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Mark Scheme (Results)

Summer 2018

BTEC Level 3 National in Health and
Social Unit 3: Anatomy and Physiology for
Health and Social Care (31493H)



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.

Specific marking guidance

The marking grids have been designed to assess learner work holistically. Rows in the grids identify the assessment focus/outcome being targeted. When using a marking grid, the 'best fit' approach should be used.

- Examiners should first make a holistic judgement on which band most closely matches the learner's 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.

BTEC Next Generation Mark Scheme

Unit 3: Anatomy and Physiology for Health and Social Care

Question Number	Answer	Mark
1ai	The rate at which energy is used/metabolism by someone at rest (1). Accept any other wording.	1

Question Number	Answer	Mark
1aii	Any 1 from: Insulation (1) Protection (1) Speed up nerve impulses (1) Energy storage (1) Regulate temperature (1) Accept any other wording.	1

Question Number	Answer	Mark
1 bi	Award one mark for the identification and one mark for the appropriate expansion to a maximum of four marks. <ul style="list-style-type: none">○ Vasodilation (1) increasing heat loss (1)○ Vasoconstriction (1) reducing heat loss (1)○ Shivering (1) to produce heat (1)○ Hair standing up (1) to insulate (1)○ Increase sweating (1) reducing heat through evaporation (1) Accept any other appropriate response.	4

Question Number	Answer	Mark
1 bii	<p>Award one mark for each descriptive point to a maximum of four marks.</p> <ul style="list-style-type: none"> • Temperature is controlled by negative feedback/homeostatic mechanisms (1) • When mechanisms fail the body does not respond to temperature change (1) • Hypothermia is low body temperature (1) • Body doesn't Shiver/vasoconstriction/piloerection (1) • Body temperature is not raised (1) • Temperature fall is uncontrolled (1) • Reduced blood flow limits blood supply to organs (1) • 32° moderate hypothermia sets in (1) • 28° severe hypothermia sets in (1) <p>Award a maximum of one mark for identified effects of hypothermia</p>	4

Question Number	Answer	Mark
2a	<p>One mark for each explanatory point to a maximum of four.</p> <p>Involuntary activities are those over which we have no conscious control (1). Controlled through a reflex arc (1). Generally mediated in the spinal cord (1). Some controlled in the brain (1). Most are autonomic responses/autonomic nervous system (1). Examples may include digestion/blood pressure/heart rate/swallowing/shivering/breathing etc. (1).</p> <p>Award no more than one mark for any appropriate example.</p> <p>Accept any other appropriate response.</p>	4

Question Number	Answer	Mark
2bi	<p>Tremor (1) Bradykinesia (1) Muscle stiffness/slow movements (1) Poor mobility (1) Poor posture (1) Memory loss (1) Dementia (1) Lose speech/ability to speak (1) Impaired cognition (1)</p> <p>Accept any appropriate alternatives.</p>	2

Question Number	Answer	Mark
2bii	<p>Award one mark for the identification and one mark for the appropriate expansion to a maximum of four marks.</p> <p>A loss of cells in the substantia nigra/brain (1) means the brain stops producing dopamine (1).</p> <p>The part of the brain controlling movement cannot function (1) so messages to the muscles are disrupted (1).</p> <p>Nerves in the brain are damaged (1) so understanding/memory is disrupted (1)</p> <p>Accept any other appropriate wording.</p>	4

Question Number	Answer	Mark
3a	<p>One mark for each point to a maximum of four.</p> <p>A process that occurs in the ovaries/testes (1). Process by which gametes/sperm/eggs/sex cells are produced (1). The amount of DNA is doubled (1). The number of chromosomes is doubled initially (1). The number of chromosomes are halved compared to a normal cell (1). Haploid cells are produced (1). $2n$ becomes n (1). Separates homologous chromosomes (1). Four daughter cells are produced (1). The number of chromosomes is doubled (1).</p> <p>One mark each for correctly identified stages.</p> <p>Accept any other appropriate wording.</p>	4

Question Number	Answer	Mark
3b	<p>Award one mark for each correct point to a maximum of four marks. Award no more than three marks for each trimester.</p> <p>In the first trimester the blastocyst develops into an embryo (1).</p> <p>In the third trimester the foetus is increasing in size (1).</p> <p>In the first trimester the placenta is developing (1).</p> <p>In the third trimester the placenta is supporting the foetus (1).</p> <p>In the first trimester the organs are developing (1).</p> <p>In the third trimester the organs are fully developed (1).</p> <p>In the first trimester sense organs are not developed (1).</p> <p>In the third trimester the foetus responds to sound/stimuli (1).</p> <p>In the third trimester the foetus is active (1).</p> <p>Foetus is engaged in the third trimester (1).</p> <p>Accept any other appropriate alternatives.</p>	4

