



Mark Scheme (Results)

January 2021

Pearson BTEC Nationals
Health and Social Care (31493H)
Unit 3: Anatomy and Physiology for Health
and Social Care

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Unit 3: Anatomy and physiology for Health and Social Care

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.
- Marking grids 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 marking grid, not according to their perception of where the grade boundaries may lie.
- All marks on the marking grid should be used appropriately.
- All the marks on the marking grid are designed to be awarded. Examiners should always award full marks if deserved. Examiners should also be prepared to award zero marks, if the learner's response is not rewardable according to the marking grid.
- Where judgement is required, a marking grid will provide the principles by which marks will be awarded.
- When examiners are in doubt regarding the application of the marking grid to a learner's response, a senior examiner should be consulted.

Question Number	Answer	Mark
1(a)	A - Cell membrane B - Smooth endoplasmic reticulum	2

Question Number	Answer	Mark
1(b)	Award one mark for identification and one additional mark for appropriate expansion to a maximum of four marks. Lysosome Contain enzymes (1) for digestion/waste removal /destroy microbes/breakdown old cell parts and organelles (1). Ribosome Links amino acids/'reads' RNA/messages (1) for protein synthesis (1). Accept any other relevant phrasing/wording.	4

Question Number	Answer	Mark
1(c)	Award one mark for identification and one additional mark for appropriate expansion. to a maximum of four marks. Aerobic respiration Uses oxygen (1) produce energy /carbon dioxide and water (1). $C_6H_{12}O_6 + 6O_2(1) = 6CO_2+6H_2O (1)$ Anaerobic respiration Happens without oxygen (1) produces energy / lactic acid (1). $C_6H_{12}O_6 (1) = 2C_3H_6O_3 (1)$ Accept any other relevant phrasing/wording.	4

Question Number	Answer	Mark
2(a)	A - Thyroid B - Pancreas	2

Question Number	Answer	Mark
2(b)	Award one mark for identification and one additional mark for appropriate expansion. to a maximum of four marks.	4

	<p>Ovaries Oestrogen (1) secondary sex characteristics/regulate periods/stimulates ovulation (1).</p> <p>Progesterone (1) thickens uterus lining/maintains pregnancy/prevents ovulation (1).</p> <p>Testes Testosterone (1) secondary sex characteristics/sex drive/aggression/sperm production (1).</p> <p>Progesterone (1) as a precursor to testosterone (1).</p> <p>Accept any other appropriate answers.</p>	
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Question Number	Answer	Mark
2(c)	<p>Award one mark for identification and one additional mark for appropriate expansion to a maximum of four marks.</p> <p>Increased thirst (1) due to excess glucose in the blood (1).</p> <p>Increased urination (1) increased blood volume (1).</p> <p>Unintended weight loss (1) as no glycogen (1).</p> <p>Blurred vision (1) as capillaries damaged (1).</p> <p>Tiredness/lethargy (1) due to reduced energy reserves (1)</p> <p>Confusion (1) as the brain runs out of energy (1)</p> <p>Accept any other correct answers.</p>	4

Question Number	Answer	Mark
3(a)	<p>Award one mark for identification and one additional mark for appropriate expansion. to a maximum of four marks.</p> <p>Peristalsis</p> <p>Muscle contractions (1) to move the food/bolus/faeces along the alimentary canal (1).</p> <p>Absorption</p>	4

	<p>Movement of Nutrients/products of digestion(1) cross the gut wall / into the bloodstream/villi (1).</p> <p>Accept any other relevant phrasing/wording.</p>	
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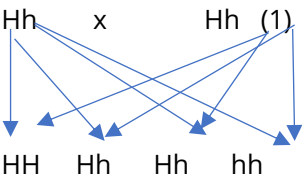
Question Number	Answer	Mark
3(b)	<p>Award one mark for identification and one additional mark for appropriate expansion to a maximum of four marks.</p> <p>.</p> <p>Amylase</p> <p>Break down/catalyse carbohydrates/starch (1) into sugars/glucose (1).</p> <p>Lipases</p> <p>Break down/catalyse fats/lipids (1) into fatty acids /glycerol (1).</p> <p>Accept any other relevant phrasing/wording.</p>	4

