

BTEC Level 3 National in Animal Management

First teaching September 2016



Sample Marked Learner Work

External Assessment

Unit 2: Animal Biology

In preparation for the first teaching from September 2016 and as a part of the on-going support that we offer to our centres, we have been developing support materials to help you better understand the application of Nationals BTEC Level 3 qualification.

What is Sample Marked Learner Work (SMLW)?

The following learner work has been prepared as guidance for centres and learners. It can be used as a helpful tool when teaching and preparing for external units.

Each question explores two responses; one good response, followed by a poor response. These responses demonstrate how marks can be both attained and lost.

The SMLW includes examples of real learners' work, accompanied with examiner tips and comments based on the responses of how learners performed.

Below displays the format this booklet follows. Each question will show a learner response, followed by comments on the command verbs and the content of the question. Tips may be offered where possible.

The appendix has attached a mark scheme showing all the possible responses that perhaps were not explored in the SMLW, but can still be attained.

The red box comments on the command verbs used in the question. Command typically means; to instruct or order for something to be done. Likewise, in assessments, learners are required to answer questions, with the help of a command verb which gives them a sense of direction when answering a question.

This box may choose to highlight the command verb used and comments if the learner has successfully done this, or not.

The green box comments on the content words and phrases. Content makes reference to subject knowledge that originates from the specification. Learners are required to use subject specific knowledge to answer the questions in order to gain maximum marks.

The comments may include:

- *Any key words/phrases used in the learner's answer.*
- *Why has the learner gained x amount of marks? And why/how have they not gained any further marks?*
- *Any suggestions/ ideas regarding the structure of the answer.*
- *If the answer meets full marks- why it is a strong answer? What part of the content has been mentioned to gain these marks?*

TIPS!



Tips offer helpful hints that the learner may find useful. For example:

- *Recommended length of the answer*
- *Reference to the amount of marks awarded*
- *General advice for the learner when answering questions*

You will need to refer to the appropriate specification alongside these sample materials.

The link below will direct you to the SAMs that this SMLW refers to.

<https://qualifications.pearson.com/content/dam/pdf/BTEC-Nationals/Animal-Management/2016/specification-and-sample-assessments/Sample-assessment-material-Unit-2-Animal-Biology.pdf>

Question 1 ai):

(a) The table shows an incomplete taxonomic hierarchy.

(i) Complete the table with the two missing grouping levels.

[Total marks for Q1 a i- 2 marks]

(a) The table below shows an incomplete taxonomic hierarchy.

(i) Complete the table with the **two** missing grouping levels.

| |
|------------------------|
| Kingdom |
| Phylum |
| Order CLASS |
| Order |
| Family |
| Genus |
| Species |

2

The command verb is 'Complete' which is defined in the unit as providing all terms required to answer the question.

Question 1ai requires the student to recall the taxonomic hierarchy. This question links to AO1, demonstrating the knowledge of living organisms.

Good response: The student has 'completed' the two require spaces within the table correctly and has been awarded 2 marks for the answer.

(a) The table below shows an incomplete taxonomic hierarchy.

(i) Complete the table with the **two** missing grouping levels.

| |
|-------------|
| Kingdom |
| Phylum |
| Taxonomy |
| Order |
| Family |
| Sub-family? |
| Species |

0

Poor response: This student does not accurately recall the taxonomic hierarchy therefore being awarded no marks. They have attempted to provide answers but appear to have misunderstood what taxonomy hierarchy is.

Poor response: The student has 'completed' the two required spaces within the table but unfortunately has provided incorrect answers. No marks have been awarded for this question.



Further understanding and revision needed on taxonomies.

Question 1 aii): Define the term species.

[Total marks for Q1 aii - 2 marks]

(ii) Define the term species.

2 marks

It is ^{large group} population of organisms which share the same DNA structure & physical characteristics as well as behavioural patterns.

1

The command verb for this question is 'Define' which requires students to state or describe the meaning of a subject as objective facts.

Good response: The student has attempted to define the term species but has not provided the required description to be awarded the full 2 marks.

Good response: Question 1a ii) links to AO1, demonstrating knowledge of living organisms.

A reasonable attempt has been made to define species but hasn't included the required information as per the mark scheme to achieve the full 2 marks.

This answer shows some understanding with of what the term 'species' means but lacks reference to being able to produce live offspring.

(ii) Define the term species.

2 marks

A species is a group of animals that have specific genotypes that work down from their taxonomic hierarchy.

0

Poor response: Student attempted to provide a definition however a weak attempt demonstrating poor understanding of what the term species means. This answer needs to make reference to a group of biologically similar individuals and that are able to produce fertile offspring in order to achieve full marks for this question.

The student has attempted to define the term species but have not provided relevant detail to be awarded any marks.



Ensure students understand the terms used when studying.



Get students to define terminology so they can practice how to write a definition.

Question 1 b): Explain why scientists use binomial nomenclature (a two-part scientific name) to describe each species. [Total marks for Q1 b - 3 marks]

Explain why scientists use binomial nomenclature (a two-part scientific name) to describe each species.

3 marks

This is to identify each species according to taxonomic hierarchy to be able to recognise specific species from others. This can also identify species within a group or family (taxonomic hierarchy)

2

The command verb for this question is 'Explain' which requires students to show that they understand the objectives of a subject and to be able to support an opinion or argument with clear details.

Good response: The student has made a good attempt to explain why binomial nomenclature is used to describe each species.

Good response: Question 1b relates to AO2 demonstrating understanding of the classification of living organisms. A good answer has been provided and awarded 2 out of 3 marks. To achieve the full marks for this question, the explanation needed to make reference to first indicate genus and second indicates species, that common names can lead to confusion, no two species share the same binomial name.

This answer shows good understanding of why binomial nomenclature is used to describe each species but requires further in depth understanding. Student could have used how many marks this question is worth to gauge an idea of how much detail is required.

As some organisms within the species may look different or have different characteristics to each other. It makes it easy to state / know the difference between them.

0

Poor response: Student has made an attempt to answer the question however they are lacking depth of subject knowledge. The answer has briefly touched upon points but they need to be clear in order to achieve the mark. Further understanding of the command verb would have supported the answer here.

This answer didn't get awarded any marks. The answer given doesn't suggest the student understands what a two-part scientific name is and why it is used. The question is worth three marks so the student needs to attempt to make three points to have the best chance of achieving a mark as three points were stated in the mark scheme.



During exam prep students need to look at how many marks the question is worth as well as the command verb to create the best response.



Ensure clear understanding of two-part scientific name and what they indicate.



This clear understanding will help to form a basis of their knowledge and support them for the rest of the module.



Every student needs to understand the command verbs and what they are asking to support them when writing the answer.



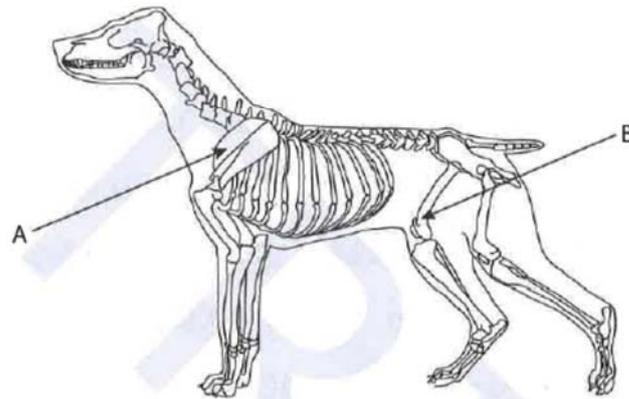
Understanding of taxonomy and two part scientific names need to be taught more rigorously and ensure students understand fully.

Question 2 a): Give the names of bone A and B labelled in the diagram above.

[Total marks for Q2 a - 2 marks]

2 A police dog handler has been offered a German Shepherd that is the right temperament to be a good police dog. He checks that it is able to run well and does not have any disorders.

The diagram below shows the skeleton of a dog.



(Source: image courtesy of Zelena/Shutterstock)

(a) Give the names of bones A and B labelled in the diagram above.

2 marks

A Scapula

B femur

2

The command verb is 'Give'. The learner has provided two correct answers.

Good response: The learner has provided two correct answers. The learner has been asked which body part. The learner has correctly identified them both so full marks awarded. There is no requirement to add a description and to do so would have wasted valuable time for the learner.

Good response: Question 2 requires learners to give the names of bone that have been labelled on an image of a skeleton.

The learner has referred to relevant content for AO1 demonstrating knowledge of the structure of living organisms.

(a) Give the names of bones A and B labelled in the diagram above.

2 marks

A Collar bone.

B metatarsal.



Poor response: The learner has not provided two correct answers. The learner has been asked which body part. The learner has incorrectly identified this.

Poor response: The learner has referred to relevant content for AO1 demonstrating knowledge of the structure of living organisms.

