



# Pearson BTEC Level 3 Nationals in Equine Management

First teaching September 2017

## Sample Assessment Materials

### Unit 1: Equine Structure, Form and Function

For use with Extended Certificate, Foundation Diploma, Diploma,  
Extended Diploma

Version 1.0



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Pearson BTEC Level 3 Nationals

# Equine Management

Extended Certificate/Foundation Diploma/Diploma/  
Extended Diploma in Equine Management

Unit 1: Equine Structure, Form and Function

Sample Assessment Material

Time: 1 hour 30 minutes

You will need a pencil and a ruler.

Total Marks

**80**

## Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided  
- *there may be more space than you need.*

## Information

- The total mark for this paper is 80.
- The marks for **each** question are shown in brackets.  
- *use this as a guide as to how much time to spend on each question.*

## Advice

- Read each question carefully before you start to answer it.

Paper reference

XXXX/XX

PXXXXXA

1 (a) Figure 1 shows the skeleton of an equine.

Label bones A and B in Figure 1 using the boxes given.

2 marks

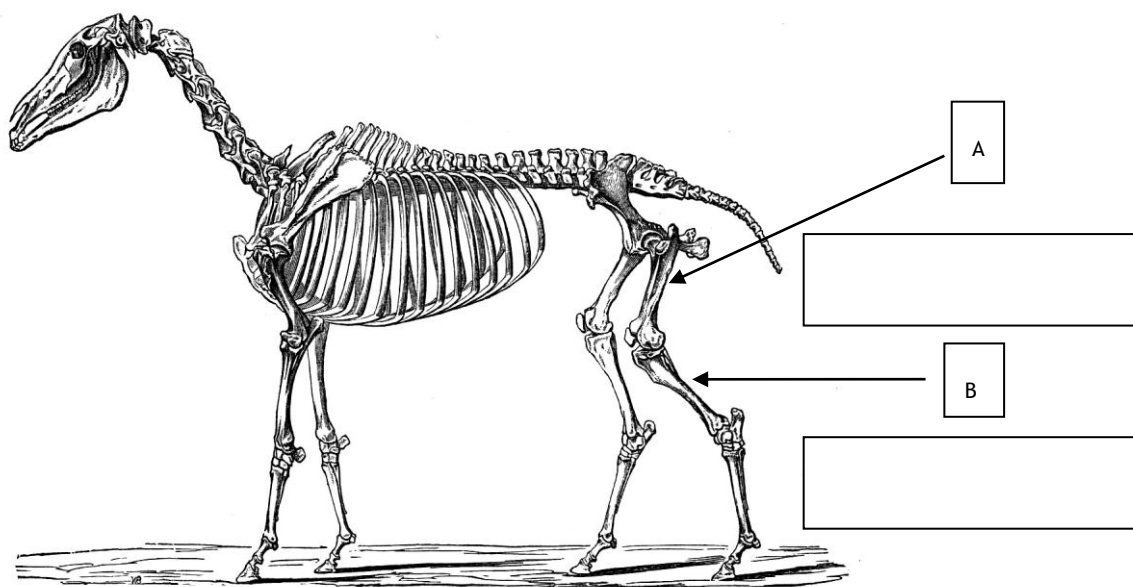
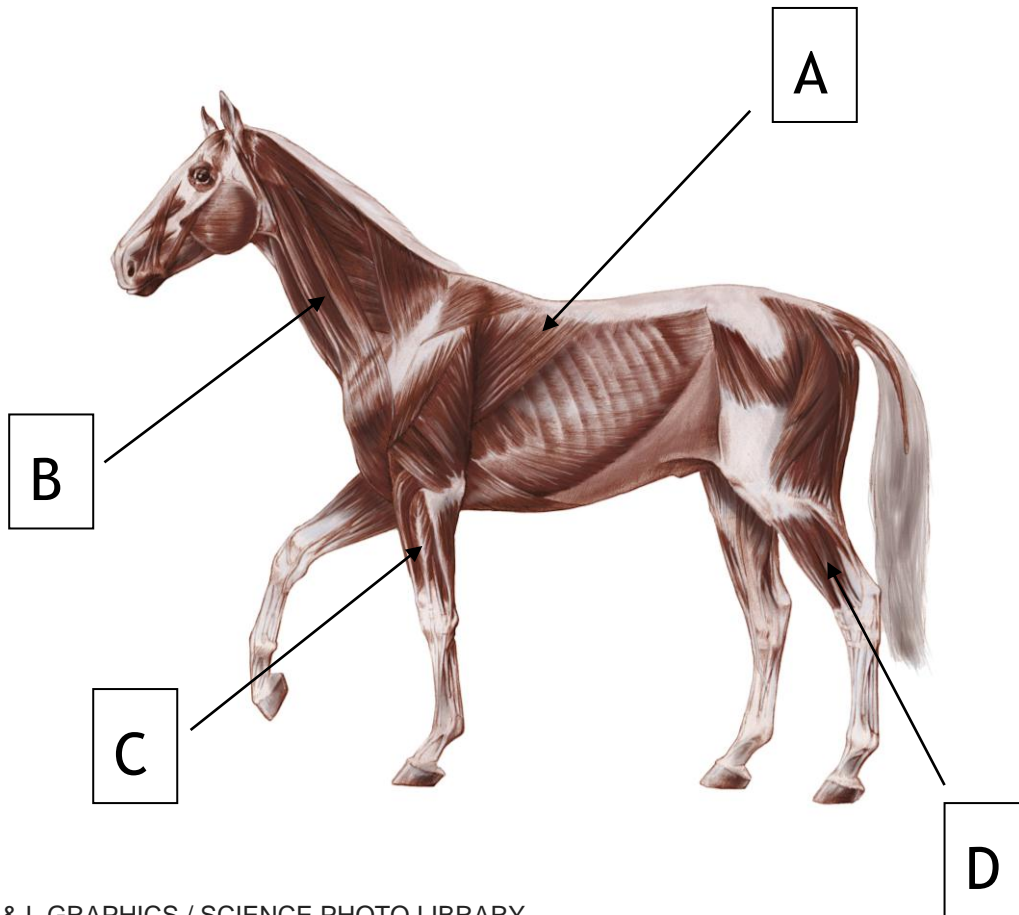