Question Number	Answer	Mark
3(c)	<p>Award one mark for identification to maximum of two and one additional mark for each appropriate expansion to a maximum of four marks.</p> <p>Amino acids can join together into small chains/peptides (1) that can function as hormones (1) such as ADH (1)</p> <p>Amino acids can form long chains/proteins (1) used for enzymes (1) or growth/repair (1) e.g., collagen/lipase (1)</p> <p>Accept specific examples, e.g. named hormones, enzymes, collagen, muscle tissue etc.</p> <p>Accept any other relevant phrasing/wording.</p>	4

Question Number	Indicative content	Mark
3(d)	<p>'Explain'</p> <p>Symptoms</p> <p>An autoimmune response triggered by gluten in the diet</p> <ul style="list-style-type: none"> • Severe or occasional diarrhoea, excessive wind and/or constipation • Persistent or unexplained nausea and vomiting 	6

		<ul style="list-style-type: none"> • Recurrent stomach pain, cramping or bloating • Any combination of iron, vitamin B12 or folic acid deficiency • Anaemia/osteoporosis and other nutrient deficiencies • The immune response can affect other areas, e.g. the skin <p>Causes</p> <ul style="list-style-type: none"> • There is a genetic element to the response • Immune response to gluten • Autoimmune damage to the intestine wall • Villi are flattened (villous atrophy) and nutrient absorption is difficult (malabsorption). 	
Level	Mark	Descriptor	
Level 0	0	No rewardable material.	
Level 1	1-2	<ul style="list-style-type: none"> • Demonstrates isolated elements of knowledge and understanding. • Generic statements may be presented rather than linkages being made. • Lines of reasoning are unsupported. 	
Level 2	3-4	<ul style="list-style-type: none"> • Demonstrates mostly accurate knowledge and understanding. • Answer evidences occasional linkages among the elements in the context of the question. • Lines of reasoning occasionally supported through the application of recent evidence. 	
Level 3	5-6	<ul style="list-style-type: none"> • Demonstrates accurate and thorough knowledge and understanding. • Answer evidences comprehensive linkages among the elements in the context of the question. • Lines of reasoning supported throughout by sustained application of relevant evidence. 	

Question Number	Answer	Mark
4(a)	Award one mark for any of the following up to a maximum of two marks: <ul style="list-style-type: none"> • plasma • red blood cells/erythrocytes • white blood cells (accept specific examples) • platelets. 	2

Question Number	Answer	Mark									
4(b)	<p>The sickle cell allele is recessive/h (1). Sickle cell trait is the heterozygote/Hh (1).</p>  <p>Or</p> <table border="1" data-bbox="555 698 1241 815"> <tr> <td></td> <td>H</td> <td>h</td> </tr> <tr> <td>H</td> <td>HH</td> <td>hh</td> </tr> <tr> <td>h</td> <td>Hh</td> <td>hh</td> </tr> </table> <p>The probability is 50% (1). Accept any other wording</p>		H	h	H	HH	hh	h	Hh	hh	4
	H	h									
H	HH	hh									
h	Hh	hh									

Question Number	Indicative content	Mark
4(c)	<p>Leukaemia is a cancer of the white blood cells. The symptoms are caused by a proliferation of immature white blood cells. This causes a reduction in the red blood cells and platelets.</p> <p>Symptoms</p> <p>Caused by fewer red blood cells</p> <ul style="list-style-type: none"> • skin looking pale or "washed out" • tiredness • breathlessness <p>Caused by reduced platelet count</p> <ul style="list-style-type: none"> • unusual and frequent bleeding, such as bleeding gums or nosebleeds • easily bruised skin • flat red or purple spots on the skin • bone and joint pain <p>Caused by fewer mature white cells</p> <ul style="list-style-type: none"> • frequent infections <p>Other symptoms</p> <ul style="list-style-type: none"> • having a high temperature, and feeling hot or shivery (fever) 	6

		<ul style="list-style-type: none"> sweating a lot losing weight without trying a feeling of fullness or discomfort in your tummy swollen glands in your neck, armpit or groin that may be sore when you touch them 	
Level	Mark	Descriptor	
Level 0	0	No rewardable material.	
Level 1	1-2	<ul style="list-style-type: none"> Demonstrates isolated elements of knowledge and understanding. Generic statements may be presented rather than linkages being made. Lines of reasoning are unsupported. 	
Level 2	3-4	<ul style="list-style-type: none"> Demonstrates mostly accurate knowledge and understanding. Answer evidences occasional linkages among the elements in the context of the question. Lines of reasoning occasionally supported through the application of recent evidence. 	
Level 3	5-6	<ul style="list-style-type: none"> Demonstrates accurate and thorough knowledge and understanding. Answer evidences comprehensive linkages among the elements in the context of the question. Lines of reasoning supported throughout by sustained application of relevant evidence. 	

