialist advice

Phone:	01223 553998
Email:	science@ocr.org.uk
Online:	http://answers.ocr.org.uk
Fax:	01223 552627
Post:	Customer Contact Centre, OCR, Progress House, Westwood Business Park, Coventry CV4 8JQ



GENERAL QUALIFICATIONS
Telephone 01223 553998
Facsimile 01223 552627

science@ocr.org.uk
1 Hills Road, Cambridge CB1 2EU

ocr.org.uk/science

J271/1308/OC607