Figure 1

(b) Figure 2 shows some of the muscles of an equine.

Four muscles have been labelled: A, B, C and D.



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Figure 2

Identify the brachiocephalicus by placing a tick next to A, B, C or D in the correct box.

1 mark

A	
B	
C	
D	

For equine movement to occur, the muscles and bones must be connected together.

(c) Describe how muscles attach to bones.

2 marks

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Bones must meet at joints for equine movement to take place.

(d) Explain **two** roles of synovial fluid in joints.

i.....  
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2 marks

ii.....  
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2 marks

Total for Question 1 = 9 marks

2 The circulatory system allows blood to be transported around the equine's body.

Figure 3 shows a cross section through the equine heart.

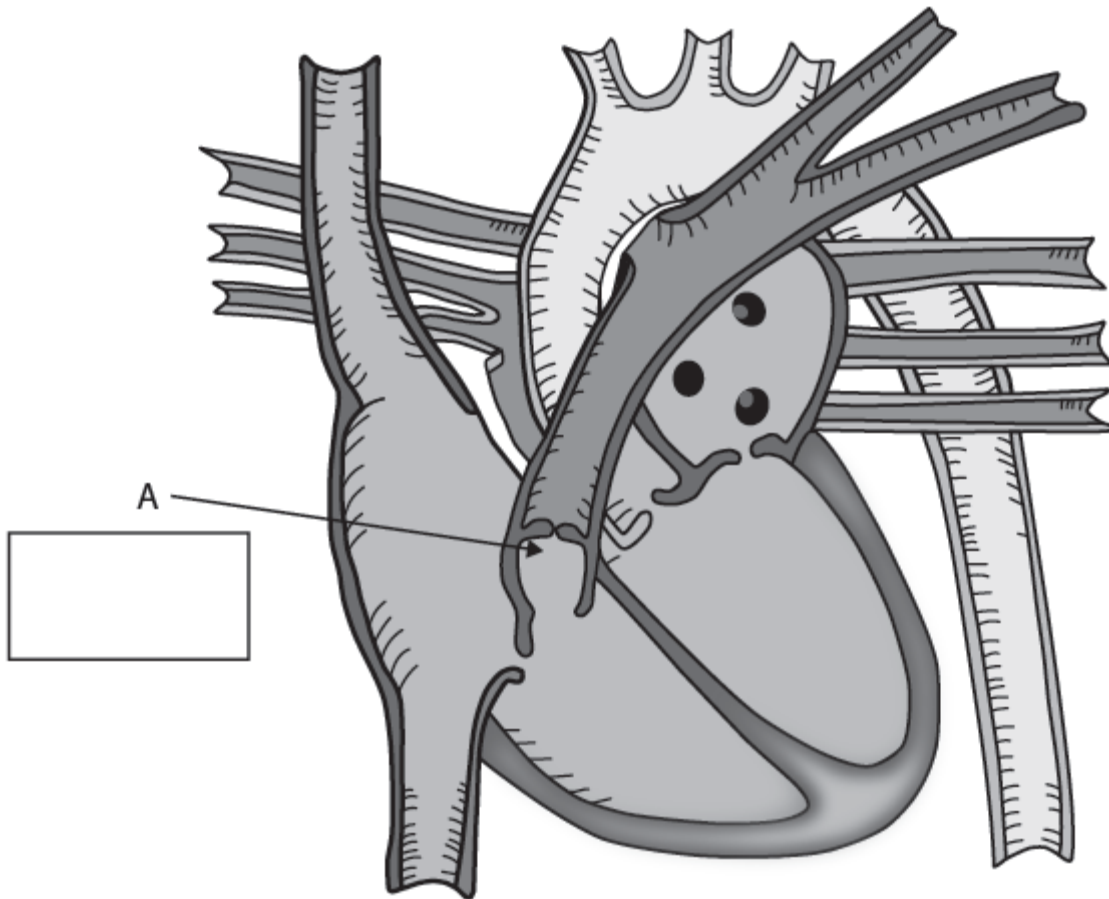


Figure 3

(a) Identify structure A in Figure 3 by labelling the box given.

1 mark

(b) Identify the left ventricle by writing 'B' on Figure 3.

1 mark



The aorta is a major equine blood vessel.

(c) Explain **two** ways the structure of the aorta is linked to its function.

i.....  
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2 marks

ii.....  
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2 marks

The heart and lungs are linked by a double circulatory system.

(d) Describe the movement of deoxygenated blood from the vena cava to the lungs.

4 marks

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Total for Question 2 = 10 marks

3 Horses are athletic animals that need to be able to exchange gases at the lungs.

(a) Explain **one** way that equine lungs are adapted for efficient gaseous exchange.

2 marks

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(b) Describe the process of oxygen transportation from the alveoli into the blood.

