

# **BTEC Level 3 National Extended Diploma in Animal Management with Science**



## **Animal Management**

**Sample Marked Learner Work**

**External Assessment- January 2018**

**Unit 2: Animal Biology**

## Question 1a

- 1 (a) The animal skeleton is divided into two main divisions.

Complete the table with the two divisions of the skeletal system.

(2)

## Higher scoring response

| Divisions of skeleton | Components                                 |
|-----------------------|--|
| Apendicular           | Shoulder, pelvis, upper limbs, lower limbs |
| Axial                 | Skull, vertebral column, ribs and sternum. |

*This is a good response which identifies the appropriate divisions of the skeleton i.e. Apendicular and Axial as per A1.2.3 of the specification demonstrating accurate memory recall required to answer this question.*

## Lower scoring response

| Divisions of skeleton | Components                                 |
|-----------------------|--|
| Endoskeletal          | Shoulder, pelvis, upper limbs, lower limbs |
| Axis                  | Skull, vertebral column, ribs and sternum. |

*This response is incorrect through inappropriate words used from being unable to recall the correct terms for these divisions of the skeleton. The word 'axis', although similar to 'axial', is not correct and cannot be awarded a mark and 'endoskeletal' is incorrect.*

**Question 1b**

(b) State **one** adaptation of a rabbit's skeleton that helps the rabbit to hop.

(1)

**Higher scoring response**

It has got elongated back legs which allow it to hop higher / over greater distance.

*This response is good stating one adaptation of a rabbit's skeleton which helps it to hop i.e. 'elongated back legs'. It demonstrates understanding of A1.4.2 in the specification re 'relative limb bone length'.*

**Lower scoring response**

Short limbs provide quick movement to escape predators.

*This response requires expansion to include reference to the 'forelimbs / front legs' to make it accurate and a good response.*

## Question 1c

(c) State **two** musculoskeletal disorders.

(2)

## Higher scoring response

1 Arthritis

2 Hip dysplasia

*This is a good response which states two correct musculoskeletal disorders i.e. Arthritis and Hip Dysplasia as per A1.4.3 of the specification demonstrating accurate memory recall required for this question.*

## Lower scoring response

1 ~~bone breaking~~ disjoints ments

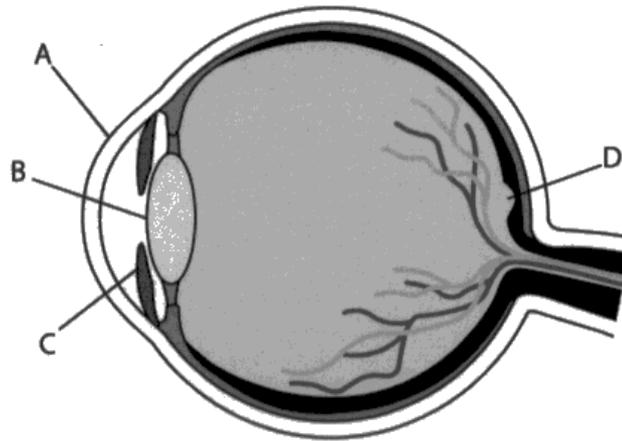
2 an extra vertebrebe

*This response is incorrect as 'disjoints ments' and 'an extra vertebrebe' are not disorders - no memory recall of information demonstrated. There are many disorders which could have been stated e.g. Osteoarthritis, osteochondritis, osteoporosis, metabolic bone disease to make this a good response.*

## Question 2a

2 (a) Name the following parts of the eye.

(4)



## Higher scoring response

A Cornea

B Lens

C Iris

D Fovea

*This is a good, accurate response which names the correct parts of the eye labelled in the diagram using memory recall from A3.4 in the specification i.e. Cornea, Lens, Iris and Fovea.*

## Lower scoring response

A

B pupil

C retina lens

D retina

*This response has a missing answer for A and incorrect answers. For B, C and D i.e. 'pupil, lens and retina' demonstrating inability to recall information from A 3.4 in the specification.*

## Question 2b

(b) Explain **one** function of the retina.

