



GCE

Human Biology

Advanced GCE

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

Mark Scheme for June 2011

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F224

Mark Scheme

June 2011

Question	Expected Answers	Marks	Additional Guidance
	<p>(ii) <i>describe</i></p> <p>1. chorionic villi / microvilli, have large surface area ;</p> <p>2. idea of villus one cell thick ;</p> <p>3. many capillaries ;</p> <p><i>explain</i></p> <p>4. concentration gradient ;</p> <p>5. (is) steep / maintained ;</p> <p>6. idea of effective diffusion ;</p>	4 max	
	<p>(iii)</p> <p>1. thicker<u>w</u>all ;</p> <p>2. <u>m</u>ore, muscle / elastic fibres ;</p> <p>3. <u>n</u>o valves ;</p> <p>4. smaller<u>l</u>umen ;</p>	2 max	Mark the first <u>two</u> only
	Total	10	

F224

Mark Scheme

June 2011

Question			Expected Answers	Marks	Additional Guidance										
2	(a)	(i)	(converted to), glycogen / lipid ; (used in), glycolysis / respiration ;	1 max											
		(ii)	<i>anaerobic</i> 1. less ATP / only 2 ATP ; 2. per mol glucose ; 3. not sustainable / cannot go on indefinitely / lactate builds up ; 4. lactate still contains energy ;	2 max	Idea of incomplete breakdown of glucose										
		(iii)	<table border="1"> <thead> <tr> <th>process</th> <th>precise location</th> </tr> </thead> <tbody> <tr> <td>glycolysis</td> <td>cytoplasm / cytosol / sarcoplasm ;</td> </tr> <tr> <td>link reaction</td> <td>(mitochondrial) matrix ;</td> </tr> <tr> <td>Krebs cycle</td> <td>(mitochondrial) matrix ;</td> </tr> <tr> <td>oxidative phosphorylation</td> <td>inner mitochondrial membrane / cristae ;</td> </tr> </tbody> </table>	process	precise location	glycolysis	cytoplasm / cytosol / sarcoplasm ;	link reaction	(mitochondrial) matrix ;	Krebs cycle	(mitochondrial) matrix ;	oxidative phosphorylation	inner mitochondrial membrane / cristae ;	4	<p>DO NOT CREDIT matrix of cell</p> <p>DO NOT CREDIT matrix of cell</p>
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glycolysis	cytoplasm / cytosol / sarcoplasm ;														
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F224

Mark Scheme

June 2011

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	(iv)	1. too big to pass through (glucose's protein channel) ; 2. no specific, transport / carrier / channel, protein (for phosphorylated glucose);	1 max	
	(v)	Idea of total oxygen consumed after exercise minus the pre-exercise level of oxygen consumption ;	1	
	(vi)	1. reoxygenate, myoglobin / haemoglobin ; 2. replace stocks of, ATP / creatine phosphate / glycogen ; 3. meet demands of <u>increased</u> metabolic rate ;	2 max	Mark the first <u>two</u> suggestions only. Read as prose unless candidate has indicated two points by bullets or numbers – in this case mark the first comment in each bullet. DO NOT CREDIT creatinine

F224

Mark Scheme

June 2011

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(b)	<p><i>muscle</i></p> <p>1 increase in (muscle), mass / size ;</p> <p>2 increase in (muscle) <u>cell</u> size ;</p> <p>3 increase in, number / size, of mitochondria ;</p> <p>4 greater store of, lipid / glycogen / myoglobin / creatine phosphate / phosphocreatine ;</p> <p>5 increase in number of respiratory enzymes ; <i>max 3</i></p> <p><i>cardiovascular system</i></p> <p>6 increase, size / number, of blood vessels ;</p> <p>7 decrease in <u>resting</u>, heart rate ;</p> <p>8 decrease in <u>resting</u> blood pressure ;</p> <p>9 increase in heart size ;</p> <p>10 increase in thickness of ventricle (wall) ;</p> <p>11 increase in, stroke volume / force of contraction ; <i>max 3</i></p>	4 max	
	QWC ;	1	3 of the emboldened terms used and spelt correctly
	Total	16	

F224

Mark Scheme

June 2011

Question			Expected Answers	Marks	Additional Guidance
3	(a)	(i)	0.75 ; ;	2	Correct answer = 2 marks even if no working shown. If answer incorrect then allow 1 mark for seeing $45 \div 60$ or $(110 - 65) \div 60$
		(ii)	50 ;	1	
		(iii)	1. increase in female hormones (pill or HRT) in water supply ; 2. environmental pollutants ; 3. idea of high temperature having negative effect on spermatogenesis ; 4. (regular use of), marijuana / cannabis ; 5. (regular use of) anabolic steroids ; 6. STDs ;	3 max	e.g. lead / solvents