4 marks

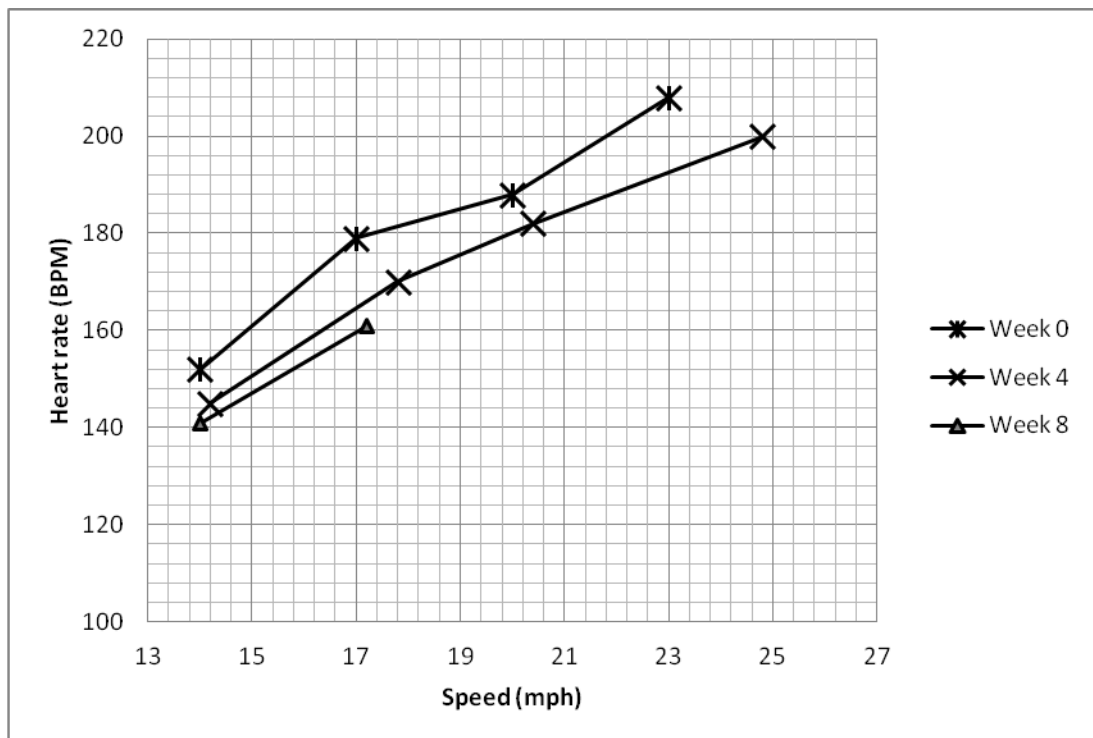
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- (c) Horses may need to prepare for a competition or an event by taking part in a fitness-training programme.

A horse was put through a fitness-training programme for an 8-week period.

The following data was recorded.

Week	Speed (mph)	Heart rate (BPM)
0	14.0	152
	17.0	179
	20.0	188
	23.0	208
4	14.2	145
	17.8	170
	20.4	182
	24.8	200
8	14.0	141
	17.2	161
	19.6	173
	23.8	189



The graph of the data from the fitness-training programme is incomplete.

(i) Complete the graph for week 8 by plotting the missing data.

2 marks

(ii) Explain how the data collected shows the changing fitness levels of the horse over the 8-week period.

4 marks

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Total for Question 3 = 12 marks

4 Movement of the horse relies on the interaction of each part of the musculoskeletal system. The structure of the hooves is directly related to how horses move.

(a) Describe how the laminae contribute to the structure of the hoof.

2 marks

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(b) Explain **two** ways the structure of the digital cushion contributes to movement in the horse.

i.....  
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2 marks

ii.....  
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2 marks

Muscles need to contract for movement to take place.

(c) Explain how the binding of calcium to troponin-tropomyosin leads to the shortening of the sarcomere in muscle contraction.

4 marks

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Total for Question 4 = 10 marks

5 Discuss the balance and control of water levels in the equine body during a training programme.

8 marks

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Total for Question 5 = 8 marks

6 Equines in the wild are sometimes in danger of attack from predators.

(a) Explain **two** ways in which orbit position affects the equine field of vision.

(i).....  
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2 marks

(ii).....  
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2 marks

When an equine sees a predator approaching, the sympathetic nervous system responds in different ways.

