

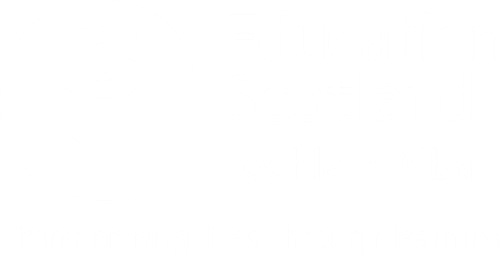
**National 5 Biology**

**Relevant Past Paper Questions from SQA Standard Grade Credit**

**and Intermediate 2 papers**

**Unit 3: Life on Earth**

**March 2014**



Transforming lives through learning

**N5 Biology Past Paper Questions**

This resource has been produced in response to the requests from practitioners who attended the National Qualifications Sciences events at Hampden Stadium in December 2013 which Education Scotland organised in partnership with the SQA.

The questions in this resource relate to the Life on Earth Unit for National 5 Biology and have been taken from the 2011, 2012 and 2013 Standard Grade and Intermediate 2 Past Papers.

For Life on Earth (Unit 1), the mandatory course key areas are as follows:

* Biodiversity and the distribution of life
* Energy in ecosystems
* Sampling techniques and the measurement of abiotic and biotic factors
* Adaptation, natural selection and the evolution of species
* Human impact on the environment

In cases where the questions relate to more than one of the National 5 Units, the constituent parts of the question have been separated into their respective key areas. The stem of the question has been retained to give the context of the question. If practitioners require the full integrated question, they should refer to the original past paper on the [SQA website](http://www.sqa.org.uk/pastpapers/findpastpaper.htm?subject=Chemistry&level=).

Past paper questions for the other two National 5 Units, Multicellular Organisms and Cell Biology, are also available from Education Scotland’s National Qualifications Glow portal: <http://www.educationscotland.gov.uk/nqcoursematerials/> (cut and paste link into your browser).

Education Scotland would like to acknowledge the support of the SQA in helping us produce this resource. We hope it proves helpful to practitioners across Scotland and assists with the implementation of the national qualifications.

**Biodiversity and the distribution of life**

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| --- | --- | --- |
| St Gr. 2011 Q1 (a) | Marsh marigold is a waterside plant which grows beside burns. | Marks |
|  |  |  |
|  | The abundance of marsh marigolds was estimated in five sampling areas beside a  burn in the Scottish borders. Average values of three abiotic factors were also  calculated for each area.  The results are shown in the table below. |  |
|  |  |  |
|  | (*a*) Name **one** abiotic factor which does not affect the abundance of marsh marigolds. |  |

|  |  |  |  |
| --- | --- | --- | --- |
| Question | Acceptable Answer | Unacceptable Answer | Marks |
| 1 (a) | (Average) Soil water (content) **or** description of that | Moisture / water | 1 |