Question Number	Answer	Mark
5(a)	A - Aorta B - Right ventricle	2

Question Number	Answer	Mark
5(b)	<p>Award one mark for each identification to a maximum of two and one additional mark for the appropriate expansion, up to a maximum of four marks.</p> <p>The autonomic nervous system (1) coordinates the regulation (1)</p> <p>Sympathetic nervous system (1) speeds it up (1)</p> <p>Nerve impulse triggered (1) when carbon dioxide levels increase/blood pressure decreases (1).</p> <p>Parasympathetic system/vagus nerve (1) slows it down (1)</p>	4

	<p>Brain receptors activated (1) when carbon dioxide levels decrease/blood pressure increases (1).</p> <p>Pacemaker (1) regulates the beat (1).</p> <p>Adrenalin (1) can speed the rate up (1).</p> <p>Accept any other relevant phrasing/wording.</p>	
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Question Number	Answer	Mark
5(c)	<p>Award one mark for the identification and one additional mark for the appropriate linked expansion, up to a maximum of four marks.</p> <p>Capillaries Thin walls/one cell thick/no muscle layers (1) to allow diffusion/nutrients through (1).</p> <p>Small lumen (1) so surface area to volume ratio is high (1).</p> <p>'leaky' walls(1) to allow fluid through (1)</p> <p>Veins Inelastic walls (1) as the blood is under low pressure. (1)</p> <p>Thin walls (1) as they contain little muscle(1)</p> <p>Valves (1) to prevent backflow (1).</p> <p>Large lumen (1) to increase the volume (1).</p> <p>Accept any other appropriate answer</p>	4

Question Number	Indicative content	Mark
5(d)	<ul style="list-style-type: none"> • CHD is usually caused by a build up of fatty deposits/atheroma in the coronary arteries leading to atherosclerosis. Hypertension can also lead to CHD. • Angina and chest pain is the most common symptom, this is detected by the nervous system and is caused by a partial blockage of the coronary arteries (circulatory system). • Breathlessness due to low oxygen levels is a common effect on the respiratory system. 	8

		<ul style="list-style-type: none"> • Complete blockage of the arteries can cause a heart attack. This damages the heart/cardiac muscle (muscular system). • Heat attack reduces oxygen levels to all the body systems causing shutdown in the worst cases. • CHD can cause heart failure where the heart weakens causing fluid build-up in the lungs. This can be acute or chronic. 	
Level	Mark	Descriptor	
Level 0	0	No rewardable material.	
Level 1	1-3	<ul style="list-style-type: none"> • Demonstrates isolated elements of knowledge and understanding. • Generic statements may be presented rather than linkages being made. • Lines of reasoning are unsupported. 	
Level 2	4-6	<ul style="list-style-type: none"> • Demonstrates mostly accurate knowledge and understanding. • Answer evidences occasional linkages among the elements in the context of the question. • Lines of reasoning occasionally supported through the application of recent evidence. 	
Level 3	7-8	<ul style="list-style-type: none"> • Demonstrates accurate and thorough knowledge and understanding. • Answer evidences comprehensive linkages among the elements in the context of the question. • Lines of reasoning supported throughout by sustained application of relevant evidence. 	