Further revision and practice of naming the bones is required, using a variety of methods.

Question 2 b): Explain two adaptations of the musculo-skeletal structure of the German Shepherd that makes it good at running. [Total marks for Q2 b - 4 marks]

(b) Explain **two** adaptations of the musculo-skeletal structure of the German Shepherd that makes it good at running.

4 marks

1. ~~long~~ Enlongated hind legs that can spread forward and gain distance when running

2. Strong muscles to help push itself forward and gain speed.

4

The command verb is 'Explain' which means that the learner is required to extend their answer beyond a description, referring to adaptations and how they ensure the animal is good at running.

Good response: The learner has identified the adaptations and has clearly explained them which has been awarded full four marks.

Question 2b requires learners to explain two possible adaptations to the German shepherd and explain how they help the animal to run faster.

The answer links to AO2 understanding the structure and function of animal body systems.

Good response: This answer could have been improved by using correct terminology/specific parts of the body.

1. The muscles and Bones are connected with strong tendons, in which provide support for impact and allow the dog to run at high speed?

2. The muscles within the backs of the legs are well built and structured, allowing the dog the strength to take powerful strides?



Poor response: The learner has not identified any adaptations and has not understood the question requiring adaptations.

Poor response: This answer provides no adaptations but more about how the body may run faster. Specific adaptations needed to be given with an explanation of how this adaptation will support the animal in running. To enable a better answer to be provided the student needed to understand what the question is asking.



Use different techniques to support students with this (BUG-Box, Underline, and Glance technique for example).



Practice reading and understanding what the question is asking, not just the command verb.

Question 2 ci): Give an example of one cause for dysplasia.

[Total marks for Q2 ci - 1 mark]

(c) Give an example of **one** cause and **one** symptom for hip dysplasia.

(i) Cause

1 mark

Genetic Inheritance - if the disorder is present in parents, offspring are more likely to develop it.

1

The command verb is 'Give' which is defined as the student providing one or more pieces of evidence.

Good response: The student has provided one example for a cause of hip dysplasia which has been awarded the full mark.

The question links to AO1, to demonstrate knowledge of animal body systems.

Good response: The student has demonstrated understanding of hip dysplasia and its causes. No further detail is required or it would have wasted valuable time for the student.

(c) Give an example of **one** cause and **one** symptom for hip dysplasia.

(i) Cause

1 mark

when the knee cap does not correctly fit into the socket

0

Poor response: The student has not provided one example for a cause of hip dysplasia. This answer suggests that the student has misunderstood the question and the command verb.

Poor response: The student hasn't provided a cause for hip dysplasia and hasn't understood the question. The answer given is a more description as to what hip dysplasia is. To be awarded a mark the student needed to give a cause for hip dysplasia, such as an inherited condition or wear and tear on the femur.



Ensure students are reading and understanding the questions as well as the command verb.

Question 2 cii): one symptom for hip dysplasia [Total marks for Q2 cii - 1 mark]

(ii) Symptom

1 mark

lameness of back end.

1

The command verb is 'Give' which is defined as the student providing one or more pieces of evidence.

Good response: The student has provided one example for a symptom of hip dysplasia which has been awarded the full mark.

Good response: Content of answer is correct so full mark awarded. Answer could have been more specific referring to 'hip' as opposed to back end.

The question links to AO1, to demonstrate knowledge of animal body systems. The student has demonstrated understanding of hip dysplasia and its symptoms. No further detail is required or it would have wasted valuable time for the student.

(ii) Symptom

1 mark

Limping

0

Poor response: Answer could have been more specific referring to 'hip' or 'back' end.

Answers need to be specific to demonstrate student knowledge.

Question 2 d): Explain the function of the tapetum lucidum in the eyes of the dog to help it to see in low light conditions. Total marks for Q2 d - 3 marks]

(d) Explain the function of the tapetum lucidum in the eyes of the dog to help it to see in low light conditions.

3 marks

The tapetum lucidum is a pigment in the eye which helps the dog to see in low light or dark conditions. This takes in as much light and is a reflecting pigment to help the dog's ~~state~~ eye absorb as much accessible light as possible.

2

The command verb is 'Explain' which means that the answer is required to be extended beyond description with reasons to support an opinion/argument.

Good response: The answer has explained what the function of the tapetum lucidum has in this scenario.

A reasonable answer that links with AO2 the understanding of the structure and function of animal body systems.

Good response: To make this a stronger answer it needs to state the reflection of light through the retina and the increase for photoreceptors. This needs to be more specific and really demonstrate understanding to be awarded the full marks.

(d) Explain the function of the tapetum lucidum in the eyes of the dog to help it to see in low light conditions.

3 marks

Due to the tapetum lucidum, more light is drawn into the eye, in order for them to see in low-light. As more light is drawn in, a clearer image is shown upon the retina, and so eye sight isn't affected.



Poor response: The answer is weak and has not provided enough depth of knowledge.

Poor response: A weak answer. The question links with AO2 the understanding of the structure and function of animal body systems

To make this answer stronger it needs to be specific on the function of tapetum lucidum and needs to use correct terminology and provide an in depth understanding of how sight works.



Ensure the answer is specific using correct terminology.

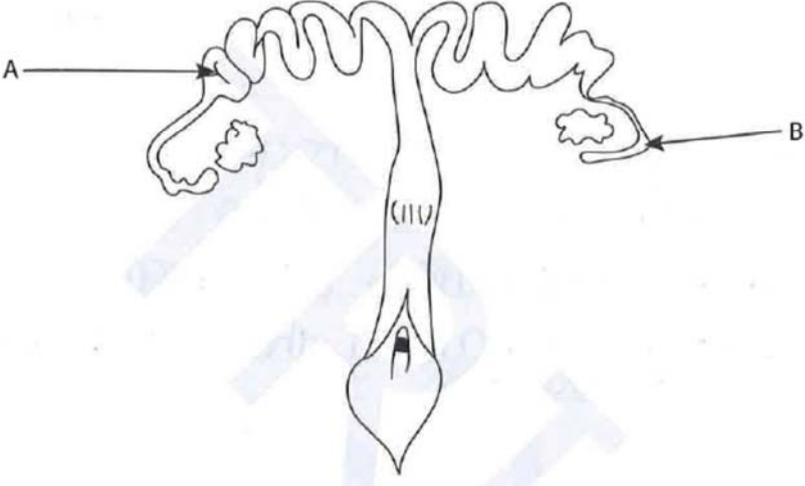
Use the marks per question to guide how in depth the answer should be.

Question 3 a): Give the names of the structures labelled A and B in the diagram.

[Total marks for Q3 a - 2 marks]

3 Sumita works in a rabbit sanctuary and is required to advise on reproduction issues.

The diagram below shows the reproductive system of a female rabbit.



(a) Give the names of structures labelled A and B in the diagram.

2 marks

A UTERUS

B OVIDUCT/FALLOPIAN TUBE.

2

The command verb is 'give' which is defined as students providing one or more pieces of information.

Good response: The student has provided correct answers. This suggests that the command verb was clearly understood and the student had knowledge on the reproductive system.

Good response: This question links to AO1 the structure of animal body systems.

No further detail is required here as it would have wasted time for the student.

(a) Give the names of structures labelled A and B in the diagram.

2 marks

A Oviduct

B Ovaries.



Poor response: The student has provided answers however incorrect. This suggests that the command verb was clearly understood.

Poor response: To make this a strong answer and to achieve full marks, correct answers need to be provided- A Uterus and B Oviduct/fallopian tube.

The student has not provided the correct answers suggesting lacking in knowledge.

Question 3 b): Give the name of the tissue that lines the reproductive tract.

[Total marks for Q3 b - 1 mark]

(b) Give the name of the tissue that lines the reproductive tract.

1 mark

epithelium

1

The command verb is 'Give' which is defined as students providing one or more pieces of information.

Good response: The student has provided the correct answer identifying the tissue that lines the reproductive tract. No further description is required as this would have wasted time for the student.

This question links to AO1 the structure of animal body systems.

Good response: The student has provided the correct answer recognising the tissue in the reproductive tract.

(b) Give the name of the tissue that lines the reproductive tract.

1 mark

Demus

0

Poor response: The student has provided the incorrect answer. To achieve the full mark for this question the student needed to have specified epithelium tissue.

TIPS!



Use quizzes to support students in recognising different tissue types.

Question 3 c): State the length of the gestation period in a rabbit.

[Total marks for Q3 c - 1 mark]

(c) State the length of the gestation period in a rabbit.

1 mark

30-31 average gestation period.

1

The command verb is 'State' which is defined as students expressing the condition of or facts about something definitely.

Good response: The student has provided a correct answer by recalling the gestation period of a rabbit.

This question links to AO1 the structure of animal body systems.

