Variation

Mark Scheme 2

Level	International A Level
Subject	Biology
Exam Board	CIE
Topic	Selection and evolution
Sub Topic	Variation
Booklet	Theory
Paper Type	Mark Scheme 2

Time Allowed : **68 minutes**

Score : **/ 56**

Percentage : **/100**

Grade Boundaries:

A*	A	B	C	D	E	U
>85%	'77.5%	70%	62.5%	57.5%	45%	<45%

1 **(a** 1 mallard numbers have increased **and** the others have decreased **;**

decrease due to

2 pesticides / pollution / fertilisers **;**

3 change in temperature or pH of water **;**

4 lack of named food source **;**

5 increased competition / AW **;**

6 direct human interference on **lake ;** e.g. fishing / sailing etc
not related to marking point 2

mallard increase due to

7 doesn't eat, insects / molluscs / fish **;**

8 less other birds so less competition **;** [4 max]

(b) 1 cultural / aesthetic / leisure, reasons **;**

2 moral / ethical, reasons **;** e.g. right to exist / prevent extinction

3 resource material **;** e.g. wood for building / fibres for clothes / food for humans

4 ecotourism **;**

5 economic benefits **;**

6 ref. resource / species, may have use in future / AW **;** e.g. medical use

7 maintains, food webs **/** food chains **;** **A** description

8 nutrient cycling / protection against erosion **;**

9 climate stability **;**

10 maintains, large gene pool **/** genetic variation **;**

[4 max]

[Total: 8]

2 **(a** 1 pollution **;**

2 environment / habitat, change qualified **;** e.g. increase in water temperature / change in water pH

3 overfishing **;**

4 loss of food / more competition for food **;**

5 direct human interference qualified **;** e.g. pleasure boats [3 max]

(b) variety of / different / total number of, species **;**

genetic diversity of species / AW **;** [2]

(c) *any three from*

1 tourism / leisure **;**

2 economic benefits **;**

3 food for humans **;**

4 ref. resource / species, may have use in future / AW **;**

5 maintains, food webs / food chains **;** **A** description

6 nutrient cycling **;**

7 maintains, (large) gene pool / genetic variation **;** [3 max]

[Total: 8]

3 **(** 1 nucleotide **;**

2 adenine + ribose / pentose + three phosphates **;**

3 loss of phosphate leads to energy release / hydrolysis releases 30.5 kJ **;**

4 ADP + Pi ⟷ ATP (reversible reaction) **;**

5 small packets of energy **;**

6 small / water soluble, so can move around cell **;**

7 used by cells as immediate energy donor **;**

8 link between energy yielding and energy requiring reactions / AW **;**

9 high turnover **;**

10 two examples of use **; ;** e.g. active transport **/** muscle contraction **/** Calvin cycle /

11 protein synthesis [8 max]

(b) 12 Pyruvate, cannot enter mitochondrion / remains in the cytoplasm **;**

13 becomes, hydrogen acceptor / reduced **;**

14 by reduced NAD **;**

15 from glycolysis **;**

16 converted to lactate **;**

17 lactate dehydrogenase **;**

18 allows glycolysis to continue **;**

19 no, decarboxylation / CO_2 removed **;**

20 single step **;**

21 reversible reaction / converted back to pyruvate **;**

22 by oxidation **;**

23 ref. oxygen debt **;**

24 ethanol produced **;**

accept ora for marking points 19–23 [7 max]

[Total: 15]

Question				Marks
4	**(a)**		metaphase 1 / (late) prophase 1 ; **R** early / middle	**1**
	(b)	1	ref. (homologous chromosomes) pairing / synapsis ;	
		2	ref. to chiasma / crossing over ;	
		3	exchange of genetic material ;	
		4	between non-sister chromatids / AW ;	**3 max**
	(c)	1	breakage of linkage groups / ref. new linkage groups ;	
		2	may have different alleles ;	
		3	creates new combinations of alleles ;	
		4	when sister chromatids separate ;	**2 max**
	(d)		ref. idea of random orientation at metaphase I and II / random alignment of homologous chromosomes on spindle equator ;	
			subsequently leads to independent assortment ;	
			2^n possible combinations when n is number of chromosome pairs ;	
			ref. to chromosome mutation qualified ;	
			extra detail ;	
			ref. gametes haploid (so can fuse) ;	
			random fusion of gametes ;	
			N.B. 3 sets of 2/3 marks	**4 max**
				Total: 10

Question			Marks
5	**(a)**	*auxin = IAA*	
	1	auxin produced in apical bud / AW ;	
	2	diffuses down stem ;	
	3	active transport (cell to cell) ;	
	4	role of plasmodesmata ;	
	5	also in phloem ;	
	6	(auxin) inhibits growth of lateral buds ;	
	7	plant grows up instead of branching out ;	
	8	removal of apical bud allows lateral buds to grow ;	
	9	AVP ; e.g. auxin concentrated in lateral bud / auxin in low amounts in lateral bud	
	10	AVP ; e.g. correct ref to effect of ABA / cytokinins	**6 max**
	(b) 11	seed absorbs water ;	
	12	by osmosis ;	
	13	gibberellin produced by embryo plant ;	
	14	passes to aleurone layer ;	
	15	switches on / activation, transcription enzyme genes / AW ;	
	16	storage proteins broken down to amino acids ;	
	17	stimulates synthesis / release of amylase ;	
	18	amylase diffuses / moves into endosperm ;	
	19	breaks down / hydrolyses starch to maltose ;	
	20	maltose to glucose ;	
	21	glucose diffuses / moves into embryo plant ;	
	22	provides source of energy for growth of embryo plant ;	**9 max**
			Total: 15