

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