Good response: This a clear and strong answer and does not require further detail as this would have wasted time during the exam.

The answer suggest the student was confident in recalling the gestation period of a rabbit.

(c) State the length of the gestation period in a rabbit.

1 mark

3 weeks.

0

Poor response: The student has provided the incorrect answer but clearly understood the command verb.

Question 10 requires learners to Identify relevant services, indicating the main features or factors and demonstrating an understanding of these.

Poor response: The learner has identified mobile carers, meaning care workers who visit the home which is correct. However the other two examples are not services to be provided at home for Joseph.

The learner has considered information from section B3 Environmental factors that affect development and referred to bullet point three, Access to health and social care services however, they have misunderstood the roles of the first two points presented in their work.

Question 3 d i): Describe the levels and the effects of progesterone and oxytocin at kindling.

i) Progesterone

[Total marks for Q3 di - 2 marks]

(d) Describe the levels and the effects of progesterone and oxytocin at kindling.

(i) Progesterone

2 marks

progesterone levels drop, this means that the body needs to produce oxytocin. progesterone will send hormonal changes.

1

The command verb is 'describe' which is defined as students giving a clear, objective account in their own words that demonstrated recall and application of knowledge within the subject.

Good response: The learner has been asked to describe the levels and effect of progesterone at kindling. Reference has been made to the levels of the hormone but has not stated that labour will begin.

This question links to AO2 demonstrating the understanding of the functions of animal body systems.

Good response: The student has correctly identified the levels of progesterone but lacking in further depth by not stating that labour begins. To make this a stronger answer the student needed to make comment about labour beginning.

(d) Describe the levels and the effects of progesterone and oxytocin at kindling.

(i) Progesterone

2 marks

Progesterone levels can vary causing the effect on the body which can either prevent bleeding from the uterus during pregnancy and cause laceration in the mother.

0

Poor response: The learner has been asked to describe the levels and effect of progesterone at kindling. Reference has been made to the changing levels of progesterone but has not been specific to state that they decrease and has failed to mention that labour begins.

Question 3 d ii): Oxytocin

[Total marks for Q3 dii - 2 marks]

2 marks

Oxytocin will be released when progesterone levels drop. oxytocin will cause contractions that will aid kindling

2

The command verb is 'Describe' which is defined as students giving a clear, objective account in their own words that demonstrated recall and application of knowledge within the subject.

Good response: The learner has been asked to describe the levels and effect of oxytocin at kindling. Reference has been made to the levels of the hormone but has not stated that contractions will begin.

This question links to AO2 demonstrating the understanding of the functions of animal body systems.

Good response: The student has correctly identified the levels of oxytocin and stated that contractions will begin. To make this a stronger answer the student could have used terminology such as uterine/foetuses.

(ii) Oxytocin

2 marks

High as this is what affects the

1

Poor response: The student has correctly identified the levels of oxytocin but lacking in further depth by not stating that contractions will begin, this is required to make this a stronger answer and be awarded the full 2 marks.

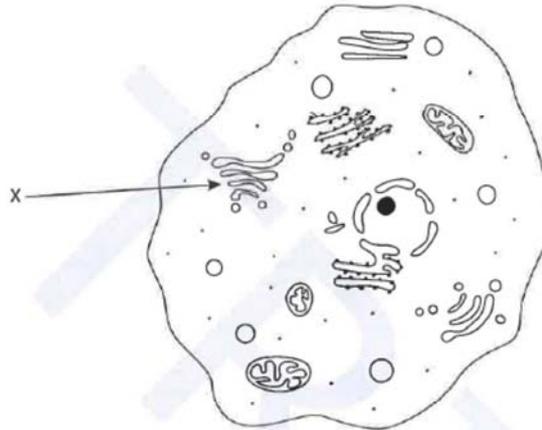


Ensure student fully understands the meaning of the command verb.

Question 3 e): Give the name of the organelle labelled X in the diagram.

[Total marks for Q3 e - 1 mark]

Hormones are globular proteins produced by secretory cells. The organelle labelled in the diagram of the ideal animal cell below packages hormones before secretion.



(e) Give the name of the organelle labelled X in the diagram.

1 mark

1

ribosome

The command verb is 'give' which is defined as students providing one or more pieces of information.

Good response: The student has provided the correct answer identifying the labelled point on a diagram of an animal cell. No further description is required as this would have wasted time for the student.

Good response: This question links to AO1 the structure of animal body systems. The student has provided the correct answer. No further detail needed.

(e) Give the name of the organelle labelled X in the diagram.

1 mark

Mitochondria

0

Poor response: The student has provided the incorrect answer not identifying the labelled point on a diagram of an animal cell.

Poor response: The student has provided the incorrect answer. To make this a strong answer the student needed to have recognised golgi apparatus/golgi body.



Further revision and practice on labelling the animal cell.

Question 3 f): Describe the process of exocytosis.

[Total marks for Q3 f - 3 marks]

Hormones are secreted from cells by exocytosis.

(f) Describe the process of exocytosis.

3 marks

Hormone is contained within a vesicle which fuses to plasma membrane. ATP is required to enable this.

3

The command verb is 'describe' which is defined as students giving a clear, objective account in their own words that demonstrated recall and application of knowledge within the subject.

Good response: The learner has been asked to describe the process of exocytosis.

This question links to AO2 demonstrating the understanding of the functions of animal body systems.

Good response: The student has not been able to describe the process in detail but has touched upon the vesicle being fused with plasma membrane but in brief detail and not using the correct terminology. To make this a strong answer reference needed to have been made to energy/ATP required, hormone s contained within a vesicle and the vesicle fusing with plasma membrane.

(f) Describe the process of exocytosis.

3 marks

X

This is where the hormone is ^{started to be} produced in the cell and crosses through the different parts of the cell and protein and is then continued in the ribosomes which uses these proteins to create and then excrete the hormone.

0

Poor response: The learner has been asked to describe the process of exocytosis but has not been able to describe this process, possibly due to lack of knowledge/understanding.

Poor response: The student has not been able to describe the process and therefore has been awarded 0 marks. To make this a strong answer reference needed to have been made to energy/ATP required, hormone s contained within a vesicle and the vesicle fusing with plasma membrane.



Further knowledge and understanding needed on the subject. Test throughout to check learning.



Check how many marks the question is worth and make that many points to achieve more marks.

Question 4 a): Complete the table to show the names and functions of stomach compartments in an adult cow. [Total marks for Q4 a - 4 marks]

4 To maximise milk yield and maintain the health of the herd, it is important to feed dairy cattle (ruminants) in a way that is appropriate to their digestive system.

(a) Complete the table to show the names and functions of stomach compartments in an adult cow.

4 marks

| Name of stomach compartment | Function |
|-----------------------------|---|
| Reticulum | Acts as a filter |
| Omasum | Absorbs water. |
| Abomasum | Contains enzymes for further breakdown of digesta |
| Rumen | Contains microorganisms that produce volatile fatty acids (VFAs) from cellulose |

4

The command verb in this question is 'complete' which requires the students to provide all items.

Good response: The table here is complete suggesting the student understood the command verb, had good depth of knowledge and understanding, for identifying the stomach compartments and the functions.

Good response: This question relates to AO2, demonstrating understanding of the structure and function of animal body systems.

The student has made a good attempt to complete the table. To make this a stronger answer the student could have provided further detail on the function of the compartments of the stomach.

| Name of stomach compartment | Function |
|-----------------------------|---|
| Reticulum | contains enzymes which break down newly entered food. |
| Omasum | where the food becomes able to be eaten again by the cow. |
| | Contains enzymes for further breakdown of digesta |
| | Contains microorganisms that produce volatile fatty acids (VFAs) from cellulose |

0

Poor response: The table here is incomplete suggesting the student didn't understand the command verb or lacked depth of knowledge and understanding.

Poor response: The student has made an attempt to complete the table but did not have the knowledge to gain any marks. To make this a strong answer the student needed to have given abomasum and rumen as the names of the stomach compartments and identified that the reticulum acts as a filter and the omasum absorbs water.



Practice the digestive system of several animals and completing tables so they are aware of what is required to achieve marks.



The digestive system of the cow should be relatively easy to achieve marks on. This answer requires more understanding and knowledge from taught and revision sessions.

Question 4 b): State the kind of muscle present throughout the length of the ruminant digestive system. [Total marks for Q4 b - 1 mark]

(b) State the kind of muscle present throughout the length of the ruminant digestive system.

1

1 mark

Smooth / involuntary

The command verb is 'state' which requires the student to express the condition of, or facts about, something definitely.

Good response: The student has identified the type of muscle throughout the ruminant digestive system.

This question links to AO1 demonstrating knowledge of the structure and function of animal body systems.

Good response: To make this a stronger answer the student should have just written smooth.

(b) State the kind of muscle present throughout the length of the ruminant digestive system.