(2)

## Higher scoring response

The retina is where all of the rod and cone cells are, They pick up light and colour and send the impulses to the optic nerve, which then goes to the brain.

*This response is a good explanation of one function of the retina i.e. identifying 'rods and cones' (photoreceptors) in the retina and explaining their function as per A3.3 in the specification.*

## Lower scoring response

~~Reflects the image~~ It reflects the image and sends information to the brain about the environment.

*This response is inaccurate, it does not identify part of the retina and explain the function as per the requirement of the question. Including 'absorbs light' and 'sends messages to the optic nerve' would have achieved 2 marks for this question.*

## Question 2c

- (c) Explain **two** ways that the nervous system controls the action of the eye to enable effective sight.

(4)

## Higher scoring response

- 1 The nervous system can ~~control the lens to~~ change the shape of the lens so ~~that~~ that the image being seen is in focus
- 2 The nervous system can make the pupil increase or decrease in size to control how much light enters the eye depending on how bright it is during the day. If it's bright the pupils increase in size and the ~~opposite~~

This response identifies and explains two ways the nervous system controls the action of the eye to enable effective sight i.e. 'change the shape of the lens' 'image in focus' and 'makes the pupil increase or decrease' 'to control how much light enters'.

Demonstration of understanding of A3.2 in the specification to be awarded 4 marks – one for each identification and one for each expansion to explain.

## Lower scoring response

- 1 By connecting the eye signals to the brain via light synapses.
- 2 sends signals to the eye about light frequency and ~~there~~

This response does not accurately identify or explain two ways the nervous system controls the action of the eye to enable effective sight i.e. 'eye signals to the brain' and 'signals to the eye about light frequency' are inappropriate answers. In order to make this a good response 'controls the eye muscles in order to change the direction of vision' plus 'dilation/contraction of the pupil to adapt to different light levels' could have been included in order to achieve 4 marks for this question

## Question 2d

(d) Explain **one** advantage of eye positioning in sheep.

(3)

## Higher scoring response

sheep have binocular vision as the eyes are on the side of their heads, this allows them to see far round behind them. This helps sheep spot oncoming predators.

*This is a good response fully explaining one advantage of eye positioning in sheep as per A3.7 in the specification i.e. 'binocular vision', 'eyes on side of head' and 'to spot oncoming predators'.*

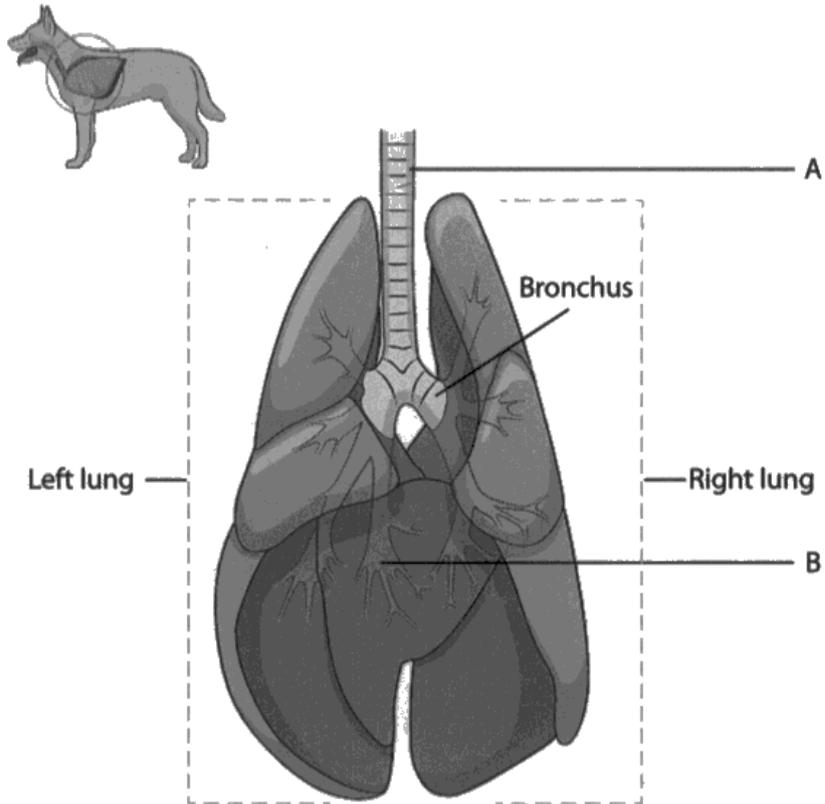
## Lower scoring response

The advantage of eye position in sheep, is that the eye is deeper into its skull, this allows more protection from predators, as its harder to get to

