



Higher National Unit specification

General information

Unit title: Animal Biology (SCQF level 8)

Unit code: H921 35

Superclass: RH

Publication date: August 2020

Source: Scottish Qualifications Authority

Version: 03

Unit purpose

This Unit is designed to enable learners to understand key aspects of the animal kingdom, the different habitats they are found in, and their functioning within these environments. Learners will also develop practical skills in techniques relevant to animal biology. The Unit is suitable for learners studying at HND level and will provide the necessary underpinning knowledge and skills to enable progression to further study of animal biology at degree level or to seek employment in science based industries.

Outcomes

On successful completion of the Unit the learner will be able to:

- 1 Describe the organisation, structure and function of animal cell types and tissues.
- 2 Describe how structure is related to function in the major groups of non-chordates and how this determines their distribution.
- 3 Describe how structure is related to function in the major groups of chordates and how this determines their distribution.
- 4 Perform practical experiments related to animal biology.

Credit points and level

1 Higher National Unit credit at SCQF level 8: (8 SCQF credit points at SCQF level 8)

Recommended entry to the Unit

Entry is at the discretion of the centre, however it is recommended that learners should have completed the HN Unit H927 34 *Cell Biology: Theory and Laboratory Skills* or equivalent, or have experience of Biology at Higher level.

Higher National Unit specification: General information (cont)

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Core Skills

Opportunities to develop aspects of Core Skills are highlighted in the Support Notes for this Unit specification.

There is no automatic certification of Core Skills or Core Skill components in this Unit.

Context for delivery

If this Unit is delivered as part of a Group Award, it is recommended that it should be taught and assessed within the subject area of the Group Award to which it contributes.

The Assessment Support Pack (ASP) for this Unit provides assessment and marking guidelines that exemplify the national standard for achievement. It is a valid, reliable and practicable assessment. Centres wishing to develop their own assessments should refer to the ASP to ensure a comparable standard. A list of existing ASPs is available to download from SQA's website (<http://www.sqa.org.uk/sqa/46233.2769.html>).

Equality and inclusion

This Unit specification has been designed to ensure that there are no unnecessary barriers to learning or assessment. The individual needs of learners should be taken into account when planning learning experiences, selecting assessment methods or considering alternative evidence.

Further advice can be found on our website www.sqa.org.uk/assessmentarrangements.

Higher National Unit specification: Statement of standards

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Acceptable performance in this Unit will be the satisfactory achievement of the standards set out in this part of the Unit specification. All sections of the statement of standards are mandatory and cannot be altered without reference to SQA.

Where evidence for Outcomes is assessed on a sample basis, the whole of the content listed in the Knowledge and/or Skills section must be taught and available for assessment. Learners should not know in advance the items on which they will be assessed and different items should be sampled on each assessment occasion.

Outcome 1

Describe the organisation, structure and function of animal cell types and tissues.

Knowledge and/or Skills

- ◆ Radial and bilateral symmetry
- ◆ Diploblastic and triploblastic organisation
- ◆ Coelomates, pseudoceolomates and acoelomates
- ◆ Segmentation
- ◆ Animal tissues: Epithelial, Connective, Nervous, Muscle

Outcome 2

Describe how structure is related to function in the major groups of non-chordates and how this determines their distribution.

Knowledge and/or Skills

- ◆ Structure of non-chordates
- ◆ Reproductive biology of non-chordates
- ◆ Structural adaptations of non-chordates

Non-chordates to be covered are: Cnidaria, Platyhelminthes, Arthropods, Molluscs, Annelids, Echinoderms.

Outcome 3

Describe how structure is related to function in the major groups of chordates and how this determines their distribution.

Knowledge and/or Skills

- ◆ Structure of chordates
- ◆ Reproductive biology of chordates
- ◆ Structural adaptations of chordates

Chordates to be covered are: Cartilaginous fish, Bony fish, Amphibians, Reptiles, Birds, Mammals

Higher National Unit specification: Statement of standards (cont)

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Outcome 4

Perform practical experiments related to animal biology

Knowledge and/or Skills

- ◆ animal biology experiments
- ◆ working safely, within current health and safety regulations
- ◆ consistent and accurate results
- ◆ recording observations and results
- ◆ evaluation skills
- ◆ result analysis and conclusions

Evidence Requirements for this Unit

Written and/or oral recorded evidence for Outcomes 1–3 should be assessed using a holistic closed-book assessment under supervised conditions. The assessment will use a sampling approach to the Knowledge and/or Skills as detailed below. It is recommended that the assessment be completed within two hours.