1 mark

Rough

Poor response: An attempt has been made but it is incorrect suggesting student did not have the knowledge.

Poor response: To make this a strong answer and be awarded the full mark the student should have answered 'smooth'. Further teaching needs to be carried out on types of muscle.

TIPS! → Recap tissue types.

Question 4 c): Describe how this related to the function of muscle cells.

[Total marks for Q4 c - 2 marks]

(c) Describe how this relates to the function of muscle cells.

2 marks

Mitochondria are the powerhouses in which Energy is produced inside the cell, Muscle cells will need the Energy to function correctly and so more Mitochondria will mean more Energy.

2

The command verb used in this question is 'describe' which is defined as students giving a clear/objective account in their own words and demonstrating some application of information about a subject.

Good response: The student has described how mitochondria relate to the function of muscle cells.

The question links to AO2 demonstrating understanding of animal body systems.

Good response: A good answer has been provided describing how mitochondria relate to the function of muscle cells. To make this a stronger answer it needs to be more in depth and to use correct terminology. The answer would have been stronger if the description included ATP and how it is formed relating it to the need for muscles to carry out work.

mitochondria is where the energy is formed in the cell for the muscle to work.

1

Poor response: The student has made an attempt to describe how mitochondria links to the function of muscle cells.

Poor response: A basic answer provided but it was clear and to the point. Needed more detailed description to have the chance of gaining an extra mark. Further revision required to be able to provide a more in depth description.

The answer would have been stronger if the description included ATP and how it is formed, relating it to the need for muscles to carry out work.



Encourage use of correct terminology.



More specific and accurate answer would be stronger.



Look at how many marks the question is worth as this should give you a guide as to how many points should be made.

Question 4 d): Give two other ways this muscle is adapted to its function in the digestive system. [Total marks for Q4 d – 2 marks]

The muscle in the ruminant digestive system has adapted its level of mitochondria to its function.

(d) Give **two** other ways this muscle is adapted to its function in the digestive system.

2 marks

- 1 Peristalsis - involuntary smooth contractions
- 2 Overlapping of cells aid in digestion, increase surface area.

2

The command verb used in this question is 'give' defined as the student providing one or more pieces of information.

Good response: The student has attempted to answer the question by stating digestion is aided by involuntary contractions and the overlapping of cells aid in digestion.

This question links to AO2 the understanding of animal body systems.

Good response: To make this a stronger answer it needs to be specific about peristalsis and that the cells overlap to allow for smooth contractions.

- 1 The muscle is adapted in order to cycle food around all chambers until completely digested.
- 2 The muscle is well fitted together in order to prevent leakage or stomach acid from burning through.

0

Poor response: The student has attempted to answer the question but hasn't provided what ways the muscle has adapted to its function.

Poor response: To make this a strong answer it needs to be specific about peristalsis and that the cells overlap to allow for smooth contractions.

The answer requires clear specific points about peristalsis and how this aids digestion by the cells overlapping.



Answer to be more specific and use correct terminology.



More in depth knowledge is required to provide the student with the tools to be able to answer this question.

Question 4 e): Explain how bloat is caused in a ruminant digestive system.

[Total marks for Q4 e- 3 marks]

Symptoms of bloat in ruminants can include signs of pain, discomfort or distress, a distended abdomen and sudden death.

(e) Explain how bloat is caused in a ruminant digestive system.

3 marks

Bloat is an overdistention of the rumenoreticulum with the gases of fermentation, either in form of a persistent foam mixed with the ruminal contents, or in the form of free gas separated from the ingesta.

3

The command verb used in this question is 'explain' which is defined as the student showing understanding of the functions and objectives of a subject. They need to give reason to support an opinion with clear details.

Good response: This is a good answer with a reasonable explanation provided.

This question links to AO2 the understanding of adaptations and disorders relating to body systems.

Good response: The answer has explained how bloat is caused to be awarded three marks. To make this a stronger answer it could include the anatomical aspects of bloat.

Overeating

0

Poor response: This is a one word answer suggesting that the student didn't understand the command verb and did not have the depth of knowledge to provide a structured answer.

Poor response: Answer is extremely weak and needed to provide detail to allow an answer to be formulated. Lack of understanding and knowledge demonstrated here. Further taught sessions needed. To make a good answer the specific terminology is needed as well as explanation on the anatomical functions.

TIPS!



Develop student knowledge around the condition but also what actually happens inside the animal and using correct terminology.



Further understanding needed in order to be able to formulate an answer.



Use the marks that can be awarded as a guide to support how detailed the answer should be.

Question 5 a i and ii): Calculate the mean average heart rate for those horses when they are walking and trotting. i) Walking ii) Trotting

[Total marks for Q5 a i and ii – 1 mark each]

(a) Calculate the mean average heart rate for these horses when they are walking and trotting.

(i) Walking

1 mark

$$75 + 70 + 80 + 78 + 73 = 376$$

$$376 \div 5 = 75.2$$

75.2 beats per minute

$$539 \div 5 = 107.8$$

107.8 beats per minute

The command verb for this question is 'calculate' which is defined as students need to obtain a numerical answer, with relevant working.

Good response: This answer shows clear calculations have been carried out, including working out demonstrating clear understanding of the question.

This question refers to AO2 demonstrating the understanding of the animal body systems.

Good response: Clear calculations have been worked out for each question. This clearly demonstrates that the student can read a graph and fully understood what the question was asking. Good practice to show working out.

(i) Walking

1 mark

$$75 + 105 + 76 + 102 + 80 + 105 + 78 + 105 + 73 + 105 = 905$$

$$905 - 539 = 376$$

$$376 \times 5 = 1,880$$

1,880 beats per minute

| | |
|---|------------------|
| $100 + \overset{112}{\cancel{172}} + \overset{115}{\cancel{2}} + 107 + 105 = 539$ | |
| 539×5 | |
| $2,695$ | beats per minute |



Poor response: This answer shows that calculations have been carried out. Calculations have been carried out but are messy and confusing. Demonstrates clear understanding of the command verb 'calculate'.

Poor response: Clear calculations have been worked out for each question. This clearly demonstrates that the student can read a graph and fully understood what the question was asking. Good practice to show working out. Calculations have been worked out although messy. This could have been a reason that contributed to incorrect answers being provided. No marks awarded for each question. Answer is weak and doesn't make sense, the learner should have picked up that the answer is impossible. This shows a lack of understanding of the calculation needed and also of the system that was being discussed.



- Good practice for students to show working out where necessary. This needs to be encouraged.
- Clear lack of understanding of the calculation required and the incorrect answer did not identify with the student. Systems need to be gone through in detail and realistic expectations in a variety of animals of what we would expect to see in certain scenarios.

Question 5 a iii): Give one reason why the average heart rate between horses that are walking and horses that are trotting are different.

[Total marks for Q5 aiii- 1 mark]

(iii) Give **one** reason why the average heart rate between horses that are walking and horses that are trotting are different.

1 mark

because of the increase in muscle movement and oxygen supply demanded.

1

The command verb in this question is 'give' which is defined as students providing one or more pieces of information.

Good response: The student has given a reason why the average heart rate between horses that are walking and trotting are different.

This question links to AO1 demonstrating knowledge of the structure and function of animal body systems.

Good response: This is an accurate answer but to make it a stronger answer it should be more specific, stating that beats per minute are increased while trotting as this uses more energy. It also demonstrates that the student can read information from a graph correctly.

Trotting is a more vigorous exercise than walking so the heart and lungs need to work harder.

0

Poor response: The student has not given a reason why the average heart rate between horses that are walking and trotting are different.

This answer suggests that full understanding of the question was not clear.

Poor response: This is a weak answer and not at the required level. This would have been a stronger answer if it was more specific in relation to the body and why it was using more energy when trotting, and that the bpm has increased.



Full understanding of questions is important so practice papers should be used to support this development.



Specific and accurate information needs to be provided to make sure the answer is clear and understood. Encourage use of correct terminology and clear understanding of how body systems work.

Question 5 b): Describe the role of glucagon in the process of regulating blood glucose levels in the horses. [Total marks for Q5b - 4 marks]

(b) Describe the role of glucagon in the process of regulating blood glucose levels in the horses.

4 marks

glucagon increases blood sugar levels after being secreted by the pancreas. when blood sugar levels drop or are demanded higher, a signal from brain to pancreas is made to secrete glucagon. glucagon will stop being secreted when demands are met, but if too high insulin lowers blood sugar levels

2

The command verb in this questions is 'describe' which is defined as giving a clear, objective account in their own words demonstrating some recall and application of knowledge.

Good response: The answer provided describes glucagon and it increasing blood sugar levels by the pancreas.

This question links to AO2 demonstrating an understanding of the function of animal body systems.