*This response does not accurately explain the advantage of eye positioning in the sheep i.e. 'the eye is deeper into its skull' and 'this allows more protection from predators' are incorrect. In order for this to have been a good response an explanation of the advantage of 'eyes are on the side of the head' would need 'allowing a wide angle of vision' and 'for early detection of predators' to have been included.*

## Question 3a

3 Below is a diagram of the lungs of a dog.



(a) Name the structures A and B.

(2)

Higher scoring response

A Trachea

B Bronchioles

*This is a good accurate response correctly naming the two structures in the lungs from memory recall of A4.7 in the specification i.e. Trachea and bronchioles.*

**Lower scoring response**

A ..... Bronchius .....

B ..... bronchi .....

This response includes incorrect names given for the structures in the lungs i.e. 'bronchius' and 'bronchi'. Accurate memory recall of the structure of the lungs of a mammal from A4.7 in the specification would have allowed correct names to be included.

**Question 3b**

(b) Describe the role of the diaphragm.

(4)

**Higher scoring response**

The diaphragm is contracted when breathing in, this allows for more air to enter the lungs as they have more space available when the diaphragm is pulled down. When exhaling the diaphragm returns to its normal resting state so the air is pushed up out of the lungs as there is not as much room available until the next inhalation.

*This response is a good description of the role of the diaphragm demonstrating understanding from A4.8 in the specification. The description includes the diaphragm being 'contracted /pulled down when breathing in' and 'exhalation when the diaphragm reduces the space available' and 'air is pushed out'.*

**Lower scoring response**

Your diaphragm is there to protect all of your vital organs and to keep them from moving about so the body isn't affected.

*This response does not answer the question re 'describe the role of The diaphragm' and the information is inaccurate. In order to be a good response 'diaphragm contracting to increase chest volume' and 'diaphragm relaxing to decrease chest volume' should be discussed.*

## Question 3c

When dogs exercise, their respiratory rate and volume increases.

(c) Describe how respiratory rate and volume are controlled.

(4)

## Higher scoring response

One way is the Bohr effect where the body has to make up for high rates of carbon dioxide which produces carbonic acid so ~~the~~ haemoglobin comes to deliver more oxygen. Another way is through respiration: anaerobic and aerobic. If the dog wants a burst of energy it uses anaerobic. If the dog is going for a long time it's with aerobic respiration.

*This response is a description which includes some accurate points re the 'Bohr Effect' and 'high rates of carbon dioxide' controlling respiratory rate and volume, although a more accurate description of this process should have included 'to increase respiration'. 'Anaerobic respiration' has been mentioned but there is no description of 'increasing respiration' for a full description to gain full awardable marks. This question requires a complete understanding of the concept from A4.9 in the specification.*

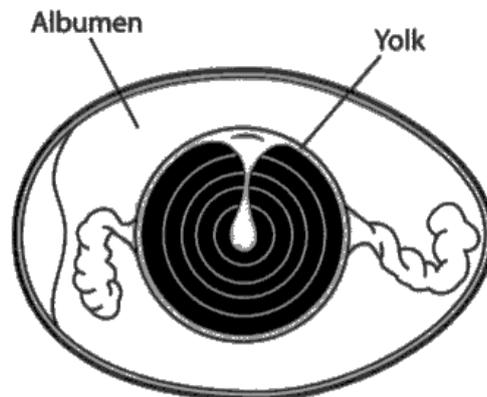
## Lower scoring response

They are controlled by the lungs. They push the air in and out the lungs ~~that~~

*This response mentions 'controlled by lungs' when a more complete answer would require a description of 'receptors in the lung walls controlling tidal volume' and 'signals from the brain stimulating contraction in the diaphragm / intercostal muscles' to make this a good response.*

## Question 4a

4 Below is an image of a cross section of a chicken egg.



(a) Explain the role of the **two** structures identified in the diagram.