Question Number	Answer	Mark
6(a)	<p>Award one mark for each descriptive point, do not award more than three marks for solely men or women.</p> <p>For men the age group with the highest incidence throughout the time period (1).</p> <p>About 1800 per 100,000 of men infected throughout the time period (1).</p> <p>Less prevalent in women aged 20-25 than in the 15-19 age group until 2015 (1).</p> <p>Most prevalent in women in this age group after 2015 (1).</p> <p>About 2100 per 100,000 women infected in 2009 (1).</p>	4

	<p>Nearly 3000 per 100,000 women infected in 2018 (1) 5b</p> <p>Women have a higher rate of infection than men (1). Infection rates in women are increasing (1). Infection rates in men are stable (1).</p> <p>Accept any other relevant phrasing/wording.</p>	
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Question Number	Answer	Mark
6(b)	<p>Award one mark for the identification and one additional mark for the appropriate expansion, up to a maximum of four marks.</p> <p>Double blind studies</p> <p>Neither the researcher nor the subject knows what is being administered (1) to remove any bias/external influence (1).</p> <p>Placebo</p> <p>A drug that has no active ingredient (1) to identify psychological effects (1).</p> <p>Accept any other relevant phrasing/wording.</p>	4

Question Number	Indicative content	Mark
6(c)	<p>If a woman drinks alcohol during pregnancy, this can result in mental and physical problems in the baby, called foetal alcohol syndrome.</p> <p>This happens because alcohol in the mother's blood passes to her baby through the placenta.</p> <p>The baby cannot process alcohol well so it can damage cells in their brain, spinal cord and other parts of their body, and disrupt their development in the womb.</p> <p>One result is the death of the foetus.</p> <p>A baby exposed to alcohol in the womb may have:</p> <ul style="list-style-type: none"> • problems with the liver, kidneys, heart, or other organs • • a head that's smaller than average. • poor growth – they may be smaller than average at birth. • distinctive facial features – such as small eyes, a thin upper lip, and a smooth area between the nose and upper lip. • Brain is affected leading to learning difficulties and mood, attention, or behavioural problems, later in life. It may also lead to physical problems e.g., movement and coordination problems, known as cerebral palsy, and hearing and vision problems. 	6
Level	Mark	Descriptor
Level 0	0	No rewardable material.
Level 1	1-2	<ul style="list-style-type: none"> • Demonstrates isolated elements of knowledge and understanding. • Generic statements may be presented rather than linkages being made. • Lines of reasoning are unsupported.
Level 2	3-4	<ul style="list-style-type: none"> • Demonstrates mostly accurate knowledge and understanding. • Answer evidences occasional linkages among the elements in the context of the question. • Lines of reasoning occasionally supported through the application of recent evidence.
Level 3	5-6	<ul style="list-style-type: none"> • Demonstrates accurate and thorough knowledge and understanding. • Answer evidences comprehensive linkages among the elements in the context of the question.

	<ul style="list-style-type: none"> • Lines of reasoning supported throughout by sustained application of relevant evidence.
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Question Number	Indicative content	Mark
7	<p>The effect on thermoregulation leads to the slowing down of enzyme action, homeostasis affecting all body systems. Water is a major constituent of blood and cells and is needed for enzyme action.</p> <p>Renal Your urine will become concentrated, changes in blood pressure/volume.</p> <p>Digestive Constipation and/or bloating may be noticed Vomiting and/or diarrhoea.</p> <p>Integumentary Dry skin, mucous membranes and lips</p> <p>Nervous Dizziness/vertigo/lightheaded Problems concentrating Confusion/seizures Headache</p> <p>Circulatory Weak irregular heartbeat (often racing) and low blood pressure.</p> <p>Respiratory Rapid breathing The effects can lead to coma and death.</p>	8
Level	Mark	Descriptor
Level 0	0	No rewardable material.
Level 1	1-3	<ul style="list-style-type: none"> • Demonstrates isolated elements of knowledge and understanding, there will be major gaps or omissions. • Few of the points made will be relevant to the context in the question. • Limited evaluation which contains generic assertions leading to a conclusion that is superficial or unsupported.
Level 2	4-6	<ul style="list-style-type: none"> • Demonstrates some accurate knowledge and understanding, with only minor gaps or omissions. • Some of the points made will be relevant to the context in the question, but the link will not always be clear. • Displays a partially developed evaluation which considers some different competing points, although not always in detail, leading to a conclusion which is partially supported.

Level 3	7-8	<ul style="list-style-type: none">• Demonstrates mostly accurate and thorough/detailed knowledge and understanding.• Most of the points made will be relevant to the context in the question, and there will be clear links.• Displays a well-developed and logical evaluation which clearly considers different aspects and competing points in detail, leading to a conclusion that is fully supported.
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