

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**

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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

