

Human Biology

Advanced GCE F224

Energy, Reproduction and Populations

Mark Scheme for June 2010

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Question			Expected Answers	Marks	Additional Guidance
1	(a)	(i)	stimulates / AW, spermatogenesis / sperm production ; responsible for <u>male</u> secondary sexual characteristics ;	1 max	answers must be related to function DO NOT CREDIT male sex hormone ACCEPT examples
		(ii)	stimulates / maintains , milk <u>production</u> ;	1	idea of production not release ACCEPT inhibits ovulation
	(b)	(i)	<u>oxytocin</u> ;	1	
		(ii)	<u>HCG</u> / <u>progesterone</u> ;	1	
	(c)		<u>oestrogen</u> ; <u>progesterone</u> ;	2	answers can be in either order
	(d)		implants ; injections ; intra-uterine system (IUS) ;	1 max	ACCEPT patches DO NOT CREDIT IUD since this does not have hormones
Total				7	

Question		Expected Answers	Marks	Additional Guidance
2	(a)	A – polypeptide (chain) / primary structure ; B – haem / prosthetic, (group) ;	2	ACCEPT iron IGNORE ion / molecule / atom
	(b)	(i) <i>myoglobin</i> = 63 - 65 and <i>haemoglobin</i> = 23 - 25 ;	1	IGNORE units
		(ii) lungs ;	1	CREDIT left atrium / left ventricle / pulmonary vein / aorta DO NOT CREDIT alveoli unqualified
		(iii) <i>description</i> 1. myoglobin has greater affinity than haemoglobin / AW ; ora <i>explanation</i> 2. oxygen released by (oxy)myoglobin only when levels (in muscle)are <u>very low</u> ; 3. after <u>oxyhaemoglobin</u> has released most of its oxygen ; 4. e.g. during <u>intense</u> exercise ; 5. ref. oxygen reserve / delays anaerobic respiration ; 6. oxyhaemoglobin replenishes myoglobin with oxygen / AW ;	1 2 max	DO NOT CREDIT haemoglobin for this marking point

	(c)	(i)	women lose blood (regularly) through menstruation ; erythrocytes (red blood cells) contain haemoglobin ; AVP ;	2	ACCEPT iron loss e.g. sex linkage / males have higher red cell count
		(ii)	vasectomy / sterilisation ; condom ;	2	
Total				11	

Question			Expected Answers	Marks	Additional Guidance
3	(a)	(i)	low partial pressure of oxygen ;	1	ACCEPT idea of less oxygen
		(ii)	kidney ;	1	
		(iii)	1. kidney, disease / failure ; 2. (increased risk of) thrombosis / blood clotting ; 3. (increased risk of) heart attack or failure / myocardial infarction ; 4. (increased risk of) stroke / transitory ischaemic attack ;	2 max	mark the first 2 answers IGNORE ref to viscosity of blood ACCEPT MI IGNORE CHD ACCEPT TIA

	(b)	<p>1 mRNA attaches to ribosome ;</p> <p>2 rough endoplasmic reticulum / free ribosomes in cytoplasm ;</p> <p>3 tRNA molecules pick up <i>specific amino acids</i> ;</p> <p>4 tRNA have anticodons ;</p> <p>5 ref complementary base pairing ;</p> <p>6 anticodon binds to codon ;</p> <p>7 amino acids (on adjacent tRNAs) form peptide bonds ;</p> <p>8 tRNA detaches (from mRNA) ;</p> <p>9 polypeptide, gets longer / AW ;</p> <p>10 (translation) continues until stop codon (on mRNA) ;</p> <p>11 sequence of amino acids corresponds to sequence of codons ;</p> <p>QWC ;</p>	<p>5 max</p> <p>1</p>	<p>ACCEPT RER</p> <p>ACCEPT A/U AND C/G</p> <p>must stress sequence or order for both</p> <p>3 of the emboldened terms used and spelt correctly</p>
		Total	10	

Question			Expected Answers	Marks	Additional Guidance
4	(a)	(i)	as the concentration of alcohol increases the concentration of NAD decreases ;	1	look for idea that concentration of alcohol is the independent variable
		(ii)	glycolysis ; link reaction ; Krebs cycle ; oxidative phosphorylation ; AVP ;	2 max	mark the first 2 answers ACCEPT ETC / electron transport chain / chemiosmosis e.g. oxidation of fatty acids
	(b)	(i)	creatine phosphate ;	1	ACCEPT CrP / PCr / PC DO NOT CREDIT PCR DO NOT CREDIT ATP