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| --- | --- | --- |
| St Gr. 2011 Q6 | Read the passage below and use the information to answer the questions which  follow. (Adapted from *Hostile Habitats*, Scottish Mountaineering Trust, 2006).  As you climb a mountain or hill, the vegetation gradually changes. In Scotland,  trees and tall grasses in the glens are replaced on the mountain tops by lichens and  dwarf mosses less than a centimetre high. The treeline is the maximum altitude at  which trees can grow. Scottish hills have relatively little tree cover and so the  treeline is not always obvious but it does form a real ecological boundary. If trees  had not been cleared by humans in past centuries, the slopes below the treeline  would be covered in forest. Low growing vegetation is dominant on the higher  slopes.  The factors which produce the treeline are not clearly understood but the average  temperature during the growing season seems to be important. Under colder  conditions, trees are at a disadvantage compared to low growing, denser  vegetation. The growing tips of trees are fully exposed to high winds which cause  physical damage and slow down growth of shoots by drying them out. High winds  in wet conditions cause wind chill which can further damage shoots. In the case of  low growing plants, these effects are reduced as their growing shoots are protected  by the surrounding vegetation.  The treeline in Scotland is generally lower than in other countries a similar  distance from the equator. The exact height of the treeline varies across Scotland.  The wet and windy conditions in the west of Scotland produce a treeline between  200 m and 450 m above sea level. In the east of Scotland, the treeline is between  500 m and 650 m above sea level. Other types of vegetation show similar effects,  with mountain plants being found at lower levels on the west coast. | Marks |
| (*a*) | Give **two** types of plants you might expect to find growing on mountain tops  in Scotland.  1 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  2 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |  |
| (*b*) | Most hills in Scotland do not have woodland present up to the potential treeline.  Why is this? |  |
| (*c*) | According to the passage, what factor might be important in determining how high up a hill trees can grow? |  |
| (*d*) | What **two** factors are needed to produce wind-chill? |  |
| (*e*) | The passage states that, “Low growing vegetation is dominant on the higher  slopes”. What advantage does this type of vegetation have which allows it to  grow at higher altitudes than trees? |  |
| (*f*) | In summer, red deer migrate to graze above the treeline. In which part of  Scotland would they have to go higher to do this? |  |

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| --- | --- | --- | --- |
| Question | Acceptable Answer | Unacceptable Answer | Marks |
| 6 (a) | 1. lichens  2. dwarf mosses both needed  (either order) |  | 1 |
| (b) | Trees (or equivalent) / woodland / forests have been cleared by humans / people  (Trees + people involved in answer) | Cleared by humans  Trees cleared over the centuries | 1 |
| (c) | Average / temperature / temp / during growing season / while plants are growing | Temperature during growing season  Average temperature | 1 |
| (d) | 1. high winds  2. wet conditions / a lot of rain both  (either order) | Wind and rain  Wind speed  Moisture  A lot of moisture  A lot of wind  (Rain not negating after wet conditions) | 1 |
| (e) | Growing shoots are protected by surrounding vegetation | They are protected …  It is protected  Shoots are protected… | 1 |
| |  |  | | --- | --- | | (f) |  | | East (coast) |  | 1 |

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| Int 2 2011 B Q5 (d) | A study has shown that Scotland’s river otter population is increasing after falling  sharply over the last 40 years. | Marks |
|  | An ecosystem such as the otters’ has several components.  Complete the table below to identify the terms used and their definitions. |  |
|  |  | 2 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Question | Acceptable Answer | Unacceptable Answer | Negates | Marks |
| 5 (d) | producer  eats animals only  all the plants and animals/  populations/ species/  organisms/ living things  (in the ecosystem)  **3 = 2 marks**  **2/1 = 1 mark** | eats meat/organisms/  example such as mammals eat other animals | Interactions | 2 |

|  |  |  |
| --- | --- | --- |
| Int 2 2012  A Q9 | The total variety of all living things on Earth is described as | Marks |
|  | A an ecosystem  B biodiversity  C a community  D random assortment. |  |

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| --- | --- |
| Question | Answer |
| 9 | B |

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| --- | --- | --- |
| Int 2 2013  A Q9 | The Treecreeper is a bird which feeds on small insects on the bark of trees during the day.  What is the correct description of the Treecreeper’s niche? | Marks |
|  | A The place where it lives  B The insects on which it feeds  C The plants and animals in the woodland environment  D Its role within the woodland ecosystem |  |

|  |  |
| --- | --- |
| Question | Answer |
| 9 | B |

**Energy in Ecosysytems**

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| --- | --- | --- |
| St Gr.  2011 Q2 | The diagram below represents part of the nitrogen cycle. | Marks |
|  |  |  |
| (*a*) (i) | Use letters from the diagram to identify the following.  Each letter may be used once, more than once or not at all. |  |
|  |  | 2 |
| (ii) | Which type of organism is responsible for process D? | 1 |
| (b) | In an investigation, wild rabbits were found to eat an average of 600 g of grass  per day. This grass contains 450 g of water. The dry weight of the grass contains 20% protein.  Calculate how much protein a rabbit eats per day.  *Space for calculation* |  |
|  | \_\_\_\_\_\_\_\_\_\_\_ g | 1 |