Good response: This is a reasonable description but in order for this to be a strong answer and possibly achieve full marks further detail is required, such as how it travels through the blood stream, how its converted, that glucose is stored as glycogen in liver/muscles. More specific detail is required to show a clear understanding of the process.

(b) Describe the role of glucagon in the process of regulating blood glucose levels in the horses.

4 marks



it ~~releases~~ increase sugar levels in the horse ^{bloodstream} when it is too low. The advantage of this is that it can provide ~~some~~ ^{some} energy for the horse. The disadvantage of this is that if insulin is not present in sufficient amounts it could eventually lead to diabetes.

Poor response: Command verb 'describe' has not been understood and a weak description has been provided. The answer has looked at the advantages and disadvantages- this was not part of the question. Student has highlighted certain parts of the question to support the answer- this is a great technique that should be encouraged.

Poor response: A weak response not answering the question so no marks were awarded. Command verbs need to be revisited to ensure all students are aware of what they are being asked. The detail provided is basic and not at the level required. This topic needs to be revisited with checking knowledge prior to exams. The answer should have been specific and used terminology demonstrating clear understanding for how glucagon is secreted, stored and travels through the blood.

TIPS!



Encourage the use of specific information/terminology.



Use the marks allocated per question as a guide to how many points should be made reference to.



Specific revision needed to provide the confidence to enable a good, strong answer.



It is good practice to pick out points in the question as seen in this example and this should be encouraged in all students. It will help them to formulate a good answer by understanding what the question is asking them.



Further specific revision is needed in this area with testing knowledge leading up to exam period.

Question 5 c): Explain how the cells, circulatory and respiratory systems work together to adapt to this change in energy requirement.

[Total marks for Q5c - 8 marks]

(c) Explain how the cells, circulatory and respiratory systems work together to adapt to this change in energy requirement.

8 marks

The more energy that is used required more cellular respiration. Cells require more oxygen and glucose. Mitochondria make ATP for more energy which requires more oxygen and glucose for aerobic respiration. Carbon dioxide is removed from tissues by blood, this would cause the blood to be acidic, in turn this would cause damage. Blood carries oxygen and glucose around the body and to respiring tissues. This requires the heart to pump faster to reach respiring tissues. Oxygen and carbon dioxide are exchanged in the lungs. An increase the respiratory rate to exchange more oxygen and carbon dioxide faster.

7

The command verb used in this question is 'explain' which is defined as the student showing understanding of the functions and objectives of a subject. They need to give reason to support an opinion with clear details.

Good response: This answer provides a detailed explanation. The answer is strong as a result of fully understanding the command verb and knowledge of the subject meeting the expectation of the question.

This question links to AO4 making connections between how animal body systems interact in order to function and adapt.

Good response: A detailed answer that reads well. Answer demonstrates good understanding, in depth knowledge and accuracy. Good application of evidence and link between elements in the context of the question.

Circulatory systems such as the veins and arteries will open up to allow more blood flow in order to take in more oxygen taken in by the respiratory systems & when exercising ~~the~~ the heart body's muscles needs more oxygen so the lungs takes in more rate and frequency of expansion and retraction increases, the heart also beats faster to allow the ^{more} oxygen to be taken in ~~to~~ to the places they're need more urgently and ^{still a} the release of carbon dioxide through the lung out of the body. When resting less energy is ^{needed} ~~used~~ so heart rate respiration ^{rate} decline ~~to~~ to reduce wastage of energy.

Poor response: This answer provides a brief explanation and description. The answer is weak as a result of not fully understanding the command verb and crosses over into description which fails to meet the expectation of the question. The answer is weak as a result of not fully understanding the question and lacking in knowledge.

This question links to AO4 making connections between how animal body systems interact in order to function and adapt.

Poor response: Basic answer lacking in detail and understanding. There has been no attempt to link the question with the answer. Limited knowledge and understanding has restricted this answer to develop further. To make this a stronger answer the student needed to demonstrate accurate knowledge and understanding supported through application of evidence and link between elements in the context of the question.



Knowledge needs to be more accurate and specific- this will come with detailed revision



Long answers need to link back to the question and ensure clear points are being made



Be clear on the command verb as this will help to format the answer



Plan your answer by doing a brief mind map at the beginning to help with the structure.

Question 5 d i): Explain what happens to haemoglobin at the lungs and at respiring tissues. 1) At the lungs. [Total marks for Q5d i - 2 marks]

(d) Explain what happens to haemoglobin at the lungs and at respiring tissues.

(i) At the lungs.

2 marks

Haemoglobin carrying its maximum load of 4 oxygen molecules so is now oxyhaemoglobin. Haemoglobin becomes oxygenated at the lungs.

2

The command verb used in this question is 'explain' which is defined as the student showing understanding of the functions and objectives of a subject. They need to give reason to support an opinion with clear details.

Good response: This answer has explained that haemoglobin becomes oxygenated at the lungs and how haemoglobin becomes oxyhaemoglobin.

This question links to AO2 the understanding of the role of cells and tissues.

Good response: A good answer provided with good use of terminology and key words.

(i) At the lungs.

2 marks

Haemoglobin is what red blood cells connect onto to be transported in the blood. At the lungs the haemoglobin will attach the red blood cells so that it can take oxygen around the body.

0

Poor response: This answer has explained what they believe is haemoglobin and what happens to haemoglobin.

Poor response: This is a weak answer showing little understanding and depth of knowledge. To make this a stronger answer the student needed to make reference to haemoglobin carrying its maximum load of 4 oxygen molecules so is now oxyhaemoglobin. Also, reference needs to be made to the saturation of oxygen and haemoglobin.

TIPS!



Use the marks as a guidance as to how detailed the answer should be.



Use key words/terminology to support your answer and demonstrate your knowledge and understanding.

Question 5 d i): Explain what happens to haemoglobin at the lungs and at respiring tissues. I) at the lungs. [Total marks for Q5d i - 2 marks]

(ii) At respiring tissues.

2 marks

Oxygen will be replaced by carbon dioxide as it reaches the respiring cell. There is lower partial pressure of oxygen and so oxyhaemoglobin releases oxygen.

2

The command verb used in this question is 'explain' which is defined as the student showing understanding of the functions and objectives of a subject. They need to give reason to support an opinion with clear details.

Good response: The answer explains that oxygen will be replaced by carbon dioxide as it reaches the respiring cell and there is lower partial pressure of oxygen and so oxyhaemoglobin releases oxygen.

This question links to AO2 the understanding of the role of cells and tissues.

Good response: A good answer provided with a good attempt to use terminology and key words.

(ii) At respiring tissues.

2 marks

~~This is~~ Haemoglobin will prepare for gaseous exchange to take place and to collect oxygen here.

0

Poor response: The answer explains that haemoglobin will prepare for gaseous exchange to take place- not answered the question.

Poor response: Weak answer provided suggesting lack of knowledge and understanding. Some attempt to use key terminology but lacking the link back to the question. To make this a stronger answer the student needed to make reference to lower partial pressure of oxygen and so oxyhaemoglobin releases oxygen.

TIPS!



Use the marks that each question is worth to ensure full attempt has been made for each question.



Further understanding is needed so taught sessions and in depth questioning would be beneficial.

Question 6 a i): Give the name of the type of conduction that takes place along a myelinated neurone. [Total marks for Q6a i - 1 mark]

(a) (i) Give the name of the type of conduction that takes place along a myelinated neurone.

1 mark

Saltatory.

1

The command verb in this question is 'give' which is defined as students providing one or more pieces of information.

Good response: The answer given is correct.

This question links to AO2 the understanding of the structure and function of animal body systems.

Good response: Correct answer provided so awarded the full mark.

(a) (i) Give the name of the type of conduction that takes place along a myelinated neurone.

1 mark

Synapse

0

Poor response: The answer given is synapse which is incorrect.

Poor response: Incorrect answer provided. In order to achieve the full mark the answer should be 'saltatory'.



All papers provided for this question achieved no marks. This suggests that this an area of weakness and needs to be taught more in depth and provided clearer explanation. Checking learning and practice exam questions to support this would recommended.

Question 6 a ii): Explain why there is a difference in the speed of transmission of an impulse along myelinated and unmyelinated neurones.

[Total marks for Q6a ii - 4 marks]

(ii) Explain why there is a difference in the speed of transmission of an impulse along myelinated and unmyelinated neurones.

4 marks

Myelin acts as an electrical insulator. Action potentials can only form at nodes (of Ranvier) in myelinated neurones. They do not have to travel the length of axon as they can jump from node to node. Action potentials are formed along the whole length of an axon in an unmyelinated neurone in a wave of depolarisation, therefore the speed of transmission is faster in a myelinated neurone than an unmyelinated neurone.

4

The command verb used in this question is 'explain' which is defined as the student showing understanding of the functions and objectives of a subject. They need to give reason to support an opinion with clear details.

