

Human Biology

Advanced GCE

Unit **F224**: Energy, Reproduction and Populations

Mark Scheme for June 2012

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All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

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







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Annotations

Annotation	Meaning
	Correct answer
	Cross
	Benefit of doubt
	Benefit of doubt not given
	Error carried forward
	Given mark
	Underline (for ambiguous/contradictory wording)
	Omission mark
	Correct response
	Ignore
	Poorly expressed
	Contradiction
	Unclear
	Example/Reference

Question			Answer	Marks	Guidance
1	(a)	(i)	<i>in Nigeria</i> 1. idea of little contraception ; 2. idea of large family to compensate for high death rate ; 3. need (more) children to, work for / support, family ; 4. stated or described religious / cultural, reason ; 5. AVP ;	2 max	CREDIT reverse argument for UK 4. eg some religious groups do not condone contraception 5. eg more people of child-bearing age / ref to abortion being more freely available in UK
		(ii)	1. can provide good health care / AW ; 2. can provide adequate nutrition ; 3. may not report all deaths / AW ; 4. idea of lower incidence of risk factors common in UK ; 5. AVP ;	2 max	1. eg 'vaccinations are available (in Ghana) 4. eg obesity, hypertension, diabetes, CHD, alcohol related diseases 5. eg higher proportion of young people (in Ghana)
	(b)		DD DI DI ; ;	2	All 3 correct = 2 marks any 2 correct = 1 mark
			Total	6	

Question		Answer	Marks	Guidance
2	(a)	<p>Mark the first answer in each box.</p> <p>E ;</p> <p>F ;</p> <p>B ;</p>	3	If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks
	(b)	(i)	gonadotrophin releasing hormone ;	1 ALLOW phonetic spelling
		(ii)	1. stimulates Graafian follicle ; 2. to release, secondary / 2 ^o , oocyte ; 3. stimulates, luteinisation / development of corpus luteum ;	2 max CREDIT 'dominant' instead of Graafian CREDIT 'causes ovulation'
		(iii)	1. (steroids) are non-polar / lipid soluble or cell surface membrane made of (phospho) lipids or (steroids) can diffuse directly (through cell surface membrane) ; 2. (progesterone) has, specific / complementary, shape to receptor or forms complex with receptor or directly affects nucleus or idea that switches genes on / off ;	2

Question		Answer	Marks	Guidance
	(iv)	1. (endometrium) gets thicker ; 2. increased, formation of blood vessels / blood supply ; 3. AVP ;	2 max	IGNORE 'maintains, endometrium / lining' 3. eg (due to) increased, mitosis / cell division
	(v)	<u>apoptosis</u> / <u>programmed</u> cell death ;	1	DO NOT CREDIT 'cells die' without qualification ALLOW phonetic spelling
Total			11	

Question			Answer	Marks	Guidance
3	(a)	(i)	anaerobic / absence of oxygen / AW ;	1	IGNORE general ref. to exercise (as given in Q) ACCEPT high intensity exercise eg sprinting
		(ii)	Mark the first answer. lactate ;	1	If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks CREDIT lactic acid
		(iii)	Mark the first answer. carbon dioxide / CO ₂ ;	1	If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks
		(iv)	Mark the first 2 answers in any order (pyruvate) dehydrogenase ; (pyruvate) decarboxylase ;	2	IGNORE hydrolytic
		(v)	<i>red blood cells</i> have no , mitochondria / <u>pyruvate</u> dehydrogenase / decarboxylase / coenzyme A ;	1	

Question	Answer	Marks	Guidance
(b)	1. acetyl CoA combines with oxaloacetate to form citrate ; 2. decarboxylation , releases / produces, CO ₂ ; 3. dehydrogenation / release of hydrogen, to form, reduced NAD / reduced FAD (at correct point in cycle) ; 4. ATP produced from ADP and Pi ; 5. (by) substrate level phosphorylation ; 6. series of, steps / intermediates / enzyme catalysed reactions ; 7. oxaloacetate regenerated ;	5 max	PENALISE ONCE ONLY if incorrect number of carbons given 1. ACCEPT acetate 3. DO NOT CREDIT release of H ₂ / hydrogen ions 4. CREDIT NAD / FAD, accepts hydrogen 6. ACCEPT a description of, 6C / citrate, to 5C to, 4C / oxaloacetate
	QWC ;	1	3 of the emboldened terms used and spelt correctly oxaloacetate citrate decarboxylation dehydrogenation / oxidation substrate level phosphorylation
	Total	12	