Question Number	Answer	Mark
3c	<p data-bbox="488 277 1043 340">One mark for identification, one mark for expansion to a total of four.</p> <p data-bbox="488 374 1099 436">Secrete hormones (1) which trigger ovulation (1).</p> <p data-bbox="488 470 1085 568">The ovaries produce progesterone (1) which thickens the uterus wall in preparation for implantation (1).</p> <p data-bbox="488 602 1142 701">The ovaries produce oestrogen (1) that controls the hormones produced by the pituitary/FSH/LH (1).</p> <p data-bbox="488 734 1086 797">Progesterone levels drop after ovulation (1) leading to shedding of the endometrium (1).</p> <p data-bbox="488 831 1018 860">Accept appropriate alternative wording.</p>	4

Question number	Indicative content	
3d	<p>Tissue outside the uterus behaves like endometrium/uterus lining. This tissue can be found in different areas, e.g. ovaries and fallopian tubes/outside of the uterus/abdominal lining/bowel/bladder.</p> <p>Symptoms and consequences may include:</p> <ul style="list-style-type: none"> • painful periods or heavy periods • pain in the lower abdomen, pelvis or lower back • pain during and after sex • bleeding between periods • difficulty getting pregnant • May lead to infertility. <ul style="list-style-type: none"> • persistent exhaustion and tiredness • discomfort when going to the toilet • bleeding from the rectum/ blood in faeces • coughing blood – in rare cases when the endometriosis tissue is in the lung <p>Further consequences may include the need for treatments such as hormone therapy/painkillers/surgery.</p> <p>There is no cure, just management of symptoms.</p>	
<p>Mark scheme (award up to 6 marks) refer to the guidance on the cover of this document for how to apply levels-based mark schemes*.</p>		
Level	Mark	Descriptor
Level 0	0	No rewardable material.
Level 1	1–2	<ul style="list-style-type: none"> • Demonstrates isolated knowledge and understanding, there be major gaps or omissions • Generic statements may be presented rather than linkages being made so that lines of reasoning are not present • Limited explanation which is not logically ordered and with significant gaps.
Level	Mark	Descriptor
Level 2	3–4	<ul style="list-style-type: none"> • Demonstrates mostly accurate knowledge and understanding, with few minor omissions/any gaps or omissions are minor • Some linkages are made so that lines of reasoning are partially present • Displays a partially developed explanation that has a structure which is mostly clear, coherent and logical with only minor omissions.
Level 3	5–6	<ul style="list-style-type: none"> • Demonstrates accurate and thorough/detailed knowledge and understanding • Linkages are consistently made so that lines of reasoning are sustained • Displays a well-developed explanation that has a structure which is clear, coherent and logical.

Question Number	Answer	Mark
4a	<p>One mark for the identification, one mark for the expansion to a total of two marks.</p> <p>Osmoregulation (1) by the production of anti-diuretic hormone/ADH (1). Production of fsh/lh/hormones (1) to control the sex organs (1). Controls egg release (1) to enable reproduction (1). Controls the menstrual cycle (1) by stimulating oestrogen/progesterone/hormones (1).</p> <p>Accept any other appropriate alternatives.</p>	2

Question Number	Answer	Mark
4bi	<p>Four marks from</p> <p>Coordinated by the adrenal gland (1) Adrenalin is produced (1) Coordinated by the (sympathetic) nervous system (1)</p> <p>This causes</p> <ul style="list-style-type: none"> • Raised heart rate (1) • Raised breathing rate (1) • Emptying of bowels/bladder (1) • Increase in blood pressure/flow (1) • Expanded air passages (1) • Maximised glucose levels (1) • Enlarged pupil (1) • Increases energy available (1) <p>Accept any other appropriate wording.</p>	4

Question number	Indicative content
4bii	<p>The thyroid gland produces thyroxine.</p> <p>In hypothyroidism the levels of thyroxine are too low.</p> <p>Often caused by an autoimmune response.</p> <p>Thyroxin controls metabolic rate, growth and development, resistance to infection and metabolism of nutrients.</p> <p>Symptoms include a poor ability to tolerate cold, a feeling of tiredness, constipation, depression, and weight gain.</p> <p>Elderly people with an underactive thyroid may develop memory problems and depression.</p> <p>Children may experience slower growth and development.</p> <p>Teenagers may start puberty earlier than normal.</p>