(4)

## Higher scoring response

## Yolk

As a chick develops, it is attached to the yolk and it is used as a food and nutrient source for the developing chick. It allows the chick to develop fully and gives it the strength to get out of the egg once it is ready.

## Albumen

This provides structure to the internal part of the egg. It helps keep everything in the correct shape and space. It also allows the formation of the shell to form around it to help the albumen in protection if the egg was fertilised (helps protect the chick).

*This response is detailed and fully identifies then explains the role of the two structures in the diagram i.e. the yolk providing a food source for the developing embryo and the albumen providing structure to support the growth of embryo. This demonstrates an understanding from A5.2.4 in the specification.*

**Lower scoring response****Yolk**

To be fertilised through incubation.

**Albumen**

To protect the yolk from bacteria &  
hold the yolk in place.

*This response is incorrect re the 'Yolk' i.e. 'fertilised through incubation' and correct re the 'Albumen' i.e. 'to protect the yolk and hold it in place'. In order to be fully accurate and gain 4 marks an explanation re 'provides a food source for the developing embryo' should be included in the answer for 'Yolk'.*

**Question 4b****(b) Describe how photoperiod affects egg production in chickens.****(2)****Higher scoring response**

Chickens need a certain amount of sunlight every day in order for egg production to work and be effective. If there are not enough daylight hours or if the chicken doesn't get enough sunlight, egg production will slow down or stop.

*This response provides an accurate description of how photoperiod affects egg production in chickens through 'not enough daylight hours slows down egg production'. The understanding is from 'the effect of photoperiod' - A5.2.2 in the specification*

**Lower scoring response**

The photoperiod can effect when a chickens eggs can be fertilised. if you try to early or late in the photoperiod the eggs may not be fertilised at all.

*This response is incorrect demonstrating that the term photoperiod has not been understood i.e. 'the photoperiod can effect when chickens eggs can be fertilised' In order to make this a good response a description including 'increased daylight leads to increased egg production' or 'increased hormone production stimulates egg release' is recommended.*

## Question 5a

5 (a) Explain **two** reasons why carbohydrates are important in the diet of an animal.

(4)

## Higher scoring response

1 Carbohydrates can be a source of energy for most animals (e.g. horses, cattle) as carbohydrates contain sugars for slow releasing and fast releasing energy.

2 Also too much carbohydrates can be turned into fat. This is good in the colder months (winters) as there is less food on the ground, so by having fat allows it to be converted into energy, or heat for the animal, allowing them to survive the winter months.

*This response accurately explains two reasons why carbohydrates are important in an animal's diet through identifying 'energy' and 'slow release / fast release' plus 'excess stored as fat' and 'heat/energy source' where marks would be awarded. This answer demonstrates an understanding of A2.1 in the Specification.*

## Lower scoring response

1 To supply the body with the correct nutrients needed to function.

2 To maintain glucose levels within the body.

*This response does not accurately explain two reasons why carbohydrates are important in an animal's diet i.e. 'to supply the correct nutrients needed to function' and 'to maintain glucose levels' are not specific enough to be awarded marks. In order to be a good response the first reason would require an explanation re supplying energy essential for brain and muscle movement. The second reason should explain how carbohydrates provide glucose for immediate energy use /short term energy store.*

## Question 5b

(b) Explain **two** functions of the liver.

(4)

## Higher scoring response

- 1 The liver is the filter for blood as the blood passes by the liver it ~~removes~~ filters out any poisons from the blood e.g. excess glucose.
- 2 The liver creates urea, which is excess protein from the animals diet, ~~and~~ which is stored into the kidneys as urine. This is one of the main parts of the excretion system.