Question		Answer	Marks	Guidance
4	(a) (i)	0.96 ; ;	2	Correct answer = 2 marks If answer is incorrect or given to the incorrect number of decimal places, then ALLOW correct working for one mark eg $121 \div 12600 (x 100)$
	(ii)	1. some maize (plants) die ; 2. maize carries out, respiration / metabolism ; 3. not all of parts of maize fed to cattle ; 4. not all of maize digested (and absorbed) ;	3 max	ACCEPT 'producer' for 'maize' throughout 3. idea that only cobs are eaten 4. ACCEPT energy loss through defaecation / egestion DO NOT CREDIT ref to excretion
	(b) (i)	Mark the first answer. protein / amino acid / nucleic acid / nitrogenous base / chlorophyll / urea / uric acid ;	1	If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks ACCEPT abbreviations e.g. DNA / RNA / NAD / FAD / ADP / ATP DO NOT CREDIT ammonia / NH ₃ / urine
	(ii)	Mark the first answer. nitrifying ;	1	If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks ACCEPT <i>Nitrobacter</i> DO NOT CREDIT <i>Nitrosomonas</i>
	(iii)	polar / AW ;	1	
Total			8	

Question		Answer	Marks	Guidance
5	(a)	<p><i>damage to DNA</i></p> <ol style="list-style-type: none"> occurs during (semi-conservative) replication ; can lead to, complementary base pairing not occurring / nucleotides not matching / change in base sequence ; (caused by) a mutagen / named mutagen ; <p><i>repair to DNA</i></p> <ol style="list-style-type: none"> DNA polymerase surveys DNA / AW ; other enzymes cut out mismatched, bases / nucleotides ; correct, base / nucleotide, inserted ; ref. to correct role of DNA ligase ; 	5 max	<p>2. ACCEPT e.g. ref to base deletion / addition / substitution</p> <p>3. e.g. UV light / ionising radiation</p> <p>5. DO CREDIT restriction enzymes / DNA polymerase / ligase</p> <p>Look for idea of re-forming phosphodiester bonds</p>
		QWC ;	1	<p>2 of the emboldened terms used and spelt correctly mutagen / mutagenic complementary nucleotides polymerase ligase</p>

Question		Answer	Marks	Guidance
	(b)	1. idea that telomeres regulate cell division ; 2. telomeres protect genes ; 3. (shortening of telomere) causes gene, exposure / damage ; 4. DNA / chromosomes, cannot replicate ;	3 max	2. DO NOT CREDIT chromosomes protected 3. DO NOT CREDIT chromosomes damaged
	(c) (i)	continue to divide indefinitely / AW ; (might) become cancerous ; telomere length is maintained ;	1 max	DO NOT CREDIT refs to growth as Q refers to a cell
	(ii)	can carry out more cell divisions (than most other cells) due to, presence of telomerase / telomeres being only slightly shortened ;	1	IGNORE ref to regeneration
	(d) (i)	1. effect on active site described ; 2. telomerase cannot, bind to substrate / form enzyme-substrate complex ;	2	DO NOT CREDIT same shape as substrate eg binds to / blocks, active site / binds on enzyme away from active site which distorts active site ACCEPT no / fewer, enzyme substrate complexes formed

Question		Answer	Marks	Guidance
	(ii)	1. no / few / little, side effects / AW ; 2. (so) could be used for longer ; 3. (so) could be used post operatively ; 4. AVP ;	2 max	1. ACCEPT idea of improved quality of life during treatment 4. eg chemotherapy less selective of cancer cells or idea that makes chemotherapy available to treat more aggressive cancers
		Total	15	

Question		Answer	Marks	Guidance
6	(a)	<p><i>dizygotic</i> two (secondary) oocytes each fertilised (by separate sperm) / AW ;</p> <p><i>monozygotic</i> one (secondary) oocyte fertilised (by one sperm) and then splits into two / AW ;</p>	2	<p>DO NOT CREDIT any references to 'egg' alone</p> <p>Penalise use of ovum / ova / egg cell once only</p>
	(b)	<p>Mark the first answer.</p> <p>vanishing twin syndrome ;</p>	1	<p>If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks</p> <p>ACCEPT disappearing twin syndrome</p>
	(c)	<p>1. increase in age of mother leads to more twins ;</p> <p>2. fertility treatment leads to more twins ;</p> <p>3. family history of twins leads to more twins ;</p> <p>4. more chance of fraternal twins (than identical) ;</p> <p>5. use of figures with units (%) to support any of mps 1-4 ;</p>	3 max	<p>CREDIT reverse argument</p> <p>eg mp1 age 25-29 yrs number of twins = 3.0% and 30-34 yrs number of twins = 4.0% mp2 with fertility treatment number of twins = 20.0% and without fertility treatment number of twins = 0.4%</p>

Question		Answer	Marks	Guidance
	(d)	1. low birth weight / AW ; 2. stillborn ; 3. named developmental problems ; 4. AVP ;	2 max	3. eg congenital heart defect / poor lung development / poor neurological development 4. eg a social or educational consequence described
		Total	8	

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