Variation

Mark Scheme 3

Level	International A Level
Subject	Biology
Exam Board	CIE
Topic	Selection and evolution
Sub Topic	Variation
Booklet	Theory
Paper Type	Mark Scheme 3

Time Allowed : **27 minutes**

Score : **/ 22**

Percentage : **/100**

Grade Boundaries:

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

Question 1

(a) *Use **one** of the following schemes **1, 2 or 3.***

1 named example e.g. sickle cell anaemia / PKU
change base ;
may change amino acid ;
change folding / shape of protein ;
detail of affect of protein changes ;

2 named example e.g. PKU ; **R** sickle cell anaemia
lack of enzyme / non functioning enzyme ;
2 x phenotype changes / symptoms ;;

3 chromosome mutation ;
detail of mutation ;
named example e.g. Down's syndrome ;
2 x symptoms ;;

4 max

(b) homozygotes for sickle cell allele die from sickle cell anaemia ;
sickle cell allele frequent in malarial areas ;
heterozygotes are resistant to malaria / have selective advantage ;
therefore pass on sickle cell allele ;
homozygous normal suffer / die from malaria ;

4 max

Total : 8

2 **(a** *in context of woolly mammoth*

1. individuals varied (in their phenotypes **;**
2. (phenotypic variation) caused by, genetic variation / mutatio **;**
3. change in, selection pressure / environmental condition **;**
4. *idea that* variation increases the chance of some individuals surviving / AW **;**
5. named adaptation explaine **;** e.g. better insulation / smaller surface area to volume
6. survivors bree **;**
7. passed on <u>alleles</u> to offsprin **;**
8. changed <u>allele</u> frequency (in population **;** [max 5]

(b) 1. differences in, primary structure / sequence of amino acids / polypeptide **;**

2. provides different, side chains / R group **;**

3. change in, tertiary structure / 3D shap **;**

4. effect on quaternary structur **;**

5. greater effect o β chain **;**

6. change in propertie **;** **A** function [max 3]

(c) **(i)** 1. still able to offload oxygen (in cold temperatures) **;**

2. surface tissues colder than, core / bod temperature **;**

3. so can maintain oxygen supply to surface tissue **;** [max 2]

(ii) 1. no / tiny, difference in effect of temperature on haemoglobin alone **;**

2. so no evidence (woolly mammoth haemoglobin) better adapte **;**

3. greater reduction in effect of temperature on haemoglobin with red cell effector woolly mammoth **; ora**

4. (so) woolly mammoth haemoglobin (with red cell effector) better adapted to col **;**

5. ref. change to oxygen binding sit **;**

6. so can offload oxygen at low temperature **;** [max 4]

[Total: 14]