

CAMBRIDGE
INTERNATIONAL EXAMINATIONS

NOVEMBER 2002

GCE Advanced Level

MARK SCHEME
MAXIMUM MARK : 50
SYLLABUS/COMPONENT : 9700 /4 BIOLOGY (STRUCTURED QUESTIONS (A2 CORE))

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Question 1

- (a)
- (i)
 increase ;
 rapid/sharp/steep ;
 then decrease ;
 does not drop to original value ; 2 max
- (ii)
 decreases to 0 / all used up ; 1
- (b)
- (i)
 GP continues to be formed from RuBP;
 (until) all RuBP used up ;
 the GP falls as converted to hexose/glucose/TP ; 2 max
- (ii)
 in dark RuBP not regenerated/converted to GP ; R used up
 requires the products /ATP/reduced NADP from the light reaction / photophosphorylation ; 2
- (c)
 ATP ;
 reduced NADP ; 2
- Total : 9**
-

Question 2

(a)

	name of structure	stage of respiration
A	matrix	Krebs cycle ;
B	cristae / inner membrane A intermembrane space	oxidative phosphorylation/ETC ; A build up of protons

**Penalise once if rows A and B are correct but swapped
 If both structure names are correct (but stages incorrect) allow one mark**

2

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(b)

membranes separate from rest of cytoplasm ;
 allows different pH ;
 inner membrane attachment of stalked particles / ATPase ;
 allows linear / ordered arrangement of carriers/ETC/respiratory chain ;
 ref. to large internal surface area/AW ;
 matrix contains enzymes;

3 max

(c)

carries / transfers protons/hydrogen(atoms) ;
 and electrons ;
 in/to ETC /FAD/respiratory chain;
 ref. to dehydrogenation/oxidising ;
 energy used to form ATP;
 ref. to coenzyme ;
 ref. alternative pathways (named);

3 max

(d)

light involved ;
 occurs in chloroplasts/chlorophyll ;
 on thylakoid membranes ;
 ref. to cyclic and non-cyclic ;
 photolysis of water/produces oxygen;

If oxidative phosphorylation stated

light not involved;
 oxygen final hydrogen acceptor/oxygen not evolved;

3max

Total:11

Question 3

(a)

engulf / remove / breakdown red blood cells ;
 haemoglobin broken down ;
 into haem and globin ;
 iron removed (from haem) ;
 remainder passes to liver cells to form bile pigments ;
 globin broken down into amino acids ;

4 max

(b)

forms lipoproteins ;
 stores fats ;
 synthesises cholesterol ;
 forms bile salts from cholesterol ;
 converts glucose to fats ;
 converts fats to fatty acids and glycerol;
 converts fats/glycerol to glucose;

3 max

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(c)		
diffuses into sinusoids;		
dissolved/in solution ;		
in blood/ plasma ;		
via hepatic vein ;		
via renal artery;		2 max
(d)		
(i)		
less glucose / amino acids / fatty acids and glycerol / nutrients/more urea;		1
(ii)		
less oxygen / more carbon dioxide;		1
		Total : 11

Question 4

(a)		
metaphase ;		1
(b)		
centromeres divide / splits;	R break	
chromatids separate ;		
idea movt. to opposite poles / centrioles ;		
by microtubules / spindle fibres ;		
idea.mechanism of movement ;		3 max
(c)		
(i)		
breaks down / disperses ;		1
(ii)		
centrioles divides/replicate;		
to form two pairs (of centrioles) ;		
move to (opposite) poles;		2 max
(d)		
1 random alignment / independent assortment / or description;		
different mix of maternal and paternal chromosomes/chromatids ;		
2 crossing over / chiasmata formation/exchange of genetic material ;		
between chromatids of homologous chromosomes ;		
breaks up linkage groups / mixes maternal and paternal alleles ;		
In 1 or 2 ref. different gametes produced;		4 max
		Total : 11

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Question 5

(a)

Either

If genetic diagram used

Penalise once for incorrect symbols

orange dominant to black (or converse);

orange scallop

parents	$S^o S^b$	X	$S^o S^b$;	
gametes	S^o	S^b	S^o	S^b	;
genotype	$S^o S^o$	$S^o S^b$	$S^o S^b$	$S^b S^b$	
phenotype		orange		black	;

black scallop

parents	$S^b S^b$	X	$S^b S^b$;	
gametes	(S^b	S^b)	
genotype		$S^b S^b$			
phenotype		black			;

Or

If text explanation given

orange dominant to black (or converse);
orange are heterozygous;
(because) ref. 3:1 ratio;
link data to ratio;
black are homozygous;
because all offspring are black;

6

(b)

separate orange scallops produced from first cross / test cross orange with black ;
some will produce only orange offspring ;
these will be homozygous for orange allele/pure breeding ;

2 max

Total : 8