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CAMBRIDGE
INTERNATIONAL EXAMINATIONS

NOVEMBER 2002

GCE Advanced Level

MARK SCHEME

MAXIMUM MARK : 50

SYLLABUS/COMPONENT :9700 /4

BIOLOGY
(STRUCTURED QUESTIONS (A2 CORE))

UNIVERSITY of CAMBRIDGE
Local Examinations Syndicate

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

(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

(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

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