Written and/or oral recorded evidence for Outcome 4 should be assessed by production of a full laboratory report, completion of an appropriate pro forma or a laboratory diary entry. An assessor's observation checklist could be used to record performance evidence of practical experiments.

Outcome 1

The assessment will sample four of the five Knowledge and/or Skills items. However, the item 'describe the structure and functions of three of the four main types of animal tissues' must be assessed on each occasion. Learners will not have prior knowledge of which items are being assessed. Those items which are not sampled must be covered in the alternative (re-sit) assessment.

Where an item is sampled, a learner's response will be judged satisfactory where the evidence shows that the learner can:

- ◆ Describe the differences between and occurrences of radial and bilateral symmetry.
- ◆ Describe the differences between and significance of diploblastic and triploblastic organisation.
- ◆ Explain the differences between coelomates, pseudoceolomates and acoelomates.
- ◆ Explain the importance of segmentation.
- ◆ Describe the structure and functions of three of the four main types of animal tissues: Epithelial, Connective, Nervous, Muscle.

Higher National Unit specification: Statement of standards (cont)

Unit title: Animal Biology (SCQF level 8)

Outcome 2

The assessment will cover all of the Knowledge and/or Skills items.

A learner's response will be judged satisfactory where the evidence shows that the learner can:

- ◆ Describe the structure of four of the six main groups of non-chordates.
- ◆ Describe how the reproductive biology of two representative non-chordates determines their distribution.
- ◆ Describe how the structural adaptations of two representative non-chordates determines their distribution.

Non-chordates to be covered are: Cnidaria, Platyhelminthes, Arthropods, Molluscs, Annelids, Echinoderms.

Learners will not have prior knowledge of which groups of non-chordates are being assessed. Those groups which are not assessed must be covered in the alternative (re-sit) assessment.

Outcome 3

The assessment will cover all of the Knowledge and/or Skills items.

A learner's response will be judged satisfactory where the evidence shows that the learner can:

- ◆ Describe the structure of four of the six main groups of chordates.
- ◆ Describe how the reproductive biology of two representative chordates determines their distribution.
- ◆ Describe how the structural adaptations of two representative chordates determines their distribution.

Chordates to be covered are: Cartilaginous fish, Bony fish, Amphibians, Reptiles, Birds, Mammals.

Learners will not have prior knowledge of which groups of chordates are being assessed. Those groups which are not assessed must be covered in the alternative (re-sit) assessment.

Higher National Unit specification: Statement of standards (cont)

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Outcome 4

Learners will perform a minimum of two practical experiments, the content of which will be related to Outcomes 1–3. A learner's response will be judged satisfactory where the evidence shows that the learner can achieve all of the following:

- ◆ Follow instructions to perform experiments related to animal biology.
- ◆ Work in a safe manner regarding current health and safety regulations.
- ◆ Achieve consistent and accurate results.
- ◆ Record experimental observations and results clearly and accurately.
- ◆ Evaluate validity of results in terms of sources of and values of experimental errors.
- ◆ Analyse results correctly and state valid conclusions.

An assessor observation checklist will be used to record the learner's performance of the practical work in line with given instructions and health and safety requirements.

Learners must report one of the two practical experiments by production of a full laboratory report. Learners may report the remaining practical experiment by production of a full laboratory report, completion of an appropriate pro forma or a laboratory diary entry. Where a pro forma approach is deployed, the pro forma will not present information or assistance to the learners on how to correctly perform calculations, analyse experimental results or experimental errors. Learners will be expected to perform such activities independently on the basis of the experimental data. Where a laboratory diary approach is deployed, the laboratory diary must meet all of the requirements of a pro forma (in particular an evaluation of experimental errors), as set out in the Understanding Standards materials.