Good response: The answer has explained the process in detail and that a myelinated neurone will be conducted allowing for quicker transmission.

This answer links to AO2 demonstrate the understating of the function and structure of animal body systems and the role of cells and tissues.

Good response: A detailed answer being awarded four marks. Answer demonstrates a detailed understanding of the subject and question.

A myelinated neurone is insulated meaning that the impulse will be warmer which results in the speed of transmission of the impulse faster than of an unmyelinated neurone.

1

Poor response: The answer has explained that a myelinated neurone will be conducted allowing for quicker transmission than an unmyelinated sheath.

This answer links to AO2 demonstrate the understating of the function and structure of animal body systems and the role of cells and tissues.

Poor response: A brief answer and lacking in detail and knowledge. This needed to have made more points as suggested by the four marks that could have been awarded. A clear answer that was accurate provided, but needed to have further depth to have a chance of gaining more marks. In order to be awarded the full four marks for this question further detail is required using specific terminology how the myelin acts and how the speed of transmission is faster.



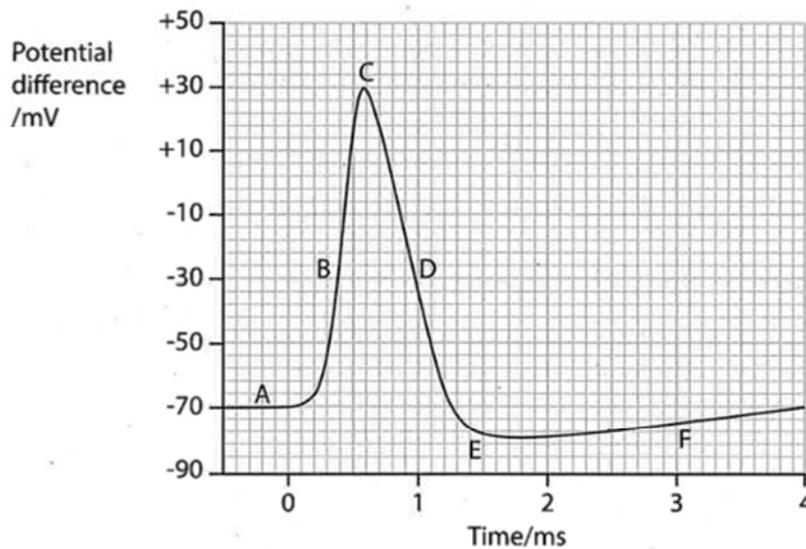
Use marks per question to guide how in depth the answer should be and many points the answer should.

Question 6 b i) Explain how the changes in potential difference are caused by changes in the membrane of neurone during stages B and D.

i) B

[Total marks for Q6b i - 3 marks]

The graph below shows the change in potential difference across the cell membrane as an action potential passes along a neurone.



(b) Explain how the changes in potential difference are caused by changes in the membrane of the neuron during stages B and D.

(i) B

3 marks

large increase in pd from 0-0.6ms. 0-0.6s potential difference.
changes from -70 to +30mv. increases by 100mv
rate of change is +166.67mv/ms. More voltage gated Na^+ channels open and a large influx of Na^+ , therefore membrane becomes depolarised.

3

The command verb used in this question is 'explain' which is defined as the student showing understanding of the functions and objectives of a subject. They need to give reason to support an opinion with clear details.

Good response: A good attempt at using the command verb 'explain' with good understanding of what the question is asking.

This question links to AO2 the understanding of adaptations and disorders relating to body systems.

Good response: A strong answer given demonstrating knowledge and understanding. Good demonstration of reading and interpreting the graph.

(b) Explain how the changes in potential difference are caused by changes in the membrane of the neuron during stages **B** and **D**.

(i) B

3 marks

~~The~~ Stage B is when the impulse will have first travelled through the membrane. Stage D will be when the impulses would have travelled out of the membrane.

Poor response: A reasonable attempt at using the command verb 'explain' although weak answer. Lack of understanding of the question is asking.

Poor response: A weak answer given not answering the question. Lack of knowledge and understanding. To make this a strong answer the graph needed to have been read and commented upon, explaining why it may have increased/decreased.

The answers provided for this question are similar and lacking the knowledge and depth required to gain a mark. Skills in reading and understanding graphs are needed. Changes in the membrane of the neurone needed to have been commented upon to make this a stronger answer



Reading from graphs is essential preparation for exams. Use practice exam questions and get the student to refer back to the graph when giving an answer demonstrating understanding of the question and knowledge of reading a graph.

Question 6 b ii) D

[Total marks for Q6b ii - 3 marks]

(ii) D

3 marks

Large (0.6-1.5ms) decreases in pd from 0.6 - 1.5ms, 0.6-1.5ms decreases from +30 to -80mV, decreases by 110mV. Rate of change is -122.22mV/ms because voltage-gated K^+ channels open therefore membrane repolarises.

3

The command verb used in this question is 'explain' which is defined as the student showing understanding of the functions and objectives of a subject. They need to give reason to support an opinion with clear details.

Good response: A great attempt at using the command verb 'explain' and a detailed answer provided, clearly understanding what the question is asking, demonstrating in depth knowledge on the subject and also the reading and interpreting of graphs.

This question links to AO2 the understanding of adaptations and disorders relating to body systems.

A detailed answer given answering the question. In depth knowledge and understanding.

Good response: The answer refers back to the graph and the question in order to provide the depth needed to be awarded the full marks.

The potential difference begins to decrease back to its average level as the impulse has synapsed from one neurone to another thus reducing the speed which it built to go synapse to carry on along the neurone.

0

Poor response: A reasonable attempt at using the command verb 'explain' although weak answer. Lack of understanding of the question is asking.

Poor response: A weak answer given not answering the question. Lack of knowledge and understanding. To make this a strong answer the graph needed to have been read and commented upon, explaining why it may have increased/decreased.

A weak answer achieving zero marks. The answer needed to refer back to the graph and the question in order to provide the depth needed to be awarded marks. The answer needed to explain how the membrane repolarised using the facts in the graph.

Answers provided for this question were similar and lacked depth and understanding. The answers didn't refer back to the question or use the information in the graphs. Changes in the membrane of the neurone needed to have been commented upon to make this a stronger answer.

TIPS!



Practice graph exam questions using the question and information provided in the graph to provide an in depth answer and also to demonstrate knowledge of being able to read and extract information from a graph.



Use the marks per question as a guide as to how much detail is needed.

Question 7 Discuss the ways in which endotherms maintain normal body temperature even when changes to the external temperature occur.

[Total marks for Q7- 8 marks]

- 7 A zookeeper is setting up enclosures that mimic the natural environments of birds and mammals. Natural habitat temperatures can change throughout each day and each season.

Discuss the ways in which endotherms maintain normal body temperatures even when changes to the external temperature occur.

~~Endotherms~~ Endotherms maintain body temperature in many different ways. Seasonal plumage changes in birds, coat growth changes in mammals, blubber or other adaptations to hot/cold environment control via negative feedback to heat loss and heat gain centres in hypothalamus.

◦ Heat loss mechanisms: Evaporative cooling and flattening of feathers or hairs via pili erector muscles. There will be behavioural mechanisms such as moving into shade, submerging in water, posture or position changes in relation to the sun. Vasodilation of arterioles next to skin and countercurrent heat loss seen in some animal/birds. Heat exchange in limbs of some animals and birds and decreased blood flow. There will be an increased metabolic rate due to shivering.

◦ Heat gain mechanisms: A reduction of evaporative cooling mechanisms and erection of feathers or hairs via pili erector muscles. Behavioural mechanisms such as moving into sunlight, posture or position changes in relation to the sun or huddling will

Total for Question 7 = 8 marks

END OF EXAM

TOTAL FOR PAPER = 80 MARKS

happen. Vasoconstriction of arterioles next to skin and countercurrent heat again.

7

The command verb used for this question is 'discuss' defined as students considering different aspects of a topic, how they interrelate and the extent to which they are important.

Good response: The answer has demonstrated elements of knowledge and understanding with specific statements and links being made. The discussion is detailed and supported through the answer.

This question links to AO3 analyse and evaluate the biological information related to adaptations and disorders affecting the animal body systems.

Good response: Content was good and demonstrated accurate knowledge and understanding with some structure to the response. The answer demonstrated understanding and knowledge referring back to the question.

Used key terminology vasoconstriction and vasodilation to support discussion. Discussion is well developed, with links that are clear and concise. The discussion is well developed and logical, applying knowledge. Using relevant evidence from context.

Discuss the ways in which endotherms maintain normal body temperatures even when changes to the external temperature occur.