(b) (i) State the name used to describe these linked responses.

1 mark

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The sympathetic nervous system causes the production of epinephrine.

(ii) Explain the effect of epinephrine on the blood glucose levels of the equine.

2 marks

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(iii) Explain **three** other responses of the sympathetic nervous system when an equine sees a predator approaching.

i.....  
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2 marks

ii.....  
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2 marks

iii.....  
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2 marks

Total for Question 6 = 13 marks

7 Horse owners may want to breed their mares. A breeding management programme may be put in place as a result, and mares will be bred when they show signs of being in heat.

(a) State **two** physical signs of a mare in heat.

(i).....  
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1 mark

(ii).....  
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1 mark

As part of a breeding management programme, a mare was given hormone implants that act in a similar way to luteinising hormone (LH).

(b) Explain how this hormone implant could affect the oestrous cycle in the mare.

4 marks

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Horses are polyoestrous, or seasonal breeders.

(c) Describe how the oestrous cycle in mares is affected during winter months.

4 marks

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Total for Question 7 = 10 marks

8 An equine moves and responds in different ways as biological demands change, such as when they need to move faster.

Discuss the physiological responses of the equine musculoskeletal system as gait speed increases.

8 marks

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**END OF EXAM** Total for Question 8 = 8 marks  
TOTAL MARKS FOR PAPER = 80 MARKS

# Unit 1: Unit 1: Equine Structure, Form and Function – sample mark grid

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## 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 be 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 be prepared to award zero marks if the learner's response is not worthy of credit according to the mark scheme.
- Where some judgement 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\*

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Levels-based mark schemes (LBMS) have been designed to assess learners' work holistically. They consist of two parts: indicative content and levels-based descriptors. Indicative content reflects specific content-related points that learners might make. Levels-based descriptors articulate the skills that learners are 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 learners' 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.

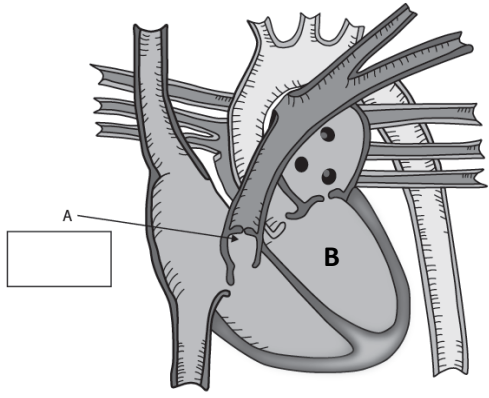
Question number	Answer	Mark
1(a)	A Femur (1) B Fibula (1)	(2)

Question number	Answer	Mark								
1(b)	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>A</td> <td></td> </tr> <tr> <td>B</td> <td style="text-align: center;">✓</td> </tr> <tr> <td>C</td> <td></td> </tr> <tr> <td>D</td> <td></td> </tr> </table> <p>Allow annotation of the diagram.</p>	A		B	✓	C		D		(1)
A										
B	✓									
C										
D										

Question number	Answer	Mark
1(c)	<p>Award up to <b>2</b> marks for a logical description that references:</p> <ul style="list-style-type: none"> <li>tendons (1) are attached to muscle one end and bone the other (1)</li> </ul>	(2)

Question number	Answer	Mark
1(d)	<p>Award <b>2</b> marks for each <b>linked</b> explanation (maximum <b>4</b> marks total):</p> <ul style="list-style-type: none"> <li>fluid is viscous/slippery (1) so friction is reduced (1) (in the joint cartilage)</li> <li>fluid acts as a transport medium (1) that provides nutrients for the cartilage (1)</li> </ul>	(4)

Question number	Answer	Mark
2(a)	Accept one of: <ul style="list-style-type: none"> <li>• tricuspid valve (1)</li> <li>• tricuspid (1)</li> <li>• valve (1)</li> </ul>	(1)