Where a learner does not perform an assessed practical experiment to the required standard, they will be given the chance to either reattempt the same practical experiment, or to undertake a different practical experiment of similar complexity. Where a laboratory report, pro forma or laboratory diary does not meet the required standard, then the learner will be given a single opportunity to re-draft. If the required standard is still not attained, then an alternative practical experiment will be set.



Higher National Unit Support Notes

Unit title: Animal Biology (SCQF level 8)

Unit Support Notes are offered as guidance and are not mandatory.

While the exact time allocated to this Unit is at the discretion of the centre, the notional design length is 40 hours.

Guidance on the content and context for this Unit

This Unit is intended as part of the framework for HNC/HND Applied Sciences and HND Applied Biological Sciences but may be suitable for inclusion in other HN Science awards. It is designed to develop the theoretical and practical aspects of animal biology introduced in the HN Unit H927 34 *Cell Biology: Theory and Laboratory Skills*. Study of key representatives of the wide diversity of the animal kingdom should ensure that learners are aware of the wide range of categories of animals and how their bodies have evolved in many ways to meet the challenges of exploiting different environments.

Outcome 1 — Describe the organisation, structure and function of animal cell types and tissues

This Outcome will enable learners to understand how animal size and organisation is directly related to their structure, function and tissue structure ie epithelial, connective, nervous and muscle tissues are directly related to the functioning of animals within their environment. The significance of cell organisation in terms of radial and bilateral symmetry and the consequences of diploblastic and triploblastic organisation should be covered. The differences between the major coelomate, pseudoceolomate and acoelomate animals should be explained as well as the degree of segmentation.

Outcome 2 — Describe how structure is related to function in the major groups of non-chordates and how this determines their distribution

The study of representative non-chordates will provide learners with an overview of the characteristics of the major groups of non-chordates. Study of the requirements of their reproductive biology and structural adaptations will elucidate ways in which non-chordates have adapted in many different ways to be successful in marine, freshwater, land and air environments.

Higher National Unit Support Notes (cont)

Unit title: Animal Biology (SCQF level 8)

Representatives of non-chordates can be taken from the following categories:

- ◆ Cnidaria: sea anemones, corals, sea pens, jellyfish, box jellies, hydrozoa
- ◆ Platyhelminthes: turbellarians, flukes, tapeworms
- ◆ Arthropods: insects, arachnids, crustaceans.
- ◆ Molluscs: gastropods, cephalopods, bivalves
- ◆ Annelids: ragworms, earthworms, leeches
- ◆ Echinoderms: starfish, sea urchins, sand dollars, sea cucumbers

Outcome 3 — Describe how structure is related to function in the major groups of chordates and how this determines their distribution

The study of representative chordates will provide learners with an overview of the characteristics of the major groups of chordates. Study of the requirements of their reproductive biology and structural adaptations will elucidate ways in which chordates have adapted in many different ways to be successful in marine, freshwater, land and air environments.

Representatives of chordates can be taken from the following categories:

- ◆ Cartilaginous fish: sharks, skates, rays
- ◆ Bony fish: ray-finned fish, lobe-finned fish
- ◆ Amphibians: frogs and toads, salamanders, caecilians
- ◆ Reptiles: turtles, crocodilians, snakes, lizards
- ◆ Birds: paleognaths, neognaths
- ◆ Mammals: monotremes rodents, bats, shrews, primates, even toed mammals, carnivores

Outcome 4 — Perform practical experiments related to animal biology

Guidance on suitable practical experiments for assessment purposes is given elsewhere in this document. However, it is envisaged that learners will also participate in a range of other practical experiments which will both develop their laboratory skills and support the theory covered in Outcomes 1–3.

In carrying out such activities, learners should follow Good Laboratory Practice (GLP) and carry out or be familiar with the risk and Control of Substances Hazardous to Health (COSHH) assessments on all procedures undertaken. Opportunities should be taken to develop awareness of the sources of experimental error and of the accuracy of measurements, with quantification of errors where possible.