This response identifies two functions and explains one i.e. 'the liver filters blood' is one function which should have been explained as 'to remove toxins and protect kidney function' for two marks. The other function re 'urea' is correct although the explanation could have been expanded to include 'urea is converted from ammonia in the liver' to achieve a further mark. This understanding is from A2.4 in the specification.

## Lower scoring response

- 1 The liver creates proteins which play a role in allowing the blood to clot.
- 2 liver also digests drugs and medication, occurs in bile production.

This response does not correctly explain two functions of the liver i.e. 'the liver creates proteins to allow blood to clot' and 'digests drugs and medication' are incorrect. 'Bile production' needs to be a clear function with an explanation for two marks to be awarded. In order to be a good response it should have explained 'production of bile to emulsify fats' and 'involved in the regulation of blood sugar by storing / releasing glucose'.

## Question 5c

(c) Discuss how blood sugar levels are maintained in animals.

(8)

## Higher scoring response

In the pancreas, the islets of Langerhans contain alpha cells and beta cells.

When blood glucose concentration is high, beta cells secrete the hormone insulin. Insulin encourages the uptake of glucose by cells plus also attaches to receptors on muscle and liver cells, increasing uptake of glucose + triggering glycogenesis, converting glucose into glycogen.

When blood glucose concentration is <sup>too</sup> low, alpha cells secrete the hormone glucagon, which binds to muscle and liver cells and triggers the processes of glycogenolysis and gluconeogenesis, converting glycogen back into glucose to be released into the blood / the production of new glucose.

Blood glucose concentrations are detected by the chemoreceptors located in the hypothalamus + it is controlled by a negative feedback reaction as the response is to bring levels back to normal.

*This question is marked according to competency at Level 1 / 2 or 3. Level 0 is awarded when there is no evidence of rewardable material. The above response is a discussion demonstrating competency at Level 3 through an accurate discussion of all aspects of how blood glucose levels are maintained in animals i.e. 'the production of insulin from the pancreas in response to high glucose levels' to 'the production of the hormone glucagon when blood glucose levels are too low' –i.e. 'glycogenesis' and 'gluconeogenesis' plus 'negative feedback reaction'. All demonstrating accurate analysis of information from A2.5 in the specification.*

**Lower scoring response**

Sugar levels are maintained by how much energy they use. If the animal uses a lot of energy during the day the sugar is stored as glucose. Glucose is produced from glycogen which is formed when animals digest carbohydrates. Carbohydrates give animals energy which is also stored as sugar.

*This response is not an accurate discussion about the regulation of blood glucose levels with isolated generic statements made i.e. 'carbohydrates give animals energy' and no lines of reasoning to support it makes it Level 1.*

*In order to be a good response i.e. Level 3 a discussion about how increased blood glucose levels are reduced through insulin production and how blood glucose levels are increased through glucagon production is required. Also further discussion about how each of these hormones work to maintain a constant blood glucose level with comprehensive linkages between elements.*

**Question 6a**

There are five kinds of epithelial tissue. One kind is ciliated epithelial tissue.

**6 (a) State two other kinds of epithelial tissue.**

(2)

**Higher scoring response**

1 Columnar epithelial tissue.

2 Cuboidal epithelial tissue.

*This is a good response which states two other kinds of epithelial tissue from the four possible types (cuboidal / squamous / Pseudostratified / columnar) i.e. Columnar and Cuboidal. This is direct memory recall from B4.3.2 in the specification.*

**Lower scoring response**

1 Smooth tissue

2 Skeletal tissue

*'Smooth tissue' and 'skeletal tissue' are incorrect answers. This response does not state any of the 4 other kinds of Epithelial tissues i.e. cuboidal / squamous / pseudostratified / columnar – only two out of these four tissue types are possible answers which could have been stated to make this a good response.*

## Question 6b

(b) Explain **two** roles of ciliated epithelial tissue.

(4)

## Higher scoring response

- 1 to remove any harmful substances in the air (trachea) from reaching the lungs. like dust, pathogens and other harmful particles
- 2 To help move the eggs in the fallopian tubes from the ovary to the uterus and create current.