Question number	Answer	Mark
2(b)		(1)

Question number	Answer	Mark
2(c)	Award <b>2</b> marks for each <b>linked</b> explanation (maximum <b>4</b> marks total): <ul style="list-style-type: none"> <li>• thick walls (1) to withstand high blood pressure (1)</li> <li>• valves at base (1) to prevent backflow of blood into heart (1)</li> </ul>	(4)

Question number	Answer	Mark
2(d)	Award up to <b>4</b> marks for a logical description that references: <ul style="list-style-type: none"> <li>• blood enters the right atrium (1)</li> <li>• moves into the right ventricle (1)</li> <li>• the walls of the ventricle contract (1)</li> <li>• blood is pumped out to the lungs via the pulmonary artery (1)</li> </ul>	(4)

Question number	Answer	Mark
<b>3(a)</b>	<p>Award up to <b>2</b> marks for one <b>linked</b> explanation:</p> <ul style="list-style-type: none"> <li>• large surface area (due to alveoli) (1) so increased rate of gas exchange (1)</li> </ul> <p><b>or</b></p> <ul style="list-style-type: none"> <li>• lungs are elastic (1) so they can expand and recoil (1)</li> </ul> <p><b>or</b></p> <ul style="list-style-type: none"> <li>• excellent blood supply (1) so concentration gradients of gases/oxygen/carbon dioxide maintained (1)</li> </ul> <p>Accept reference to O<sub>2</sub> or CO<sub>2</sub></p>	<b>(2)</b>

Question number	Answer	Mark
<b>3(b)</b>	<p>Award up to <b>4</b> marks for a logical description that references:</p> <ul style="list-style-type: none"> <li>• (simple) diffusion (1)</li> <li>• higher oxygen concentration in the alveoli/lower concentration in the blood (1)</li> <li>• across the capillary wall (1)</li> <li>• loaded onto haemoglobin (in blood) (1)</li> </ul> <p>Accept other appropriate response.</p>	<b>(4)</b>



Question number	Answer	Mark						
3(c)(i)	<ul style="list-style-type: none"> <li>Award 1 mark for correct plotting of both data points (1)</li> <li>Award 1 mark for ruled lines between data points (1)</li> </ul> <p>(Allow one small square in accuracy of plotting.)</p> <table border="1"> <thead> <tr> <th>Speed (mph)</th> <th>Heart rate (BPM)</th> </tr> </thead> <tbody> <tr> <td>19.6</td> <td>173</td> </tr> <tr> <td>23.8</td> <td>189</td> </tr> </tbody> </table>	Speed (mph)	Heart rate (BPM)	19.6	173	23.8	189	(2)
Speed (mph)	Heart rate (BPM)							
19.6	173							
23.8	189							

Question number	Answer	Mark
3(c)(ii)	<p>Award up to <b>4</b> marks for an explanation linking the data with fitness levels:</p> <ul style="list-style-type: none"> <li>in week 4/at the beginning of the programme the heart rates are <b>around 7 BPM</b> lower (at approximately the same speeds) (1)</li> <li>in week 8/at the end of the programme they are lower than <b>both</b> weeks 0 and 4 (1)</li> <li>indicating increased fitness levels across the training/8 weeks (1) because the lower the heart rate at given running speeds the fitter the horse (1)</li> </ul> <p>Accept other appropriate response.</p>	(4)

Question number	Answer	Mark
4(a)	<p>Award up to <b>2</b> marks for a logical description that references:</p> <ul style="list-style-type: none"> <li>• primary and secondary laminae (1)</li> <li>• interdigitate to hold the hoof wall to the dermis (1)</li> </ul> <p>Accept other appropriate response for interdigitate.</p>	<b>(2)</b>