Guidance on approaches to delivery of this Unit

There is no particular order in which Outcomes 1–3 would be best delivered. It is envisaged that laboratory work for Outcome 4 will feature across each of the Outcomes, and that the assessed practical experiments will be undertaken in similar timeframe to the underpinning theory.

Higher National Unit Support Notes (cont)

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Outcome 1 is intended to cover the characteristics and functioning of the main animal tissues, as well as their organisation in terms of symmetry germ layers, coelom and segmentation.

Outcomes 2 and 3 are intended to examine representatives of chordates and non-chordates and how their reproductive biology and structural adaptations determines their distribution.

Centres may prefer to emphasise the diversity of the animal kingdom by studying evolutionary trends illustrated by important representatives of the major groups of animals and study how the organisation of cell and body plans within these representatives of major groups of animals enables them to function with their environment. Practical work could be undertaken at appropriate points during delivery.

A learner-centred, participative and practical approach is to be encouraged and field trips, visits and visiting experts could enhance the learner experience.

It is envisaged that Outcome 4 will be delivered alongside the theoretical based Outcomes 1–3. A range of practical experiments could be utilised to both support understanding of the underlying theory and to prepare learners for undertaking the assessed practical experiments.

Guidance on approaches to assessment of this Unit

Evidence can be generated using different types of assessment. The following are suggestions only. There may be other methods that would be more suitable to learners.

Outcomes 1–3 could be assessed by a single holistic closed-book assessment with an appropriate cut-off score that covers the sampling requirements as detailed in the Evidence Requirements. Assessment should be carried out in supervised conditions, and it is recommended that the assessment be completed within 120 minutes.

Where evidence of Outcome 1 is assessed by sampling, the whole of the content listed in the Knowledge and/or Skills must be taught and available for assessment. Learners should not know in advance the items on which they will be assessed, and different items should be sampled on each assessment occasion. Any items not sampled in the first assessment, must be included in the alternative (re-sit) assessment.

In Outcome 4 learners are required to undertake two assessed practical experiments, the content of which will be related to Outcomes 1–3. Examples of suitable experiments are given below. However, this list is not prescriptive, and other practical experiments of similar complexity may be used by the centre.

Suitable practical experiments for Outcome 1 are:

- ◆ Microscopic examination and comparison of representative animal tissues.
- ◆ Examination and comparison of diploblastic and triploblastic animals.
- ◆ Examination and comparison of radial and bilateral symmetry in representative animals.
- ◆ Examination and comparison of the effects of differing degrees of segmentation in representative animals.
- ◆ Examination and comparison of coelomates, pseudoceolomates and acoelomates.

Higher National Unit Support Notes (cont)

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Suitable practical experiments for Outcome 2 are:

- ◆ The effects of varying environmental parameters on non chordate behaviour, eg *Oniscus*.
- ◆ Investigate the size and distribution of dog whelks on a rocky shore.
- ◆ Compare structure and function of hydrostatic and exoskeletons.
- ◆ Investigation of osmosis in chicken eggs.
- ◆ Organisation, movement and locomotion in annelids, crustaceans and insects.
- ◆ Use of biological keys to identify specimens.

Suitable practical experiments for Outcome 3 are:

- ◆ Investigate the relationship between dentition and diet.
- ◆ Relate endoskeleton structure to habitat.

Assessed practical experiments will usually be performed individually. However, there may be some experiments that are suitable to be undertaken in pairs or small groups. If this is the case then the assessor should ensure that all participants are actively involved and are able to adequately demonstrate the required skills.

An exemplar instrument of assessment with marking guidelines has been produced to indicate the national standard of achievement at SCQF level 8.

Centres are reminded that prior verification of centre-devised assessments would help to ensure that the national standard is being met. Where learners experience a range of assessment methods, this helps them to develop different skills that should be transferable to work or further and higher education.

Opportunities for e-assessment

E-assessment may be appropriate for some assessments in this Unit. By e-assessment we mean assessment which is supported by Information and Communication Technology (ICT), such as e-testing or the use of e-portfolios or social software. Centres which wish to use e-assessment must ensure that the national standard is applied to all learner evidence and that conditions of assessment as specified in the Evidence Requirements are met, regardless of the mode of gathering evidence. The most up-to-date guidance on the use of e-assessment to support SQA's qualifications is available at www.sqa.org.uk/e-assessment.