*This response identifies and explains two roles of ciliated epithelial tissue to gain awardable marks i.e. 'to remove harmful substances in the air to prevent infection' and 'moving the eggs down the fallopian tube'. This demonstrates understanding of B4.3.2 in the specification.*

## Lower scoring response

- 1 To allow for things to pass through the tissue diffusion to occur.
- 2 To allow for nutrients to be absorbed.

*This response is an incorrect explanation as ciliated epithelial tissue does not 'allow things to pass through' or 'nutrients to be absorbed' – confusion with the role of villi. To be a good response 'removes dirt and foreign bodies to prevent infection' and 'moves mucous secretions for effective gaseous exchange' would have to be included an explanation of two roles.*

## Question 6c

(c) Describe the sliding filament theory of muscle contraction.

(4)

## Higher scoring response

Thick myosin filament heads bind to active sites on the thin actin filaments. The myosin head then moves pulling on the actin filament with it. This is during contraction.  $Ca^{2+}$  is needed to bind with troponin to create ~~calcium~~ calcotroponin which reveals the actin binding site for the myosin head. After one powerstroke the head unbinds from the site onto another to power stroke that.

*This response is a complete description of the sliding filament theory of muscle contraction with marks awarded for 'thick myosin filaments', 'thin actin filaments', 'calcium binding to troponin', 'the myosin head moving and pulling the actin filament' and 'power stroke'. Demonstration of a good understanding from B4.6.3 in the specification.*

## Lower scoring response

The muscles have a tiny bit of space inbetween them which allows them to contract easier, by the sliding movement. This helps when needed with having a faster reflex to an effector.

*This response is an inadequate description of the sliding filament theory of muscle contraction which although mentions 'the sliding movement' no mark can be awarded through no description. 'Sliding past each other / cross bridges are formed / energy is provided by ATP / shortening the muscle / actin and myosin filaments included in the description would have made this a good response.*

## Question 6d

(d) Compare fast and slow twitch muscle fibres.

(4)

## Higher scoring response

Fast and slow twitch muscle fibres both bring about movement and need ATP but they differ in resistance and respiratory methods. Slow twitch muscle fibres work aerobically (with oxygen) they need moderate ATP and are very resistant to fatigue. Fast twitch muscle fibres work anaerobically (without O<sub>2</sub>) they ~~can~~ work faster but ~~are~~ are less resistant to fatigue, tiring easily.

This response compares fast and slow twitch muscle fibres with marks awarded for 'slow twitch muscle fibres work aerobically and fast twitch muscle fibres work anaerobically' plus 'slow twitch muscle fibres are resistant to fatigue and fast twitch muscle fibres tire easily'. Demonstration of analysis of information from B4.6.2 in the specification.

## Lower scoring response

Slow twitch muscle fibres <sup>ball and socket joint</sup> resulting in for example an animal moving towards its prey. The message is sent through a ~~meten~~ myelinated sheath with an electric charge to the axon which sends a message to the brain, then moving the object. A fast muscle fibre is hinge joint which allows the animal to move faster.

This response is not an accurate comparison between the two different types of muscle fibres. To make this a good response differences such as 'fast twitch have low capillary density while slow twitch have high' / 'fast twitch have longer recovery rate while slow twitch have slower' / 'fast twitch are lighter in colour while slow twitch are darker in colour' / 'fast twitch enable muscles to move quickly while slow twitch provide power for endurance' should have been included in the comparison provided.

## Question 7a

7 (a) Explain the role of water in a cat's diet.

(4)

## Higher scoring response

A cat needs water in its diet in order for its organs to function properly also it keeps the cat coat and skin healthy and soft. It also prevents the cat from becoming dehydrated. Plus, if the cat gets given dry food the water lubricates the food allowing it to pass through its digestive system more easily. Stops faeces from becoming too hard.