Question number	Answer	Mark
4(b)	<p>Award <b>2</b> marks for each <b>linked</b> explanation (maximum <b>4</b> marks total):</p> <ul style="list-style-type: none"> <li>• fibroelastic/collagen <b>and</b> elastic fibres (1) allow strength <b>and</b> flexibility (1)</li> <li>• adipose tissue <b>and</b> cartilage (1) absorb shock (1)</li> </ul> <p>Accept other appropriate response.</p>	<b>(4)</b>

Question number	Answer	Mark
4(c)	<p>Award up to <b>4</b> marks for a linked explanation:</p> <ul style="list-style-type: none"> <li>• troponin changes shape (1) exposing actin-myosin binding sites (1)</li> <li>• actin-myosin cross-bridges can be formed (1) allowing myosin to be pulled along actin and so filaments are able to move past one another (1) (shortening the sarcomere)</li> </ul> <p>Accept other appropriate response.</p>	<b>(4)</b>

Question number	Indicative content
5	<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.</p> <p>Answers may cover some/all of the indicative content but should be rewarded for other relevant answers.</p> <p><b>Balance</b></p> <ul style="list-style-type: none"> <li>• Gain: drinking, feed; excessive water intake/retention: increased blood pressure, cells may begin to lyse leading to loss of organ function</li> <li>• Loss: urine, faeces, sweat during exercise, water vapour in breath; dehydration may be caused by strenuous exercise or illness and may lead to reduced cell, tissue, organ and system function/kidney failure</li> </ul> <p><b>Control</b></p> <ul style="list-style-type: none"> <li>• Water levels monitored by specialised neurons/osmoreceptors; negative feedback mechanism returns water levels back to set point</li> <li>• When water levels are too low: <ul style="list-style-type: none"> <li>○ increased thirst results in increased water intake</li> <li>○ antidiuretic hormone (ADH) secreted from hypothalamus and stored in pituitary gland – released when dehydration occurs</li> <li>○ action of ADH causes more water to be reabsorbed – increases permeability of distal convoluted tubule and collecting duct cells; increases absorption of sodium (Na<sup>+</sup>) into ascending limb of loop of Henle</li> <li>○ when water is reabsorbed urine formed is concentrated, darker and in lower volumes (nitrogenous waste still needs to be removed)</li> </ul> </li> <li>• When water levels are too high: <ul style="list-style-type: none"> <li>○ reduced thirst results in decreased water intake</li> <li>○ ADH not secreted so water not reabsorbed in the kidneys – urine formed is dilute, lighter and in larger volumes</li> </ul> </li> </ul>

**Mark scheme (award up to 8 marks)** refer to 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	<ul style="list-style-type: none"> <li>• Demonstrates isolated elements of knowledge and understanding; presented in an unstructured format.</li> <li>• Generic statements may be presented rather than linkages being made so that lines of reasoning are unclear.</li> <li>• Discussion is superficial and rarely supported through the application of relevant evidence from the context.</li> </ul>

<b>Level</b>	<b>Mark</b>	<b>Descriptor</b>
Level 2	3-5	<ul style="list-style-type: none"> <li>• Demonstrates mostly accurate knowledge and understanding; some structure to the response.</li> <li>• Some occasional linkages present so that lines of reasoning are partially supported and mostly clear.</li> <li>• Discussion is partially developed and occasionally supported through the application of relevant evidence from the context.</li> </ul>
Level 3	6-8	<ul style="list-style-type: none"> <li>• Demonstrates accurate and thorough knowledge and understanding; presented in a clear and logical format.</li> <li>• Comprehensive linkages evidenced so that lines of reasoning are well supported, clear and concise.</li> <li>• Displays a well-developed and logical discussion, supported throughout by sustained application of relevant evidence from the context.</li> </ul>

Question number	Answer	Mark
<b>6(a)</b>	<p>Award <b>2</b> marks for each <b>linked</b> explanation (maximum <b>4</b> marks total):</p> <ul style="list-style-type: none"> <li>• limits binocular vision/depth perception ahead (1) in relation to distance (1)</li> <li>• results in monocular vision to the side (1) to allow greater field of vision (1)</li> <li>• creates blind spots to rear and ahead (1) at short distances (1)</li> </ul> <p>Accept other appropriate response.</p>	<b>(4)</b>