|  |  |  |  |
| --- | --- | --- | --- |
| Question | Acceptable Answer | Unacceptable Answer | Marks |
| 2 (a) i | B  C and D / D and C  G  4 correct = 2  2/3 correct = 1 |  | 2 |
| ii | (nitrifying) bacteria | Denitrifying  Nitrogen fixing  Any other type of bacteria | 1 |
| |  |  | | --- | --- | | (b) |  | | 30 |  | 1 |

|  |  |  |
| --- | --- | --- |
| St Gr. 2012 Q1 (a) i | The diagram below shows the transfer of energy through a food chain in a wood.  The numbers represent the units of energy in the different populations of the food  chain. | Marks |
|  |  |  |
| (*a*) (i) | Complete the table below using information from the diagram. |  |
|  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| Question | Acceptable Answer | Unacceptable Answer | Marks |
| 2 (a) i | |  |  |  |  | | --- | --- | --- | --- | | oak tree | 30000 | |  | | 2400 | | 5 correct boxes = **2**  3 / 4 correct boxes = 1 | | | sparrow | | | | | 95 | | | | |  | 2 |

|  |  |  |  |  |  |
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| St Gr. 2012 Q2 (b) & (c) |  | | | Marks | |
| (b) | A pyramid of biomass, including mussels, is shown below. | | |  | |
|  |  | | |  | |
|  | Explain what is meant by a pyramid of biomass. | | | 1 | |
| (c) | Part of the food web from the shore is shown below. | | |  | |
|  |  | | |  | |
|  | The numbers of mussels and periwinkles may be affected if the barnacles were  removed from the food web. | | |  | |
|  |  | | | 1 | |
|  |  | | | 1 | |
| Question | | Acceptable Answer | Unacceptable Answer | | Marks | |
| 2 (b) | | It shows the total mass / weight of living material / organisms present in each level / stage of a food chain (Accept......food web)  It shows the mass / weight of all the living material / organisms present in each level / stage of a food chain (Accept ......food web) | amount | | 1 | |
| (c) i | | Increase  More food / plankton available/  less / no competition for food  **or**  Decrease  **Dog whelks eat more periwinkles so less**  Dog whelks eat more periwinkles so food for oystercatchers so they eat more  fewer oystercatchers to eat mussels  **or**  Stay the same – must explain both effects and say they cancel each other. | No competition | | 1 | |
| ii | | Decrease  Dog whelks eat more periwinkles  **or**  More plankton so more mussels so more oystercatchers to eat them | They are the dog-whelks only food | | 1 | |

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| St Gr. 2013 Q1 | (*a*) The diagram below shows part of a woodland food web. | Marks |
|  |  |  |
|  | Use the words ***increase*, *decrease*** or ***stay the same*** to describe the effect on the populations of greenflies and stoats if all the mice were killed by a disease.  Give a reason for your answer. |  |
|  |  | 1 |
|  |  |  |
|  | (*b*) Which of the following food chains could be represented by the pyramid  of numbers shown below? |  |
|  |  | 1 |

|  |  |  |  |
| --- | --- | --- | --- |
| Question | Acceptable Answer | Unacceptable Answer | Marks |
| 1 (a) i | Decrease  More ladybirds left to eat greenfly / them  (needs reference to food / eating) | More ladybirds left to kill greenfly | 1 |
| ii | *Effect Reason*  Decrease Less food / mice for stoats / them **/**  no food / mice for stoats / them **/**  stoats would starve  Increase Less food for weasels so they  decrease. Less food for foxes so  they decrease.    Fewer stoats eaten  Stay the same Combination of both reasons (both must be given) |  | 1 |
| (b) |  |  | 1 |