		(ii)	<p>1. glycolysis produces pyruvate / glucose converted to pyruvate ;</p> <p>2. pyruvate reduced ;</p> <p>3. using (H from) reduced NAD ;</p> <p>4. by lactate dehydrogenase ;</p> <p>5. forming lactate ;</p> <p>6. NAD, produced / regenerated ;</p> <p>7. net gain of 2ATP ;</p>	3 max	<p>ACCEPT pyruvic acid</p> <p>ACCEPT pyruvic acid</p> <p>CREDIT 'NADH₂ / NADH + H⁺'</p> <p>ACCEPT lactic acid</p> <p>ACCEPT idea of 2 used and 4 produced</p>
		(c)	<p>1 reoxidise haemoglobin / AW ;</p> <p>2 reoxidise myoglobin / AW ;</p> <p>3 replace ATP ;</p> <p>4 replace creatine phosphate ;</p> <p>5 <u>oxidise</u> lactate to pyruvate ;</p> <p>6 due to increased, metabolic rate / heart rate / body temperature ;</p> <p>7 increased supply of oxygen to, intercostals muscles / diaphragm / cardiac muscle ;</p>	3 max	<p>ACCEPT CrP / PCr / PC</p> <p>ACCEPT pyruvic acid / lactic acid</p>
			Total	10	

Question		Expected Answers	Marks	Additional Guidance
5	(a)	<p><i>multiple pregnancy</i> <u>simultaneous</u> development of more than 1 foetus in the uterus / AW ;</p> <p><i>multiple birth</i> (live) birth of more than one child <u>from 1 pregnancy</u> ;</p>	2	
	(b)	24(%) ; ;	2	Correct answer = 2 marks If answer incorrect or not correctly rounded, then allow 1 mark for $\frac{1019}{4246} \times 100$
	(c)	1 (increased risk of) pre-eclampsia ; 2 (increased risk of) hypertension / AW ; 3 (increased risk of) anaemia ; 4 (increased risk of) haemorrhage / excessive bleeding ; 5 greater need for caesarean ; 6 higher risk of death ; 7 AVP ;	3 max	<p>DO NOT CREDIT risks to the child / fetus</p> <p>e.g. (gestational) diabetes / risk of pelvic misalignment (SPD)</p>

	(d)	<p>1 named infectious disease that causes damage ;</p> <p>2 lower sperm count / absence of sperm ;</p> <p>3 underdeveloped / damaged / abnormal / immobile / lazy , sperm ;</p> <p>4 blocked, sperm ducts / vas deferens ;</p> <p>5 named genetic condition ;</p> <p>6 autoimmune reaction to sperm ;</p>	3 max	<p>DO NOT CREDIT 'age' alone DO NOT CREDIT erectile dysfunction e.g. gonorrhoea / chlamydia</p> <p>e.g. cystic fibrosis / Klinefelter's syndrome</p>
	(e)	<p>1 lack of anonymity / concern about being contacted by child ;</p> <p>2 (concern about) , legal / financial , responsibilities ;</p> <p>3 no financial reward for donation ;</p> <p>4 AVP ;</p>	2 max	<p>CREDIT specific e.g. (child support)</p> <p>e.g. on-selling to other countries</p>
			Total	12

Question		Expected Answers	Marks	Additional Guidance
6	(a)	L <u>nitrifying</u> (bacteria) / <i>Nitrosomonas</i> and <i>Nitrobacter</i> ; M <u>nitrogen-fixing</u> (bacteria) / <i>Rhizobium</i> ;	2	
	(b)	1 not all plant eaten ; 2 not all parts of plant digested ; 3 (energy) loss due to, respiration (in animals) ; 4 (energy) loss due to , excretion / egestion ; 5 heat loss / movement, (by animals) ; QWC ;	2 max 1	2 of the emboldened terms used and spelt correctly
	(c)	(i) high population growth leads to high deforestation rate ; ref. two named countries and paired figures <u>%</u> ;	2	Increase in deforestation must be as a result of an increase in population, not the other way round CREDIT manipulated figs. (e.g. percentage difference)

		<p>(ii)</p> <ol style="list-style-type: none"> 1. switch to renewable energy ; 2. switch off unused, lights / appliances ; 3. turn down heating ; 4. use energy efficient appliances / energy saving light bulbs ; 5. use appliances more efficiently ; 6. ref. home insulation ; 7. ref. transport ; 8. shop locally / AW ; 9. AVP ; 		<p>e.g. only use washing machine when full / only boil required volume of water</p> <p>e.g. use public transport / car sharing / cycling</p> <p>e.g. carbon offsetting / eat less meat</p>
		Total	3 max	10

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