Mark scheme (award up to 6 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	<ul style="list-style-type: none"> • Demonstrates isolated knowledge and understanding, there be major gaps or omissions • Generic statements may be presented rather than linkages being made so that lines of reasoning are not present • Limited explanation which is not logically ordered and with significant gaps.
Level	Mark	Descriptor
Level 2	3–4	<ul style="list-style-type: none"> • Demonstrates mostly accurate knowledge and understanding, with few minor omissions/any gaps or omissions are minor • Some linkages are made so that lines of reasoning are partially present • Displays a partially developed explanation that has a structure which is mostly clear, coherent and logical with only minor omissions.
Level 3	5–6	<ul style="list-style-type: none"> • Demonstrates accurate and thorough/detailed knowledge and understanding • Linkages are consistently made so that lines of reasoning are sustained • Displays a well-developed explanation that has a structure which is clear, coherent and logical.

	Answer	Mark
5ai	<p>Allow one mark for each point to a maximum of three per structure. Giving a total of four overall.</p> <p>A: Alveolus/air sac (1) oxygen in/CO₂ out (1) into the blood supply (1).</p>	4

	<p>B: Capillary/blood vessel (1) transports haemoglobin/dissolved CO₂/O₂/red blood cells (1) to the heart/rest of the body (1).</p> <p>Accept any other appropriate wording.</p>	
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	Answer	Mark
5a ii	<p>One mark for the identification and one for the expansion to a total of two.</p> <p>Large surface area (1) allows a lot of diffusion of gases to occur (1).</p> <p>Thin membrane in the alveolus (1) allows diffusion to happen quickly (1).</p> <p>A good blood supply (1) to maintain concentration gradient (1).</p> <p>They are elastic (1) so they can expand/contract (1).</p> <p>Moist surface (1) for oxygen to dissolve in (1).</p> <p>Accept any other valid response.</p>	2

	Answer	Mark
5b	<p>One mark for the identification and one for the expansion to a total of four.</p> <p>Increasing breathlessness (1) caused by damage to the alveoli/emphysema (1).</p> <p>A persistent chesty cough (1) caused by inflammation of the airways.</p> <p>Frequent chest infections (1) caused by chronic bronchitis (1).</p> <p>Persistent wheezing (1) caused by the build-up of mucus (1).</p> <p>Chest pain (1) due to irritated air way (1).</p> <p>Dizziness (1) due to lack of oxygen (1).</p> <p>Blue lips/pallor (1) due to deoxygenated blood (1).</p> <p>Accept any other appropriate alternative responses.</p>	4

Question number	Indicative content	
5c	<p>Double circulation means oxygen can get to the tissues effectively as the pressure drop in the lungs doesn't affect it.</p> <p>Cardiac cycle is an effective way of ensuring blood is delivered to the tissues.</p> <p>Control of heart rate by the brain/sympathetic/parasympathetic nervous systems.</p> <p>Control of heart rate by the endocrine system.</p> <p>Chemoreceptors sense CO₂ levels.</p> <p>These alter the rate of delivery of oxygen depending on demand.</p> <p>Structure of the arteries (muscular walls/small lumen) ensures efficient delivery.</p> <p>Structure of veins (large lumen/valves) efficiently returns blood for re-oxygenation.</p> <p>Structure of capillaries/capillary beds means efficient diffusion of O₂/CO₂.</p> <p>Oxygen dissociation curve/ binding to haemoglobin ensures oxygen delivered to where it is needed.</p>	
<p>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*.</p>		
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, there will be major gaps or omissions • Few of the points made will be relevant to the context in the question • Limited discussion which contains generic assertions rather than considering different aspects and the relationship between them
Level	Mark	Descriptor
Level 2	3–5	<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 discussion which considers some different aspects and some consideration of how they interrelate, but not always in a sustained way.
Level 3	6–8	<ul style="list-style-type: none"> • Demonstrates mostly accurate and detailed knowledge and understanding • Most of the points made will be relevant to the context in the question, and there will be clear links