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| --- | --- | --- |
| St Gr. 2013 Q3 (b) | (*b*) The following list gives some of the stages involved in the nitrogen cycle. | Marks |
|  | ***List***  1 Production of plant protein  2 Absorption of nitrogen compounds into plants  3 Nitrates produced in the soil  4 Ammonium compounds produced from soil organic matter  5 Nitrites produced in the soil  6 Death of plants |  |
|  | (i) Use the numbers from the list to show the correct sequence of the stages in the diagram below.  Two boxes have been completed for you. |  |
|  |  |  |
|  | (ii) Three of the stages involve the action of bacteria.  Write the numbers of any two of these stages in the boxes below. |  |
|  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| Question | Acceptable Answer | Unacceptable Answer | Marks |
| 3 (b) i |  |  | 1 |
| ii | any two |  | 1 |

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| Int 2 2011  A  Q12 | The table below shows the relationship between planting density and the mass of seed harvested for a trial cereal crop. | Marks |
|  |  |  |
|  | The reason a low mass of seed was harvested when the planting density was 128 plants per square metre was |  |
|  | A less disease at high planting densities  B more nutrients available  C more competition for light and nutrients  D less space for weeds. |  |

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| **Question** | **Answer** |
| 12 | C |

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| Int 2 2011  A  Q16 | Two groups of the seeds of genetically tall plants were grown under different conditions.  Group I seeds were grown in high light intensity and high nutrient levels.  Group II seeds were grown in low light intensity and low nutrient levels.  All plants in group I were taller than those in group II.  The effect of the different conditions on the phenotype is due to | Marks |
|  | A natural selection  B biodiversity  C environmental impact  D polygenic inheritance. |  |

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| --- | --- |
| **Question** | **Answer** |
| 16 | C |

|  |  |  |
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| Int 2 2011  B  Q5  (a), (b) & (c) | A study has shown that Scotland’s river otter population is increasing after falling sharply over the last 40 years. | Marks |
|  | Otters live along the banks of rivers, usually in reeds and gaps between tree roots.  Fish are their main food. |  |
| (a) | What term is used for the place where otters live? | 1 |
| (b) | What disadvantage might otters have if reeds are removed from riverbanks? |  |
| (c) | Mink are North American animals introduced into Scotland. They feed on  fish and live in riverbanks.  What effect would the mink have on otter numbers? Explain your answer.  Effect  Explanation |  |

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| --- | --- | --- | --- |
| Question | Acceptable Answer | Unacceptable Answer | Marks |
| 5 (a) | habitat/holt |  | 1 |
| (b) | less shelter/home/place to live/habitat/breeding ground/places of safety/food available  (more chance of being) seen by predators/prey  increased competition for habitat  may have to move to another area | no absolutes [eg no home] | 1 |
| (c) | otter numbers would decrease  (otters and mink) in competition for food/fish/ habitat [*idea of competition*] | competition | 1  1 |

|  |  |  |
| --- | --- | --- |
| Int 2 2011  C Q1 | A. The pictures below show a food chain which is also represented by two types of  pyramid. | Marks |
|  |  |  |
|  | Name the type of pyramid X. Explain why **both** pyramids are correct for this  food chain. |  |

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| --- | --- | --- |
| Question | Acceptable Answer | Marks |
| 1 A |  | 5 |

|  |  |  |
| --- | --- | --- |
| Int 2 2012 B Q6 | The diagram below represents a food web from a Scottish river ecosystem. | Marks |
| (a) | Decide if each of the following statements about this food web is **True** or **False**, and tick the appropriate box.  If the statement is **False**, write the correct word in the **Correction** box to replace the word underlined in the statement. |  |
|  |  | 3 |
| (b) | (i) Complete the food chain below with four organisms from this food web. |  |
|  |  | 1 |
|  | (ii) What do the arrows in the food chain represent? |  |
| (c) | A pyramid of biomass shows the mass of living organisms at each level.  Explain why the heron has the lowest biomass in this food web. |  |

|  |  |  |  |
| --- | --- | --- | --- |
| Question | Acceptable Answer | Unacceptable Answer | Marks |
| 6 (a) | F prey  F two  T | food | 1  1  1 |
| (b) i |  |  | 1 |
| (b) ii | energy flow | energy | 1 |
| (c) | energy lost as it passes through the food chain  heron has least energy available to build tissues  or  fewer heron than any other organism  (must be comparative) |  | 1  1 |