F224

Mark Scheme

June 2011

Question		Expected Answers	Marks	Additional Guidance
	(b) (i)	1. mixed with, chemical to prevent damage (on freezing) / preservative ; 2. sperm / semen, placed in, straws / vials, and labelled ; 3. cryogenically preserved / (deep) frozen, in liquid nitrogen ; 4. insulated metal container ;	2 max	IGNORE in a test tube
	(ii)	1. genetic disease / named genetic disease ; 2. infectious disease / named infectious disease ; 3. motility of sperm ; 4. proportion of abnormal sperm ; 5. volume of semen ;	2 max	DO NOT CREDIT disease alone e.g. CF / Huntington's disease. e.g. HIV / hepatitis (B) IGNORE hepatitis A
	(iii)	1. before, radiotherapy / chemotherapy / surgery ; 2. if, man / partner, physically unable to have intercourse ; 3. if man has terminal illness ; 4. if man is in armed forces ;	1 max	e.g. paraplegic e.g. cancer
Total			11	

F224

Mark Scheme

June 2011

Question		Expected Answers	Marks	Additional Guidance
4	(a)	sodium hydroxide / potassium hydroxide / soda lime ; absorbs carbon dioxide ;	2	DO NOT CREDIT NaOH / KOH as they are formulae and not names ACCEPT CO ₂
	(b)	<p>1 water bath to maintain temperature ;</p> <p>2 read initial fluid level in manometer ;</p> <p>3 leave for set time ;</p> <p>4 measure distance moved by fluid (in set time) ;</p> <p>5 use tap to reset manometer ;</p> <p>6 repeat at same temperature ;</p> <p>7 calculate mean value ;</p> <p>8 repeat at (least) 5 different temperatures ;</p> <p>9 calculate rate as distance ÷ time ;</p> <p>10 plot graph of rate vs. temperature ;</p> <p>11 AVP ;</p>	5 max	ACCEPT sketch graph with labelled axes e.g. time to adjust at each temperature / equilibration role of tube G do not boil yeast
Total			7	

F224

Mark Scheme

June 2011

Question		Expected Answers	Marks	Additional Guidance
5	(a)	1 starts with uncolonised area ;	2 max	ACCEPT no organisms present
		2 pioneer plants ;		
		3 series of, stages / seres ;		
		4 progresses to climax community ;		
		QWC ;	1	climax plus 1 of the other emboldened terms used and spelt correctly
	(b)	1 stabilise environment ;	2 max	
		2 form, soil / humus ;		
		3 hold water ;		
		4 change (soil) pH ;		
		5 release, minerals / nutrients ;		
		6 provide habitat for other organisms ;		
		7 provide shelter / reduce exposure / reduce erosion ;		

F224

Mark Scheme

June 2011

Question		Expected Answers	Marks	Additional Guidance
	(c)	<p>1 grazing / mowing ;</p> <p>2 burning ;</p> <p>3 (selective) herbicides ;</p> <p>4 exposure to (strong) wind ;</p> <p>5 shrubs unable to grow / climax community not reached / plagioclimax ;</p>	2 max	
	(d)	(i)		Mark first on line DO NOT CREDIT (named) pigment
		granum / thylakoid (membranes) / light harvesting cluster / photosystem ;	1	
		(ii)		Mark first two answers DO NOT CREDIT any ref to NAD etc
		ATP ; reduced NADP / NADPH / NADPH ₂ / NADPH ⁺ and H ⁺ ;	2	
		(iii)		
		reached climax community ; competition between plants for, light / minerals ;	1 max	
Total			11	

F224

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June 2011

Question			Expected Answers	Marks	Additional Guidance
6	(a)	1	variety / number, of species ;	2	measured by species richness
		2	ref. genetic variation ;		
	(b)		<i>All statements must be in an economic context</i>		
		1	generates jobs ;		
		2	suitable example of medical use ;		e.g. saves money on research
		3	suitable example of resource material ;		e.g. wood for building / fibres for clothes
		4	food (for humans) / agriculture ;		
		5	(eco)tourism or described ;		
		6	suitable example of prevention of natural disasters ;		e.g. economic implications of disaster / saving money by not having to rebuild or rescue
		7	AVP ;	3 max	e.g. biological control (predators / parasites, reduce pest populations)
			Total	5	

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