		<ul style="list-style-type: none"> Displays a well-developed and logical discussion which clearly considers a range of different aspects and considers how they interrelate, in a sustained way.
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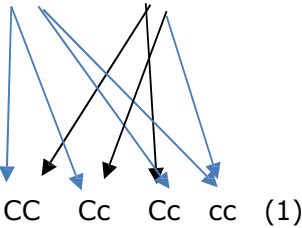
	Answer	Mark
5d	<p>Award one mark for each correct point to a total of four. Do not award more than three marks for one process.</p> <p>Both processes produce energy from glucose (1) First stage of glycolysis is the same (1). Aerobic respiration uses oxygen (1). Anaerobic respiration does not use oxygen (1). Aerobic respiration produces CO₂ (1). Anaerobic respiration does not produce CO₂ (1). Anaerobic respiration produces lactic acid (1). Aerobic respiration does not produce lactic acid (1). Aerobic respiration leads into Krebs cycle (1). Anaerobic respiration stops before glycolysis (1). Anaerobic respiration occurs when oxygen isn't available (1). Anaerobic respiration causes an oxygen debt (1).</p> <p>Award one mark for an accurate word or symbolic equation for each process.</p> <p>Accept any other appropriate alternative wording.</p>	4

	Answer	Mark
6a (i)	<p>One mark for each point to a maximum of two.</p> <p>Both are larger than the European average (1).</p> <p>COPD kills about 25 times more people prematurely than asthma (1).</p> <p>COPD is two times the European average (1).</p> <p>Asthma is 1.5 times (1).</p> <p>COPD kills 25,000 a year (1).</p> <p>Asthma kills 1000/1200 a year (1).</p> <p>Accept any other appropriate alternative wording.</p>	2

	Answer	Mark
6a (ii)	<p>One mark for the identification and one for the expansion to a total of four.</p> <p>COPD is often caused by lifestyle factors (1) such as smoking (1).</p> <p>Asthma is exacerbated by environmental factors (1) such as air pollution (1).</p> <p>COPD can lead to secondary infections (1) such as pneumonia (1).</p> <p>Asthma affects younger people (1) with better immune systems (1).</p> <p>Asthma is a chronic condition (1) that can be managed by medication (1).</p> <p>COPD puts strain on the heart (1) leading to stroke/heart disease (1).</p> <p>Accept any other appropriate alternative wording.</p>	4

	Answer	Mark
6b	<p>One mark for the identification and one for the expansion to a total of four.</p> <p>Identify affected/at risk groups (1) geographically/age/lifestyle/occupation (1).</p>	4

	<p>Morbidity rates (1) are useful for chronic diseases (1).</p> <p>Mortality rates (1) are useful for acute diseases (1).</p> <p>Use the statistics to develop hypothesis (1) to develop research programmes (1).</p> <p>Identify the incidences of disease (1) to see patterns (1).</p> <p>Identify prevalence of disease (1) to judge how serious the problem is (1).</p> <p>Identify factors (1) to explain patterns (1).</p> <p>Accept any other appropriate alternatives.</p>	
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Question number	Indicative content									
6c	<p data-bbox="440 239 1310 331">Award one mark for each correct point in the diagram to a maximum of three and one point for each explanatory point to a maximum of five, giving a total of eight.</p> <p data-bbox="440 367 571 398">Diagram</p> <p data-bbox="440 434 1318 495">Award one mark for correct parental alleles to a total of two. One mark in total for the correct crosses.</p> <p data-bbox="440 530 1313 591">Accept alternative letters identifying the alleles. Dominant alleles must be capitalised and recessive alleles must be lower case.</p> <p data-bbox="440 624 711 656">Cc (1) x Cc (1)</p>  <p data-bbox="440 848 743 880">CC Cc Cc cc (1)</p> <p data-bbox="440 916 475 947">Or</p> <table border="1" data-bbox="440 981 1353 1081"> <tbody> <tr> <td></td> <td>C</td> <td>c</td> </tr> <tr> <td>C</td> <td>CC</td> <td>Cc</td> </tr> <tr> <td>c</td> <td>Cc</td> <td>cc</td> </tr> </tbody> </table> <p data-bbox="440 1149 722 1180">Explanatory points</p> <p data-bbox="440 1216 831 1247">1:2:1 ratio of genotypes (1)</p> <p data-bbox="440 1247 807 1279">3:1 ratio of phenotypes (1)</p> <p data-bbox="440 1279 799 1310">25% are cc genotype (1)</p> <p data-bbox="440 1346 863 1377">The allele for cf is recessive (1)</p> <p data-bbox="440 1377 887 1408">The normal allele is dominant (1)</p> <p data-bbox="440 1408 959 1440">Carriers/parents are heterozygous (1)</p> <p data-bbox="440 1440 1002 1471">Carriers/parents phenotype is normal (1)</p> <p data-bbox="440 1471 1230 1532">Affected people inherit 2 recessive alleles/are homozygous recessive (1)</p> <p data-bbox="440 1532 826 1563">Both parents are carriers (1)</p>		C	c	C	CC	Cc	c	Cc	cc
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