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| --- | --- | --- |
| Int 2 2013 A Q11 | The diagram below shows the number of organisms at each level in a pyramid of  numbers. | Marks |
|  |  |  |
|  | How many organisms are consumers? |  |
|  | A 2  B 82  C 6000  D 6082 |  |

|  |  |
| --- | --- |
| Question | Answer |
| 11 | D |

|  |  |  |
| --- | --- | --- |
| Int 2 2013 A Q12 | The diagram below shows the feeding relationships of some of the organisms found  in a fresh water loch. | Marks |
|  |  |  |
|  | Which population of organisms in this food web would have the smallest biomass? |  |
|  | A Pike  B Trout  C Microscopic animals  D Microscopic plants |  |

|  |  |
| --- | --- |
| Question | Answer |
| 12 | A |

**Sampling techniques and measurement of abiotic and biotic factors**

|  |  |  |
| --- | --- | --- |
| St Gr. 2011 Q1 (b) | Marsh marigold is a waterside plant which grows beside burns. | Marks |
|  |  |  |
|  | The abundance of marsh marigolds was estimated in five sampling areas beside a burn in the Scottish borders. Average values of three abiotic factors were also calculated for each area.  The results are shown in the table below. |  |
|  |  |  |
| (b) | The soil pH for each sampling area was measured using a pH meter with a probe which was pushed into the soil to obtain each reading. |  |
|  | (i) Identify a possible source of error in measuring a **named** abiotic factor and suggest how to minimise it. |  |
|  |  | 2 |
|  | (ii) How was the measurement of the abiotic factors in this survey carried out to reduce the effect of atypical results? |  |

|  |  |  |  |
| --- | --- | --- | --- |
| Question | Acceptable Answer | Unacceptable Answer | Marks |
| 1 (b) i | Named abiotic factor + source of error when measuring  (Answers relating to light intensity must be clear that shading is caused by sampler to be acceptable)  If abiotic factor missed out, but other two parts ok = 1  (the second mark)  Method of minimising error appropriate to technique | food | 1  1 |
| ii | Several measurements of the abiotic factors taken /  Average values were calculated | Five areas sampled  It was repeated / done more than once  Random samples were taken  Experiment carried out 5 times and an average taken | 1 |

**Adaptation, natural selection and the evolution of species**

|  |  |  |
| --- | --- | --- |
| Int 2 2011  A  Q10 | A choice chamber was used to investigate the effect of humidity on the behaviour of woodlice, as shown below. | Marks |
|  | Which line in the table below describes the most appropriate set up for this investigation? |  |
|  |  | 1 |

|  |  |
| --- | --- |
| Question | Answer |
| 10 | D |

|  |  |  |
| --- | --- | --- |
| Int 2 2013 B Q6 | (a) The diagrams below give some information about three species of  Darwin’s Finches which live on the Galapagos Islands. | Marks |
|  | Using evidence from the diagrams, explain why these three finch species occupy different niches. | 2 |
|  | (*b*) Some areas on the islands have a thin layer of soil and low rainfall.  Describe **two** adaptations which plants growing in these areas will have to help  them survive.  1  2 | 2 |

|  |  |  |  |
| --- | --- | --- | --- |
| Question | Acceptable Answer | Unacceptable Answer | Marks |
| 6 (a) | beak shapes/sizes/structures  Different food sources/types  **(*must have comparison with all 3*)** | Head size/colour  All 3 not mentioned | 1  1 |