Question number	Answer	Mark
<b>6(b)(i)</b>	'Fight or flight'	<b>(1)</b>

Question number	Answer	Mark
<b>6(b)(ii)</b>	<p>Award up to <b>2</b> marks for a <b>linked</b> explanation:</p> <ul style="list-style-type: none"> <li>• blood glucose level is increased (1) so that tissues are able to gain energy (1)</li> </ul>	<b>(2)</b>

Question number	Answer	Mark
<b>6(b)(iii)</b>	<p>Award <b>2</b> marks for each <b>linked</b> explanation (maximum <b>6</b> marks total):</p> <ul style="list-style-type: none"> <li>• increased heart rate (1) so that blood can transport substances around the body more quickly (1)</li> <li>• bronchodilation/increased diameter of airways (1) to allow rapid gas exchange in lungs (1)</li> <li>• increased muscle strength (1) so that strides are more powerful (1)</li> <li>• increased sweating (1) for loss of heat produced in extra exercise (1)</li> <li>• reduced digestive processes (1) to focus on body functions needed for immediate survival (1)</li> </ul>	<b>(6)</b>

Question number	Answer	Marks
<b>7(a)</b>	<p>Award up to <b>2</b> marks for two of the following:</p> <ul style="list-style-type: none"> <li>• elevation of tail (1)</li> <li>• 'winking'/opening and closing of lips of vulva (1)</li> <li>• repeated urination/mucus squirting (1)</li> </ul> <p>Do not award marks for references to behavioural signs of heat.</p>	<b>(2)</b>

Question number	Answer	Marks
<b>7(b)</b>	<p>Award up to <b>4</b> marks for a linked explanation:</p> <ul style="list-style-type: none"> <li>• the body responds as it would to increased LH levels (1)</li> <li>• ovulation may be caused (1) because a peak in (luteinising hormone) LH is the trigger for ovulation (1)</li> <li>• LH causes follicles to mature/a rise in oestrogen levels (1)</li> </ul> <p>Accept other appropriate response.</p>	<b>(4)</b>

Question number	Answer	Marks
<b>7(c)</b>	<p>Award up to <b>4</b> marks for a logical description that references:</p> <ul style="list-style-type: none"> <li>• day lengths are short during winter (1)</li> <li>• pineal gland detects day length (1)</li> <li>• pineal gland secretes more melatonin (1)</li> <li>• pro-oestrus does not take place/mares are anoestrus in the winter (1)</li> </ul>	<b>(4)</b>

Question number	Indicative content
8	<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.</p> <p>Answers may cover some/all of the indicative content but should be rewarded for other relevant answers.</p> <ul style="list-style-type: none"> <li>• Muscles work in antagonistic pairs to bring about movement at joints</li> <li>• Cells and tissues require oxygen and nutrients to respire and produce energy for biological activities</li> <li>• Changes to the following with increased gait speed: <ul style="list-style-type: none"> <li>○ weight bearing (more limbs move at once and with greater force); limb symmetry; rhythm; vertical movement and body positioning; position of centre of gravity</li> </ul> </li> <li>• Physiological responses with increased gait speed: <ul style="list-style-type: none"> <li>○ force when hooves strike the ground</li> <li>○ stride frequency and length</li> <li>○ pressure on joints and shock-absorbing structures, e.g. muscles, cartilage, digital cushion</li> <li>○ energy demand so increased aerobic respiration</li> <li>○ respiratory and heart rate, increased blood pressure to supply oxygen and nutrients to respiring tissues</li> <li>○ type 2 muscle fibre activity</li> <li>○ anaerobic respiration</li> </ul> </li> </ul>

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