Endotherms ^(like a mouse) are warm blooded animals. In cold temperatures an endotherm can ^{flatter} change the down their fur to ensure their heat is retained and animals such as rabbits can huddle to share ^{their} body heat. In hot temperatures some animals can sweat to cool down their bodies and dogs will pants to release heat. Kangaroos will coat themselves in their own saliva to remain cool even in extremely hot temperatures, the disadvantage of this is that they can lose a ~~to~~ lot of moisture in doing so (risking dehydration). ~~are another~~

2

Poor response: The answer has demonstrated isolated elements of knowledge and understanding with generic statements rather than links being made. The discussion is superficial and not supported through the answer.

Poor response: Lack of knowledge to go in to any depth. To make this a stronger answer it needed to have discussed heat loss and heat gain mechanisms using key word and terminology such as vasodilation, countercurrent, vasoconstriction and hypothalamus. The answer needed to demonstrate accurate understanding and knowledge with some structure to the response. Links need to be provided throughout with evidence supporting. Discussion needs to be developed further.

The answer needs to refer back to the question to ensure all aspects are covered.



Lacking depth of knowledge so taught sessions and revision session would be beneficial.



The student highlighted bits of the question which I think is good practice and should be encouraged, however, there is lack of referring back to the question within the answer which has lost marks.



Practice answering eight marks questions would be beneficial, using a plan at the beginning of the question to support the answer.

Unit 2: Animal Biology - Sample mark scheme

General Marking Guidance

- All learners must receive the same treatment. Examiners must mark the first learner in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Learners must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the learner's response is not worthy of credit according to the mark scheme.
- Where some judgment is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a learner's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the learner has replaced it with an alternative response.

Specific Marking Guidance for Levels Based Mark Schemes*

Levels based mark schemes (LBMS) have been designed to assess learner work holistically. They consist of two parts: indicative content, and levels based descriptors. Indicative content reflects specific content-related points that a learner might make. Levels based descriptors articulate the skills that a learner is likely to demonstrate in relation to the Assessment Outcomes being targeted by the question. Different rows within the levels represent the progression of these skills.

When using a levels-based mark scheme, the 'best fit' approach should be used.

- Examiners should first make a holistic judgement on which band most closely matches the learner response and place it within that band. Learners will be placed in the band that best describes their answer.
- The mark awarded within the band will be decided based on the quality of the answer in response to the assessment focus/outcome and will be modified according to how securely all bullet points are displayed at that band.
- Marks will be awarded towards the top or bottom of that band depending on how they have evidenced each of the descriptor bullet points.

| Question | Answer | Mark |
|------------------|---|-------------------|
| 1 (a) (i) | <p>Award 1 mark for each grouping level identified correctly:</p> <ul style="list-style-type: none"> • Class (1) • Genus (1) <p>Answers must be given in the correct order.</p> | 2x1 (2) |
| 1(a) (ii) | <p>Award up to 2 marks for a definition that makes reference to:</p> <ul style="list-style-type: none"> • a group of biologically similar individuals (1) • able to produce fertile offspring (1) | (2) |
| 1 (b) | <p>Award up to 3 marks for an explanation that makes reference to:</p> <ul style="list-style-type: none"> • First indicates Genus, second indicates species (1) • Common names could lead to confusion (1) • whereas binomial name is specific / No two species share the same binomial name (1) | (3) |
| 2 (a) | <p>Award 1 mark for each bone identified correctly:</p> <p>A. Scapula (1)</p> <p>B. Femur (1)</p> | 2x1 (2) |
| 2 (b) | <p>Award up to 2 marks for each explanation referring to the following adaptations:</p> <ul style="list-style-type: none"> • long limbs (1) for increased stride length (1) • reduced digits (1) so increased stability (1) • angular hind limbs (1) allow increased propulsion (1) • flexible spine (1) increases agility (1) • lack of clavicle (1) increased flexibility of forelimbs (1) | (4) |
| 2 (c) (i) | <p>Award 1 mark for the identification of a correct cause</p> <p>Any one from:</p> <ul style="list-style-type: none"> • Inherited condition (1) • Muscles, tendons and ligaments are lax (subluxation) (1) • Increased wear and tear on femur (1) | (1) |

| Question | Answer | Mark |
|-------------------|---|-------------------|
| 2 (c) (ii) | Award 1 mark for the identification of a correct symptom Any one from: <ul style="list-style-type: none"> • Stiffness (1) • Pain in hip region (1) • Unwillingness to exercise (1) • Limping / Altered gait / bunny-hopping whilst running (1) | (1) |
| Question | Answer | Mark |
| 2 (d) | Award up to 3 marks for an explanation that makes reference to: <ul style="list-style-type: none"> • (Tapetum lucidum is) layer of extra tissue behind retina (1) • Reflects light back through retina (1) • Therefore increases light for photoreceptors (1) | (3) |
| Question | Answer | Mark |
| 3 (a) | Award 1 mark for each structure identified correctly: A. Uterus (1) B. Oviduct/fallopian tube (1) | 2x1 (2) |
| Question | Answer | Mark |
| 3 (b) | <ul style="list-style-type: none"> • (ciliated) epithelial (tissue) (1) Accept epithelium | (1) |
| Question | Answer | Mark |
| 3 (c) | <ul style="list-style-type: none"> • 31 days/one month (1) Accept any stated length between 28 and 31 days | (1) |
| Question | Answer | Mark |
| 3 (d) (i) | Award up to 2 marks for a description that makes reference to: <ul style="list-style-type: none"> • Progesterone decreases/levels are lower (1) • Labour begins (1) | (2) |
| Question | Answer | Mark |
| 3 (d) (ii) | Award up to 2 marks for a description that makes reference to: <ul style="list-style-type: none"> • Oxytocin increases/levels are higher(1) • Uterine contractions begin/foetuses are expelled rapidly (1) | (2) |

| Question | Answer | Mark | | | | | | | | | | | | | | | |
|-----------------------------|--|-----------------------------|----------|--|-----------|--|-----|--------|--|-----|----------|---------------------|-----|-------|----------------------------|-----|-----|
| 3 (e) | <ul style="list-style-type: none"> • Golgi apparatus (1) • Accept Golgi complex / Golgi body | (1) | | | | | | | | | | | | | | | |
| Question | Answer | Mark | | | | | | | | | | | | | | | |
| 3 (f) | <p>Award up to 3 marks for a description that makes reference to:</p> <ul style="list-style-type: none"> • Hormone is contained within a vesicle (1) • Vesicle fuses with plasma membrane (1) • thus releasing contents to the outside OWTTE (1) • Energy / ATP is required (1) | (3) | | | | | | | | | | | | | | | |
| Question | Answer | Mark | | | | | | | | | | | | | | | |
| 4 (a) | <table border="1"> <thead> <tr> <th>Name of stomach compartment</th> <th>Function</th> <th></th> </tr> </thead> <tbody> <tr> <td>Reticulum</td> <td>acts as a filter to remove large objects</td> <td>(1)</td> </tr> <tr> <td>Omasum</td> <td>absorbs some water / reduces particle size</td> <td>(1)</td> </tr> <tr> <td>Abomasum</td> <td>Contains enzymes...</td> <td>(1)</td> </tr> <tr> <td>Rumen</td> <td>Contains microorganisms...</td> <td>(1)</td> </tr> </tbody> </table> <p>OWTTE for functions</p> <p>One mark for each correct row</p> <p>Accept named VFA (acetic, butyric or propionic acid)</p> <p style="text-align: right;">4x1</p> | Name of stomach compartment | Function | | Reticulum | acts as a filter to remove large objects | (1) | Omasum | absorbs some water / reduces particle size | (1) | Abomasum | Contains enzymes... | (1) | Rumen | Contains microorganisms... | (1) | (4) |
| Name of stomach compartment | Function | | | | | | | | | | | | | | | | |
| Reticulum | acts as a filter to remove large objects | (1) | | | | | | | | | | | | | | | |
| Omasum | absorbs some water / reduces particle size | (1) | | | | | | | | | | | | | | | |
| Abomasum | Contains enzymes... | (1) | | | | | | | | | | | | | | | |
| Rumen | Contains microorganisms... | (1) | | | | | | | | | | | | | | | |
| Question | Answer | Mark | | | | | | | | | | | | | | | |
| 4 (b) | <ul style="list-style-type: none"> • Smooth (1) | (1) | | | | | | | | | | | | | | | |
| Question | Answer | Mark | | | | | | | | | | | | | | | |
| 4 (c) | <p>Award up to 2 marks for a description that makes reference to:</p> <ul style="list-style-type: none"> • Mitochondria form ATP (1) • A lot of ATP is needed for muscles to carry out work (1) <p>Accept adenosine triphosphate for ATP</p> <p>Reject adenosine diphosphate / ADP unless in a description of ATP formation</p> | (2) | | | | | | | | | | | | | | | |