Opportunities for developing Core and other essential skills

The delivery and assessment of this Unit will provide learners with the opportunity to develop the Core Skills of *Numeracy* and *Problem Solving* at SCQF level 6, and *Information and Communication Technology (ICT)* at SCQF level 4.

Numeracy — Using Number at SCQF level 6

Learners will be required to decide on the steps and operations to solve complex problems, carrying out sustained and complex calculations.

Higher National Unit Support Notes (cont)

Unit title: Animal Biology (SCQF level 8)

Problem Solving — Reviewing and Evaluating at SCQF level 6

Following assessed practical experiments learners will be required to review and evaluate the effectiveness of the exercise with a thorough interpretation of random and systematic sources of error. Learners will be required to reach sound conclusions on the basis of the data collected and the inherent errors.

Information and Communication Technology (ICT) — Providing/Creating Information at SCQF level 4

Learners may make effective and appropriate use of ICT packages to produce laboratory reports in an appropriate format. Packages used will likely include word processing and spreadsheets.

Sustainability

Sustainability can be embedded in delivery of the Unit in a variety of ways. For example, by encouraging minimum usage, correct disposal procedures and possibly recycling (eg of solvents) during practical experiments.

History of changes to Unit

Version	Description of change	Date
03	The number of main groups of non-chordates and chordates reduced from 8 to 6. Sampling of non-chordates and chordates reduced to 4 out of 6.	10/08/2020
02	Duration of assessment for Outcomes 1-3 amended.	23/01/2016

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General information for learners

Unit title: Animal Biology (SCQF level 8)

This section will help you decide whether this is the Unit for you by explaining what the Unit is about, what you should know or be able to do before you start, what you will need to do during the Unit and opportunities for further learning and employment.

This is a 1 credit Unit at SCQF level 8, which you are likely to be studying as part of the second year of a HNC/HND science programme. Before progressing to this Unit it would be beneficial to have completed the HN Unit H927 34 *Cell Biology: Theory and Laboratory Skills*, where you will have learned underpinning aspects of animal biology and developed your practical skills.

On completion of the Unit you should be able to:

- 1 Describe the organisation, structure and function of animal cell types and tissues.
- 2 Describe how structure is related to function in the major groups of non-chordates and how this determines their distribution.
- 3 Describe how structure is related to function in the major groups of chordates and how this determines their distribution.
- 4 Perform practical experiments related to animal biology.

Outcome 1

In this Outcome you will cover the organisation, structure and function of animal cell types and tissues.

Outcome 2

In this Outcome you will learn how structure is related to function in the major groups of non-chordates, and you will learn how this determines their distribution. Non-chordates that you will study will include: Cnidaria, Platyhelminthes, Arthropods, Molluscs, Annelids and Echinoderms.

Outcome 3

In this Outcome you will learn how structure is related to function in the major groups of chordates, and you will learn how this determines their distribution. Chordates you will study will include: Cartilaginous fish, Bony fish, Amphibians, Reptiles, Birds and Mammals.

Outcome 4

In this Outcome you will undertake practical experiments, based on the content of Outcome 1–3.

During this practical work, you will also be expected to improve your skills of manipulation, observation and measurement. You will also be encouraged to develop safe working practices and to strive constantly to improve the accuracy and reliability of your results. The reporting and analysis of experimental data is an important aspect of the practical sessions.

General information for learners (cont)

Unit title: Animal Biology (SCQF level 8)

Assessment

For Outcomes 1 to 3 you will take a closed-book, end of Unit assessment.

Outcome 4 will be assessed after you have learned the necessary practical skills, and will take the form of two practical experiments, for which you will report your results either in a full laboratory report, pro forma report or a laboratory diary entry.

Core Skills

Although there is no automatic certification of Core Skills in the Unit, you will have opportunities to develop the Core Skills of *Numeracy* and *Problem Solving* at SCQF level 6, and *Information and Communication Technology (ICT)* at SCQF level 4.