*This response is a good explanation of the role of water in a cat's diet with marks awarded for 'organs to work properly', 'prevents dehydration', 'allowing food to pass through the digestive system more easily', and 'stops faeces from becoming hard'. Demonstration of understanding of A2.1 in the specification.*

## Lower scoring response

~~This cat necessarily eats meat~~ Cats eat meat so they don't get as much minerals as they need from ~~water~~ meat as they just eating meat. Water gives the cat the minerals it needs ~~to~~ from the water it drinks.

*This response is an inaccurate explanation of the role of water i.e. 'water gives the minerals it needs'. To make this a good response the explanation could include 'improves the effectiveness of digestion by increasing nutrient absorption, a reactant involved in chemical reactions, a solvent for soluble chemicals such as water soluble vitamins and urea'.*

## Question 7b

(b) Explain how intestinal villi are adapted to absorb biological molecules.

(4)

## Higher scoring response

The villi in the intestine increase the surface area of the intestines, allowing more water and nutrients to be absorbed back into the animal's body. Also the villi have thin walls making the diffusion path quicker and more efficient in absorbing ~~me~~ biological molecules, such as water, glucose, salt...

*This response is a complete explanation of how villi are adapted to absorb biological molecules. Marks were awarded for 'increase the surface area of the intestines', 'allowing more nutrients to be absorbed', 'thin walls making diffusion more efficient'. Demonstration of understanding of A2.7 in the specification.*

## Lower scoring response

villi are hair like structures which ~~and~~ help ~~at~~ food to ~~go~~ keeping on passing through the stomach, large and small intestines.

*This response does not explain how intestinal villi are adapted to absorb biological molecules i.e. 'help food to keep passing through the stomach, large and small intestines' is an incorrect explanation. In order to make this a good response 'good blood supply to allow increased diffusion of molecules / lymph vessels allow absorption of lipids / large surface area so more molecules can be absorbed' could have been explained.*

## Question 7c

(c) Discuss the structural adaptations of the digestive system of birds.

(8)

## Higher scoring response

The Bird's beak (depending on its diet) is suited best for what it is required to do to gain food. e.g. Bird that eats seeds, large blunt beak. This beak is only needed for requiring the food other organs within deal with its breakage and absorption.

Next is the crop which is mostly used for storage as most birds migrate over long distances and will need sustenance on the journey.

The Gizzard is then used as teeth ~~to~~ to mechanically grind up food with teeth like keratin structures or swallowed up grit and gravel.

The intestine system overall is a much smaller ~~and~~ less complicated version of a monogastric system. This smaller ~~the~~ digestive system allows the bird to be more light. In all of the birds systems and even in its base are required to enable flight so a much smaller and lighter digestive system is required.

This question is marked according to competency at Level 1 / 2 or 3 Level 0 will be awarded when there is no evidence of rewardable material. The above response is a discussion demonstrating competency at Level 2 through various accurate adaptations of the bird's digestive system being discussed i.e. beak for selecting food, crop for storage, gizzard for grinding, smaller intestines. Demonstrates mostly accurate understanding and some analysis of the information provided as per A2.6 in the specification. In order for this response to be at Level 3 further discussion and comprehensive linkages between elements would be required i.e. two caeca to increase water absorption, a cloaca allowing elimination of uric acid and faeces, proventriculus for chemical digestion.

### Lower scoring response

The birds digestive system is very complex and birds maintain a healthy digestive system by sometimes eating ~~the~~ rocks which help to cleanse the crop. Birds have gillet in their system which is the main organ which absorbs key nutrients for the body. Birds digestive system is very different to a mammalian system because they've adapted due to their foods they consume. The birds digestive system contains 2 chambers which breaks down molecules quicker.

*There is no rewardable material in the above discussion about the structural adaptations of the digestive system of a bird. Incorrect statements include 'digestive system is very complex, eating rocks, cleanse the crop, gillet absobs, 2 chambers breaking molecules quicker. In order to be a good response at Level 3, a higher level of competency must be demonstrated through accurate knowledge and understanding of the concept i.e. beaks not teeth, shape of beak, crop for storage, grit in gizzard for mechanical digestion, proventriculus for chemical digestion two caeca to increase water absorption and a claoa allowing elimination of uric acid and faeces plus comprehensive linkages between elements.*