| Question | Answer | Mark |
|-------------|--|------|
| 4 (d) | <ul style="list-style-type: none"> • Cells overlap allowing smooth contractions (1) • Muscle uses peristaltic motion / contractions / peristalsis to push food along the alimentary canal (1) | (2) |
| Question | Answer | Mark |
| 4 (e) | <p>Award up to 3 marks for an explanation that makes reference to:</p> <ul style="list-style-type: none"> • The rumen becomes overdistended (1) • Gases are trapped in the rumenoreticulum (1) • Eructation cannot occur because of an obstruction / a stable foam collects on top of the rumen liquid because of diet (e.g. lush pasture/rapidly growing forage) (1) | (3) |
| Question | Answer | Mark |
| 5 (a) (i) | <ul style="list-style-type: none"> • 75 / 75.2 (bpm) (1) <p>Do not accept rounding errors</p> | (1) |
| Question | Answer | Mark |
| 5 (a) (ii) | <ul style="list-style-type: none"> • 108 / 107.8 (1) <p>Do not accept rounding errors</p> | (1) |
| Question | Answer | Mark |
| 5 (a) (iii) | <ul style="list-style-type: none"> • The beats per minute will be increased for trotting horses as they are moving faster and so are using more energy | (1) |
| Question | Answer | Mark |
| 5 (b) | <p>Award up to 4 marks for a description that makes reference to the following:</p> <ul style="list-style-type: none"> • Glucose stored as glycogen in liver/muscles (1) • Glucagon secreted by alpha cells of pancreas (1) • Glucagon travels through blood stream to liver/muscles/target cells (1) • Glucagon binds with target cell membrane (1) • Glycogen is converted to glucose (1) • Glucose is released into blood stream (1) <p>Ignore references to insulin</p> <p>Glucose, glucagon and glycogen must be spelt correctly and used in context</p> <p>Accept liver/muscle cell membrane</p> | (4) |

| Question Number | Indicative content |
|-----------------|--|
| 5 (c) | <p>Answers will be credited according to the learner's demonstration of knowledge and understanding of the material using the indicative content and levels descriptors below. The indicative content that follows is not prescriptive. Answers may cover some/all of the indicative content but should be rewarded for other relevant answers.</p> <ul style="list-style-type: none"> • More energy used = more cellular <u>respiration</u> needed • Cells require more <u>oxygen</u> and <u>glucose</u> • <u>Mitochondria</u> make ATP for more energy • <u>Mitochondria</u> require more oxygen and glucose for <u>aerobic</u> respiration • <u>Carbon dioxide</u> removed from tissues by blood • Build-up of carbon dioxide would cause blood to be acidic/cause damage • Blood carries oxygen and glucose around body / to respiring tissues • Heart needs to pump faster to reach respiring tissues • Oxygen and carbon dioxide are exchanged at the lungs • Increase in respiratory rate to exchange more oxygen and carbon dioxide faster |

Mark scheme (Award up to 8 marks) Refer to the guidance on the cover of this document for how to apply Levels Based Mark Schemes*.

| Level | Mark | Descriptor |
|---------|------|---|
| Level 0 | 0 | No rewardable material |
| Level 1 | 1-2 | <p>Demonstrates isolated elements of knowledge and understanding. Generic statements may be presented rather than linkages being made.</p> <p>Lines of reasoning are unsupported.</p> |
| Level 2 | 3-5 | <p>Demonstrates mostly accurate knowledge and understanding. Answer evidences occasional linkages between the elements in the context of the question.</p> <p>Lines of reasoning occasionally supported through the application of relevant evidence.</p> |
| Level 3 | 6-8 | <p>Demonstrates accurate and thorough knowledge and understanding. Answer evidences comprehensive linkages between the elements in the context of the question.</p> <p>Lines of reasoning supported throughout by sustained application of relevant evidence.</p> |

| Question | Answer | Mark |
|------------|---|------|
| 5 (d) (i) | <p>Award up to 2 marks for an explanation that makes reference to:</p> <p>At the lungs:</p> <ul style="list-style-type: none"> • Higher partial pressure of oxygen and so haemoglobin becomes saturated with oxygen (1) • Therefore haemoglobin carrying its maximum load of four oxygen molecules is now <u>oxyhaemoglobin</u> (1) | (2) |
| 5 (d) (ii) | <p>Award up to 2 marks for an explanation that make reference to:</p> <p>At respiring tissues:</p> <ul style="list-style-type: none"> • Lower partial pressure of oxygen and so oxyhaemoglobin releases oxygen (1) • Therefore haemoglobin is reformed (1) | (2) |
| 6 (a) (i) | <ul style="list-style-type: none"> • Saltatory | (1) |
| 6 (a) (ii) | <p>Award up to 4 marks for an explanation that makes reference to:</p> <ul style="list-style-type: none"> • Myelin acts as an electrical <u>insulator</u> / action potentials can only form <u>at nodes</u> (of Ranvier) in myelinated neurones (1) • Action potentials do not have to travel whole length of axon / action potentials jump from node to node (1) • Action potentials are formed along the whole length of an axon in an unmyelinated neurone in a wave of <u>depolarisation</u> (1) • Therefore the speed of transmission is faster in a myelinated neurone than an unmyelinated neurone (1) | (4) |
| 6 (b) (i) | <p>Award up to 3 marks for an explanation that makes reference to:</p> <p>B:</p> <ul style="list-style-type: none"> • Large increase in pd from 0 – 0.6ms / 0-0.6s potential difference changes from -70 to +30mV / increases by 100mV / Rate of change is +166.67mV/ms (1) • Because more voltage-gated Na⁺ channels open/ large influx of Na⁺ (1) • Therefore membrane becomes depolarised (1) <p>Accept sodium for Na⁺</p> | (3) |

| Question | Answer | Mark |
|------------|--|------------|
| 6 (b) (ii) | <p>Award up to 3 marks for an explanation that makes reference to:</p> <p>D:</p> <ul style="list-style-type: none"> • Large (OWTTE) decrease in pd from 0.6-1.5ms / 0.6-1.5ms decreases from +30 to -80mV / decreases by 110mV / Rate of change is -122.22 mV/ms (1) • Because voltage-gated K⁺ channels open (and voltage-gated Na⁺ channels close) (1) • Therefore membrane repolarises (1) <p>Accept potassium for K⁺</p> | (3) |

| Question Number | Indicative content |
|-----------------|--|
| 7 | <p>Answers will be credited according to the learner's demonstration of knowledge and understanding of the material using the indicative content and levels descriptors below. The indicative content that follows is not prescriptive. Answers may cover some/all of the indicative content but should be rewarded for other relevant answers.</p> <ul style="list-style-type: none"> • Seasonal plumage changes in birds, coat growth changes in mammals, blubber or other adaptations to hot/cold environment • Control via <u>negative feedback</u> to heat loss and heat gain centres in <u>hypothalamus</u> • Heat loss mechanisms: <ul style="list-style-type: none"> ○ <u>Evaporative</u> cooling (<u>gular</u> fluttering and <u>cloacal</u> evaporation in birds, <u>sweating</u> if sweat glands present) ○ Flattening of feathers or hairs via pili erector muscles ○ Behavioural mechanisms such as moving into shade, submerging in water, posture or position changes in relation to the sun ○ <u>Vasodilation</u> of arterioles next to skin ○ <u>Countercurrent</u> heat loss ○ Increased metabolic rate/shivering (rapid contraction and relaxation of muscles) Counter-current heat exchange in limbs of some animals and birds: decreased blood flow. • Heat gain mechanisms: <ul style="list-style-type: none"> ○ Reduction of evaporative cooling mechanisms ○ <u>Erection</u> of feathers or hairs via pili erector muscles ○ Behavioural mechanisms such as moving into sunlight, posture or position changes in relation to the sun or huddling ○ <u>Vasoconstriction</u> of arterioles next to skin ○ <u>Countercurrent</u> heat gain |

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| Level | Mark | Descriptor |
|---------|------|--|
| Level 0 | 0 | No rewardable material |
| Level 1 | 1-2 | <p>Demonstrates isolated elements of knowledge and understanding presented in an unstructured format. Generic statements may be presented rather than linkages being made so that lines of reasoning are unclear.</p> <p>Discussion is superficial rarely supported through the application of relevant evidence from the context</p> |
| Level 2 | 3-5 | <p>Demonstrates mostly accurate knowledge and understanding. There is some structured to the response.</p> <p>Some occasional linkages present so that lines of reasoning are partially supported and mostly clear.</p> <p>Discussion is partially developed occasionally supported through the application of relevant evidence from the context</p> |
| Level 3 | 6-8 | <p>Demonstrates accurate and thorough knowledge and understanding presented in a clear and logical format.</p> <p>Comprehensive linkages evidenced so that lines of reasoning are well supported, clear and concise.</p> <p>Displays a well-developed and logical discussion supported throughout by sustained application of relevant evidence from the context</p> |